Asheville
REGIONAL AIRPORT
Master Plan

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Asheville REGIONAL AIRPORT Master Plan Update

Chapter 1 Introduction

In an effort to establish a solid plan for the future development of the Asheville Regional Airport (Airport), the Greater Asheville Regional Airport Authority, in conjunction with the Federal Aviation Administration (FAA), elected to update the Airport's master plan. Significant development and growth at the Airport, since the last master plan study was completed in 2001, called for an updated review of its facilities to measure how they will meet the future air transportation demands of Western North Carolina. Needed infrastructure improvements identified through this process will help guide the planning and development decisions of Airport officials and the FAA for the next 20 years.

A structured and measured approach is critical in developing an effective master plan that adequately addresses what will be needed for the Airport to meet future aviation demand. This chapter, organized into the following sections, outlines the approach taken to prepare an airport master plan and describes its purpose, objectives and the importance of involving key stakeholders and the public as a part of the planning process.

1.1 Purpose
1.2 Objectives
1.3 Master Planning Process
1.4 Stakeholder and Public Involvement
1.5 Conclusion

1.1 Purpose

A master plan is a comprehensive study of an airport that analyzes short-, medium-, and long-term infrastructure needs over a 20 year period to identify cost-effective solutions that will be necessary to meet anticipated aviation demand. A master plan may vary in complexity and scope, based on the size, function, issues and challenges of an individual airport. Primarily intended for use by an airport sponsor, its staff, consultants, the FAA and state aviation officials, a master plan also serves as a beneficial planning document for board members, municipal officials, community planners and the general public.

The purpose of a master plan is to provide the framework necessary to guide the future development of an airport, considering environmental and socioeconomic issues. In addition, master plans help to evaluate the costs associated with the alternative concepts and establish a timeline and financial approach towards their implementation. Master plans also help to provide preliminary information needed to further evaluate environmental and socioeconomic impacts of each proposed alternative.

It should be noted that airport master plans are intended to be fluid documents that are updated periodically. Recommendations and findings from the study effort are not intended to be concrete and may change as other factors such as activity levels, aviation trends, levels of demand, or airport tenants and users change. Master plans should be evaluated periodically and updated as necessary to provide an airport with an effective planning document that adequately guides future development decisions.

1.2 Objectives

The primary objective of a master plan is to identify the long-term development goals of an airport and indicate the infrastructure improvements that will be necessary to meet future aviation demand. Additional master plan objectives include justifying the purpose and need for each improvement and establishing a timeline and financial schedule for implementation. Guidance outlined in FAA Advisory Circular (AC) 150/5070-6B, *Airport Master Plans*, states master plans should:

- Document the issues that the proposed development actions will address.
- Justify the proposed development actions through technical, economic and environmental investigation of concepts and alternatives.
- Provide an effective graphic presentation of the proposed development at an airport and anticipated land uses within its vicinity.
- Establish a realistic schedule for the implementation of the proposed developments, particularly through a short-term capital improvement program.
- Propose an achievable financial plan to support the implementation of the proposed developments.
- Provide sufficient definition and detail for subsequent environmental evaluations that may be required before recommended development actions are approved.
- Present a plan that adequately addresses any issues to satisfy local, state and federal regulations.
- Document policies and future aeronautical demand to support municipal or local deliberations on spending, debt, land use controls and other policies necessary to preserve the integrity of an airport and its surroundings.
- Establish the framework for a continuing planning process. This process should monitor key conditions and permit changes in plan recommendations as required.

Master plans may also meet specific objectives, directly related to the development needs of an individual airport. These are often determined during the pre-planning element of the master planning process and can become the emphasis of the master plan study effort. For example, an airport may have identified the need for additional runway length, improved facilities for maintenance and Aircraft Rescue and Fire Fighting (ARFF) equipment, or additional general aviation hangars prior to the initiation of the study. In these instances, a master planning effort may instead focus on the justification for these projects and the identification of preferred alternatives. .

1.3 Master Planning Process

The airport master planning process focuses on a series of fundamental elements that are carefully coordinated to evaluate the infrastructure developments needed to meet future aviation demand. While some elements may vary in complexity based on an airport's defined scope and development, they all play an essential role in the master planning process. Each element is typically identified as a specific task in the study effort and may be presented as an individual chapter in the master plan report. The following summarizes each master planning process element:

- **Pre-planning –** An airport begins the master planning process by completing a needs determination and releasing a Request for Proposal (RFP). After interviewing candidates, a consultant is selected, upon which a contract is negotiated and the study design is developed.
- **Public Involvement –** Once a contract has been negotiated with a consultant, funding obtained, and a notice-to-proceed issued, a public involvement program is initiated. Typically, an advisory committee of various airport stakeholders assembles and convenes at critical points throughout the project schedule to provide input and technical advice. In addition, public input meetings may also be held to gauge the general public's opinion on future airport development and to receive feedback on proposed alternatives.
- **Inventory of Existing Conditions –** An inventory of existing facilities and services is collected and assembled into a database that can be utilized for subsequent plan elements.
- **Aviation Forecasts –** Short-, medium-, and long-term forecasts of aeronautical demand are prepared for enplanements, operations and based aircraft. These forecasts serve as a baseline to measure future aviation demands.
- **Facility Requirements –** Existing facilities are assessed to determine their ability to meet the forecasted aviation projections. Facilities that are unable to accommodate the increase in demand are identified for improvements.
- **Alternative Development and Evaluation –** Options to meet facility requirements are prepared and evaluated against operational, environmental, and financial criteria. This process helps identify a recommended development action that results in the least amount of environmental and socioeconomic impacts.
- **Environmental Considerations –** A review of the surrounding environment is conducted to identify constraints that may impact the selection of the preferred alternative or its implementation.

- **Financial Feasibility Analysis –** A financial plan is prepared to outline the capital improvement needs of an airport, including how the recommended projects will be financed. This analysis helps to demonstrate the financial feasibility of the proposed projects.
- **Airport Layout Plan –** Recommended development options are illustrated in the Airport Layout Plan (ALP), which is a set of drawings of existing and future airport facilities. This graphic representation of master plan information is necessary for an airport to receive federal financial assistance for the proposed projects.

At the completion of the master planning process, the FAA will review all elements to ensure sound planning techniques have been applied. Though the FAA reviews all planning process elements, it only approves aviation forecasts and the ALP drawing set. This is done to ensure consistency with projections identified in the FAA's Terminal Area Forecast (TAF) and to indicate whether the proposed developments identified on the ALP are safe, efficient and conform to FAA airport design standards.

1.4 Stakeholder and Public Involvement

The involvement of major airport stakeholders and the general public is crucial when drafting an effective plan that adequately addresses the future development needs of an airport. Input including the needs, concerns and issues of airport users, tenants, resource agencies, public officials and the general public can be gathered through the use of a Stakeholder Advisory Committee (SAC) and public information meetings. The project team can then use this input to identify the critical infrastructure needs of an airport to develop a set of possible development solutions. Each avenue to engage the public offers an informational exchange platform appropriate to the technical expertise of the audience. The following sections describe how the public was involved in the preparation of the Asheville Regional Airport Master Plan.

1.4.a Master Plan Stakeholder Advisory Committee

Stakeholder Advisory Committees (SACs) are typically assembled to provide insight on technical issues and to gather feedback on proposed development actions. SACs are often comprised of key airport stakeholders that possess high levels of technical expertise associated with aviation or airport operation. Committee members may also include key business or community leaders and members of the general public that have a vested interest in the airport. In addition to offering technical advice, SAC members also help foster the exchange of information between the interest groups they represent and the master plan project team.

It should be noted that SACs serve in an advisory role during the planning process and are granted no decision making power on their own. SACs typically meet with the project team during critical project decision points such as the review of existing capacity and future activity projections, development of proposed alternatives and selection of recommendations. The number of members that comprise a SAC varies based on the size of the airport, complexity of the project, and number of vested stakeholders.

Asheville Regional Airport Master Plan's SAC was comprised of 11 members and included representatives from Airport tenants and community planning representatives.

1.4.b Public Information Meetings and Outreach

In addition to understanding the needs of key stakeholders, it is also important to gather the public's perception of future airport development needs. Public information meetings offer an interactive forum for the project team to collect input from the local community related to infrastructure needs while providing them with an opportunity to comment on proposed development plans. Public information meetings can vary from a traditional formal hearing format where public statements about the study are made between the project team and audience to an informal "open house" format were interactive stations and staff members are available to provide information about the planning process. Traditionally, "open house" formats are preferred to engage the public as it allows them to attend at their own convenience and to informally interact with project team members. This format has often proven to be the most effective method for collecting the public's thoughts, concerns and ideas on future airport development needs.

The number of public information meetings held during a study process is based on the scope of the project, the size of an airport, the population size of the surrounding community, and the level of interest or controversy anticipated with proposed alternatives. Meetings are held in conjunction with critical project decision points, such as the evaluation of proposed alternatives and the selection of recommended development actions. There were two public information meetings held as a part of the Asheville Regional Airport's master planning study. The first meeting, held upon the completion of the proposed development alternatives, offered the public an opportunity to speak with project team members and provide comments. A second meeting was held at the conclusion of the process to collect comments from the public on the findings of the master plan study.

In addition to the information meetings, other methods of public involvement were utilized to inform and collect community input about this master plan study. Public notices distributed to local media outlets helped inform the public about the information meetings and provided date, time, and location information. Handouts made available at the meetings allowed attendees take home information about the proposed developments and findings of the study and share with other members of the community who were not able to attend. A project website was created to also help inform the public about the master plan, the planning process, and the status of the project which was updated at key project milestones. Presentations given to the City of Asheville, County of Buncombe, and the County of Henderson briefed these local governmental bodies on the status of the process and allowed officials to ask questions and submit comments about the master planning effort with team members. Finally, outreach meetings held with local business groups helped inform the local business community on the progress and findings of the master plan.

1.5 Conclusion

Master plans provide airport officials, state aviation agencies, the FAA, community planners, and local governmental officials with a valuable decision making tool to help guide future development at an airport. Through a comprehensive master planning process that evaluates the condition of existing infrastructure and measures its ability to meet future aviation demand, alternatives can be developed to identify infrastructure improvements that will be needed over the next 20 years. Applying input received from key stakeholders and the general public, alternatives can be further refined to select a recommended development option that benefits the future capacity needs of an airport and limits adverse environmental and socioeconomic impacts. Timeframes and financial approaches identified through the planning process allow airport officials sufficient time to coordinate the resources necessary for each recommended project in advance of its implementation. In conjunction with the objectives and planning processes summarized in this section, an effective master plan can be prepared to establish the long-term development goals of an airport.

Chapter 2
Inventory of Facilities

One of the initial tasks in the preparation of an airport master plan is the collection of information on the condition of existing facilities and services. This inventory of data is necessary to not only evaluate the physical attributes of airside and landside infrastructure, but also to complete subsequent study tasks such as demand/capacity analyses and the determination of facility requirements. Information collected focuses on the use, size, quantity, type, area, operational intent, and other characteristics of the airside and landside components of an airport. Typical categories of information that are collected include history, physical infrastructure, regional setting, surrounding land uses, environmental features, historical aviation activity, business affairs, and socioeconomic demographics of the surrounding community.

Several sources of information were referenced to compile a comprehensive database of facilities and services at the Asheville Regional Airport (Airport). These included, but were not limited to, the previous Airport Master Plan, recent National Environmental Policy Act (NEPA) documents, the Terminal Area Plan, the Land Use Plan, and the Airport Layout Plan (ALP). In addition, historical enplanements, aircraft operations, based aircraft, aircraft fleet mix, enplaned cargo, and automobile parking data was obtained from Federal Aviation Administration (FAA) databases and Airport records. Databases from Woods & Poole Economics, Inc. provided population, employment, retail sales, and per capita income data for the 11 counties that comprise the Airport's service area. Finally, an on-site visual inspection of the Airport was conducted to complete the inventory effort and verify any data discrepancies.

Organized by the following sections, this Chapter summarizes the data that was collected on the condition of existing Airport facilities and services:

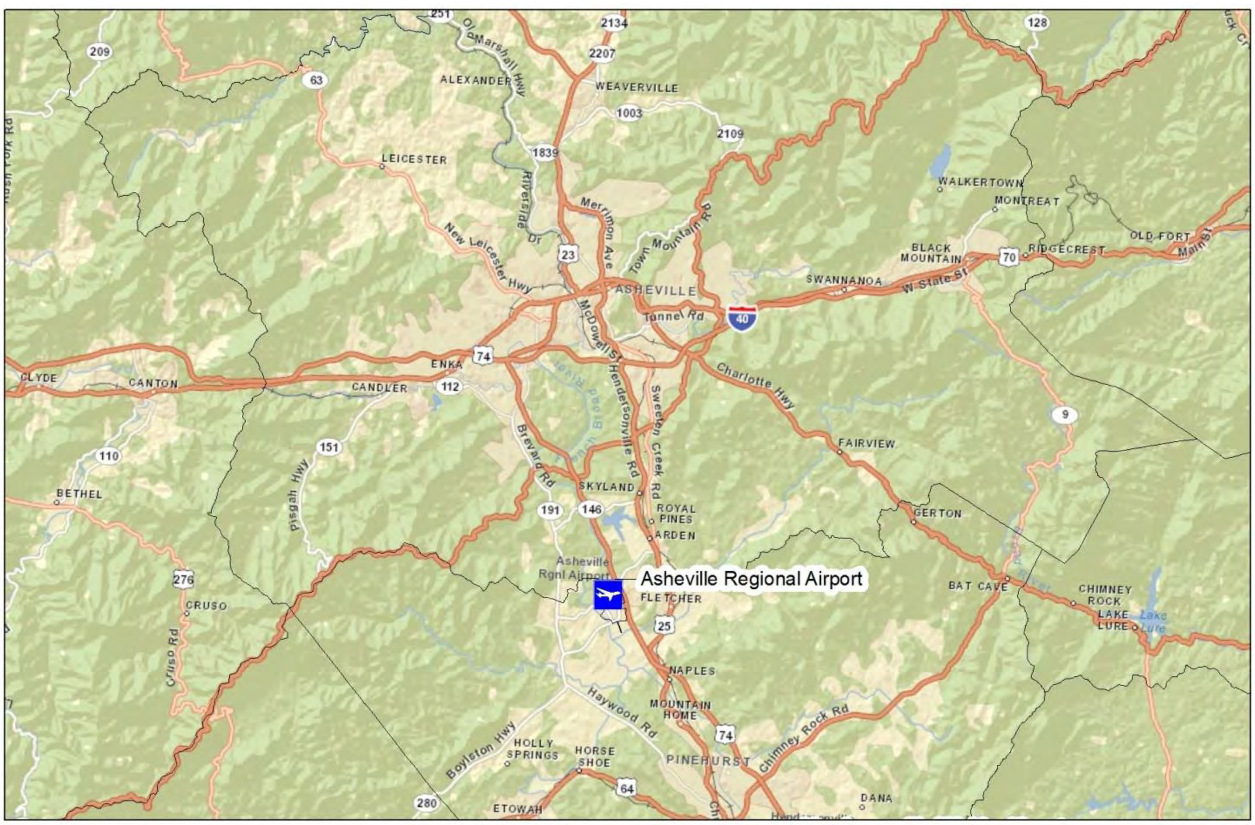
2.1 General Description and Location Information
2.2 History
2.3 Environment and Land Use
2.4 Socioeconomic Data
2.5 Airport Management Structure
2.6 Existing Facilities
2.7 Businesses and Tenants
2.8 Airspace, Air Traffic Control, and Approach/Departure Procedures
2.9 Summary

2.1 General Description and Location Information

The Asheville Regional Airport is the premier air transportation gateway for Western North Carolina. It is classified in the National Plan of Integrated Airport Systems (NPIAS) as a primary, small-hub commercial service airport that is significant to support the aviation demands of the nation's aviation system. Within the state aviation system, the North Carolina Department of Transportation (NCDOT) classifies the Airport as an Air Carrier airport. The Airport holds a Federal Aviation Regulation (FAR) Part 139 operating certificate, meeting the requirements of a Class I airport capable of serving scheduled and unscheduled operations of large and small air carrier aircraft. In addition, the Airport meets Aircraft Rescue and Fire Fighting (ARFF) Index B requirements for firefighting equipment and fire extinguishing agents.

The Airport is located in the Blue Ridge Mountains region of Western North Carolina, approximately ten miles south of downtown Asheville near the town of Fletcher (**Figure 2-1**). The property of the Airport primarily lies within Buncombe County, with a small portion located in Henderson County.

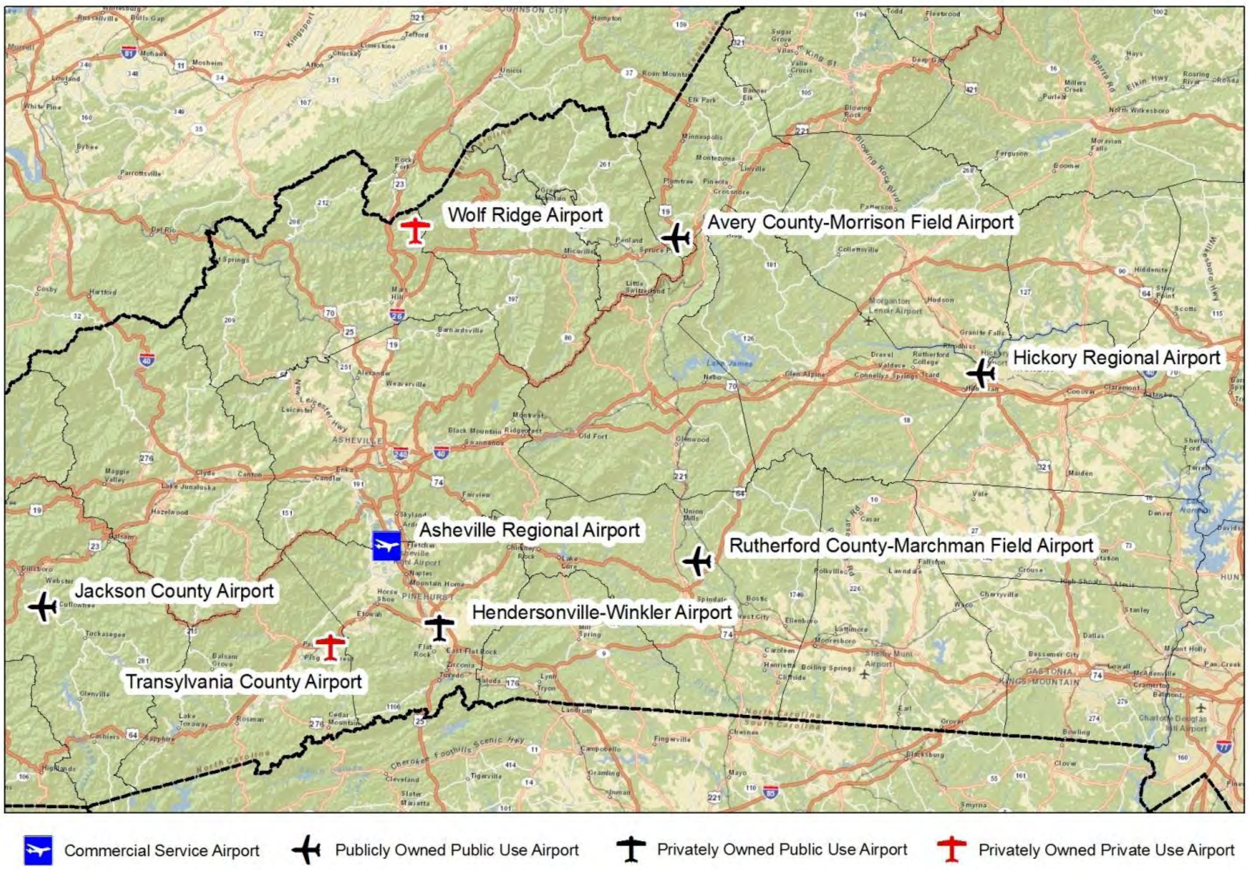
Figure 2-1: Airport Regional Map



Source: Mead & Hunt

There are four public use, publicly-owned general aviation airports that are in proximity to the Asheville Regional Airport: the Rutherford County – Marchman Field Airport near Rutherfordton located approximately 33 miles to the east; the Jackson County Airport near Sylvia located approximately 38 miles to the west; the Avery County – Morrison Field Airport near Spruce Pine located approximately 46 miles to the northeast; and the Hickory Regional Airport near Hickory located approximately 68 miles to the northeast (**Figure 2-2**). It should be noted that the privately owned public use Hendersonville-Winkler Airport is located approximately ten miles to the southeast near Hendersonville. Two privately owned, private use airports are also located near the vicinity of the Asheville Regional Airport: the Transylvania County Airport near Brevard approximately 12 miles to the southwest and the Wolf Ridge Airport near Mars Hill approximately 34 miles to the north.

Figure 2-2: Nearby Public Use General Aviation Airports



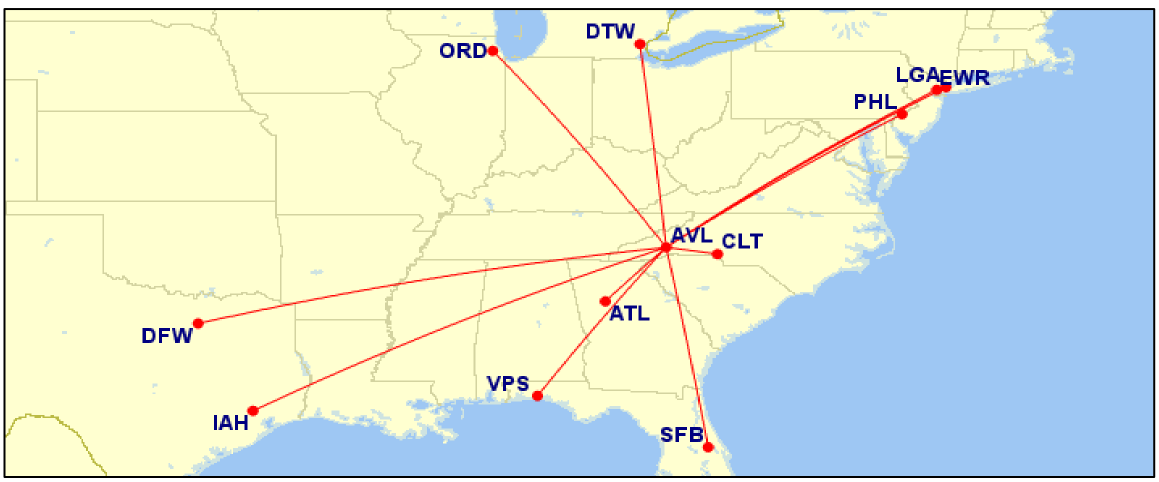
Source: Mead & Hunt, Inc.

Commercial airline service at the Airport is provided by six operators, three of which (Delta Air Lines, United Airlines, and US Airways) provide service to eight destinations daily. Two airlines, Vision Airlines and American Eagle, provide daily service seasonally to Ft. Walton Beach, Florida, and Dallas-Ft. Worth, Texas, respectively, while Allegiant offers service twice a week to the Orlando Sanford International Airport in Florida. **Table 2-1** lists each airline that offers service at the Airport, the destinations they serve, and the frequency of each arriving and departing flight; **Figure 2-3** illustrates the non-stop flights available from Asheville. It should be noted that AirTran Airways served the Asheville market with daily flights to Tampa and Orlando, Florida until service was discontinued in January 2012.

Table 2-1: Commercial Airline Service		
Airline	**Destination**	**Frequency**
allegiant	Orlando (Sanford)	Monday, Friday
American Airlines American Eagle	Dallas-Ft. Worth	Daily (April through October)
DELTA	Atlanta Detroit New York (LaGuardia)	Daily
UNITED	Chicago (O'Hare) Houston (Bush Intercontinental) Newark	Daily
US AIRWAYS	Charlotte Philadelphia	Daily
Vision Airlines	Ft. Walton Beach, Florida	Sunday, Thursday (April through August)

Note: Destinations and frequency of flights current as of January 2012.
Source: Asheville Regional Airport

Figure 2-3: Non-Stop Destinations from Asheville



Note: Destinations current as of January 2012.
Source: Asheville Regional Airport

Other airports offering commercial airline service that are nearest to the Asheville region include: the Greenville-Spartanburg International Airport near Greer, South Carolina located approximately 41 miles to the south; the Tri-Cities Regional Airport near Blountville, Tennessee located approximately 72 miles to the north; the McGhee Tyson Airport near Knoxville, Tennessee located approximately 85 miles to the northwest; the Charlotte Douglas International Airport near Charlotte, North Carolina located approximately 90 miles to the east; and the Piedmont Triad International Airport in Greensboro, North Carolina located approximately 152 miles to the northeast (**Figure 2-4**). The Hartsfield-Jackson Atlanta International Airport in Atlanta, Georgia located approximately 163 miles to the southwest is also occasionally used by travelers to access the Western North Carolina region.

Figure 2-4: Nearby Commercial Service Airports

Source: Mead & Hunt, Inc.

Asheville is the largest populated city in Western North Carolina, located approximately 51 miles north of Greenville, South Carolina and 99 miles west of Charlotte. It is intersected by Interstate 26 and Interstate 40 which connect it with the Tri-Cities region of Tennessee to the north; Spartanburg, South Carolina to the south; Winston-Salem, North Carolina to the east; and Knoxville, Tennessee to the west. Other significant roadways that connect the city with the surrounding region include Interstate 240, U.S. Highway 25, U.S. Highway 74-A, and the scenic Blue Ridge Parkway. Although no passenger rail service is available, the city is located along an important freight trunk line of the Norfolk Southern Railroad.

In addition to being known for its natural beauty of the surrounding Blue Ridge Mountains, Asheville is also known as a cultural and tourist center that is consistently ranked near the top of national city rankings. Most recently, it was ranked as the 24th best place in the U.S. for business and careers by Forbes.com (June 2011), top small city for art by *American Style Magazine* (May 2011), and a Best Place to Retire by TopRetirements.com (February 2011). Asheville is home to a diversified economy that is based on advanced manufacturing, technology, professions/technical services, health care, education, and tourism. Major employers include: the Buncombe County Public School system, Mission Health System, City of Asheville, The Biltmore Company, Buncombe County Government, The Grove Park Inn Resort & Spa, Ingles Markets, Inc., the Veterans Administration Medical Center-Asheville Department of Veterans Affairs, BorgWarner Turbo & Emissions Systems, CarePartners Health Services, as well as several small successful businesses. The city is home to five higher education institutions, including the University of North Carolina-Asheville, Montreat College, Warren Wilson College, Mars Hills College, and the Asheville-Buncombe Technical Community College.

2.2 History

In 1957, plans for the Asheville Regional Airport began when leaders of the community started searching for a new location for the Asheville & Hendersonville Airport that was unable to expand to accommodate larger commercial aircraft. After the passage of a bond authorizing the City of Asheville to expend up to $1.2 million for a new airport, a suitable location was identified near Fletcher adjacent to the French Broad River. On January 15, 1961, commercial flight service began at Asheville Regional Airport and the terminal building opened six months later.

1961-1980: The Airport made several airfield infrastructure improvements during this timeframe. In 1962, an instrument landing system (ILS) was installed to offer precision navigational guidance for aircraft on landing approach while in 1979 a Department of Public Safety building was constructed for Airport police and fire rescue personnel. Also in 1979, the most significant development during this 20 year time frame occurred when the Airport's operational management shifted from the City of Asheville to the newly created Greater Asheville Regional Airport Authority, comprised of appointees by the Buncombe County Commission and the Asheville City Council. In 1980, a runway extension project was completed increasing the former 6,500 foot runway to its current length of 8,001 feet. Finally, a baggage claim and boarding gate area expansion doubled the existing capacity of the terminal building.

1981-2004: Projects designed to accommodate an increase in passengers were the focus of Airport improvement efforts during these years. In 1992, the terminal building was again expanded to increase the size of the airline ticket counter lobby, baggage claim area, administrative office space, and boarding gate areas. To better manage the increase in vehicular traffic around the Airport campus, a loop service road was constructed between the terminal building and North Carolina Route 280. An additional expansion to the terminal building in 2003 increased the passenger lounge to 10,000 square feet.

2005-2010: Continued growth in passenger traffic from 2000 to 2005 resulted in the construction of an enlarged terminal apron and new Airport maintenance facility in 2006. In 2008, a consolidated rental car service facility was constructed as well as new terminal building boarding gate ramps. In addition, 2008 saw the Greater Asheville Regional Airport Authority appoint its first member from Henderson County. In 2009 and 2010, several improvements were made to the terminal building that included the construction of an additional baggage carousel, an expanded car rental desk area, increased office space, and an expanded gate holding area, new passenger boarding bridges, and an enlarged security screening area. Additional projects completed over this five-year time period include the construction of T-style and bulk hangars, installation of new airfield lighting and wildlife/security fencing, improvements to landside access roadways and public parking lots, and the addition of back-up power generators at the Public Safety and maintenance facilities. Growing aviation demand forecasted at the Airport over the next 20 years will continue to require facilities to evolve into the future.

2.3 Environment and Land Use

In order to plan for future Airport development, an understanding must first be gained of local environmental conditions and surrounding land uses. Topography, soil type, climate, and local wind conditions can all factor in determining future infrastructure needs and areas suitable for development while surrounding land uses can influence growth and expansion opportunities. As part of the inventory data collection effort, information was gathered on local environmental conditions and a review was conducted of surrounding land uses. This section summarizes the Airport's environs and adjacent land uses.

2.3.a Environment

The review of the Airport's environs focused on the topography of the surrounding landscape, the types of soil located on Airport property, historical meteorological conditions, and the average direction and intensity of local winds. Each one of these environmental elements plays an important role in how future development occurs at the Airport. A summary of each environ is presented in the following subsections.

Topography – The mountainous topography surrounding the Airport is an important physical factor that impacts future development and expansion opportunities. At an elevation of 2,165 feet above mean sea level (MSL), the airfield lies on a plateau that gradually slopes downward from north to south to an elevation of 2,111 feet above MSL. Outside of the airfield plateau, the topography again slopes downward away from the airfield to elevations of approximately 2,040 feet MSL to the north and 2,160 MSL to the south. Along the east and west of the airfield plateau, the topography of the land drops sharply approximately 35 feet outside of the boundaries of the airfield design surfaces and the terminal area. On a broader scale, the topography of the land outside the immediate boundary of the Airport, within a two to three mile radius, is comprised of small hills and valleys that are surrounded by the Blue Ridge Mountains.

Soil – A variety of loams and soil complexes comprise the soil types that are found on existing Airport property according to the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Web Soil Survey (http://websoilsurvey.nrcs.usda.gov). This source of soil survey information identifies that loamy and urban land complex Udorthents are the primary soil types found on existing Airport property. Urban land complex Udorthents found primarily on the airfield and on the east side of the airfield are suitable to support development such as runways, taxiways, aprons, roadways, parking lots, buildings, and other structures. The remainder of soil types identified on Airport property that are not well suited for development includes Clifton clay loams, Clifton sandy loams, Evard-Cowee complex soils, Dillard loam, Hemphill loam, Iotla loam, Tate-urban land complex soils, and Hayesville loam.

Meteorological/Climate Conditions – Asheville's latitude, elevation, and the surrounding Blue Ridge Mountains influence the local climate and meteorological conditions of the region. Though located in a humid subtropical climate much like the rest of the southeastern United States, temperatures in Asheville are often cooler as a result of its higher elevation. Summers are warm and humid with the daily maximum temperature in July averaging 83 degrees Fahrenheit and a low of 63 degrees Fahrenheit. Winters are cool with below freezing temperatures experienced occasionally as the average daily temperature in January reaches a high of 46 degrees Fahrenheit and a low of 26 degrees Fahrenheit. Precipitation totals in Asheville are modest as the region receives approximately 47 inches of rainfall and 13 inches of snowfall annually. Based on 30 year averages, sunshine is present throughout the region 59 percent of the year with approximately 97 days experiencing clear skies, 111 days with partly cloudy conditions, and151 days with overcast skies.

Wind – One of the most important environmental elements at any airport is the direction of local prevailing winds. Since operational safety is highest when aircraft land and takeoff into the wind, it is important that the orientations of an airport's runways are aligned in the same direction as local prevailing winds. FAA Advisory Circular (AC) 150/5300-13, *Airport Design*, recommends that the orientation of runways at an airport provide at least 95 percent wind coverage for types of aircraft using the airport on a regular basis. This is important since smaller aircraft are greatly impacted by crosswinds, or wind perpendicular to an aircraft's path of travel.

Based on hourly wind observation data obtained from the National Climatic Data Center (NCDC), the orientation of the Airport's single runway, Runway 16/34, provides sufficient wind coverage in a 10.5 knot crosswind 99.56 percent of the time during all weather conditions. A 10.5 knot component was used to evaluate wind coverage because this is typically the threshold upon which smaller aircraft can safely operate in crosswind conditions. Crosswind components of 13 knots, 16 knots, and 20 knots were also evaluated to measure the coverage provided in stronger winds that could impact the operations of twin-engine and jet aircraft. **Table 2-2** illustrates the wind coverage provided by Runway 16/34 during all weather conditions while **Table 2-3** and **Table 2-4** illustrate coverage provided during Visual Flight Rules (VFR) and Instrument Flight Rules (IFR) weather conditions, respectively. Based on the data, the orientation of Runway 16/34 provides sufficient wind coverage that exceeds the FAA's standards.

Table 2-2: Runway 16/34 Wind Coverage In All Weather Conditions

Crosswind (in knots)	Runway 16	Runway 34
10.5	62.07%	76.69%
	99.56%	
13	62.25%	76.83%
	99.87%	
16	62.30%	76.90%
	99.97%	
20	62.31%	76.91%
	99.99%	

Note: single runway end coverages calculated with a 3 knot tailwind
Source: National Climatic Data Center, FAA Standard Wind Analysis tool
Station: Asheville, NC
Period of Record: 2000-2009 based on 78,481 hourly observations

Table 2-3: Runway 16/34 Wind Coverage In VFR Weather Conditions		
Crosswind (in knots)	**Runway 16**	**Runway 34**
10.5	59.14%	77.22%
	99.52%	
13	59.34%	77.38%
	99.86%	
16	59.40%	77.45%
	99.97%	
20	59.41%	77.46%
	99.99%	

Note: single runway end coverages calculated with a 3 knot tailwind
Source: National Climatic Data Center, FAA Standard Wind Analysis tool
Station: Asheville, NC
Period of Record: 2000-2009 based on 69,638 hourly observations
VFR = Ceiling greater than or equal to 1,000 feet and visibility greater than or equal to 3 statute miles

Table 2-4: Runway 16/34 Wind Coverage In IFR Weather Conditions		
Crosswind (in knots)	**Runway 16**	**Runway 34**
10.5	84.33%	68.20%
	99.91%	
13	84.35%	68.23%
	99.97%	
16	84.35%	68.26%
	99.99%	
20	84.35%	68.27%
	100.00%	

Note: single runway end coverages calculated with a 3 knot tailwind
Source: National Climatic Data Center, FAA Standard Wind Analysis tool
Station: Asheville, NC
Period of Record: 2000-2009 based on 7,053 hourly observations
IFR = Ceiling less than 1,000 feet but greater than or equal to 200 feet and/or visibility less than 3 statute miles but greater than or equal to 1/2 statue mile

2.3.b Land Use

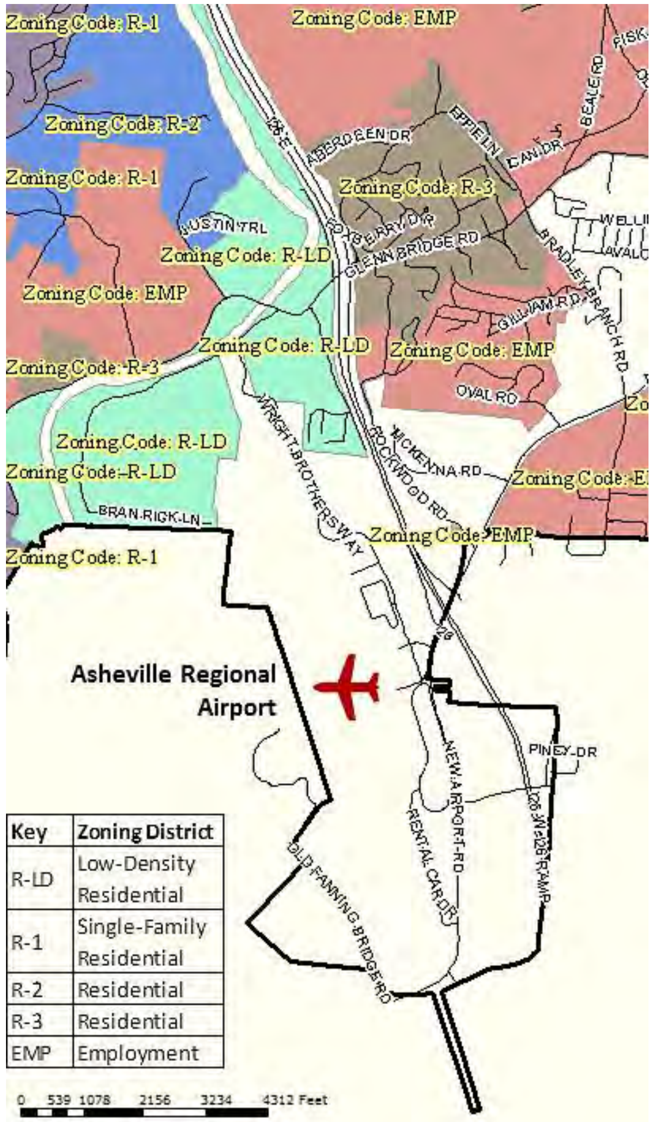
When establishing a plan for the future development of the Airport, it is important that adjacent land uses are reviewed to identify possible constraints that may impact the ability to expand. To the north, the French Broad River borders the Airport along with residential areas located to the east and west of the approach end of Runway 16. To the south, North Carolina Route 280 lies adjacent to the Airport beyond which lies the Broadmoor Golf Links golf course. Several types of land uses are found along the eastern boundary of the Airport. To the southeast, North Carolina Route 280 borders the Airport from the approach end of Runway 34 to the main Airport entrance. Northeast of the main Airport entrance and long-term parking lots, two tracts of land owned by the Airport east of North Carolina Route 280 are bordered by a warehouse/distribution center, hotel, restaurant, and gas station. North of these two tracts of land, the eastern boundary of the Airport continues along North Carolina Route 280 until intersecting with Interstate 26. Land is largely undeveloped west of the Airport, with a forested area located between the airfield and the French Broad River. The aerial photo presented in **Figure 2-5** illustrates the land uses that are found within the immediate proximity of the Airport.

Figure 2-5: Surrounding Land Uses

Aerial Photo: Woolpert, Inc.

In addition to evaluating existing land uses, it is also important to review the boundaries and locations of adjacent zoning districts to gain an understanding of future permitted uses of land around the Airport. Since the Airport is located in both Buncombe and Henderson counties, surrounding land use zoning is divided between four entities: Buncombe County, the City of Asheville, the Town of Fletcher, and the Town of Mills River. To the north, as illustrated in **Figure 2-6**, land within Buncombe County is zoned primarily for office use, industrial use, storage, warehousing, and wholesale trade (Employment District) and various residential development that includes low-density and single family uses.

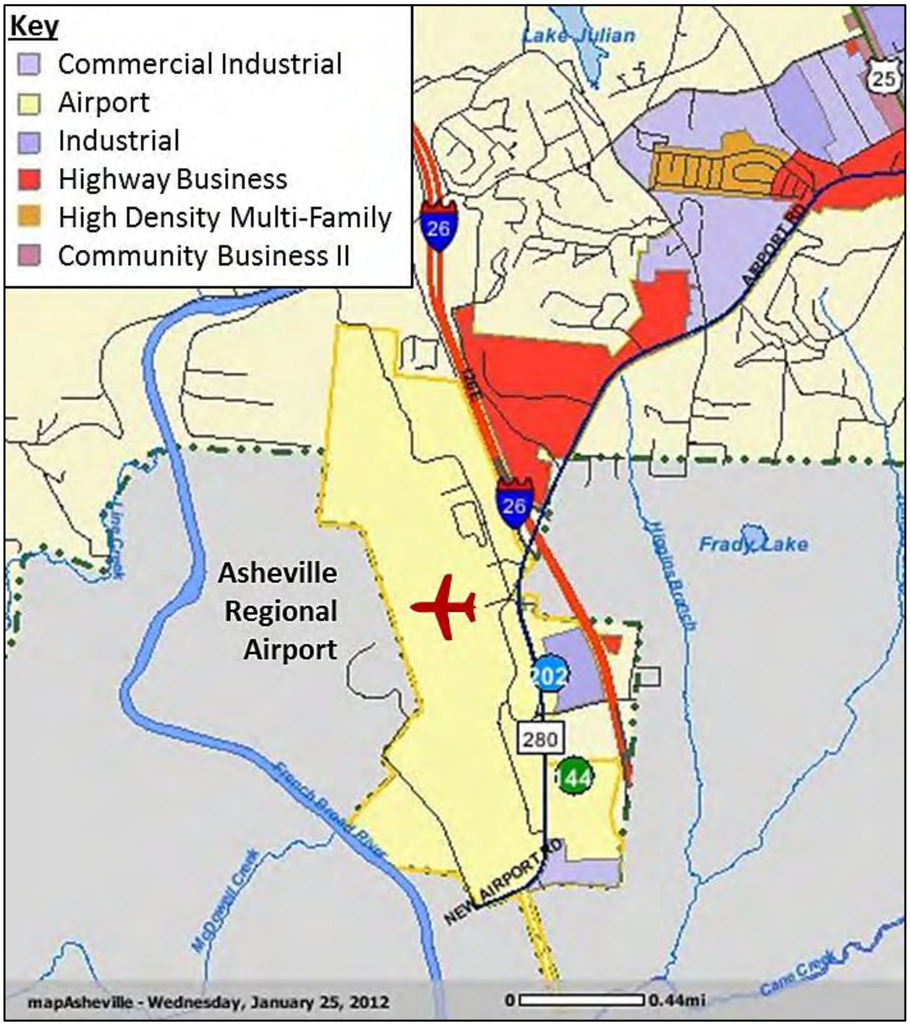
Figure 2-6: Buncombe County Zoning Districts



Source: Buncombe County GIS Department

The Airport and an area of land to the northeast lie within the City of Asheville and are subject to the City's zoning and land use controls. As illustrated in **Figure 2-7**, land immediately surrounding the immediate vicinity of the Airport is zoned for a wide range of commercial and industrial uses such as light manufacturing, wholesale, warehousing, services, offices, and automobile-oriented commercial development. In addition, a small area designated for high density multi-family housing types along with limited institutional, public, and commercial use lies north of the Airport on Airport Road. It should be noted that Airport land within the City of Asheville is zoned for aviation-related commercial/industrial and recreational uses.

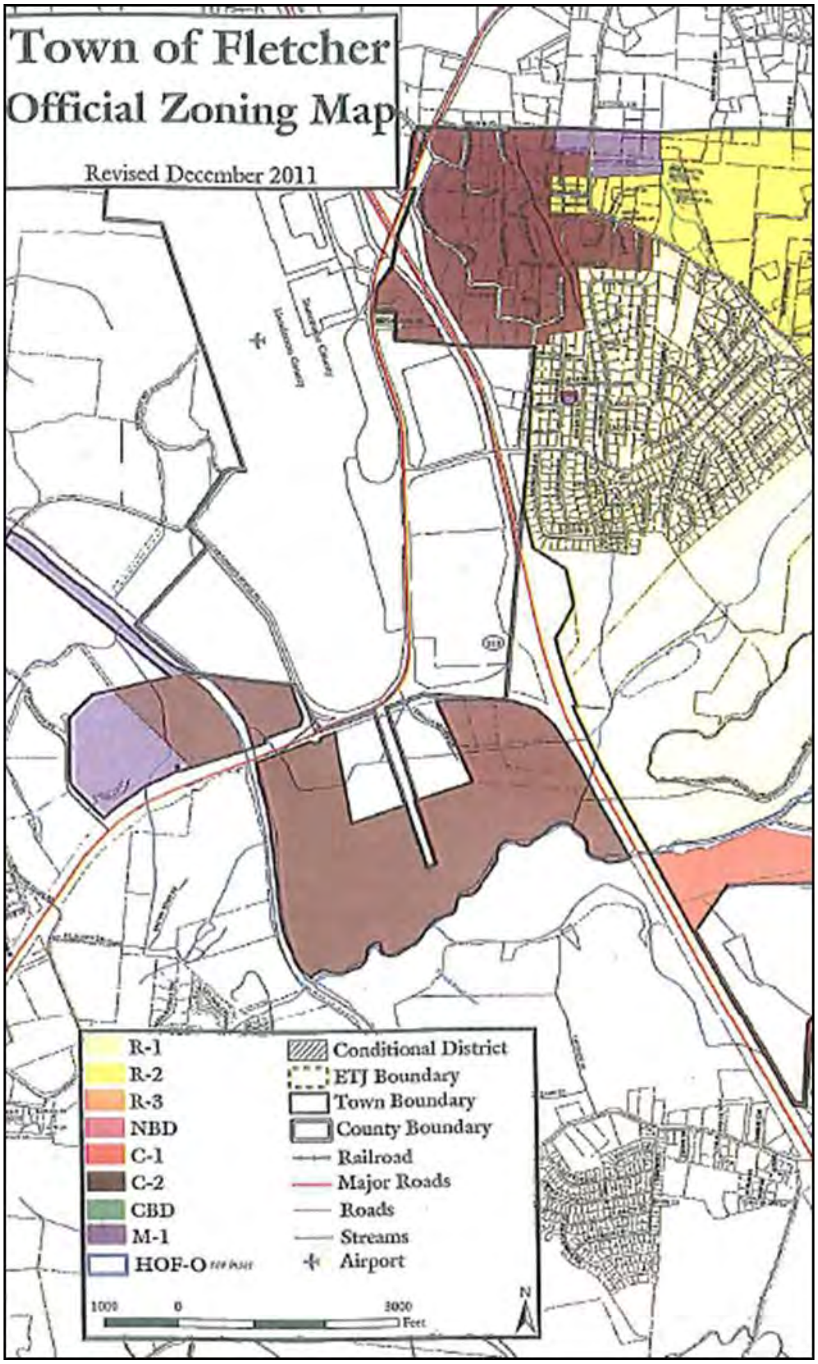
Figure 2-7: City of Asheville Zoning Districts



Source: *mapAsheville Development Mapper* (City of Asheville)

In North Carolina, land use statues grant authority to local governments to regulate the use of private land. In Henderson County, land adjacent to Airport property is regulated by the Town of Fletcher and the Town of Mills River. **Figure 2-8** illustrates the zoning districts to the south and east of the Airport located within the Town of Fletcher. Land zoned for low-density and single-family neighborhoods (R-1 & R-2) and mixed commercial, residential, and service oriented uses (C-2) are primarily found adjacent to the Airport in Fletcher. In addition, two manufacturing districts (M-1) intended for manufacturing, processing, assembling of parts, and distribution of products and services are designated in Fletcher near the proximity of the Airport.

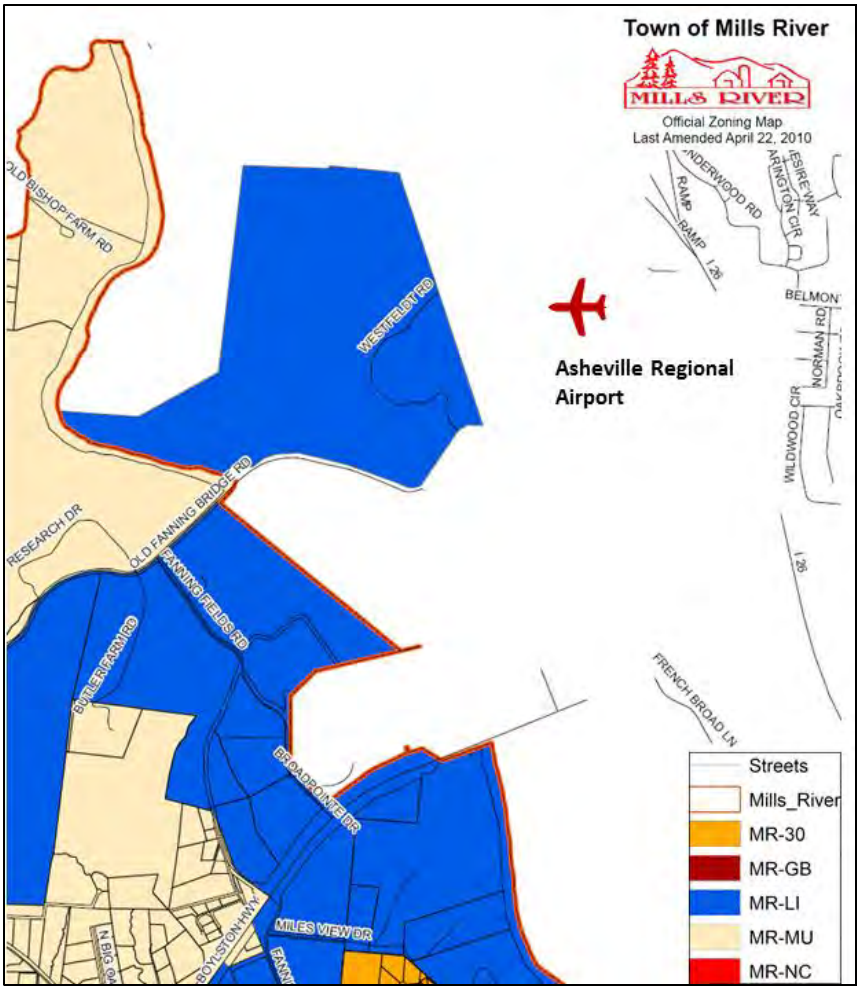
Figure 2-8: Town of Fletcher Zoning Districts



Source: Town of Fletcher Planning and Zoning Department

Land zoned west of the Airport within the Town of Mills River is primarily designated for light industrial use (MR-LI) that includes manufacturing, assembly, storage, processing, distribution, and sale of equipment. Mixed land use zoning districts (MR-MU) are also found in proximity to the Airport that are designed to permit a variety of uses that includes residential, industrial, and commercial development. **Figure 2-9** illustrates the zoning districts west of the Airport within the Town of Mills River.

Figure 2-9: Town of Mills River Zoning Districts



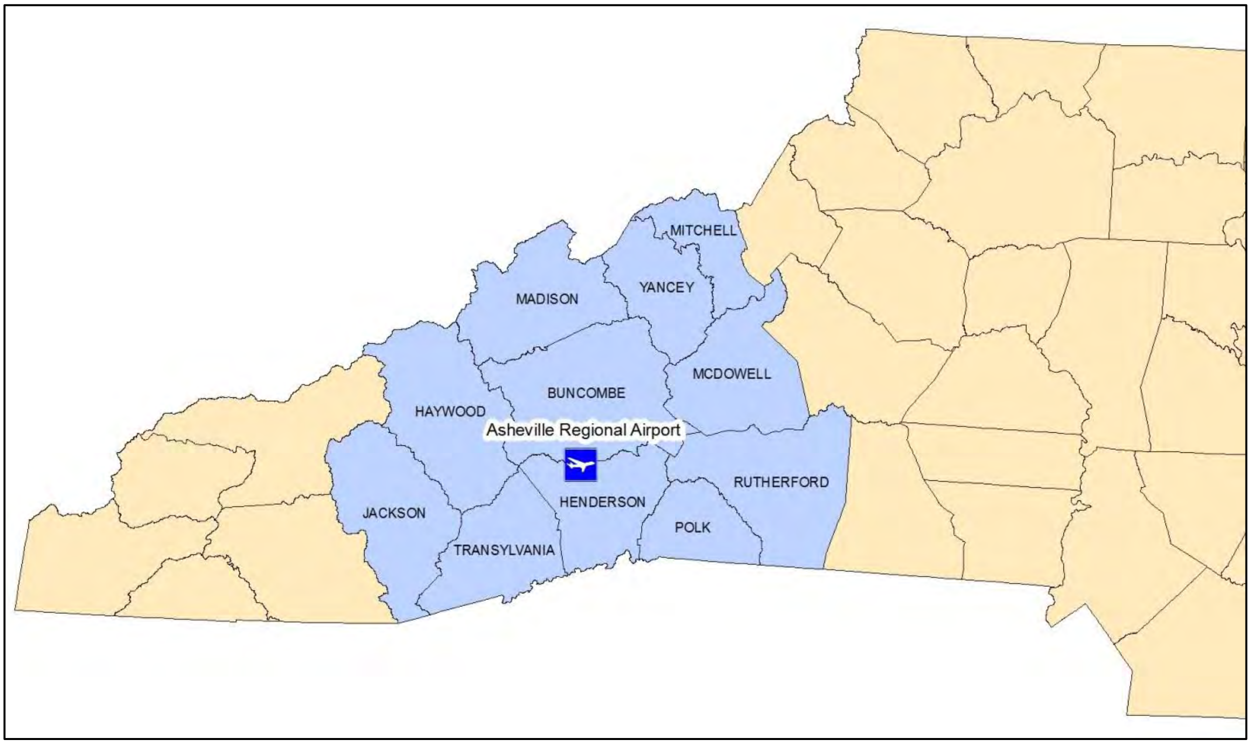
Source: Town of Mills River Official Zoning Map

It should be noted that the Asheville Regional Airport Master Land Use and Site Development Plan was prepared in January 2007 to identify land uses and opportunities for development in proximity to the Airport. This is a result of relatively flat land immediately surrounding the Airport and the accessibility of the area to both the Asheville and Hendersonville metropolitan areas. It is critical that existing zoning and land use controls are applied to promote development in the area, yet prevent incompatible land uses from impacting Airport operations.

2.4 Socioeconomic Data

In an effort to project future aviation activity at the Airport and to determine what infrastructure improvements will be needed over the next 20 years, an understanding must be gained of the socioeconomic conditions of the Airport's primary service area. Though a majority of users are located in the Asheville and Hendersonville metropolitan areas, the Airport's primary service area stretches over 11 Western North Carolina counties which are identified in **Figure 2-10**.

Figure 2-10: Airport Service Area



Source: Mead & Hunt, Inc.

According to data obtained from the U.S. Census, the population of the Airport's 11 county primary service area increased 13 percent from 651,332 in 2000 to 664,932 in 2010. A breakdown of the population change in each county from 2000 to 2010 is presented in **Table 2-5**. As illustrated in the table, the populations in ten counties have increased since 2000, with Jackson, Henderson, Buncombe counties experiencing the greatest increase in growth, respectively.

Table 2-5: Historical Population of Airport Service Area

County	2000	2010	% change
Buncombe County	206,330	238,318	15.5%
Haywood County	54,033	59,036	9.3%
Henderson County	89,173	106,740	19.7%
Jackson County	33,121	40,271	21.6%
Madison County	19,635	20,764	5.7%
McDowell County	42,151	44,996	6.7%
Mitchell County	15,687	15,579	-0.7%
Polk County	18,324	20,510	11.9%
Rutherford County	62,899	67,810	7.8%
Transylvania County	29,334	33,090	12.8%
Yancey County	17,774	17,818	0.2%
TOTAL	**588,461**	**664,932**	**13.0%**

Source: U.S. Census Bureau, 2000 & 2010 Census data

According to 2010 U.S. Census data, 36 percent of the Airport's service area population lives within Buncombe County, followed by Henderson County with 16 percent and Rutherford County with 10 percent. Demographically, 51 percent of the population is between the ages of 20 and 59 followed by persons 60 years of age and older at 26 percent and 19 years of age and under at 23 percent. **Table 2-6** illustrates the breakdown in age demographics for the 11 counties that comprise the Airport's service area.

Table 2-6: 2010 Age Demographics of Airport Service Area

County	19 & Under	%	20-29	%	30-39	%	40-49	%	50-59	%	60 & Over	%	Total	%
Buncombe County	54,628	23%	30,628	13%	31,800	13%	32,925	14%	34,647	15%	53,690	23%	**238,318**	36%
Haywood County	12,804	22%	5,663	10%	6,586	11%	8,326	14%	8,692	15%	16,965	29%	**59,036**	9%
Henderson County	23,930	22%	10,096	9%	12,232	11%	13,837	13%	15,010	14%	31,635	30%	**106,740**	16%
Jackson County	9,780	24%	7,773	19%	4,224	10%	4,516	11%	5,181	13%	8,797	22%	**40,271**	6%
Madison County	4,829	23%	2,228	11%	2,433	12%	2,851	14%	3,229	16%	5,194	25%	**20,764**	3%
McDowell County	10,798	24%	4,805	11%	5,823	13%	6,494	14%	6,670	15%	10,406	23%	**44,996**	7%
Mitchell County	3,343	21%	1,521	10%	1,716	11%	2,192	14%	2,448	16%	4,359	28%	**15,579**	2%
Polk County	4,362	21%	1,600	8%	1,869	9%	2,709	13%	3,310	16%	6,660	32%	**20,510**	3%
Rutherford County	16,931	25%	6,732	10%	7,946	12%	9,707	14%	9,976	15%	16,518	24%	**67,810**	10%
Transylvania County	6,784	21%	3,257	10%	3,114	9%	3,979	12%	4,750	14%	11,206	34%	**33,090**	5%
Yancey County	3,930	22%	1,608	9%	2,073	12%	2,414	14%	2,727	15%	5,066	28%	**17,818**	3%
TOTAL	**152,119**	23%	**75,911**	11%	**79,816**	12%	**89,950**	14%	**96,640**	15%	**170,496**	26%	**664,932**	100%

Source: U.S. Census Bureau, 2010 Census data

The mean household total personal income offers a method to summarize the economic demographics of the population within the Airport's service area. Since 2000, the mean household total income has fluctuated with some counties experiencing an increase in their average income while others have decreased. **Table 2-7** compares the mean household total personal income for each county that comprises the Airport's service area from 2000 to 2010. Data from Woods & Poole Economics, Inc. indicates that the greatest increase in average total household personal income from 2000 to 2010 occurred in Rutherford County at 4.8 percent while the greatest decrease occurred in Yancey County at minus 9.1 percent. It is interesting to note that the average of the mean household total personal income for all counties within the Airport's service area between 2000 and 2010 has remained constant.

Table 2-7: Mean Household Total Personal Income of Airport Service Area

County	2000	2010	% change
Buncombe County	$67,666	$69,676	3.0%
Haywood County	$58,185	$60,762	4.4%
Henderson County	$70,396	$69,055	-1.9%
Jackson County	$53,365	$54,083	1.3%
Madison County	$53,081	$53,447	0.7%
McDowell County	$56,204	$53,080	-5.6%
Mitchell County	$50,345	$51,231	1.8%
Polk County	$76,063	$76,792	1.0%
Rutherford County	$56,494	$59,229	4.8%
Transylvania County	$65,648	$64,781	-1.3%
Yancey County	$50,990	$46,327	-9.1%
AVERAGE	**$59,858**	**$59,860**	**0.0%**

Source: Woods & Poole Economics, Inc. (in 2004 dollars)

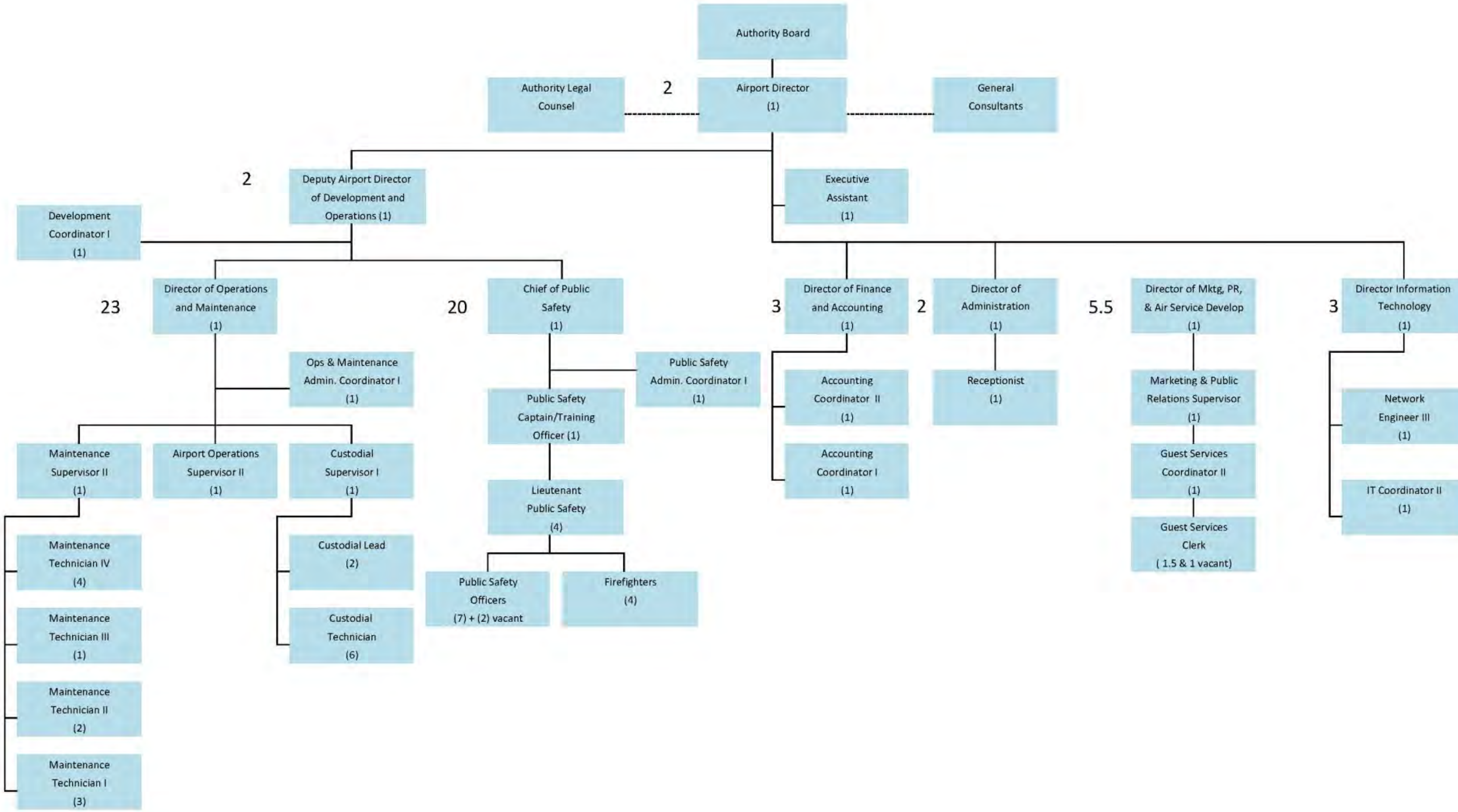
2.5 Airport Management Structure

The management of the Asheville Regional Airport is overseen by the Greater Asheville Regional Airport Authority Board, which was founded in 1979 and is charged with the maintenance, operation, and development of the Airport. The Board includes seven members, three of which are appointed by the Asheville City Council and three of which are appointed by the Buncombe County Board of Commissioners. A seventh member is selected by the six Authority Board appointees as the At-Large member.

The Airport Director, with support from the Authority Legal Counsel, General Consultants, and Airport staff, reports to the Authority Board. The Airport Director is assisted by the Director of Finance and Accounting, the Director of Administration, the Director of Marketing and Public Relations, and the Director of Information Technology who are responsible for Airport administrative tasks. These positions are also supported by coordinators, supervisors, and assistants who are responsible for more specific administrative tasks.

The Airport Director is also supported by the Deputy Airport Director of Development and Operations who oversees operations, maintenance, public safety, and the management of capital development projects at the Airport. Reporting to the Deputy Airport Director of Development and Operations are the Director of Operations and Maintenance and the Chief of Public Safety who oversee supervisors, coordinators, technicians, and officers responsible for specific Airport tasks. In all, the Airport Authority is comprised of 60 full-time employees. **Figure 2-11** illustrates the organizational structure of Greater Asheville Regional Airport Authority staff.

Figure 2-11: Airport Authority Organizational Structure



Source: Greater Asheville Regional Airport Authority

2.6 Existing Facilities

A majority of the inventory effort focused on the collection of information related to airside and landside facilities, along with the aviation support infrastructure necessary to ensure the safe and efficient operation of the Airport. This library of information that was collected offered a baseline that was used to complete subsequent study analyses in an effort to determine what will be needed over the next 20 years to meet anticipated future aviation demand. This section summarizes the data that was collected related to airside facilities (such as runways, taxiways, aprons, and navigational aids), aviation support facilities (such as the terminal building, hangars, air traffic control tower (ATCT), Aircraft Rescue and Fire Fighting (ARFF) station, and maintenance vehicle garage), and landside facilities (such as access roads, parking lots, and the rental car service facility).

2.6.a Runways

The Airport's single runway, Runway 16/34, is oriented in a northwest/southeast direction, and is 8,001 feet in length, 150 feet in width, and paved in asphalt. The runway's design meets Airport Reference Code (ARC) Category C-III standards which are designed for aircraft with approach speeds between 121 and 141 knots and wingspans between 79 and 118 feet. Additional information on the Airport Reference Code is explained in Chapter 4, Demand/Capacity and Facility Requirements Analysis. Though designed for Category C-III aircraft, a wide variety of aircraft types are capable of operating on the runway based on the weight bearing capacity of their main landing gear wheel configurations. The runway's pavement is rated to 120,000 pounds for aircraft with single wheel main landing gear configurations, 160,000 pounds for aircraft with dual wheel main landing gear configurations, and 260,000 pounds for aircraft dual tandem wheel configurations.

The strength of pavement was evaluated using the Pavement Condition Index (PCI), which is an industry standard that rates the condition of a pavement surface based on a variety of factors such as structural integrity, capacity, roughness, skid resistance/hydroplaning potential and rate of deterioration. A PCI score is based on a scale from 0 to 100 with pavements rated at 100 considered to be in excellent condition while pavements with a score of 10 or less are considered to be failing. A runway pavement evaluation conducted in 2009 found the weighted PCI of Runway 16/34 to be 50, which is below the PCI of 70 that is recommended to be maintained for primary surfaces at airports. A pavement rejuvenation project in 2011 resurfaced the runway with sealant to help preserve the useful life of the existing pavement and help slow its further deterioration. It is anticipated that the sealant will help maintain the pavement in a good to fair condition for the next five years.

A summary of the data collected for Runway 16/34 is presented in **Table 2-8**.

Table 2-8: Runway 16/34 Data	
Length	8,001 feet
Width	150 feet
Surface	Asphalt
Airport Reference Code (ARC)	C-III
Weight Bearing Capacity	Single Wheel: 120,000 pounds Dual Wheel: 160,000 pounds Dual Tandem Wheel: 260,000 pounds
Pavement Condition Index (PCI) Rating	50

Source: Airport Layout Plan

2.6.b Taxiways

Taxiways are defined pavement surfaces used for aircraft to travel safely between the runway and other airfield destinations such as aprons, hangars, and terminals. An airport's taxiway configuration should be designed to efficiently move aircraft between points on the airfield and minimize the amount of time an aircraft occupies a runway prior to takeoff or after landing. As a result of having a single runway and a linear organization of facilities, the taxiway configuration at the Airport is relatively simple and is comprised of a parallel taxiway, connector taxiways, and high speed exit taxiways. The Airport's parallel taxiway, Taxiway A, extends the entire length of Runway 16/34 and is 75 feet in width. Connector taxiways, such as Taxiway B, Taxiway F, Taxiway N, and Taxiway R, intersect the parallel taxiway or runway perpendicularly, connecting airfield destinations and the runway with the taxiway system. Finally, high speed exit taxiways such as Taxiway E, Taxiway M, and Taxiway P offer aircraft an acute angle to quickly exit the runway after landing, increasing its throughput capacity during periods of frequent aircraft operations. **Figure 2-12** illustrates the taxiway configuration at the Airport.

Figure 2-12: Airport Taxiway Configuration

Aerial Photo: Woolpert, Inc.

2.6.c Aprons

Aprons, also known as ramps, are large paved surfaces designed for the parking and servicing of aircraft. Aprons provide access to terminal, hangar, and fixed base operator (FBO) facilities, locations to transfer passengers and cargo from aircraft, and areas for aircraft fueling and maintenance. The size and pavement strength of an apron varies upon several factors that include the fleet mix of aircraft intended to use the surface, available space, special aircraft servicing needs, and the configurations of terminals, hangars, and FBOs. The Airport has four primary aprons that serve the main terminal building, the FBO, and the numerous corporate and private hangars based on the airfield. The terminal apron, approximately 417,100 square feet in area, is located adjacent to the main terminal building and is intended for the exclusive use of commercial airlines to transfer passengers and luggage to and from aircraft. This apron is also intended for the commercial airlines to service, fuel, and deice aircraft. The north apron offers parking locations for transient aircraft as well as access to the Landmark Aviation FBO. The south apron, approximately 357,400 square feet in area, is located north of the terminal apron and provides access to box-style aircraft hangars that house both corporate and private aircraft. The apron area located between the north and south aprons is referred to as the middle-ramp, or mid-ramp, and offers access to the three T-hangar structures as well as tie down locations for based and itinerant aircraft.

It should be noted that two helicopter parking aprons are located adjacent to the south apron and middle ramp. Though these surfaces may be referred to as helipads in some documents, they are primarily designed for the parking and servicing of itinerant helicopters since they are located within the non-movement area of the airfield. In accordance with air traffic control (ATC) instructions, helicopters are expected to take off and land at the Airport from the parallel taxiway or runway and hover or ground taxi to and from the helicopter parking aprons.

Figure 2-13 illustrates the locations of the four apron areas and two helicopter parking locations at the Airport.

Figure 2-13: Airport Apron Locations

Aerial Photo: Woolpert, Inc.

2.6.d Navigational Aids

Navigational aids (NAVAIDs) are forms of visual and electronic equipment designed to assist pilots in identifying and navigating to an Airport. Ranging from devices that help a pilot visually identify the location of an airport to those that provide the correct glide path and angle of descent for landing on a runway, NAVAIDs are most useful in nighttime conditions or when a pilot's visibility is limited. NAVAIDs that emit electronic signals are especially useful to pilots operating properly equipped aircraft when navigating an approach to an airport in poor visibility weather conditions. While most NAVAIDs are ground-based equipment that are installed on an airfield, some are satellite-based that provide navigational signals for properly equipped aircraft. This section reviews both the ground-based and satellite-based visual and electronic NAVAID equipment available for aircraft operations at the Airport.

Visual NAVAIDs – Visual NAVAIDs are those that allow a pilot to visually identify the airfield on approach to landing, when taxiing after landing or prior to takeoff. Visual NAVAIDs range from lighting equipment to signs identifying airfield locations and devices that indicate the strength and direction of the wind. The following visual NAVAIDs are located at the Airport:

- **Rotating Beacon** – A rotating beacon is a high intensity light that rotates 360 degrees and is operated at night and in inclement weather conditions to assist pilots in identifying the location of an airport from a distance in the air. The beacon is equipped with a green and a white lens separated 180 degrees from one another that emits alternating white and green flashes indicating an airport is available for public use. The rotating beacon at the Airport is located on the top of the ATCT.

- **Wind Indicators –** Wind indicators, also known as wind socks, are orange fabric cones that indicate the strength and direction of the wind. These NAVAIDs assist pilots in making navigational corrections to adjust for surface prevailing winds moments before touchdown or prior to departure. Wind cones are required to be located approximately 1,000 feet from the end of each runway that serves air carrier aircraft and are to be lighted if an airport is open to commercial air carrier operations at night. Three lighted wind indicators are located at the Airport: one inside the segmented circle adjacent to the south ramp, one adjacent to the glide slope antenna on the approach end of Runway 16, and one adjacent to the glide slope antenna on the approach end of Runway 34.

- **Segmented Circle –** A segmented circle is a ground based marking indicating the traffic pattern, wind direction, and wind strength to pilots en route. A segmented circle features a series of white or orange markings arranged in a circle with traffic pattern indicators protruding from the circle to specify the direction of the traffic pattern. A lighted wind indicator is placed inside the segmented circle markings to indicate the direction and intensity of the wind. The segmented circle at the Airport is located adjacent to the south ramp and includes two "L" shaped traffic pattern indicators separated 180 degrees away from one another to indicate the right traffic pattern for Runway 34.

- **MALSR –** Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) assists pilots in visually acquiring the centerline of a runway prior to its threshold. MALSRs are most beneficial to pilots when aligning an aircraft with a runway centerline moments before touchdown during inclement weather and night time conditions when visibility is limited. A typical MALSR arrangement consists of nine light bars, each with five lights that are preceded by five sequenced flashing (SF) lights. At the Airport, MALSRs are located one at each approach end of Runway 16/34.

- **VASI** – Visual Approach Slope Indicators (VASIs) are lighting systems that indicate the correct glide path to pilots when on approach to a runway. A combination of red and white lights emitted from the VASI allows pilots to identify whether they are above, below, or on path with the correct glide slope. VASIs are typically a two bar, four-light unit located adjacent to the runway near the touchdown point aiming point marking. At the Airport, a four-light unit VASI is located on the approach end of Runway 34.

- **PAPI** – Precision Approach Path Indicators (PAPIs) are a more simplified version of a VASI that also indicate the correct glide slope to pilots. Like VASIs, the correct glide path is indicated by a combination of red and white lights that identify whether a pilot is above, below, or on path with the correct glide slope. PAPIs are typically comprised of a two- or four-light unit located adjacent to the touchdown zone aiming point marking of a runway. A four-light PAPI is located at the Airport on the approach end of Runway 16.

- **Runway Edge Lighting –** Runway edge lighting serves as an important navigational tool for pilots as it helps pilots identify the edge of the runway pavement surface during night and in low visibility weather conditions. This NAVAID is used by pilots to help align an aircraft with the centerline of a runway and in judging the distance remaining after touchdown and during takeoff. Runway edge lights are white except for the last 2,000 feet of an instrument runway when edge lighting is amber in color to help pilots identify the end of the pavement surface.

  Runway edge lights are classified into three types of lighting systems: High Intensity Runway Lights (HIRL), Medium Intensity Runway Lights (MIRL), and Low Intensity Runway Lights (LIRL). HIRL systems offer the greatest illumination intensity with five light intensity settings while MIRL systems offer three light intensity settings and LIRL systems typically have a single intensity setting. Runway 16/34 at the Airport is equipped with a HIRL system that can be controlled remotely by the pilot through a series of microphone keys on the Common Traffic Advisory Frequency (CTAF) when the ATCT is closed between 11:00 p.m. and 6:30 a.m. daily.

- **Runway Centerline Lights –** Runway centerline lights are located in the pavement of a runway along its centerline to assist pilots in visually identifying the center of a runway. In addition to helping pilots position an aircraft laterally on a runway during takeoff and landing, runway centerline lights are also used as an indicator to judge the distance remaining on a runway. Runway centerline lights are white and extend the entire distance of a runway until the last 3,000 feet when red and white lights alternate. For the remaining 1,000 feet, runway centerline lights are entirely red. Runway 16/34 is equipped with runway centerline lighting in both directions.

- **Runway Touchdown Zone Lights –** Runway touchdown zone (TDZ) lighting is another in-pavement lighting system utilized by pilots when on approach to a runway to identify the location of the touchdown zone. This lighting system is especially beneficial to pilots when locating the landing zone of a runway during nighttime and low visibility conditions. Runway TDZ lights consist of two rows of traversing three bars, each with three unidirectional lights that extend down the runway from the beginning of the touchdown zone to a distance of 3,000 feet. At the Airport, Runway 34 is equipped with TDZ lighting.

- **Runway Pavement Markings –** Although not typically associated as a navigational aid, runway pavement markings offer pilots another visual NAVAID to identify the touchdown zone and centerline of a runway. Markings applied to a runway are determined by the type of instrument approach to a runway. Runways equipped for only visual approaches may only require a few essential markings such as the runway designation, centerline, and an aiming point while runways equipped for precision instrument approaches require these and threshold, touchdown zone, and side stripe markings. Since Runway 16 and Runway 34 have precision instrument approaches, precision pavement markings are applied both ends of the runway.

- **Airfield Signs –** Airfield signage is also not typically associated as an NAVAID, but serves as an important navigational element for movement of aircraft on the ground. Airfield signs vary from those that indicate the distance remaining on a runway to identifying the location of runways, taxiways, aprons, and other airfield destinations. Airfield signage at the Airport includes location signs, directional signs, and mandatory signs such as runway hold and ILS critical area signs.

- **Taxiway Edge Lighting –** Taxiway edge lighting is similar to runway edge lighting in that it helps pilots identify the edge of the taxiway surface at night time and during times of reduced visibility. Taxiway edge lights are particularly useful to pilots when attempting to locate taxiway turnoff points from a runway after landing at night and when visibility is limited. Taxiway light systems at airports that serve commercial air carriers are normally a Medium Intensity Taxiway Lights (MITL) system comprised of three illumination intensity settings. The taxiway edge lights found on the airfield at the Airport are a MITL system.

Electronic NAVAIDs – Electronic based NAVAIDs serve an important function at the Airport as they allow aircraft to operate during conditions where visibility is limited, cloud ceiling heights are low, and/or when inclement weather is present. Complementing the visual NAVAIDs, electronic NAVAIDs allow an airport to remain open and increase the rate at which aircraft can arrive and depart during conditions that limit a pilot to visually navigate an aircraft. Electronic NAVAIDs operate by transmitting electronic signals which are received by avionic equipment installed on an aircraft providing position, altitude, and speed information which allows a properly trained and certified pilot to navigate an aircraft using the instrumentation in the cockpit. Methods of providing electronic navigational information range from ground-based transmitters installed on the airfield of an airport to satellites orbiting the Earth. Electronic NAVAIDs utilized at the Airport are listed in the following subsection:

- **Instrument Landing System –** Instrument Landing Systems (ILS) are electronic NAVAIDs that provide precision vertical and horizontal position information for aircraft on approach to a runway. An ILS is comprised of two pieces of equipment: a localizer and a glide slope antenna. Localizers are positioned at the departure end of a runway and transmit a signal that allows aircraft to align with the centerline of a runway when on approach to land. Signals transmitted from glide slope antennas position aircraft vertically with the correct glide slope path as they descend for landing on a runway. An ILS is the most precise navigational guidance systems of all electronic NAVAIDs.

  There are different categories of ILSs based upon their navigational accuracy, decision height, and visibility requirements. The standard ILS, Category I, allows a properly equipped aircraft to conduct an approach to a runway when the ceiling is not lower than 200 feet and the visibility is not lower than a 1/2 mile. At the Airport, Runway 16 and Runway 34 are equipped with Category I ILSs.

- **Global Positioning System (GPS) –** The Global Positioning System (GPS) is a satellite based navigational system that allows aircraft equipped with GPS receivers to accurately determine their location, altitude, direction of travel, and velocity. GPS offers aircraft the ability to conduct non-precision instrument approaches to runways without the use of ground based navigational equipment. With the installation of ground based GPS equipment, aircraft can receive more precise navigational information to conduct a near precision Localizer Performance with Vertical Guidance (LPV) instrument approach. Aircraft are able to conduct LPV GPS approaches at the Airport to both Runway 16 and Runway 34.

2.6.e Weather Equipment

Since aircraft operations are directly impacted by the weather, equipment is installed at an airport to accurately record and timely disseminate local airfield weather conditions. Two forms of weather reporting equipment are often installed at airports to accomplish this task: Airport Surface Observation System (ASOS) and Airport Weather Observation System (AWOS). The main elements of each weather observation system are relatively identical; however, build-in redundancy is included for components installed in ASOS units. Airports with ATCTs often install ASOS units that include instrumentation and sensors to measure wind speed and direction, temperature, dew point, barometric pressure, cloud ceiling height, visibility, and precipitation. Installation of a Runway Visual Range (RVR) component allow ASOS units to measure, in feet, the visibility below 1/2 mile which is particularly useful to pilots operating in Instrument Flight Rules (IFR) weather conditions. An ASOS unit with RVR capabilities is located at the Airport east of Taxiway A and north of the rental car service facility.

Surrounding the Airport, seven Low Level Wind Shear Alert System (LLWAS) sensor towers have been installed to notify pilots and ATC officials when this weather phenomenon is present. Wind shears are sudden changes in velocity or direction that are usually associated with warm or cold fronts, low level jet streams, and mountainous terrain. A strong wind shear can quickly alter the airspeed and path of travel of an aircraft that may result in a dangerous loss of lift. To warn pilots when these dangerous wind conditions are present, the seven wind shear indicators are located around the Airport.

Also installed at the Airport is a SCAN Web internet-based weather system that provides a snapshot of real-time weather information collected from ASOS instrumentation and in-pavement runway sensors. The system displays weather information such as air temperature, ground temperature, dew point, relative humidity, precipitation, wind speed, wind direction, and visibility for designated locations across the airfield. SCAN Web is particularly useful during snow and ice removal operations as in-pavement sensors on Runway 16/34 can measure the temperature of the pavement and help determine when precipitation may begin to freeze. This information helps Airport maintenance staff determine when to expect snow accumulation on the runway and when to apply deicing and anti-icing agents. The SCAN Web system at the Airport can be accessed by approved personnel through a secure web address on any internet browsing software.

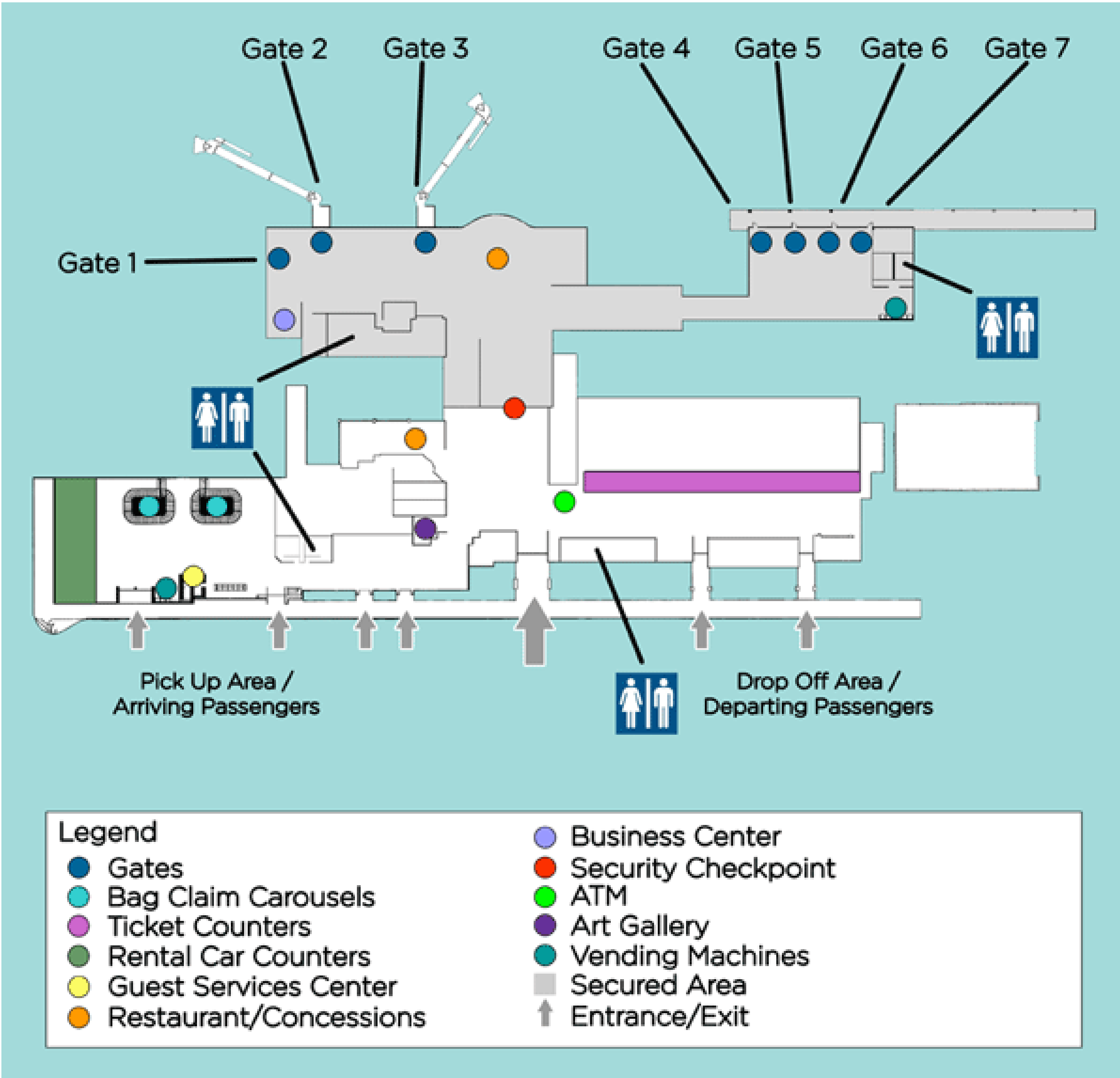
2.6.f Terminal Building

The main terminal building at the Airport is a seven gate facility equipped with five passenger boarding bridges, two baggage claim devices, and a single security checkpoint. Airline ticket counters are located in the north wing of the terminal on the public side of the security screening checkpoint while the baggage claims, rental car counters, and a guest services desk are located in the south wing. Prior to entering the security checkpoint, a concession stand is located next to the exit lane offering magazines, newspapers, snacks, and other travel items for purchase. On the secured side of the screening checkpoint, the Blue Ridge Trading + Tavern provides passengers with a full-service restaurant and bar while the gift shop sells reading materials, travel essentials, merchandise, and souvenirs. A business center located post screening near Boarding Gate 1 offers travelers a quiet area to complete work and other tasks. **Figure 2-14** illustrates the floor plan of the terminal building and its features.

Inside the terminal, artwork from Western North Carolina artists is displayed on a rotating basis. Sculptors and painters are encouraged to apply with the Airport to have their work displayed throughout the terminal and within the art gallery located near the security screening checkpoint. In addition to displaying art work, a piano purchased by the Airport in the terminal is available for musicians from pianists to folk ensembles to use if they apply with the Airport.

It should also be noted that the Airport's control tower is located on the top of the terminal building complex. Further discussion about the ATCT is presented in Section 2.8 of this Chapter.

Figure 2-14: Terminal Building Layout



Source: Asheville Regional Airport

2.6.g Fixed Base Operator

Fixed Base Operators (FBOs) are aviation-related businesses that provide services for pilots, aircraft, and passengers that range from aircraft fueling, ground servicing, aircraft maintenance and repair, in-flight catering, flight training, and aircraft rental. FBOs also serve as a terminal for passengers boarding general aviation aircraft and may include a passenger lobby, restrooms, vending machines, and rental car agencies. Accommodations for pilots to rest and prepare for their next flight such as pilot lounges, flight planning rooms, weather computers, and pilot shops may also be included in an FBO.

Landmark Aviation operates the only FBO at the Airport which is located on the north ramp and provides Jet A and 100LL aviation fuel, and aircraft ground handling services. Landmark Aviation also provides hangar storage for itinerant and based aircraft, concierge services, a passenger lobby, pilot lounge, conference room, and flight planning services. In addition, Landmark Aviation also oversees the leasing of several private general aviation hangars and tie-down spaces on both the north and south ramps.

Figure 2-15 illustrates Landmark Aviation's FBO terminal facility and its main hangar.

Figure 2-15: Landmark Aviation Facility

Source: Mead & Hunt, Inc.

2.6.h Hangars

Hangars are enclosed structures for the parking, servicing, and maintenance of aircraft and are designed for the protection of aircraft from environmental elements such as wind, rain, snow, ice, dust, and shelter-seeking small animals and birds. Most aircraft hangar structures are either box-style or T-style designs. Box-style hangars have a rectangular or box-shaped building footprint that range in size from structures that can house one or two single-engine aircraft to those capable of accommodating multiple jet aircraft. T-style hangars, also known as T-hangars, are in essence a series of small, interconnected single-engine aircraft hangars with footprints in the shape of a "T". Box-style hangars are most often constructed for multi-engine and jet aircraft while T-hangars are a popular covered storage option for multi- and single-engine aircraft.

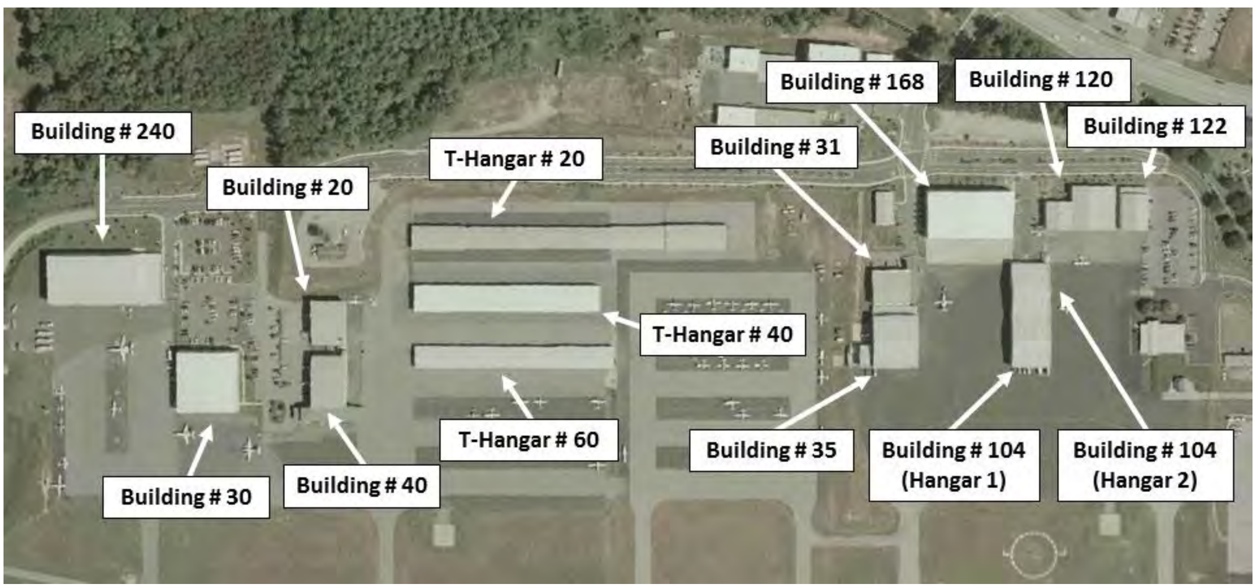
Several box-style hangars are located on both the north and south ramps at the Airport while three T-style hangar structures are found on the north ramp. **Table 2-9** lists the hangars found at the Airport while **Figure 2-16** identifies their location.

Table 2-9: Airport Hangars

Address	Building Number	Description	Hangar Type	Approx. Sq. Feet
20 Lindbergh Lane	20	Hangar with office	Box Style	8,480
168 Wright Brothers Way	168	Bulk hangar	Box Style	28,648
122 Wright Brothers Way	122	Hangar	Box Style	6,091
104 Wright Brothers Way	104	Hangar 1	Box Style	10,920
104 Wright Brothers Way	104	Hangar 2	Box Style	10,920
120 Wright Brothers Way	120	Hangar with office	Box Style	14,430
30 Lindbergh Lane	30	Bulk hangar	Box Style	19,600
35 Aviation Way	35	Hangar/office building	Box Style	14,727
31 Aviation Way	31	Hangar	Box Style	7,127
240 Wright Brothers Way	240	FBO office building & hangar	Box Style	31,980
40 Lindbergh Lane	40	FBO office building & hangar	Box Style	15,220
20 T-Hangar Row	T-Hangar 20	T-hangar	T-Style	22,827
40 T-Hangar Row	T-Hangar 40	T-hangar	T-Style	26,488
60 T-Hangar Row	T-Hangar 60	T-hangar	T-Style	39,368

Source: Asheville Regional Airport

Figure 2-16: Airport Hangar Locations



Aerial Photo: Woolpert, Inc.

2.6.i Fuel Facilities

Two fuel farm facilities designated for the storage of aircraft fuels are located on the Airport adjacent to the Landmark Aviation facility on Wright Brothers Way and east of the approach end of Runway 16 adjacent to the airfield perimeter access road. Each fuel farm is operated by Landmark Aviation and combined have a total capacity of 80,000 gallons of Jet A and 24,000 gallons of 100 low lead (100LL) fuels. Each fuel farm has above ground tanks and is constructed with secondary containment walls with dykes to control fuel in the event of an accidental leakage. Jet A and 100LL is available 24 hours per day, seven days per week through Landmark Aviation's full service staff or through a self-service 100LL pump.

In addition to the two aviation fuel farms, three other fueling facilities for non-aviation related purposes are located at the Airport. A fuel farm with a capacity of 1,800 gallons of diesel fuel and 1,800 gallons of unleaded gasoline is located within the airfield maintenance facility that is utilized by the Airport to refuel vehicles, tractors, snow removal equipment, and ARFF vehicles. A second non-aviation related fuel farm is located at the rental car maintenance facility at the south end of the Airport and is utilized by the rental car agencies for the refueling of rental vehicles. This fuel farm has five above ground, double-walled 5,000 gallon unleaded gasoline tanks that have a total capacity of 25,000 gallons. The third non-aviation fuel farm is located on the south side of the terminal building complex and consists of a single 8,000 gallon double-walled diesel fuel tank. This tank supplies diesel to the several emergency power generators located adjacent to the terminal that provide electricity to airfield lighting and other essential electrical components in the event of a power failure.

2.6.j Air Cargo Facilities

US Airways operates an air cargo processing facility for small packages in a building located adjacent to the ARFF building on the north side on the main terminal apron. Customers that have established shipping accounts with US Airways are able to drop off and pick up freight at the facility during standard business hours Monday through Friday for transport aboard the US Airways commercial passenger jets and small single- and twin-engine general aviation aircraft. The building has a total of eight roll up doors, four facing airside and four facing landside.

It should be noted that the Airport is utilizing coal-combustion by products (CCBs) for an engineered fill project on the west side of the airfield adjacent to the approach end of Runway 34 to create additional areas for future development. While a future use for this area has not yet been officially determined, it is anticipated that additional air cargo facilities may be constructed at this location. Given the close proximity of a FedEx Freight processing facility southwest of the airfield, continued efforts to prepare this area for future development may attract additional air cargo and freight processing facilities.

2.6.k Airport Maintenance Facility and Equipment

The Airport's maintenance facility for vehicles, equipment, and personnel is located landside near the intersection of Aviation Way and Wright Brothers Way. The three-building facility features storage and service areas for equipment, vehicle bays, workspaces, and personnel areas for Airport maintenance staff. The maintenance bay facility includes multiple bays for equipment servicing and includes a vehicle lift, overhead crane, and retractable pressurized air, electrical, and vehicle fluid hose reels. A personnel area adjacent to the maintenance bay facility provides staff with workspaces, offices, restrooms/showers, lockers, a kitchen, lounge, and sleeping quarters for staff use. Two additional multiple bay facilities provide covered storage for snow removal equipment, tractors, vehicles, mowers, supplies, and snow removal raw material storage.

Several vehicles and self-propelled machines are utilized by the Airport's maintenance department to maintain and keep the airfield operational. In addition to pickup trucks, tractors, mowers, fork lifts, and front end loaders, the Airport's maintenance vehicle inventory also includes rotary cutters, sweepers, and tandem axle snowplow trucks. **Table 2-10** lists the inventory of maintenance vehicles and other pieces of self-propelled equipment at the Airport.

Table 2-10: Airport Maintenance Vehicles

Equipment Description	#	Equipment Description	#
Ford F-250/350/550 4x4 trucks	9	Volvo BL70 backhoe	1
John Deere/Kubota/Int'l/Ford tractors	4	Sweepster/Tennant Sentinel sweepers	3
Caterpillar forklift	1	Kubota/Walker mower	2
Volvo L90C/Clark loaders	2	Kodiak snow blower	1
Ford/Volvo tandem axle trucks	4	Ford Freestar minivan	1
Ford Expedition 2x4 SUV	2	Ventrac 4200 personal tractor	1

Source: Asheville Regional Airport

2.6.I Aircraft Rescue and Fire Fighting (ARFF) and Public Safety Facility and Equipment

The 5,800 square foot Department of Public Safety (DPS) building located adjacent to the terminal building houses the Airport's Aircraft Rescue and Fire Fighting (ARFF) equipment, Airport Police operations, and the Airport's Communication Center, as well as provides offices, living quarters, and work areas for Public Safety officers. The vehicle bay of the DPS building provides heated, covered storage for up to four ARFF trucks in addition to storage room for Aqueous Film Forming Foam (AFFF), medical supplies, and firefighting equipment. Adjacent to the vehicle bay are the personnel quarters that contain offices, a dispatch center, locker room, kitchen, day room, training room, and storage space for DPS officers who are responsible for both ARFF and police duties at the Airport.

It should be noted that at the time of this master plan study the Airport was planning to construct a new ARFF and Public Safety facility to replace the existing DPS building that is limited in space for the storage of equipment, supplies, and vehicles. In particular, the vehicle bays of the existing facility do not meet size requirements for next generation ARFF vehicles that the Airport needs to purchase to replace outdated equipment. Also, the planned location of the new facility on a site north of the existing DPS building on the south apron would provide a clear path to the airfield for responding emergency vehicles. Currently, ARFF vehicles responding from the existing DPS building are sometimes forced to navigate around parked commercial airline aircraft as a result of its location in close proximity to the terminal. Having a dedicated clear route to the airfield would help decrease airfield emergency response times and prevent potential collisions with ARFF vehicles and parked aircraft. As a result of the planning undertaken by the Airport for this new facility prior to the initiation of this study, an extensive analysis was not conducted for a new ARFF/DPS building.

ARFF services at the Airport are provided by three vehicles that meet Index B requirements as outlined in FAR Part 139; an E-One Crash Truck, an Oshkosh Crash Truck, and an Oshkosh Striker 1500. At all times, two of these vehicles comprise the active duty fleet at the Airport while the third is maintained as a reserve vehicle in the event additional vehicles are needed for an emergency. A fourth fire truck, a Walters 4x4 Crash Truck, will be taken out of service in 2012 and replaced with a 2012 Rosenbauer Rapid Intervention Vehicle which is on order. In addition to these vehicles, a Polaris Ranger all-terrain vehicle (ATV) is used to access locations on the Airport that may be difficult to reach with the larger trucks.

Since DPS also provides law enforcement at the Airport, two police package Ford Expedition vehicles are provided for officers to complete routine patrols, traffic stops, and respond to emergency situations. In addition to these vehicles, a Ford F-350 pickup truck is used for inspecting airfield conditions and taking surface friction readings during snow removal operations.

2.6.m Airfield Electrical Vault & Generator

It is critical that a constant supply of power is provided to airfield lighting and navigational equipment in order to maintain a continually operational airfield. Two airfield electrical elements necessary to complete this task are an airfield electrical vault and a power generator. Airfield electrical vaults are structures designed to house transformers, relays, lighting panels, constant current regulators (CCRs), and other electrical components required to power airfield electrical infrastructure. Airfield generators are self-generating auxiliary sources of power intended to provide emergency electricity in the event of an off-Airport public utility power outage.

Since airfield electrical vaults and generators are connected to the same circuit, each will often be located in close proximity to one another to provide a centralized location for maintenance and accessibility. At the Airport, the airfield electrical vault and generator are located airside adjacent to one another next to the baggage return wing of the terminal building. A degree of redundancy has been built into the equipment installed in the vault to ensure the airfield receives power in the event any of the electrical components fail. In combination with the diesel powered generator, constant, uninterrupted power can be provided to airfield lighting and navigational equipment allowing the Airport to remain operational during night, in low visibility weather conditions, and in the event of a power failure.

2.6.n Airport Access Roads

Three entrances provide access to the Airport from North Carolina Route 280. To the north, Aviation Way provides access to the Airport's general aviation area while Terminal Drive provides access to the terminal building and commercial passenger parking. An additional Airport entrance for southbound traffic on North Carolina Route 280 provides access to Terminal Drive and the terminal area. Terminal Drive, the main Airport entrance, is a circular roadway that allows traffic to loop from North Carolina Route 280 to the terminal building, long- and short-term parking lots, and the rental car ready/return lot. South of the rental car ready/return lot on Terminal Drive, Rental Car Drive provides gated access to the consolidated rental car service center.

The northern entrance to the Airport provided by Aviation Way intersects Wright Brothers Way which provides access to the various aeronautical and non-aeronautical businesses that comprise general aviation area of the Airport. Near Landmark Aviation, Lindbergh Lane intersects Wright Brothers Way to provide additional access to the FBO as well as Belle Air Maintenance Facility and Hangar #30. All Airport access roads are considered to be in good condition with recent improvements occurring on Terminal Drive (resurfacing) and Wright Brothers Way (resurfacing and widening). **Figure 2-17** illustrates the access roads at the Airport.

Figure 2-17: Airport Access Roads

Aerial Photo: Woolpert, Inc.

2.6.o Automobile Parking

At the Airport, there are over 2,500 parking spaces for commercial airline passengers, terminal building tenant employees, and rental car vehicles divided between ten different lots. The public long-term parking lot, located adjacent to the terminal building, has the largest parking capacity with 752 available spaces. Within the long-term lot is a designated short-term lot that provides an additional 192 public parking spaces. An overflow lot, located south of the long-term lot, adds an additional 520 parking spaces totaling the Airport's public parking capacity for commercial airline passengers at 1,465 vehicles. In addition to these lots, a cell phone waiting lot located south of the employee parking lot provides an additional 48 spaces for public parking that are designated only for vehicles waiting to pick up arriving passengers.

South of the terminal building near the baggage claim entrance is a rental car ready/return lot that has a parking capacity of 107 vehicles. In combination with the consolidated rental car service center that has a capacity of 578 vehicles, a total of 685 parking spaces at the Airport are available for rental vehicles. Parking for employees at the Airport is available at two lots south of the rental car ready/return lot that have a combined capacity of 327 vehicles while parking for Greater Asheville Regional Airport Authority employees is available at two lots north of the terminal building that have a combined capacity of 34 vehicles. DPS and Maintenance employees park in separate lots located within the north employee parking lot (six parking spaces) and at the Maintenance facility (18 parking spaces). Though the DPS facility has a parking lot, all spaces are reserved for either DPS vehicles or visitors. **Table 2-11** summarizes the total number of allocated parking spaces at the Airport.

Table 2-11: Airport Allocated Parking Spaces

Parking Lot	Number of Parking Spaces
Long-Term Lot	752
Short-Term Lot	193
Overflow Lot (Long-Term)	520
Cell Phone Waiting Lot	48
Rental Car Ready/Return Lot	107
Consolidated Rental Car Service Center Lot	578
South Employee Parking Lot	240
North Employee Parking Lot	87
Authority Employee Parking Lots	34
DPS Employee Parking Lot	6
Maintenance Employee Parking Lot	18
TOTAL	**2,583**

Note: Parking spaces in Airport tenant lots not included in this tabulation
Source: Asheville Regional Airport

2.6.p Consolidated Rental Car Facility

The Airport's consolidated rental car facility, constructed in 2008, is located south of the terminal parking area on Rental Car Drive and provides the rental car agencies a centralized location to quickly service vehicles in between rentals. The consolidated rental car facility is comprised of two multiple bay vehicle service buildings and two service islands. Each vehicle service building is equipped with service bays that feature car washing equipment, vehicle lifts, and overhead retractable hose reels that provide pressurized air and vehicle fluids. Adjacent to each building is a covered service island that contains gasoline pumps and vacuums to fuel and clean vehicles.

2.7 Businesses and Tenants

There are several businesses, organizations, and governmental entities that engage in both aviation and non-aviation related activities at the Airport. Each of these entities is considered to be a tenant of the Airport since they lease office space, buildings, ticket counters, storage areas, and/or service space from the Authority. In the terminal building, Allegiant Air, United Airlines, Delta Air Lines, and US Airways have ticket counters, offices, and baggage makeup areas for their airline operations. The Paradies Shops, operators of the Blue Ridge Trading + Tavern restaurant and the gift shop lease restaurant, concession, and storage areas in the terminal for their operations. In addition to these businesses, two governmental agencies responsible for the safety and security of aviation also lease office space in the terminal building. The Transportation Security Administration (TSA) leases offices for administrative officials and Transportation Security Officers (TSOs) while the FAA leases office and work space for its ATC operations.

Rental car agencies based at the Airport lease space in both the terminal building and the consolidated rental car facility for their operations. Avis, Budget, Enterprise, Hertz, and National/Alamo lease ticket counter and office space in the terminal to conduct business transactions while offices and storage areas at the consolidated rental car facility are leased for service employees, supplies, and materials. Also involved in ground transportation-related activities at the Airport is Standard Parking, which has offices in the parking lot toll booth plaza and is responsible for the management and revenue control of the Short- and Long-Term parking lots.

Other tenants at the Airport include the FBO operator Landmark Aviation, Belle Aircraft Maintenance, and WNC Aviation, which conducts flight instruction and provides rental aircraft. Two other governmental entities, the U.S. Forestry Service and the Civil Air Patrol (CAP), lease buildings at the Airport for aerial firefighting and auxiliary services for the U.S. Air Force, respectively. Finally, Advantage West, a regional economic development commission, leases a building near the US Airways cargo facility as its center of operations.

2.8 Airspace, Air Traffic Control, and Approach/Departure Procedures

In addition to the collection of data on physical infrastructure elements, information was also gathered on the surrounding airspace, ATC, and approach/departure procedures at the Airport. Evaluation of this information from subsequent study tasks has helped to identify the adequacy of existing airspace design and procedures to support Airport operations for the next 20 years. Elements that comprise the makeup of airspace surrounding the Airport are presented in the following sections.

2.8.a Airspace

All airspace over the United States is classified into one of six different categories by the FAA based on criteria such as level of activity, type of ATC, and requirements for IFR and VFR flight. Special restrictions, conditions, and operating rules apply to each classification of airspace. The following lists the different classes of airspace and describes the operational criteria associated with each.

Class A – Class A airspace is located between the altitudes of 18,000 feet and 60,000 feet MSL and lies over the entire United States. Aircraft operating in Class A airspace must do so under IFR and file a flight plan with an FAA Flight Service Station (FSS). All aircraft operating in this airspace must receive approval from ATC prior to entering and must remain in constant radio communication.

Class B – Class B airspace is located between ground level and an altitude of 10,000 feet MSL and occurs generally around airports with high levels of air traffic. The horizontal dimension of Class B airspace varies based on the specific needs of an Airport, such as the orientation of runways, surrounding land uses, and arrival and departure procedures. Aircraft operating in this class of airspace must receive clearance from ATC prior to entering and remain in constant radio communication.

Class C – Class C airspace is located between ground level and an altitude of 4,000 feet MSL and is assigned around airports with a control tower, radar approach control, and have a significant number of IFR operations. The horizontal dimension of Class C airspace varies based upon the specific needs of an Airport but is generally two-tiered in shape with a with an inner radius of five miles around an airport from ground level to an altitude of 1,200 feet MSL and an outer radius of ten miles from an altitude of 1,200 feet MSL to 4,000 feet MSL. Permission and constant radio communication from ATC is required for aircraft to operate in Class C airspace.

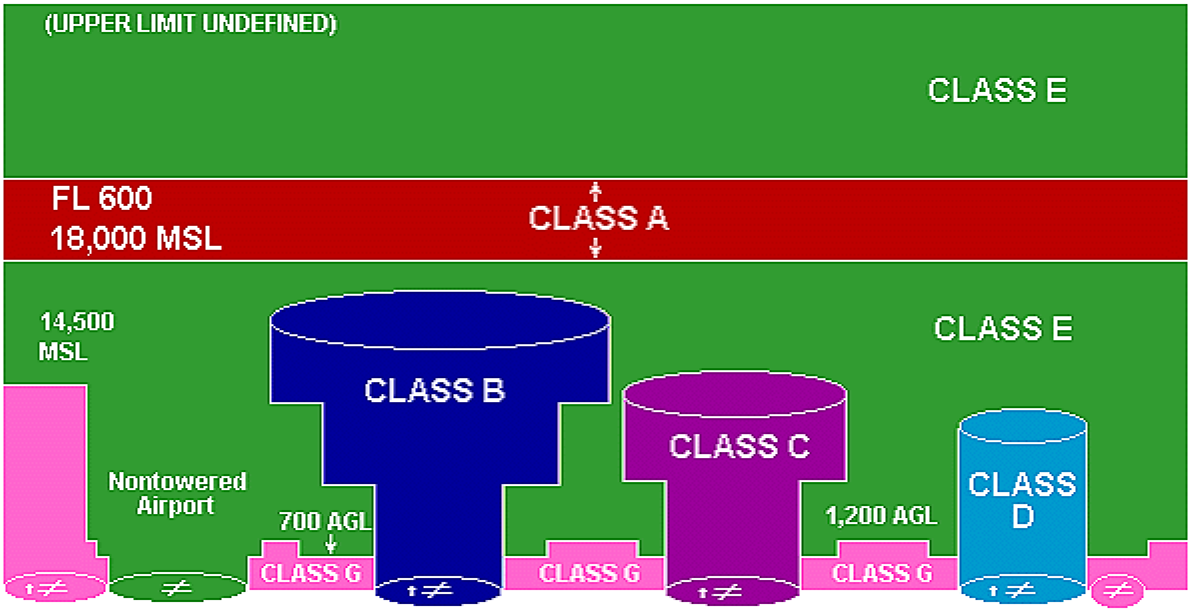
Class D – Class D airspace is located between ground level and an altitude of 2,500 feet MSL and is classified around airports that have an ATCT, but may not have radar approach control in the ATCT. The horizontal dimension of Class D airspace varies based upon specific airport needs such as type of arriving and departing aircraft, level of IFR/VFR activity, and aircraft approach and departure routes. Aircraft must request permission from ATC and remain in constant radio communication to operate in this airspace.

Class E – Class E airspace is all airspace from ground level to 18,000 feet MSL and from 60,000 feet MSL to the upper operational ceiling of aircraft that is not classified as A, B, C, D, or G. While aircraft operating under IFR are required to be in constant communication with ATC in Class E airspace, those operating VFR are not required to contact ATC.

Class G – Class G airspace is located between ground level up to an altitude of 14,500 feet MSL, though it is generally assigned to an altitude of 1,200 feet about ground level (AGL). This class of airspace is not provided ATC services and can be found around large, remote areas.

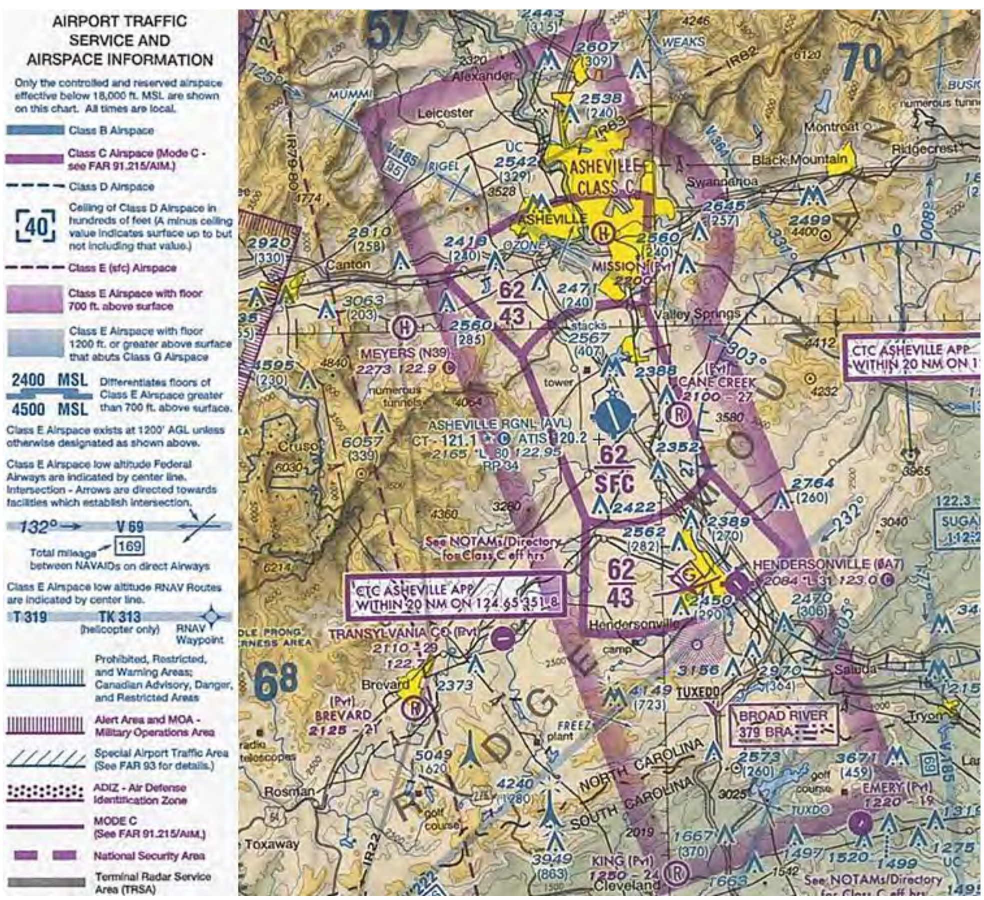
Airspace around the Airport is classified as Class C and is linear shaped based upon the arrival and departure paths of aircraft to and from Runway 16/34. Aircraft must receive permission to enter the airspace and be in constant radio communication with both airport control tower and radar approach air traffic controllers. **Figure 2-18** illustrates the six classifications of airspace while **Figure 2-19** illustrates the airspace around the Airport from the FAA Airspace Sectional Chart.

Figure 2-18: Classes of Airspace



Source: Federal Aviation Administration

Figure 2-19: Airspace Sectional Chart



Source: SkyVector.com Aeronautical Charts, 2011

2.8.b Part 77 Surfaces

FAR Part 77 was established by the FAA to protect aircraft from obstructions when operating in proximity to an airport through a set of design surfaces that protect airspace from the construction of towers, buildings, and other tall objects. Through 14 Code of Federal Regulations (CFR) Part 77, a reporting method has been established to notify the FAA of proposed construction that may be a hazard to safe air navigation. Although the FAA will make a decision if the proposed construction will impact the safe and efficient use of navigable airspace, the determination may not prevent someone from constructing or altering a structure that is a hazard since the FAA does not have authority to control land use. The five design surfaces defined in FAR Part 77 are summarized in the following sections.

Primary Surface – The primary surface is centered longitudinally on a runway centerline at the same elevation as a runway and extends 200 feet beyond each end of a paved runway. On runways with turf surfaces, the primary surface length is the same length as the runway. The width of this surface is:

- 250 feet for utility runways (designed for propeller driven aircraft of 12,500 pounds maximum gross weight or less) having only visual approaches
- 500 feet for utility runways having non-precision instrument approaches
- 500 feet for runways other than utility having only visual approaches
- 500 feet for non-precision instrument runways other than utility having visibility minimums greater than 3/4 statue mile
- 1,000 feet for non-precision instrument runways other than utility having a non-precision instrument approach with visibility minimums as low as 3/4 statue mile
- 1,000 feet for precision instrument approach runways other than utility

Since Runway 16/34 is a precision instrument runway, its primary surface is 1,000 feet in width and extends 200 feet beyond each runway end.

Approach Surface – The approach surface is centered on a runway centerline and extends longitudinally upward and outward away from the primary surface at each runway end. The inner width of the surface is the same width as the primary surface and expands uniformly to a width of:

- 1,250 feet for the end of a utility runway with only visual approaches
- 1,500 feet for the end of a runway other than utility with only visual approaches
- 2,000 feet for the end of a utility runway with a non-precision instrument approach
- 3,500 feet for the end of a non-precision instrument runway other than utility having visibility minimums greater than 3/4 statue mile
- 4,000 feet for the end of a non-precision instrument runway other than utility having a non-precision instrument approach with visibility minimums as low as 3/4 statue mile
- 16,000 feet for precision instrument runways

The horizontal distance and slope of the approach surface is:

- 5,000 feet at a slope of 20:1 for all utility and visual runways
- 10,000 feet at a slope of 34:1 for all non-precision instrument runways other than utility
- 10,000 feet at a slope of 50:1 with an additional 40,000 feet at a slope of 40:1 for all precision instrument runways

As mentioned before, both ends of Runway 16/34 have a precision instrument approach. The dimensions of the approach surface for each end of the runway are:

- Inner width: 1,000 feet
- Outer width: 16,000 feet
- Slope: 50:1 to a distance of 10,000 feet, then 40:1 slope for an additional 40,000 feet

Transitional Surface – The transitional surface is also centered on a runway centerline and extends outward and upward perpendicularly from the primary surface at a slope of 7:1 until a height of 150 feet above an airport where it meets the horizontal surface.

Horizontal Surface – The horizontal surface is a horizontal plane located 150 feet above an airport and meets the transitional and conical surfaces. The perimeter of the horizontal surface is constructed by lines of tangent from arcs generated from each runway end. The radii of the arcs are:

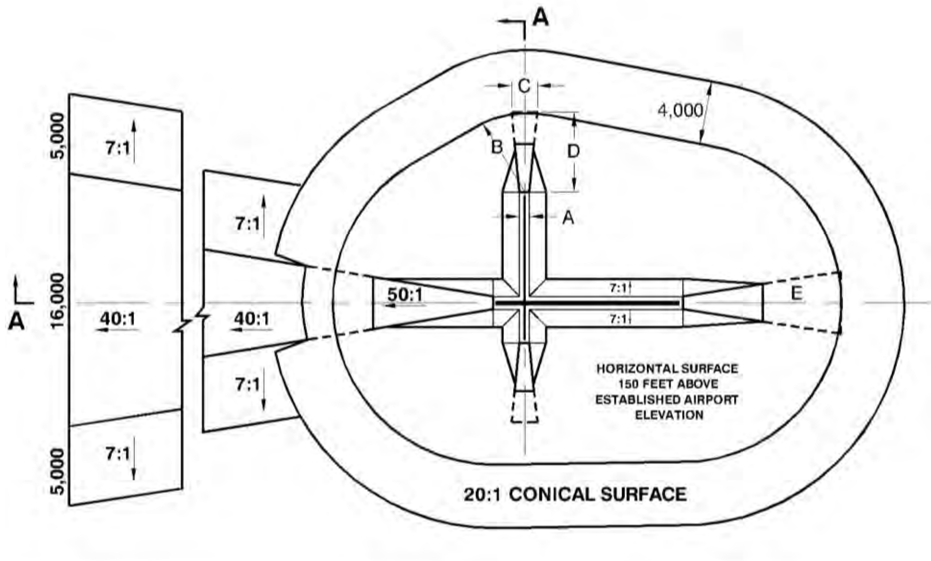
- 5,000 feet for all runways designated as utility or visual
- 10,000 feet for all other runways

In the event a 5,000 feet arc is encompassed by tangents connecting two adjacent 10,000 feet arcs, the 5,000 feet arc shall be disregarded in the design of the horizontal surface perimeter. The radii of the arcs used in the establishing the perimeter of the horizontal surface above Runway 16/34 is 10,000 feet.

Conical Surface – The conical surface extends outward and upward from the perimeter of the horizontal surface at a slope of 20:1 for a horizontal distance of 4,000 feet.

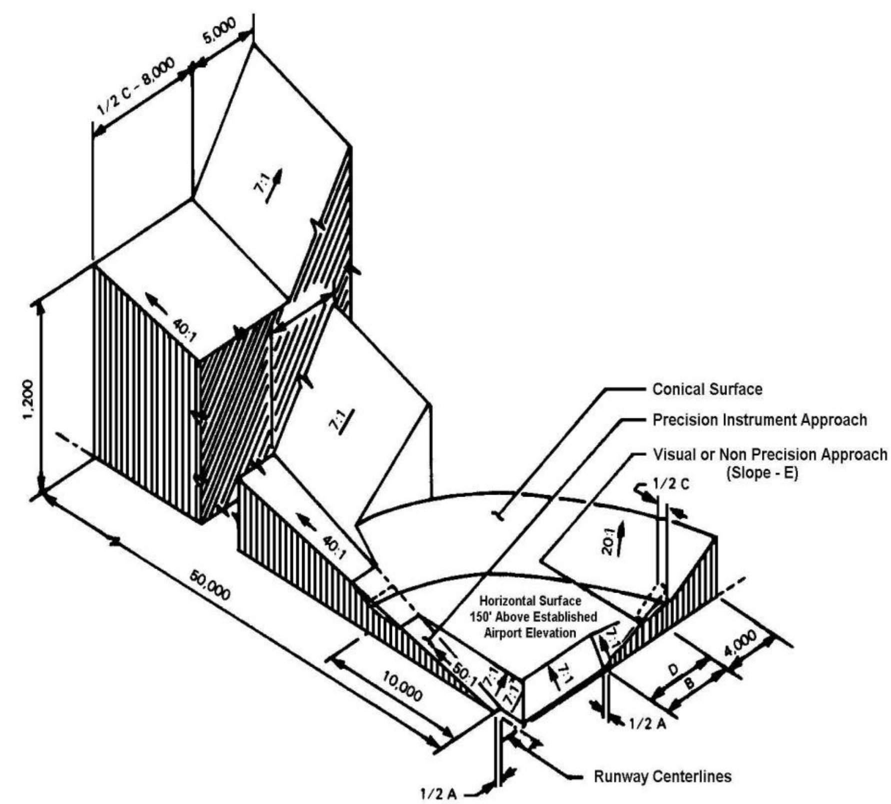
Further information on the FAR Part 77 surfaces at the Airport is provided in Chapter 4. **Figure 2-20** illustrates a plan view of the five FAR Part 77 surfaces while an isometric view is presented in **Figure 2-21**.

Figure 2-20: FAR Part 77 Surfaces – Plan View



Source: FAR Part 77

Figure 2-21: FAR Part 77 Surfaces – Isometric View



Source: FAR Part 77

2.8.c Runway Protection Zones

Another airfield design element intended to protect airspace, prevent incompatible land uses, and protect people and property on the ground within the vicinity of a runway end are runway protection zones (RPZs). RPZs are trapezoidal-shaped areas located on both the arrival and departure ends of a runway within the innermost portion of the FAR Part 77 approach surface. The dimensions of an RPZ are based on the type of aircraft expected to use a runway and its approach visibility minimums (**Table 2-12**). Airports are sought by the FAA to control the land within the RPZ to prevent the creation of hazards to landing and departing aircraft. Further information on the RPZs and their dimensions at the Airport is available in Chapter 4.

Table 2-12: Runway Protection Zone Dimensions

Visibility Minimums	Design Aircraft	Dimensions			
		Length	Inner Width	Outer Width	RPZ Acres
Visual and not lower than 1 mile	Small Aircraft Only	1,000 ft.	250 ft.	450 ft.	8.035 acres
	ARC Category A & B	1,000 ft.	500 ft.	700 ft.	13.770 acres
	ARC Category C & D	1,700 ft.	500 ft.	1,010 ft.	29.465 acres
No less than 3/4 mile	All Aircraft	1,700 ft.	1,000 ft.	1,510 ft.	48.978 acres
Lower than 3/4 mile	All Aircraft	2,500 ft.	1,000 ft.	1,750 ft.	78.914 acres

Source: FAA AC 150/5300-13, *Airport Design*

2.8.d Air Traffic Control (ATC)

ATC at the Airport and within the airspace surrounding its proximity is the responsibility of the FAA through an on-site ATCT and Terminal Radar Approach Control Facility (TRACON). The ATCT is responsible for the safe separation of aircraft on final approach, initial climb-out after departure, and both aircraft and vehicle traffic on the airfield while the TRACON facility is responsible for the safe transition of aircraft into and out of the airspace surrounding the Airport. In addition to safe aircraft separation, the ATCT and TRACON facilities also provide traffic advisories, disseminate safety alerts, and provide radar vectoring when requested by pilots. Both ATC units are located in the control tower with ATCT services provided from a cab on the top and TRACON occupying space on floors underneath. An Airport Surveillance Radar (ASR), located adjacent to the intersection of Wright Brothers Way and Lindbergh Lane, is utilized by both the ATCT and TRACON to provide radar coverage at the Airport. Display screens located in both the ATCT cab and TRACON radar control room display position information, direction of travel, speed, and altitude of aircraft detected by the ASR.

ATC services at the Airport by the ATCT and TRACON are provided from 6:30 a.m. until 11:00 p.m. local time outside of which the surrounding Class C airspace reverts to a Class E airspace requiring pilots to communicate directly with one another to coordinate their aircraft's safe separation. This coordination between pilots is accomplished through a Common Traffic Advisory Frequency (CTAF) upon which a pilot can report the position of his or her aircraft with other aircraft operating within the Airport's airspace.

Basic radar services during the closure of the ATCT and TRACON are provided by the Atlanta Air Route Traffic Control Center (Atlanta ARTCC) located in Atlanta, Georgia, which is responsible for the safe separation of aircraft in airspace surrounding the Airport.

Aircraft separation services provided by the ATCT and TRACON are divided into operational disciplines based on the air traffic separation needs for each phase of flight. The following summarizes the operational disciplines offered by ATC at the Airport:

Ground Control – Ground control is a position within the ATCT that is responsible for the movement of aircraft and vehicles on runways, taxiways, and aprons located within the aircraft movement area. In addition to providing taxiing instructions to aircraft and overseeing the safe passage of vehicles, ground control is also responsible for personnel and equipment operating within the safety area of runways and taxiways. All aircraft, vehicles, personnel, and equipment are required to:

- Request permission from ground control to enter the movement area
- Remain in constant radio communication with ground control while within the movement area
- Notify ground control upon exiting the movement area

Tower – The tower controller position is responsible for the safe separation of arriving and departing aircraft from the Airport. In addition to providing landing and takeoff clearances, the tower controller also is responsible for the separation of aircraft that transition to and from airspace controlled by TRACON.

Approach/Departure Control – Approach/departure controllers are positions within TRACON that are responsible for the separation of arriving, departing, and transient aircraft within 20 nautical miles of the Airport. Depending on the traffic volume and available staffing, the approach and departure control positions may be combined into the responsibility of a single controller.

Table 2-13 summarizes the communication frequencies utilized by ATC controllers at the Airport. In addition to ground control, tower, and approach/departure control, frequencies are also assigned for the continual broadcast of weather observations and Airport condition information through the Automatic Terminal Information Service (ATIS), emergencies, and for non-ATC related radio traffic through the universal communications frequency (UNICOM).

Table 2-13: Airport Communication Frequencies

Ground Control:	121.9 MHz
Tower:	121.1 MHz
Approach Control:	124.65 MHz & 351.8 MHz (160°-339°) 125.8 MHz & 269.575 MHz (339°-160°)
Departure Control:	124.65 MHz & 351.8 MHz (160°-339°) 125.8 MHz & 269.575 MHz (339°-160°)
CTAF:	121.1 MHz
ATIS:	120.2 MHz
Emergency:	121.5 MHz & 243.0 MHz
UNICOM:	122.95 MHz

Source: FAA Airport/Facility Directory

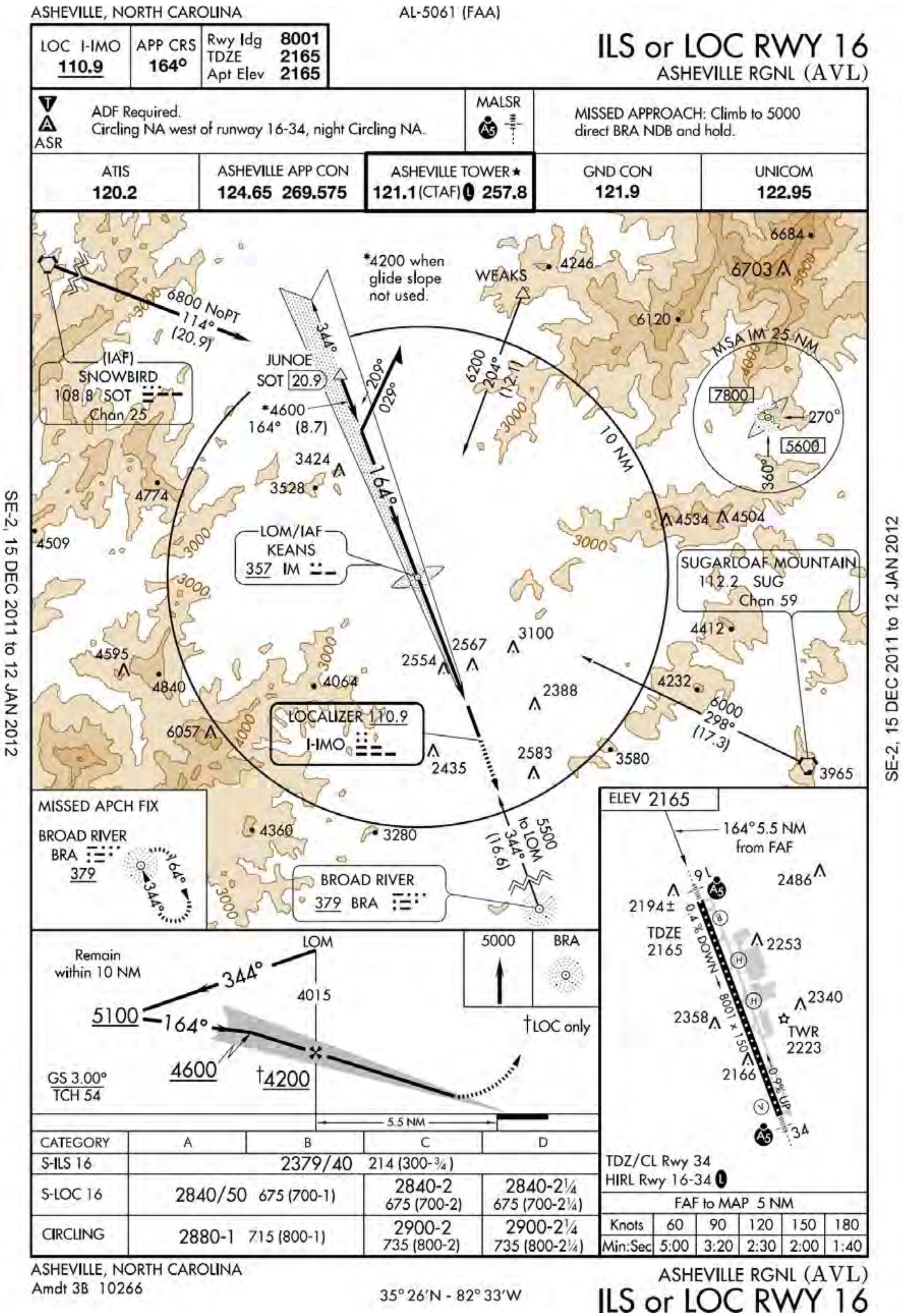
2.8.e Approach/Departure Procedures

To assist pilots in navigating through airspace prior to landing and during the initial climb after takeoff in night time, low visibility, low cloud ceilings, and inclement weather conditions, the FAA will establishes approach and departure procedures at an airport. Approach procedures outline routes and altitudes to be flown by pilots when navigating an approach to landing while departure procedures outline defined flight paths for aircraft to follow to intercept an en route airway. Departure procedures are particularly useful in managing the flow of traffic at airports with higher traffic volumes or to direct traffic away from populated areas for noise abatement purposes. Each procedure established by the FAA identifies waypoints for runway alignment or route vectoring, specific altitudes, radio frequencies, minimum visibility, and ceiling height requirements.

Approach and departure procedures are developed based upon the type of navigational equipment installed and utilized at an airport. Approach procedures are commonly established for runways that utilize precision and non-precision NAVAID equipment, such as Area Navigation (RNAV) based on GPS signals and ILS while departure procedures utilized standard en route NAVAIDs such as GPS, Very High Frequency Omnidirectional Range (VOR) equipment, and navigational instructions from ATC. At the Airport, four approach procedures and one departure procedure has been developed for departing and arriving aircraft on Runway 16/34. The following pages illustrate the published approach and departure procedures that have been established at the Airport as of December 2011:

- ILS or Localizer approach to Runway 16 (**Figure 2-22**).
- ILS or Localizer approach to Runway 34 (**Figure 2-23**).
- RNAV (GPS) approach to Runway 16 (**Figure 2-24**).
- RNAV (GPS) approach to Runway 34 (**Figure 2-25**).
- Asheville Three Departure from Runway 16/34 (**Figure 2-26** and **Figure 2-27**).

Figure 2-22: ILS or Localizer Approach to Runway 16



CATEGORY	A	B	C	D
S-ILS 16		2379/40	214 (300-¾)	
S-LOC 16	2840/50 675 (700-1)		2840-2 675 (700-2)	2840-2¼ 675 (700-2¼)
CIRCLING	2880-1 715 (800-1)		2900-2 735 (800-2)	2900-2¼ 735 (800-2¼)

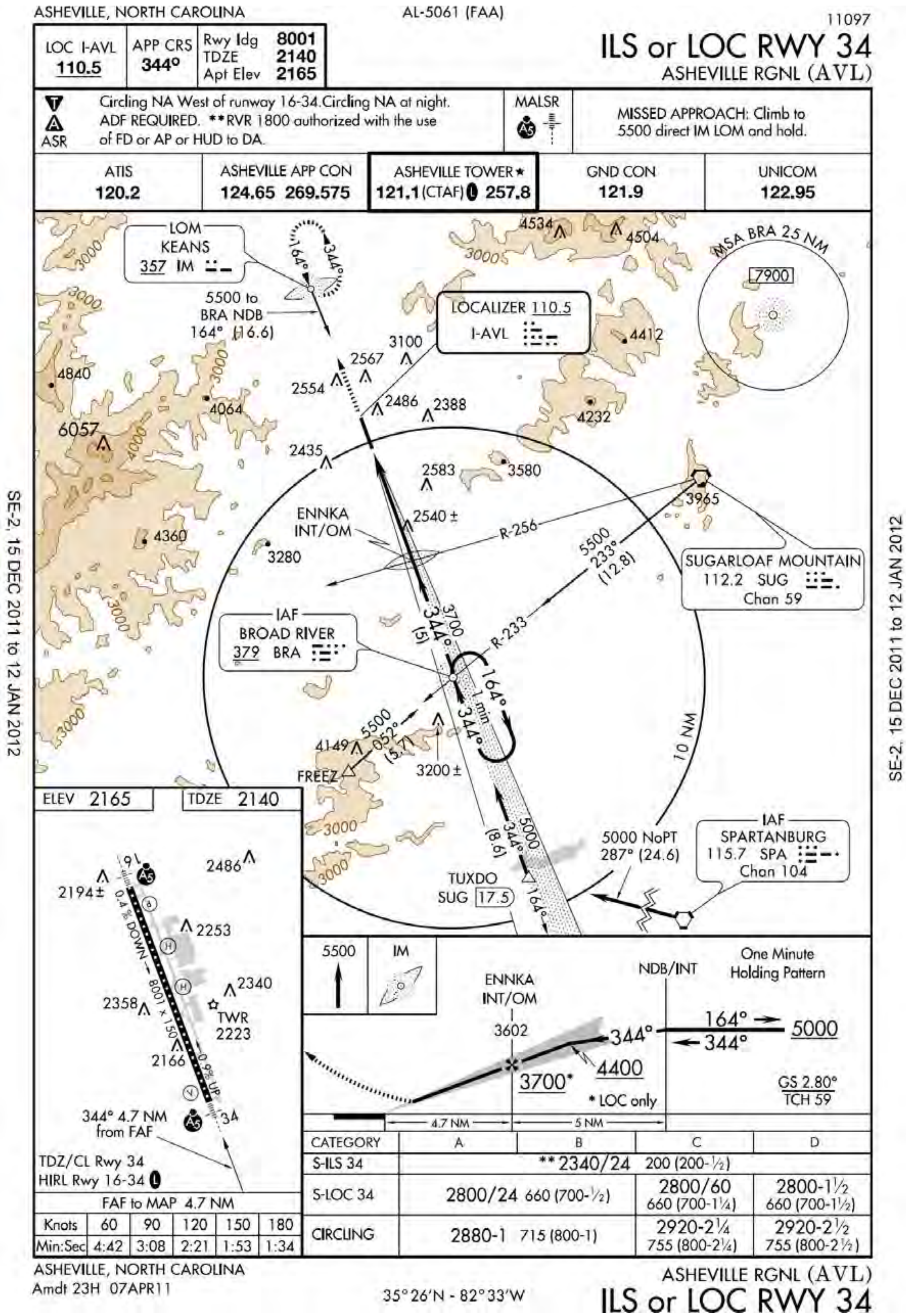
FAF to MAP 5 NM

Knots	60	90	120	150	180
Min:Sec	5:00	3:20	2:30	2:00	1:40

ASHEVILLE, NORTH CAROLINA
Amdt 3B 10266
35° 26'N - 82° 33'W
ASHEVILLE RGNL (AVL)
ILS or LOC RWY 16

Source: Federal Aviation Administration

Figure 2-23: ILS or Localizer Approach to Runway 34

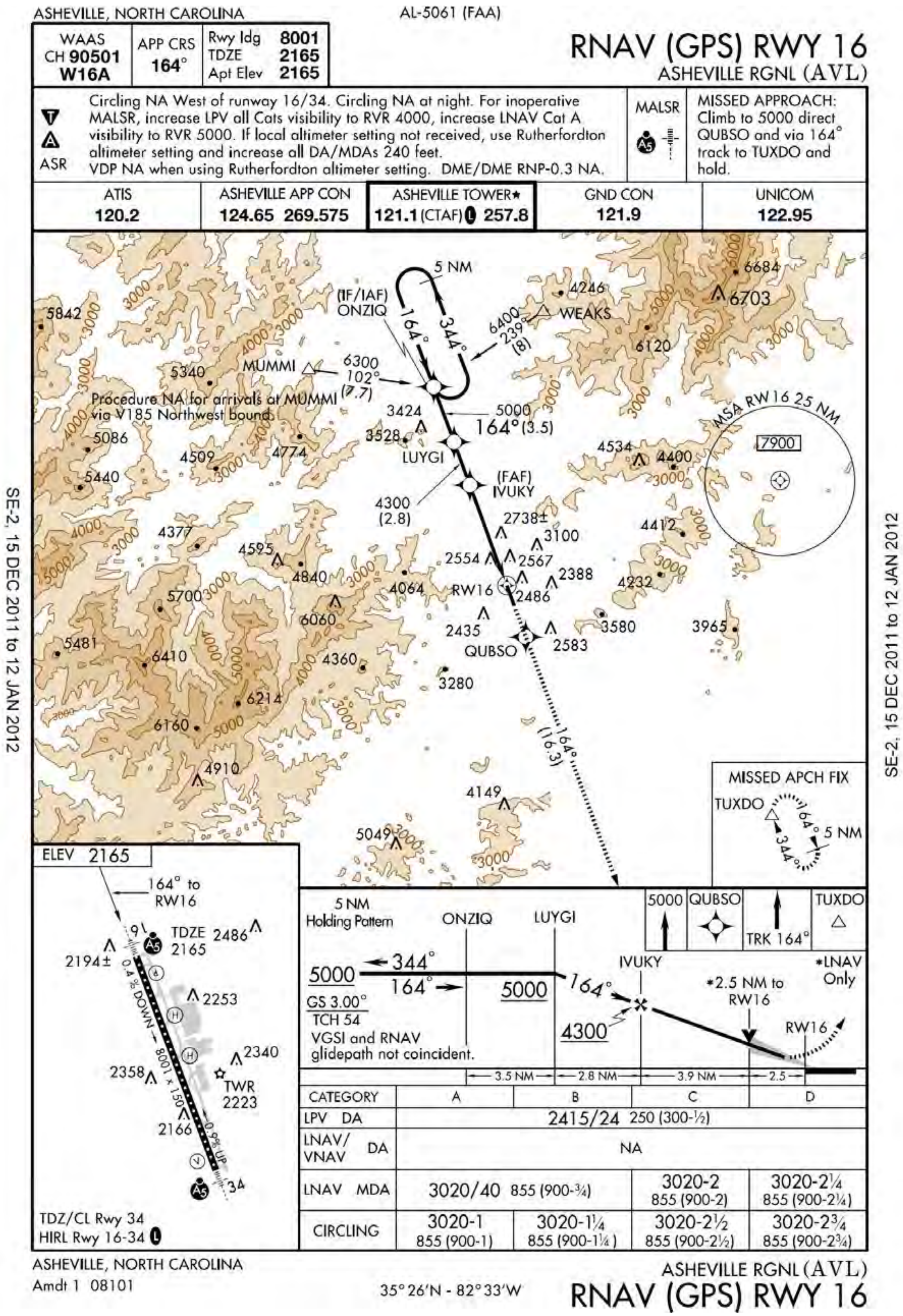


Knots	60	90	120	150	180
Min:Sec	4:42	3:08	2:21	1:53	1:34

CATEGORY	A	B	C	D
S-ILS 34	**2340/24 200 (200-½)			
S-LOC 34	2800/24 660 (700-½)		2800/60 660 (700-1¼)	2800-1½ 660 (700-1½)
CIRCLING	2880-1 715 (800-1)		2920-2¼ 755 (800-2¼)	2920-2½ 755 (800-2½)

Source: Federal Aviation Administration

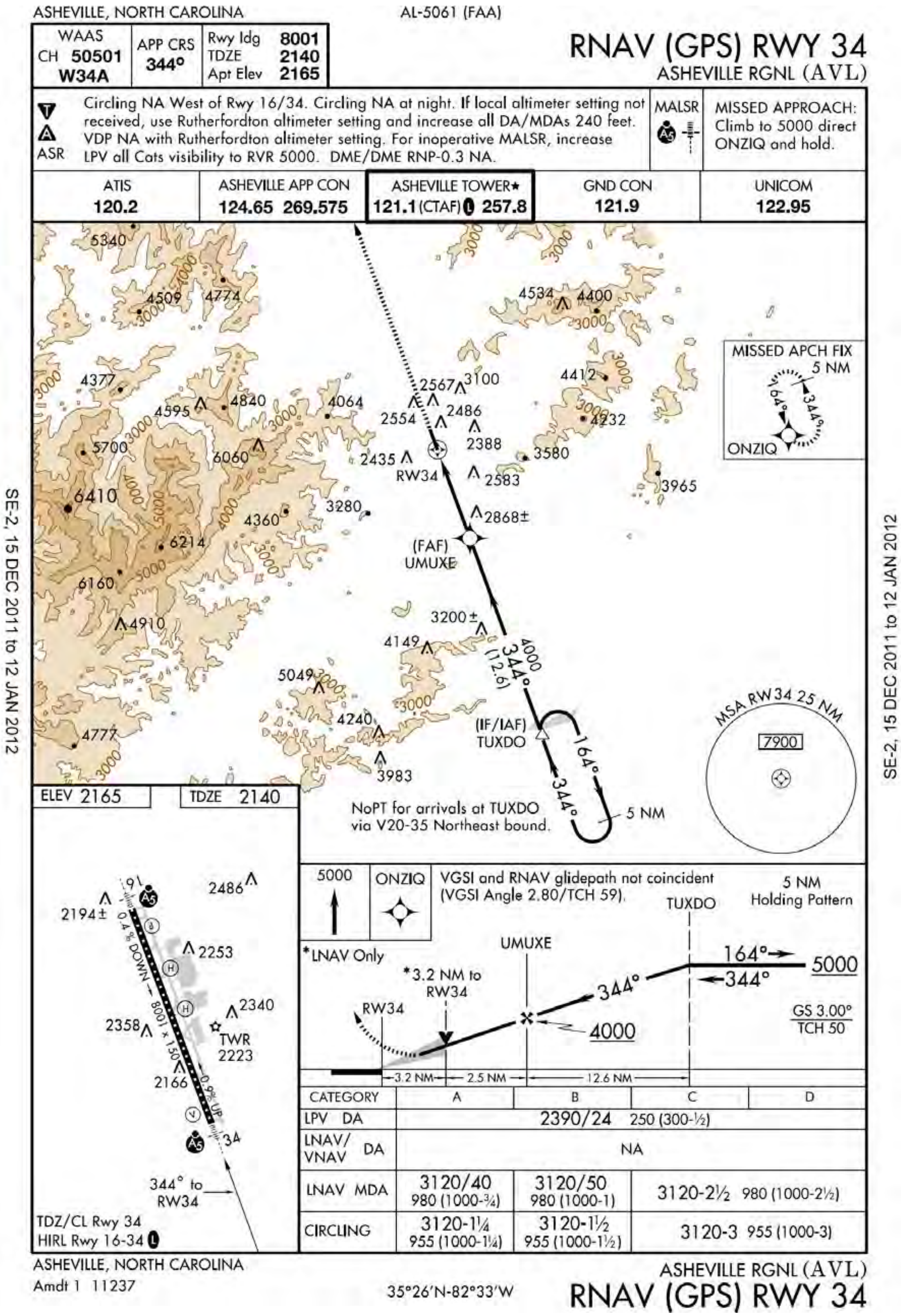
Figure 2-24: RNAV (GPS) Approach to Runway 16



CATEGORY	A	B	C	D
LPV DA	2415/24 250 (300-½)			
LNAV/VNAV DA	NA			
LNAV MDA	3020/40 855 (900-¾)		3020-2 855 (900-2)	3020-2¼ 855 (900-2¼)
CIRCLING	3020-1 855 (900-1)	3020-1¼ 855 (900-1¼)	3020-2½ 855 (900-2½)	3020-2¾ 855 (900-2¾)

Source: Federal Aviation Administration

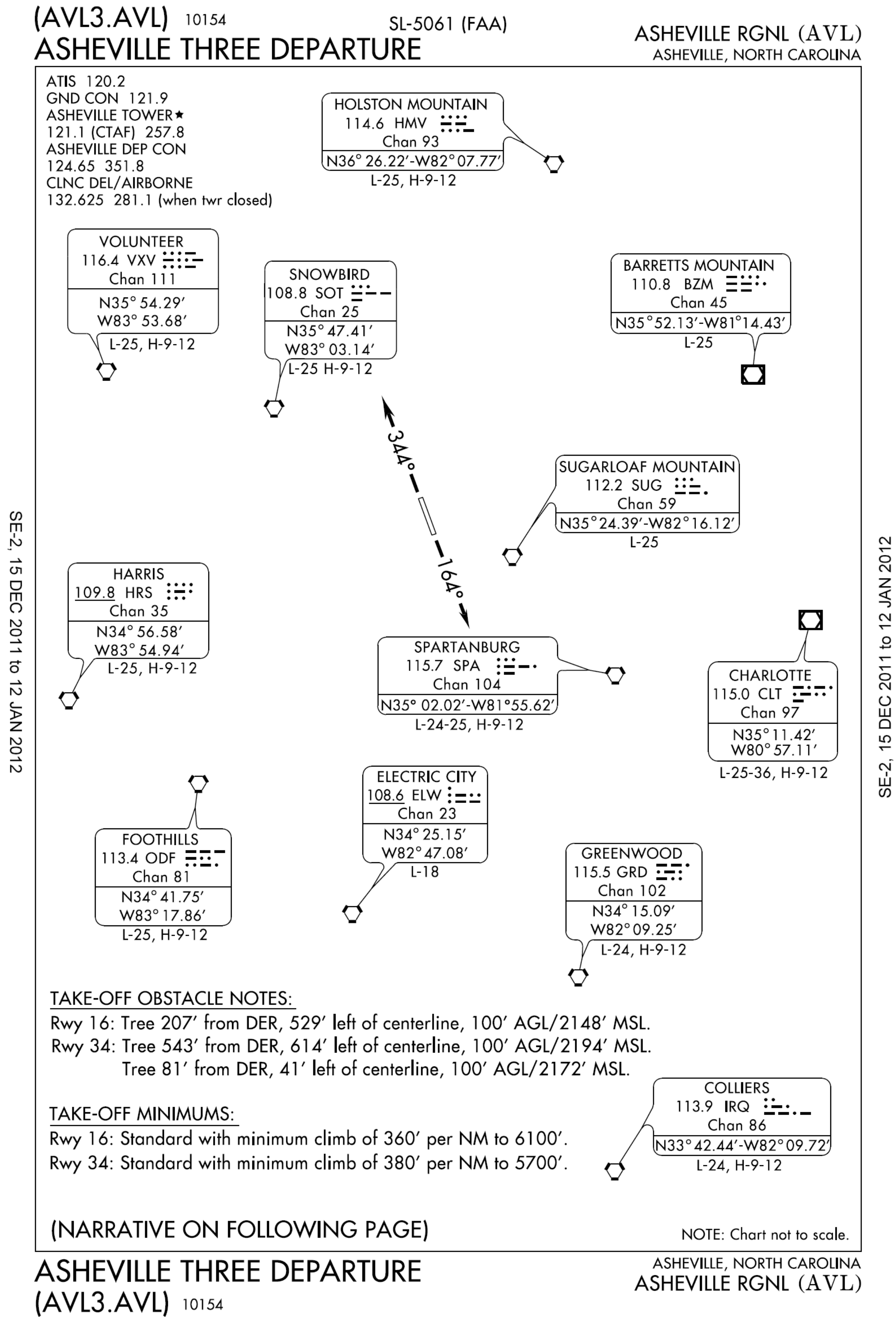
Figure 2-25: RNAV (GPS) Approach to Runway 34



CATEGORY	A	B	C	D
LPV DA	2390/24 250 (300-½)			
LNAV/VNAV DA	NA			
LNAV MDA	3120/40 980 (1000-¾)	3120/50 980 (1000-1)	3120-2½ 980 (1000-2½)	
CIRCLING	3120-1¼ 955 (1000-1¼)	3120-1½ 955 (1000-1½)	3120-3 955 (1000-3)	

Source: Federal Aviation Administration

Figure 2-26: Asheville Three Departure from Runway 16/34



Source: Federal Aviation Administration

Figure 2-27: Asheville Three Departure Narrative

(AVL3.AVL) 09127
ASHEVILLE THREE DEPARTURE

SL-5061 (FAA)

ASHEVILLE RGNL (AVL)
ASHEVILLE, NORTH CAROLINA

SE-2, 15 DEC 2011 to 12 JAN 2012

DEPARTURE ROUTE DESCRIPTION

TAKE-OFF RUNWAY 16: Climb heading 164° to 10000′ or lower filed altitude. Expect radar vectors to join filed route/fix when leaving 6100′. Thence....

TAKE-OFF RUNWAY 34: Climb heading 344° to 10000′ or lower filed altitude. Expect radar vectors to join filed route/fix when leaving 5700′. Thence....

....Aircraft filed at or above 11000′ maintain 10000′ and expect filed altitude/flight level ten minutes after departure.

SE-2, 15 DEC 2011 to 12 JAN 2012

ASHEVILLE THREE DEPARTURE
(AVL3.AVL) 09127

ASHEVILLE, NORTH CAROLINA
ASHEVILLE RGNL (AVL)

Source: Federal Aviation Administration

2.9 Summary

Information collected during the inventory effort of the master planning process provides a method to evaluate the conditions of existing Airport facilities and provide a baseline to measure how well current infrastructure will be able to accommodate future aviation demand. Through a review of the inventory information presented in this Chapter, subsequent study tasks can be conducted to determine what improvements will be necessary at the Airport to meet the air transportation requirements of Western North Carolina over the next 20 years. In comparison with future aviation demand projections and demand/capacity analyses, alternatives can be developed to identify a plan on how the Airport will address the required improvements. Ashville Regional Airport has continually evolved over its 50-year history to meet the demand of its users, and this study effort will help direct the prospective growth and expansion of existing Airport facilities to meet future aviation needs.

Chapter 3
Aviation Forecasts

This Chapter features aviation activity forecasts for the Asheville Regional Airport (Airport) over a next 20-year planning horizon. Aviation demand forecasts are an important step in the master planning process. Ultimately, they will form the basis for future demand-driven improvements at the Airport, provide data used to estimate future off-airport impacts such as noise and traffic, and are incorporated by reference into other studies and policy decisions. This Chapter, which presents aviation activity forecasts through 2030, is organized as follows:

- 3.1 Forecasting Approach
- 3.2 Enplaned Passengers
- 3.3 Based Aircraft
- 3.4 Based Aircraft Fleet Mix
- 3.5 Commercial Aircraft Operations
- 3.6 General Aviation Operations
- 3.7 Military Operations
- 3.8 Instrument Operations
- 3.9 Enplaned/Deplaned Cargo
- 3.10 Peak Passenger Activity and Operations
- 3.11 Forecast Summary and TAF Comparison

The Federal Aviation Administration (FAA) projects future aviation activity through its Terminal Area Forecasts (TAF) which is utilized to compare projections that were prepared for this Master Plan. Forecasts that are developed for airport master plans and/or federal grants must be approved by the FAA. It is the FAA's policy, listed in Advisory Circular (AC) 150/5070-6B, *Airport Master Plans*, that FAA approval of forecasts at small-hub airports be consistent with the TAF. Master plan forecasts for operations, based aircraft and enplanements are considered to be consistent with the TAF if they meet the following criteria:

a) Forecasts differ by less than ten percent in the five-year forecast and 15 percent in the ten- or 20-year period, or
b) Forecasts do not affect the timing or scale of an airport project

This Chapter examines data that pertains to aviation activities and describes the projections of aviation demand. It should be noted that projections of aviation demand are based on data through the year 2010, as this was the most recent calendar year for which a full 12 months of historical data was available at the time these forecasts were developed.

3.1 Forecasting Approach

Several forecasting methods have been applied in the development of the aviation demand projections presented in this Chapter. These forecasts incorporate local and national industry trends in assessing current and future demand. Socioeconomic factors such as local population, income, and employment have also been analyzed for the effect they may have had on historical and may have on future levels of activity. The comparison of the relationships among these various indicators provided the initial step in the development of realistic forecasts for future aviation demand. Methodologies used to develop forecasts described in this section include:

- Time-series methodologies
- Market share methodologies
- Socioeconomic methodologies

3.1.a Time-Series Methodologies

Historical trend lines and linear extrapolation are widely used methods of forecasting. These techniques utilize time-series types of data and are most useful for a pattern of demand that demonstrates a historical relationship with time. Trend line analyses used in this Chapter are linearly extrapolated, establishing a trend line using the least squares method to known historical data. Growth rate analyses used in this Chapter examined the historical compounded annual growth rates (CAGR) and extrapolated future data values by assuming a similar CAGR for the future.

3.1.b Market Share Methodology

Market share, ratio, or top-down methodologies compare local levels of activity with a larger entity. Such methodologies imply that the proportion of activity that can be assigned to the local level is a regular and predictable quantity. This method has been used extensively in the aviation industry to develop forecasts at the local level. Historical data is most commonly used to determine the share of total national traffic activity that will be captured by a particular region or airport. The FAA develops national forecasts annually in its FAA Aerospace Forecasts document; the latest edition of which is the FAA Aerospace Forecasts Fiscal Year (FY) 2011-2031.

3.1.c Socioeconomic Methodologies

Though trend line extrapolation and market share analyses may provide mathematical and formulaic justification for demand projections, there are many factors beyond historical levels of activity that may identify trends in aviation and its impact on local aviation demand. Socioeconomic or correlation analyses examine the direct relationship between two or more sets of historical data. Local conditions examined in this Chapter include population and the total retail sales for the 11 counties that make up the Airport's primary service area (Buncombe, Madison, Haywood, Transylvania, Henderson, Polk, Rutherford, McDowell, Yancey, Jackson, and Mitchell). Historical and forecasted socio-economic statistics for this service area were obtained from the economic forecasting firm Woods & Poole Economics, Inc. Based upon the observed and projected correlation between historical aviation activity and the socioeconomic data sets, future aviation activity projections were developed.

3.2 Enplaned Passengers

Enplanements are defined as the activity of passengers boarding commercial service aircraft that depart an airport and include both revenue and non-revenue passengers on scheduled commercial service aircraft or unscheduled charter aircraft. Passenger enplanement data is provided to Airport management by commercial passenger service carriers, who maintain counts on the number of people that are transported to and from an airport. This section examines the passenger enplanement data and describes future passenger projections.

3.2.a Enplanement History

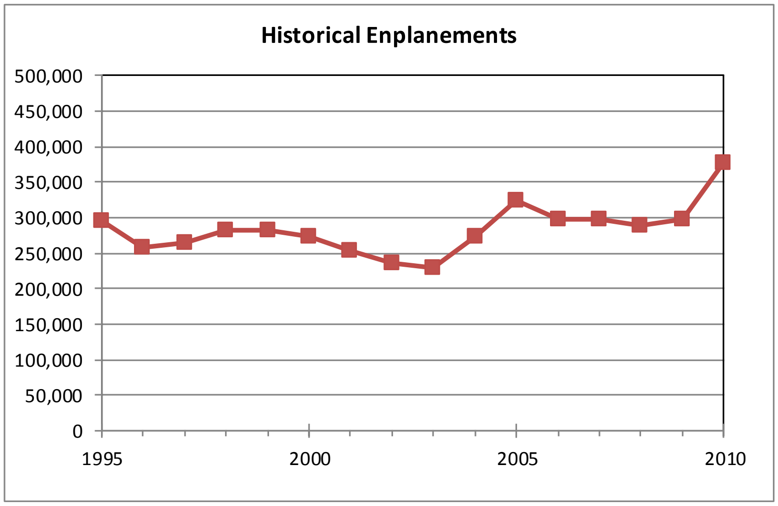
Between 1995 and 2010, passenger enplanements at the Asheville Regional Airport fluctuated between a low of 230,178 in 2003 and a high of 378,087 in 2010. From 1995 through 2010, enplanements have increased from 294,780 to 378,087 respectively, at a CAGR of 1.67 percent. **Table 3-1** presents the historical enplanements at the Airport since 1995.

3.2.b Federal Aviation Administration Forecast

The FAA records passenger enplanements for all commercial service airports and releases an updated version of the TAF every year. It should be noted that annual TAF data is based on the federal fiscal year rather than the calendar year, so historical figures differ slightly from the Airport's records. The FAA's historical records and projections of passenger enplanements are shown in **Table 3-2**.

Table 3-1: Historical Enplanements

Year	Historical Enplanements
Historical:	
1995	294,780
1996	257,215
1997	263,767
1998	283,146
1999	283,209
2000	274,281
2001	253,250
2002	236,019
2003	230,178
2004	273,691
2005	323,353
2006	297,792
2007	298,667
2008	289,215
2009	298,865
2010	378,087
CAGR (1995-2010)	*1.67%*



Notes: CAGR = Compounded Annual Growth Rate
Sources: Historical Enplanements - Airport Records

Table 3-2: Enplanement Forecast – FAA Terminal Area Forecast (TAF)

Year	FAA TAF Enplanements
Historical:	
1995	294,788
1996	257,215
1997	252,543
1998	279,611
1999	285,335
2000	277,158
2001	268,779
2002	240,088
2003	218,312
2004	252,246
2005	312,125
2006	294,065
2007	290,153
2008	276,762
2009	296,053
2010	349,880
Projected:	
2015	394,721
2020	432,090
2025	473,084
2030	518,051
CAGR (2010-2030)	*1.59%*

Source: FAA Terminal Area Forecast

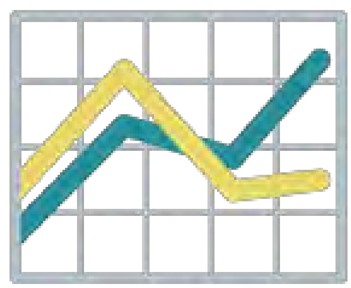
As illustrated, the FAA projects strong, steady growth in passenger enplanements at the Asheville Regional Airport through 2030. The TAF predicts 394,721 passenger enplanements in 2015, 432,090 in 2020, 473,084 in 2025, and 518,051 in 2030, at a CAGR of 1.59 percent.

3.2.c Enplanement Forecasts

Six methodologies were evaluated to develop projections for passenger enplanements. These methodologies are described in the following sections and include trend line and growth rate methodologies. The results of these two forecasting methodologies are presented in **Table 3-3**.

Trend Line Methodology – The trend line methodology is based on the assumption that future trends will continue to mimic those of the selected time period and that factors that affect those trends will continue to influence demand levels in a similar fashion. The establishment of a linear trend line using historical data through the least squares method typically serves as a baseline projection to which other methodologies are compared.

Airport records for passenger enplanements from 1995 to 2010 were reviewed as a part of this methodology. Applying the least squares method, the trend line methodology projects passenger enplanements will decrease to 331,514 in 2015 before increasing to 350,731 in 2020, 369,949 in 2025, and 389,167 in 2030.



Growth Rate Methodology – The growth rate methodology examines the percent change in activity between two points in time, and assumes that future activity will change at this rate throughout the forecasting period. Between 1995 and 2010, there was a 1.67 percent annual increase in passenger activity. Applying this CAGR, passenger enplanements are forecasted to grow to 410,793 in 2015, 446,328 in 2020, 484,937 in 2025, and 526,886 in 2030.

Table 3-3: Enplanement Forecasts – Trend Line & Growth Rate Methodologies

	Trend Line	Growth Rate	
Year	Enplanements	Enplanements	Percent Change
Historical:			
1995	294,780	294,780	
1996	257,215	257,215	-12.74%
1997	263,767	263,767	2.55%
1998	283,146	283,146	7.35%
1999	283,209	283,209	0.02%
2000	274,281	274,281	-3.15%
2001	253,250	253,250	-7.67%
2002	236,019	236,019	-6.80%
2003	230,178	230,178	-2.47%
2004	273,691	273,691	18.90%
2005	323,353	323,353	18.15%
2006	297,792	297,792	-7.90%
2007	298,667	298,667	0.29%
2008	289,215	289,215	-3.16%
2009	298,865	298,865	3.34%
2010	378,087	378,087	26.51%
		CAGR (1995-2010)	*1.67%*
Projected:			
2015	331,514	410,793	*1.67%*
2020	350,731	446,328	*1.67%*
2025	369,949	484,937	*1.67%*
2030	389,167	526,886	*1.67%*
0.00%	*0.14%*	*1.67%*	

Sources: Historical Enplanements - Airport Records
Projections - Mead & Hunt

Market Share Methodology – Market share methodology compares activity levels at an airport to a larger geographical region as a whole over a given length of time. For the purposes of this Master Plan, two market share methodology forecasts have been developed that compare activity at the Asheville Regional Airport with total U.S. domestic enplanements. Domestic U.S. and Asheville Regional Airport enplanement data dating back to 1995 was examined. The results of these projection methodologies are presented in **Table 3-4**.

Market Share Methodology (1) – The first market share methodology applies the Airport's market share in 2010 of 0.0595 percent to projections of total U.S. domestic enplanement projections described in the FAA Aerospace Forecasts FY 2011-2031. The first market share methodology projects 447,900 passenger enplanements in 2015, 515,597 in 2020, 574,919 in 2025 and 629,547 in 2030. This represents a compound annual growth rate of 2.58 percent, matching the FAA's projected growth rate in domestic U.S. enplanements.

Market Share Methodology (2) – Between 1995 and 2010, the Asheville Regional Airport's market share of total U.S. domestic passenger enplanements ranged from a minimum of 0.392 percent in 2003 to a maximum of 0.595 percent in 2010, averaging to 0.0452 percent over the 15-year period. The second market share methodology applies the average U.S. market share that the Airport experienced during the 1995-2010 timeframe to total U.S. domestic passenger enplanement projections. The second market share methodology projects 340,458 passenger enplanements in 2015, 391,915 in 2020, 437,008 in 2025 and 478,531 in 2030.

Table 3-4: Enplanement Forecasts – Market Share Methodologies

	Market Share Methodology 1			Market Share Methodology 2		
Year	AVL Enplanements	Total U.S. Domestic Enplanements (mil)	AVL Market Share	AVL Enplanements	Total U.S. Domestic Enplanements (mil)	AVL Market Share
Historical:						
1995	294,780	531.1	0.0555%	294,780	531.1	0.0555%
1996	257,215	558.1	0.0461%	257,215	558.1	0.0461%
1997	263,767	578.3	0.0456%	263,767	578.3	0.0456%
1998	283,146	589.3	0.0480%	283,146	589.3	0.0480%
1999	283,209	610.9	0.0464%	283,209	610.9	0.0464%
2000	274,281	641.2	0.0428%	274,281	641.2	0.0428%
2001	253,250	625.8	0.0405%	253,250	625.8	0.0405%
2002	236,019	575.1	0.0410%	236,019	575.1	0.0410%
2003	230,178	587.8	0.0392%	230,178	587.8	0.0392%
2004	273,691	628.5	0.0435%	273,691	628.5	0.0435%
2005	323,353	669.5	0.0483%	323,353	669.5	0.0483%
2006	297,792	668.4	0.0446%	297,792	668.4	0.0446%
2007	298,667	690.1	0.0433%	298,667	690.1	0.0433%
2008	289,215	680.7	0.0425%	289,215	680.7	0.0425%
2009	298,865	630.8	0.0474%	298,865	630.8	0.0474%
2010	378,087	635.3	0.0595%	378,087	635.3	0.0595%
					Average (1995-2010)	*0.0452%*
Projected:						
2015	447,900	752.5	0.0595%	340,458	752.5	0.0452%
2020	515,597	866.3	0.0595%	391,915	866.3	0.0452%
2025	574,919	966.0	0.0595%	437,008	966.0	0.0452%
2030	629,547	1,057.7	0.0595%	478,531	1,057.7	0.0452%
CAGR	*2.58%*	*2.58%*		*1.18%*	*2.58%*	

Sources: Historical Enplanements - Airport Records
Total US Domestic Enplanements - FAA Aerospace Forecasts FY 2011-2031
Projections - Mead & Hunt

Socioeconomic Methodology – Socioeconomic, or correlation, methodologies examine the direct relationship between two or more sets of historical data. To conduct forecasts using this method, local conditions were examined including population and total retail sales for the eleven counties that comprise the Airport's primary service area. Historical and forecasted socioeconomic statistics were obtained from the economic forecasting firm of Woods & Poole Economics, Inc. Based upon the observed and projected correlation between historical aviation activity and the socioeconomic data sets, future aviation activity projections were developed. The results of these methodologies are presented in **Table 3-5**.

Socioeconomic Methodology – Population Variable – Local population can be a strong indicator for the demand of commercial aviation, particularly at small hub and non-hub airports. The socioeconomic population variable methodology compares historical population figures to passenger enplanements. Between 1995 and 2010, the population of the region increased from 545,658 to 651,332. In 2010, the number of annual enplanements per capita was 0.580. This figure was applied to population projections by Woods and Poole Economics, Inc. to forecast 400,761 passenger enplanements in 2015, 424,120 in 2020, 447,873 in 2025, and 471,784 in 2030.

Socioeconomic Methodology – Retail Sales Variable – Because local economic conditions can impact levels of passenger activity, another socioeconomic factor that was examined was total retail sales. Between 1995 and 2010, total retail sales in the Airport's primary service area increased from $5,785,000 to $7,565,000. It should be noted that these sales figures are presented in constant 2004 dollars, used to measure the "real" change in earnings and income when inflation is taken into account. Enplanements per $1 million in retail sales were 49.982 in 2010. Applying this figure to the total retail sales projections by Woods and Poole Economics, Inc., forecasts illustrate that 420,270 passengers will be enplaned in 2015, 466,738 in 2020, 517,937 in 2025, and 574,362 in 2030.

Table 3-5: Enplanement Forecasts – Socioeconomic Methodologies

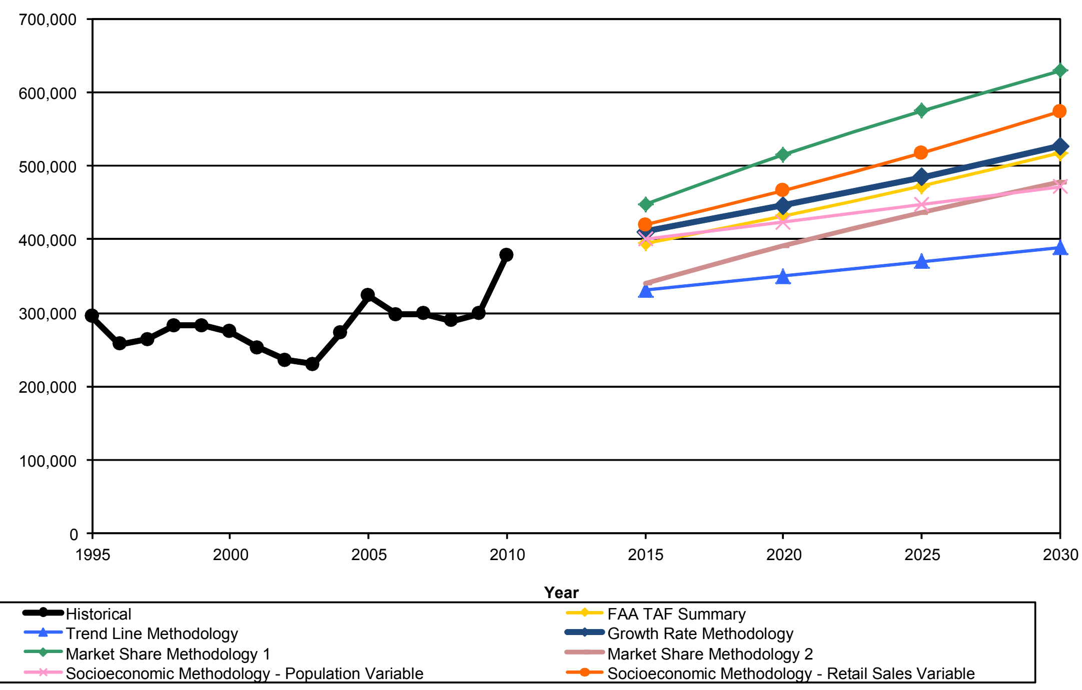
	Socioeconomic Methodology -			Socioeconomic Methodology -		
Year	Enplanements	Regional Population	Enplanements Per Capita	Enplanements	Total Retail Sales (In millions, $2004)	Enplanements per $1mil Sales
Historical:						
1995	294,780	545,658	0.540	294,780	$5,785	50.953
1996	257,215	NA		257,215	NA	
1997	263,767	NA		263,767	NA	
1998	283,146	NA		283,146	NA	
1999	283,209	NA		283,209	NA	
2000	274,281	590,254	0.465	274,281	$7,185	38.175
2001	253,250	594,799	0.426	253,250	$7,165	35.348
2002	236,019	599,088	0.394	236,019	$7,167	32.932
2003	230,178	603,960	0.381	230,178	$7,326	31.421
2004	273,691	609,266	0.449	273,691	$7,587	36.074
2005	323,353	614,343	0.526	323,353	$7,805	41.431
2006	297,792	621,714	0.479	297,792	$7,989	37.273
2007	298,667	629,306	0.475	298,667	$8,065	37.032
2008	289,215	635,990	0.455	289,215	$7,775	37.196
2009	298,865	643,638	0.464	298,865	$7,201	41.500
2010	378,087	651,332	0.580	378,087	$7,565	49.982
		Average (2000-2010)	*0.463*		*Average (2000-2010)*	*38.033*
Projected:						
2015	400,761	690,392	0.580	420,270	$8,409	49.982
2020	424,120	730,633	0.580	466,738	$9,338	49.982
2025	447,873	771,552	0.580	517,937	$10,363	49.982
2030	471,784	812,745	0.580	574,362	$11,491	49.982
CAGR	*1.11%*	*1.11%*		*2.11%*	*2.11%*	

Sources: Historical Enplanements - Airport Records
Historical & Projected Population & Retail Sales - Woods & Poole Economics, Inc.
Projections - Mead & Hunt

Enplanement Forecasts Comparison and Summary – A comparison of projected enplanements using the methodologies described in this section is presented in **Table 3-6**. All of the methodologies project that there will be an increase in passenger demand over the next 30 years. The growth rate methodology lies near the middle of the statistical average of the various forecast methodologies employed and has therefore been selected as the preferred enplanement forecast for the purposes of long-range planning at the Asheville Regional Airport.

Table 3-6: Enplanement Forecasts Summary

Year	Historical	FAA TAF Summary	Trend Line Methodology	Preferred Growth Rate Methodology	Market Share Methodology 1	Market Share Methodology 2	Socioeconomic Methodology - Population Variable	Socioeconomic Methodology - Retail Sales Variable
Historical:								
1995	294,780							
1996	257,215							
1997	263,767							
1998	283,146							
1999	283,209							
2000	274,281							
2001	253,250							
2002	236,019							
2003	230,178							
2004	273,691							
2005	323,353							
2006	297,792							
2007	298,667							
2008	289,215							
2009	298,865							
2010	378,087							
CAGR (1995-2010)	*1.67%*							
Projected:								
2015		394,721	331,514	410,793	447,900	340,458	400,761	420,270
2020		432,090	350,731	446,328	515,597	391,915	424,120	466,738
2025		473,084	369,949	484,937	574,919	437,008	447,873	517,937
2030		518,051	389,167	526,886	629,547	478,531	471,784	574,362
CAGR (2010-2030)		*1.59%*	*0.14%*	*1.67%*	*2.58%*	*1.18%*	*1.11%*	*2.11%*



Sources: Historical Enplanements - Airport Records
Projections - Mead & Hunt, Inc., except FAA TAF Summary which are from the FAA Terminal Area Forecast

3.3 Based Aircraft

The FAA defines a based aircraft at an airport, as an aircraft that is "operational & air worthy" and which is typically based at the airport for a majority of the year. Communities such as Asheville that have a large number of seasonal residents, also have a large number of seasonally-based aircraft. Discussions with the Fixed Base Operator (FBO) at Asheville Regional Airport indicate that the Airport has a year-round based aircraft population of approximately 140 to 145 aircraft, and during the summer its based aircraft population increases to approximately 170 aircraft. The current FAA 5010 Airport Master Record notes an inspection date of July 2011, and notes the following based aircraft: 115 single engine aircraft, 37 multi-engine, 16 jet, and 6 helicopters, for a total of 174 based aircraft. This total from the 5010 form confirms the FBO's description of the airport's current seasonal based aircraft total.

For airport master planning purposes it is the airport's seasonal based aircraft population that has the largest impact on facility and space needs, therefore it is this seasonal total that will be projected and primarily used in this document. The year-round based aircraft total (145 of the 174 total based aircraft) represents approximately 83 percent of the seasonal based aircraft total and will also be noted for reference.

There are several factors that affect the number of based aircraft at an airport. Recently, increasing costs to own and operate aircraft has been a primary factor that has contributed to a slight decline in the overall U.S. general aviation fleet since 2007. The Asheville Regional Airport, however, has experienced an increase in the number of aircraft based at the Airport during this same time period. Several methodologies were evaluated to develop based aircraft projections. The FAA TAF and time series methodologies that include trend line analysis and growth rate analysis are presented in **Table 3-7**.

Table 3-7: Based Aircraft Forecasts – TAF, Trend Line, & Growth Rate Methodologies

	FAA TAF Summary	Trend Line	Growth Rate	
Year	Based Aircraft	Based Aircraft	Based Aircraft	Growth Rate
Historical:				
1995	120	120	120	
1996	128	128	128	6.67%
1997	119	119	119	-7.03%
1998	119	119	119	0.00%
1999	107	107	107	-10.08%
2000	107	107	107	0.00%
2001	107	107	107	0.00%
2002	128	128	128	19.63%
2003	130	130	130	1.56%
2004	128	128	128	-1.54%
2005	128	128	128	0.00%
2006	139	139	139	8.59%
2007	130	130	130	-6.47%
2008	141	141	141	8.46%
2009	160	160	160	13.48%
2010	124	174	174	8.75%
			CAGR (1995-2010)	*2.51%*
Projected:				
2015	135	165	197	*2.51%*
2020	149	180	223	*2.51%*
2025	163	194	252	*2.51%*
2030	178	208	286	*2.51%*
CAGR (2010-2030)	*1.82%*	*0.91%*	*2.51%*	

Sources: Historical Based Aircraft -1995-2009 FAA Terminal Area Forecast; 2010 FAA 5010 Form
Projected Based Aircraft - Mead & Hunt, Inc., except FAA TAF Summary which are from the FAA TAF

It should be noted that the FAA TAF projection was recently revised by the FAA and significantly reduced the number of based aircraft at the airport in 2010 from 160 down to 124. Conversations with the FAA Airport's District Office indicate that the decrease in the FAA's based aircraft data is likely due to the efforts the FAA is undertaking nationwide to try to improve the integrity of its based aircraft counts. The FAA is assigning each aircraft to a particular airport, where it spends the majority of the year; however this method of counting ends up excluding the seasonally based aircraft at AVL. This is primarily the reason for the disparity in the comparison of the FAA TAF based aircraft forecasts to the master plan based aircraft forecasts.

The market share methodology compares local based aircraft at the Airport to the total number of general aviation aircraft in the U.S. as reported by the FAA. As illustrated in **Table 3-8**, the Airport's market share has increased since 1995, and in 2010 the number of based aircraft represented 0.07762 percent of total active general aviation aircraft in the United States. Applying a projected CAGR of 0.88 percent as forecasted for the growth of based aircraft in the U.S., the number of aircraft at the Airport is forecasted to grow from 174 in 2010 to 207 in 2030.

Table 3-8: Based Aircraft Forecast – Market Share Methodology

Year	Market Share Methodology Based Aircraft	Total U.S. Active Aircraft	Market Share
Historical:			
1995	120	188,089	0.06380%
1996	128	191,129	0.06697%
1997	119	192,414	0.06185%
1998	119	204,710	0.05813%
1999	107	219,464	0.04876%
2000	107	217,533	0.04919%
2001	107	211,446	0.05060%
2002	128	211,244	0.06059%
2003	130	209,606	0.06202%
2004	128	219,319	0.05836%
2005	128	224,350	0.05705%
2006	139	221,939	0.06263%
2007	130	231,606	0.05613%
2008	141	228,668	0.06166%
2009	160	223,920	0.07145%
2010	174	224,172	0.07762%
		Average (1995-2010)	*0.06043%*
Projected:			
2015	178	229,140	0.07762%
2020	185	237,795	0.07762%
2025	194	250,560	0.07762%
2030	207	267,055	0.07762%
CAGR (2010-2030)	*0.88%*	*0.88%*	

Sources: Historical Based Aircraft -1995-2009 FAA Terminal Area Forecast; 2010 FAA 5010 Form
Total U.S. Active Aircraft (GA & Air Taxi) - FAA Aerospace Forecasts FY2011-2031
Projected Based Aircraft - Mead & Hunt, Inc.

Socioeconomic (or correlation) forecasting methodologies examine the direct relationship between two or more sets of historical data. Data examined in developing based aircraft forecasts using this methodology included both population and total retail sales. Total retail sales were used as an indicator of economic activity occurring within the community with the assumption being that changes in economic activity will impact the number of based aircraft. Historical and projected socioeconomic statistics for the Airport's general aviation service area were obtained from Woods & Poole Economics, Inc. databases. For this analysis we have used a general aviation service area of Buncombe County and its eight surrounding counties. This general aviation service area is similar to the eleven counties that comprise the Airport's primary service area (see Section 3.1.c), except that Jackson and Mitchell Counties were excluded as they are farthest away and both have a public use airport within them or closer to them than the Asheville Regional Airport. Based upon the observed and projected correlation between historical aviation activity and socioeconomic data, based aircraft forecasts were developed. The forecasts that were prepared utilizing these methodologies are presented in **Table 3-9**.

As illustrated in the table, based aircraft at the Airport are projected to increase from 174 aircraft in 2010 to 217 aircraft in 2030 using the population variable socioeconomic methodology. Utilizing the same methodology, but applying a multiplier of 0.02482 per $1 million of sales for each based aircraft to the projected level of retail sales for the service area, based aircraft at the Airport are projected to increase from 174 aircraft in 2010 to 265 aircraft in 2030.

Table 3-9: Based Aircraft Forecasts – Socioeconomic Methodologies

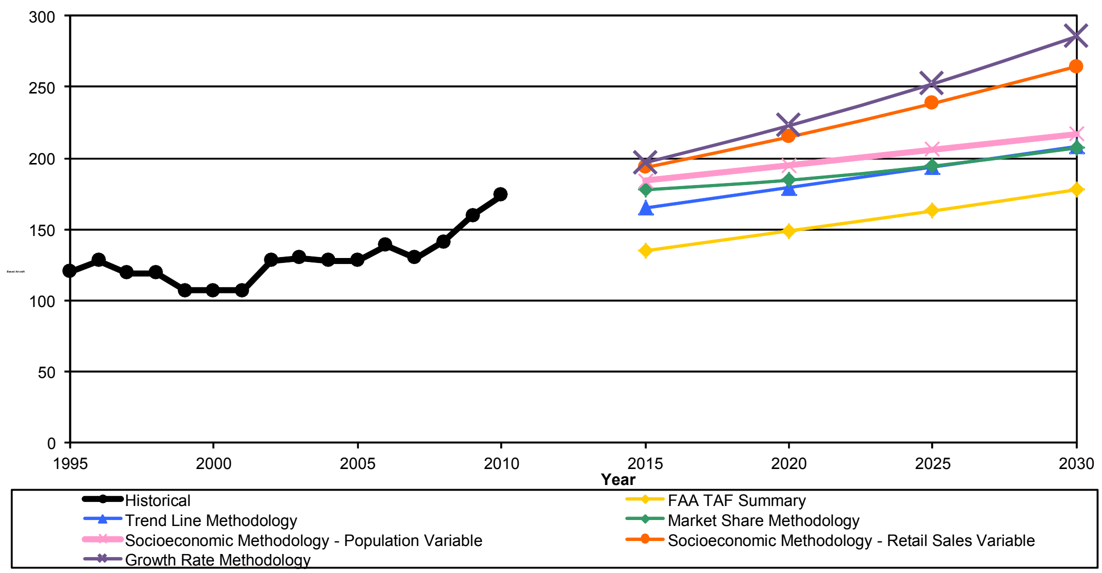
	Socioeconomic Methodology - Population Variable			Socioeconomic Methodology - Retail Sales Variable		
Year	Based Aircraft	GA Service Area Population	Based Aircraft Per Capita	Based Aircraft	GA Service Area Retail Sales (mil, $2004)	Based Aircraft Per $1mil Sales
Historical:						
1995	120	500,435	0.00024	120	$5,428	0.02211
1996	128	NA		128	NA	
1997	119	NA		119	NA	
1998	119	NA		119	NA	
1999	107	NA		107	NA	
2000	107	541,254	0.00020	107	$6,677	0.01602
2001	107	545,326	0.00020	107	$6,644	0.01610
2002	128	549,183	0.00023	128	$6,632	0.01930
2003	130	553,291	0.00023	130	$6,776	0.01919
2004	128	557,940	0.00023	128	$7,016	0.01824
2005	128	562,902	0.00023	128	$7,222	0.01772
2006	139	569,778	0.00024	139	$7,396	0.01879
2007	130	577,264	0.00023	130	$7,473	0.01740
2008	141	583,467	0.00024	141	$7,206	0.01957
2009	160	590,459	0.00027	160	$6,674	0.02397
2010	174	597,493	0.00029	174	$7,011	0.02482
Projected:						
2015	184	633,206	0.00029	193	$7,795	0.02482
2020	195	670,002	0.00029	215	$8,658	0.02482
2025	206	707,420	0.00029	238	$9,610	0.02482
2030	217	745,090	0.00029	265	$10,658	0.02482
CAGR (2010-2030)	*1.11%*	*1.11%*		*2.12%*	*2.12%*	

Sources: Historical Based Aircraft -1995-2009 FAA Terminal Area Forecast; 2010 FAA 5010 Form
Historical & Projected Population & Per Capita Income - Woods & Poole Economics, Inc.
Projected Based Aircraft - Mead & Hunt, Inc.

A comparison of projected based aircraft at the Airport using the methodologies described in this section is presented in **Table 3-10**. Each methodology employed projects an increase in based aircraft over the next 20 years. For the purposes of this Master Plan study, the socioeconomic methodology based upon the correlation between based aircraft and population, lies near the middle of the various methodologies and serves as the preferred projection of based aircraft for the next 20 years. This methodology projects based aircraft to increase from 174 in 2010 to 217 in 2030, a compound annual growth rate of 1.11 percent.

Table 3-10: Based Aircraft Forecasts Summary

Year	Historical	FAA TAF Summary	Trend Line Methodology	Growth Rate Methodology	Market Share Methodology	*Preferred* Socioeconomic Methodology - Population Variable	Socioeconomic Methodology - Retail Sales Variable
Historical:							
1995	120						
1996	128						
1997	119						
1998	119						
1999	107						
2000	107						
2001	107						
2002	128						
2003	130						
2004	128						
2005	128						
2006	139						
2007	130						
2008	141						
2009	160						
2010	174						
CAGR (1995-2010)	*2.51%*						
Projected:							
2015		135	165	197	178	184	193
2020		149	180	223	185	195	215
2025		163	194	252	194	206	238
2030		178	208	286	207	217	265
CAGR (2010-2030)		*0.11%*	*0.91%*	*2.51%*	*0.88%*	*1.11%*	*2.12%*



Sources: Historical Based Aircraft -1995-2009 FAA Terminal Area Forecast; 2010 FAA 5010 Form
Projections - Mead & Hunt, Inc., except FAA TAF Summary which are from the FAA Terminal Area Forecast

The socioeconomic methodology serves as the preferred projection of based aircraft and projects based aircraft to increase from 174 in 2010 to 217 in 2030. This total represents the seasonally based aircraft during the summer months, as noted previously the year-round based aircraft population is approximately 83 percent of the seasonal based aircraft total. Therefore the year-round based aircraft projection is 153 in 2015, 162 in 2020, 171 in 2025, and 180 in 2030, and the seasonal based aircraft projection for summer months is 184 in 2015, 195 in 2020, 206 in 2025, and 217 in 2030.

3.4 Based Aircraft Fleet Mix

Historical based aircraft by type and projected fleet mix at the Asheville Regional Airport is presented in **Table 3-11**. In 2010, 66 percent of the local fleet was comprised of single engine aircraft, 21 percent multi-engine aircraft, 9 percent jet aircraft, and 3 percent helicopters. The FAA Aerospace Forecast FY 2011-2031 projects that turboprop and jet aircraft will see a higher growth rate than other types of aircraft through 2030. This trend is also anticipated to occur locally as the number of multi-engine and jet aircraft based at the Airport are expected to increase at a higher growth rate than other aircraft types.

Table 3-11: Based Aircraft Fleet Mix Forecast

	Single Engine		Multi-Engine		Jet		Helicopter		Other		
Year	#	%	#	%	#	%	#	%	#	%	Total
Historical:											
1995	89	74%	26	22%	3	3%	2	2%	0	0%	120
1996	99	77%	24	19%	3	2%	2	2%	0	0%	128
1997	96	81%	19	16%	3	3%	1	1%	0	0%	119
1998	96	81%	19	16%	3	3%	1	1%	0	0%	119
1999	82	77%	17	16%	5	5%	3	3%	0	0%	107
2000	82	77%	17	16%	5	5%	3	3%	0	0%	107
2001	82	77%	17	16%	5	5%	3	3%	0	0%	107
2002	93	73%	23	18%	9	7%	3	2%	0	0%	128
2003	95	73%	23	18%	9	7%	3	2%	0	0%	130
2004	93	73%	23	18%	9	7%	3	2%	0	0%	128
2005	93	73%	23	18%	9	7%	3	2%	0	0%	128
2006	105	76%	18	13%	12	9%	4	3%	0	0%	139
2007	74	57%	40	31%	8	6%	8	6%	0	0%	130
2008	87	62%	27	19%	18	13%	9	6%	0	0%	141
2009	130	81%	10	6%	17	11%	3	2%	0	0%	160
2010	115	66%	37	21%	16	9%	6	3%	0	0%	174
Projected:											
2015	122	66%	39	21%	20	11%	4	2%	0	0%	184
2020	129	66%	41	21%	21	11%	4	2%	0	0%	195
2025	134	65%	43	21%	25	12%	4	2%	0	0%	206
2030	139	64%	48	22%	26	12%	4	2%	0	0%	217
CAGR (2010-2030)	*0.95%*		*1.28%*		*2.46%*		*0.00%*		*0.00%*		*1.11%*

Notes: Numbers may not add due to rounding
Sources: Historical Based Aircraft -1995-2009 FAA Terminal Area Forecast; 2010 FAA 5010 Form
Projections - Mead & Hunt, Inc.

3.5 Commercial Aircraft Operations

Commercial aircraft operations are either scheduled or unscheduled flights typically operated by a certificated air carrier, or are conducted by a charter or air taxi operator. This section summarizes the forecasts that were prepared for commercial aircraft operations.

3.5.a Scheduled Commercial Passenger Operations Forecasts

National trends in aviation demand have been volatile in recent years. The terrorist attacks that occurred on September 11, 2001 had a significant impact on collective national travel behavior and the economic recession that began in 2008 has also impacted travel behavior and the commercial airlines economics. As a result, fewer passengers were enplaned at many airports throughout the U.S. With recent increases in aircraft operating costs, airlines have been forced to maximize fleet efficiency in order to remain profitable.

In many markets, air carriers are reducing or retiring older turboprops and less fuel efficient small regional jet aircraft (typically 50 seats and smaller), and if the market can profitably sustain it, replacing them with larger regional jets (typically 70 to 90 seats) and narrow-body jets that have more seats and lower operational costs per passenger. In many markets, the use of larger aircraft is reducing the frequency of particular routes. Due to increasing fuel and operational costs, air carriers must maintain higher passenger load factors to remain profitable. **Table 3-12** presents the historical and projected seats per departure and load factor at the Asheville Regional Airport and for the U.S. regional mainline carrier fleets.

Table 3-12: Scheduled Commercial Average Seats/Departure and Load Factor

	Average Seats/Dep			Load Factor % (Domestic)		
Year	AVL	US Regional Carrier Fleet	US Mainline Carrier Fleet	AVL	US Regional Carrier Fleet	US Mainline Carrier Fleet
Historical:						
2007	48.7	49.9	150.6	75.4%	75.5%	80.4%
2008	49.7	52.9	150.3	71.6%	73.7%	80.2%
2009	50.4	55.2	151.2	80.5%	74.3%	81.4%
2010	52.4	56.2	151.9	77.6%	76.2%	82.7%
CAGR (2007-2010)	*2.47%*	*4.04%*	*0.29%*	*0.97%*	*0.31%*	*0.94%*
Projected:						
2015	56.5	58.3	152.3	78.0%	76.8%	84.2%
2020	59.0	60.6	152.7	78.0%	77.0%	84.9%
2025	63.5	63.0	153.0	78.0%	77.2%	85.3%
2030	66.5	65.5	153.4	78.0%	77.3%	85.5%
CAGR (2010-2030)	*1.20%*	*0.77%*	*0.05%*	*0.02%*	*0.07%*	*0.17%*

Sources: Hist Average Seat Data - Airline Schedules, Diio Mio
Hist Load Factor Calculated from Historial Passengers, Historcial Departures, and Historical Avg Seats/Dep
Hist and Projected US Carrier Fleet Avg/Seats & Load Factor - FAA Aerospace Forecasts FY2011-2031
Projections - Mead & Hunt, Inc.

At the Asheville Regional Airport, the average number of seats per departure and aircraft load factor is projected to increase, similar to the FAA's projected increases in these metrics within U.S. regional and mainline carrier fleets. At the Airport, the average number of seats per departure is anticipated to increase from 52.4 in 2010, to 56.5 in 2015, 59.0 in 2020, 63.5 in 2025, and 66.5 in 2030. Passenger load factor is also anticipated to increase throughout the projection period, from 77.6percent in 2010 to 78.0 percent through the forecast period.

In calculating future scheduled commercial operations, the average number of seats per departure at the Airport is multiplied by the passenger load factor. Projected passenger enplanements are then divided by this figure to obtain scheduled commercial passenger departures. It is assumed that the number of annual commercial departures and arrivals will be the same; departures are multiplied by two to calculate projected scheduled commercial operations (**Table 3-13**). Through the next 20 years, 18,643scheduled commercial operations are projected in 2015, 19,397 in 2020, 19,582in 2025, and 20,316 in 2030, resulting in a CAGR of 0.45 percent.

Table 3-13: Scheduled Commercial Operations Forecasts

Year	Enplanements	Scheduled Passenger Dep	Average Seats/Dep	Load Factor	Scheduled Passenger Ops
Historical:					
2007	298,667	8,129	48.7	75.4%	16,258
2008	289,215	8,121	49.7	71.6%	16,242
2009	298,865	7,366	50.4	80.5%	14,732
2010	378,087	9,293	52.4	77.6%	18,586
2011	NA	9,368	53.7		18,736
Projected:					
2015	410,793	9,321	56.5	78.0%	18,643
2020	446,328	9,699	59.0	78.0%	19,397
2025	484,937	9,791	63.5	78.0%	19,582
2030	526,886	10,158	66.5	78.0%	20,316
CAGR (2010-2030)	*1.67%*	*0.45%*			*0.45%*

Note: 2011 data is estimated
Sources: Hist Enplanements - Airport Records
Hist Scheduled Air Carrier Dep's and Avg Seat Data - Airline Schedules, Diio Mi (Oct 2011)
Projections - Mead & Hunt, Inc.

3.5.b Air Carrier Fleet Mix

The FAA Aerospace Forecasts FY 2011-2031 notes the following regarding the U.S. commercial aircraft fleet:

- The number of commercial aircraft in the U.S. is forecast to grow from 7,096 in 2010 to 10,523 in 2031, an average annual growth rate of 1.9 percent.
- The mainline carrier fleet is projected to shrink initially in 2011 as carriers remove older, less fuel efficient narrow-body aircraft, and then increase through 2031. The narrow-body fleet is anticipated to grow by approximately 69 aircraft annually, particularly as carriers take deliveries of Embraer 190s, and the coming single aisle replacements from Airbus and Boeing (A320-NEO, B737-MAX). The wide-body fleet is anticipated to grow by 34 aircraft per year, particularly as the Boeing 787 and Airbus A350's enter the fleet.

- The regional carrier passenger fleet is forecast to increase by 39 aircraft per year as increases in larger regional jets offset reductions in 50 seat and smaller regional jets. All growth in regional jets over the forecast period is projected to occur in the larger 70- and 90-seat aircraft. The turboprop/piston fleet is expected to shrink from 806 units in 2010 to 620 in 2031, reflecting a decline in the make-up of the regional carrier passenger fleet from 31.3 percent turboprop/piston in 2010 to only 18.3 percent in 2010.

Bombardier Commercial Aircraft prepares market forecasts regarding the world commercial aircraft market. The Bombardier Commercial Market Forecast 2011-2030, projects a significant decline in the less than 60 seat fleet and strong growth in the 60 to 99 seat fleet along with strong growth in the 100 to 149 seat aircraft fleets (see **Table 3-14** below).

Table 3-14: World Fleet Growth Forecast – 2010 to 2030

Segment	Fleet 2010	Deliveries	Retirement	Fleet 2030
20- to 59-seat	3,600	300	2,500	1,400
60- to 99-seat	2,200	5,800	1,200	6,800
100- to 149-seat	5,200	7,000	3,000	9,200
Total Aircraft	11,000	13,100	6,700	17,400

Source: Bombardier Commercial Market Forecast 2011-2030

As previously mentioned, in many US markets, air carriers are reducing or retiring older and less fuel efficient aircraft, particularly 50 seat and smaller regional jets, and replacing them with larger regional (70 to 90 seats) and narrow-bodied jets that have more seats and lower operational costs per passenger. This trend is evident at the Asheville Regional Airport as the average number of seats per commercial departure has increased from 48.7 in 2007 to 53.7 in 2011.

Table 3-15 presents the historical and projected fleet of scheduled commercial airline operators at the Airport. Commercial aircraft equipped with 40 or fewer seats have proportionally seen annual operations decline from 22.5 percent in 2007 to 1.4 percent in 2011. Operations increased for aircraft equipped with 40-60 seats from 66.7 percent in 2007 to 95.7 percent in 2009. A decline experienced during the following two years lowered the percentage of operations by this group to 88.3 percent in 2011. It is anticipated that smaller passenger aircraft use at the Airport will continue to decline throughout the forecast period as 37- to 50-seat turboprops are retired and 50-seat regional jets are replaced by more efficient larger regional jet aircraft and narrow-body aircraft with up to 150-seats. Additionally service by low-cost carriers, utilizing narrow-body aircraft, a few times per week to leisure destinations is anticipated to continue through the projection period.

Table 3-15: Scheduled Commercial Operations Fleet Mix Forecast

Seat Range	Typical Aircraft	Historical Departures 2007	2008	2009	2010	2011	Projected 2015	2020	2025	2030
Less than 40	Saab340, 328Jet, ERJ135	1,826	1,184	224	117	131	0	0	0	0
	Beech1900, EMB120, DHC-8	*22.5%*	*14.6%*	*3.0%*	*1.3%*	*1.4%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
40-60	CRJ200, ERJ140, ERJ145,	5,419	6,195	7,051	8,522	8,271	7,942	7,497	6,472	6,054
	DHC-8-300	*66.7%*	*76.3%*	*95.7%*	*91.7%*	*88.3%*	*85.2%*	*77.3%*	*66.1%*	*59.6%*
61-99	AvroRJ, CRJ700, CRJ900,	884	742	3	398	627	811	1,513	2,360	2,915
	EMB170, EMB175	*10.9%*	*9.1%*	*0.0%*	*4.3%*	*6.7%*	*8.7%*	*15.6%*	*24.1%*	*28.7%*
100-130	B717, DC9, EMB190,	0	0	88	248	272	466	533	656	772
	EMB195, A319	*0.0%*	*0.0%*	*1.2%*	*2.7%*	*2.9%*	*5.0%*	*5.5%*	*6.7%*	*7.6%*
131-150	A320, MD81/82/83/87/88,	0	0	0	8	67	103	155	206	284
	B737-4, B737-5	*0.0%*	*0.0%*	*0.0%*	*0.1%*	*0.7%*	*1.1%*	*1.6%*	*2.1%*	*2.8%*
151 or more	MD90, B737-8, B737-9, B757	0	0	0	0	0	0	0	98	152
		0.0%	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*1.0%*	*1.5%*
Total Scheduled Passenger Aircraft Departures		8,129	8,121	7,366	9,293	9,368	9,321	9,699	9,791	10,158
Average Seats Per Departure		48.7	49.7	50.4	52.4	53.7	56.5	59.0	63.5	66.5
Total Scheduled Seats		396,076	403,650	371,344	487,153	503,240	526,658	572,216	621,714	675,495

Sources: Historical Scheduled Departures and Average Seat Data - Airline Schedules, Diio Mi
Projections - Mead & Hunt, Inc.

3.5.c Unscheduled Commercial Passenger Operations Forecasts

Unscheduled commercial flights are typically categorized as charters or air taxis. **Table 3-16** summarizes the number of scheduled commercial operations in comparison to the number of operations conducted by commercial air carrier aircraft over 60 seats and air taxi aircraft 60 seats and under reported by the Airport's Airport Traffic Control Tower (ATCT). The difference between the two totals is the number of unscheduled commercial operations.

Table 3-16: Air Carrier and Air Taxi Operations Forecasts

Year	Total: Air Carrier	Commuter / Air Taxi	Total Commercial	Scheduled Operations: Scheduled Commercial Departures	Scheduled Commercial Operations	*Percent Scheduled*	Unscheduled / Others[1]: Operations	*Percent Unscheduled*
Historical:	***Historical ATCT Records***							
2007	1,807	19,255	21,062	8,129	16,258	*77.2%*	4,804	*22.8%*
2008	1,327	19,049	20,376	8,121	16,242	*79.7%*	4,134	*20.3%*
2009	363	17,234	17,597	7,366	14,732	*83.7%*	2,865	*16.3%*
2010	1,160	19,605	20,765	9,293	18,586	*89.5%*	2,179	*10.5%*
		FAA Projected Growth Rate in Total Active General Aviation and Air Taxi Fleet[2]					*0.9%*	
Projected:								
2015	1,380	19,542	20,922	9,321	18,643	*89.1%*	2,279	*10.9%*
2020	2,202	19,579	21,780	9,699	19,397	*89.1%*	2,383	*10.9%*
2025	3,319	18,755	22,074	9,791	19,582	*88.7%*	2,492	*11.3%*
2030	4,124	18,798	22,922	10,158	20,316	*88.6%*	2,607	*11.4%*
CAGR (2010-2030)	*6.55%*	*-0.21%*	*0.50%*	*0.45%*	*0.45%*		*0.90%*	

[1]Others is the difference between the tower reported Commercial Ops and the Scheduled Ops reported by Diio Mi. Others represents the Air Taxi/Fractional ownership aircraft

[2]FAA Aerospace Forecasts 2011-2031

Sources: Historical ATCT Records - FAA Air Traffic Activity Data System (ATADS)
Historical Scheduled Commercial Operations: Airline Schedules obtained from Diio Mi
Projections - Mead & Hunt, Inc.

The overall proportion of unscheduled operations at the Asheville Regional Airport has declined from 22.8 percent in 2007 to 10.5 percent in 2010. The demand for unscheduled flights can hinge on several factors and can be difficult to forecast. Between 2007 and 2010, the number of annual unscheduled operations declined from 4,804 to 2,179. According to the FAA Aerospace Forecasts FY 2010-2030, the projected annual growth rate of the national general aviation and air taxi fleet is expected to be 0.9 percent. It is assumed that unscheduled operations at the Asheville Regional Airport will reflect this national trend; therefore, applying this projected CAGR to the level of operations conducted in 2010, an increase to 2,607 operations annually can be anticipated by 2030.

3.6 General Aviation Operations

General aviation operations are those aircraft operations that are not categorized as commercial or military. Since reaching a peak in 1998 of 66,187 operations, general aviation operations at the Airport have declined to a 15-year low of 41,752 operations in 2010 despite higher numbers of general aviation aircraft based at the Airport. Overall, aircraft operations across the nation have significantly decreased, with the greatest loss of activity experienced in recreational flying due to higher fuel and operating costs. Several methodologies were evaluated to project future general aviation operations at the Airport. The FAA TAF, trend line analysis, and growth rate methodology projections of general aviation operations at the Airport are presented in **Table 3-17**.

Table 3-17: GA Operations Forecasts – TAF, Trend Line, & Growth Rate Methodologies

		FAA TAF Summary	Trend Line	Growth Rate	
Year	Historical	Total GA Ops	Total GA Ops	Total GA Ops	Growth Rate
Historical:					
1995	51,777	53,255	51,777	51,777	
1996	49,180	47,529	49,180	49,180	-5.02%
1997	58,366	57,217	58,366	58,366	18.68%
1998	66,187	63,657	66,187	66,187	13.40%
1999	64,573	66,962	64,573	64,573	-2.44%
2000	56,557	56,780	56,557	56,557	-12.41%
2001	53,744	54,049	53,744	53,744	-4.97%
2002	50,762	54,080	50,762	50,762	-5.55%
2003	45,766	44,418	45,766	45,766	-9.84%
2004	44,203	45,455	44,203	44,203	-3.42%
2005	44,663	44,771	44,663	44,663	1.04%
2006	49,194	47,506	49,194	49,194	10.14%
2007	56,841	55,277	56,841	56,841	15.54%
2008	52,912	55,812	52,912	52,912	-6.91%
2009	45,125	44,835	45,125	45,125	-14.72%
2010	41,752	43,546	41,752	41,752	-7.47%
CAGR (1995-2010)	*-1.42%*			*CAGR (1995-2010)*	*-1.42%*
Projected:					
2015		44,789	41,903	38,862	*-1.42%*
2020		45,830	37,874	36,172	*-1.42%*
2025		46,900	33,845	33,668	*-1.42%*
2030		47,996	29,816	31,338	*-1.42%*
	CAGR (2010-2030)	*0.49%*	*-1.67%*	*-1.42%*	

Sources: Historical Operations - Air Traffic Activity Data System (ATADS)
Projections - Mead & Hunt, Inc., except FAA TAF Summary which are from the FAA Terminal Area Forecast

Table 3-18 presents the general aviation operations forecasts that were prepared using the operations per based aircraft and the market share methodologies. Though the number of based aircraft at the Airport between 1995 and 2010 has increased, the number of general aviation operations during the same time period has decreased. In 2010, the number of general aviation operations per based aircraft was 240. Assuming this level of operations per based aircraft remains constant throughout the forecasting period, general aviation operations will increase from 41,752 in 2010 to 52,066 in 2030.

Between 1995 and 2010, Asheville Regional Airport's market share of total U.S. general aviation operations has ranged from a low 0.1264 percent in 2004 to a high of 0.1740 percent in 1998. Using the FAA's forecasts of total U.S. general aviation operations, and assuming the 2010 market share of 0.1571 percent remains constant throughout the forecasting period, the market share methodology projects general aviation operations will increase from 41,752 in 2010 to 55,097 in 2030.

Table 3-18: GA Operations Forecasts – Operations per Based Aircraft & Market Share

	Operations Per Based Aircraft Methodology			Market Share Methodology		
Year	Based Aircraft	Operations per Based Aircraft	Total Operations	Total Operations	Total U.S. GA Operations	Market Share
Historical:						
1995	120	431	51,777	51,777	35,926,600	0.1441%
1996	128	384	49,180	49,180	35,298,300	0.1393%
1997	119	490	58,366	58,366	36,833,300	0.1585%
1998	119	556	66,187	66,187	38,046,600	0.1740%
1999	107	603	64,573	64,573	39,999,600	0.1614%
2000	107	529	56,557	56,557	39,878,500	0.1418%
2001	107	502	53,744	53,744	37,626,472	0.1428%
2002	128	397	50,762	50,762	37,652,701	0.1348%
2003	130	352	45,766	45,766	35,524,020	0.1288%
2004	128	345	44,203	44,203	34,967,730	0.1264%
2005	128	349	44,663	44,663	34,146,832	0.1308%
2006	139	354	49,194	49,194	33,072,516	0.1487%
2007	130	437	56,841	56,841	33,131,959	0.1716%
2008	141	375	52,912	52,912	31,573,810	0.1676%
2009	160	282	45,125	45,125	27,999,595	0.1612%
2010	174	240	41,752	41,752	26,571,397	0.1571%
	Avg (2000-2010)	*378*			*Average (1995-2010)*	*0.1493%*
Projected:						
2015	184	240	44,248	45,306	28,833,363	0.1571%
2020	195	240	46,819	48,285	30,728,860	0.1571%
2025	206	240	49,434	51,547	32,804,953	0.1571%
2030	217	240	52,066	55,097	35,064,533	0.1571%
	1.11%		*1.11%*	*1.40%*	*1.40%*	

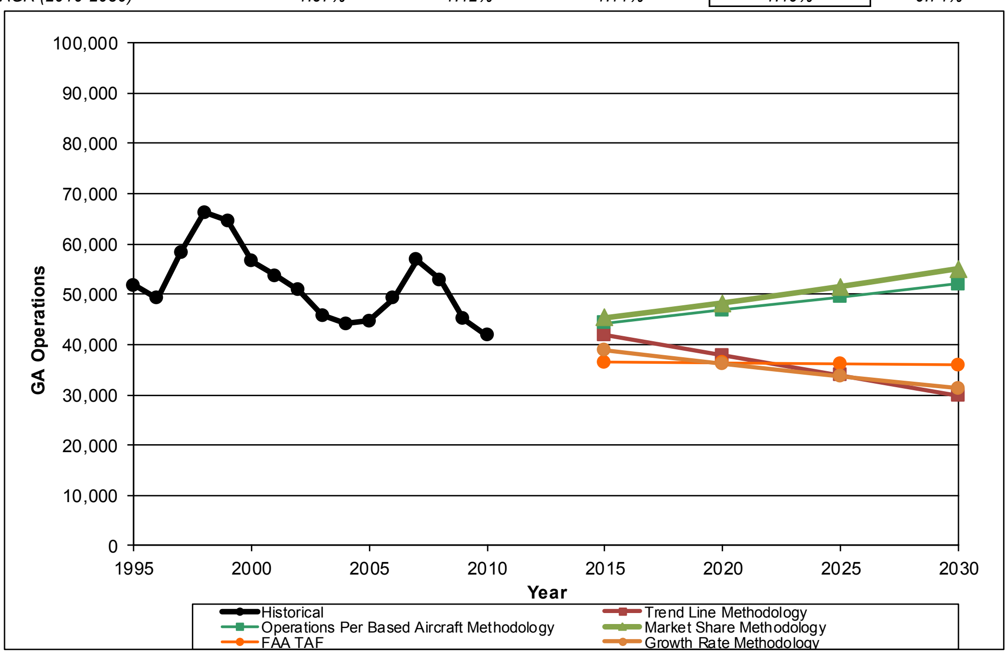
Sources: Historical Operations - Air Traffic Activity Data System (ATADS)
Total U.S. GA Operations - FAA Aerospace Forecasts FY 2011-2031
Projections - Mead & Hunt, Inc.,

General aviation activity can be affected by many variables including the costs to own and operate an aircraft, available hangar space for lease, and the status of local, state, national and world economies. A comparison of projected general aviation operations using the methodologies described in this section is presented in **Table 3-19**.

The number of general aviation aircraft operations conducted at both the Asheville Regional Airport and throughout the U.S. has declined in recent years; however, long term growth is projected by the FAA through 2030. It is anticipated that the Airport's market share of total general aviation operations conducted in the U.S. will remain relatively consistent with the 1.4 percent CAGR projected by the market share methodology; therefore, this is the preferred forecasting approach.

Table 3-19: GA Operations Forecasts Summary

Year	Historical	Trend Line Methodology	Growth Rate Methodology	Operations Per Based Aircraft Methodology	Market Share Methodology	FAA TAF
Historical:						
1995	51,777					
1996	49,180					
1997	58,366					
1998	66,187					
1999	64,573					
2000	56,557					
2001	53,744					
2002	50,762					
2003	45,766					
2004	44,203					
2005	44,663					
2006	49,194					
2007	56,841					
2008	52,912					
2009	45,125					
2010	41,752					
CAGR (1995-2010)	*-1.42%*					
Projected:						
2015		41,903	38,862	44,248	45,306	36,524
2020		37,874	36,172	46,819	48,285	36,339
2025		33,845	33,668	49,434	51,547	36,157
2030		29,816	31,338	52,066	55,097	35,977
CAGR (2010-2030)		*-1.67%*	*-1.42%*	*1.11%*	*1.40%*	*-0.74%*



Notes: CAGR = Compounded annual growth rate.
Sources: Historical Operations - Air Traffic Activity Data System (ATADS)
Projections - Mead & Hunt, Inc., except FAA TAF Summary which are from the FAA Terminal Area Forecast

As a part of the projections developed for general aviation operations, a breakdown of the operations that can be anticipated by local and itinerant aircraft movements was also prepared. As defined by the FAA Air Traffic Activity Data System, local operations are those operations performed by aircraft that remain in the local traffic pattern, execute simulated instrument approaches or low passes at an airport, and operate to or from an airport and have a designated practice area within a 20-mile radius of the tower. Itinerant operations are operations performed by an aircraft, either IFR, SVFR (special VFR), or VFR that lands at an airport arriving from outside the airport area or departs an airport and leaves the airport area.

Historically, itinerant general aviation operations have comprised the majority of total general aviation operations conducted at the Asheville Regional Airport. Between 1995 and 2010, itinerant general aviation operations have averaged approximately 66 percent of the total general aviation operations, while in 2010 the percentage exceeded the historical average at 69 percent. It is anticipated that the split in local/itinerant operations experienced in 2010 will remain constant throughout the forecasting period. A summary of the projected local and itinerant general aviation operations is presented in **Table 3-20**.

Table 3-20: Local/Itinerant General Aviation Operations Forecast

	Total GA	Itinerant GA		Local GA	
Year	Operations	Operations	Percent	Operations	Percent
Historical:					
1995	51,777	35,583	69%	16,194	31%
1996	49,180	33,142	67%	16,038	33%
1997	58,366	36,397	62%	21,969	38%
1998	66,187	40,214	61%	25,973	39%
1999	64,573	40,887	63%	23,686	37%
2000	56,557	37,081	66%	19,476	34%
2001	53,744	36,392	68%	17,352	32%
2002	50,762	33,880	67%	16,882	33%
2003	45,766	30,753	67%	15,013	33%
2004	44,203	30,065	68%	14,138	32%
2005	44,663	31,482	70%	13,181	30%
2006	49,194	34,650	70%	14,544	30%
2007	56,841	38,711	68%	18,130	32%
2008	52,912	33,096	63%	19,816	37%
2009	45,125	28,175	62%	16,950	38%
2010	41,752	28,843	69%	12,909	31%
		Avg (1995-2010)	*66%*	*Avg (1995-2010)*	*34%*
Projected:					
2015	45,306	31,298	69%	14,008	31%
2020	48,285	33,356	69%	14,929	31%
2025	51,547	35,609	69%	15,937	31%
2030	55,097	38,062	69%	17,035	31%
CAGR (2010-2030)	*1.40%*	*1.40%*		*1.40%*	

Notes: CAGR = Compounded Annual Growth Rate.
Sources: Historical Operations - Air Traffic Activity Data System (ATADS)
Projections - Mead & Hunt, Inc.

3.7 Military Operations

Historically, military operations have comprised less than six percent of the total aircraft operations at the Asheville Regional Airport. Between 2000 and 2010, the number of annual military operations averaged 4,028. Military operations are driven more by national security policy decisions than by economic factors, therefore it is logical to project military operations will remain consistent with their 2000-2010 historical average. **Table 3-21** presents the military operations projections.

Table 3-21: Military Operations Forecast

	Itinerant		Local		
Year	Operations	%	Operations	%	Total
Historical:					
2000	3,119	51%	2,955	49%	6,074
2001	2,471	51%	2,332	49%	4,803
2002	1,904	61%	1,202	39%	3,106
2003	1,788	60%	1,201	40%	2,989
2004	2,147	53%	1,909	47%	4,056
2005	2,244	67%	1,124	33%	3,368
2006	2,361	58%	1,685	42%	4,046
2007	2,383	63%	1,388	37%	3,771
2008	2,389	67%	1,163	33%	3,552
2009	2,459	66%	1,256	34%	3,715
2010	3,271	68%	1,552	32%	4,823
Avg (2000-2010)	*2,412*	*61%*	*1,615*	*39%*	*4,028*
Projected:					
2015	2,440	61%	1,588	39%	4,028
2020	2,440	61%	1,588	39%	4,028
2025	2,440	61%	1,588	39%	4,028
2030	2,440	61%	1,588	39%	4,028
				CAGR 2010-2030	*-0.90%*

Sources: Historical Military Operations - FAA Air Traffic Activity Data System (ATADS)
Projections - Mead & Hunt, Inc.

Table 3-22 presents the fleet mix break down by physical aircraft class and representative equipment types (in declining prevalence) for the projected years. The current military fleet mix was obtained from the FAA's Enhanced Traffic Management System Counts (ETMSC), which utilizes IFR flight plan data and radar traffic records to estimate operational counts. As noted above, military operations are driven more by national security policy decisions than by economic factors, therefore it is assumed that the projected military operational fleet mix will remain consistent with its 2010 composition.

Table 3-22: Military Operations Fleet Mix

Physical Class	Equipment Type	Current Military Fleet Mix: 2010 IFR Departures	Current Military Fleet Mix: Percent of Military Activity	Projected Annual Operations (2012-2030)
Jet	HAWK - BAe Systems Hawk	36	4.9%	198
Jet	C560 - Cessna Citation V/Ultra/Encore	26	3.5%	143
Jet	BE40 - Raytheon/Beech Beechjet 400/T-1	15	2.0%	82
Jet	GLF5 - Gulfstream V/G500	13	1.8%	71
Jet	C17 - Boeing Globemaster 3	9	1.2%	49
Jet	GLF3 - Gulfstream III/G300	8	1.1%	44
Jet	*20 Others (All 1.0% or less of activity; Types include Falcon 20, T38, E6, GIV, F18, F16, B757, others)*	73	9.9%	401
	Subtotal Jets	180	24.5%	988
Turbine	P3 - Lockheed P-3C Orion	128	17.4%	702
Turbine	TEX2 - Raytheon Texan 2	104	14.2%	571
Turbine	BE20 - Beech 200 Super King	61	8.3%	335
Turbine	C130 - Lockheed 130 Hercules	34	4.6%	187
Turbine	*11 Others (All 2.4% or less of activity; Types include Pilatus PC-12, T34, Merlin, C-130, King Air 350, others)*	51	6.9%	280
	Subtotal Turbine	378	51.5%	2,074
Piston	C172 - Cessna Skyhawk 172/Cutlass	38	5.2%	209
Piston	C182 - Cessna Skylane 182	34	4.6%	187
Piston	T6 - North American T-6 Texan	8	1.1%	44
Piston	T34 - Beech T 34	6	0.8%	33
Piston	*6 Others (All 0.4% or less of activity; Types include Cessna 206, Beech 58, others)*	8	1.1%	44
	Subtotal Pistons	94	12.8%	516
Copter	TEX2 - Raytheon Texan 2	21	2.9%	115
Copter	H60 - Sikorsky SH-60 Seahawk	16	2.2%	88
Copter	B06 - Agusta AB-206 LongRanger	10	1.4%	55
Copter	*21 Others (All 0.3% or less of activity)*	35	4.8%	192
	Subtotal Copters	82	11.2%	450
	Grand Total	734	100.0%	4,028

Source: 2010 IFR Military Departures – FAA Enhanced Traffic Management System Counts (ETMSC)
Mead & Hunt, Inc.

3.8 Instrument Operations

Instrument operations are those conducted by properly equipped aircraft that can utilize radio and global positioning system (GPS) signals emitted by navigational equipment for a pilot to conduct a landing with limited visual cues. Most instrument operations are conducted by commercial aircraft, general aviation aircraft filing instrument flight plans, and essentially all aircraft operations conducted in IFR weather. In 2010, 58 percent of all aircraft operations conducted at the Asheville Regional Airport were instrument operations (**Table 3-23**). Assuming this percentage remains constant throughout the forecasting period, instrument operations are projected to increase from 38,969 in 2010 to 47,480 in 2030.

Table 3-23: Instrument Operations Forecast

Year	Total Operations	Instrument Operations		Visual Operations	
		Operations	Percent	Operations	Percent
Historical:					
2000	80,351	37,761	47%	42,590	53%
2001	75,380	36,921	49%	38,459	51%
2002	72,821	38,604	53%	34,217	47%
2003	68,285	38,994	57%	29,291	43%
2004	71,224	41,057	58%	30,167	42%
2005	70,532	43,064	61%	27,468	39%
2006	74,373	43,667	59%	30,706	41%
2007	81,674	44,970	55%	36,704	45%
2008	76,840	40,736	53%	36,104	47%
2009	66,437	35,056	53%	31,381	47%
2010	67,340	38,969	58%	28,371	42%
		Average (2000-2009)	*55%*	*Average (2000-2009)*	*45%*
Projected:					
2015	70,255	40,656	58%	29,599	42%
2020	74,093	42,877	58%	31,216	42%
2025	77,648	44,934	58%	32,714	42%
2030	82,047	47,480	58%	34,567	42%
CAGR (2009-2030)	*0.99%*	*0.99%*		*0.99%*	

Notes: CAGR = Compounded Annual Growth Rate.
Sources: Historical Operations - FAA Air Traffic Activity Data System (ATADS)
Projections - Mead & Hunt, Inc.

3.9 Enplaned/Deplaned Cargo

Air cargo is carried by both scheduled passenger carriers and dedicated air cargo operators. Cargo is typically categorized as either mail, express or freight.

3.9.a Cargo Scenario 1

The total amount of cargo enplaned annually at the Asheville Regional Airport has decreased significantly since 2003, falling from 569,886 pounds in 2003 to a low of 127,943 pounds in 2010 (**Table 3-24**). This is due to significant reductions in the amount of cargo being carried by the scheduled passenger carriers and reductions in chartered cargo/freight carriers. The Airport's market share compared to total U.S. revenue ton miles in 2010 was 0.001 percent. Cargo Scenario 1 assumes that the Airport's current market share of the domestic air cargo market will remain through the forecasting period. Analyzing U.S. air cargo projections obtained from the FAA Aerospace Forecast FY 2011-2031, a CAGR of 2.79 percent is projected through 2030. Applying this CAGR, total air cargo enplaned and deplaned at the Airport is projected to increase from 127,943 pounds in 2010 to 221,680 pounds in 2030. This projection serves as the baseline air cargo projection for the Airport.

Table 3-24: Air Cargo Scenario 1 (Baseline)

Year	AVL Enplaned Cargo				AVL Deplaned Cargo				Total AVL Cargo	Total U.S. Air Cargo (mil-rev ton mi)	AVL Market Share
	Mail	Express	Freight	Total	Mail	Express	Freight	Total			
Historical:											
2003	17,079	93,720	67,818	178,617	21,037	90,274	279,958	391,269	569,886	14,698.7	0.00388%
2004	0	17,580	98,835	116,415	5,413	31,266	294,739	331,418	447,833	16,340.9	0.00274%
2005	0	1,975	116,872	118,847	1,246	2,556	237,212	241,014	359,861	16,089.6	0.00224%
2006	0	499	99,617	100,116	338	2,139	260,324	262,801	362,917	15,710.5	0.00231%
2007	0	4,119	78,687	82,806	1,675	6,495	158,779	166,949	249,755	15,818.0	0.00158%
2008	35	5,068	24,267	29,370	0	5,173	112,343	117,516	146,886	14,410.5	0.00102%
2009	1	11,817	32,194	44,012	0	14,956	74,800	89,756	133,768	11,900.0	0.00112%
2010	0	16,613	30,779	47,392	0	11,970	68,581	80,551	127,943	12,848.0	0.00100%
% of Total	*0.0%*	*13.0%*	*24.1%*	*37.0%*	*0.0%*	*9.4%*	*53.6%*	*63.0%*			
Projected:											
2015	0	20,548	38,070	58,618	0	14,805	84,826	99,632	158,250	15,891.4	0.00100%
2020	0	23,124	42,842	65,966	0	16,661	95,460	112,121	178,087	17,883.5	0.00100%
2025	0	25,898	47,982	73,880	0	18,660	106,912	125,572	199,453	20,029.0	0.00100%
2030	0	28,784	53,329	82,114	0	20,740	118,827	139,567	221,680	22,261.1	0.00100%
% of Total	*0.0%*	*13.0%*	*24.1%*	*37.0%*	*0.0%*	*9.4%*	*53.6%*	*63.0%*			
CAGR	*0.00%*	*2.79%*	*2.79%*	*2.79%*	*0.00%*	*2.79%*	*2.79%*	*2.79%*	*2.79%*	*2.79%*	

Notes: CAGR = Compounded annual growth rate.
Sources: Historical Airport Cargo Data - Airport Management
Total U.S. Air Cargo (Revenue Ton Miles) - FAA Aerospace Forecasts FY2011-2031

3.9.b Cargo Scenario 2

The Airport has received past inquiries from air cargo companies regarding the availability of space at the airport to accommodate air cargo operations and activities. Given that the utilization of the Airport by a dedicated air cargo company would significantly alter the amount of cargo enplaned and deplaned at the Airport, Cargo Scenario 2 has been developed. This scenario anticipates use of the Airport by an overnight air cargo hauler such as FedEx or UPS. This type of overnight cargo operation would likely initially include service by a narrow-body aircraft such as a B727 or B757, five to seven days a week. Annual enplaned cargo for this type of operation at a regional airport would typically total eight million pounds and deplaned cargo 12 million pounds. Scenario 2 assumes a growth rate of 2.79 percent annual growth in these figures, identical to the FAA-projected growth rate in U.S. air cargo. This cargo activity would be in addition to the Scenario 1 activity. **Table 3-25** presents the additional and total air cargo activity anticipated under Air Cargo Scenario 2.

Table 3-25: Air Cargo Scenario 2 (High Growth)

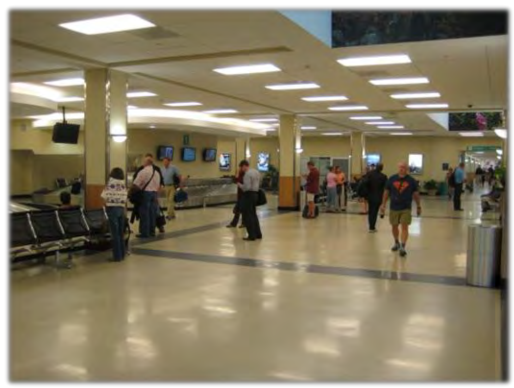
	Scenario 1 Air Cargo (lbs)			+	Scenario 2 New Cargo Carrier (lbs)			=	Scenario 2
Year	Enplaned	Deplaned	Total		Enplaned	Deplaned	Total		Grand Total
Historical:									
2010	47,392.0	80,551	127,943		-	-	-		127,943
Projected:									
2015	58,618.0	99,632	158,250		8,000,000	12,000,000	20,000,000		20,158,250
2020	65,966.1	112,121	178,087		9,180,035	13,770,052	22,950,086		23,128,174
2025	73,880.2	125,572	199,453		10,534,129	15,801,194	26,335,323		26,534,776
2030	82,113.7	139,567	221,680		12,087,959	18,131,938	30,219,897		30,441,578
CAGR	*2.79%*	*2.79%*	*2.79%*		*2.79%*	*2.79%*	*2.79%*		*2.79%*

Notes: CAGR = Compounded annual growth rate.
Sources: Historical Airport Cargo Data - Airport Management
Mead & Hunt

3.10 Peak Passenger Activity and Operations

Airside and landside infrastructure planning is often based on peak periods of passenger and aircraft activity. In an effort to measure how well existing facilities can accommodate high levels of demand, this section presents the monthly, daily and hourly peak activity levels for passengers and aircraft operations that can be anticipated at the Airport for the next 20 years.

3.10.a Peak Month Passenger Activity Forecasts



Monthly passenger enplanement data obtained from the Airport illustrates that between 2007 and 2010, the average percentage of passenger enplanements that occurred in the peak month accounted for 10.3 percent of the total annual enplanements (**Table 3-26**). It is assumed that the peak monthly enplanements will continue to account for 10.3 percent of the total enplaned passengers at the Airport throughout the forecasting period. Applying this methodology, peak month enplanements are anticipated to increase from 39,629 in 2010 to 54,259 in 2030.

Table 3-26: Peak Month Passenger Activity Forecasts

Historical Monthly Enplanements

Month	2007		2008		2009		2010	
Jan	17,751	6.1%	17,912	6.4%	19,049	6.5%	18,248	4.9%
Feb	16,066	5.6%	17,161	6.1%	17,194	5.9%	18,197	4.9%
Mar	20,891	7.2%	20,128	7.2%	21,488	7.4%	25,622	6.9%
Apr	22,256	7.7%	20,190	7.2%	23,782	8.2%	29,441	8.0%
May	26,555	9.2%	23,730	8.5%	24,796	8.5%	34,178	9.2%
Jun	28,806	10.0%	26,324	9.4%	28,356	9.7%	37,472	10.1%
Jul	28,945	10.0%	26,587	9.5%	29,198	10.0%	39,629	10.7%
Aug	28,642	9.9%	26,550	9.5%	27,810	9.6%	38,173	10.3%
Sep	25,289	8.7%	24,236	8.7%	25,244	8.7%	33,555	9.1%
Oct	28,170	9.7%	29,182	10.4%	27,766	9.5%	38,276	10.4%
Nov	24,048	8.3%	24,418	8.7%	23,917	8.2%	30,470	8.2%
Dec	21,999	7.6%	23,061	8.3%	22,599	7.8%	26,315	7.1%
Total	289,418	Jul	279,479	Oct	291,199	Jul	369,576	Jul
Peak Month	28,945	10.0%	29,182	10.4%	29,198	10.0%	39,629	10.7%

Average Percent of Enplanements in Peak Month = 10.3%

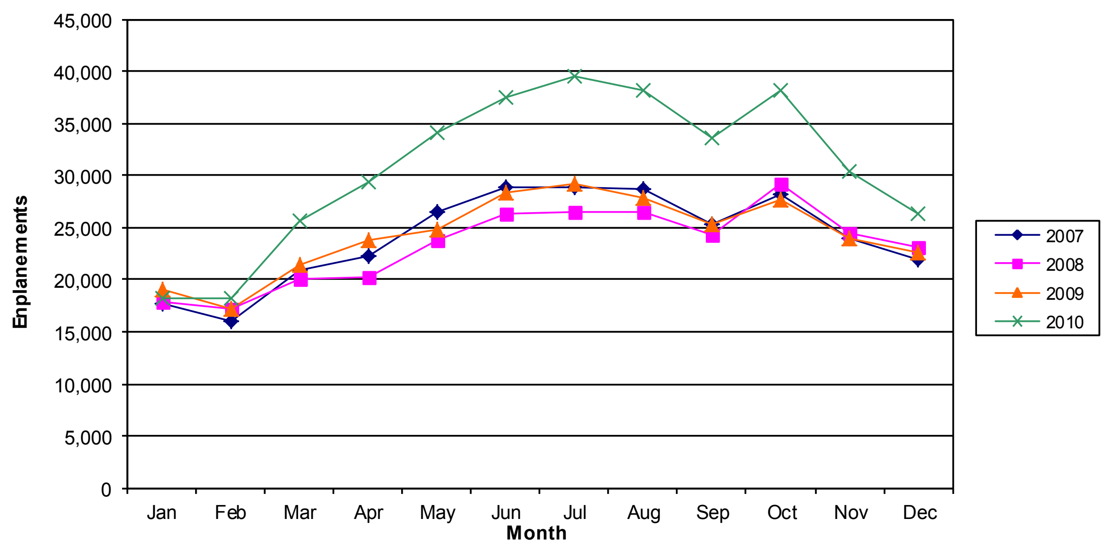
Scheduled Peak Passenger Month Departing Seats and Peak Month Load Factor

2007		2008		2009		2010	
37,146	77.9%	38,852	75.1%	32,671	89.4%	45,920	86.3%

Average Peak Month Load Factor = 82.2%

Projected Peak Month Enplanements

	Projected Annual Enpl	Peak Month %	Peak Month Enplanements
2015	410,793	10.3%	42,304
2020	446,328	10.3%	45,963
2025	484,937	10.3%	49,939
2030	526,886	10.3%	54,259



Source: Airport Management Records
Airline Schedules from Diio Mi
Mead & Hunt, Inc.

3.10.b Peak Month Average Day Passenger Activity Forecasts

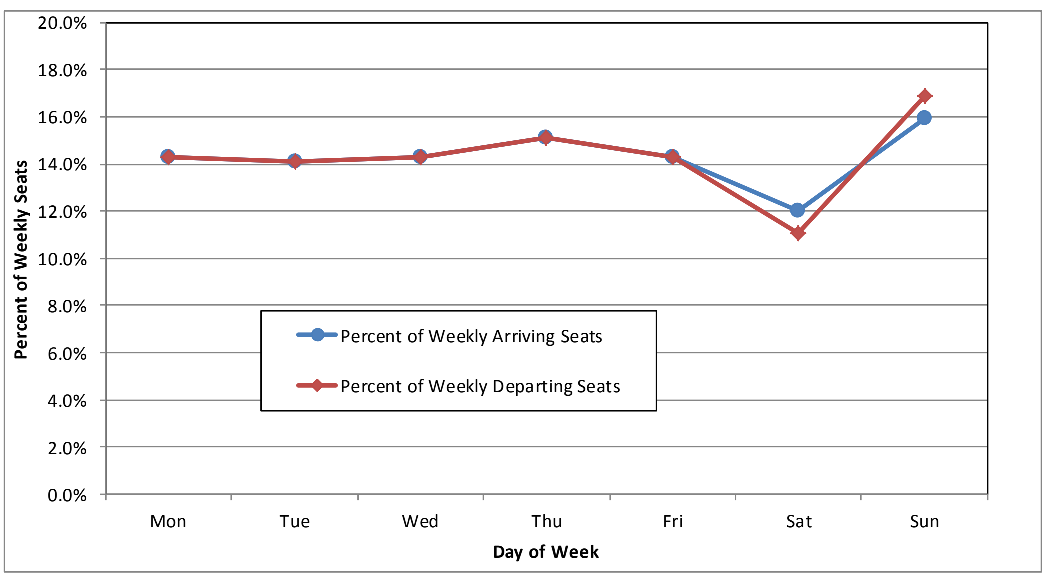
It should be noted that airport infrastructure planning is based on the probable demand for facilities that may occur over a period of time. If planning is contingent with the busiest periods of activity, it can lead to overestimation, overspending, and inefficiencies. Daily peak activity figures are based on a regularly occurring activity level day during the peak month. A review of airline activity schedules for the month of July 2011 indicates that activity regularly peaks on Sundays. On average, Sunday typically has 34 departures and 33 arrivals and accounts for approximately 16.9 percent and 15.9 percent of weekly departing and arriving seats, respectively (**Table 3-27**). Considering the average peak month is 31 days long (4.4 weeks), the average number of weekly passengers in the peak month is calculated by dividing the number of total monthly passengers with the average number of weeks in the peak month. This figure is then divided by the percent of weekly activity that occurs on a typical Sunday to determine the average daily number of total passengers that are enplaned and deplaned in the peak month.

Table 3-27: Peak Month Average Day Passenger Activity Forecasts

	Departures			Arrivals		
Day of the Week	Departures	Departing Seats	Percentage of Weekly Dep Seats	Arrivals	Arriving Seats	Percentage of Weekly Arr Seats
Mon	31	1,711	14.3%	31	1,711	14.3%
Tue	31	1,691	14.1%	31	1,691	14.1%
Wed	31	1,711	14.3%	31	1,711	14.3%
Thu	32	1,813	15.1%	32	1,813	15.1%
Fri	31	1,711	14.3%	31	1,711	14.3%
Sat	25	1,324	11.0%	26	1,441	12.0%
Sun	34	2,027	16.9%	33	1,910	15.9%
Total	215	11,988		215	11,988	

Average Day Passengers (Sunday)

				Percent of Weekly Activity on a Typical Sunday		Average Day Passengers		
Year	Peak Month Enpl/Depl	Weeks in Peak Month	Avg Week Enpl/Depl	Enplaning	Deplaning	Enpl	Depl	Total Pass.
2010	39,629	4.4	9,007	16.9%	15.9%	1,523	1,435	2,958
2015	42,304	4.4	9,614	16.9%	15.9%	1,626	1,532	3,158
2020	45,963	4.4	10,379	16.9%	15.9%	1,755	1,654	3,409
2025	49,939	4.4	11,277	16.9%	15.9%	1,907	1,797	3,703
2030	54,259	4.4	12,252	16.9%	15.9%	2,072	1,952	4,024



Source: Airline Schedules from Diio Mi, July 2011 Schedule

3.10.c Peak Hourly Passenger Activity Forecasts

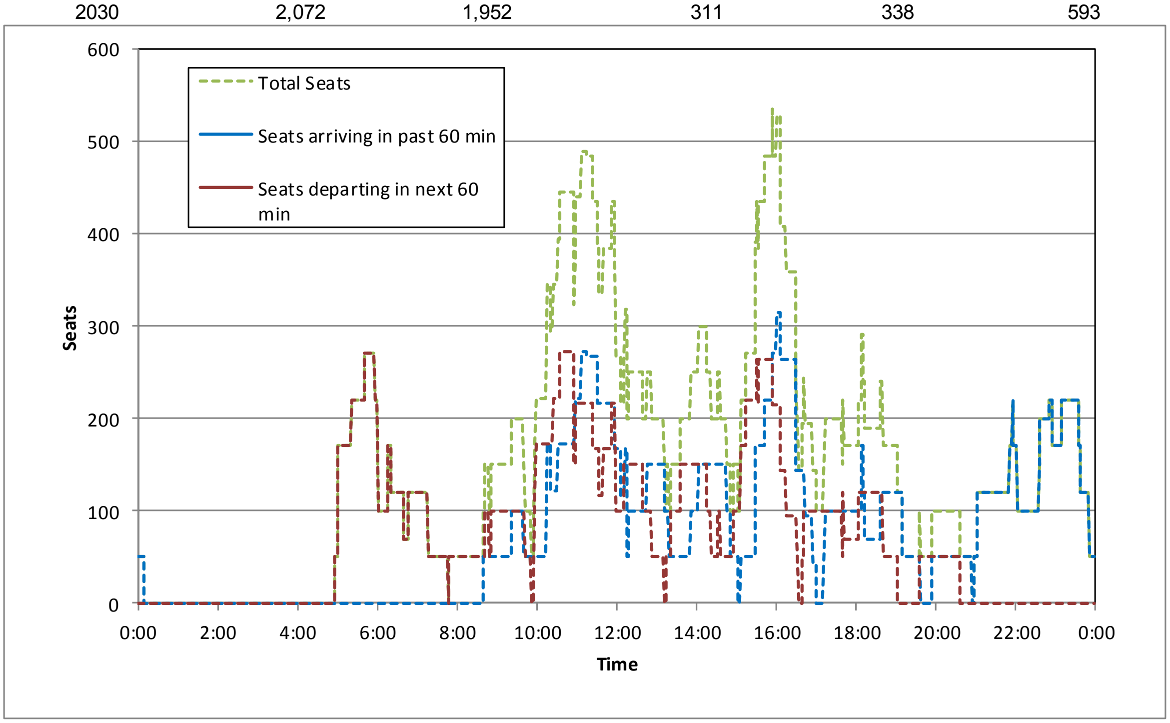
The number of hourly arriving and departing seats during a typical day in the peak month is shown in **Table 3-28**. Peak hour departing seats occur between 10:34 a.m. and 11:33 a.m. while peak hour arriving seats occur between 3:01 p.m. and 4:00 p.m. The peak total arriving and departing seats occurs between 3:34 p.m. and 4:33 p.m.

Table 3-28: Peak Hour Passenger Activity Forecasts

Time of Day	Number of Seats	Total Daily Seats	Percent of Day in Peak Hour (PH)
Peak Hour Departing Seats (Enplanements)			
10:34 to 11:33	272	1,813	15.0%
Peak Hour Arriving Seats (Deplanements)			
15:01 to 16:00	314	1,813	17.3%
Peak Total Passengers			
15:34 to 16:33	534	3,626	14.7%

Projected Peak Hour

	Peak Month Average Day Passengers		Peak Hour Passengers		
Year	Enplanements	Deplanements	Enplanements *15.0%*	Deplanements *17.3%*	Total Pass. *14.7%*
2010	1,523	1,435	228	249	436
2015	1,626	1,532	244	265	465
2020	1,755	1,654	263	286	502
2025	1,907	1,797	286	311	545
2030	2,072	1,952	311	338	593



Source: Airline Schedules from Diio Mi, Wed, July 2011 Schedule
Mead & Hunt, Inc.

3.10.d Passenger Activity Peaking Characteristics Summary

A summary of the peak month, peak month average day, and peak hour passenger forecasts presented in this section is illustrated in **Table 3-29**.

Table 3-29: Passenger Activity Peaking Characteristics Summary

Year	Peak Factor	Enplanements	Deplanements	Total Passengers
2010	**Actual**			
	Annual	369,576	369,576	739,152
	Peak Month	39,629	39,629	79,258
	Peak Month Average Day (PMAD)	1,523	1,435	2,958
	Peak Hour - PMAD	228	249	436
2015	**Projected**			
	Annual	410,793	410,793	821,586
	Peak Month	42,304	42,304	84,608
	Peak Month Average Day (PMAD)	1,626	1,532	3,158
	Peak Hour - PMAD	244	265	465
2020	**Projected**			
	Annual	446,328	446,328	892,656
	Peak Month	45,963	45,963	91,926
	Peak Month Average Day (PMAD)	1,755	1,654	3,409
	Peak Hour - PMAD	263	286	502
2025	**Projected**			
	Annual	484,937	484,937	969,874
	Peak Month	49,939	49,939	99,878
	Peak Month Average Day (PMAD)	1,907	1,797	3,703
	Peak Hour - PMAD	286	311	545
2030	**Projected**			
	Annual	526,886	526,886	1,053,772
	Peak Month	54,259	54,259	108,518
	Peak Month Average Day (PMAD)	2,072	1,952	4,024
	Peak Hour - PMAD	311	338	593

Source: Airline Schedules, Diio Mi
Airport Management Records
Mead & Hunt, Inc.

3.10.e Peak Operations Forecasts

To forecast peak month operations, the average percent of operations accounted for in the peak month is multiplied by the projected number of annual operations, and then divided by the number of days in the peak month. Assuming this percentage remains constant throughout the forecasting period, the peak number of operations in a month is anticipated to increase from 6,929 in 2010 to 8,467 in 2030.

The FAA Air Traffic Activity Data System (ATADS) notes that the average number of aircraft operations in the peak hour for each day in July 2010 was 13.8 percent of the total daily operations. Assuming this percentage remains constant throughout the forecasting period, the number of peak hour operations in the peak month is anticipated to increase from 31 in 2010 to 38 in 2030 (**Table 3-30**).

Table 3-30: Peak Month, Average Day, and Peak Hour Operations Projections

		Monthly Operations					
		2005	**2006**	**2007**	**2008**	**2009**	**2010**
Historical:	Jan	4,467	4,447	4,924	5,559	4,455	4,331
	Feb	4,450	4,556	4,698	4,732	3,998	4,033
	Mar	5,610	5,898	6,088	6,002	4,959	5,183
	Apr	6,288	5,816	5,884	5,843	5,251	5,698
	May	6,553	6,094	7,572	7,780	5,444	6,213
	Jun	6,950	6,968	8,037	7,647	6,324	6,365
	Jul	6,234	7,374	8,339	8,066	6,816	6,929
	Aug	6,143	7,656	8,757	7,317	6,518	6,529
	Sep	6,668	6,799	7,125	6,910	5,509	5,992
	Oct	6,780	7,411	7,662	7,261	6,728	6,603
	Nov	5,502	5,836	6,952	5,251	5,852	5,236
	Dec	4,887	5,518	5,636	4,472	4,583	4,228
	Total	70,532	74,373	81,674	76,840	66,437	67,340
	Peak Month	Jun	Aug	Aug	Jul	Jul	Jul
	Peak Month	6,950	7,656	8,757	8,066	6,816	6,929
	Percent of Annual	9.85%	10.29%	10.72%	10.50%	10.26%	10.29%
	PMAD Operations	232	247	282	260	220	224
					PMAD Peak Hour Operations [1]		31
			Average Percent of Annual Operations in Peak Month (2005-2010)				10.32%

Projected:	**Annual Ops**	**Peak Mnth %**	**PM Ops**	**PMAD Ops**	**Peak Hr[1] %**	**PH Ops**
2015	70,255	10.32%	7,250	234	13.80%	32
2020	74,093	10.32%	7,646	247	13.80%	34
2025	77,648	10.32%	8,013	258	13.80%	36
2030	82,047	10.32%	8,467	273	13.80%	38
CAGR (2010-2030)	*0.95%*		*0.96%*	*0.96%*		*0.96%*

Notes: CAGR = Compounded Annual Growth Rate.
PM = Peak Month; PMAD = Peak Month Avg Day
[1]Peak Hour percentage for each day in Jul 2010 averaged 13.80%

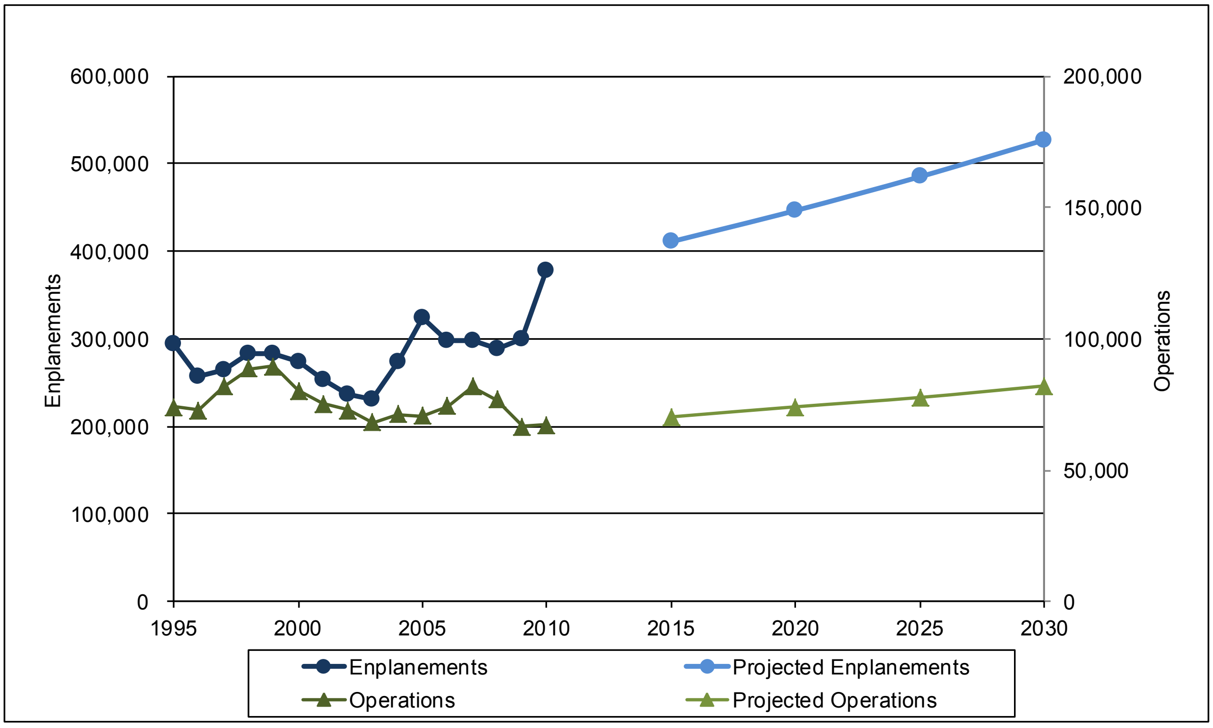
Sources: Historical Montly & Daily Operations - FAA Air Traffic Activity Data System (ATADS)
Historical Hourly Operations - FAA Enhanced Traffic Management System Counts (ETMSC)
Projections - Mead & Hunt, Inc.

3.11 Forecast Summary and FAA TAF Comparison

Passenger and aircraft activity at the Asheville Regional Airport has fluctuated in recent history. This is not uncommon in comparison to many U.S. airports as economic uncertainty and increased travel costs have impacted travel behavior. Despite increases in fuel cost, airline bankruptcies, system-wide route restructuring and aircraft fleet overhauls, the forecasts developed for this Master Plan Update suggest passenger enplanements, based aircraft and total aircraft operations will grow at the Airport over the next 20 years. A summary of these projections is presented in **Table 3-31**. A summary of these forecasts is also presented in specific FAA-required tabular formats in **Table 3-32** and **Table 3-33**.

Table 3-31: Summary of Annual Activity Forecasts

Year	Enplanements	Operations: Commercial Air Carrier	Operations: General Aviation	Operations: Military	Operations: Total	Total Freight	Based Aircraft
Historical							
1995	294,780	18,326	51,777	4,051	74,154	-	120
1996	257,215	17,746	49,180	5,908	72,834	-	128
1997	263,767	16,841	58,366	6,648	81,855	-	119
1998	283,146	17,032	66,187	5,262	88,481	-	119
1999	283,209	18,766	64,573	6,074	89,413	-	107
2000	274,281	17,720	56,557	6,074	80,351	-	107
2001	253,250	16,833	53,744	4,803	75,380	-	107
2002	236,019	18,953	50,762	3,106	72,821	-	128
2003	230,178	19,530	45,766	2,989	68,285	569,886	130
2004	273,691	22,965	44,203	4,056	71,224	447,833	128
2005	323,353	22,501	44,663	3,368	70,532	359,861	128
2006	297,792	21,133	49,194	4,046	74,373	362,917	139
2007	298,667	21,062	56,841	3,771	81,674	249,755	130
2008	289,215	20,376	52,912	3,552	76,840	146,886	141
2009	298,865	17,597	45,125	3,715	66,437	133,768	160
2010	378,087	20,765	41,752	4,823	67,340	127,943	174
Projected							
2015	410,793	20,922	45,306	4,028	70,255	158,250	184
2020	446,328	21,780	48,285	4,028	74,093	178,087	195
2025	484,937	22,074	51,547	4,028	77,648	199,453	206
2030	526,886	22,922	55,097	4,028	82,047	221,680	217
CAGR (2010-2030)	*1.67%*	*0.50%*	*1.40%*	*-0.90%*	*0.99%*	*2.79%*	*1.11%*



Note: Total Freight in pounds

Source: Historical Enplanements - Airport Records
Historical Operations - FAA Air Traffic Activity Data System (ATADS)
Historical Freight - Airport Records
Historical Based Aircraft Data - FAA Terminal Area Forecast Records
Projections - Mead & Hunt, Inc.

Table 3-32: FAA Template for Summary of Forecasts and Growth Rates

A. Forecast Levels and Growth Rates

Specify base year: 2010

	2010	2015	2020	2025	2030	Average CAGR			
	Base Yr. Level	Base Yr. + 5yr.	Base Yr. + 10yrs.	Base Yr. + 15yrs.	Base Yr. + 20yrs.	Base Yr. + 5yr.	Base Yr. + 10yrs.	Base Yr. + 15yrs.	Base Yr. + 20yrs.
Passenger Enplanements									
TOTAL Air Carrier & Commuter	378,087	410,793	446,328	484,937	526,886	1.7%	1.7%	1.7%	1.7%
Operations									
Itinerant									
Air carrier	1,160	1,380	2,202	3,319	4,124	3.5%	6.6%	7.3%	6.5%
Commuter/air taxi	19,605	19,542	19,579	18,755	18,798	-0.1%	0.0%	-0.3%	-0.2%
Total Commercial Operations	20,765	20,922	21,780	22,074	22,922	0.2%	0.5%	0.4%	0.5%
General aviation	28,843	31,298	33,356	35,609	38,062	1.6%	1.5%	1.4%	1.4%
Military	3,271	2,440	2,440	2,440	2,440	-5.7%	-2.9%	-1.9%	-1.5%
Local									
General aviation	12,909	14,008	14,929	15,937	17,035	1.6%	1.5%	1.4%	1.4%
Military	1,552	1,588	1,588	1,588	1,588	0.5%	0.2%	0.2%	0.1%
TOTAL OPERATIONS	67,340	70,255	74,093	77,648	82,047	0.9%	1.0%	1.0%	1.0%
Instrument Operations	38,969	40,656	42,877	44,934	47,480	0.9%	1.0%	1.0%	1.0%
Peak Hour Operations	31	32	34	36	38	0.9%	1.0%	1.0%	1.0%
Cargo/mail (enplaned+deplaned)									
Scenario 1	127,943	158,250	178,087	199,453	221,680	4.3%	3.4%	3.0%	2.8%
Scenario 2	127,943	20,158,250	23,128,174	26,534,776	30,441,578	175.1%	68.2%	42.7%	31.5%
Based Aircraft (Seasonally)									
Single Engine (Nonjet)	115	122	129	134	139	1.1%	1.1%	1.0%	0.9%
Multi Engine (Nonjet)	37	39	41	43	48	0.9%	1.0%	1.0%	1.3%
Jet Engine	16	20	21	25	26	4.9%	3.0%	2.9%	2.5%
Helicopter	6	4	4	4	4	-9.3%	-4.2%	-2.5%	-1.6%
Other	0	0	0	0	0	NA	NA	NA	NA
TOTAL	174	184	195	206	217	1.2%	1.2%	1.1%	1.1%
Based Aircraft (Year-Round)									
TOTAL	145	153	162	171	180	1.1%	1.1%	1.1%	1.1%

B. Operational Factors

	Base Yr. Level	Base Yr. + 5yr.	Base Yr. + 10yrs.	Base Yr. + 15yrs.	Base Yr. + 20yrs.
Average aircraft size (seats)					
Air carrier & Commuter	52.4	56.5	59.0	63.5	66.5
Average enplaning load factor					
Air carrier & Commuter	77.6%	78.0%	78.0%	78.0%	78.0%
GA operations per based aircraft	240	246	247	250	254

CAGR = Compound Annual Growth Rate

Table 3-33: FAA Template for Summary of Forecasts Compared to FAA TAF

	Year	Airport Forecast	TAF	AF/TAF (% Difference)
Passenger Enplanements				
Base Yr. Level	2010	378,087	349,880	8.1%
Base Yr. + 5yr.	2015	410,793	394,721	4.1%
Base Yr. + 10yrs.	2020	446,328	432,090	3.3%
Base Yr. + 15yrs.	2025	484,937	473,084	2.5%
Base Yr. + 20yrs.	2030	526,886	518,051	1.7%
Commercial Operations				
Base Yr. Level	2010	20,765	18,102	14.7%
Base Yr. + 5yr.	2015	20,922	21,986	-4.8%
Base Yr. + 10yrs.	2020	21,780	22,985	-5.2%
Base Yr. + 15yrs.	2025	22,074	24,061	-8.3%
Base Yr. + 20yrs.	2030	22,922	25,180	-9.0%
Total Operations				
Base Yr. Level	2010	67,340	66,258	1.6%
Base Yr. + 5yr.	2015	70,255	62,707	12.0%
Base Yr. + 10yrs.	2020	74,093	63,521	16.6%
Base Yr. + 15yrs.	2025	77,648	64,415	20.5%
Base Yr. + 20yrs.	2030	82,047	65,354	25.5%

Notes: TAF data is on a U.S. Government fiscal year basis (October through September)
Airport Forecast is on a calendar year basis.

Asheville Regional Airport Master Plan Update

Chapter 4 Facility Requirements

Airport planning for facilities requirements is based upon the probable demand that may occur over time. Chapter 3, *Aviation Forecasts*, describes projections of aviation demand at Asheville Regional Airport for 5-, 10-, and 20-year time increments. This chapter provides an account of the existing condition of airside and landside facilities at the Airport and provides recommendations for facility requirements based on the projections contained in Chapter 3. The recommendations developed in this chapter offer the basis for the development of alternatives related to Airport needs, facilities, staffing, and funding.

The general elements that will be addressed in this chapter include the following:

4.1 Airfield Demand/Capacity Analysis
4.2 Airfield Facility Requirements
4.3 Terminal Area Requirements
4.4 General Aviation Facility Requirements
4.5 Support Facility Requirements
4.6 Additional Facility Requirements

4.1 Airfield Demand/Capacity Analysis

The purpose of the airfield demand/capacity analysis is to assess the capability of the airfield facilities to accommodate projected levels of aircraft operations. A number of factors can impact airfield capacity and delay, including:

- Airfield layout, the number of runways, and runway configuration
- Number and location of exit taxiways
- Runway use restrictions
- Runway use as dictated by wind conditions
- The percentage of time the airport experiences poor weather conditions
- The level of touch-and-go activity
- Types of aircraft that operate at the airport

- Surrounding terrain/local geography
- Changes in air traffic control procedures

FAA Advisory Circular (AC) 150/5060-5, *Airport Capacity and Delay,* defines Annual Service Volume (ASV) as a reasonable estimate of an airport's annual practical capacity. It accounts for differences in runway use, aircraft mix, weather conditions, pattern of demand (peaking), and other factors that impact an airport. A demand/capacity analysis was conducted in accordance with FAA Advisory Circular (AC) 150/5060-5, *Airport Capacity and Delay* and found the ASV at Asheville Regional Airport to be 121,272 annual operations.

The relationship between the ratio of demand to ASV and delay is shown in **Table 4-1**. The chart depicts the average delay per aircraft based upon the ratio of annual demand to annual service volume, the FAA guidance notes that the upper part of the band applies to air carrier airports and the full band applies to general aviation airports. The upper part of the band has been used to determine annual average delay per aircraft at the Airport. The FAA guidance also notes that individual aircraft delays can be 5 to 10 times the average delay.

Table 4-1: Ratio of Demand to ASV and Delay

Ratio of Annual Demand to ASV	Annual Average Aircraft Delay (min)	Peak Delays for Individual Aircraft (min)
0.1	0.05 - 0.05	0.25 - 0.50
0.2	0.10 - 0.15	0.50 - 1.50
0.3	0.20 - 0.25	1.00 - 2.50
0.4	0.25 - 0.30	1.25 - 3.00
0.5	0.35 - 0.50	1.75 - 5.00
0.6	0.50 - 0.75	2.50 - 7.50
0.7	0.65 - 1.05	3.25 - 10.50
0.8	0.95 - 1.45	4.75 - 14.50
0.9	1.40 - 2.15	7.00 - 21.50
1.0	2.30 - 3.50	11.50 - 35.00
1.1	4.40 - 7.00	22.00 - 70.00

Source: FAA AC 150/5060-5, *Airport Capacity and Delay*

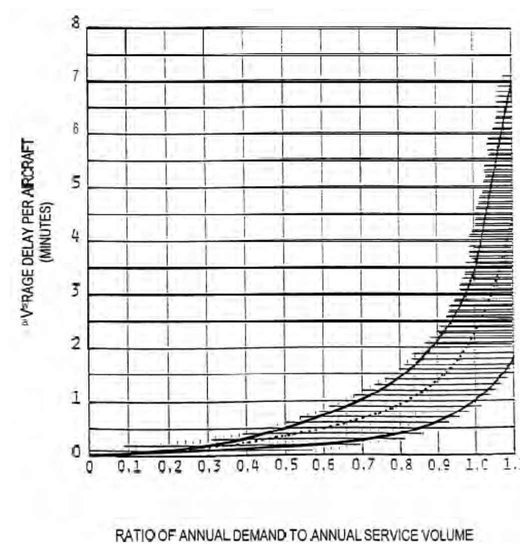


Table 4-2 depicts the ratio of annual demand to annual service volume for Asheville Regional Airport and the anticipated range of average and peak aircraft delays. Average delays are anticipated to increase from a range of 0.41 to 0.57 minutes to a range of 0.66 to 0.96 minutes in 2030.

Table 4-2: FAA Estimated Delay Ranges

Year	Annual Demand	Ratio of Demand to ASV*	Range of Avg Aircraft Delay (min)	Range of Peak Aircraft Delays (min)
	ASV =	**121,272**		
Historical:				
2005	70,532	0.58	0.45 - 0.64	2.27 - 6.37
2006	74,373	0.61	0.52 - 0.73	2.58 - 7.31
2007	81,674	0.67	0.66 - 0.95	3.28 - 9.49
2008	76,840	0.63	0.56 - 0.80	2.80 - 7.98
2009	66,437	0.55	0.40 - 0.55	1.98 - 5.51
2010	67,340	0.56	0.41 - 0.57	2.04 - 5.69
Projected:				
2015	70,191	0.58	0.45 - 0.63	2.25 - 6.30
2020	74,025	0.61	0.51 - 0.72	2.55 - 7.22
2025	77,868	0.64	0.58 - 0.83	2.89 - 8.28
2030	82,066	0.68	0.66 - 0.96	3.32 - 9.62

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

FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems (NPIAS)*, notes that capacity improvements should be recommended with sufficient lead time so that the improvement can be before the problem becomes critical and delays are excessive. For runway capacity it is recommended that capacity development begin when demand reaches 75 percent annual capacity. As shown in **Table 4-2**, demand at the Airport in 2010 was 56 percent of capacity while demand in 2030 is projected to be 68 percent of capacity. These levels are near the FAA recommended thresholds, but are not anticipated to exceed the 75 percent threshold within the planning period. Additionally in 2007, the Airport accommodated nearly 82,000 operations, which is near the 2030 projected level of operational demand. Therefore, airfield capacity at the Airport appears adequate for projected operational demand through the planning period.

4.2 Airfield Facility Requirements

Airfield facility requirements have been developed and organized in this subsection by the following functional areas:

- 4.2.a Airfield Layout & Wind Coverage
- 4.2.b Identification of Design Standards
- 4.2.c Runway Length
- 4.2.d Runway Width
- 4.2.e Runway Pavement Strength

4.2.a Airfield Layout & Wind Coverage

Asheville Regional Airport has a single runway, Runway 16/34, with a length of 8,001 feet and a width of 150 feet. Runways are designated with a number between 1 and 36; the FAA's Aeronautical Information Manual (AIM) notes that this designation is the whole number nearest 1/10 the magnetic azimuth of the centerline of the runway, measured clockwise from the magnetic north. Runway designations can change over time because the magnetic poles slowly drift over the Earth's surface and the magnetic bearing will change. Runway 16/34 has a true north bearing of North 159.82 degrees East (N159.82E). According to the National Oceanic and Atmospheric Administration (NOAA), magnetic declination at the Airport's location in December 2011 was estimated to be 6 degrees 17 minutes west and changing by 0 degrees 4 minutes west per year. The magnetic headings of the runway were found to currently be 166.10 and 346.10 degrees. Dividing by 10 and rounding these magnetic headings to the nearest whole number indicates that the Runway's designation should be changed from 16/34 to 17/35. For the purposes of this master plan report the runway numeration will continue to be referred to as 16/34, as that is what its current designation is in all FAA publications and reports; however, a future change to 17/35 is recommended to conform to FAA design standards.

Runway location and orientation are paramount to airport safety, efficiency, economics, and environmental impact. Since operational safety is highest when aircraft land and takeoff into the wind, it is important that the orientation of an airport's runway is aligned in the same direction as local prevailing winds. FAA Advisory Circular 150/5300-13, *Airport Design* recommends that a runway orientation provide at least 95 percent wind coverage for any aircraft forecasted to use the airport on a regular basis. If runway coverage cannot be provided by a single runway a crosswind runway is recommended. FAA guidance notes that the 95 percent wind coverage is computed on the basis that crosswinds not exceed the following (*Airport Reference Codes are defined in the next section of this report*):

- 10.5 knots for Airport Reference Codes A-I and B-I,
- 13 knots for Airport Reference Codes A-II and B-II,
- 16 knots for Airport Reference Codes A-III, B-III, and C-I through D-III, and
- 20 knots for Airport Reference Codes A-IV through D-VI.

Wind coverage provided by the current orientation of Runway 16/34 was presented in Section 2.3.a of the Inventory Chapter of this Master Plan report. Based on hourly wind observation data obtained from the NCDC, the orientation of Runway 16/34, with up to a 10.5 knot allowable crosswind, provides wind coverage 99.56 percent of the time during all weather conditions, 99.51 percent during Visual Flight Rules weather conditions, and 99.91 percent in Instrument Flight Rules weather conditions. The all-weather conditions wind coverage for allowable crosswinds of 13 knots, 16 knots, and 20 knots is 99.87 percent, 99.97 percent, and 99.99 percent, respectively. Therefore the orientation of the airport's single runway, Runway 16/34, provides sufficient wind coverage that exceeds the FAA's recommended standards of 95 percent wind coverage for all types of aircraft.

4.2.b Identification of Design Standards

Significant elements in the planning and design of an airport include the role of the airport and the functional requirements of critical aircraft that operate there. The FAA outlines guidance for planning and design in several ACs, which promote safety, economy, efficiency, and longevity of airport facilities.

For planning and design purposes, it is necessary to establish design standards that apply to operations and facilities at Asheville Regional Airport. The selection of the appropriate design standards for airfield facilities is based primarily upon the characteristics of the most demanding aircraft projected to use the airport on a regular basis, along with the types of approaches to be provided to each runway at the Airport. FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems (NPIAS)*, states the following regarding selection of airport design standards:

"Airport dimensional standards (such as runway length and width, separation standards, surface gradients, etc.) should be selected which are appropriate for the critical aircraft that will make substantial use of the airport in the planning period. Substantial use means either 500 or more annual itinerant operations, or scheduled commercial service. The critical aircraft may be a single aircraft or a composite of the most demanding characteristics of several aircraft. The critical aircraft (or composite aircraft) is used to identify the appropriate Airport Reference Code for airport design criteria."

FAA AC 150/5300-13, *Airport Design*, provides guidance defining the Airport Reference Code (ARC). The ARC is a system developed by the FAA to relate airport criteria to the operational and physical characteristics of the aircraft at an airport. The ARC has two components that relate to the airport design aircraft. The first component, depicted by a letter, is the Aircraft Approach Category (ACC) and relates to certified aircraft approach speed. Generally, aircraft approach speed applies to runways and runway related facilities. Based on FAA AC 150/5300-13, *Airport Design,* aircraft are grouped into five categories:

- Category A: Approach speeds less than 91 knots.
- Category B: Approach speed of 91 knots or more, but less than 121 knots.
- Category C: Approach speed of 121 knots or more, but less than 141 knots.
- Category D: Approach speed of 141 knots or more, but less than 166 knots.
- Category E: Approach speed of 166 knots or more.

Aircraft Approach Categories A and B typically include small piston engine aircraft and a limited number of smaller, commuter turboprops as well as business jets having approach speeds of less than 121 knots. Category C consists of business jets with approach speeds greater than 121 knots as well as regional jet and narrow-bodied commercial aircraft. Category D and E aircraft include higher performance business and narrow-bodied jets as well as larger wide-bodied commercial and military aircraft.

The second component of the Airport Reference Code, depicted by a Roman numeral, is the airplane design group, which is categorized by wingspan or tail height. Where an airplane is in two categories, the most demanding category should be used. Aircraft wingspan primarily relates to separation requirements of taxiways and ramp space area as shown in **Table 4-3**.

Table 4-3: Airplane Design Groups

Group	Tail Height	Wingspan
I	Less than 20 feet	Less than 49 feet
II	From 20 feet to less than 30 feet	From 49 feet to less than 79 feet
III	From 30 feet to less than 45 feet	From 79 feet to less than 118 feet
IV	From 45 feet to less than 60 feet	From 118 feet to less than 171 feet
V	From 60 feet to less than 66 feet	From 171 feet to less than 214 feet
VI	From 66 feet to less than 80 feet	From 214 feet to less than 262 feet

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

Airplane Design Groups (ADG) I and II primarily include small piston aircraft, business jets, turboprop aircraft and some commercial regional jets. ADG III includes large business jets and most regional and narrow body commercial aircraft. ADG IV and V include large jetliners utilized for commercial service and military service. ADG VI only includes the largest transport aircraft such as the Airbus A380, Boeing 747-8, C-5 Galaxy and Antonov An-124.

The 2010 update of the Airport Layout Plan (ALP) identified airfield design standards were based upon ARC Category C-III aircraft which were the most demanding type anticipated to operate at the Airport. Though operations by Category C-III aircraft are forecasted to increase over the 20 year planning period, operations from larger ARC Category C-IV aircraft are also expected to increase. The reduction and elimination of 50-seat regional jet aircraft will increase operations at the Airport from larger ARC Category C-III aircraft such as the Boeing 737, Airbus A319 & A320, and Embraer ERJ-170 & ERJ-190 as well as Category C-IV aircraft such as the Boeing 757. Should areas be developed for dedicated air cargo processing, additional ARC Category C-IV aircraft operations can be expected from freighter versions of the Boeing 757, 767, MD-11, and Airbus A300/A310 aircraft that are operated by air cargo haulers such as FedEx and UPS. In preparation of expected operations from these larger aircraft types, the airfield should be planned to ARC Design Group IV standards.

Table 4-4 compares ARC Airplane Design Group III and IV airfield design standards as outlined in FAA AC 150/5300-13, *Airport Design*. As summarized in the table, the dimensions of most existing airfield design surfaces meet ADG IV standards while the width of Runway 16/34 and parallel Taxiway A exceed minimum requirements for Airplane Design Group III.

Table 4-4: Airfield Design Standards			
Criteria	**FAA Requirements**		**Runway 16/34**
Airplane Design Group	III	IV	III
Runway Length	n/a*	n/a*	8,001 ft.
Runway Width	100 ft.	150 ft.	150 ft.
RSA Width	500 ft.	500 ft.	500 ft.
RSA Length	1,000 ft.	1,000 ft.	1,000 ft.
OFZ Width	400 ft.	400 ft.	400 ft.
OFZ Length	200 ft.	200 ft.	200 ft.
Runway OFA Width	800 ft.	800 ft.	800 ft.
Runway OFA Length	1,000 ft.	1,000 ft.	1,000 ft.
Parallel Taxiway Width	50 ft.	75 ft.	75 ft.
Parallel Taxiway Safety Area	118 ft.	171 ft.	118 ft.
Parallel Taxiway OFA Width	186 ft.	259 ft.	186 ft.

* Note: As a result of several factors that influence the length of a runway, the FAA does not require a minimum runway distance for each ARC classification; Advisory Circular 150/5325-4 and aircraft operating manuals provide guidance on recommended runway lengths by aircraft type.

Source: FAA Advisory Circular 150/5300-13, *Airport Design*; 2010 Airport Layout Plan; Mead & Hunt, Inc.

At the time of the 2010 Airport Layout Plan (ALP) update, the Airbus A320 was chosen as the existing and ultimate critical aircraft types as it was anticipated to frequently operate at the Airport over the 20 year planning period. A review of commercial airline departures per week by aircraft type since 2010 indicates the Airport has received more frequent operations from the McDonnell Douglas MD-80-88 series aircraft and the Boeing 737-700, which both have a maximum takeoff weight (MTOW) greater than 150,000 pounds. Airfield design standards listed in FAA AC 150/5300-13, *Airport Design*, indicates surfaces intended for ADG III aircraft with an MTOW of greater than 150,000 pounds should meet runway width, shoulder width, and blast pad requirements of the next higher classification of aircraft in ADG IV.

Since the dimensions of a number of the airfield surfaces meet ADG IV standards and the MTOW of the Airbus A320 is less than 150,000 pounds, it is recommended the current critical aircraft type be changed to the Boeing 737-700. Though the MD-80-88 series aircraft conducts multiple weekly operations at the Airport, the Boeing 737-700 is similar in size and has a greater wingspan which is one of the design criteria for airfield surfaces according to the ARC. This change will more accurately reflect the most demanding size of aircraft that operates at the Airport while supporting airfield surface design criteria for existing and future infrastructure improvement projects.

Activity projections presented in the forecasting chapter indicate operations from larger ARC Category C-IV aircraft will increase throughout the planning period as airlines shift away from using smaller 50-seat regional jets to serve the Asheville market. A popular ARC Category C-IV aircraft that is operated by three of the four airlines at the Airport and is anticipated to remain in service throughout the next 20 years is the Boeing 757-200. It is recommended the ultimate critical aircraft type be changed to the Boeing 757-200 in an effort to plan future infrastructure improvements that meet the design standards of this larger ARC category of aircraft. **Figure 4-1** illustrates the existing, recommended existing, and ultimate critical aircraft types.

Figure 4-1: Recommended Critical Aircraft Types

Existing Critical Aircraft
Airbus A320
ARC Category C-III

Recommended Existing Critical Aircraft
Boeing 737-700
ARC Category C-III

Recommended Ultimate Critical Aircraft
Boeing 757-200
ARC Category C-IV

Photo Sources: US Airways, Delta Air Lines, Mead & Hunt, Inc.

4.2.c Runway Length

An airport's required runway length is determined by the operating characteristics of the most demanding (current or projected) aircraft in its operational fleet. According to FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*, when the maximum takeoff weight of a critical design aircraft exceeds 60,000 pounds or is considered a regional aircraft, the recommended runway length is determined based on individual airplanes. The FAA states that the design objective for the primary runway is to provide a runway length for all airplanes that will regularly use it without causing operational weight restrictions.

Runway length is determined by applying the Airport's mean high temperature (83.2 degrees Fahrenheit) for the hottest month (July), elevation (2,165 feet), and length of haul performed by aircraft operating on the runway. Airport Planning Manuals (APMs) were obtained from aircraft manufacturers, where available, to determine required runway lengths. The required runway lengths for aircraft that currently operate or are highly likely for potential service at the Airport are presented in **Table 4-5**.

Table 4-5: Commercial Aircraft Required Runway Lengths

Aircraft	Maximum Takeoff Weight (lbs)	Engines	Runway Length Required: Stnd Day (51.3° F)	Runway Length Required: Hot Day (83.2° F)
Current Service				
MD-83	160,000	JT8D-219	10,100 ft.[1]	10,900 ft.[2]
737-700	154,500	CFM56-7	7,500 ft.[1]	7,800 ft.[2]
737-400	150,000	CFM56-3	10,700 ft.[1]	11,300 ft.[2]
717	121,000	BR715	10,200 ft.[1]	10,700 ft.[2]
CRJ-700	75,000	G.E. CF34-8C5	7,500 ft.[1]	7,800 ft.[2]
ERJ-145	53,131	AE 3007 A1E	7,900 ft.[1]	8,200 ft.[2]
CRJ-200	53,000	G.E. CF34-3B1	7,800 ft.[1]	8,600 ft.[2]
Dash 8-300	43,000	PW123	*	*
Potential Service				
737-300	270,000	PW2043	10,200 ft.[1]	10,800 ft.[2]
757-200	255,000	PW2040	9,200 ft.[1]	9,500 ft.[2]
737-800	174,200	CFM56-7	8,400 ft.[1]	9,400 ft.[2]
737-900	174,200	CFM56-7	8,800 ft.[1]	10,000 ft.[2]
A320/A321	171,960	CFM56	8,600 ft.[1]	8,800 ft.[2]
A319	166,448	CFM56	9,100 ft.[1]	9,200 ft.[2]
MD-87	160,000	JT8D-217C	9,700 ft.[1]	10,300 ft.[2]
MD-90	156,000	V2500-D5	8,500 ft.[1]	8,900 ft.[2]
MD-88	149,500	JT8D-217A	9,600 ft.[1]	9,900 ft.[2]
DC-9-50	121,000	JT8D-17	10,000 ft.[1]	12,000 ft.[2]
ERJ-195	115,280	CF34-10EA1	8,400 ft.[1]	9,300 ft.[2]
ERJ-190	114,199	CF34-10E5	8,900 ft.[1]	9,300 ft.[2]
CRJ-1000	91,800	CF34-8C5A1	8,000 ft.[3]	9,300 ft.[3]
ERJ-175	85,517	CF34-8E5	10,700 ft.[1]	11,600 ft.[2]
CRJ-900	84,500	CF34-8C5	7,900 ft.[1]	8,300 ft.[2]
ERJ-170	82,012	CF34-8E	6,400 ft.[1]	6,900 ft.[2]
ERJ-135	44,092	AE 3007 A3	7,100 ft.[1]	7,900 ft.[2]

Notes: * = Aircraft does not require more than 8,000 ft. of runway under any circumstances
[1] = ISA temperature 51.31°F (taken from manufacturers standard day chart plus 530 ft. for runway elevation difference)
[2] = Approx. Hot day distance (taken from manufacturers hot day chart plus 530 ft. for runway elevation difference)
[3] = Manufactures runway length charts not available, runway lengths approximated based upon S.L. ISA published lengths
Source: Aircraft Manufactures' Airport Planning Manuals

It should be noted that the runway length requirements listed are based on the MTOW of each aircraft which would apply primarily to those flying long-haul routes. As illustrated in the table, several aircraft currently operating or anticipated to operate at the Airport require more than 8,001 feet of runway at maximum takeoff weight. In order for these aircraft to operate from 8,001 feet of runway, concessions must be made to passenger, cargo, and/or fuel loads to reduce the runway length needed. Those payload reductions can ultimately impact the range aircraft can travel unrefueled from the Airport.

In an effort to evaluate the impacts the 8,001 feet runway has on range and passenger load capabilities of aircraft operating at the Airport, stage lengths and frequency of operations were examined by airline and equipment type. **Table 4-6** presents the number of departures per week by airline and equipment type as well as the distance in nautical miles each destination is away from the Airport.

Table 4-6: Airline Service by Aircraft Type & Destination

		Departures per Week													
		ATL	CLT	DFW	DTW	EWR	IAH	LGA	MCO	ORD	PHL	SFB	TPA	VPS	
		Nautical Miles from AVL													
Carrier	**Equipment**	**143**	**79**	**737**	**408**	**506**	**725**	**520**	**424**	**466**	**438**	**404**	**447**	**358**	**Total**
American Airlines	ERJ-145			7											7
Continental Airlines	ERJ-145					7	7								14
Delta Air Lines	CRJ200	65			8										73
Delta Air Lines	ERJ-145				12			7							19
AirTran Airways	B717								4				1		5
AirTran Airways	B737-700												3		3
Allegiant Air	MD-83											2			2
United Airlines	CRJ200									16					16
US Airways	CRJ700		27												27
US Airways	CRJ200		13					11			1				25
US Airways	Dash8-300		24												24
Vision Airlines	B737-400													2	2
		65	64	7	20	7	7	18	4	16	1	2	4	2	217

Source: FAA Flight Schedule Data System (FSDS)

As illustrated in the table, most of the departures per week are conducted by CRJ-200 aircraft that account for 114 of the 217 weekly departures at the Airport while ERJ-145, CRJ-700, and Dash 8-300 round out the remaining majority of the operations, respectively. Approximately 59 percent of departures are traveling within a 200 mile radius of the Airport to either Charlotte (CLT) or Atlanta (ATL) while an additional 23 percent of departures are to a destination within 500 miles of Asheville. Combined, 82 percent of departures per week are within a 500 mile radius of the Airport.

Table 4-7 illustrates the ranges of current and potential aircraft types at the Airport operating from an 8,001 feet runway at full passenger loads on a hot day with concessions made for fuel and cargo loads. As presented in the table, the 8,001 feet length of Runway 16/34 provides sufficient takeoff distance to meet the runway length requirements of current aircraft types and the destinations they serve with a full passenger load. The maximum range of anticipated aircraft types operating from an 8,001 feet runway with full passenger loads are also provided to indicate the markets that could be served by these equipment types at the Airport. With the exception of the DC-9-50, the range for existing and potential aircraft types with a full passenger load from the existing 8,001-foot runway is over 1,200 nautical miles, providing adequate range for the entire eastern U.S. and as far west as Denver and the Rocky Mountains.

Table 4-7: Maximum Aircraft Ranges From 8,001-Foot Runway at Full Passenger Loads

Current Service Aircraft Type	Current Destinations	Max. Distance (Nautical Miles)	Runway Length Required – Hot Day	Max range from current 8,001 ft. runway with full passenger load[1]
717	TPA, MCO	447	5,900 ft.	1,600 nm
737-400	VPS	358	5,400 ft.	1,600 nm
737-700	TPA	447	4,400 ft.	2,600 nm
CRJ-200	LGA, ORD, PHL, DTW, ATL, CLT	520	5,500 ft.	1,800 nm
CRJ-700	CLT	79	4,200 ft.	1,400 nm
Dash 8-300	CLT	79	*	*
ERJ-145	DFW, IAH, LGA, EWR, DTW	737	5,700 ft.	1,900 nm
MD-83	SFB	404	5,900 ft.	1,500 nm
Potential Service Aircraft Type				**Max range from current 8,001 ft. runway with full passenger load[1]**
757-300				2,000 nm[2]
757-200				2,600 nm[2]
737-800				2,600 nm
737-900				1,900 nm
A320				2,300 nm[2]
A319				2,600 nm[2]
MD-90				1,400 nm
MD-87				2,300 nm
MD-88				1,200 nm
DC-9-50				700 nm
ERJ-195				1,400 nm
ERJ-190				1,600 nm
CRJ-1000				n/a
ERJ-175				1,800 nm
CRJ-900				1,800 nm
ERJ-170				2,100 nm
ERJ-135				1,700 nm

Note: * = Aircraft does not require more than 8,000 ft. of runway under any circumstances
[1] = Concessions necessary in fuel and cargo loads
[2] = Range varies based on engine type; max range attainable from all available engine types listed
Source: Aircraft Manufacturers' Planning Manuals; Mead & Hunt, Inc.

The airport has occasionally received inquiries regarding non-stop west coast flights. As illustrated in **Figure 4-2**, potential far west markets include Denver at 1,084 nautical miles (NM), Los Angeles at 1,767 NM, San Francisco at 1,916 NM, and Seattle at 1,908 NM. The runway length required for stage lengths of 2,000 NM was assessed for each of the existing and potential service aircraft types. **Table 4-8** presents the runway length required for 2,000 NM range for each of these aircraft types. Note that some of the aircraft are not capable of a 2,000 NM range with a full passenger load, in these instances the runway length required to provide the maximum range with a full passenger load is noted.

Figure 4-2: Potential West Coast Non-Stop Markets

Source: Great Circle Mapper – copyright © Karl L. Swartz

Table 4-8: Runway Length Required for Non-stop West Coast Service

Current Service Aircraft Type	Range (NM)	Takeoff Weight Required for 2,000 NM Range (or Max Range)	Runway Length Required for 2,000 NM Range (or Max Range) - Hot Day (ft)
MD-83	2,000	158,000	11,000
737-700	2,000	146,000	6,900
737-400	2,000	142,000	9,200
717	2,000	121,000	10,600
CRJ-700	Max Range 1,700 NM[1]	75,000	7,800
CRJ-200	Max Range 1,775 NM[1]	53,000	8,600
ERJ-145	Max Range 1,900 NM[1]	53,000	8,200
Potential Service Aircraft Type			
757-300	2,000	255,000	9,000
757-200	2,000	222,000	6,700
737-900	2,000	172,000	9,800
737-800	2,000	166,000	8,300
A320	2,000	165,000	8,200
MD-90	Max Range 1,400 NM[1]	156,000	8,900
A319	2,000	154,000	7,400
MD-88	Max Range 1,500 NM[1]	149,500	9,800
MD-87	2,000	138,000	8,000
DC-9-50	Max Range 1,200 NM[1]	121,000	12,000
ERJ-195	Max Range 1,600 NM[1]	115,000	9,300
ERJ-190	2,000	111,000	8,900
CRJ-900	Max Range 1,800 NM[1]	84,500	8,300
ERJ-175	2,000	81,000	10,000
ERJ-170	2,000	81,000	6,700
ERJ-135	Max Range 1,700 NM[1]	44,000	7,900
CRJ-1000	n/a	n/a	n/a

Note: [1] = Maximum range with full passenger load, assuming 225 pounds per passenger & baggage
n/a = payload/range charts not available in aircraft manufactures' current airport planning manual

Source: Aircraft Manufacturers' Planning Manuals; Mead & Hunt, Inc.

As shown in **Table 4-8**, there are a number of aircraft types that would require additional runway length, above the 8,001 feet currently provided, to provide nonstop service to west coast markets (approximately 2,000 nautical miles), or to provide the aircraft's maximum range with a full passenger load.

The 8,001 feet length of Runway 16/34 appears adequate to meet the runway length requirements of existing and anticipated aircraft types throughout the planning period to operate at full passenger loads and serve current and the majority of likely markets, as far away as Denver. However, as noted, some equipment types and markets could require additional runway length for aircraft to operate with full passenger loads. As the Airport has had past inquiries regarding service to the west coast, it is recommended that alternatives be evaluated to extend the runway up to 10,000 feet, or to maximize the runway length between the major physical constraints of North Carolina Route 280 on the south and the French Broad River on the north. It is recommended the Airport continue to monitor the runway length needs of equipment types operated by airlines and the destinations they serve to ensure sufficient runway length is available for commercial aircraft.

4.2.d Runway Width

The width of a runway is determined based upon the ADG designation of the most demanding type of aircraft expected to conduct regular operations on the surface. According to FAA AC 150/5300-13, *Airport Design*, the required width of a runway for ADG III aircraft is 100 feet, unless the maximum certificated takeoff weight is greater than 150,000 pounds, upon which the width is 150 feet. Since Runway 16/34 is currently classified as an ADG III runway that receives regular operations for ARC Category C-III aircraft greater than 150,000 pounds such as the MD-83, MD-88 and Boeing 737-700, the existing runway width at 150 feet meets the current FAA design standard.

The future critical aircraft has been designated as the Boeing 757-200, which is an ARC C-IV aircraft. In accordance with FAA AC 150/5300-13, *Airport Design*, the recommended runway width for ARC C-IV design group is 150 feet. Therefore the existing runway width meets the recommended airfield design standard for the future critical aircraft.

Also, it is recommended in FAA AC 150/5300-13, *Airport Design*, that runways designed for operations from aircraft in ADG III and greater have paved shoulders; currently, Runway 16/34 does not have paved shoulders. The width of a paved shoulder is based upon the ARC of the critical design aircraft intended to operate on the surface. For ADG III aircraft with a MTOW greater than 150,000 pounds, the width of each shoulder should be 25 feet meeting requirements of the next highest ADG (design group IV). Since the recommended future critical aircraft type is in ADG IV and the current critical aircraft type is in ADG III and has a MTOW greater than 150,000 pounds, it is recommended the Airport plan for the inclusion of 25 feet width shoulders as a part of any future reconstruction or relocation of the runway. The inclusion of paved shoulders not only allows the runway to meet recommended design standards for ADG III and ADG IV aircraft, it also will help to provide resistance from blast erosion as a result of operations from larger aircraft types and help to support the passage of maintenance and emergency vehicles.

4.2.e Runway Pavement Strength

The pavement strength of Runway 16/34 is rated for aircraft weighing up to 120,000 pounds with single wheel main landing gear configurations, 160,000 pounds for aircraft with dual wheel main landing gear configurations, and 260,000 pounds for aircraft with dual tandem wheel main landing gear configurations. A review of the maximum gross weight and main landing gear configuration of the existing (Airbus A320), recommended (Boeing 737-700), and recommended ultimate (Boeing 757-200) critical aircraft types indicate the strength of the runway is sufficient to meet demand throughout the planning period. Though no changes are necessary to increase the strength of the runway, it is recommended that pavement be designed as a part of any future runway reconstruction or rehabilitation projects that is capable of retaining existing weight bearing capacities.

One method used in evaluating the strength and condition of pavement surfaces is the Pavement Condition Index (PCI), which is a subjective evaluation based on inspection, testing, and observation. The PCI system rates the condition of pavement using a score of 0 to 100 where 100 designates that the pavement is in excellent condition while scores of 10 or less are designated for those pavements that have failed. A pavement rehabilitation/reconstruction assessment conducted in 2008 by RS&H found the weighted PCI rating of Runway 16/34 to be 50, which is well below the minimum PCI of 70 recommended by industry experts for primary surfaces at airports. The assessment also forecasted the remaining useful life expectancy of the pavement. Assuming no major rehabilitation projects were completed to the runway, the average PCI was forecasted to decrease from 50 to 35 by 2013.

In an effort to provide a short term solution to extend the useful life of the runway and slow its further deterioration, a pavement rejuvenation project was completed in 2011 after the pavement assessment reference above was conducted. The pavement rejuvenation project included crack routing and sealing, application of a runway rejuvenator seal, and re-striping of the paved surfaces to extend its useful life for another five years. It is recommended a major rehabilitation or reconstruction of the runway occur in the immediate future to improve the condition of the pavement and increase its PCI rating to a satisfactory value of greater than 70.

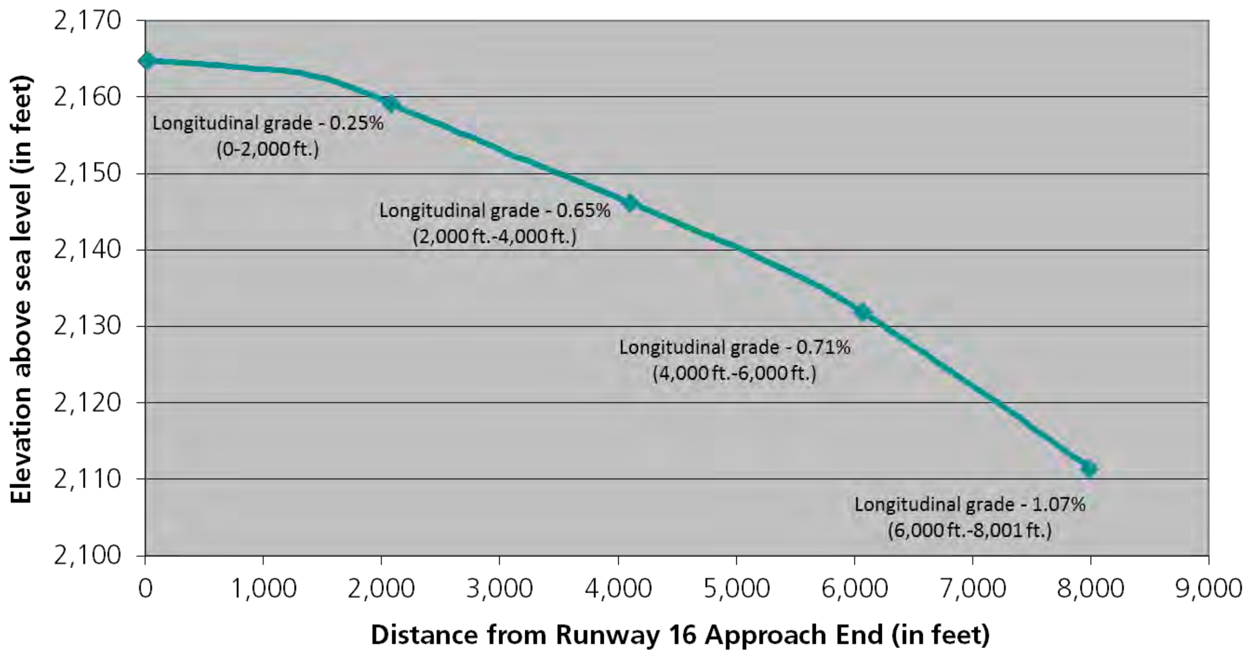
4.2.f Runway Grade

FAA Advisory Circular 150/5300-13, *Airport Design*, lists runway gradient design standards to ensure pilots and air traffic controllers are able to see at any one point that the surface is clear of aircraft, vehicles, wildlife, and other hazardous objects. The design standards for longitudinal and transverse runway gradients are based on the AAC of the critical design aircraft. For Category C and D aircraft, the maximum longitudinal grade is plus/minus 1.5 percent and may not exceed plus/minus 0.8 percent in the first and last quarter of the runway.

Runway 16/34's overall longitudinal grade of 1.075 percent meets FAA design standards; however, on the approach end of Runway 34 the longitudinal grade of the first quarter of the runway is greater than 0.8 percent due to the airfield topography. The significance of this grade change at the approach end of Runway 34 is such that aircraft positioned for takeoff cannot view the opposite end of the runway to visually confirm the surface is clear of aircraft and ground vehicles. This concern is particularly an issue during periods when the control tower is closed and pilots are responsible for determining the runway is clear for takeoff or landing through radio communication and visual means.

Figure 4-3 illustrates the longitudinal grade on each quarter of Runway 16/34 while **Table 4-9** lists the change in elevation for each quarter of the runway and its longitudinal grade.

Figure 4-3: Runway 16/34 Longitudinal Grade



Source: Woolpert, Inc.

Table 4-9: Runway 16/34 Longitudinal Slope by Quarter			
Distance From Rwy 16 Approach End	**Elevation (MSL)**	**Change in Elevation**	**Longitudinal Grade**
0 ft.	2,164 ft.	-	-
2,000 ft.	2,159 ft.	5 ft.	0.25%
4,000 ft.	2,146 ft.	13 ft.	0.65%
6,000 ft.	2,132 ft.	14 ft.	0.71%
8,001 ft.	2,111 ft.	21 ft.	1.07%

Source: Woolpert, Inc.

As a result of this non-standard longitudinal grade in the last quarter of the runway, a modification of standards was approved by the FAA in 1978 for the first and last quarter of the runway (Aeronautical Study Number ATL-603-7268). It is recommended as a part of any future runway rehabilitation or reconstruction project that the variance of the longitudinal grade for the approach end of Runway 34 be corrected to comply with FAA airfield design standards. It has been brought to the attention of the Airport by the FAA that the modification of standards for the non-standard longitudinal grade will only be extended for a maximum of five years, requiring a solution to be developed to correct the variance.

4.2.g Taxiway System

Design standards for taxiways outlined in FAA AC 150/5300-13, *Airport Design*, are based upon a combination of wingspan and approach speed of the critical design aircraft intended to use the surface. While the dimensions of some standards such as a taxiway's width, safety area, and object free area, for example, are based upon the wingspan of the critical design aircraft, others such as a parallel taxiway's separation distance from the runway is based upon both wingspan and approach speed. The following section presents the facility needs that were identified for the taxiway system at the Airport:

Taxiway Designations – FAA AC 150/5340-18F, *Standards for Airport Sign Systems*, lists standards in naming taxiways and aprons at an airport. General guidelines that should be followed include keeping the naming designation simple and logical, using letters of the alphabet in sequential order from one end of the airport to the other (e.g. east to west or north to south), and using designations such as "A1", "A2", and "A3" for short taxiways that are parallel to a runway or a taxiway adjacent to a ramp area. A review of the naming convention of the existing taxiway system indicated that the Airport could benefit from a re-designation of taxiways as a part of any future planned airfield improvements. It is recommended that if a parallel taxiway is planned for the west side of the airfield it should be named "Taxiway B" to align with the naming of the existing parallel Taxiway A while the existing connector taxiways between Taxiway A and Runway 16/34 would be renamed "A1", "A2", "A3", etc. from south to north. Likewise, connector taxiways between Taxiway A and the aprons on the east side of the airfield should also then be renamed "C", "D", "E", etc. from south to north. A south to north naming convention would allow for the naming of future connector taxiways if they are constructed north of the North Apron for future aviation development areas to follow the same pattern. **Figure 4-4** illustrates the proposed renaming of all taxiways at the Airport.

Figure 4-4: Proposed Taxiway Designations

Note: Taxiway B would be reserved in the event a parallel taxiway is constructed on the west side of the airfield
Aerial Photo: Woolpert, Inc.

Taxiway A – A review of taxiway design standards is most critical for Taxiway A since it parallels Runway 16/34 and provides access to the runway for all aircraft. Since the current critical design aircraft for Runway 16/34 is the Boeing 737-700, the dimensions of Taxiway A design surfaces must meet standards for ARC Category C-III aircraft. The ultimate critical design aircraft has been identified as the Boeing 757 aircraft; therefore, the dimensions of the Taxiway A design surfaces must meet standards for ARC Category C-IV aircraft in the future.

AC 150/5300-13 states taxiways for ARC Category C-III aircraft should be 50 feet wide, have paved shoulders 20 feet in width, have a safety area width of 118 feet, and have an object free area width of 186 feet. While Taxiway A meets or exceeds the standards for taxiway width (75 feet), safety area width (118 feet), and object free area width (186 feet), it does not have paved shoulders which are required for taxiways that accommodate ADG III and higher aircraft to reduce the possibility of blast erosion and engine ingestion problems associated with jet engines that overhang the edge of the taxiway pavement.

It should be noted that the 75 feet width of Taxiway A meets the taxiway design standard for the next larger classification of aircraft in ADG IV and was widened from 50 feet to 75 feet in 1994 to accommodate Boeing 757 charter operations that were occurring at the time. It is recommended the Airport retain the existing width of the taxiway to accommodate the future critical aircraft which is ADG IV.

Changing the size of the critical design aircraft to ARC Category C-IV would require no improvements to the width of Taxiway A, as the taxiway is already 75 feet in width. A larger taxiway safety area and object free area would be needed to meet ARC Category C-IV standards. Taxiway safety areas are similar to runway safety areas in that they must be clear, graded, and capable of supporting under dry conditions snow removal equipment, firefighting apparatuses, and the occasional passes of an aircraft without causing structural damage. As a result of these requirements, taxiway safety areas must meet transverse grade standards identified in FAA AC 150/5300-13, *Airport Design*. It appears the width of the Taxiway A safety area does not meet grade requirements for ADG IV standards along the east side of the taxiway near the approach ends of Runway 16 and 34 as a result of the change in topography in these areas. Currently, the sharp change in topography in these areas lie outside the boundary of the taxiway safety area that meets ADG III standards; increasing the width of the taxiway safety area to meet ADG IV standards will require fill and grading of the land to meet transverse grade standards.

Standards for the taxiway object free area also identified in FAA AC 150/5300-13, *Airport Design*, states no objects may be present in this area except those required for aviation purposes that are below aircraft wing tip elevations. Taxiway object free areas designed for ARC Category C-IV aircraft must be 259 feet in width, or 129.5 feet from either side of the taxiway centerline. Review of potential objects that may need to be relocated if the taxiway object free area was increased to meet ARC Category C-IV standards indicate that a portion of the perimeter fence near the employee parking lot adjacent to the ASOS unit and the throat of the service road at the intersection of Taxiway D1 may need to be relocated.

Runway/Parallel Taxiway Separation – FAA AC 150/5300-13 lists separation distances between runways and parallel taxiways based on the different ARC categories of aircraft to satisfy the requirement that no part of an aircraft (tail tip, wing tip, etc.) on a taxiway is within the runway safety area or penetrates the obstacle free zone (OFZ). Runways for critical design aircraft in approach categories C and D with wingspans at least 79 feet but less than 118 feet and an approach visibility minimum lower than 3/4 statue mile are required to have a separation of 400 feet between the runway and parallel taxiway centerlines. This 400 feet of separation is also required for runways that serve ARC Category C-IV aircraft with approach visibility minimums lower than 3/4 statue mile. The existing separation between Runway 16/34 and Taxiway A is 325 feet, which is 75 feet less than the 400 feet design standard for surfaces intended for ARC Category C-III aircraft. As a result of this non-standard runway/taxiway separation, a modification of airport design standards was requested to the FAA and approved on August 16, 1978 (Aeronautical Study Number ATL-603-7268). Increased operations that are forecasted from larger ARC Category C-IV aircraft at the Airport raises the potential that a wing tip with one of these aircraft while on the taxiway will penetrate the runway safety area or obstacle free zone while another C-IV aircraft is operating on the runway.

It is recommended that the design of any future reconstruction of the runway or taxiway system increase the separation between Runway 16/34 and Taxiway A by 75 feet to a total distance of 400 feet between centerlines. This would allow the airfield to comply with FAA airport design standards and provide a sufficient safety margin between aircraft simultaneously operating on the taxiway and runway. Increasing the separation between the two surfaces would also satisfy design requirements for ARC Category C-III aircraft and larger ARC Category C-IV aircraft that are anticipated to increase in operations over the planning period.

Taxiway/Parallel Taxilane Separation – East of Taxiway A along the west edge of the terminal apron is a taxilane that parallels the taxiway. As with runways/parallel taxiways, separation standards identified in FAA AC 150/5300-13, *Airport Design*, that are based on the ARC of the critical design aircraft intended to use the surface help satisfy the requirement no part of an aircraft on the taxilane is within the safety area or penetrates the OFZ of the taxiway. Currently, the separation distance between Taxiway A and the parallel taxi lane along the west edge of the terminal ramp is currently 200 feet. FAA design standards require that the distance from a taxiway centerline to a parallel taxiway or taxi lane centerline be at least 1.2 times the critical aircraft wingspan plus 10 feet. This indicates that the current 200 feet separation is adequate for aircraft up to 158 feet wingspans, but not up to 171 feet as is categorized by ADG IV. However, it should be noted that the design standard does meet separation requirements for the future critical design aircraft (Boeing 757) which has a wingspan of up to 125 feet. Should the Airport receive operations from ADG IV aircraft with wingspans larger than 158 feet, consideration should be given to increase the separation between Taxiway A and the terminal apron taxilane, or operating procedures established to make certain that adequate wingtip clearances as provided between aircraft on these centerlines.

Taxiway R Manhole Cover – Located at the intersection of Taxiway R and Taxiway A within the taxiway fillet is a manhole cover. This structure is depressed compared to the grade of the surrounding pavement surface and may not be in compliance with the taxiway surface transverse grade limitations presented in FAA AC 150/5300-13, *Airport Design*. Though not identified by the FAA as a non-compliance issue, it is recommended as a part of any future runway or taxiway reconstruction/relocation project that a topography survey of the depression in comparison with the surrounding pavement surface grade be conducted to determine whether it is consistent with FAA design standards.

Taxiway P Transverse Grade – Operators of larger aircraft at the Airport will on occasion refuse to taxi on Taxiway P to enter or exit Runway 16/34 as a result of an inverted angled low elevation line that cuts across the taxiway. Though the transverse grade of the taxiway has not been identified by the FAA as a non-compliant issue, it is recommended a topography survey be conducted as a part of any future runway or taxiway reconstruction/relocation project to determine if the low elevation line meets gradient requirements identified in FAA AC 150/5300-13, *Airport Design*. Regardless of whether it complies with design standards, consideration should be given to correct the inverted low elevation portion of the pavement to provide a more level surface for taxiing aircraft entering or exiting Runway 16/34.

Taxiway H Width – Taxiway H is a connector taxiway used by aircraft to transition between the south apron and parallel Taxiway A. Often, larger aircraft that are being serviced by the FBO such as ADG III types including the Boeing 737 and Airbus A319 and ADG IV types including the Lockheed Martin C-130 and Boeing 757 are parked on the south apron, requiring them to taxi on Taxiway H. Likewise, the width of Taxiway H should meet design standards of ADG IV aircraft since these are the most demanding type parked on the south apron. Currently, Taxiway H is 50 feet wide; review of FAA design standards indicates that taxiways serving ADG IV aircraft should be 75 feet in width. Since other airfield design surfaces are recommended to meet ADG IV standards of the future critical design aircraft, the width of Taxiway H should also be increased. This would allow the taxiway to better accommodate larger charter and military aircraft such as the Boeing 757 and Lockheed Martin C-130 that are occasionally parked on the south apron when being serviced by the FBO. It should be noted that the width of adjacent Taxiway K which also provides access to the south apron would remain at 40 feet to discourage ADG III and IV aircraft from using this surface. This taxiway would instead be used by smaller single-, twin-engine, and jet aircraft to access the south apron so that adequate wingtip clearances can be maintained at the south end of the apron in the event this area is used for future development purposes, such as the construction of a new public safety building or expansion of the terminal apron.

North Apron/Mid Ramp Connector Taxiway Width – Review of the remaining connector taxiway widths between parallel Taxiway A and the north apron/mid ramp areas indicate their 35 feet width is consistent with design standards up to ADG II aircraft which includes most single-, twin-, and jet engine general aviation aircraft. Consideration should be given to increase the widths of those connector taxiways (Taxiways D1, D2, F, and G) that provide access to apron areas for ADG III general aviation aircraft which routinely conduct operations at the Airport such as the Bombardier Global Express and Boeing Business Jet. Increasing the width of the connector taxiways would result in a 15 foot expansion from 35 feet to 50 feet to meet ADG III standards. Future development of general aviation areas should also consider connector taxiways with widths that meet ADG III standards in order to provide sufficient lateral room for the wheelbases of the most common types of general aviation aircraft that conduct operations at the Airport in these areas.

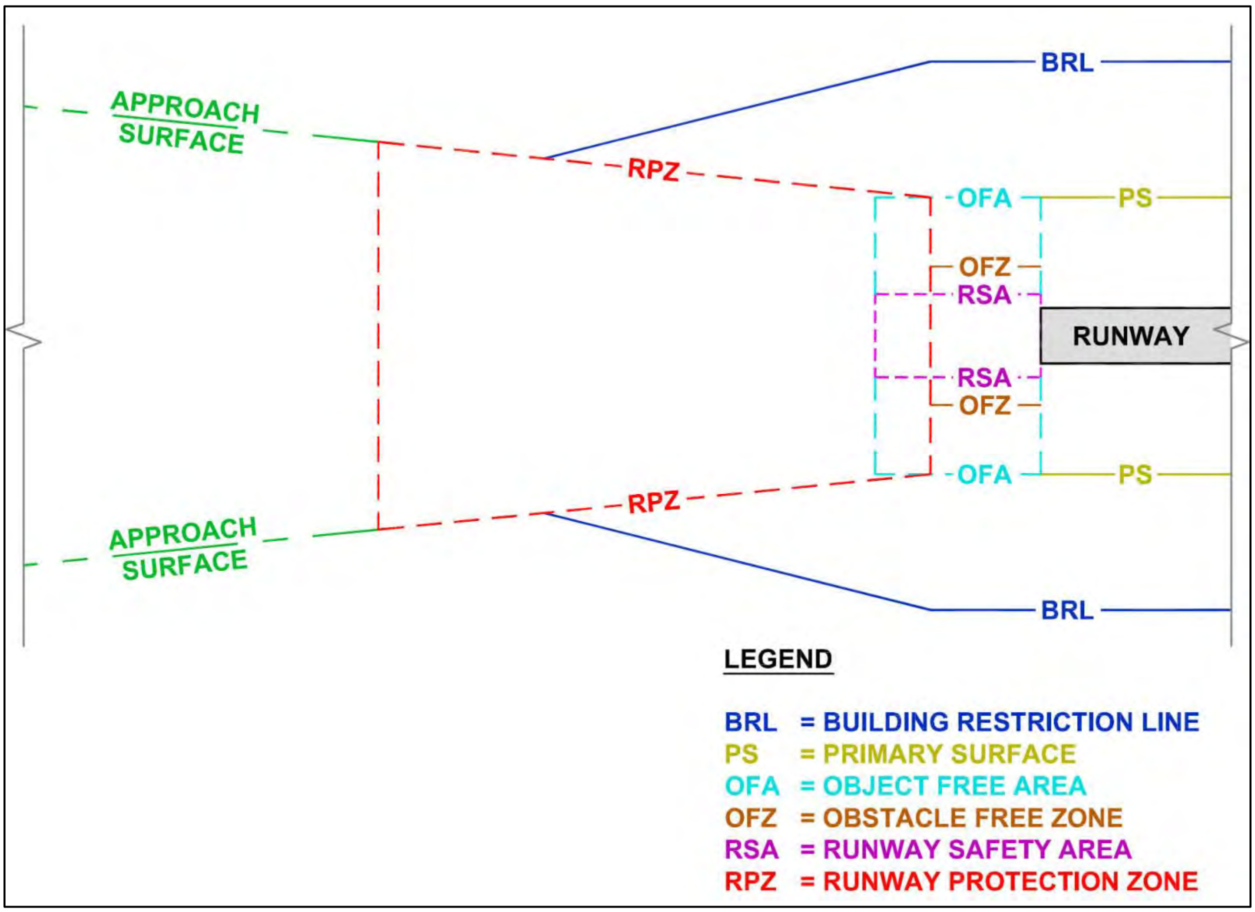
West Side Development Taxiways – While no additional improvements are necessary for the remainder of the taxiway system to meet existing demand, it should be noted that if future development occurs on the west side of the airfield an additional parallel taxiway and complementing connector taxiways may be required. Addition of these taxiways would minimize the need for aircraft to taxi across Runway 16/34 and increase the potential of a runway incursion. It is recommended that as a part of any future development planning on the west side of the airfield that the need for an additional parallel or connector taxiways be considered if aircraft activity levels result in frequent crossings of Runway 16/34..

4.2.h Airfield Safety Areas

This section presents FAA design standards for various airfield safety areas as they relate to Asheville Regional Airport. A visual depiction of various safety areas is shown in **Figure 4-5**. The following airfield safety areas are described in this section:

- Runway Safety Area (RSA)
- Runway Object Free Area (OFA)
- Obstacle Free Zone (OFZ)
    - Runway OFZ
    - Inner-Approach OFZ
    - Inner-Transitional OFZ
- Runway Protection Zone (RPZ)

Figure 4-5: Airfield Safety Areas



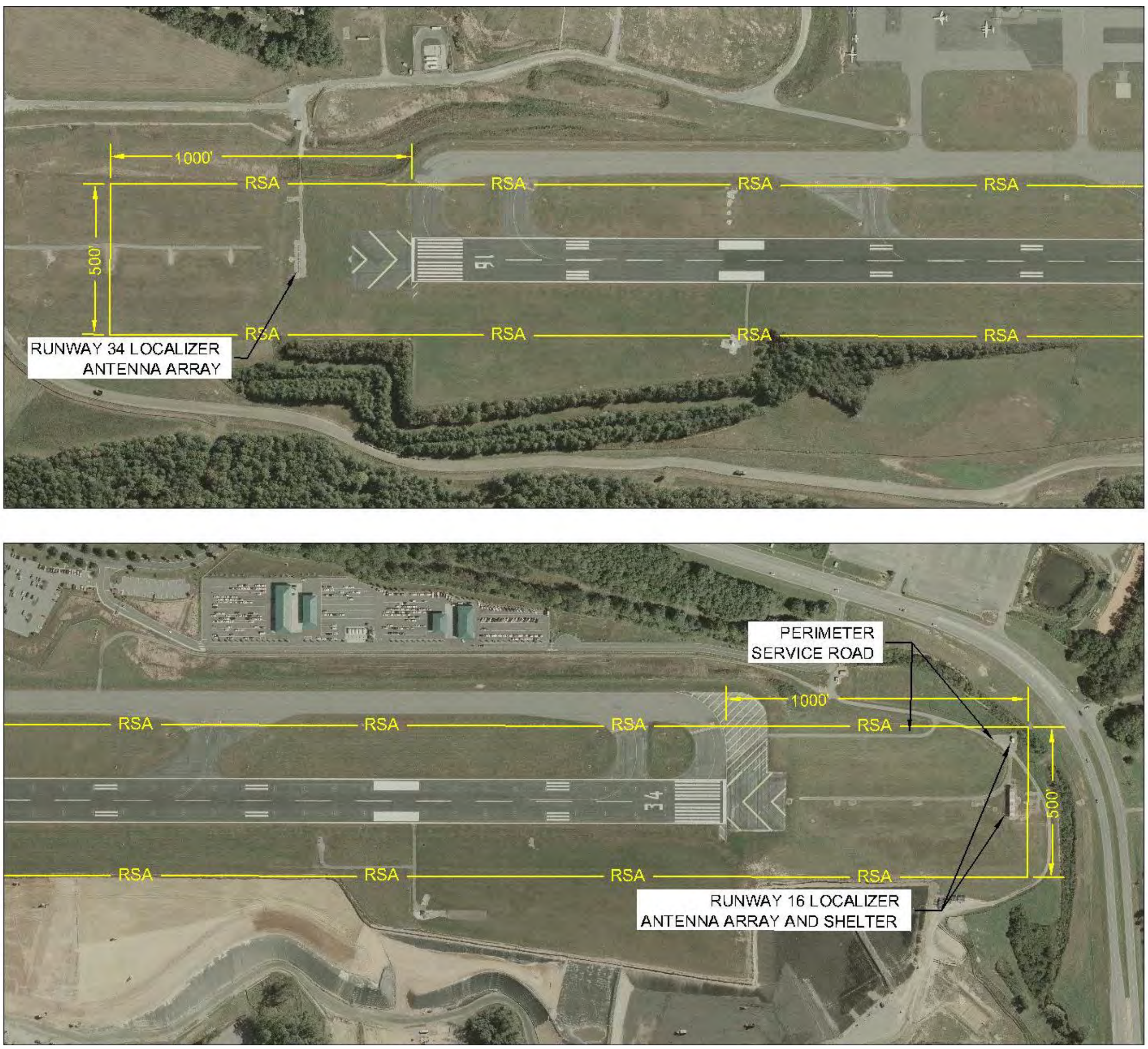
Source: Mead & Hunt, Inc.

Runway Safety Area – The Runway Safety Area (RSA) is a two-dimensional ground area that surrounds the runway. Based on FAA criteria, the RSA for Runway 16/34 should be 500 feet wide centered on the centerline and extend 1,000 feet beyond each runway end. The FAA mandates that the RSA be:

- Cleared, graded, and free of potential hazardous surface variations and be properly drained.
- Capable of supporting snow removal equipment (SRE), aircraft rescue and firefighting (ARFF) equipment, and aircraft (without causing damage to the aircraft).
- Free of objects except those mounted on low-impact resistant supports whose location is fixed by function.

Figure 4-6 depicts the RSA off each end of the runway at Asheville Regional Airport.

Figure 4-6: Runway Safety Area



Source: Mead & Hunt, Inc.

Localizer antennas are generally placed on a runway centerline off the end of a runway, however they can be located far enough from a runway end to place them outside the RSA, therefore they are generally not considered fixed by function. The Airport's RSA currently has the following objects within it which are not fixed by function:

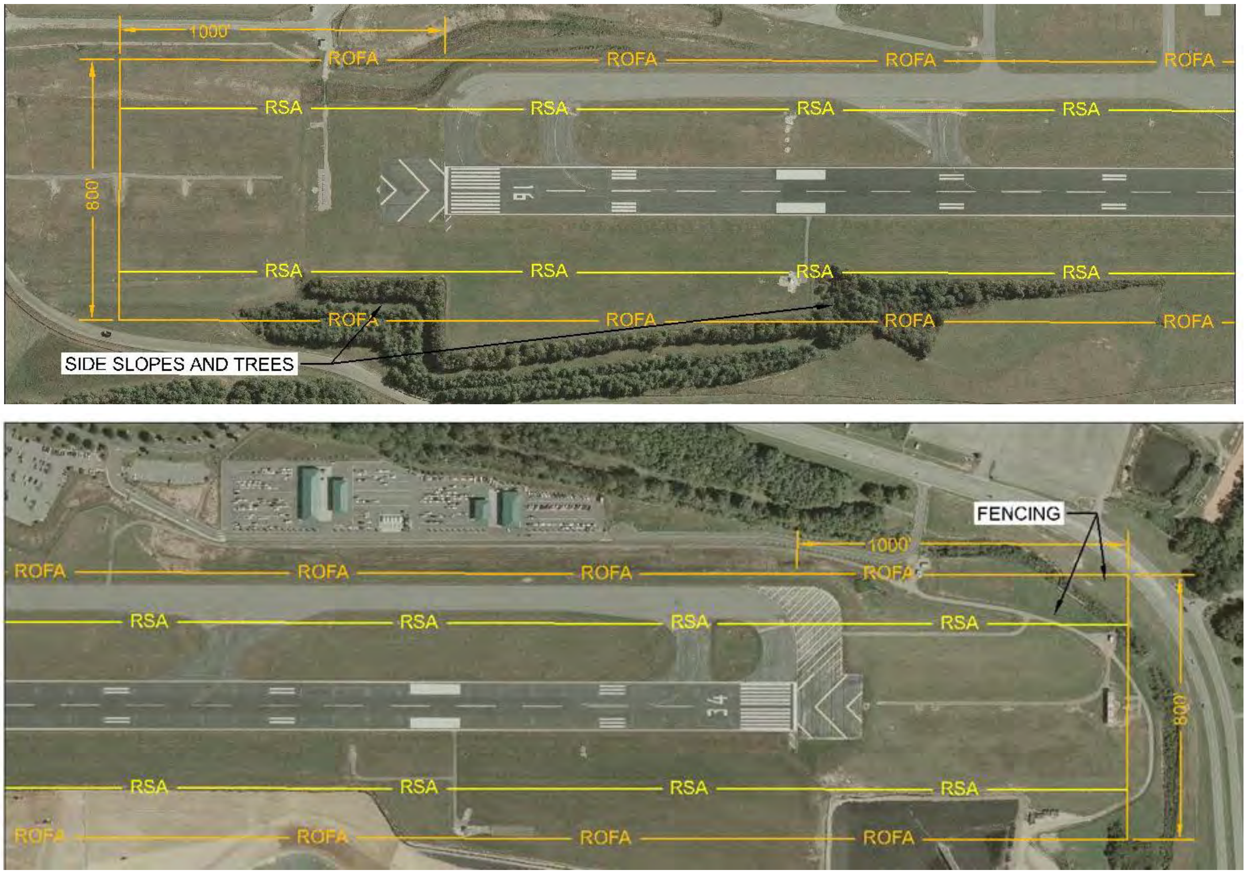
- Runway 34 localizer antenna array (FAA owned)
- Runway 16 localizer antenna array and equipment shelter building (FAA owned)
- Perimeter service road

Though the perimeter service road lies below the elevation of the runway, it is still non-compliant since the RSA must be free of objects at its surface elevation except those required because of their function. It should also be noted that the runway approach lighting systems installed for Runway 16 and Runway 34, which are owned by the FAA and not the Airport, do not meet all current FAA frangibility requirements and are therefore non-compliant within the RSA. All of the remaining items within the RSA such as the Runway 34 VASI and Runway 16 PAPI that are considered fixed by function are mounted on frangible bases and meet RSA requirements. It is recommended as a part of any future runway reconstruction or safety area improvement project that the relocation of the objects not fixed by function within the RSA be considered while those fixed by function meet all frangibility requirements. It should be noted that it will be the responsibility of the FAA and not the Airport to relocate these non-compliant objects.

In addition, it also appears a portion of the perimeter fencing and drainage ditch along North Carolina Route 280 may encroach upon the southeast corner of the RSA. It is recommended as a part of any future runway reconstruction or relocation project that the locations of these objects are surveyed to determine if they encroach upon the RSA. If it is found these objects penetrate the RSA, removal or relocation of the fence and drainage ditch may be required as a part of any future airfield development project. While solutions to relocate these potentially non-compliant objects are discussed and evaluated in the alternatives analysis chapter, one noteworthy option may be to pipe the ditch in an effort to set back the perimeter fencing from the corner of the RSA.

Runway Object Free Area – The Runway Object Free Area (ROFA) is a two-dimensional ground area centered on the runway. FAA standards prohibit parked aircraft and all above-ground objects protruding above the edge of the Runway Safety Area edge elevation, except objects for air navigation or aircraft ground maneuvering purposes. The length and width of the ROFA are determined by the type of aircraft that are anticipated to use the runway. Dimensions are based on aircraft approach categories and approach visibility minimums. Based on FAA criteria, the ROFA for Runway 16/34 should be 800 feet wide centered on the centerline and extend 1,000 feet beyond each runway end. **Figure 4-7** depicts the Runway Object Free Area at the approach ends of Runway 16 and Runway 34.

Figure 4-7: Runway Object Free Area – Runway 16 & Runway 34



Source: Mead & Hunt, Inc.

In the Runway 34 approach area, there are two areas of fencing within the ROFA that extend up above the elevation of the edge of the runway safety area. The noncompliant fencing within the ROFA should be evaluated for removal along with any RSA improvement alternatives evaluated. Along the west side of the runway near the end of Runway 16 , part of the sides within the ROFA slope away from the edge of the runway safety area and have trees on them.. Many of these trees are below the elevation of the runway safety area edge; however the 2010 ALP does note a FAR Part 77 primary surface penetration by a tree near the Runway 16 Glide Slope Antenna. Any trees extending up above the edge of the runway safety area elevation are in the ROFA and should be trimmed or removed. These areas should continue to be monitored by the airport to keep the vegetation cut to keep them from protruding up into the ROFA.

Obstacle Free Zone – The Obstacle Free Zone (OFZ) is a three-dimensional segment of airspace. OFZ clearing standards prohibit taxiing and parked aircraft and object penetrations, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function. The OFZ is comprised of the runway OFZ, the inner approach OFZ, and the inner-transitional OFZ.

The FAA design standards for the Obstacle Free Zone are as follows:

- The Runway OFZ is a volume of airspace above the runway centerline. It extends 200 feet beyond each end of the runway and is 400 feet wide for runways that serve large aircraft over 12,500 pounds such as Runway 16/34 at Asheville Regional Airport.

- The Inner-approach OFZ overlies the approach area and applies to runways with an approach lighting system, both Runway ends at AVL have an approach lighting system and therefore both have an inner-approach OFZ. The inner-approach OFZ begins 200 feet from runway threshold and extends 200 feet beyond the last unit in the approach lighting system. Its width is the same as the Runway OFZ and it rises at a slope of 50 (horizontal) to 1 (vertical) from its beginning.

- The Inner-transitional OFZ is a defined volume of airspace along the sides of the Runway OFZ and Inner-approach OFZ. For CAT I runways such as Runway 16/34 at AVL, it rises vertically for a height of "H", and then slopes 6 (horizontal) to 1 (vertical) out to height of 150 feet above the established airport elevation. The height "H" is defined in a formula by the FAA dependent upon the runway threshold elevation (E) and the wingspan of the most demanding airplanes using the runway (S). The Runway 16 threshold elevation is 2164.7 and is greater than the Runway 34 elevation. The ultimate design aircraft are anticipated to be from ARC Category C-IV, which have wingspans up to 171 feet. Therefore the height is defined by the FAA as follows:

$$H = 61 - 0.094(S) - 0.003(E)$$
$$H = 61 - 0.094(171) - 0.003(2164.7)$$
$$H = 38.4 \text{ feet}$$

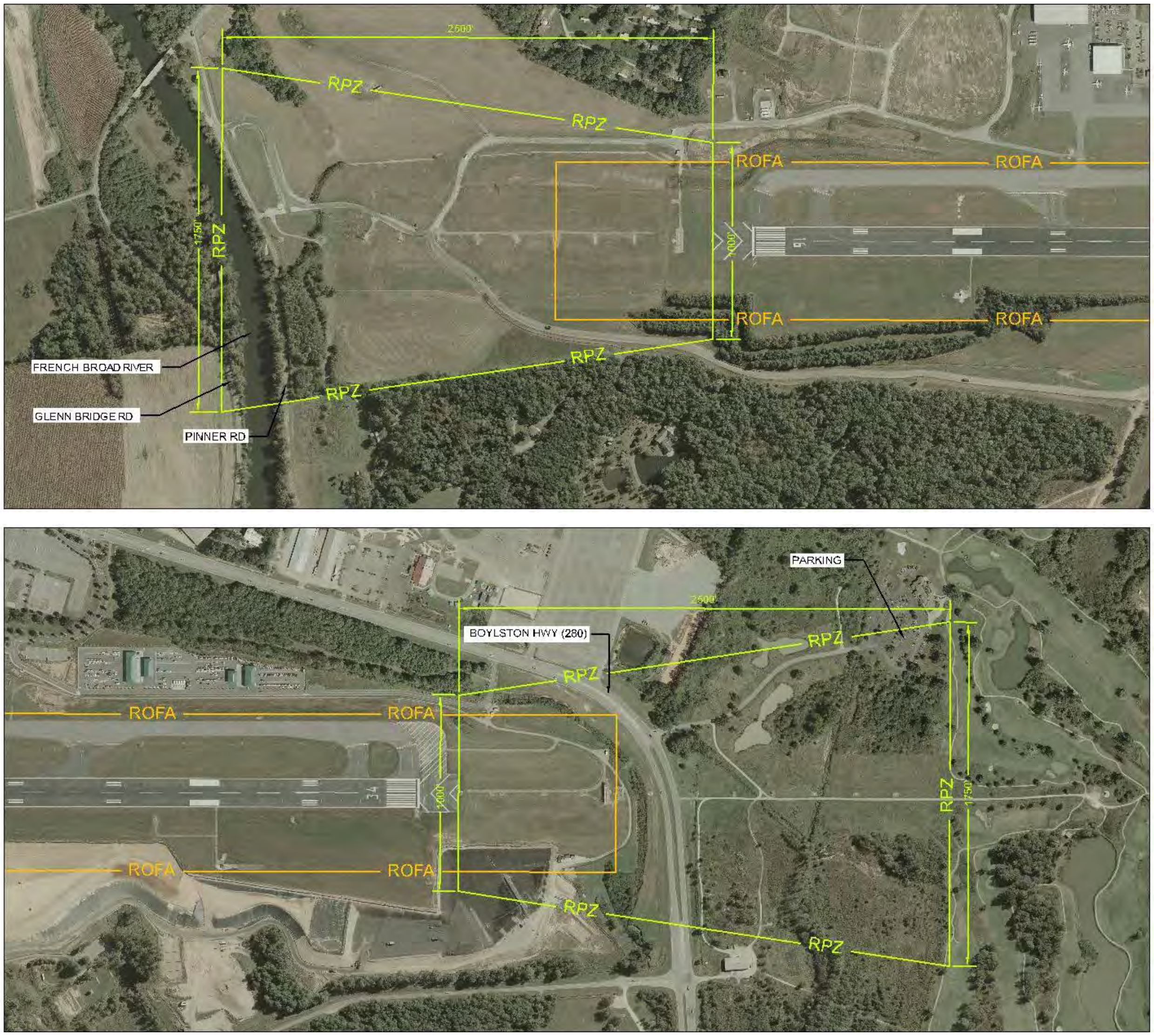
According to the existing Airport Layout Plan (ALP), the OFZ is compliant with FAA standards and no object penetrations exist.

Runway Protection Zone – The function of the Runway Protection Zone (RPZ) is to enhance the protection of people and property on the ground. This is achieved through airport owner control over RPZ's, to clear the RPZ of any incompatible land uses. While it is desirable to clear all objects from the RPZ, some uses are permitted, provided they do not attract wildlife, are outside the Runway OFA, and do not interfere with NAVAIDs. Land uses prohibited from the RPZ are residences and places of assembly (churches, schools, hospitals, office buildings, etc.).

The RPZ is trapezoidal in shape and centered about the extended runway centerline in the approach/departure area for each runway. The RPZ begins 200 feet past the end of the runway pavement useable for takeoff or landing. RPZ length and width dimensions are contingent on the type of aircraft that operate at a particular airport. Generally, as aircraft size increases and the type of approach becomes more precise, the dimensions of the RPZ increase. As both ends of Runway 16/34 have precision approaches, the dimensions of the RPZs on each end are the same. They have an inner width of 1,000 feet, an outer width of 1,750 feet, and a length of 2,500 feet.

Figure 4-8 depicts the Runway Protection Zone at either end of Runway 16/34.

Figure 4-8: Runway 16 Runway Protection Zone



Source: Mead & Hunt, Inc.

There are some public roadways, the French Broad River, and a public parking lot within the RPZs of the runway; however, all of these are below the runway elevation and none have a substantial adverse effect on the Airport, nor do the RPZs include land uses that are residential or places of assembly. Therefore the RPZs are compliant with FAA design standards.

4.2.i FAR Part 77 Surfaces

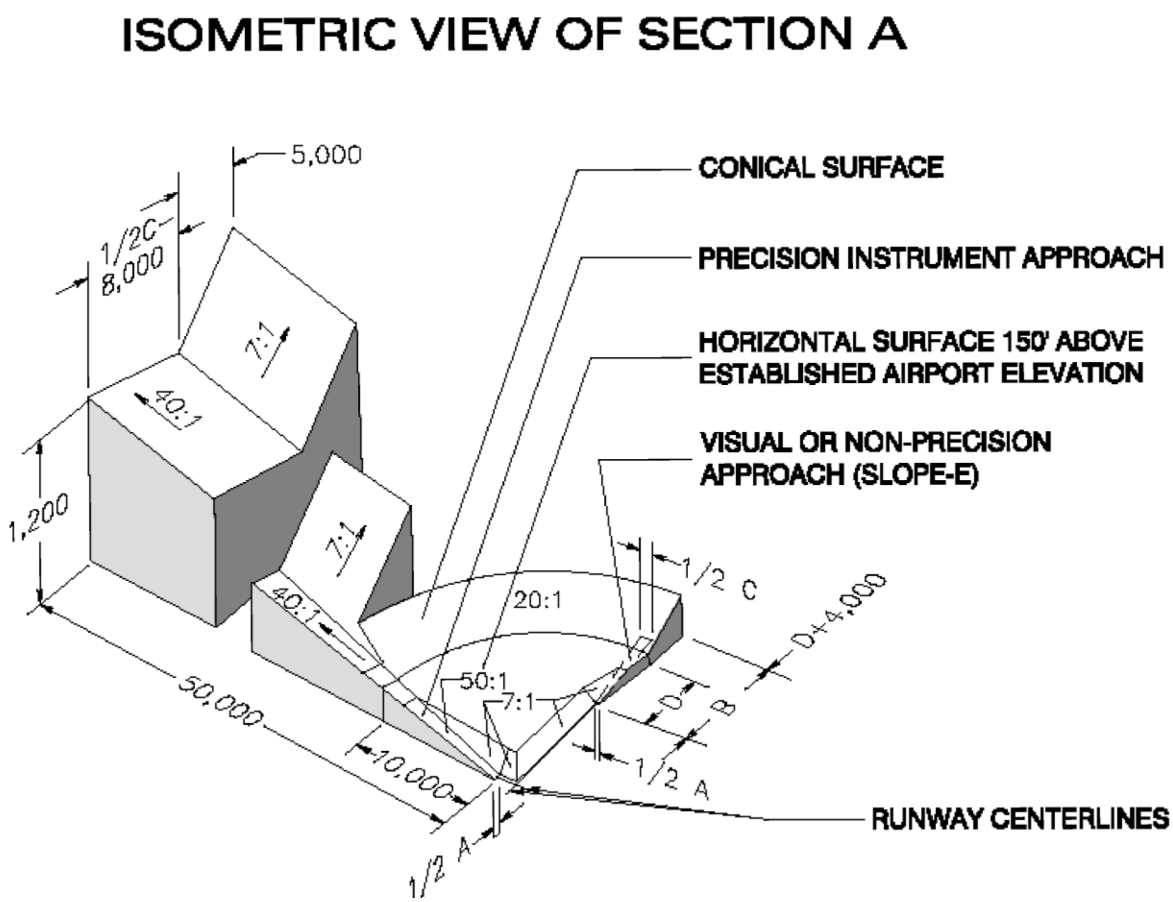
Federal Aviation Regulation (FAR) Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace*, establishes standards that determine potential obstructions to air navigation. FAR Part 77, Subpart C, Section 77.19, *Civil Airport Imaginary Surfaces*, defines a set of "imaginary surfaces" that surround an airport. Objects affected include existing or proposed objects, natural growth, terrain, or permanent and temporary construction.

The "imaginary surfaces" defined in FAR Part 77 include:

- Primary Surface
- Transitional Surface
- Horizontal Surface
- Conical Surface
- Approach Surface

A graphical depiction of FAR Part 77 surfaces is shown in **Figure 4-9**.

Figure 4-9: FAR Part 77 Standards



Source: Mead & Hunt, Inc.

FAR Part 77 civil airport imaginary surfaces are established with relation to the airport and to each runway. The size of each such imaginary surface is based on the category of each runway according to the type of approach available or planned for that runway. The slope and dimensions of the approach surface applied to each end of a runway are determined by the most precise approach existing or planned for that runway end.

Horizontal Surface – The horizontal surface is a plane 150 feet above the established airport elevation, the perimeter of which is constructed by swinging arcs of specified radii from the center of each end of the primary surface of each runway of each airport and connecting the adjacent arcs by lines tangent to those arcs. The radius of each arc is based upon the designation of the runway. At the Airport the radii of the horizontal surface is 10,000 feet, meeting criteria set forth in FAR Part 77.

Conical Surface – The conical surface extends outward and upward from the periphery of the horizontal surface at a slope of 20 to 1 for a horizontal distance of 4,000 feet.

Primary Surface – The primary surface is centered longitudinally on a runway, extending 200 feet beyond the end of each runway that has a specially prepared hard surface; when the runway has no specially prepared hard surface, or planned hard surface, the primary surface ends at each end of that runway. The elevation of any point on the primary surface is the same as the elevation of the nearest point on the runway centerline. The width of a primary surface is based upon the designation of the runway and type of approach. The primary surface at the Airport is 1,000 feet in width meeting requirements for precision instrument runways and extends 200 feet beyond the threshold of each end of the runway.

Approach Surface – The approach surface is centered longitudinally on the extended runway centerline and extends outward and upward from each end of the primary surface. An approach surface is applied to each end of the runway based upon the type of existing or planned approach for that runway end. The inner edge of the approach surface is the same width as the primary surface and expands uniformly to a width based on the designation and type of approach to that runway. As such, the inner edge of the approach surface to each end of Runway 16/34 is 1,000 feet and expands to a width of 16,000 feet, meeting criteria for precision instrument runways. The slope and horizontal distance of the approach surface is also based on the designation of the runway and type of approach; for Runway 16/34, the approach surface extends upward at a slope of 50:1 for a distance of 10,000 feet and then extends upward at a slope of 40:1 for an additional distance of 40,000 feet.

Transitional Surface – Transitional surfaces extend outward and upward at right angles from the extended runway centerline at a slope of 7 to 1 from the sides of the primary surface and approach surface. Transitional surfaces for those portions of the precision approach surfaces which project through and beyond the limits of the conical surface extend a distance of 5,000 feet measured horizontally from the edge of the approach surface and at right angles to the runway centerline.

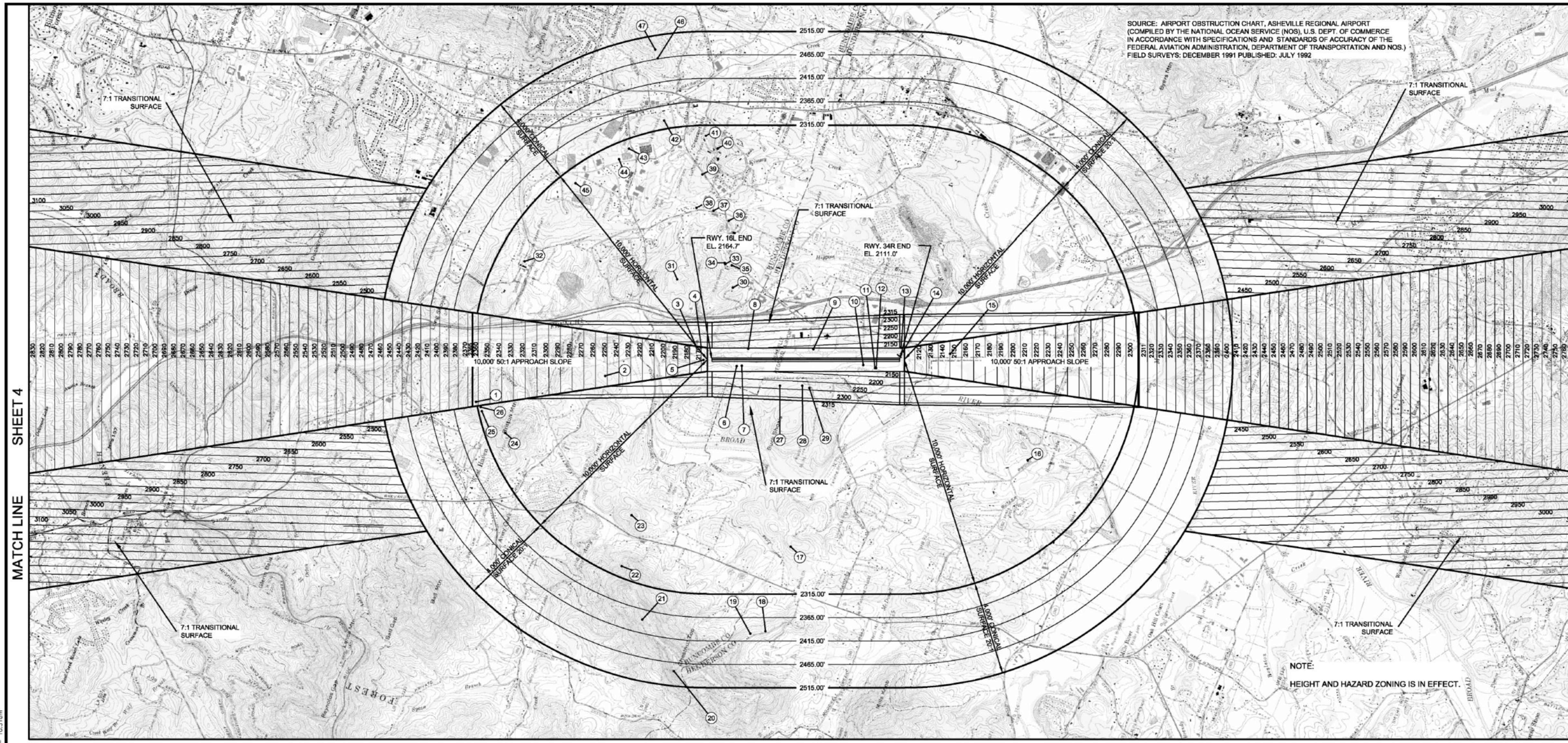
Any penetrations of the FAR Part 77 surfaces are considered obstructions and are presumed hazards to air navigation unless further aeronautical study concludes that the object is not a hazard. Once a further aeronautical study has been initiated, the FAA will use the standards in FAR Part 77, along with FAA policy and guidance material, to determine if the object is a hazard to air navigation. It should be noted that there is no specific authorization in any statute that permits the FAA to limit structure heights or determines which structures should be lighted or marked. In every aeronautical study determination, the FAA acknowledges that state or local officials have control over the appropriate use of property beneath an airport's airspace. Further evaluation of the height and hazard zoning in proximity of the Airport is discussed in the Environmental Overview chapter of this master plan.

Similar to RPZs, dimensions of FAR Part 77 surfaces vary by the type of runway approach. All runways at Asheville Regional Airport are designed for precision approaches. **Figure 4-10** and **Figure 4-11** depicts the Airport's Airport Airspace plan from the June 2010 Airport Layout Plan Update. This includes the FAR Part 77 surfaces and a schedule of obstructions. Additional obstruction evaluation will be done as part of an ALP update towards the conclusion of this master plan project; the obstructions identified on the 2010 ALP will be updated and any additional obstructions will also be identified and evaluated.

The Airport is responsible for protecting their FAR Part 77 surfaces to avoid the introductions of obstructions into their airspace. FAR Part 77 obstructions identified on the airspace plan such as the number of trees noted for trimming should be removed or pruned below the airspace surfaces if possible. Those obstructions that are fixed by function, or are unable to be removed should be identified with an obstruction light if possible.

There may be instances where nearby airports or surrounding airspace restrictions are more controlling factors in the protection of airspace than the FAR Part 77 surfaces of the Airport. In considering this, it is important to note the FAR Part 77 surfaces of the Asheville Regional Airport overlap the FAR Part 77 surfaces associated with the Hendersonville-Winkler Airport located approximately ten miles to the southeast. Though the location of the Hendersonville-Winkler Airport lies outside the boundary of all FAR Part 77 at the Asheville Regional Airport, the horizontal, approach, and conical surfaces appear to overlap the approach surface associated with Runway 34 at the Hendersonville-Winkler Airport. Typically in situations where FAR Part 77 surfaces overlap, each airport is responsible for protecting their own airspace needs. While addressing the overlap in FAR Part 77 surfaces is not required as a part of this master plan nor is it required to be identified in the airspace plan drawing of the ALP, it is encouraged the Airport inform others of this circumstance as a courtesy when engaging in airspace protection discussions.

Figure 4-10: Airport Airspace Plan



PART 77 OBSTRUCTIONS

NO.	OBJECT	TOP ELEV. (MSL)	PART 77 CLEAR (FT.)	PART 77 VIOLATION (FT.)	PART 77 SURFACE PENETRATED	ACTION TO BE TAKEN
1	TREE	2387		25.0	APPROACH SURFACE	TRIM TREE
2	TREE	2248	3.50		APPROACH SURFACE	N/A
3	TREE	OBSTRUCTION HAS BEEN CLEARED				
4	TREE	OBSTRUCTION HAS BEEN CLEARED				
5	OL ON LOCALIZER	2168	0.10		APPROACH SURFACE	N/A
6	ROD ON OL GLIDE SLOPE	2192		29.6	PRIMARY SURFACE	NONE – FIXED BY FUNCTION
7	TREE	2176		14.1	PRIMARY SURFACE	TRIM TREE
8	BUILDING	2164		2.80	PRIMARY SURFACE	NONE – FIXED BY FUNCTION
9	OL ON WINDSOCK	2174		29.2	PRIMARY SURFACE	NONE – FIXED BY FUNCTION
10	ROD ON OL TRANSMISSOMETER	2138		11.2	PRIMARY SURFACE	NONE – FIXED BY FUNCTION
11	ROD ON OL TRANSMISSOMETER	2138		15.7	PRIMARY SURFACE	NONE – FIXED BY FUNCTION
12	ROD ON OL GLIDE SLOPE	2146		24.2	PRIMARY SURFACE	NONE – FIXED BY FUNCTION
13	TREE	OBSTRUCTION HAS BEEN CLEARED				
14	RADAR REFLECTOR	2113		2.00	PRIMARY SURFACE	NONE – FIXED BY FUNCTION
15	TREE	2145	4.90		APPROACH SURFACE	N/A
16	ANTENNA ON OL POLE	2324		9	HORIZONTAL SURFACE	NONE – FIXED BY FUNCTION
17	TREE	2315		0	HORIZONTAL SURFACE	TRIM TREE
18	TERRAIN VIOLATION	2450		100	CONICAL SURFACE	NO ACTION (LIGHT IF POSSIBLE)
19	TREE	2443		88	CONICAL SURFACE	TRIM TREE
20	TERRAIN VIOLATION	3137		697	CONICAL SURFACE	NO ACTION (LIGHT IF POSSIBLE)
21	TERRAIN VIOLATION	2953		609	CONICAL SURFACE	NO ACTION (LIGHT IF POSSIBLE)
22	TREE	2450		135	HORIZONTAL SURFACE	TRIM TREE
23	TREE	2370		55	HORIZONTAL SURFACE	TRIM TREE
24	TERRAIN VIOLATION	2610		295	HORIZONTAL SURFACE	NO ACTION (LIGHT IF POSSIBLE)
25	TREE	2434		119	HORIZONTAL SURFACE	TRIM TREE
26	TREE	2422		107	HORIZONTAL SURFACE	TRIM TREE
27	TREE	2264		139	TRANSITIONAL SURFACE	TRIM TREE
28	TREE	2291		166	TRANSITIONAL SURFACE	TRIM TREE
29	ANTENNA ON OL POLE	2358		218	TRANSITIONAL SURFACE	NONE – FIXED BY FUNCTION
30	TREE	2336		21	HORIZONTAL SURFACE	TRIM TREE
31	TREE	2327		12	HORIZONTAL SURFACE	TRIM TREE
32	ROD ON OL STACK	2567		252	HORIZONTAL SURFACE	NONE – FIXED BY FUNCTION
33	ANTENNA ON OL RTR TOWER	2423		108	HORIZONTAL SURFACE	NONE – FIXED BY FUNCTION
34	ANTENNA ON OL POLE	2486		171	HORIZONTAL SURFACE	NONE – FIXED BY FUNCTION
35	TERRAIN VIOLATION	2404		89	HORIZONTAL SURFACE	NO ACTION (LIGHT IF POSSIBLE)
36	TREE	2413		98	HORIZONTAL SURFACE	TRIM TREE
37	BUILDING	2379		64	HORIZONTAL SURFACE	REMOVE OR LIGHT
38	TREE	2333		18	HORIZONTAL SURFACE	TRIM TREE
39	TREE	2372		57	HORIZONTAL SURFACE	TRIM TREE
40	TERRAIN VIOLATION	2484		169	HORIZONTAL SURFACE	NO ACTION (LIGHT IF POSSIBLE)
41	TERRAIN VIOLATION	2555		240	HORIZONTAL SURFACE	NO ACTION (LIGHT IF POSSIBLE)
42	TREE	2366		51	HORIZONTAL SURFACE	TRIM TREE
43	TREE	2355		40	HORIZONTAL SURFACE	TRIM TREE
44	TREE	2357		42	HORIZONTAL SURFACE	TRIM TREE
45	TREE	2332		17	HORIZONTAL SURFACE	TRIM TREE
46	TREE	2495		34	CONICAL SURFACE	TRIM TREE
47	TREE	2539		58	CONICAL SURFACE	TRIM TREE

MAG. DEC. 5° 25.6' W (JUNE 2000) TRUE

0 1,000' 2,000' 4,000'

REVISIONS	
DATE	DESCRIPTION

SPONSOR: Asheville REGIONAL AIRPORT — ASHEVILLE REGIONAL AIRPORT AUTHORITY

PROJECT: AIRPORT LAYOUT PLAN UPDATE

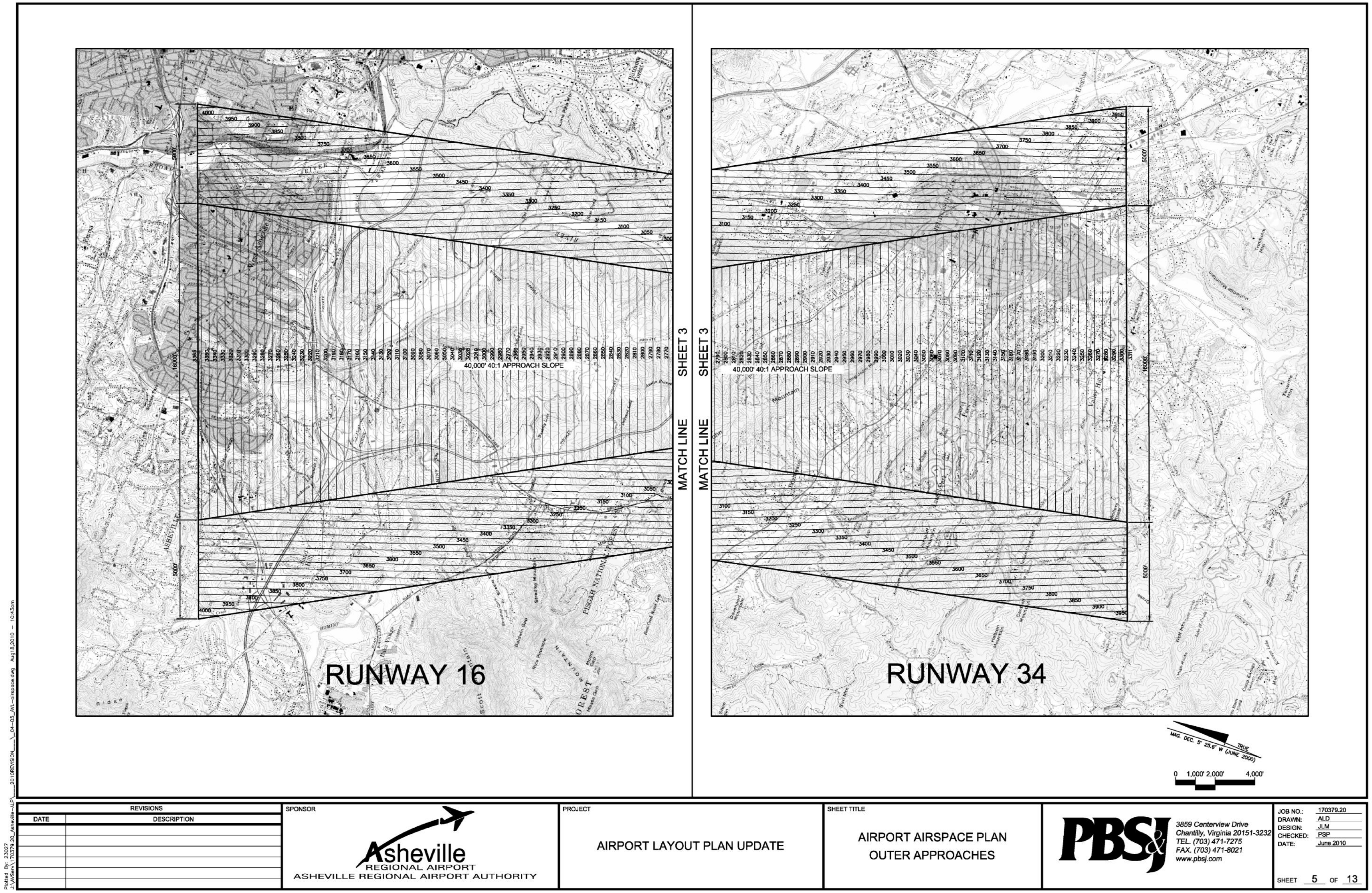
SHEET TITLE: AIRPORT AIRSPACE PLAN FULL

PBS&J — 3859 Centerview Drive, Chantilly, Virginia 20151-3232, TEL. (703) 471-7275, FAX. (703) 471-8021, www.pbsj.com

JOB NO.: 170379.20
DRAWN: ALD
DESIGN: JLM
CHECKED: PSP
DATE: June 2010
SHEET 4 OF 13

Source: 2010 Airport Layout Plan

Figure 4-11: Airport Airspace Plan (Continued)



Source: 2010 Airport Layout Plan

4.2.j Navigational Aids (NAVAIDs) and Weather Reporting Equipment

Navigational Aids (NAVAIDs) provide guidance for pilots during flight preparation and operation. Several factors such as the type, mission, and volume of aviation activity, as well as local meteorological conditions and types of established instrument approach procedures dictate the appropriate navigational aids (NAVAIDs) that should be installed at an airport. AC 150/5300-13, *Airport Design*; AC 150/5340-30F, *Design and Installation Details for Airport Visual Aids*; Order 7031.2C, *Airway Planning Standard Number One – Terminal Air Navigation Facilities and Air Traffic Control Services*; FAR Part 139; and the Aeronautical Information Manual (AIM) offer guidance on the appropriate visual and electronic NAVAIDs that should be present at an airport given FAA policy and other criteria considerations. A review was conducted of each NAVAID presented in Chapter 3 to determine if any improvements to existing equipment or installation of additional NAVAIDs are necessary to meet anticipated demand. **Table 4-10** lists the existing and proposed NAVAIDs for Runway 16/34.

Table 4-10: Existing & Proposed Runway 16/34 NAVAIDs

Runway	ILS	Cat II/III	RNAV/ GPS	MALSR	ALSF	VASI	PAPI	HIRL	RCL	TDZ
16	E	P	E	E	P	-	E	E	E	P
34	E	P	E	E	P	E	P	E	E	E

Notes: E – Existing; P – Planned; ILS – Instrument Landing System (precision approach);
CAT II/III – Precision approach with Category II/III minimums; RNAV/GPS – Area Navigation / Global Positioning System
MALSR – Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights;
ALSF – High Intensity Approach Lighting System with Sequenced Flashing Lights;
VASI – Visual Approach Slope Indicator; PAPI – Precision Approach Path Indicator; HIRL – High Intensity Runway Lights
RCL – Runway Centerline Lights; TDZ – Runway Touchdown Zone Lights

Source: Mead & Hunt, Inc.

NAVAIDs will be discussed in three categorizations: Terminal Area NAVAIDs, Electronic Approach NAVAIDs, and Visual NAVAIDs.

Terminal Area NAVAIDs - Terminal area NAVAIDs provide positive control of aircraft and help maintain orderly flow of air traffic within a specified area. Terminal area NAVAIDs assist to prevent collisions between aircraft during landing and take-off sequence, as well as to support sufficient maneuvering. Terminal area NAVAIDs at the Asheville Regional Airport includes the Airport Traffic Control Tower (ATCT), Asheville Terminal Radar Approach Control Facilities (TRACON), Atlanta Air Route Traffic Control Center (ARTCC), and the Airport Surveillance Radar (ASR).

The ATCT is operated by the FAA and occupies the third floor of the passenger terminal building. The facility operates from 6:30 a.m. to 11:00 p.m. The Asheville Approach Control is responsible for assisting both arrivals to and departures from the Airport. En route control for aircraft to and from the Airport is initially provided by the Atlanta ARTCC; control is transferred as aircraft approach Asheville Regional Airport.

The existing tower on the third floor of the passenger terminal building is quite old and nearing the end of its useful life. Typically, the FAA recommends an area of approximately seven acres for an ATCT and associated facilities such as automobile parking. Potential locations and evaluation regarding the relocation of the ATCT will be addressed in Chapter 5.

The Airport is also equipped with an Airport Surveillance Radar (ASR) that is located off Wright Brothers Way just north of the T-hangar structures on the middle ramp. The ASR antenna scans 360 degrees to provide the airport traffic controller with location information on aircraft within line of sight and in range. This equipment offers the Airport the ability to more precisely handle aircraft within the immediate vicinity of the Airport.

Electronic Approach NAVAIDs - Electronic Approach NAVAIDs assist aircraft during instrument approach procedures. An instrument approach procedure consists of a series of predetermined maneuvers that allows orderly transfer of an aircraft during instrument flight conditions to a point where a visual landing may be made.

The availability of instrument approach procedures permits aircraft landings during periods of limited visibility. The extent to which approach minimums, with respect to ceiling and visibility, can be lowered depends on available instruments to develop an approach procedure and on obstructions within the runway approach and in missed approach areas. Instrument approaches may be restricted to particular aircraft models or to certain flight crews that are certified to conduct such a procedure with the appropriate equipment.

Precision instrument approaches that can be flown with the lowest visibility and cloud ceiling height minima are categorized by these two criteria. **Table 4-11** presents the decision height and visibility criteria for each category of precision instrument approach.

Table 4-11: Precision Instrument Approach Categories and Criteria

Approach Category	Decision Height	Visibility
I (w/ MALSR)	200 feet	½ mile or 2,400 ft.
I (w/ centerline & TDZ lights and Runway Visual Range (RVR) Equipment)	200 feet	1,800 ft.
II	100 feet	1,200 ft.
IIIA	*	700 ft.
IIIB	*	150 ft.
IIIC	*	**

Notes:
* = Decision height not specified, only visibility limits apply
** = Aircraft must have auto land capability and a qualified pilot
Source: FAA AC 150/5300-13, *Airport Design*

The Airport is equipped with a Category I Instrument Landing System (ILS) on the approaches to Runway 16 and 34 that appears adequate to meet existing demand. However, as illustrated in **Table 4-12**, 2.27 percent of the time weather conditions exceed visibility and cloud ceiling height minimums that prevent aircraft from conducting instrument approaches into the Airport. Though these weather conditions can result in possible flight delays and cancellations until visibility and/or cloud ceiling heights improve, the small percentage of time they are present does not significantly impact operations at the Airport nor does it justify the development of a Category II or III precision instrument approach.

Table 4-12: 2000-2009 Weather Condition Analysis

Weather Condition	Number of Hourly Occurrences	% of Total Observations
Visual Flight Rules (VFR)	69,638	88.74%
Instrument Flight Rules (IFR)	7,053	8.99%
Below IFR Minimums	1,783	2.27%
Total	78,474	100.00%

Note: IFR minimums are 1/2 mile visibility and cloud ceiling 200 feet AGL
Source: National Climatic Data Center
Period of Record: 2000-2009

Though there is no justifiable need for a Category II or III precision instrument approach, it is recommended that the Airport plan to protect for increased precision approach minimums to Runways 16 and 34 should upgrades be needed in the future. **Table 4-13** lists the required infrastructure and operational improvements that would be needed to gain a Category II or III approach.

Table 4-13: ILS Category II and III Infrastructure and Operational Requirements

Required Element	Installed	Needed
Equipment		
• Glideslope and Localizer equipment for Category II/III authorization		X[1]
• Runway Visual Range (RVR) equipment (touchdown, roll-out, and midfield for runways over 8,000 feet in length)		X[2]
• Inner marker (typically required)		X
• Uninterrupted secondary power source and switchgear	X	
• Remote monitoring		X
Lighting System Requirements		
• ALSF-1 or ALSF-2 approach lights		X
• In-pavement touchdown zone lights		X[3]
• In-pavement runway centerline lights	X	
• High intensity runway lights	X	
Operational Requirements		
• Surface Movement Guidance Control System (SMGCS) plan		X
• Runway/taxiway centerline separation of 500 feet or greater[4]		X[5]
• Airport Traffic Control Tower (ATCT) open while aircraft are conducting Cat II/III approaches	X	
• 3° glide path and threshold crossing height between 50 and 60 feet	X	
• Runway centerline consistent with localizer final course	X	
Airspace / Terminal Instrument Procedures (TERPS)		
• No aircraft/ground vehicle penetration of Object Free Zone (OFZ), Obstacle Clearance Surfaces (OCS), or Precision Obstacle Free Zone (POFZ)		X[6]

Notes: 1 = Upgrade of existing glideslope and localizer needed
2 = RVR equipment needed at midfield
3 = Currently on Runway 34 only, needed on Runway 16
4 = For low visibility operations requiring a SMGCS, separation of at least 500 ft. should typically exist; When this distance is less than 500 ft., an on-site evaluation on a case-by-case basis may be appropriate to establish SMGCS procedures.
5 = As a result of the surrounding topography, limited lateral distance is available to separate Runway 16/34 and Taxiway A. It is recommended to request SMGCS procedures be developed to accommodate 400 feet of separation.
6 = Establishment of obstacle clearance surface needed

Source: FAA Order 8400.13D, *Procedures for the Evaluation and Approval of Facilities for Special Authorization Category I Operations and All Category II and III Operations*

It should be noted that technology improvements through Global Positioning System (GPS) based approaches are making Category I precision approach minimums attainable without the costly installation of ground-based ILS systems. While the potential to use GPS for Category II or III approaches is uncertain at this time, protecting for an increased precision instrument approach would position the Airport favorably to receive a Category II or III should technology advancements be made in GPS approaches.

Airfield infrastructure and operational improvements required for a Category II or III precision instrument approach include upgrades to the existing localizer and glide slope equipment; increased separation between the runway and taxiway centerlines; revised air traffic control procedures to prevent ground vehicle and taxiing aircraft penetration into the OFZ and POFZ; the establishment of an obstacle clearance surfaces (OCS); revised Terminal Instrument Procedures (TERPS); installation of an High Intensity Approach Lighting System With Sequenced Flashing Lights (ALSF); and the possible creation of a Surface Movement Guidance Control System (SMGCS) plan if operations are conducted below 1,200 feet Runway Visual Range (RVR).

It should be noted that the installation of runway centerline lighting will typically allow airline operators to request specific authorization for departures below the minimum visibility criteria. Specific authorization Category II approaches offering 100 feet decision height and 1,600 feet RVR, or 1,200 feet RVR for aircraft equipment with auto land or Heads Up Display (HUD) equipment certified for touchdown, can be conducted on Category I approaches that may not have dual localizer and glide slope transmitters, runway touchdown zone lighting, runway centerline lighting, and approach lighting systems. Should the Airport and any airline operators request specific authorization for departures below 1,200 feet RVR, a Surface Movement Guidance and Control System (SMGCS) plan is required by the FAA. SMGCS plans for operations below 1,200 feet RVR also have a set of infrastructure and operational criteria that must be met separate from the elements listed in a Category II or III instrument approach system. **Table 4-14** lists the required infrastructure and operational elements needed for a SMGCS plan designed for operations below 1,200 feet RVR. Currently, none of the airlines operating at the Airport have procedures that would permit them from departing when the RVR is less than 1,200; therefore, a SMGCS plan has not been developed. Should the airlines seek to request authorization for departures below 1,200 feet RVR or the Airport gains a Category II or III instrument approach, a SMGCS plan would be required.

Table 4-14: SMGCS Plan Requirements For Operations Below 1,200 Feet RVR

Required Element	Installed	Needed
Taxiway lights	X	
Runway guard lights		X
12 inch taxiway markings with black borders	X	
Taxiway guidance signs at all intersections	X	
Consideration of local issues	*	*
Ground vehicle training and control		X
Low visibility taxi route chart		X
Initial and periodic operational inspections		X
Review and revision of SMGCS plan as needed		X

Notes: * = Local issues would be considered as a part of plan development

Source: FAA AC 120-57A, *Surface Movement Guidance and Control System*

Visual NAVAIDs – Visual NAVAIDs are classified as those navigational devices that require visual recognition by a pilot and includes approach lighting, windsocks, and airfield signage. In particular, visual NAVAIDs are most beneficial in assisting a pilot to visually locate a runway and complete the transition from flight to touchdown on the runway. Visual NAVAIDs often compliment electronic NAVAIDs and may be required in certain circumstances to fulfill the installment of an electronic NAVAID. The following summarizes the facility requirements of visual navigational equipment found on the airfield:

- **Rotating Beacon –** The rotating beacon at the Airport is located on the top of the air traffic control tower and helps to identify the location of the Airport to pilots from the air. When the rotating beacon is illuminated at night it indicates that the Airport is open; if illuminated during the day it indicates the cloud ceiling height is below 1,000 feet and/or the visibility is less than three miles. The angle of the light should be positioned as such that on- and off-airport structures and the surrounding terrain do not block the light when viewed from the air. Currently, there are no obstructions or surrounding terrain penetrating the light beam; it is recommended that the angle of the light be reevaluated as a part of any future on- or off- airport development to determine if the rotating beacon will need to be repositioned.

- **Wind Indicators –** Wind indicators, or otherwise known as wind cones, are devices that provide surface wind direction information to pilots. FAR Part 139 directs that a wind indicator must be installed at each end of an air carrier runway or at least at a point visible to the pilot on final approach and prior to takeoff. If an airport is open for air carrier operations at night, wind indicators are also required to be illuminated. At the Airport, three wind indicators are present; one at each runway end and one located in the segmented circle. All three are illuminated; therefore, no wind indicator improvements are anticipated throughout the planning period other than routine inspections and replacement to worn or faded fabric.

- **Segmented Circle –** A segmented circle is a series of ground based markings arranged in a circle with a wind indicator positioned in the center used to indicate wind strength and the traffic pattern of each runway at an airport. FAR Part 139 states that a segmented circle, landing strip indicator, and traffic pattern indicator must be installed around a wind indicator for each runway that has a right-hand traffic pattern. FAR Part 139 also states that airports serving air carrier operations much install a segmented circle when a control tower is not present or is not in operation. The segmented circle installed at the Airport is equipped with landing strip indicators, traffic pattern indicators, and a lighted wind indicator in the middle. No changes are anticipated to the Airport's segmented circle which is located adjacent to the south apron.

- **MALSR –** Medium Intensity Approach Lighting System and Runway Alignment Indicator Lights (MALSR) is an approach lighting system that compliments an Instrument Landing System (ILS) in helping pilots visually identify the centerline of the runway prior to its threshold. MALSR and other approach lighting systems installed on the approach end of a runway vary based upon the needs and requirements of an airport, its users, and the FAA. Typically, MALSRs are installed for Category I ILS approaches while ALSFs are installed for ILS Category II and III approaches. The MALSRs on the approach ends of Runway 16 and Runway 34 appear adequate to meet the approach lighting demands throughout the planning period. Consideration should be given to the installation of an ALSF-2 approach lighting system should the ILSs be upgraded to a Category II approach or the minimum approach visibility and cloud ceiling height criterion are reduced below 1/2 mile and 200 feet above ground level (AGL).

- **VASI –** Visual Approach Slope Indicators (VASIs) are another form of approach lighting systems that indicate the correct glide path to pilots through a combination of red and white lights. VASI installations may consist of 2, 4, 6, 12, or 16 lights arranged in sets of two or three bars, depending on whether an additional visual glide path is necessary to accommodate high cockpit aircraft. Though increased operations are anticipated throughout the planning period by aircraft with cockpits that are higher off the ground than the current fleet mix, no changes are anticipated to the two-bar, four light VASI unit installed on the approach end of Runway 34.

- **PAPI –** Precision Approach Path Indicators (PAPIs) are similar to VASIs as they provide the correct glide path to pilots through a more simplified combination of red and white lights. Arranged in a single row of either two- or four-light units, they convey the same information as a VASI and are typically a less costly visual glide path indicator solution. The four-light PAPI unit installed on the approach end of Runway 16 meets standards and no improvements to the visual guidance approach lighting system are anticipated. Consideration should be given to upgrade to a PAPI, replacing the VASI on Runway 34 when it approaches the end of its serviceable life.

- **Runway Edge Lighting –** High intensity runway lighting (HIRL) installed on Runway 16/34 offers five intensity light settings and the greatest illumination intensity of available runway lighting systems. When the ATCT is closed, pilots can remotely control the intensity of the lights through a series of microphone keys on the Common Traffic Advisory Frequency (CTAF). Given the seven-and-a-half-hour period the control tower is closed each evening and the requirement that runways with instrument approaches must be equipped with medium- or high-intensity lighting, maintaining the HIRL lighting system is anticipated. The existing HIRL system is quite old and in generally poor condition. It is recommended the HIRL system be replaced as part of any runway reconstruction or relocation project in the near future.

  Longitudinal spacing between runway edge light units must not exceed 200 feet as directed in FAA AC 150/5340-30F, *Design and Installation Details for Airport Visual Aids*. In instances where a connecting taxiway or other pavement surface impedes the placement of an edge light, an in-pavement light must be installed. Currently at the Airport, the runway edge lighting system is outdated and in need of replacement as a result of deterioration that has occurred to aging system components. In addition, a non-compliance issue exists with runway edge lighting since there are several locations at runway/taxiway intersections where in-pavement edge lights should be present and are missing. In anticipation of a major reconstruction or relocation of the runway, the Airport has postponed the installation of these fixtures given the high cost of the project and the likelihood that lights may need to be removed if the runway is relocated. It is recommended that as a part of any future runway reconstruction or relocation project that the installation of in-pavement HIRL edge lights be considered at locations where runway/taxiway intersection pavement is present 200 feet from the next adjacent light.

- **Runway Centerline Lighting –** Runway centerline lights are installed on some precision approach runways to facilitate landings, rollouts, and takeoffs under low visibility weather conditions. Required for runways with ILS Category II and III approaches, centerline lighting is also required for ILS Category I runways when landing operations are conducted below 2,400 feet Runway Visual Range (RVR). Though instrument approaches to Runway 34 may be conducted when the visibility is no less than a 1/2 mile, aircraft equipped and utilizing a flight director, autopilot, or heads up display may fly the ILS or localizer published approach to a decision height of 200 feet AGL when the RVR is no less than 1,800 feet. Though no changes are necessary to existing runway centerline lighting to meet existing published instrument approach requirements or those meeting ILS Category II or III criteria, replacement of the electrical components of the system are recommended since the lighting equipment is outdated, requires high maintenance, and is inefficient since power distributed through the underground cabling is lost due to the age and deterioration of the system.

- **Runway Touchdown Zone Lighting –** As with centerline lighting, runway touchdown zone (TDZ) lighting is required for ILS Category II and III runways and ILS Category I runways when used for landing operations below 2,400 feet RVR. Since instrument approaches can be conducted on Runway 34 when RVR is no less than 1,800 feet if aircraft are equipped with a flight director, autopilot, or heads up display and can visually locate the runway at 200 feet AGL, TDZ lighting is installed on the approach end of this runway. Consideration should also be given to installing TDZ lighting on Runway 16 should the Category I ILS be upgraded or Category II and III approaches be developed as a result of future improvements to satellite-based navigation technology.

- **Airfield Pavement Markings –** Airfield pavement markings are applied to runways, taxiways, and apron surfaces to provide location and navigational information to pilots and ground vehicle operators. Markings indicate the location to hold short of a runway and its associated safety area, provides turn guidance for aircraft maneuvering taxiway intersections, and identifies the boundary of the movement/non-movement area. Pavement markings applied to runways provide pilots with visual and perceptional cues about its designation, threshold location, centerline, and aiming point and vary based on the type of runway approach. Runways that support precision instrument approaches are required to include runway designation markings, centerlines, threshold markings, aiming point marking, touchdown zone markings, and side stripes. Runway

16/34 meets these marking requirements; only routine maintenance is anticipated throughout the planning period to ensure markings meet reflectivity standards for reduced visibility and nighttime conditions.

- **Airfield Signage –** Airfield signage complements pavement markings by providing locational and directional information to pilots and ground vehicle operators maneuvering on an airfield. Signage found on an airfield includes runway hold position signs, runway distance remaining signs, taxiway location signs, taxiway direction signs, and destination signs. A review of existing airfield signage found that improvements are needed to bring all airfield signage up to standards addressed in AC 150/5340-18F, *Standards for Airport Sign Systems*. As a result of the reduced separation between Runway 16/34 and the parallel taxiway, several mandatory hold signs have been placed in locations. These hold signs are not compliant with standards identified in FAA AC 150/5340-18F, *Standards for Airport Sign Systems*, which state that signs must be adjacent to the pavement hold markings. It should be noted that while the hold line markings in some places have been angled or adjusted to help account for the decreased separation between the runway and parallel taxiway, the hold signs have never been moved to correspond with the relocated pavement markings. Installation of an additional mandatory runway hold sign on Taxiway A at the approach end of Runway 34 (on the south side of the intersection) and replacement of the remaining mandatory runway hold signs (with panels that have black borders around the white legends) is needed to meet FAA standards. Replacement of panels for the remaining guidance signs that are experiencing de-lamination of the retro-reflective background is also recommended to improve visibility during nighttime and low-visibility weather conditions.

- **Taxiway Edge Lighting –** Taxiway edge lighting is used as a navigational tool by pilots and ground vehicle operators to help delineate the edge of the surface when conditions limit visibility such as during night and in inclement weather. Medium Intensity Taxiway Lighting (MITL) systems are recommended for airports with commercial airline service since they offer three illumination intensity settings. Since the existing airfield lighting system is outdated and requires frequent maintenance, replacement of aging and inefficient electrical components is recommended to improve taxiway edge lighting at the Airport. It should also be noted that the eventual conversion of all taxiway lights to more energy efficient Light-Emitting Diode (LED) fixtures could help reduce energy usage which in turn could reduce airfield operating expenses.

Weather Equipment – Adverse weather has a significant impact on airport operations as it can affect efficiency, capacity, and safety. It is important airports install appropriate weather reporting equipment specific to the operational needs and the atmospheric characteristics of the surrounding environment. The employment of specific types of weather reporting equipment capable of accurately reporting existing weather conditions is essential in some instances for an airport to gain precision instrument approaches, such as those offered by Category II and III minima.

Existing weather equipment installed at the Airport meets the accuracy of weather reporting required for aircraft to conduct Category I, II, and III instrument approaches as well as conduct departures in low visibility/low cloud ceiling conditions. The existing ASOS with Runway Visual Range (RVR) instrumentation offers a level of accuracy to report the visibility in feet below a half mile which is critical for pilots operating in Instrument Flight Rules (IFR) conditions. CAT II/III operations will require the installation of a third RVR sensor, in a midfield location to complement the touchdown and rollout sensors required. The Low Level Wind Shear Alert System (LLWAS) installed around the proximity of the Airport also offers an additional method for reporting local wind conditions especially when wind shear and downdraft phenomenon are present. Additionally, an installed SCAN Web weather system offers a complementary method for Airport personnel to obtain information on local weather conditions as well as determine environmental information about the runway surface. In-pavement sensors detecting and measure such environmental elements such as pavement surface temperatures, moisture, snow, ice, and deicing and anti-icing chemicals that are present.

Though it appears the instrumentation of existing weather equipment is sufficient to meet demand throughout the planning period, consideration should be given to relocate the ASOS unit. The distance of the equipment to the taxiway has been a concern for the wingtip clearances of larger aircraft such as the Boeing 767 and 747 that occasionally conduct operations at the Airport. Also, the National Weather Service (NWS) has noted that the close proximity of the ASOS to the taxiway is possibly affecting temperature readings as a result of heat being reflected off the paved surface. At the time of the ASOS unit installation, the topography of the Airport limited locations for its placement; ongoing work with the west side fill project will create additional airside land that may offer a more suitable location for the ASOS unit. It is recommended an evaluation be conducted to find a more desirable site for the ASOS unit that is well situated away from the aircraft wingtip clearance distances of larger aircraft, is not affected by radiating heat from concrete or asphalt surfaces, and is located near the touchdown zone of the runway. FAA Order 6560.20B, *Siting Criteria for Automated Weather Observing Systems (AWOS),* offers guidance on siting weather observing equipment so that sensors are not influenced by artificial conditions such as large structures, cooling towers, and expanses of concrete and tarmac. It should be noted that these general siting requirements apply to an ASOS as well. While each ASOS sensor (wind, temperature, cloud ceiling, etc.) has specific siting requirements, all ASOS sensors should be located together and outside of runway and taxiway object-free areas. Generally ASOS sensors are best placed between 1,000 and 3,000 feet from the primary runway threshold and between 500 and 1,000 feet from the runway centerline.

Consideration should also be given by the FAA to relocate its LLWAS tower directly west of the Airport. The tower may be an obstruction for the proposed temporary runway and its location on private property may interfere with future development plans of that property. Since the Airport is prone to low-level wind shear as a result of the surrounding mountainous topography, accurate and timely warnings to ensure passenger safety and comfort during takeoff and landing is necessary; therefore, it is recommended that the FAA-owned LLWAS be maintained. It is recommended that the FAA evaluate relocating the tower to a place that does not penetrate FAR Part 77 surfaces and does not interfere with future land use development plans around the Airport. .

4.3 Terminal Area Requirements

In addition to airside elements, a review of the facility needs in the terminal area was also conducted as a part of this master plan study. Terminal area elements that were assessed include the terminal gates and apron, terminal building, landside vehicular access, and vehicle parking. For the purposes of this master plan, the terminal area review is organized in the following four elements:

- 4.3.a Terminal Gate & Apron Requirements
- 4.3.b Terminal Building Requirements
- 4.3.c Landside Access Requirements
- 4.3.d Vehicle Parking Requirements

4.3.a Terminal Gate & Apron Requirements

The number of gates needed to support forecasted activity is a critical element in determining the overall size and configuration of the terminal complex. A gate is defined as an aircraft parking position near the terminal that is used on a daily basis for the loading and unloading of passengers. The Airport is currently in process of replacing the loading devices and installing passenger boarding devices for Gates 4, 5, and 6. This project will also include a slight reconfiguration of lead-in lines and parking positions for all the gates at the terminal. **Figure 4-12** depicts the terminal apron parking configuration after the passenger boarding bridge replacement project is complete.

Figure 4-12: Terminal Apron Aircraft Layout

Source: Mead & Hunt, Inc.

Terminal Apron – The terminal apron aircraft parking layout can typically accommodate 9 aircraft parking positions for the fleet mix that operates at the Airport shown as blue in **Figure 4-12**. Parking positions 1 and 7 are typically used last as they do not have loading bridges, involve ramp loading and unloading, and require passengers to walk some distances across the apron. Parking position 8 in the corner of the apron is used primarily for remote parking and is not typically used for the loading or unloading of passengers. Therefore, there are eight gate positions and one remote aircraft parking position on the terminal apron.

Delta Air Lines typically utilizes the single loading bridge at Gate 3 to service two regional jet parking positions. Alternatively, Gate 3 space can be used by a single Boeing 737/Airbus A320 narrow body. Gates 4/5 and 6/7 can also accommodate larger aircraft, typically replacing two smaller aircraft with the one larger aircraft. These alternative aircraft positions are shown in yellow on Figure 4-12. **Table 4-15** summarizes the aircraft parking by gate, after the completion of the upcoming passenger boarding bridge replacement project.

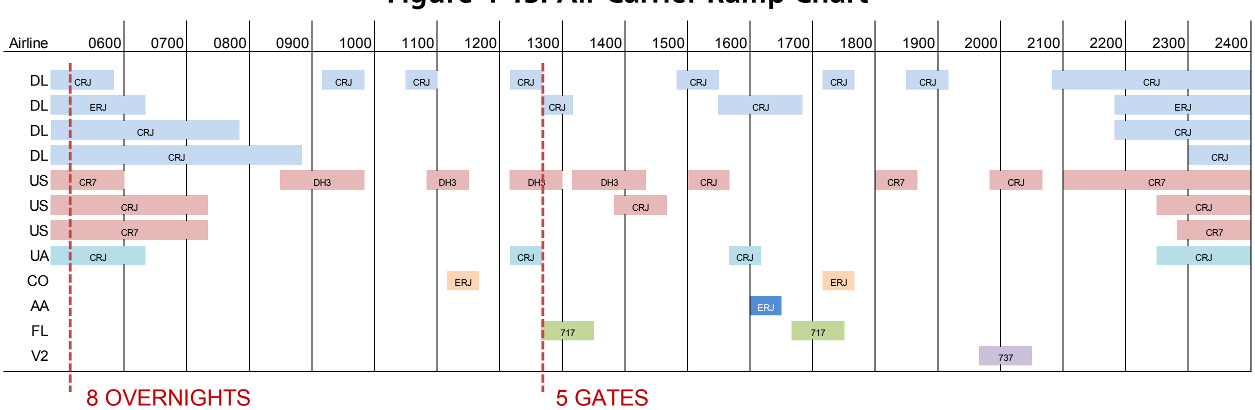
Table 4-15: Aircraft Parking by Gate / Position

Gate / Position	Aircraft Types
1	B757 at remote parking position stand
2	B737 (all series)
3 & 3A	(2) CRJ 900; or (1) B737 (all series)
4	(1) MD80; or (1) B737; however Gate 5 will be closed for aircraft over MD80 in size at Gate 4
5	(1) MD80; or (1) B737; however Gate 4 will be closed for aircraft over MD80 in size at Gate 5
6	B737 (all series); or (1) B757; however parking position 7 will be closed for B757
7	B737 (all series)
8 (remote)	B737 (all series)

Note: Gates can typically accommodate aircraft type noted above and all aircraft with smaller wingspans.
Source: RS&H PBB Replacement B-Gates Layout Plan
Mead & Hunt, Inc.

The size of the terminal apron should be able to accommodate the fleet mix of commercial aircraft types present during periods where the demand for space is at its greatest. **Figure 4-13** depicts the peak month (July 2011) airline schedule depicted as a ramp chart by carrier. This ramp chart shows a bar for each aircraft at the Airport plotted with time, showing when each aircraft arrives and departs, which indicates when it is occupying a gate or parking position on the airline parking apron.

Figure 4-13: Air Carrier Ramp Chart



Source: Asheville Regional Airport

The greatest demand for terminal apron space occurs during the overnight period when aircraft from the final arriving flights of the day are parked and staged for departure the following morning. Remain overnight (RON) aircraft parking during the peak month of July are presented in the air carrier ramp chart. As shown in Figure 4-13, airlines schedule eight overnight aircraft. It should also be noted that the Airport experiences occasional RON charter flights that are not included in the ramp chart of scheduled passenger activity.

The forecasted demand for RON aircraft parking on the terminal apron through 2030 is presented in **Table 4-16**. It is assumed that the total number of typical day departures is directly proportional to the total number of annual scheduled passenger aircraft departures. The total number of daily departures by aircraft type was projected along with the number of daily RON aircraft. Using the demand for RON aircraft parking on a typical Sunday in the peak month of July 2011 as a benchmark, the projected demand for RON aircraft parking by aircraft type was extrapolated from the projected typical daily departures.

Table 4-16: Projected RON Aircraft Parking Demand

			2011	2015	2020	2025	2030
		Annual Enplanements:	362,295	410,793	446,328	484,937	526,886
		Total Annual Scheduled Passenger Aircraft Departures:	9,368	9,321	9,699	9,791	10,158
		Peak Month Typical Day (PMTD) Departures:	34	34	35	36	37
Seats	**Typical Aircraft**						
Less than 40	SAAB 340, Dornier 328, ERJ-135, Beech 1900, EMB-120, DHC-8	Projected Annual Departures:	131	0	0	0	0
		Projected PMTD Departures:	*0.5*	*0*	*0*	*0*	*0*
		Daily RON Aircraft:	**0**	**0**	**0**	**0**	**0**
40-60	CRJ-200, ERJ-140, ERJ-145, DHC-8-300	Projected Annual Departures:	8,271	7,942	7,497	6,472	6,054
		Projected PMTD Departures:	*30.0*	*28.8*	*27.2*	*23.5*	*22.0*
		Daily RON Aircraft:	**6**	**6**	**5**	**4**	**4**
61-99	Avro RJ, CRJ-700, CRJ-900, ERJ-170, ERJ-175	Projected Annual Departures:	627	811	1,513	2,360	2,915
		Projected PMTD Departures:	*2.3*	*2.9*	*5.5*	*8.6*	*10.6*
		Daily RON Aircraft:	**2**	**1**	**2**	**2**	**3**
100-130	717, DC-9, ERJ-190, ERJ-195, A319	Projected Annual Departures:	272	466	533	656	772
		Projected PMTD Departures:	*1.0*	*1.7*	*1.9*	*2.4*	*2.8*
		Daily RON Aircraft:	**0**	**1**	**1**	**1**	**1**
131-150	A320, MD-81/82/83/87/88, 737-400, 737-500	Projected Annual Departures:	67	103	155	206	284
		Projected PMTD Departures:	*0.2*	*0.4*	*0.6*	*0.7*	*1.0*
		Daily RON Aircraft:	**0**	**0**	**0**	**1**	**1**
151 or more	MD-90, 737-800, 737-900, 757-200	Projected Annual Departures:	0	0	0	98	152
		Projected PMTD Departures:	*-*	*0.0*	*0.0*	*0.4*	*0.6*
		Daily RON Aircraft:	**0**	**0**	**0**	**0**	**0**
		TOTAL RON AIRCRAFT:	**8**	**8**	**8**	**8**	**9**
		Percent of Total Average Daily Depatures:	***23.5%***	***23.5%***	***23.5%***	***23.5%***	***23.5%***

Projections: Mead & Hunt, Inc. (2012)

As illustrated in Table 4-16, the total number of daily RON aircraft is not expected to significantly increase through the planning period; however, the fleet mix of RON aircraft is anticipated to change. The projected growth rate in scheduled passenger departures is less than the predicted growth rate in the number of overall passengers primarily due to projected increases in average aircraft sizes and load factors. Even with significant passenger growth, only modest growth is expected in scheduled passenger departures and RON aircraft. Therefore, it is anticipated that daily RON aircraft in 2030 (with nearly 527,000 enplanements), will consist of nine aircraft, which is an increase over current airline schedules.

Additionally it is desirable for the terminal apron to be sized to accommodate at least one or two additional aircraft beyond those projected to accommodate late arriving or departing flights, changes in airline flight schedules, charter activity, a new entrant service carrier, or aircraft diversions from other airports due to weather. Therefore, the Airport should plan to accommodate at least 10 or 11 RON aircraft parking positions. The existing terminal apron accommodates nine aircraft, indicating that planning should be initiated for at least one or two additional parking positions.

Terminal Gates – In addition to RON aircraft parking, terminal gate demand during peak activity hours was also evaluated. As noted previously, there are currently eight gate positions, but only five loading bridges. The loading bridge at Gate 3 is typically used by Delta Air Lines to serve two regional jet parking positions. As was shown on the airline ramp chart, the peak gate demand outside of RON aircraft parking occurs around 12:30 p.m. when there are five gates used simultaneously. However, it should be noted US Airways only has one gate occupied during this period, but at another times during the day has two gates occupied simultaneously. Additionally, there are some airlines that are not represented in the peak hour such as Continental/United Airlines and American Airlines that also require gate facilities and RON charter flights, typically during peak months of activity. As shared or common use gate facilities become more commonplace in the industry, these carriers could utilize an unoccupied gate assigned to another carrier provided flights and boarding gate occupancy times do not overlap. To determine the required number of peak hour gates, **Table 4-17** illustrates an analysis similar to the forecasted RON aircraft parking demand to determine gate demands through 2030.

Table 4-17: Projected Peak Hour Aircraft Gate Demand

Seats	Typical Aircraft		2011	2015	2020	2025	2030
		Annual Enplanements:	362,295	410,793	446,328	484,937	526,886
		Total Annual Scheduled Passenger Aircraft Departures:	9,368	9,321	9,699	9,791	10,158
		Peak Month Typical Day (PMTD) Departures:	34	34	35	36	37
Less than 40	SAAB 340, Dornier 328, ERJ-135, Beech 1900, EMB-120, DHC-8	Projected Annual Departures:	131	0	0	0	0
		Projected PMTD Departures:	*0.5*	*0*	*0*	*0*	*0*
		Peak Hour Gate Demand:	**0**	**0**	**0**	**0**	**0**
40-60	CRJ-200, ERJ-140, ERJ-145, DHC-8-300	Projected Annual Departures:	8,271	7,942	7,497	6,472	6,054
		Projected PMTD Departures:	*30.0*	*28.8*	*27.2*	*23.5*	*22.0*
		Peak Hour Gate Demand:	**4**	**3**	**3**	**3**	**2**
61-99	Avro RJ, CRJ-700, CRJ-900, ERJ-170, ERJ-175	Projected Annual Departures:	627	811	1,513	2,360	2,915
		Projected PMTD Departures:	*2.3*	*2.9*	*5.5*	*8.6*	*10.6*
		Peak Hour Gate Demand:	**0**	**1**	**1**	**1**	**1**
100-130	717, DC-9, ERJ-190, ERJ-195, A319	Projected Annual Departures:	272	466	533	656	772
		Projected PMTD Departures:	*1.0*	*1.7*	*1.9*	*2.4*	*2.8*
		Peak Hour Gate Demand:	**1**	**1**	**1**	**1**	**1**
131-150	A320, MD-81/82/83/87/88, 737-400, 737-500	Projected Annual Departures:	67	103	155	206	284
		Projected PMTD Departures:	*0.2*	*0.4*	*0.6*	*0.7*	*1.0*
		Peak Hour Gate Demand:	**0**	**0**	**0**	**0**	**1**
151 or more	MD-90, 737-800, 737-900, 757-200	Projected Annual Departures:	0	0	0	98	152
		Projected PMTD Departures:	-	*0.0*	*0.0*	*0.4*	*0.6*
		Peak Hour Gate Demand:	**0**	**0**	**0**	**0**	**0**
		Total Peak Hour Gate Demand:	**5**	**5**	**5**	**5**	**5**
		Percent of Total Average Daily Depatures:	***14.7%***	***14.7%***	***14.7%***	***14.7%***	***14.7%***

Projections: Mead & Hunt, Inc. (2012)

As illustrated in the table, the peak gate demand is not anticipated to significantly increase through the planning period; however, the fleet mix of the aircraft is anticipated to change. Due to the fact that airline schedules are constantly changing, and considering a shared or common use approach can help to more effectively meet boarding gate demand, it is recommended that planning be initiated for at least two or three additional gates beyond projected demand. These additional gates will accommodate various carriers' equipment, changes in airline flight schedules, late arriving or departing flights, charter activity, a new entrant service carrier, and aircraft diversions from other airports for weather or other reasons. Therefore, for terminal and space planning purposes, the airport should plan to have at least six to eight gates through the planning period. The existing terminal has 8 gate parking positions but only 5 loading bridges and hold rooms, indicating that planning should occur for at least one to three additional gates and hold rooms.

4.3.b Terminal Building Requirements

The 102,588 square foot terminal building space at the Airport consists of seven boarding gates, five passenger boarding bridges, two baggage claim devices, a single security checkpoint, airline and rental car spaces, Transportation Security Administration (TSA) offices, concessions spaces, and other ancillary spaces. This master plan study does not include a detailed space programming study of the individual components within the terminal building facility, but it does include an assessment and planning for overall gross terminal building space needs.

The 2005 Terminal Area Planning Study included a detailed assessment of the terminal building and its various functional areas. Terminal facility needs are generally a function of peak passenger demands placed upon the facility. The total terminal gross area recommended by the 2005 Terminal Area Planning Study for various total peak hour passenger levels is depicted in **Table 4-18**. Total gross terminal building space needs were developed using the total peak hour passenger projections from this Master Plan and interpolating between the peak hour passenger levels and terminal building space needs from the prior master plan study.

Table 4-18: Projected Terminal Building Space Needs

2005 Terminal Area Planning Study Findings					
Peak Hour Total Passengers		360	460	540	670
Total Gross Terminal Area Recommended (SF)		91,300	106,800	115,900	132,899
Master Plan Projections	**2010**	**2015**	**2020**	**2025**	**2030**
Annual Enplanements	369,576	410,793	446,328	484,937	526,886
Peak Hour Total Passengers	436	465	502	545	593
Total Gross Terminal Area Recommended (SF)*	102,247	106,091	110,996	116,695	123,058
Approximate Existing Terminal Facilities (SF)	102,588				
Terminal Facilities Surplus (+) / Deficiency (-) (SF)	341	(3,503)	(8,408)	(14,107)	(20,473)

Note: *Interpolated from 2005 Terminal Area Planning Study Findings
Source: 2005 Terminal Area Planning Study Findings
Mead & Hunt, Inc.

As shown in the projected terminal building space needs table, the existing terminal building will require an expansion of approximately 20,500 square feet through the planning period.

4.3.c Landside Access Requirements

Landside vehicular access to the Airport was also reviewed as a part of the master planning study. In addition to on-Airport roadways and traffic circulation around the terminal area, access to the Airport from major regional traffic arteries was also evaluated to determine if roadway infrastructure improvements are needed. Below are the findings:

Existing Landside Access Roadways – As stated in Chapter 2, the Airport is located adjacent to the intersection of North Carolina Route 280 and Interstate 26, with three access points located along North Carolina Route 280. South of the intersection of North Carolina Route 280 and Interstate 26, Aviation Way provides access to the general aviation area while approximately 1/2 mile south, Terminal Drive provides access to the terminal, passenger parking, and rental car areas. An exit ramp to Terminal Drive from North Carolina Route 280 directly south of the Aviation Way intersection provides an additional entrance to the terminal area for southbound traffic on North Carolina Route 280.

Terminal area traffic is circulated on Terminal Drive from North Carolina Route 280 around the short- and long-term vehicle parking lots to the front of the terminal building. Terminal Drive continues adjacent to the employee lot, rental car ready/return lot, and consolidated rental car service facility until it is joined up again with North Carolina Route 280. Wright Brothers Way, which intersects Aviation Way, provides access to the general aviation area including the air cargo facility occupied by US Airways, the Landmark Aviation fixed base operator (FBO), and fuel farm adjacent to the approach end of Runway 16.

Off-Airport Access – Overall, the Airport is well situated in close proximity to Interstate 26 which is the major north-south traffic artery in the region. In combination with other major east-west traffic arteries that intersect Interstate 26 such as Interstate 40, U.S. Route 64, and U.S. Route 74, most of the eleven county service area has sufficient access to the Airport. It appears no highway infrastructure improvements in the region are needed for the community to more efficiently access the Airport.

It should be noted that the North Carolina Department of Transportation (NCDOT) issued a request for proposal (RFP) in 2011 to re-design the Interstate 26/North Carolina Route 280 interchange to a diverging diamond design with construction planned for 2013. As a result of the modifications needed to alter North Carolina Route 280 for this type of interchange, access to the general aviation area from Aviation Way may be impacted. It is recommended Airport staff work with the NCDOT during the design and construction of this interchange to prevent and/or limit potential roadway access impacts to the Airport.

On-Airport Access – The existing network of on-Airport roadways appears sufficient in providing adequate access to destinations on the east side of the airfield. Recent improvements to Wright Brothers Way that included rehabilitation, widening, and extension appear adequate to meet the existing and future landside access needs of the general aviation area. Further extension of this roadway to the north will likely be needed to support development at the north general aviation area site. Improvements to the roadway leading to the fuel farm adjacent to the approach end of Runway 16 is needed to support the increase in traffic to and from the fuel farm and to allow adequate separation between passing vehicles.

The existing network of roadways on the east side of the Airport is considered to be in good condition as a result of recent improvements to Wright Brothers Way and a resurfacing of Terminal Drive. While it is not anticipated that significant roadway improvements will be needed over the planning period other than preventative maintenance such as crack sealing and seal coating, consideration should also be given to add a dedicated right turn lane on Terminal Drive at the intersection of North Carolina Route 280 for traffic exiting the Airport. A dedicated right turn lane will help to alleviate congestion and traffic backups at this intersection by separating right turn traffic from the existing two lanes that permit a left turn.

Roadway and access improvements will also be needed on the west side of the airfield should it be developed for future aeronautical and non-aeronautical uses. Currently, Old Fanning Bridge Road is scheduled to be improved with a pavement overlay and paved shoulders. It also will be equipped a high pressure water main and a roundabout at the intersection of Westfeldt Road, that will serve the new Sierra Nevada Brewery site, which is under construction. Access roads leading to the planned roundabout on Old Fanning Bridge Road and/or Pinner Road to the north should be considered pending as they are dependent on the location of future development.

Terminal Area Traffic Circulation –The Institute of Transportation Engineers (ITE) published a formula used to calculate the average level of daily traffic associated with passengers arriving and departing from an airport. The formula, $Y = 7.395(x)^{0.8526}$, is based on the number of average daily arriving and departing passengers (x) to calculate the average level of daily traffic at an Airport. **Table 4-19** illustrates the projected level of average daily traffic at the Airport based on enplanement projects presented in Chapter 3.

Table 4-19: Projected Airport Vehicle Traffic Calculations

Year	Enplanements	Average Daily Arriving/Departing Passengers	Average Daily Traffic	Trips Per Passenger
2010	378,087	1,036	2,753	2.66
2015	410,793	1,125	2,954	2.63
2020	446,328	1,219	3,163	2.59
2025	484,937	1,329	3,405	2.56
2030	526,886	1,444	3,654	2.53

Sources: Airport Trip Generation, *ITE Journal* (May 1998), Vol. 68, Page 26; Mead & Hunt, Inc.

As illustrated in the table, the average level of daily traffic from 2010 to 2030 is anticipated to increase approximately 33 percent, which will affect traffic circulation. Typically, the optimal service level of a road is 1,000 vehicles per hour per lane, depending on the speed limit and number of vehicles exiting and changing lanes on the roadway. Given the three through traffic lanes in front of the terminal building, it appears the existing roadway network is more than adequate to accommodate traffic circulation demand throughout the planning period

As noted, Terminal Drive is a one-way continuous loop that requires entering traffic to navigate the entire roadway before exiting at desired destination. This direction of traffic circulation most particularly impacts the transfer of rental vehicles from the consolidated rental car service center to the rental car ready/return lot. It requires vehicles to navigate the entire roadway, often resulting in additional congestion in front of the terminal building during peak periods of activity. Development of a new roadway that creates a direct route from the consolidated rental car service center to the rental car ready/return lot to the would eliminate the need for serviced rental cars to pass in front of the terminal building, reducing congestion during peak periods and improving traffic circulation.

Also in an effort to reduce congestion in front of the terminal building, a dedicated commercial vehicle lane or curb lane for taxis and limousines is recommended to separate these activities from circulating traffic. Currently, taxis, limousines, and vans that are dropping off or waiting to pick up passengers are required to park in front of the terminal in designated locations that are adjacent to the terminal entrances. Particularly during peak hours, taxis, limousines, and vans may be blocked not only by pedestrian traffic entering or exiting the terminal, but also by personal vehicles that are dropping off or picking up passengers. Often, this restricts the arrival and departure of commercial ground transportation vehicles and results in temporarily parked personal vehicles on the through lanes of traffic. Development of a commercial vehicle lane or curb away from the front of the terminal building will help to reduce congestion by separating taxi, limousine, and shuttle van vehicles from pedestrian and personal vehicle traffic in front of the terminal building.

4.3.d Vehicle Parking Requirements

Walker Parking Consultants was selected as a part of the master plan project team to conduct an assessment of vehicle parking at the Airport that assures adequate, convenient parking is available throughout the planning period as enplanements and facilities grow. In addition, an evaluation of employee parking and rental car ready/return parking needs was conducted to determine if future expansion of these lots will be necessary. The basis of these analyses involved benchmarking past and current relationships between parking demand and originating enplanements to project future parking demand based on anticipated levels of enplanements.

Parking Supply – There are currently 1,469 spaces available for public parking in the short term lot (193 spaces), the long term lot (752 spaces), the long term overflow lots (520 spaces), and at the maintenance facility (four spaces). There is also a Cell Phone Lot available for vehicles awaiting arriving passengers that contains 48 spaces. Employee parking is currently provided in the upper employee lot (87 spaces), the lower employee lot (240 spaces), the Greater Asheville Regional Airport Authority lot (34 spaces), the Department of Public Safety (DPS) lot (six spaces), and at the maintenance facility (14 spaces), for a total of 381 parking spaces. Rental car ready/return spaces are provided in a separate lot immediately south of the terminal which provide 107 spaces for the six agencies operating on the Airport while 578 spaces are available for the servicing of vehicles at the Consolidated Rental Car Service Facility. All the parking lots at the Airport are within walking distance to the terminal and no shuttle buses are needed. **Table 4-20** summarizes the current parking supply at the Airport.

Table 4-20: Existing Parking Supply

Parking Lot	Spaces	Fee
Public Parking		
Short Term	193	$1 first 30 min, $1 each additional 30 min.; $12 daily maximum
Long Term	752	$1.50 first hour, $1 each additional hour; $8 daily maximum; $48 weekly maximum
Long Term Overflow	520	Same as long term
Visitors @ Maintenance Facility	4	No fee
Subtotal Public	**1,469**	
Employee Parking		
Lower Employee	240	n/a
Upper Employee	87	n/a
Airport Authority	34	n/a
DPS	6	n/a
Maintenance Facility	14	n/a
Subtotal Employee	**381**	
Rental Cars		
Ready/Return	107	n/a
Consolidated Service Facility	578	n/a
Subtotal Rental Cars	**685**	
Other		
Cell Phone Waiting	48	No fee
AIRPORT TOTAL	**2,583**	

Source: Walker Parking Consultants

Public Parking Demand – Parking demand at an airport is normally expressed as a ratio of spaces required per 1,000 annual originating enplanements. Walker Parking Consultants recommends an approach where a "design day" is chosen. This "design day" should be a typical day with a high level of passenger activity and smooth and normal operations, but not necessarily the peak day of activity.

Like most systems, a parking system runs most efficiently when it is at 85 percent to 95 percent of capacity. The allowance of 5 percent to 15 percent of spaces allows for the dynamics of cars moving into and out of spaces, reduces search time for a space, and allows for temporary loss of spaces due to minor construction, snow cover, or unforeseen circumstances. Ideally, this cushion can also accommodate parking on days which are busier than the design day. On those extremely busy days, there should still be a space for everyone, but the cushion will be very small and parking space search times will be higher. **Table 4-21** presents the parking occupancy counts for September 2010 through December 2011. During that timeframe, the peak month of enplanements and the peak 2:00 p.m. occupancy count of the long term lot occurred during July 2011.

Table 4-21: Occupancy of the Public Parking Lots

Month	Enplanements	Short Term		Long Term		
		Average Overnight	Maximum Overnight	Average Overnight	Maximum Overnight	Maximum 2:00 p.m.
2010						
September	34,250	90	120	831	935	1,066
October	39,034	76	115	763	915	1,022
November	31,061	68	106	646	1,059	1,069
December	26,919	57	119	551	880	875
2011						
January	21,093	57	121	488	685	764
February	19,453	65	113	553	691	801
March	24,796	69	107	607	716	807
April	27,379	63	110	620	733	846
May	31,711	68	112	645	759	983
June	38,080	74	109	740	883	1,025
July	41,409	67	114	722	809	1,173
August	38,646	69	108	696	855	1,005
September	32,503	77	121	717	844	966
October	36,530	70	109	683	845	923
November	30,850	70	122	644	1,064	1,099
December	28,522	57	124	603	994	1,039

Note: July 2011 highest month of enplanements and parking demand
Source: Walker Parking Consultants

The 2:00 p.m. occupancy of the long term lot is considered by Airport staff to be the approximate daily peak. In the short term lot, no comparable daily counts were taken. Airport staff estimates that the short term lot is approximately 70 percent full on a normal busy day, or 135 spaces are occupied. Therefore, the total public parking demand at present is estimated at 1,308 spaces.

Walker Parking Consultants recommends that a conservative approach be used in determining the design day for parking at the Airport, and thus the parking demand ratio. While many Airport facilities are designed for the average day of the peak month (ADPM), it is recommended that the parking system be designed for the peak day of the peak month (PDPM). The reasons for this recommendation are as follows:

- The peak day of the peak month of enplanements does not represent the peak day of the year. For example, the parking demand on a holiday weekend may be higher than the busiest day in July.
- The history of enplanements at the Airport has fluctuated over the years, so it is necessary the Airport remains flexible in order to accommodate demand when enplanements increase.
- If a low-cost carrier (LCC) enters the market or enplanements on LCCs increase, the parking demand at Airport may grow more quickly than enplanements.

The current PDPM parking demand at the Airport is estimated to be 1,308 spaces. A cushion of 10 percent is added to this demand so that the system operates efficiently on the design day. On days that are busier than the design day, the cushion becomes smaller as the demand for parking increases. The demand for parking including a 10 percent cushion is therefore calculated as 1,308/0.90 = 1,453. When compared to 2011 annual enplanements, the public parking demand ratio is 1,453/370.972 = 3.92 spaces per 1,000 annual originating enplanements.

This ratio is applied to the forecast enplanements throughout the planning period as shown in **Table 4-22**. This calculation results in a small 2010 public parking deficit of 17 spaces, growing to a deficit of 145 spaces in 2015 and eventually to 600 spaces in 2030.

Table 4-22: Public Parking Demand Projections

Year	Enplanements	Demand Ratio per 1,000 Enplanements	Projected Demand	Parking Capacity	Surplus/Deficit
2010	378,087	3.92	1,482	1,465	- 17
2015	410,793	3.92	1,610	1,465	- 145
2020	446,328	3.92	1,750	1,465	- 285
2025	484,937	3.92	1,901	1,465	- 436
2030	526,886	3.92	2,065	1,465	- 600

Notes:
Parking demand ration includes 10 percent cushion.
Parking capacity includes short-term lot, long-term lot, and long-term overflow lot.
Visitor spaces at maintenance lot were not included in the parking capacity total.
Source: Walker Parking Consultants

It should be noted that the parking demand ratio can be measured with some precision for any particular year as long as the proper data is collected. However, it is not a static number, although it has been treated as such in the projections because the nature of airline passengers can change over time due to a number of factors. For example, if enplanements on LCCs comprise of a large portion of the increase in enplanements at the Airport, the parking demand may increase more quickly than enplanements for reasons stated previously. Therefore, it is good practice to check this calculation each year to track trends, and adjust accordingly to changing patterns.

It should also be noted that the above calculation is quantitative, not qualitative; in other words, there may be enough parking, but it may not provide the level of customer service desired by the Airport. It is also noted that a large percentage of patrons in the short term lot are daily or long term parkers. The average overnight inventory is about 70 spaces occupied and the monthly maximum is about 115 spaces. Consideration should be given to raise the daily maximum rate in the short term lot so that long term parkers are discouraged from using it; therefore, the most convenient spaces at the Airport could then be available for short term parkers who typically constitute two-thirds to three-quarters of all customers.

An additional public parking need demonstrated by passengers using the Airport is a reduced grade walking path from the long term and overflow parking lot to the terminal building. Currently, passengers are required to walk up an increasing grade to access the terminal building from these lots, which is occasionally a difficult task for elderly, disabled, and other passengers who have difficulties walking long distances. As a part of any future expansion of the public parking lot, consideration should be given to developing a method to reduce or eliminate the need for walking passengers to transverse this grade change such as an escalator, elevator, and/or pedestrian bridge if a parking garage is planned.

Employee Parking Demand – Employees parking at the Airport include those from the Greater Asheville Regional Airport Authority, TSA, FAA, car rental agencies, tenants, and airlines. These employees are assigned to a variety of on-Airport parking lots which, in the aggregate, provide 381 spaces. No occupancy counts were taken in the employee lots, but their use was estimated by Airport staff to approximate the percentages illustrated in **Table 4-23**. Since employees are familiar with the parking system and generally create only low turnover in the lots, the cushion afforded to employee facilities is typically 5 percent rather than the 10 percent assigned to public facilities.

Table 4-23: Estimated Occupancy of Employee Lots

Parking Lot	Capacity	Estimated Occupancy	Parking Demand
Upper Lot	87	90%	78
Lower Lot	240	40%	96
Authority Lot	34	100%	34
DPS	6	100%	6
Maintenance Facility	14	85%	12
TOTAL	**381**	**59%**	**226**

Source: Walker Parking Consultants

Employee parking demand is estimated to remain at 226 spaces under existing conditions. Since the peak demand occurs during shift changes, a five percent cushion is incorporated that results in a parking demand of 238 spaces. Relating this demand to 2010 enplanements yields a demand ratio of 0.64 spaces per 1,000 annual originating enplanements. **Table 4-24** contains the projections of employee parking demand throughout the planning period upon which a surplus of capacity is projected to occur through 2030.

Table 4-24: Employee Parking Demand Projections

Year	Enplanements	Demand Ratio per 1,000 Enplanements	Projected Demand	Parking Capacity	Surplus/Deficit
2010	378,087	0.64	238	381	+ 143
2015	410,793	0.64	263	381	+ 118
2020	446,328	0.64	286	381	+ 95
2025	484,937	0.64	310	381	+ 71
2030	526,886	0.64	337	381	+ 44

Notes: Parking demand ratio includes a five percent cushion

Source: Walker Parking Consultants

Rental Car Ready/Return Spaces – In 2010, the rental car ready/return lot directly south of the terminal contained 107 spaces allocated as follows:

- Avis – 18 spaces
- Budget – 15 spaces
- Enterprise – 22 spaces
- Hertz – 30 spaces

- National – 22 spaces

Interviews were conducted with each rental car agency manager that focused on the current operations of the ready/return lot. Each manager was asked to estimate the number of spaces they needed for optimum conditions under today's circumstances. The total came to 144 ready/return spaces, which is three quarters more than the current 107-space lot.

Each manager related that the rental car business at the Airport is quite seasonal and that they are able to sufficiently meet demand during the winter months. However, in the summer and fall, the demand for spaces in the ready/return lot often exceeds capacity. During those periods, the shuttling of vehicles between the ready/return lot and consolidated service center cannot keep up with the demand for vehicles as one agency reported having drivers deliver cars to terminal building curbside because space was not available in the ready/return lot.

Although they are able to operate under existing conditions, all the rental car agency managers expressed the need for more space. Although the managers expressed a cumulative desire for 144 spaces compared to the existing 107, our experience is that the balance between operating expenses, particularly the labor to shuttle vehicles back and forth and the cost of leasing the ready/return spaces, typically results in fewer spaces being leased. Therefore, we estimate the 2010 need for ready/return spaces at 136, or about 27 percent more than currently provided. The parking demand ratio is therefore 0.36 spaces per 1,000 annual enplanements (136/378.087).

Demand projections for rental car ready/return spaces are shown in **Table 4-25**. As passenger traffic increases, it is anticipated that rental car transactions will increase at the same rate. Fleet sizes will grow and more spaces will be needed to accommodate the operation of each rental car agency.

Table 4-25: Rental Car Ready/Return Parking Demand Projections

Year	Enplanements	Demand Ratio per 1,000 Enplanements	Projected Demand	Parking Capacity	Surplus/ Deficit	Approx. Maximum Fleet Size
2010	378,087	0.36	136	107	- 29	950
2015	410,793	0.36	148	107	- 41	1,032
2020	446,328	0.36	161	107	- 54	1,121
2025	484,937	0.36	175	107	- 68	1,218
2030	526,886	0.36	190	107	- 83	1,324

Note: Annual enplanements are assumed to equal the annual number of deplanements

Source: Walker Parking Consultants

The rental car operation is already in need of expansion to provide customers with an acceptable level of rental car service. Office space and counter space in the terminal were not mentioned as current issues, but may need expansion in the future.

The actual growth rate of rental car business compared to the passenger growth rate is contingent on the traffic mix (business versus pleasure travel) and future expansion of the Airport service area. For example, high levels of leisure passenger traffic would result in increased rental terms which also would affect the number of spaces needed. Such phenomena could require expansion of the ready/return lot on a different schedule than originally planned. Other factors, currently unknown, can greatly influence the accuracy of any current projections. Rental car company mergers and technological or marketing innovations could remake the entire system. In any case, it is factual that expansion is needed now and that passenger traffic growth projections indicate that further expansion will be necessary in the near future.

Parking Needs Summary – A summary of existing and projected parking supply and demand throughout the planning period is presented in **Table 4-26**. Review of the table indicates the parking situation at the Airport is generally balanced except for the rental car ready/return lot. However, parking deficits will develop throughout the planning period as enplanements increase. The desired level of customer service should be considered along with the number of spaces provided as plans are developed for future parking facility needs.

Table 4-26: Parking Supply/Demand Summary

Year	Projected Annual Enpl.	Public Parking			Employee Parking			Rental Ready/Return			Total		
		Projected Parking Demand	Parking Supply	Parking Surplus/(Deficit)	Projected Parking Demand	Parking Supply	Parking Surplus/(Deficit)	Projected Parking Demand	Parking Supply	Parking Surplus/(Deficit)	Parking Supply	Parking Demand	Surplus/(Deficit)
2010	378,087	1,482	1,465	(17)	238	381	143	136	107	(29)	1,953	1,856	97
2015	410,793	1,610	1,465	(145)	263	381	118	148	107	(41)	1,953	2,021	(68)
2020	446,328	1,750	1,465	(285)	286	381	95	161	107	(54)	1,953	2,197	(244)
2025	484,937	1,901	1,465	(436)	310	381	71	175	107	(68)	1,953	2,386	(433)
2030	526,886	2,065	1,465	(600)	337	381	44	190	107	(83)	1,953	2,592	(639)

Notes: Parking supply numbers exclude visitor spaces at the maintenance facility and consolidated rental car service facility
Source: Walker Parking Consultants

Additional Parking Needs – Thought not directly related to aviation activities at the Airport, it is recommended that an expanded parking area be considered for the Advantage West headquarters located on Wright Brothers Way. Typically, the parking lot adjacent to the building provides adequate capacity for demand during normal business activities; however, meetings occasionally held at the Advantage West headquarters have resulted in a demand for parking that exceeds available capacity. When demand exceeds capacity, overflow vehicles are forced to park along Wright Brothers Way and near the entrance of the US Airways air cargo processing facility which increases traffic congestion. It is recommended the Airport work with Advantage West to help provide additional parking capacity during these short periods of increased demand so that vehicles are not parking on Wright Brothers Way and restricting traffic to other facilities such as the US Airways air cargo processing facility.

A review of vehicle parking lot pavement conditions indicates that rehabilitation or reconstruction of some of these surfaces is anticipated to be needed during the 20-year planning period. Parking lots such as the lower long-term lot, employee parking lot, and rental car ready/return lot are considered to be in “fair” condition and are anticipated to need improvements within the next five to 10 years. Planning should be initiated to improve those parking lot pavement surfaces that are considered to be in “fair” condition through preventative measures such as crack sealing and/or seal coating before complete reconstruction is needed.

4.4 General Aviation Facility Requirements

General aviation (GA) accounts for the largest percentage of annual activity at the Airport with 62 percent of all aircraft operations in 2010 conducted by itinerant and local GA aircraft. Therefore, it is important to evaluate the adequacy of GA facilities at the Airport when reviewing facility requirements. The size and type of GA facilities needed are directly proportional to the size and type of GA aircraft that operate at an airport, as well as local conditions such as climate, availability of developable land, and anticipated demand. The review of GA facilities at the Airport focused on four components where demand is related to the anticipated level of GA activity: space available for itinerant aircraft, based aircraft apron space/hangar availability, apron pavement condition, and fixed base operators.

4.4.a Itinerant Aircraft Apron Space

The demand for itinerant GA aircraft apron space calculated based upon guidance established within Appendix 5 of FAA AC 150/5300-12, *Airport Design,* which suggests the best method for determining the total amount of ramp space needed is to evaluate demand during the busiest day of operation. The total number of daily itinerant general aviation aircraft operations was obtained from the FAA's Air Traffic Activity Data System. It is assumed that 50 percent of these daily itinerant GA aircraft are parked on the ramp at a single time. Data from the FAA's Enhanced Traffic Management System, which utilizes IFR flight plan data, was used to estimate the percent of these operations by general aviation aircraft size groupings. The approximate number of square yards needed per aircraft was then used to calculate the approximate apron area needed. The existing and anticipated transient apron area needed for transient GA aircraft based on these calculations is presented in **Table 4-27**.

Table 4-27: Apron Needs for Transient Aircraft

Criteria			2010	2015	2020	2025	2030
Total Annual GA Itinerant Operations			28,843	31,298	33,356	35,609	38,062
x Percentage peak month annual ops			10.29%	10.29%	10.29%	10.29%	10.29%
= Peak month operations			2,968	3,221	3,432	3,664	3,917
Busiest Day Itinerant Operations			145	157	168	179	191
Percent of Month on Busy Day			4.89%	4.89%	4.89%	4.89%	4.89%
Itinerant GA Landing Operations			73	79	84	90	96
Assume 50% of Itinerant Ops on Ground			37	40	42	45	48
GA Aircraft Size Groupings	**Percent by Type**	**Apron SY per type**					
Single & Twin	48%	300	5,328	5,760	6,048	6,480	6,912
Beechjet, Citation I, King Air	32%	550	6,512	7,040	7,392	7,920	8,448
Hawker, Falcon, Citation II	17%	800	5,032	5,440	5,712	6,120	6,528
G-IV, G-V, Global	4%	1,500	2,220	2,400	2,520	2,700	2,880
Total Itinerant Apron Demand (SY)			19,092	20,640	21,672	23,220	24,768
Total Itinerant Apron Demand (SF)			171,828	185,760	195,048	208,980	222,912
Existing North Apron Itinerant Aircraft Parking Area (SF)			185,000				
Itinerant Apron Surplus/Deficiency (SF)			13,172	-760	-10,048	-23,980	-37,912

Note: Apron SY per type includes 10 feet wingtip clearances and apron maneuvering dimensions

The north apron totals approximately 250,000 square feet; however, some of that space is located in front of hangar doors or is used for fuel truck staging and is not appropriate for the parking of itinerant aircraft.

Considering this, there is approximately 185,000 square feet of space available for itinerant aircraft parking and maneuvering purposes on the north apron. It appears from the table that additional apron space will be needed to complement the north apron. As a result of Landmark Aviation's t 2012 relocation project that moved its FBO terminal to the old Odyssey Aviation hangar, an increase in transient aircraft parking is projected occur on the mid-ramp and south apron. While this shift in parking is anticipated to alleviate demand on the north apron, planning should be initiated for additional apron space if the mid-ramp and south aprons are unable to accommodate the increase in demand for transient aircraft parking.

4.4.b Based Aircraft Parking and Storage Areas

Apron parking and hangar storage areas for aircraft based at the Airport vary between box- and T-style hangars, designated areas on apron surfaces, and apron tie-down locations. It is typically assumed that all based aircraft desire hangar storage, so aircraft parked on apron surfaces is often used as an indicator of the need for additional hangars. However, as a result of the influx of seasonal-based aircraft, some aircraft owners may prefer to not lease hangars for their temporary stay at the Airport or may prefer to park their aircraft on the apron. This section evaluates the need for apron space and hangar storage at the Airport throughout the planning period for based aircraft with consideration given to the seasonal peak demand for based aircraft parking.

Forecasts prepared in Chapter 3 projected the number of based aircraft by fleet mix that can be anticipated at the Airport throughout the 20-year planning period. As summarized in **Table 4-28**, based aircraft are anticipated to grow from a total of 174 aircraft in 2010 to a total of 217 aircraft in 2030. Based single-engine aircraft are projected to increase approximately 21 percent throughout the planning period while based multi-engine and jet aircraft are projected to increase approximately 30 percent and 63 percent, respectively.

Table 4-28: Based Aircraft Fleet Mix Projections Summary

Year	Single Engine	Multi Engine	Jets	Helicopters	Total
2010	115	37	16	6	174
2015	122	39	20	4	184
2020	129	41	21	4	195
2025	134	43	25	4	206
2030	139	48	26	4	217

Projections: Mead & Hunt, Inc.

Landmark Aviation manages the apron tie-down and hangar leases for based aircraft at the Airport and keeps an updated inventory of the parking locations of each aircraft. A snapshot of based aircraft parking locations obtained from Landmark Aviation in September 2011 offered a method to evaluate the demand for apron and hangar space. **Table 4-29** summarizes the September 2011 count of based aircraft parking locations at the Airport. As indicated in the table, 25 percent of based aircraft are parked at a tie-down location on an apron surface while 75 percent of aircraft are parked in either a box-style or T-style hangar.

Table 4-29: Based Aircraft Parking Locations

Aircraft Type	Box-Style Hangar	% of Total	T-Style Hangar	% of Total	Tie-down/ Apron	% of Total	Total
Single Engine	33	30%	48	43%	30	27%	111
Multi Engine	11	44%	10	40%	4	16%	25
Jets	12	75%	0	0%	4	25%	16
Helicopters	2	100%	0	0%	0	0%	2
TOTAL	**58**	**38%**	**58**	**38%**	**38**	**25%**	**154**

Note: Percentages may not add to 100% due to rounding
Source: Landmark Aviation based aircraft information, September 2011

In order to establish a baseline for evaluating whether additional capacity may be needed, an inventory was collected on available area for based aircraft parking. The total area in square feet designated for aircraft parking on the mid-ramp and in each hangar was calculated and is summarized in **Table 4-30**. As indicated in the table, there are a total of 15 hangar structures and two aprons that provide approximately 688,900 square feet of area for aircraft parking. In addition, the middle ramp is approximately 444,700 square feet in area and has 113 tie-down locations. It should be noted that the number of aircraft parking positions in both hangars and on apron surfaces can vary based on the size of aircraft being accommodated in each hangar and positioned at each tie-down location. Also, the available apron area for aircraft parking can also vary as additional space can be made available based on the positioning of parked aircraft adjacent to designated parking areas, hangar structures, and taxi lanes. For the purposes of this needs analysis, only the areas designated for aircraft parking on the mid-ramp and south apron were included in the parking summary.

Table 4-30: Available Based Aircraft Parking Summary

Parking Method	Number Available	Number of Aircraft Parking Positions	Total Approximate Sq. Ft. Available
Box Style Hangar	12 hangars	*	155,600 sq. ft.
T-Style Hangar	3 hangars	68	88,600 sq. ft.
Tie Down/Apron Space	2 aprons	113*	444,700 sq. ft.
TOTAL	15 hangars & 2 aprons	181*	688,900 sq. ft.

Notes:
* = Number of available parking positions varies based on aircraft type
Belle Air Maintenance Facility hangar not included in calculations
Source: Mead & Hunt, Inc.

Discussions with Airport officials and Landmark Aviation staff as well as a review of the breakdown in existing based aircraft parking locations, indicates there is hangar availability at the Airport as no hangar waiting list is presently maintained. It is assumed then that a percentage of based aircraft owners prefer to park their aircraft at tie-down locations or within designated parking areas on apron surfaces. Given the percentage of based aircraft parked in hangars versus tie-down locations on apron surfaces remains constant throughout the planning period, the demand for future apron space and hangar availability can be projected. A summary of anticipated demand for tie-down apron space and hangar demand for the projected fleet mix of based aircraft at the Airport is presented in **Table 4-31**. As indicated in the table, growth in demand for box-style hangars, T-style hangars, and tie-down locations on the apron surfaces is anticipated through 2030.

Table 4-31: Projected Based Aircraft Apron Parking and Hangar Demand by Fleet Mix

Aircraft Type/ Year	Projected Based Aircraft	Box-style hangar	% of total	T-style hangar	% of total	Tie-down/ apron	% of total
Single Engine							
2015	122	37	30%	52	43%	33	27%
2020	129	39	30%	55	43%	35	27%
2025	134	40	30%	58	43%	36	27%
2030	139	42	30%	60	43%	38	27%
Multi Engine							
2015	39	17	44%	18	40%	6	16%
2020	41	18	44%	19	40%	7	16%
2025	43	19	44%	20	40%	7	16%
2030	48	21	44%	23	40%	8	16%
Jets							
2015	20	15	75%	0	0%	5	25%
2020	21	16	75%	0	0%	5	25%
2025	25	19	75%	0	0%	6	25%
2030	26	20	75%	0	0%	7	25%
Helicopters							
2015	4	4	100%	0	0%	0	0%
2020	4	4	100%	0	0%	0	0%
2025	4	4	100%	0	0%	0	0%
2030	4	4	100%	0	0%	0	0%
TOTAL DEMAND							
2015	185	73	-	70	-	44	-
2020	195	77	-	74	-	47	-
2025	206	82	-	78	-	49	-
2030	217	87	-	83	-	53	-

Notes: Aircraft demand by hangar/apron space may not equal projected total due to rounding

Source: Mead & Hunt, Inc.

As indicated previously, the available parking capacity for based aircraft on apron surfaces and in hangar structures is dependent upon the size of each aircraft and how each one is positioned with other aircraft within each designated parking area. Before an evaluation can be conducted to compare whether additional based aircraft capacity is necessary to meet projected demand, the area needed to park aircraft within each fleet mix classification must first be determined. **Table 4-32** summarizes the approximate parking area in square feet for each type of based aircraft anticipated in the projected fleet mix. Since the amount of area required to park an aircraft varies between model types, planning ratios were established for each fleet mix classification based upon the size of common aircraft types. Size approximations for each aircraft classification included a safety margin for wingtip, nose, and tail clearances.

Table 4-32: Typical Parking Area Sizes for Based Aircraft

Aircraft Type	Examples	Approximate Square Feet
Single Engine	Cessna 172, Cirrus SR-22	1,400 square feet
Multi Engine	Piper Seneca, Beechcraft King Air	2,500 square feet
Small & Mid-Sized Jets	Cessna Citation, LearJet	3,600 square feet
Large Business Jets	Gulfstream G550, Global Express	10,000 square feet
Helicopters	Sikorsky S-76, Bell 206	1,400 square feet

Note: Approximately 3,935 square feet of apron space required for each aircraft with taxilanes included.

Source: Mead & Hunt, Inc.

The anticipated demand for box-style hangar space, T-style hangar units, and apron tie-down space for the planning period is presented in **Table 4-33**. It should be noted that a T-style hangar unit is defined as a covered parking space for one single-engine or small twin-engine aircraft and that it is assumed 15 percent of projected based jets parked in hangars are large business jets. As illustrated in the table the demand for box-style hangar area is anticipated to increase to approximately 208,100 square feet by 2030 while the demand for T-hangar space will increase to 83 units. Approximately 53 tie-downs and 208,500 square feet of tie-down apron area are also anticipated by 2030 for based aircraft.

Table 4-33: Projected Hangar and Apron Area Requirements

Aircraft Type/ Year	Approx. Area per Aircraft (Sq. ft.)	Box-Style Hangar		T-Style Hangar	Tie-down/Apron Area	
		Projected Demand (aircraft)	Needed Capacity (Sq. ft.)	Projected Demand (aircraft)	Projected Demand (aircraft)	Apron Area (Sq. ft.)
Single Engine						
2015	1,400	37	51,800	52	33	129,855
2020	1,400	39	54,600	55	35	137,725
2025	1,400	40	56,000	58	36	141,660
2030	1,400	42	58,800	60	38	149,530
Multi Engine						
2015	2,500	17	42,500	18	6	23,610
2020	2,500	18	45,000	19	7	27,545
2025	2,500	19	47,500	20	7	27,545
2030	2,500	21	52,500	23	8	31,480
Small & Mid-sized Jets & Turboprops						
2015	3,600	13	46,800	0	5	19,675
2020	3,600	14	50,400	0	5	19,675
2025	3,600	16	57,600	0	6	23,610
2030	3,600	17	61,200	0	7	27,545
Large Business Jets						
2015	10,000	2	20,000	0	0	0
2020	10,000	2	20,000	0	0	0
2025	10,000	3	30,000	0	0	0
2030	10,000	3	30,000	0	0	0
Helicopters						
2015	1,400	4	5,600	0	0	0
2020	1,400	4	5,600	0	0	0
2025	1,400	4	5,600	0	0	0
2030	1,400	4	5,600	0	0	0
TOTAL DEMAND						
2015	-	73	166,700	70	44	173,140
2020	-	77	175,600	74	47	184,945
2025	-	82	196,700	78	49	192,815
2030	-	87	208,100	83	53	208,555

Note: It is assumed 15 percent of total based jet projections will be large business jets and that all large business jets will require storage in a box-style hangar.
Projections: Mead & Hunt, Inc.

The needed capacity for projected hangar and apron area demand for based aircraft is presented in **Table 4-34**. As illustrated in the table, approximately 52,500 square feet of additional box-style hangar space and an additional 15 T-hangar units will be needed to accommodate anticipated demand by 2030. Existing tie-down and apron space for based aircraft appears sufficient to meet anticipated demand throughout the planning period.

Table 4-34: Projected Hangar and Apron Area Needed Capacity				
Aircraft Type/ Parking Method	**2015**	**2020**	**2025**	**2030**
BOX-STYLE HANGAR				
Needed Capacity	166,700 sq. ft.	175,600 sq. ft.	196,700 sq. ft.	208,100 sq. ft.
Available Capacity	155,600 sq. ft.	155,600 sq. ft.	155,600 sq. ft.	155,600 sq. ft.
Surplus/Deficit	**- 11,100 sq. ft.**	**- 20,000 sq. ft.**	**- 41,100 sq. ft.**	**- 52,500 sq. ft.**
T-STYLE HANGAR				
Needed Capacity	70 units	74 units	78 units	83 units
Available Capacity	68 units	68 units	68 units	68 units
Surplus/Deficit	**- 2 units**	**- 6 units**	**- 10 units**	**- 15 units**
TIE-DOWN/APRON AREA				
Needed Capacity	173,140 sq. ft.	184,945 sq. ft.	192,815 sq. ft.	208,555 sq. ft.
Available Capacity	444,700 sq. ft.	444,700 sq. ft.	444,700 sq. ft.	444,700 sq. ft.
Surplus/Deficit	**+272,560 sq. ft.**	**+259,755 sq. ft.**	**+251,885 sq. ft.**	**+236,145 sq. ft.**

Projections: Mead & Hunt, Inc.

It is recommended that the Airport plan for the construction of additional box-style hangar or hangars with an available capacity of at least 52,500 square feet to accommodate the anticipated demand for based aircraft parking. Construction of a structure or structures that can meet this expected demand will allow the Airport to adequately meet the demand for hangar space of single-engine, multi-engine, jet, and helicopter aircraft owners. Planning should also be initiated for the development of additional T-hangar units to meet the expected increase in demand for single-engine aircraft owners.

No improvements or expansion of tie-down areas and designated apron parking locations are anticipated as sufficient area is available to accommodate the projected demand. The surplus in the mid-ramp tie-down apron areas can be used to meet the deficiency in itinerant apron needs identified for the north ramp. It is anticipated that the northern portion of the mid-ramp will be used primarily for itinerant aircraft parking, particularly given the pending relocation of the FBO terminal building to the old Odyssey hangar.

4.4.c Apron Pavement Condition

The Terminal Area Planning Study conducted in 2005 indicated the north apron and mid-ramp have a weight bearing capacity of 60,000 pounds for aircraft with dual wheel main landing gear configurations while the south apron has a weight bearing capacity of 100,000 pounds for aircraft with the same landing gear configuration. A review of empty ramp weight and MTOW of the most demanding types of aircraft parked on each surface found that additional pavement strength may be needed for the north apron, south apron, and mid ramp. For the north apron and mid-ramp, the Bombardier Global Express XRS and the Gulfstream G550, each with an empty weight of 51,200 pounds and 48,300 pounds, respectively, are typically the largest aircraft parked on each surface. While capable of supporting the empty weights of each aircraft, additional weight-bearing capacity is needed to support Global Express and G550 if each is at their MTOW (98,000 pounds and 91,000 pounds, respectively). If it is planned to continually park these aircraft types on each surface at their MTOW, it is recommended the pavement strength be increased as a part of any future apron pavement reconstruction or rehabilitation project.

The weight bearing capacity of the south apron is greater than the north apron/mid-ramp areas and is typically used to service and park larger aircraft types such as the Boeing Business Jet and the Lockheed Martin C-130. A review of the empty ramp weight and MTOW of these aircraft types also concluded that additional pavement strength is needed in order to support these aircraft at their MTOW. While the pavement strength appears sufficient for the empty weight of the Boeing Business Jet (94,980 pounds) and the Lockheed Martin C-130 (73,000 pounds), additional pavement strength is needed to support the MTOWs of each aircraft (171,000 pounds and 165,000 pounds, respectively).

It is also important to note the weight bearing capability of the south apron to support the Boeing 757 since this aircraft occasionally conducts charter operations at the Airport and is projected to be increased in use commercial airlines throughout the planning period. As noted, the weight bearing capacity of the south apron is 100,000 pounds for aircraft with dual wheel main landing gear configurations. Since the Boeing 757 has a dual-tandem main landing gear configuration, FAA AC 150/5335-5B, *Standardized Method of Reporting Airport Pavement Strength – PCN*, was referenced to determine the dual tandem wheel weight capacity based on the duel wheel weight capacity. According to Appendix 6 of the AC, pavement surfaces with an optimal subgrade designed to support dual wheel main landing gear configuration aircraft weighing up to 100,000 pounds should be capable of supporting dual tandem wheel main landing gear configuration aircraft weighing up to 195,000 pounds. Likewise, pavement supported by less desirable subgrade conditions capable of supporting the weight of a dual wheel main landing gear configuration aircraft weighing approximately 100,000 pounds should be able to support a dual tandem main landing gear configuration aircraft weighing approximately 160,000 pounds. Review of the empty ramp weight and MTOW of the Boeing 757-200 (130,440 pounds and 255,000 pounds, respectively) indicates the surface is capable of supporting the empty weight of the aircraft but not at its MTOW. As such, it is recommended the weight bearing capacity of the south apron be increased as a part of any future apron reconstruction or rehabilitation project if the Airport anticipates that fully loaded Boeing 757s will be parked on the surface at any time throughout the planning period.

In addition to increasing the weight bearing capacity of the apron surfaces, consideration should also be given to replace sections of apron pavement that have deteriorated beyond acceptable conditions. This includes areas that have excessive cracks, severe spalling, loose debris, and depressions or low spots. While a majority of the pavement on the north apron and south apron is considered to be in "good" condition, large sections of pavement on the mid-ramp are considered to be in "poor" condition and should be repaired before the pavement is considered "failed". If it is not economically feasible to plan for a major apron rehabilitation or reconstruction project, it is recommended apron pavement repair efforts should focus on the most deteriorated sections of apron pavement.

4.4.d Fixed Base Operators

Fixed base operators (FBOs) are aeronautical-related businesses that provide services to general aviation aircraft, pilots, and passengers, as well as provide support services for commercial airlines and air cargo operators. FBOs typically offer the sale of aviation fuel and line services, but may also provide aircraft maintenance, flight training, aircraft rental, catering, air taxi, charter services, sale of aircraft parts, and storage facilities for itinerant and based aircraft. The services offered by FBO vary from airport to airport based on the level and type of aviation activities conducted at an airport. Landmark Aviation operates the only FBO at the Airport and offers full service Jet A and 100 low lead (100LL) aircraft refueling as well as self-serve 100LL aircraft fueling, ground handling services, and storage for itinerant and based aircraft. Landmark Aviation's facility also serves as the terminal facility for passengers, pilots, and crew members departing and arriving from GA flights.

Landmark Aviation recently opened a modern, state-of-the-art facility in 2009 that was based on a comprehensive evaluation of user needs and aeronautical services demanded at the Airport. A renovation of the former Odyssey Aviation building (Building # 40) scheduled for completion in 2012 will expand the aircraft storage and service capabilities of Landmark Aviation and move the transient FBO operations into the renovated building. Space occupied in the existing Landmark Aviation building for transient aircraft operations will then be converted to serve corporate and based customers. As a result of these recent improvements, it is anticipated level of FBO services provided at the Airport will be sufficient to meet demand throughout the planning period. It should be noted that several variable and unforeseen factors can impact an FBO business model at an airport such as changes in local, national, and global economies, cost of aviation fuel, competition with competing FBO service provides, number and type of aircraft based at an airport by tenants, and the demand for specific aeronautical services. Continual evaluation should take place throughout the planning period as activity levels change to assess how well aeronautical needs are being addressed and determine if improvements or expansion of the FBO is needed.

4.5 Support Facility Requirements

Support facilities required for the operation and maintenance of the Airport were evaluated as a part of the facility needs analysis and focused on structures and buildings that provide essential services to help keep the airfield operational. Support facilities included in this review are as follows:

- Department of Public Safety (DPS) Facility / Aircraft Rescue and Fire Fighting (ARFF)
- Airport Maintenance Facility
- Aircraft Fuel Storage Facilities
- Vehicle Fuel Storage Facilities

4.5.a Department of Public Safety (DPS) Facility / Aircraft Rescue and Fire Fighting (ARFF)

The Airport Department of Public Safety (DPS) is responsible for police, fire, and first response medical services at the Airport in addition to providing Aircraft Rescue and Fire Fighting (ARFF) services for aircraft operations. Review of facility requirements for the Department of Public Safety focused on two elements: the capability of the DPS facility to meet the operational needs of the department throughout the planning period and whether the existing ARFF Index is sufficient to accommodate the types of commercial aircraft anticipated to operate at the Airport. The following section will evaluate these two elements and identify any improvements that may be necessary to meet anticipated user needs.

DPS Facility – The DPS facility serves as the centralized center for public safety operations at the Airport and is located on the south end of the terminal apron adjacent to the passenger terminal building. In addition to providing office space, locker rooms, and break areas for DPS officers, this building also houses the Airport's Aircraft Rescue and Fire Fighting (ARFF) equipment and communication center. Vehicle bays included in the structure provide sheltered, heated storage of fire apparatuses and storage areas for materials, supplies, and equipment. Adjacent rooms in the facility provide personnel quarters, training areas, a day room, and additional storage space for DPS officers.

The most recent renovation of the DPS facility occurred in 1993 when an expansion project added additional office areas, an expanded kitchen area/day room, and a training room. Since then, the existing facility has reached its available capacity for the storage of equipment and supplies. Most notably, the apparatus bays of the existing DPS facility are not large enough to house next generation ARFF equipment that the Airport will be required to purchase in the next few years to replace outdated equipment. In addition, there is concern with maintaining unobstructed access from the DPS facility to the airfield for responding DPS and ARFF vehicle due to the close proximity of parked air carrier aircraft on the terminal apron.

At the time of this master planning the study, the Airport was working with an architect to develop an initial design of a new DPS facility that addresses the inadequacies of the existing facility. The new DPS facility will be planned to incorporate larger vehicle bays capable of housing larger next generation ARFF equipment while providing adequate space for work areas and the storage of equipment and supplies. Since a comprehensive effort was being undertaken by the Airport to conceptualize a new DPS facility, a detailed reviewed of needs will not be discussed in this master plan. It is recommended that the design of the new DPS facility be based on the findings of this comprehensive evaluation of existing and future needs.

ARFF Index – In addition to reviewing the needs of the existing DPS facility, the level of ARFF services provided in accordance with FAR Part 139 was also evaluated to determine if an increase in the Airport's index can be anticipated throughout the planning period. Operators of airports that hold an FAR Part 139 certificate are required to provide ARFF services during air carrier operations determined by a combination of the length and average daily departures of the longest air carrier aircraft that has an average of five or more daily departures. Presently, the Airport is classified as an Index B facility that must meet the following minimum equipment and agent requirements:

- One vehicle carrying at least 500 pounds of sodium-based dry chemical, Halon 1211, or clean agent and 1,500 gallons of water and the commensurate quantity of Aqueous Film Forming Foam (AFFF) or;

- Two vehicles with one carrying 500 pounds of sodium-based dry chemical, Halon 1211, or clean agent or 450 pounds of potassium-based dry chemical and water with a commensurate quantity of AFFF to total 100 gallons for simultaneous dry chemical and AFFF application and the other vehicle carrying an amount of water and commensurate quantity of AFFF so that the total quantity of water for foam production carried by both vehicles is at least 1,500 gallons.

Based on the future aviation activity projections presented in Chapter 3, the Airport can expect increased operations from larger ARC Category C-II and C-IV aircraft throughout the planning period. Though the projected number of average daily operations by these larger aircraft types is not anticipated to be greater than five, consideration should be given to meet Index C requirements should the number of average daily operations by these aircraft types exceed projections. Increasing the ARFF Index from B to C would require the Airport to maintain:

- Three vehicles with one carrying 500 pounds of sodium-based dry chemical, Halon 1211, or clean agent or 450 pounds of potassium-based dry chemical and water with a commensurate quantity of AFFF to total 100 gallons for simultaneous dry chemical and AFFF application and two vehicles carrying an amount of water and commensurate quantity of AFFF so the total quantity of water for foam production carried by all three vehicles is at least 3,000 gallons or;

- Two vehicles with one carrying at least 500 pounds of sodium-based dry chemical, Halon 1211, or clean agent and 1,500 gallons of water and the commensurate quantity of AFFF for foam application and one vehicle carrying water and the commensurate quantity of AFFF so the total quantity of water for foam productions carried by both vehicles is at least 3,000 gallons.

Based on the projected frequency of aircraft types anticipated to operate at the Airport during the planning period, an ARFF Index B classification appears adequate to meet FAR Part 139 firefighting requirements.

4.5.b Airport Maintenance Facility

The maintenance facility at the Airport is a three-building complex located landside near the intersection of Aviation Way and Wright Brothers Way that provides approximately 30,680 square feet of area for the storage of equipment, supplies, materials, and office/work space for maintenance personnel. Multiple vehicle bays at each facility provide covered, heated areas to store airfield snow removal apparatuses such as plow trucks, brooms, and snow blowers; airfield maintenance equipment such as trucks, tractors, trailers, and mower decks; and airfield deicing and anti-icing materials such as sand and potassium acetate. Dedicated vehicle bays equipped with vehicle lifts and an overhead crane that provide an area to conduct maintenance and repairs on all types of Airport vehicles. Adjacent to the vehicle bay facilities is the maintenance office building that includes office space, work areas, a locker room, break room/kitchen area, and dormitories for maintenance personnel. Land north of the maintenance facility complex provides additional area for the overflow storage of equipment, supplies, and vehicles.

Recent improvements to the maintenance facility complex in 2006 that constructed the state-of-the-art vehicle service bay facility and work space/office areas for maintenance personnel addressed long-term vehicle, equipment, and material storage needs; no significant improvements to the complex are anticipated throughout the planning period. Consideration should be given, however, to necessary facility improvements as new equipment is purchased. For example, larger available widths for snow plows and brooms may require an increase in the size of vehicle doors to permit transition of the equipment into and out of the vehicle bays. Likewise, the construction of an additional vehicle storage facility may be needed if existing facilities are unable to accommodate the fleet mix of maintenance equipment, supplies, and materials.

Additionally, improved facilities are needed near the terminal building for the storage of winter deicing chemicals, maintenance equipment, and supplies. Current facilities and areas in the terminal building for the storage of deicing chemicals, supplies, and equipment are not adequately sized to meet needed demand, requiring some items to be kept at the maintenance facility complex. This proves to be most inefficient during the winter season when required travel between the terminal and the maintenance facility complex for supplies and equipment results in delayed snow removal operations around the terminal area. It is encouraged that planning be initiated to improve and expand deicing chemical storage facilities and maintenance storage areas near the terminal building to meet anticipated demand throughout the planning period.

Continual evaluation of the storage capacity needs of the maintenance department is recommended throughout the planning period to determine if any further improvements may be needed to the maintenance facility complex.

4.5.c Aircraft Fueling Facilities

Two aircraft fuel farm facilities are located on Wright Brothers Way, one adjacent to the Landmark Aviation facility and the second east of the approach end of Runway 16. Combined, the two fuel farms have a total capacity of 80,000 gallons of Jet-A fuel and 24,000 gallons of 100 low lead (LL) fuel that are stored in above ground tanks surrounded by secondary containment walls and dykes to control fuel in the event of accidental leakage. Aircraft fuel farm improvements scheduled for 2012 will add two 20,000 gallon Jet-A fuel tanks to the fuel storage facility adjacent to the approach end of Runway 16 and relocate a 1,000 gallon 100LL tank near the Landmark Aviation hangar to Building # 40. In addition, the fuel farm facility adjacent to the Landmark Aviation FBO will be removed. After the completion of the planned fuel farm improvements in 2012, Jet-A storage capacity will remain at 80,000 gallons while 100LL capacity will decrease to 13,000 gallons.

In evaluating the aircraft fuel storage requirements of the Airport throughout the planning period, it is first important to review historical fuel sales to establish a baseline of demand. Historical annual fuel sales at the Airport from 2008 to 2011 are presented in **Table 4-35**. As illustrated in the table, an average of 4,212,530 gallons of Jet-A fuel has been sold annually between 2008 and 2011; likewise during the same period an annual average of 225,652 gallons of 100LL fuel has been sold. It should also be noted from the table that approximately 68 percent of fuel sold at the Airport, on average, is for commercial airline operations (Jet-A) while approximately 27 percent and five percent of fuel sold, respectively, is for GA turbine (Jet-A) and GA reciprocal engine aircraft (100LL) operations.

Table 4-35: 2008-2011 Aviation Fuel Sales (In Gallons)

Year	Airline Jet-A	% of Total	GA Jet-A	% of Total	Total Jet-A	% of Total	GA 100LL	% of Total	TOTAL SALES
2008	2,811,980	63%	1,365,815	31%	4,177,795	94%	287,488	6%	4,465,283
2009	2,499,258	66%	1,073,280	28%	3,572,538	94%	213,093	6%	3,785,631
2010	3,517,752	72%	1,137,293	23%	4,655,045	96%	216,837	4%	4,871,882
2011	3,251,904	70%	1,192,838	26%	4,444,742	96%	185,190	4%	4,629,932
'08-'11 Avg.	3,020,224	68%	1,192,307	27%	4,212,530	95%	225,652	5%	4,438,182

Note: Percentages may not add to 100% due to rounding
Source: Asheville Regional Airport

Aircraft fuel storage requirements can be projected assuming the percentage in total annual fuel sold for commercial airline, GA turbine, and GA reciprocal engine aircraft remains constant throughout the planning period. The historical average of Jet-A fuel sales per commercial airline operation is presented in **Table 4-36**. As illustrated in the table, an average of 152.065 gallons of fuel is sold per operation given that historically commercial airlines account for 72 percent of Jet-A fuel sales.

Table 4-36: Historical Commercial Airline Jet-A Fuel Demand

Year	Total Jet-A Fuel Sales	Historical Average of Sales	Commercial Jet-A Fuel Sales	Commercial Operations	Gallons per Operation Ratio
2008	4,177,795	72%	3,008,012	20,376	147.625
2009	3,572,538	72%	2,572,227	17,597	146.174
2010	4,655,045	72%	3,351,632	20,765	161.408
2011	4,444,742	72%	3,200,214	20,909	153.054
				AVERAGE	**152.065**

Source: Historical Operations – FAA Air Traffic Activity Data System (ATADS)
Projections: Mead & Hunt, Inc.

Based on the average gallons-per-operation ratio, projections presented in **Table 4-37** were developed for future commercial airline Jet-A fuel consumption. Nearly 3.5 million gallons of Jet-A fuel are projected to be sold to commercial airlines at the Airport by 2030.

Table 4-37: Projected Commercial Airline Jet-A Fuel Demand

Year	Projected Operations	Gallons per Operations	Projected Demand (in Gallons)
2015	20,922	152.065	3,181,504
2020	21,780	152.065	3,311,976
2025	22,074	152.065	3,356,683
2030	22,922	152.065	3,485,634

Projections: Mead & Hunt, Inc.

Table 4-38 illustrates the historical gallons-per-operation ratio for the remaining 28 percent of Jet-A aviation fuel sales at the Airport associated with turbine-powered general aviation aircraft. As illustrated in the table, a ratio of 27.222 gallons of Jet-A fuel is sold per general aviation operation.

Table 4-38: Historical GA Jet-A Fuel Demand

Year	Total Jet-A Fuel Sales	Historical Average of Sales	GA Jet-A Fuel Sales	Total GA Operations	Gallons per Operation Ratio
2008	4,177,795	28%	1,169,783	52,912	22.108
2009	3,572,538	28%	1,000,311	45,125	22.168
2010	4,655,045	28%	1,303,413	41,752	31.218
2011	4,444,742	28%	1,244,528	37,267	33.395
				AVERAGE	**27.222**

Source: Historical Operations – FAA Air Traffic Activity Data System (ATADS)
Projections: Mead & Hunt, Inc.

The projected demand in Jet-A fuel sales at the Airport for GA turbine-powered aircraft is presented in **Table 4-39**. As illustrated in the table, fuel consumption is expected to increase from approximately 1.2 million gallons in 2015 to almost 1.5 million gallons in 2030.

Table 4-39: Projected GA Jet-A Fuel Demand

Year	Projected Operations	Gallons per Operation Ratio	Projected Demand (in Gallons)
2015	45,306	27.222	1,233,320
2020	48,285	27.222	1,314,414
2025	51,547	27.222	1,403,212
2030	55,097	27.222	1,499,851

Projections: Mead & Hunt, Inc.

Table 4-40 illustrates the historical gallons-per-operation ratio for 100LL fuel consumption at the Airport from 2008 to 2011. Since single- and twin-engine GA aircraft are typically powered by 100LL fuel, calculating the ratio of fuel sales to total GA operations offers a satisfactory method to find the gallons-per-operation ratio. As indicated in the table, an average of 5.079 gallons of fuel was sold per general aviation aircraft operation from 2008 to 2011.

Table 4-40: Historical 100LL Fuel Demand			
Year	**Total 100LL Fuel Sales**	**Total GA Operations**	**Gallons per Operation Ratio**
2008	287,488	52,912	5.433
2009	213,093	45,125	4.722
2010	216,837	41,752	5.193
2011	185,190	37,267	4.969
		AVERAGE	**5.079**

Source: Historical Operations – FAA Air Traffic Activity Data System (ATADS)
Projections: Mead & Hunt, Inc.

The projected demand for 100LL fuel throughout the planning period is presented in **Table 4-41**. The demand for 100LL fuel at the Airport is anticipated to increase to 279,838 gallons in 2030, a 22 percent increase from the 230,109 gallons of fuel projected to be consumed in 2015.

Table 4-41: Projected 100LL Fuel Demand			
Year	**Projected Operations**	**Gallons per Operation Ratio**	**Projected Demand (in Gallons)**
2015	45,306	5.079	230,109
2020	48,285	5.079	245,239
2025	51,547	5.079	261,807
2030	55,097	5.079	279,838

Projections: Mead & Hunt, Inc.

Projected demand and fuel storage requirements for Jet-A and 100LL fuel at the Airport throughout the planning period is presented in **Table 4-42**. Approximately 4.9 million gallons of Jet-A fuel is anticipated to be sold at the Airport annually by 2030 in addition to nearly 280,000 gallons of 100LL fuel. As indicated in the table, additional capacity will be needed to store a seven day supply of Jet-A fuel throughout the planning period. The planned 13,000 gallon storage capacity for 100LL fuel appears well sufficient to meet anticipated demand for in excess of two weeks.

Table 4-42: Projected Demand and Fuel Storage Requirements						
Demand/ Year	**Commercial Demand**	**GA Demand**	**Total Demand**	**7 Day Demand**	**Available Capacity**	**Surplus/ Deficit**
Jet-A						
2015	3,181,504	1,233,320	4,414,824	84,668 gal.	80,000 gal.	- 4,668 gal.
2020	3,311,976	1,314,414	4,626,390	88,483 gal.	80,000 gal.	- 8,483 gal.
2025	3,356,683	1,403,212	4,759,895	91,286 gal.	80,000 gal.	- 11,286 gal.
2030	3,485,634	1,499,851	4,985,485	95,612 gal.	80,000 gal.	- 15,612 gal.
100LL						
2015	0	230,109	230,109	4,413 gal.	13,000 gal.	+ 8,587 gal.
2020	0	245,239	245,239	4,690 gal.	13,000 gal.	+ 8,310 gal.
2025	0	261,807	261,807	5,021 gal.	13,000 gal.	+ 7,979 gal.
2030	0	279,838	279,838	5,367 gal.	13,000 gal.	+ 7,633 gal.

Projections: Mead & Hunt, Inc.

Overall, it appears additional aircraft fuel storage capacity will be needed to meet a seven day supply throughout the planning period. It is recommended planning be initiated by 2015 to construct an additional tank or tanks with the capacity to meet the projected fuel storage deficit through 2030. Though the storage capacity of 100LL fuel at the Airport will decrease by 19,000 gallons after planned fuel farm improvements are completed in 2012, the remaining 13,000 gallon capacity appears more than sufficient to meet anticipated demand. Since other various unforeseen factors can impact the demand for aviation and likewise the demand for aviation fuel, it is recommended the level of commercial airline operations, general aviation activity, and the sale of aviation fuel be continually monitored throughout the planning period to determine if any fuel storage capacity improvements will be needed.

It should be noted that the demand in fuel projected throughout the planning period includes consumption from larger sized aircraft that are expected to increase in operations at the Airport throughout the planning period. Larger aircraft such as the Boeing 737, Airbus A320, and the Boeing 757 have fuel capacities that are up to four times larger than the current fleet mix of commercial aircraft. While the projected demand for aviation fuel is based on a historical gallons-per-operation ratio from the existing fleet mix, it is anticipated the increase in demand from larger aircraft will offset the loss in demand from smaller regional jets that are expected to conduct less frequent operations at the Airport.

4.5.d Vehicle Fuel Storage Facilities

In addition to aircraft fuel storage facilities, there are also two vehicle fuel storage facilities at the Airport that provide rental car agencies fuel for returned rental vehicles and to refuel Authority owned vehicles, equipment, and self-propelled apparatuses. An assessment of the existing capacity at each facility and its ability to meet demand projected throughout the planning period was conducted as a part of the facility needs analysis. The following sections summarize whether the existing capacity at each facility is adequate to store a seven day supply of fuel or if additional improvements may be needed to meet anticipated demand.

Rental Car Fuel Storage Facility – The rental car fuel storage facility located between the two vehicle service buildings at the consolidated rental car service facility is comprised of five above ground, double walled tanks that each has a capacity of 5,000 gallons for unleaded fuel. Data obtained from Airport records on the total amount of unleaded fuel delivered at the facility in 2011 by car rental agency is presented in **Table 4-43**. As indicated in the table, a total of 150,431 gallons of fuel was delivered to the facility in 2011, averaging approximately 2,893 gallons of fuel consumed each week. Given that the combined total capacity of the five fuel tanks is 25,000 gallons, it appears the rental car fuel storage facility is well suited to provide a seven day supply of fuel to meet existing demand.

Table 4-43: Summary of 2011 Rental Car Agency Fuel Deliveries

Agency	Total Unleaded Fuel Delivered
Avis / Budget	25,257 gallons
Enterprise / National / Alamo	84,619 gallons
Hertz	40,555 gallons
ANNUAL TOTAL	150,431 gallons
Weekly Average	2,893 gallons

Source: Asheville Regional Airport

As indicated in the rental car ready/return discussion of the Vehicle Parking Requirements section of this chapter, the rental car fleet at the Airport is projected to grow approximately 39 percent from 950 vehicles in 2010 to 1,324 vehicles in 2030. Assuming fuel consumption by the rental car agencies increases at this same rate, approximately 4,032 gallons of fuel is projected to be consumed each week on average by 2030. Again, the capacity of the rental car fuel storage facility well exceeds what is needed to provide a seven day supply of fuel. As such, it appears no improvements are necessary to increase the capacity of the rental car fuel storage facility to provide a seven day supply of fuel throughout the planning period.

Fuel Storage Facility – The fuel storage facility operated by the Authority is intended to refuel Authority vehicles and equipment and is located at the Airport maintenance facility that consists of one double walled, 1,800 gallon unleaded gasoline tank and one double walled, 1,800 gallon diesel tank. In 2011, approximately 3,750 gallons of unleaded gasoline and 7,590 gallons of diesel fuel were pumped for Authority use, averaging to approximately 72 gallons of unleaded gasoline and 145 gallons of diesel fuel each week. Given that the total capacity of each tank is 1,800 gallons, the fuel storage facility is well capable of storing a seven day supply of fuel to meet existing demand. Considering that the amount of unleaded gasoline and diesel fuel consumed by the Authority remains relatively constant from year to year, an increase in demand is not projected throughout the planning period. As such, it appears no improvements are necessary to increase the capacity of the fuel storage facility to meet an average seven day demand for fuel through 2030.

4.6 Additional Facility Requirements

In addition to airside and landside infrastructure, a review of other aeronautical and non-aeronautical related elements critical to the overall operation of the Airport was conducted to identify other facility requirements. This review focused on two infrastructure components that the Airport has received numerous requests from existing and potential tenants over the past several years: development areas for air cargo operations and vehicle service facilities for rental car operations. The following section evaluates these infrastructure inquires to determine what improvements may be necessary to meet anticipated demand throughout the planning period.

4.6.a Air Cargo Development

The existing air cargo facility at the Airport is a 2,178 square foot facility operated by US Airways located adjacent to the DPS facility on the terminal apron. The facility primarily processes small packages for US Airways commercial passenger jets, single-engine, and small twin-engine aircraft. Given the size of the facility, an expansion is necessary if it is desired to significantly increase the throughput of air cargo at the Airport.

Past inquiries from air cargo operators about the availability of space to establish an air cargo operation at the Airport has led to initial planning and consideration for space to support a possible development. The Airport's close proximity to major traffic arteries in the region and centralized location between the population centers of Charlotte, North Carolina; Knoxville, Tennessee; and Greenville/Spartanburg, South Carolina makes it an attractive location to process and distribute air cargo throughout the Western North Carolina and Blue Ridge Mountain regions. A regional FedEx Ground sorting facility located one mile in proximity to the southwest of the Airport serves as an example of the value of the Airport's location for regional freight and cargo operations. As such, planning for the development of an expanded area for air cargo operations serves to not only benefit economic development and the exchange of goods in the region, but also the local economy of the Airport.

Planning initiated as a part of the 2001 update of the Airport master plan identified a site on the west side of the airfield near the approach end of Runway 34 for future general aviation and air cargo development. As a result of the topography of the selected site, a regional partnership was established in 2009 between the Airport, Progress Energy Carolinas Inc., and Charah Inc. to grade and fill land with a coal combustion product known as fly ash to develop additional aeronautical areas at the Airport. Scheduled for completion in 2014, this development area will create approximately 53.5 acres of land adjacent to the airfield for aeronautical development. It is intended this area would be selected for development by a potential air cargo operator to build infrastructure needed to support the transfer of packages, freight, and servicing of air cargo aircraft.

Review of the air cargo projections prepared for this master plan indicate that approximately 20 to 30 million pounds of cargo can be anticipated annually throughout the planning period if a dedicated air cargo company begins operations at the Airport. To gain an understanding of the size of facilities required to support this level of air cargo activity, a review of similar cargo facilities at other airports was conducted to calculate the approximate area of buildings, aprons, and support infrastructure (such as roads and parking lots) needed. For planning purposes, a summary of the approximate size of facilities needed to accommodate projected levels of air cargo activity should a dedicated operator establish an operation at the Airport is presented in **Table 4-44**.

Table 4-44: Air Cargo Facility Size Requirements

Facility	Approximate Size
Package sorting building/offices	7,000 sq. ft. – 13,000 sq. ft.
Aircraft apron	100,000 sq. ft. – 300,000 sq. ft.
Employee/delivery truck/ground support vehicle parking lots	30,000 sq. ft. – 70,000 sq. ft.
TOTAL	**137,000 sq. ft. – 383,000 sq. ft.**

Source: Mead & Hunt, Inc.

As illustrated in the table, approximately 137,000 square feet to 383,000 square feet of total area should be planned to support infrastructure necessary for a dedicated air cargo operation. Various factors such as the fleet mix of cargo aircraft, level of packaging transfer activity, available land for development, number of workers, and level of freight truck activity will ultimately determine the total amount of area needed. It is recommended sufficient area be planned to accommodate the infrastructure necessary to support an air cargo operation of at least two narrow-bodied aircraft daily. With consideration given to other site development needs such as driveways, landscaping, utilities, and storm water drainage, approximately ten acres of land is anticipated to be needed for air cargo operations. Alternatives presenting initial site layout and development plans are discussed in further detail in Chapter 5.

4.6.b Rental Car Service Facilities

Prior to 2008, a need was identified for improved rental car service facilities at the Airport. At the time, each rental car agency operated independent facilities that were located both on- and off-airport to service, clean, and maintain vehicles in-between rentals. These facilities were outdated, in need of improvements, and as a result of the increasing demand were reaching their capacity to process vehicles. Collaboration between the Airport and the individual car rental agencies identified a need for a consolidated vehicle service facility that could provide a modern, expanded, and centralized on-airport location to clean, refuel, service, and perform maintenance on rental car vehicles.

An eight-acre site south of the employee parking lot was selected for the development of a consolidated rental car service facility to be shared by each of the agencies conducting business at the Airport. Completed in 2008, the rental car service facility consists of two vehicle maintenance buildings, approximately 5,000 square feet and 7,500 square feet in size, as well as two fuel island canopies, a fuel storage area, and three surface lots with parking capacity for 578 vehicles. Each rental car maintenance building is equipped with vehicle bays, car washing equipment, vehicle lifts, and overhead hose reels that provide pressurized air and fluids for automobile engines while gasoline pumps and vacuums are installed at each of the fuel island canopies.

Findings from a comprehensive evaluation of long-term needs led to the planning and design of the rental car service facility; therefore, no significant infrastructure improvements are anticipated through the planning period. Since numerous unknown factors can greatly impact the demand for rental vehicles, it is recommended the facility be continually evaluated to determine if additional vehicle service bays, fuel storage capacity, vehicle service equipment, parking space, or other facility improvements are needed.

4.7 Summary

Overall, the level of investment and planning that has been made to improve facilities by the Airport over the years has positioned it well to meet the air transportation demands of the Western North Carolina region for the next 20 years. A review of existing infrastructure and its ability to accommodate projected levels of demand has identified a few areas that should be the focus of future facility planning and development at the Airport. The following summarizes these facility requirements that were identified in this chapter as a part of the facility requirement analysis:

- **Airfield Demand/Capacity –** An airfield demand/capacity analysis that reviewed factors affecting runway capacity such as weather conditions, number of local and itinerant operations, aircraft fleet mix, peak hour capacity, annual service volume, and range of delay found capacity at the Airport appears adequate for demand projected throughout the planning period.

- **Wind Coverage –** The airfield configuration and orientation of Runway 16/34 provides sufficient wind coverage that exceeds the FAA's recommended standards.

- **Airfield Design Standards –** In preparation of expected operations from larger passenger and cargo aircraft types, the airfield should be planned to meet ARC design group IV standards. The widths of most existing airfield surfaces meet group IV design requirements.

- **Critical Design Aircraft –** The current critical design aircraft should be changed from the Airbus A320 to the Boeing 737-700; the future critical design aircraft should be changed to the Boeing 757-200.

- **Runway 16/34 –** Review of the takeoff distance requirements for existing and anticipated commercial aircraft types indicates that the existing length of the 8,001 feet runway is sufficient to serve markets for the entire eastern United States and as far west as the Rocky Mountains. It is recommended alternatives be evaluated to extend the runway up to 10,000 feet, or to the maximum extent possible between the major physical constraints of the French Broad River to the north and North Carolina Route 280 to the south to support non-stop service to destinations on the west coast if or when such service is initiated.

  Paved shoulders are recommended for Runway 16/34 to meet runway design standards for ADG III and IV aircraft.

  A major rehabilitation or reconstruction of Runway 16/34 is recommended to address the following items that do not meet FAA design standards:

  - **Pavement Condition** – The PCI value and condition of existing runway pavement does not meet preferred industry standards and is anticipated to deteriorate to an unsatisfactory condition within five years.
  - **Longitudinal Grade –** The longitudinal grade of Runway 16/34 at the approach end of Runway 34 exceeds the allowable variance addressed in FAA design standards.
  - **Runway/Parallel Taxiway Separation –** An increased separation of 75 feet is needed between Runway 16/34 and parallel Taxiway A to meet the required 400 feet distance separation between centerlines to meet design standards for ARC Category III and IV aircraft.

  As a part of any future reconstruction of Runway 16/34, the following objects not fixed by function are recommended to be relocated outside of the runway safety area:

  - Runway 34 localizer antenna array
  - Runway 16 localizer antenna array and equipment building
  - Perimeter service road

  A portion of the perimeter fencing and drainage ditch along North Carolina Route 280 may need to be removed as it appears to penetrate the southeast corner of the RSA.

  The designation of Runway 16/34 should be changed to Runway 17/35.

Installation of in-pavement runway edge lights are needed at runway/taxiway intersection locations that are 200 feet longitudinally from adjacent edge lights to meet FAA standards.

Potential non-compliant fencing that extends up above the elevation of the RSA within the ROFA should be evaluated for removal as well as any trees along the west of Runway 16 near its approach end.

- **Taxiway Naming Designation –** It is recommended that if a parallel taxiway is planned for the west side of the airfield it should be named "Taxiway B" to align with the naming of the existing parallel Taxiway A while the existing connector taxiways between Taxiway A/Runway 16/34 and Taxiway A/aprons should be renamed "A1", "A2", "A3", etc., and "C", "D", "E", etc. from south to north, respectively.

- **Taxiway A –** It is recommended the 75 feet width of Taxiway A be retained in anticipation of future operations by ADG IV aircraft. Paved shoulders are also recommended to meet ADG III and IV airfield design standards.

  Planning must be initiated to change the topography along the east side of Taxiway A near its north and south junctures with Runway 16/34 to meet safety area requirements should the critical design aircraft be changed to ADG IV.

  Should the critical aircraft type change in the future to ADG IV, the increased width required for the Taxiway A object free area may require the relocation of a portion of the perimeter fencing near the ASOS unit and the throat of the service road at the intersection of Taxiway D1.

- **Taxiway R Manhole Cover –** Improvements may be needed to a manhole cover located within the taxiway fillet at the intersection of Taxiway R and Taxiway A if it is found to be non-compliant with taxiway surface gradient standards.

- **Taxiway P Transverse Grade –** Consideration should be given to correct an inverted low elevation portion of Taxiway P as it may not meet transverse grade design standards.

- **Taxiway H Width –** The width of Taxiway H needs to be increased to 75 feet in order to meet the design standards of ADG IV aircraft that are often parked on the south apron.

- **North Apron/Mid-Ramp Connector Taxiway Width –** An increase in taxiway width is needed for Taxiways D1, D2, F, and G to meet ADG III design standards as this is the most demanding category of aircraft to regularly taxi on the surfaces.

- **FAR Part 77 Surface Obstructions –** FAR Part 77 obstructions identified in the updated airspace plan as a part of the ALP update to be completed towards the conclusion of this master plan project should be removed if possible or identified with an obstruction light.

- **Air Traffic Control Tower –** Sites should be evaluated to relocate the air traffic control tower as the structure is outdated and nearing the end of its useful life.

- **Precision Instrument Approaches –** Planning should be initiated to protect airspace for a Category II or III precision instrument approach should a need be demonstrated in the future to improve the visibility and cloud ceiling height minimums at the Airport. Considerations should be given for the installation of an ALSF-2 runway approach lighting system and a mid-field RVR, if a Category II or III approach is developed for either runway end as well as touchdown zone lighting if such an approach is developed for Runway 16. Though it appears there is no justifiable need for a Category II or III precision instrument approach, the Airport should plan to protect for CAT II or III minimums and associated to Runway 16 and Runway 34 facilities to the extent feasible, for potential implementation in the future.

- **Specific Authorization For Category II Approaches –** Runway centerline lighting, touchdown zone lighting, and approach lighting on the approach end of Runway 34 allows airline operators to request specific authorization for a Category II approaches. Should airlines seek to request authorization for operations below 1,200 feet Runway Visual Range, a Surface Movement Guidance Control System plan will be required.

- **Precision Approach Path Indicator –**The Visual Approach Slope Indicator on Runway 34 is recommended to be replaced with a Precision Approach Path Indicator when it approaches the end of its serviceable life.

- **Airfield Signage –** Installation of an additional mandatory hold sign on Taxiway A is needed at the approach end of Runway 34 on the south side of the intersection. Replacement of the remaining mandatory hold signs with panels that have black boarders around the white legends is also needed to meet FAA standards. Also, replacement of guidance sign panels are recommended for those experiencing de-lamination of the retro-reflective background to improve visibility in nighttime and low-visibility weather conditions. In addition, several mandatory hold signs need to be relocated to align with the hold markings on the taxiway pavement surface.

- **Airfield Lighting –** In general, most airfield lighting equipment is old, requires high maintenance, and is inefficient since the intensity of power distributed through the system is lost due to age and deterioration of underground cabling. Replacement of aging, deteriorated, and inefficient electrical components is recommended to improve the reliability of the system.

- **ASOS Weather Equipment –** Consideration should be given to relocate the ASOS unit as its current location is a wingtip clearance concern for larger aircraft such as the Boeing 767 and 747 that occasionally conduct operations at the Airport. Siting for a relocated ASOS should also consider a location that is unaffected by heat radiating from nearby paved surfaces.

- **LLWAS Wind Shear Tower –** Consideration should be given by the FAA to relocate its LLWAS tower west of the Airport since its location may be an obstruction to the proposed temporary runway and it may interfere with the future development of the private property upon which it is located.

- **Terminal Apron –** Planning should be initiated for at least one or two additional parking locations on the terminal apron to accommodate late arriving or departing flights, future changes in airline flight schedules, charter activities, entrance of a new service carrier, or aircraft diversions from other airports.

- **Boarding Gates –** The terminal building should have at least six to eight boarding gates for commercial aircraft throughout the planning period; planning for the construction of at least one to three additional gates and passenger holding areas should occur.

- **Terminal Building –** An additional 20,500 square feet should be planned for the terminal building to meet the demands of tenants and passengers throughout the planning period.

- **Off-Airport Access –** It is recommended Airport staff participate in the planning of a proposed interchange re-design at the of Interstate 26 and North Carolina Route 280 to prevent temporary and permanent roadway access impacts to the Airport.

- **Landside Access Roadways –** An extension and widening of Wright Brothers Way to the north should be considered so landside access can be provided to the north general aviation site. While the existing networks of roadways on the east side of the Airport are considered to be in “good” condition, planning should also be initiated for preventative maintenance such as crack sealing throughout the planning period.

  Consideration should be given to the installation of a dedicated right turn lane on Terminal Drive at the intersection of North Carolina Route 280 to help alleviate congestion and traffic backups. In addition, development of a new roadway to create a direct route from the consolidated rental car service facility to the ready/return lot is recommended to reduce traffic congestion in front of the terminal building during peak periods and help to improve the efficiency vehicle transfers between the two locations.

  Construction of a commercial vehicle lane or curb lane for commercial vehicle operators away from the front of the terminal building is recommended to help reduce congestion between taxi, limousine, and shuttle van operations from pedestrian and personal vehicle traffic.

- **Public Parking Lot –** An expansion of the public parking facilities is needed to meet growing demands. There is currently a small public parking deficit of 17 spaces that is anticipated to grow to a deficit of 145 spaces in 2015 and eventually to 600 spaces in 2030. Additionally, a public parking need demonstrated by passengers is a reduced grade walking path from the long term and overflow parking lot to the terminal building. Consideration should also be given for additional public parking at the Advantage West facility and rehabilitation for those parking lot pavement surfaces that are considered to be in “fair” condition and are anticipated to need improvements within the planning period such as the lower long-term parking lot, employee parking lot, and the rental car ready/return lot.

- **Rental Car Ready/Return Lot –** An expansion of the rental car ready/return lot is needed to meet the existing deficiency in available parking spaces. An anticipated 190 parking spaces is projected to be needed to accommodate demand by 2030.

- **Based Aircraft Storage –** Planning should be initiated for the construction of an additional box-style hangar or hangars with an available capacity of at least 52,500 square feet to accommodate anticipated demand. Development of an additional 15 T-style hangar units should also be planned to meet the projected increase in single engine based aircraft.

- **Apron Pavement Condition –** It is recommended the pavement strength of the north ramp and the mid-apron be increased to accommodate large business jet aircraft such as the Global Express and the Gulfstream G550 on these surfaces. The weight bearing capacity of the south apron should also be increased to accommodate ADG III and IV aircraft on the surface at their maximum gross weights. In addition, deteriorated sections of apron pavement surfaces that have excessive cracks, severe spalling, loose debris, and depressions or low spots should be repaired.

- **Department of Public Safety Facility/Aircraft Rescue and Fire Fighting –** It is recommended that the design of the new DPS facility include increased area for workspaces, storage of equipment and materials, and larger apparatus bays for next generation ARFF equipment.

- **ARFF Index Classification –** Though the existing Index B classification of aircraft rescue and fire services appears adequate to meet FAR Part 139 firefighting requirements throughout the planning period, consideration should be given to meet Index C requirements should the frequency of average daily operations from larger aircraft types exceed projections. Any new ARFF facility should be planned to accommodate future Index C requirements.

- **Terminal Building Maintenance Facilities –** Improved and expanded facilities are needed for the storage of deicing chemicals and maintenance equipment at the terminal building

- **Aircraft Fuel Storage –** Overall, it does not appear additional aircraft fuel storage capacity will be needed to meet anticipated demand throughout the planning period unless it is found necessary to maintain a one week supply of Jet-A fuel. Should this be desired, planning should be initiated by 2015 to construct an additional tank or tanks.

- **Air Cargo Development –** Consideration should be given to plan for a dedicated air cargo operation at the Westside Development site after the fill and grading project with fly ash coal combustion project is complete. Development of an air cargo facility is supported by past inquiries from air cargo operators, the Airport's location near major regional traffic arteries, and its centralized location between major population centers. Should such a facility be constructed, additional taxiways and landside access may be needed on the west side of Runway 16/34.

Chapter 5
Alternatives Analysis

Alternatives presented in this chapter offer feasible development options to address infrastructure needs that were identified through the review of existing facilities and their ability to meet projections of future aviation demand. Each alternative presented in this chapter takes into consideration the long-term needs of the Asheville Regional Airport (Airport) while also addressing development actions necessary to meet immediate and short-term demands. The goal of this analysis was to focus on the advantages and disadvantages of each development option considering economic, operational, and environmental factors in an effort to identify a preferred alternative for each facility need.

Each alternative was quantitatively or qualitatively ranked based on its evaluation with the other proposed development options to satisfy each facility need. Tangible and intangible implementation factors as well as the ability of each alternative to meet the long-term goals and objectives of the Airport were also considered as a part of this evaluation. The alternative that most effectively addressed the needed infrastructure improvement considering these factors was selected as the preferred alternative. It should be noted that some preferred alternatives were based on a single, logical development option, and as a result, a comprehensive analysis that involved comparing several development options was not conducted. Since alternatives presented in this chapter are conceptual in nature they are subject to further refinement through financial, environmental, and engineering means.

The analysis of development options and selection of the preferred alternative for each facility requirement is presented in this chapter by the following sections:

- 5.1 Methodology and Evaluation Criteria
- 5.2 Runway 16/34
- 5.3 Taxiway System
- 5.4 Airport Traffic Control Tower (ATCT)
- 5.5 Automated Surface Observation System (ASOS)
- 5.6 Terminal Area
- 5.7 Terminal Curb Front
- 5.8 General Aviation Development
- 5.9 Vehicle Parking

5.1 Methodology and Evaluation Criteria

In order to analyze the alternatives for each facility need, a set of evaluation criteria was established to review the advantages and disadvantages of the proposed development options. Merits and deficiencies were then compared and ranked with other alternatives based on quantitative or qualitative factors. This methodology centered on the following factors that were used to evaluate alternatives presented in this chapter:

- **Operational Factors –** Alternatives were evaluated for their ability to accommodate projected demand throughout the planning period that included aircraft operations, enplanements, vehicle traffic, based aircraft, air cargo activity, fuel sales, and the demand for hangar/apron space. This evaluation criterion focused on the advantages and disadvantages to address such operational factors as aircraft delay, airfield circulation, and convenience to Airport users.

- **Economic Factors –** Qualitative economic factors such as construction and life cycle costs were considered in comparing the cost effectiveness of the available development options. It should be noted that this economic evaluation did not focus only on the cost to design and construct each alternative but also operational and maintenance expenses associated with day-to-day operation.

- **Environmental Factors –** Though a more in-depth overview of the environmental factors that could impact development around the Airport are presented in Chapter 6, this element focused on those environmental conditions that would be directly impacted by the proposed development such as noise, air quality, water quality, scenic oversight, land use impacts, and socioeconomic impacts. A comparison of the number and types of environmental categories impacted by the available development options was factored in the selection of the recommended alternative.

- **Implementation Feasibility –** Often there are several factors both tangible and intangible that affect the ability to implement an infrastructure improvement project at an airport. Consideration of this factor focused on a qualitative analysis of an alternative to help support or negate the feasibility of implementing the proposed action. Such factors that were considered in this analysis included logic, common sense, and the probability of unknown contingencies.

Each section of this chapter addresses a need that was identified through the analysis of facility requirements and is organized so that the evaluation of all development options follows a structure that is based on the previously described evaluation criteria. A summary table presented at the end for each alternative discussion reviews advantages and disadvantages for comparison with the other proposed development options. The preferred alternative along with justification supporting why it is the recommended course of action for the Airport to follow over the ensuing 20-year planning period is presented at the end of each section.

5.2 Runway 16/34

As noted in Chapter 4, Runway 16/34 is in need of several improvements to meet Federal Aviation Administration (FAA) design standards outlined in Advisory Circular (AC) 150/5300-13, *Airport Design*. Since it is projected Airplane Design Group (ADG) III and IV aircraft are anticipated to increase in operation at the Airport over the 20-year planning period, several improvements are needed to Runway 16/34 that include:

- Improving the longitudinal grade of the runway to meet allowable variance standards.
- Increasing the separation between Runway 16/34 and parallel Taxiway A by 75 feet to meet the 400-foot distance separation requirement between centerlines.
- Removing or relocating non-compliant objects within the Runway Safety Area (RSA) and Runway Object Free Area (ROFA) such as perimeter fencing, trees, drainage ditching, perimeter service road, Runway 34 localizer antenna array, Runway 16 localizer antenna array, and the Runway 16 localizer equipment building.
- Constructing paved shoulders to meet airfield design standards for ADG III and IV aircraft.

In addition, a major rehabilitation or reconstruction of Runway 16/34 is needed to improve the condition and Pavement Condition Index (PCI) value of the surface since it does not meet preferred industry standards and is anticipated to deteriorate to an unsatisfactory condition within five years. Other improvements needed include:

- Increasing the runway length if non-stop service is desired to markets west of the Rocky Mountains.
- Installing in-pavement edge lighting at runway/taxiway intersection locations that are longitudinally located 200 feet from adjacent edge lights.

Based upon these needs identified through the review of facility requirements, five alternatives were developed that offer feasible solutions to improve Runway 16/34 and correct the items that do not meet current FAA design standards as listed above. The following describes each proposed development action as well as evaluates advantages and disadvantages based on operational, economic, environmental, and implementation factors.

5.2.a Alternative 1 – Relocate Runway 75 Feet To The West

Alternative 1, illustrated in **Figure 5-1**, proposes to shift or relocate Runway 16/34 a distance of 75 feet to the west in order to obtain a 400foot separation between the centerlines of the runway and parallel Taxiway A to meet FAA runway design requirements for ADG III and IV aircraft. As a part of this project, the connector taxiways between the runway and Taxiway A would also be extended 75 feet while an acquisition of 4.47 acres would be needed to control land uses within the relocated Runway Protection Zones (RPZs) at each end of the runway.

- **Operational Factors –** Shifting the runway 75 feet to the west would meet separation standards between the runway and parallel taxiway centerline for ADG III and IV aircraft and provide a sufficient safety margin between aircraft operating simultaneously on Taxiway A and Runway 16/34. Since the footprint of the relocated runway would overlap the footprint of the existing runway, closure of the entire airfield would be necessary and would affect all operations at the Airport for approximately six months.

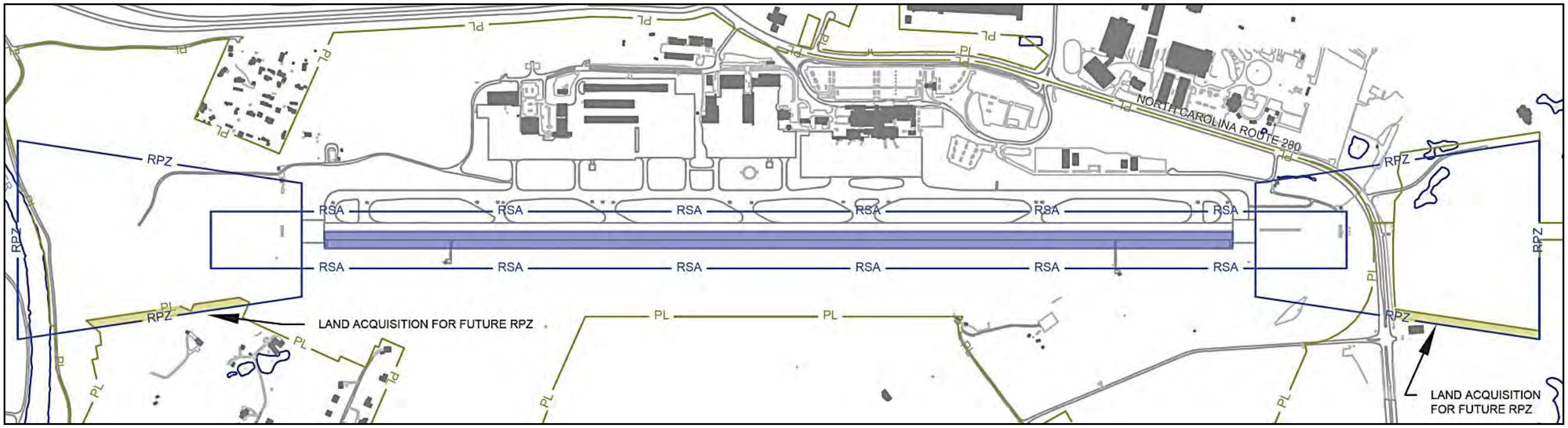
- **Economic Factors –** The cost of Alternative 1 from a construction standpoint is the less expensive option to increase separation between the runway and parallel Taxiway A; however, the indirect economic impacts during construction would be considerably significant. Most business activity at the Airport would most likely be halted during the anticipated six months of construction since the airfield would be closed. This would also significantly impact the entire Western North Carolina region which relies on the Airport for the transportation of people, goods, and services to and from the region.

- **Environmental Factors –** No significant impacts to the surrounding environment would occur with implementation of this alternative. A total of approximately 4.47 acres of currently undeveloped land would need to be acquired to control land uses within the relocated RPZs at each end of the runway. Though the runway would shift 75 feet to the west, noise contours established for the existing runway would remain relatively unchanged and within the existing footprint of the Airport.

- **Implementation Factors –** Implementation of this alternative would require that the Airport remain closed throughout the entire course of the project which is not feasible given the importance of the Airport in serving the Western North Carolina region. Closure of the Airport would restrict the movement of people, goods, and services which would impose unnecessary economic and quality of life hardships on businesses, institutions, and residents.

Table 5-1 summarizes the advantages and disadvantages of Alternative 1.

Figure 5-1: Alternative 1 – Relocate Runway 75 Feet to West



Source: Mead & Hunt, Inc. (2012)

Table 5-1: Alternative 1 Summary	
Advantages	**Disadvantages**
• Minimal cost to design and construct alternative • Corrects the separation distance between the runway and parallel taxiway centerlines • No significant environmental impacts • Minimal land acquisition required within RPZs • Runway noise contours remain relatively unchanged	• Requires the Airport to be closed for an approximate 6 month period. • Significant economic impacts to Airport businesses and surrounding community during construction • Not feasible to close Airport for an approximate 6 month period for construction.

5.2.b Alternative 2 – Relocate Taxiway A 75 Feet To The East

Alternative 2 proposes to relocate parallel Taxiway A and its associated connector taxiways between the runway 75 feet to the east in order to provide sufficient separation between Runway 16/34 and Taxiway A. Grading and fill of land located east of the taxiway near each approach end of the runway would be required to accommodate the taxiway pavement and associated safety area. The relocation of several objects would also be needed with this alternative, including an airfield service road near the Landmark Aviation facility, the segmented circle and lighted wind cone near the South Apron, airfield perimeter fencing adjacent to the employee parking lot, Rental Car Drive adjacent to the rental car service facility, and Automated Surface Observing System (ASOS) weather equipment south of the employee parking lot.

- **Operational Factors –** Relocating Taxiway A 75 feet to the east would provide sufficient separation between the runway and parallel taxiway so that FAA design standards would be met for ADG III and IV aircraft. This would also provide adequate wingtip clearance should the largest type of aircraft from each ADG passes each other simultaneously while operating on Taxiway A and Runway 16/34. Implementation of Alternative 2 would not require complete closure of the airfield; however, partial closures of the taxiway during construction would require aircraft to back-taxi on the runway, reducing airfield capacity and possibly increasing flight delays and cancellations. Additionally, a temporary air carrier apron at a remote location could be necessary to support commercial airline operations during taxiway construction since the capacity of the terminal apron will be reduced.

  Since aircraft would be occupying the runway for an increased amount of time during partial closures of the existing parallel taxiway, the risk of a runway incursion is raised during the implementation of this alternative. Combined with the non-standard longitudinal grade of Runway 16/34 that prevents a clear line-of-sight from the opposite ends of the runway, additional measures such as the Airport Traffic Control Tower (ATCT) remaining operational 24 hours a day during construction may be needed to mitigate this risk. Likewise, the risk of a taxiway incursion is also increased with this alternative since the pushback of many commercial aircraft types from terminal gates would occur directly into the controlled movement area of Taxiway A.

  Other operational factors to consider is that Alternative 2 does not offer a solution to correct the non-standard longitudinal grade of Runway 16/34 or the relocation of objects not fixed by function within the runway safety area. It also does not offer an option to construct paved shoulders on Runway 16/34 as required by FAA AC 150/5300-13, *Airport Design* nor does it offer a solution to correct the deteriorating condition of the pavement on Runway 16/34. Also, this alternative requires the relocation of the segmented circle and ASOS weather unit in which potential airfield sites for these devices are limited as a result of the surrounding topography and other proposed airfield development.

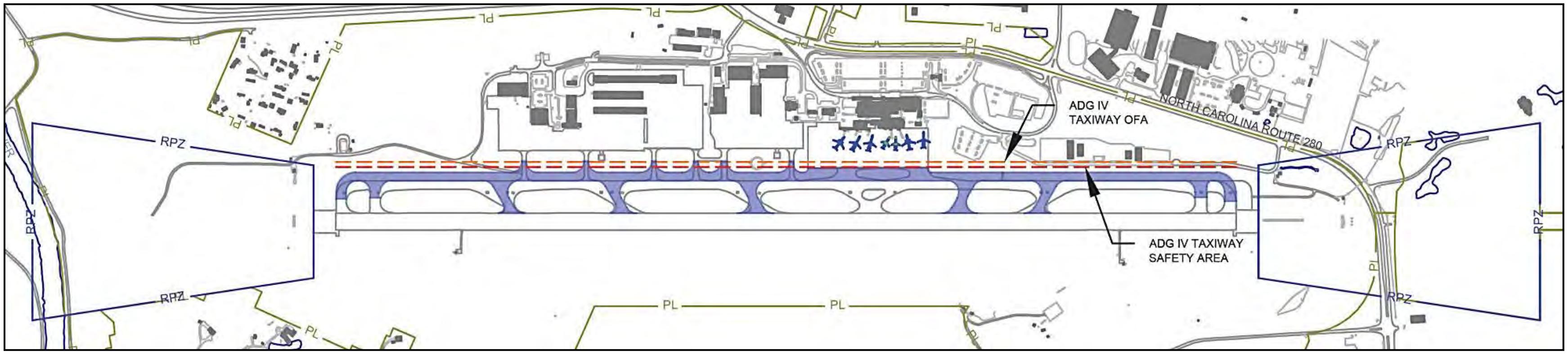
- **Economic Factors –** Considerable cost for the implementation of this alternative would be for the fill material needed to grade the topography of the land along the east side of the taxiway near the approach ends of the runway. In addition, another economic factor to consider is that relocation of the taxiway would reduce available development area on the east side of the airfield which would impact revenue producing opportunities for the Airport.

- **Environmental Factors –** No land acquisition would be needed to implement Alternative 2 and no long-term significant environmental impacts are anticipated, though short-term environmental impacts may include reduce air quality as a result of construction equipment. Best industry practices and approval from federal, state, and local authorities would be needed to help prevent and mitigate the impacts of erosion and storm water drainage.

- **Implementation Factors –** Relocating the taxiway 75 feet to the east would place the taxiway safety area within a 10 foot lateral distance from Rental Car Drive; however, this 10 foot lateral distance is separated by approximately 30 feet of elevation change as a result of the difference between the grade of the taxiway and the grade of the roadway. As a result, a retaining wall would be necessary that would force the relocation of Rental Car Drive. Limited options are available to realign the roadway without changing the layout of the rental car service facility. Considering the time, labor, expenses, and level of mobilization needed to transport offsite fill material, construct a retaining wall, and revise the recently constructed rental car service facility, the cost-effective goal of this alternative may not be feasible.

Alternative 2 is illustrated in **Figure 5-2** while a summary of advantages and disadvantages is presented in **Table 5-2**.

Figure 5-2: Alternative 2 – Relocate Taxiway A 75 Feet To The East



Source: Mead & Hunt, Inc. (2012)

Table 5-2: Alternative 2 Summary

Advantages	Disadvantages
• Corrects runway to taxiway separation deficiency • Does not require runway closure • No land acquisition needed • No significant environmental impacts	• Back-taxiing on runway required during construction, leading to reduced capacity and increased chance of a runway incursion • Commercial apron taxilane is eliminated requiring many pushbacks of commercial aircraft from terminal gates to occur directly into the controlled movement area of Taxiway A. • Significant grading and fill material required for Taxiway A relocation • Edge of relocated taxiway safety area approximately 10 feet laterally from Rental Car Drive and 30 feet vertically between grades of the safety area and roadway. A required retaining wall would force the relocation of Rental Car Drive, impacting the layout of the rental car service facility • Does not correct the longitudinal grade of the runway, the need for paved runway shoulders, relocation of non-compliant objects within the runway safety area and object free area, or correct the deterioration of existing runway pavement

5.2.c Alternative 3 – Relocate Runway 250 Feet To The West

Alternative 3 proposes a 250-foot shift of Runway 16/34 to the west from its present location to meet FAA design runway/parallel taxiway separation requirements. The 250-foot relocation of the runway as proposed in this alternative is based on the maximum distance the runway can be shifted and still provide clear approaches considering the surrounding topography of the land. In addition to the relocation of the runway, this alternative also proposes a 250-foot extension of the connector taxiways between the runway and parallel Taxiway A. Approximately 15 acres of land acquisition would also be needed to control land uses within the relocated RPZs in addition to approximately 27.3 acres of additional land that may need acquisition or easements for possible obstruction clearing within the transitional surface.

- **Operational Factors –** While Alternative 3 offers a solution to correct the non-standard separation between Runway 16/34 and parallel Taxiway A, it would require a substantial closure of the Airport during periods when construction would occur within the safety area of the existing runway since the safety areas of both the relocated runway and existing runway overlap. Closure of the airfield would significantly impact most aeronautical and non-aeronautical activities at the Airport in addition to the air transportation demands of the Western North Carolina region. It should also be noted that while this alternative offers the opportunity for the relocation of parallel Taxiway A to the west, opening up additional areas for development on the east side of the airfield, it would diminish opportunities for aeronautical-related development within the northwest and southwest general aviation development areas.

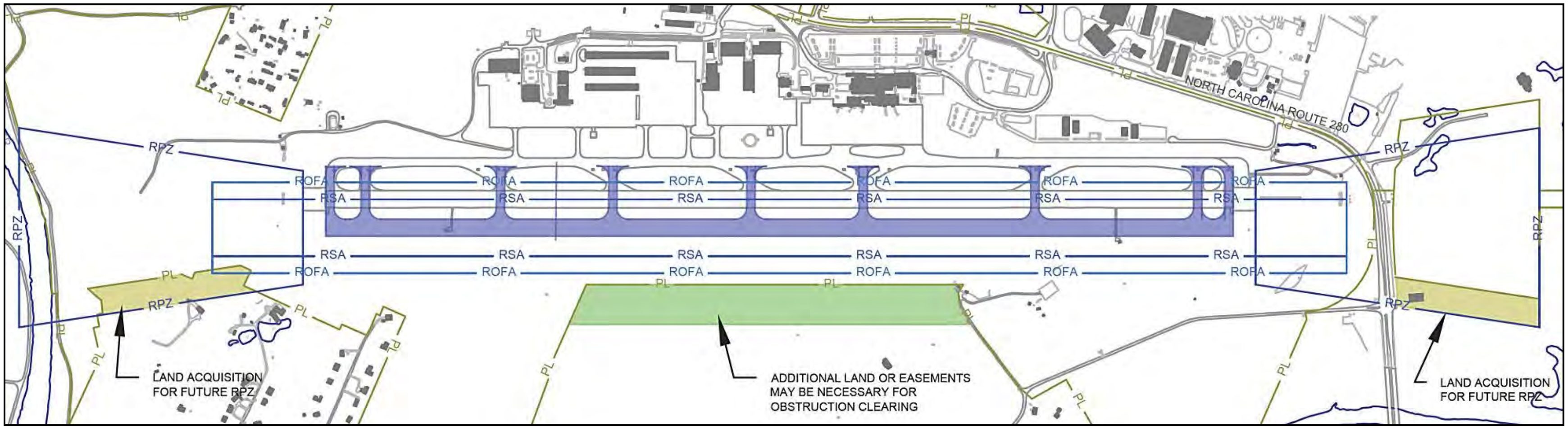
- **Economic Factors –** From a qualitative perspective, the cost to implement this alternative is not significantly greater than compared to Alternative 1; however, consideration should be given to the cost associated with the land acquisition necessary to control land uses within the relocated RPZs. Additional cost is also anticipated based on the additional land acquisition or easements that may be necessary for obstruction clearing within land west of the relocated runway. The direct and indirect economic impact of this alternative is quite significant since the Airport, tenants, and other businesses that rely on aeronautical activity would be greatly affected during the periods the Airport is closed for construction. Likewise, the economic well-being of the surrounding region would also be impacted since the transport of people, goods, and services necessary for business activity would be constrained during periods the Airport is closed.

- **Environmental Factors –** Though implementation of this alternative would occur mostly within the existing footprint of Airport property, over 42 acres of land acquisition and easements may be needed to control land uses and obstructions within airfield design surfaces such as RPZs and the runway transitional surface. In addition, as a result of the surrounding topography, significant grading and filling is anticipated in order to meet design standards for the longitudinal grade of the relocated runway and associated safety area. Industry best practices that meet federal, state, and local requirements would also be necessary during construction to prevent erosion and reduce or prevent impacts to air and water quality.

- **Implementation Factors –** Substantial closure of the Airport needed to implement this alternative is a major factor to consider when evaluating its feasibility. Similar to the evaluation of implementation factors for Alternative 1, closure of the Airport would impact the transport of people, goods, and services throughout the Western North Carolina region and impose unnecessary economic and quality of life hardships. In addition, the phasing of construction that would be required to minimize the time needed to close the existing runway as a result of overlapping runway safety areas would complicate the construction process and may increase the probability of a safety area violation such as an incursion or non-standard condition.

Figure 5-3 illustrates the proposed 250 foot relocation of Runway 16/34 to the west while **Table 5-3** summarizes its advantages and disadvantages.

Figure 5-3: Alternative 3 – Relocate Runway 250 Feet To The West



Source: Mead & Hunt, Inc. (2012)

Table 5-3: Alternative 3 Summary

Advantages	Disadvantages
• Corrects runway/parallel taxiway separation deficiency • Allow for relocation of Taxiway A to the west, which opens up some additional development areas on the east side of the airfield	• Substantial closure of the Airport required during periods the runway is being construction within the existing runway safety area • Diminished areas for aeronautical development on the west side of the airfield • Potential airspace impacts within the relocated transitional surface on the west side of the airfield as a result of surrounding topography • Significant economic and quality of life impacts to the surrounding community as a result of runway closure

5.2.d Alternative 4 – West Side Parallel Taxiway/Relocate Runway 75 Feet To The West

Alternative 4 proposes the construction of a west side parallel taxiway to be used as a temporary runway while Runway 16/34 is relocated 75 feet to the west. Upon completion of the relocated runway, the temporary runway would revert into a west side parallel taxiway that would be used to support planned aeronautical development on the west side of the airfield. Approximately 38.9 acres of land within temporary and permanent relocated airfield design surfaces would need to be controlled through acquisition or easements to prevent incompatible land uses and obstructions. In addition, connector taxiways on the east side of the runway would also need to be extended 75 feet while new connector taxiways between the runway and the west side parallel taxiway would need to be connected.

- **Operational Factors –** Alternative 4 offers a solution to correct the separation between Runway 16/34 and parallel Taxiway A while permitting Airport operations to continue uninterrupted during construction. Additionally, it also offers a solution to correct the non-standard longitudinal grade with the existing runway as well as provides an opportunity to construct paved shoulders and relocate non-compliant objects outside of the runway safety area. Conversion of the temporary runway into a parallel taxiway after construction is complete would help support the development of general aviation facilities on the west side of the airfield since infrastructure would already be in place to provide access to these areas from the runway. Though Alternative 4 offers many advantages, one challenge would be establishing a precision instrument approach to the temporary runway while the existing runway is closed. There is the potential for significant project delays as a result of the time needed to relocate or install new glide slope and localizer equipment and develop and publish new flight procedures for the temporary runway. Prior coordination with the FAA to expedite this process will be essential to minimize the time necessary to implement this process.

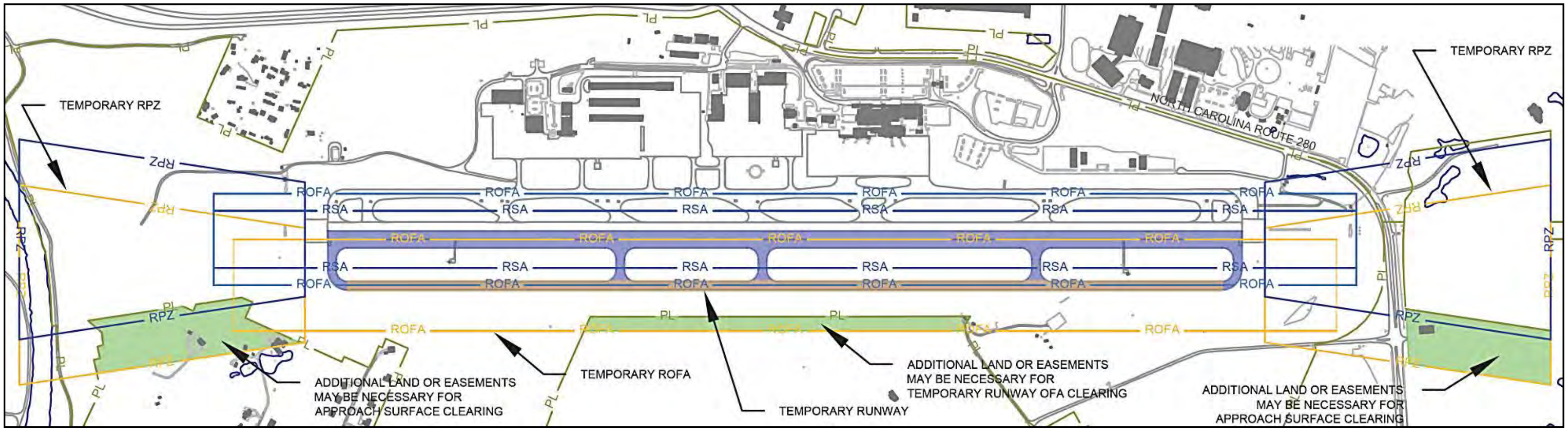
- **Economic Factors –** Qualitatively speaking, Alternative 4 offers a relatively economical solution to correct the non-standard separation between Runway 16/34 and the parallel taxiway. As a result of an ongoing fill project, there would be minimal cost associated with filling and grading the land within the area of the temporary runway/future parallel taxiway and its associated safety area. Likewise, Alternative 4 offers minimal adverse economic impacts to the surrounding region since aircraft operations would continue with little interruption during construction. This would allow businesses and other drivers of economic activity that rely on aviation for the transport of people, goods, and services to be minimally affected during construction.

- **Environmental Factors –** While most of the proposed site for the relocated runway is within the existing footprint of Airport property, approximately 38.9 acres of land acquisition would be needed to control land uses and objects of height within the temporary and permanently relocated airfield design surfaces such as RPZ, ROFAs, and transitional surface. No significant environmental impacts are anticipated with implementation of this alternative if all construction activities are performed in accordance with industry best practices and all applicable federal, state, and local environmental regulations.

- **Implementation Factors –** Alternative 4 offers many advantageous implementation factors to consider when evaluation options to correct the non-standard separation between Runway 16/34 and parallel Taxiway A. Most notably, implementation of this alternative does not require a partial or complete closure of the Airport which would allow aeronautical activities to continue with little interruption during construction. This advantage is a considerable factor to be cognizant of when comparing the runway alternatives since Alternatives 1, 2, and 3 require a partial or complete closure of the Airport. Since the Airport would remain operational, it could continue supporting the air transportation demands of the surrounding region. The long-term air transportation demands of the region will also benefit from an improved runway that would be well-suited to meet the projected level and type of aeronautical activity projected for the 20-year planning period. It should also be noted that implementation of this alternative will not significantly impact future infrastructure improvement opportunities at the Airport since adequate land would still be available to the east and west of the runway for aeronautical and non-aeronautical development opportunities.

Figure 5-4 illustrates the west side parallel taxiway/temporary runway concept as proposed by Alternative 4 while **Table 5-4** summarizes its advantages and disadvantages.

Figure 5-4: Alternative 4 – West Side Parallel Taxiway/Relocate Runway 75 Feet To The West



Source: Mead & Hunt, Inc. (2012)

Table 5-4: Alternative 4 Summary

Advantages

- Corrects runway/parallel taxiway separation deficiency
- Allows simultaneous operations by ADG III and IV aircraft on the runway and parallel taxiway
- Offers solution to also correct Runway 16/34's longitudinal grade, install runway shoulders, and relocate non-standard objects within safety area
- Airport does not require partial or complete closure during construction
- Temporary runway can be converted into a parallel taxiway which can help support aeronautical development on the west side of airfield
- Does not restrict other areas of the Airport for future aeronautical infrastructure development
- The economy of the surrounding region is not significantly impacted during construction since a partial or complete closure of the Airport is not necessary
- No significant environmental impacts are anticipated

Disadvantages

- Significant fill and grading cost required for construction of temporary runway/future west side parallel taxiway
- Land acquisition/easements needed for temporary and permanent relocated airfield design surfaces
- Project delays may be experienced with the establishment of precision instrument approaches to the temporary runway.

5.2.e Runway/Parallel Taxiway Separation Preferred Alternative

A qualitative review of Alternatives 1, 2, 3, and 4 found that Alternative 4 offers the most preferred solution to correct the identified deficiencies with Runway 16/34 considering operational, economic, environmental, and implementation factors. Alternative 4 proposes to relocate the runway 75 feet to the west in order to provide sufficient separation between parallel Taxiway A that meets airfield design standards outlined in FAA AC 150/5300-13, *Airport Design*. To avoid interrupting aircraft operations, Alternative 4 also proposes to also construct a temporary runway that would serve as a parallel taxiway to support future aeronautical development on the west side of the airfield once construction of the relocated runway is complete.

Since the Airport has a single runway, significant consideration was given in the selection of a preferred alternative to a development option that would not impact aircraft operations during construction. Alternative 4 offers the only solution that allows aircraft operations to continue uninterrupted during construction of the relocated runway since it proposes to utilize a temporary runway. While Alternative 2 does not require a closure of the runway, it does require aircraft to back-taxi on the runway during construction of the relocated taxiway that would reduce the throughput capacity of the runway, potentially leading to an increase in delays for arriving and departing flights. Alternative 3 requires temporary Airport closures during phases of construction occurring with the existing runway safety area while Alternative 1 requires a complete closure of the Airport for the entire duration of construction.

Implementing Alternative 4 allows the Airport to improve the deteriorating pavement of the existing runway, install paved shoulders, and relocate non-compliant objects within the runway safety area. While Alternative 2 offers a solution that is simple in concept to increase the separation between the runway and parallel taxiway, it requires a future runway rehabilitation project and safety area improvement project to correct these deficiencies.

Alternative 4 offers the only option that does not significantly impact Airport businesses, quality of life, or the economy of the surrounding region since use of the temporary runway allows aircraft operations to continue uninterrupted during construction. Considering these factors, the advantage of Alternative 4 over Alternative 2 is that Alternative 2 would restrict the type of aircraft that could operate at the Airport during construction since limited room would be available on the runway for aircraft to complete a 180 degree turn in transition to back-taxi. This would restrict aircraft types with long wheel base distances from operating at the Airport during construction which may impact flight schedules and efficient movement of people, goods, and services to and from the region. In comparison to the complete closure of the Airport required to implement Alternative 1 and the partial closures of the Airport required to implement Alternative 3, both of which would significantly impact Airport businesses, economic activity, and quality of life throughout the region, Alternative 4 offers the most feasible solution when considering these factors.

Other factors that were considered in the determination of a preferred alternative is that no significant environmental impacts are anticipated with Alternative 4 other than the fill and grading of land needed for construction and the land acquisitions/easements needed to control land uses and objects of heights within airfield design surfaces. Fill and grading of land needed to implement this alternative would occur within the existing footprint of Airport property while land acquisition/easements needed would be for currently undeveloped land. Alternative 4 offers the fewest environmental impacts as compared to the significant fill and potential erosion and storm water damage associated with Alternative 2 and the fill and grading of previously undisturbed land associated with Alternative 3.

Alternative 4 also practices environmental sustainability with the reuse of the temporary runway as a parallel taxiway and serves as an investment for infrastructure development on the west side of the airfield. The location of the relocated runway and parallel taxiway in Alternative 4 allows the west side of the airfield to be developed for aeronautical uses that would otherwise be limited for these uses in comparison with Alternative 3. Alternative 4 also does not impact areas for future general aviation development on the east side of the airfield, the consolidated rental car service center, or the terminal area since Taxiway A can remain in its existing location unlike the concept proposed in Alternative 2.

Though project delays may be experienced as a result of the coordination needed to establish instrument approach procedures for the temporary runway, Alternative 4 offers the most feasible option to increase the separation between Runway 16/34 and parallel Taxiway A considering operational, economic, environmental, and implementation factors. The avoidance of a complete closure of the Airport during construction so that aeronautical activity can continue uninterrupted without a reduction in capacity strongly supports the justification of Alternative 4 as the preferred alternative. Therefore, it is recommended that Alternative 4 be considered to correct the deficiencies identified for Runway 16/34.

5.2.f Alternative 5 – Extend Runway 1,300 Feet To The North

Identified as a part of the facility needs analysis, the existing 8,001 foot length of Runway 16/34 was found sufficient to satisfy the runway length requirements of existing and future aircraft types serving markets east of the Rocky Mountains throughout the 20-year planning period. However, since the Airport has occasionally received inquiries regarding non-stop flights to destinations west of the Rocky Mountains, planning should be initiated for an extended runway if a future need is identified. Alternative 5 proposes a 1,300-foot extension to the north of Runway 16/34 based on the relocation of the runway as illustrated in Alternative 4. In addition to the runway extension, Alternative 5 also incorporates an extension of the existing and future west side parallel taxiway as well as the addition of a holding apron on Taxiway A at the approach end of Runway 16. The 1,300 foot extension proposed in this alternative is based on longest runway length that could be achieved without altering controlling objects to the north and south of the runway such as the French Broad River and North Carolina Route 280. A total of approximately 83.7 acres of land may be needed; acquisition of approximately 44.8 acres of land would be required in order to control land uses within the relocated RPZ at the approach end of Runway 16. An additional 38.9 acres of land may be needed to clear objects within the RPZs and ROFA for the temporary runway if it is decided to extend the runway at the same time as its relocation.

- **Operational Factors –** Increasing the length of Runway 16/34 by 1,300 feet maximizes the available takeoff and landing distance of the runway without impacting the French Broad River to the north and North Carolina Route 280 to the south. The increase in runway length would allow most existing and projected commercial service aircraft types to operate non-stop flights from the

Airport to west of the Rocky Mountains to such markets as Salt Lake City, Seattle, Portland, San Francisco, Los Angeles, and San Diego without making concessions to fuel and passenger loads.

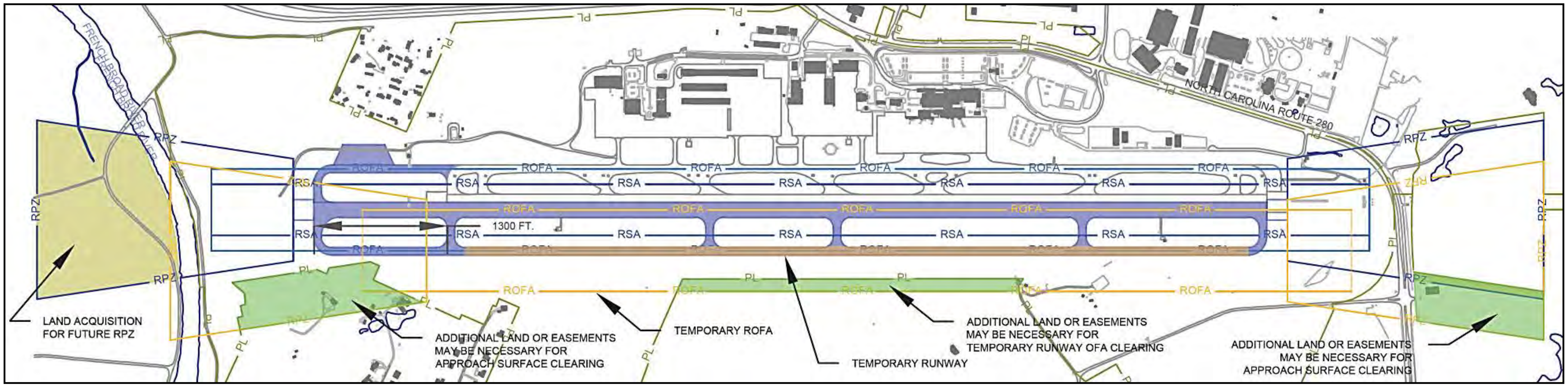
- **Economic Factors –** It is anticipated that significant cost associated with the implementation of this alternative would be for the fill and grading of land required for the extension of the runway and runway safety area. Additional project expenses are anticipated for the acquisition of land and easements that would be needed to control land uses within relocated airfield design surfaces such as the RPZ and ROFA. The economic benefit of the runway extension to the Western North Carolina region would be considerably measurable since the increase in destinations that could be achieved non-stop from the Airport would help further facilitate commerce and the efficient movement of people, goods, and services.

- **Environmental Factors –** Significant property acquisition and easements (up to 83.7 acres) would be required as a part of this alternative to control land uses and objects of height within the RPZ and ROFA of the relocated airfield design surfaces. However, this will be dependent on whether the runway extension coincides with the relocation of the runway proposed in Alternative 4. It should also be noted that the relocation of a few residents within the RPZ of the extended runway at the approach end of Runway 16 might be necessary since the boundary of this airfield surface designed to protect people and property on the ground extends over this area.

- **Implementation Factors –** The runway extension proposed in Alternative 5 could be incorporated with Alternatives 1, 2, and 3 as well if it is decided at the time of implementation that another alternative option is preferred to correct the non-standard separation between the runway and the parallel taxiway. Also, a temporary reduction in runway length would be necessary during construction of the extension in order to meet runway safety area requirements outlined in FAA AC 150/5370-2F, *Operational Safety on Airports During Construction*. This temporary reduction in available takeoff and landing distance may impact aircraft operations as concessions in fuel, passenger, and cargo loads may be needed to operate from the shorten runway that would temporarily limit the range of destinations that could be reached non-stop from the Airport during construction.

A 1,300 foot extension of Runway 16/34 to the north as proposed in Alternative 5 based on the configuration of the airfield recommended in Alternative 4 is presented in **Figure 5-5**. Advantages and disadvantages of Alternative 5 are summarized in **Table 5-5**.

Figure 5-5: Alternative 5 – Extend Runway 1,300 Feet To The North



Source: Mead & Hunt, Inc. (2012)

Table 5-5: Alternative 5 Summary

Advantages	Disadvantages
• Maximizes runway length between controlling factors to the north (French Broad River) and the south (North Carolina Route 280) • Provides runway length needed for existing and future commercial aircraft types to conduct non-stop flights to the west coast without needing to make concessions in fuel, passenger, or cargo loads • Proposed extension could be incorporated into any one of the runway/parallel taxiway separation alternatives • Provides the region with a valuable economic development tool that can help facilitate the efficient movement of people, goods, and services.	• Significant property acquisition/easements may be needed to control land uses and obstruction clearing • May require relocation of residents north of French Broad River located within future RPZ • Significant cost required for needed fill and grading to construct runway extension • Temporary reduction in runway length during construction to meet runway safety area standards

5.2.g Runway Extension Preferred Alternative

As a result of the French Broad River to the north and North Carolina Route 280 to the south, available options to increase the length of Runway 16/34 are limited. Alternative 5 offers the most logical solution considering these controlling factors and is recommended as the preferred alternative. It should be noted that although illustrated as a part of the airfield configuration presented in Alternative 4 to correct the separation between the runway and parallel taxiway, Alternative 5 could also be implemented in conjunction with Alternatives 1, 2, and 3. Though it was determined through the review of facility requirements that a runway extension is not anticipated to be needed for existing and projected commercial aircraft types operating at the Airport to serve markets east of the Rocky Mountains throughout the 20-year planning period, consideration should be given to Alternative 5 if non-stop flights to the West Coast is desired. Since the Airport has occasionally received inquiries in the past concerning non-stop flights to destinations west of the Rocky Mountains, Alternative 5 is presented for initial planning and conceptual purposes should it be determined that additional runway length is needed. It is recommended that this runway extension concept be considered if a need is presented in the future for additional runway length.

5.3 Taxiway System

The review of facility requirements found that improvements to the taxiway system are needed at the Airport in order to meet design standards outlined in FAA AC 150/5300-13, *Airport Design*. Most of these improvements are based upon the taxiway system accommodating ADG III and IV aircraft, which are projected to increase in operations throughout the planning period and become the critical design aircraft at the Airport. The following summarizes the taxiway system improvements that were identified as a part of the facility requirements analysis:

- Parallel Taxiway A should be retained at its existing width of 75 feet in anticipation of future operations by ADG IV aircraft. In addition, 25-foot paved shoulders, improvements to the topography of the safety area near its north and south junctures with Runway 16/34, and the relocation of a portion of the perimeter fencing near the existing ASOS unit to accommodate an increase in the width of the taxiway object free area will also be necessary to meet taxiway design standards for this category of aircraft.

- The surface gradient of taxiway pavement adjacent to a manhole cover within a fillet at the intersection of Taxiway R and Taxiway A may need to be corrected if it is found to be non-compliant with taxiway gradient design standards.

- An inverted low elevation portion of Taxiway P that does not meet transverse grade design standards needs to be corrected.

- The width of Taxiway H needs to be increased to 75 feet to meet design standards for ADG IV aircraft that are often parked on the south apron. Likewise, an increase in taxiway width to meet ADG III design standards is required for Taxiways D1, D2, F, and G.

One additional improvement recommended from the review of facility requirements is the renaming of the taxiway system to more closely align with the naming convention outlined in FAA AC 150/5340-18F, *Standards for Airport Sign System*, which does not require the reconfiguration of existing taxiway system infrastructure. The following section will focus on development options to correct the infrastructure-related improvements that were identified through the review of facility requirements. It should be noted that since there is a single, logical development option to correct each need, a single alternative has been prepared to address the needed taxiway system improvements.

5.3.a Alternative 6 – Taxiway System Improvements

Alternative 6 proposes several improvements to the taxiway system to address the deficiencies that were identified through the review of facility requirements. The most significant infrastructure improvements proposed by Alternative 6 is the retention of the existing 75-foot width of Taxiway A and the addition of 25-foot paved shoulders to the taxiway and its associated connector taxiways between Runway 16/34 and the terminal apron. As a part of the inclusion of paved shoulders, Alternative 6 also proposes to correct the inverted low portion of Taxiway P and a depression in the taxiway pavement surface near a manhole cover within the fillet at the intersection of Taxiway A and Taxiway R. Other taxiway system improvements proposed by Alternative 6 include increasing the width of the Taxiway A safety area to meet ADG IV standards which requires fill and grading along the eastern portion of the safety area near the approach ends of Runway 16/34. Increasing the safety area to meet ADG IV standards also requires increasing the width of the OFA with is also proposed in Alternative 6. As a result of these, a portion of the perimeter fence near the existing ASOS unit and a portion of an airfield access road near Taxiway D1 would have to be relocated to accommodate the increase in design standards. Finally, Alternative 6 proposes to widen Taxiway H to 75 feet in order to accommodate ADG IV aircraft and Taxiways D1, D2, F, and G to 50 feet in order to accommodate ADG III aircraft that frequently use these surfaces.

- **Operational Factors –** The improvements proposed by Alternative 6 will meet airfield design standards for the existing (ADG III) and future (ADG IV) critical design aircraft, which are designed to provide the safe separation of objects and other aircraft from the wingspans of these critical aircraft types. Since it is projected that ADG Category IV aircraft will increase operations at the Airport throughout the planning period, these improvements will provide a needed margin of safety so that these larger aircraft types can operate on Taxiway A. Likewise, increasing the widths of the north and south apron connector taxiways to meet the design standards of ADG III and ADG IV aircraft allows these surfaces to better accommodate the wider wheelbases of these aircraft types.

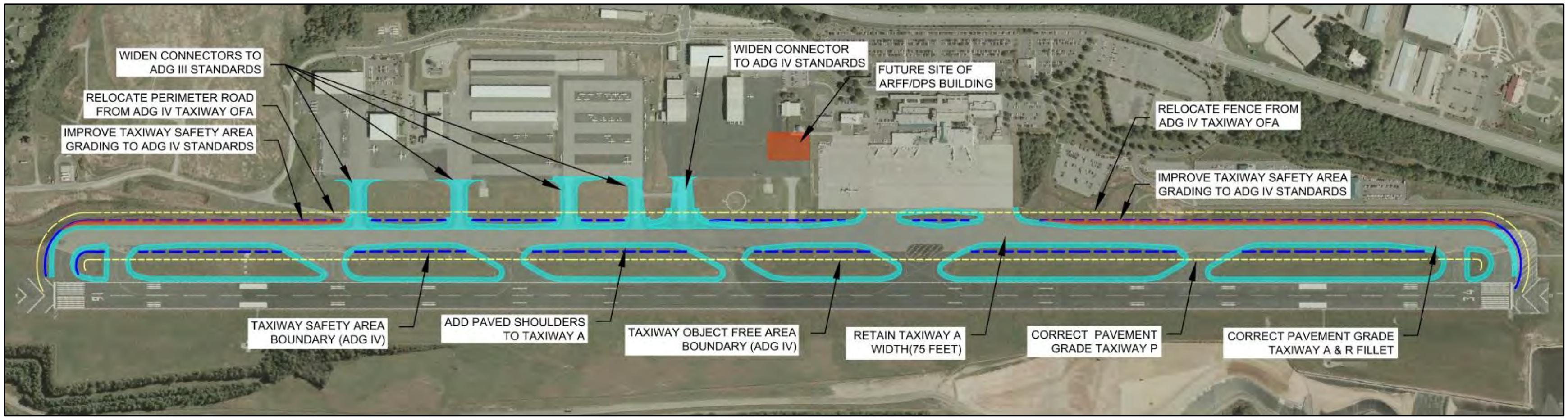
- **Economic Factors –** Qualitatively, a relative low cost is required to implement these alternatives; however, a significant portion of project cost would need to be devoted to the fill material and grading necessary to bring the Taxiway A safety area up to ADG IV design standards. Since there is a sharp drop in topography near the eastern boundary of the safety area at the approach ends of Runway 16/34, significant fill would be necessary to raise the elevation of the ground within the expanded safety area.

- **Environmental Factors –** The deposit of fill material and grading necessary to correct the topography of the land within the expanded safety area of Taxiway A would require mitigation strategies and industry best practices to reduce or eliminate the effects of storm water runoff and erosion. Installation of paved shoulders along Taxiway A and its associated connector taxiways between Runway 16/34 and terminal apron would help reduce the effects of jet blast erosion on the safety area and reduce the potential of foreign object debris (FOD) on the taxiway surface.

- **Implementation Factors –** Temporary closures of Taxiway A and the connector taxiways between the runway and apron surfaces would be necessary during construction in order to increase the width of the connector taxiways and install paved shoulders. This may result in temporary airfield capacity reduction during portions of construction that require closures to Taxiway A as aircraft will need to back-taxi on Runway 16/34, resulting in increased runway occupancy times prior to takeoff or after landing. Improvements to the Taxiway A safety area may also impact the ability of ADG IV aircraft to utilize the taxiway during construction since the larger wingspans of these aircraft types may not adequately clear equipment and personnel working outside of the boundary of the existing safety area that meets ADG III standards.

Figure 5-6 illustrates the improvements that are proposed to the taxiway system as identified in Alternative 6 while **Table 5-6** summarizes the advantages and disadvantages of the taxiway system development plan.

Figure 5-6: Alternative 6 – Taxiway System Improvements



Source: Mead & Hunt, Inc. (2012)

Table 5-6: Alternative 6 Summary	
Advantages	**Disadvantages**
• Meets taxiway design standards outlined in FAA AC 150/5300-13, *Airport Design* • Expanded Taxiway A OFA provides for safe separation of airfield objects from the wingspans of ADG IV aircraft • Expanded width of connector taxiways better accommodate the wheelbases of ADG III and IV aircraft that use the north and south aprons, respectively • Paved shoulders reduce the effects of jet blast erosion within taxiway safety area and helps eliminate FOD on taxiway • Relative low cost to implement	• Significant fill/grading required to improve Taxiway A OFA to meet design standards for ADG IV aircraft • Temporary taxiway closures required during construction

5.3.b Taxiway System Improvements Preferred Alternative

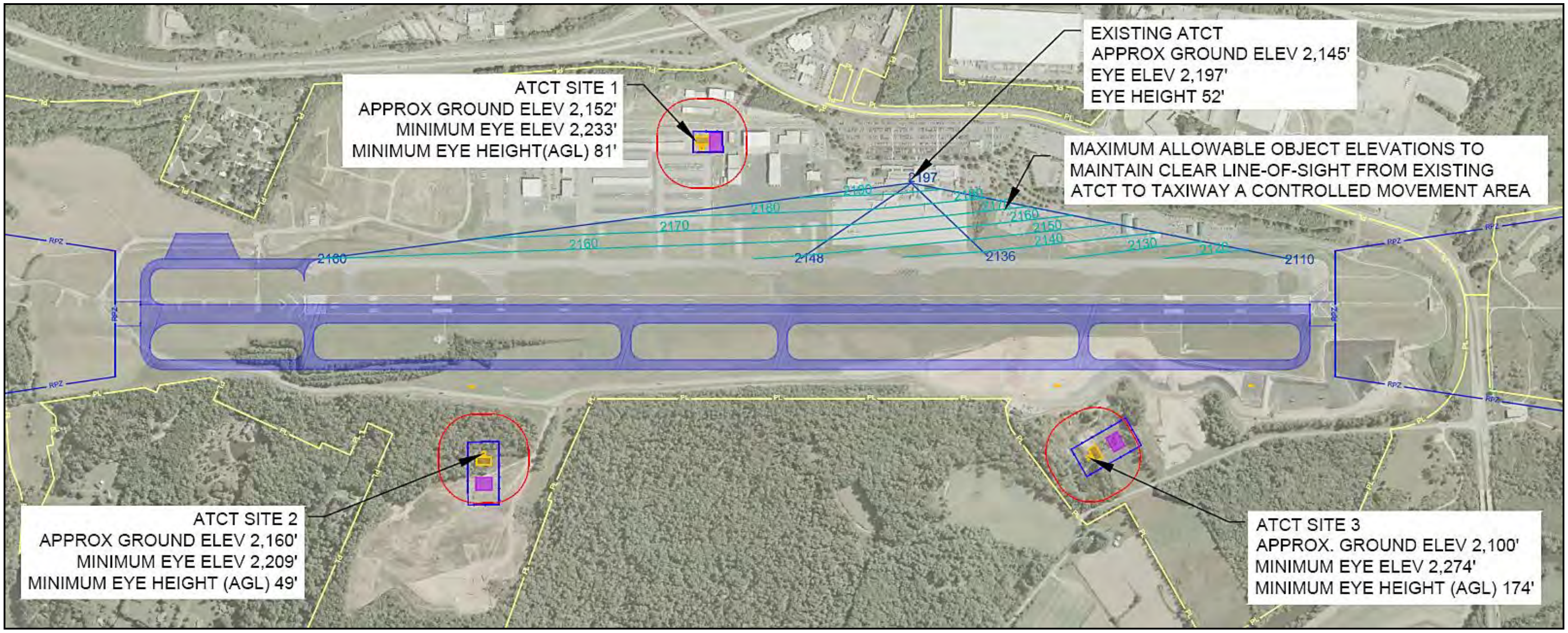
As a result of the logical options to provide correct the identified taxiway system deficiencies outlined in the review of facility requirements, there was not a need to prepare multiple alternatives for evaluation; therefore, the proposed taxiway system improvements presented in Alternative 6 should be considered as the recommended development actions. It should also be noted that additional taxiway system infrastructure will be needed to support any future development of aeronautical facilities on the west side of the airfield. As proposed in the Alternative 4 to correct the non-standard separation between Runway 16/34 and Taxiway A, a temporary runway designed for conversion into a west side parallel taxiway after construction of the relocated runway is complete offers one option to address this need. Should another development option be chosen to correct the non-standard separation between Runway 16/34 and Taxiway A, consideration should be given to construct a full or partial parallel taxiway on the west side of the airfield to support future aeronautical activities.

5.4 Airport Traffic Control Tower (ATCT)

A review of facility requirements identified that the existing airport traffic control tower (ATCT) is outdated and will be nearing the end of its useful life during the 20-year planning period; therefore, planning should be initiated to identify a preliminary site for construction of a new ATCT. Though the site for a new ATCT will ultimately be the decision of the FAA based upon extensive analysis of line-of-sight issues, object discrimination, and operational cohesiveness with Airport operations, FAR Part 77 surfaces, and the Airport Surveillance Radar (ASR), a preliminary site should be identified as a part of the master planning process to protect an area from other planned development. The varying topography surrounding the airfield and the location of other infrastructure elements limits ideal locations for construction of a new ATCT; however, three potential sites were identified as illustrated in **Figure 5-7** on the following page. The following section reviews these three sites and weighs advantages and disadvantages of each that will be used to justify the preferred site for construction of a new ATCT that will be identified on the Airport Layout Plan (ALP) drawing set.

It should be noted that the approximate ground elevation, minimum eye height elevation, and minimum eye height above ground level (AGL) are indicated for each ATCT site presented in **Figure 5-7** for initial site evaluation purposes. Further evaluation of the ATCT height necessary at each site to provide an obstructed view of the airfield will be necessary as part of a more comprehensive tower site evaluation study. The maximum allowable object elevations to maintain a clear line-of-sight from the location of the existing ATCT to the Taxiway A controlled movement area is also indicated in the figure and should be referenced for infrastructure development planning that occurs within this area. FAA Order 6480.4A, *Airport Traffic Control Siting Criteria*, requires that a visibility performance be conducted for potential ATCT sites using the FAA's Airport Traffic Control Tower Visibility Tool (ATCT VAT). Each location must provide a minimum probability of 95.5% of detecting or noticing the presence of an object on the airport surface in accordance with the ATCT VAT analysis tool. **Figure 5-7** presents the results of this analysis.

Figure 5-7: Airport Traffic Control Tower Alternatives



Object Discrimination Analysis Results – Probability Detection

Site	Min Threshold	Fut Rwy 16 End	Fut Rwy 34 End	Pass/Fail
1	95.5%	99.6%	99.6%	Pass
2	95.5%	99.9%	98.4%	Pass
3	95.5%	97.2%	100.0%	Pass

Sources: Mead & Hunt, Inc. (2012), FAA Airport Traffic Control Tower Visibility Analysis Tool (ATCT VAT)

5.4.a Alternative 7 – ATCT Site 1

Site 1 proposes the construction of a new ATCT on a currently undeveloped parcel of land located adjacent to the mid-ramp near the intersection of Wright Brothers Way and Aviation Way with access to the site provided from Wright Brothers Way. In addition to a control tower that is at least 81 feet above ground level (AGL) to provide the necessary minimum eye height from the tower cab, Alternative 7 also proposes the construction of an approach/departure control facility and an employee parking lot.

- **Operational Factors –** The site proposed in Alternative 7 offers a near midfield location that is often preferred by air traffic control in order to have a clear, unobstructed view of the runway, taxiways, and apron surfaces. This site also offers a location that provides a clear view of both the northwest and southwest general aviation (GA) development areas for when aeronautical facilities are planned on the west side of the airfield. In addition, the location and height meets minimum visibility performance criteria defined by FAA Order 6480.4A, *Airport Traffic Control Tower Siting Criteria*.

- **Economic Factors –** The use of a current undeveloped parcel of land reduces the need to impact existing revenue producing areas such as the mid-ramp and hangar structures on the south apron. Since the footprint of the facility proposed in Alternative 7 is located entirely within this available plot of land, removal of apron tie-down locations or hangar structures is not necessary which ultimately does not impact the revenue generating ability of the Airport.

- **Environmental Factors –** No significant environmental impacts are anticipated with the construction of an ATCT facility at Site 1 since significant grading of the land is not required and removal of trees or other obstructions are not needed.

- **Implementation Factors –** As a result of the topography of the south apron area, which is approximately 10 feet higher in elevation than the ground level at Site 1, a control tower with a height of 81 feet AGL is needed to provide a clear view of all airfield surfaces. Site 1 does not provide 300 feet of clearance from public areas around the facility for blast protection requiring the construction of a more blast resistant control tower structure at this site. In addition, further evaluation will be needed to determine if the construction of a control tower at this site would impact the operation of the Airport Surveillance Radar (ASR) since the feasibility of this site may be impacted if it is found an ATCT could interfer with ASR radar signatures.

The advantages and disadvantages of Site 1 are summarized in **Table 5-7**.

Table 5-7: Alternative 7 – ATCT Site 1 Summary

Advantages	**Disadvantages**
• No loss of existing aeronautical revenue generating areas • Midfield location • No significant environmental impacts • No tree removal necessary	• Does not meet 300 foot setback from public areas – requires blast protection • 81 feet tower height required as a result of topography of site • Proximity of site to ASR may interfere with radar signatures

5.4.b Alternative 7 – ATCT Site 2

Alternative 7 – Site 2 proposes the construction of a new ATCT within the northwest development area with landside access to the site made available via an extension of Pinner Road. A minimum ATCT tower height of 49 feet would be necessary to provide controllers with a clear view of each end of Runway 16/34 as a result of the surrounding topography at this site. The construction of an approach/departure control facility and an employee parking lot is also proposed at Site 2.

- **Operational Factors –** Site 2, located near the approach end of Runway 16, does not provide a midfield location for an ATCT tower which is desired as a part of the site selection process by the FAA. Site 2 does provide, however, a 300 foot setback from public areas which would not require the facility to be constructed from blast resistant materials. Additionally, location and height of the ATCT tower meets minimum visibility performance criteria defined by FAA Order 6480.4A.

- **Economic Factors –** Construction of an ATCT facility at Site 2 would greatly impact the aeronautical revenue generating potential of the northwest development area since limited space adjacent to the airfield would be available for the construction of hangars, taxiways, and other planned infrastructure improvements. In addition, significant cost for tree clearing, grading, and construction of an extended Pinner Road would be necessary with the development of an ATCT facility at this site.

- **Environmental Factors –** As a result of the surrounding topography and the lack of existing infrastructure at the site, significant tree clearing and grading would be necessary to construct an ATCT facility at this site. Care would also need to be taken to prevent erosion and water runoff from the site during construction from infiltrating the French Broad River which is located approximately 2,200 feet to the west.

- **Implementation Factors –** As noted in the review of economic factors, construction of an ATCT facility at Site 2 limits the opportunity to develop aeronautical facilities at this site. As a result, the northwest development area may not prove to be as attractive of a site for non-aeronautical commercial development such as warehouses, light industrial, self-storage, and machine shops that could benefit from the close proximity of aeronautical uses such as air freight forwarders, aircraft maintenance facilities, and Fixed Base Operators (FBOs).

Site 2 advantages and disadvantages are summarized in **Table 5-8**.

Table 5-8: Alternative 7 – ATCT Site 2 Summary

Advantages	Disadvantages
• Provides a location with a 300 foot setback from public areas	• Limits aeronautical development and revenue generating abilities of northwest development area • Grading and tree clearing necessary • Significant cost for grading, tree clearing, and extended access road • Not a midfield location

5.4.c Alternative 7 – ATCT Site 3

ATCT Site 3 designated in Alternative 7 proposes the construction of a control tower and approach control facility at a site on the southwest side of the airfield within an area designated for future commercial and non-commercial aeronautical development. In order to provide clear, unobstructed views of the airfield, a control tower with a minimum height of 174 feet would be necessary so that the tower cab can view each end of the runway. Landside access to the site and its accompanied approach/departure control facility and employee parking lot would be made available from Old Fanning Bridge Road.

- **Operational Factors –** Though Site 3 does not provide a desired midfield location for construction of a new air traffic control tower, it is located in close proximity to the proposed west side parallel taxiway offering controllers an advantageous view to coordinate runway crossings of vehicle and aircraft to and from this side of the airfield. The site, however, does not provide an advantageous view of the north side of the airfield, particularly to surfaces adjacent to the Landmark Aviation FBO where frequent aircraft movements occur. It should also be noted that Site 3 would provide for 300 feet of clearance around the site from public areas and would not require the tower and approach/departure control facilities to be constructed from blast resistant material. Also, the site's location and tower height meets minimum visibility performance criteria defined by FAA Order 6480.4A, *Airport Traffic Control Tower Siting Criteria*.

- **Economic Factors –** Section of Site 3 for the construction of a new ATCT facility would significantly impact the ability of the Airport to develop this site for revenue generating aeronautical uses such as facilities for air cargo operations and hangars for private or corporate use. Since most of the land within this development area that is contiguous with the airfield would be occupied by the ATCT facility, sufficient room may not be available for further aeronautical development that may significantly impact the ability of the Airport to attract and generate revenue from an expanded air cargo operation.

- **Environmental Factors –** Since a project is near completion to fill and grade this area with a used coal combustion product known as fly ash to support expansion of development areas at the Airport, environmental impacts as a result of the construction of the ATCT facility are anticipated to be minimal.

- **Implementation Factors –** Selection of Site 3 for the construction of a new airport traffic control tower would significantly impact the ability of the Airport to develop an air cargo facility since there is not another ideal location to support the infrastructure needed for this type of aeronautical operation. The primary intention of the fly ash grade and fill project at this site was to create an area for air cargo development since past inquiries have been received from air cargo operators about establishing an air cargo facility at the Airport. The use of this site for an air traffic control tower may significantly impact the ability to develop an air cargo facility since limited developable land contiguous with the airfield to support this type of aeronautical activity is available on existing Airport property.

The advantages and disadvantages of constructing a new air traffic control facility at Site 3 are summarized in **Table 5-9**.

Table 5-9: Alternative 7 – ATCT Site 3 Summary	
Advantages	**Disadvantages**
• Located within close proximity to future west side parallel taxiway • Provides a location with a 300 foot setback from public areas	• Not a midfield location • Does not provide an advantageous view of north side of airfield • Limits aeronautical revenue generating potential of the west side development site • Significantly impacts the ability of the Airport to develop air cargo facilities • Tree clearing necessary

5.4.d Airport Traffic Control Tower Preferred Alternative

When considering the advantages and disadvantages of each proposed ATCT site in addition to operational, economic, environmental, and implementation factors, Site 1 should be considered as the preferred location for construction of a new ATCT facility. While a comprehensive site evaluation study is needed to further review the feasibility of this location for the construction of an ATCT facility, the following justifications support protecting this site for the future development of a new control tower:

- **Midfield Location –** The midfield location of Site 1 offers sightlines to the approach ends of Runway 16/34 that are approximately equal in distance, providing controllers with a centralized location to view all aircraft and vehicle movement on the airfield and the best visibility performance metrics in terms of minimum object detection to both ends of the airfield. The sightlines offered at Site 2 and Site 3 would be advantageous for only one end of the airfield, increasing the difficulty of controllers of visually identify airfield activity at the respective opposite end. A centralized, midfield location that Site 1 provides would offer the best available location for construction of a new ATCT so that controllers can clearly observe all airfield activity.

- **No Loss of Existing Aeronautical Revenue Generating Areas –** Site 1 offers a location on a currently undeveloped area of land near the mid-ramp and south apron that does not impede upon existing or future aeronautical revenue generating areas of the Airport. Construction of an ATCT facility at Site 2 would significantly reduce the area available at this site for other aeronautical related development while selection of Site 3 may altogether eliminate the potential of air cargo development at the Airport.

- **No Significant Environmental Impacts –** No significant environmental impacts are anticipated with constructing an ATCT facility at Site 1 since significant fill, grading, and tree clearing will not be necessary unlike Site 2 or Site 3, both of which would require this. The topography of Site 1 and lack of significant foliage within its immediate proximity offers the more favorable development site with the least environmental impacts compared to Site 2 and Site 3.

Disadvantages associated with Site 1 are minimal; though the location does not provide 300 feet of setback from public areas for protection from explosive devices, justification can be made to construct a new facility at this site with blast hardened materials given the disadvantages of constructing a tower at the other sites. Another disadvantage that should be considered with the selection of Site 1 as the preferred alternative for the construction of a new ATCT facility is the proximity of the ASR and the potential of the control tower to interfere with its radar operations. While construction of a control tower is not anticipated to create a shadow in the ASR radar coverage at the Airport, further evaluation of this potential will be needed as a part of the site evaluation study. Considering that these disadvantages are minimal in comparison with the significance of the disadvantages at Site 2 and Site 3, Site 1 should be considered as the preferred location for development of a new ATCT facility.

5.5 Automated Surface Observation System (ASOS)

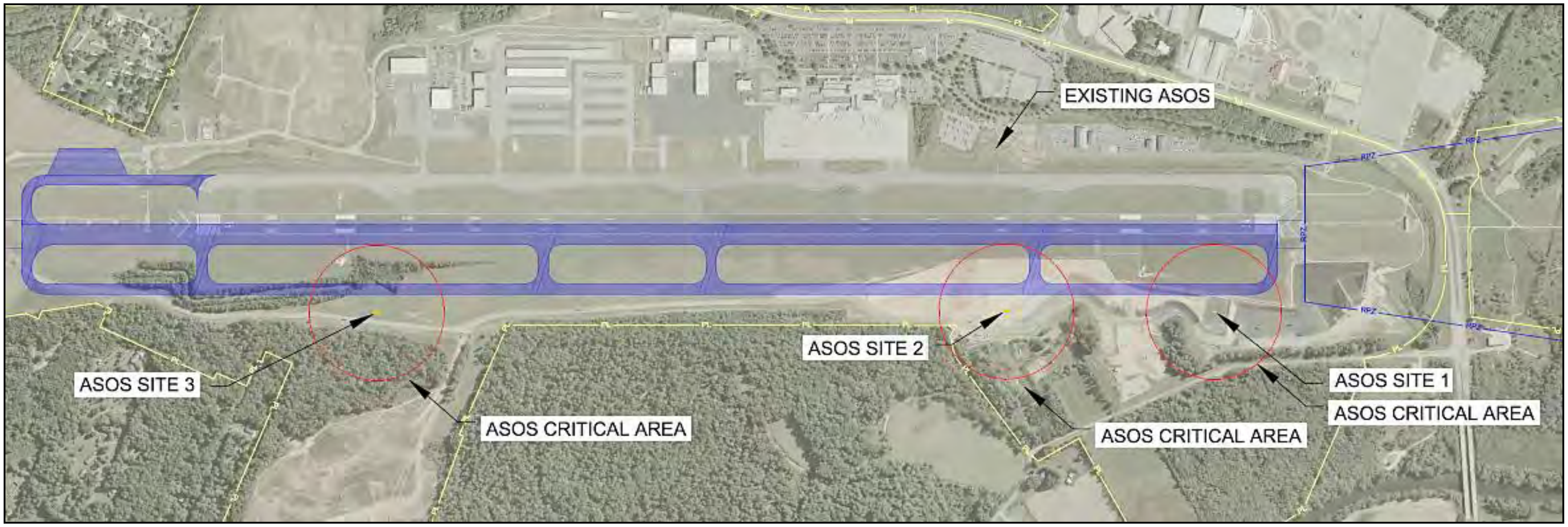
Relocation of the Automated Surface Observation System (ASOS) is recommended in Chapter 4. Its close proximity to Taxiway A, the employee parking lot, and the rental car service road may be affecting temperature readings at the Airport as a result of inadvertent reflected heat from the pavements being measured instead of the actual air temperature. As such, relocation of the ASOS is recommended to permit accurate airfield temperature measurements and move the equipment from being in such close proximity to numerous constructed facilities. Following guidance in FAA Order 6560.20B, *Siting Criteria for Automated Weather Observing Systems (AWOS)*, three locations illustrated in **Figure 5-8** were identified that could be considered as possible future sites for a relocated ASOS. Comparison of the advantages and disadvantages of each site is discussed in this section with selection and justification of the preferred site presented at its conclusion.

5.5.a Alternative 8 – ASOS Site 1

Site 1 proposes to relocate the ASOS to the southwest development area approximately 600 feet southwest of the Runway 34 glide slope antenna and would include a 500-foot critical area that would be required to be free of obstructions such as buildings and tress that could affect weather measurement readings.

- **Operational Factors –** Site 1 offers a location that most closely meets siting requirements identified in FAA Order 6560.20B stating an ASOS should be adjacent to the primary runway 1,000 feet to 3,000 feet down the runway from the threshold of the approach with the lowest minimums. The site also provides 500 feet of critical area around the ASOS that is free of most obstructions and objects such as buildings and trees that could affect weather condition measurement readings by sensors and other instrumentation. It should be noted that as a result of the higher ground elevation at Site 1 in comparison of the surrounding topography, significant tree clearing within the 500 foot critical area is not anticipated.

Figure 5-8: Automated Surface Observation System Alternatives



Source: Mead & Hunt, Inc. (2012)

- **Economic Factors –** While Site 1 is located within an area that has been filled with fly ash material and is suitable to support development, the adjacent sloping topography may interfere with the ability of instrumentation to record accurate airfield weather conditions. As such, additional fill and grading may be necessary to reduce the slope of the adjacent topography, which has the potential to add significant cost to the ASOS relocation project.

- **Environmental Factors –** No significant tree clearing is anticipated within the 500-foot critical area around Site 1 since its elevation is higher than the surrounding topography. Any trees within this 500-foot critical area that are taller than 15 feet less the elevation of the wind sensor must be removed to meet standards identified in FAA Order 6560.20B if they are found to interfere with local winds around the sensor.

- **Implementation Factors –** Relocation of the ASOS to Site 1 may impact infrastructure development planning within the southwest development area since the 500-foot critical area surrounding the site is required to be free of obstructions such as buildings within 15 feet in height of the 30 foot wind sensor. Further evaluation to identify the exact location of Site 1 will be necessary so that the maximum developable area possible can be obtained within the southwest development area without impacting the 500 foot critical area for the ASOS sensors and instrumentation.

A summary of the advantages and disadvantages of relocated the ASOS to Site 1 is presented in **Table 5-10**.

Table 5-10: Alternative 8 – ASOS Site 1 Summary	
Advantages	**Disadvantages**
• Located near touchdown zone of runway approach with lowest minimums • ASOS critical area free of most objects that could affect sensor and instrumentation measurements • No significant tree clearing anticipated within ASOS critical area	• ASOS critical area may impact future infrastructure development within southwest development area • Fill and grading may be necessary if it is found surrounding topography could interfere with instrument readings

5.5.b Alternative 8 – ASOS Site 2

Site 2 proposes the relocation of the ASOS to a site approximately 1,060 feet northwest of the Runway 34 glide slope antenna within the southwest development area, which would include a 500 foot critical area that would need to be clear of obstructions that could affect the ability of sensors and instrumentation to accurately measure weather conditions.

- **Operational Factors –** Site 2 offers a location that is adjacent to the touchdown zone of Runway 34, which has lowest approach minimums and meets siting criteria identified in FAA Order 6560.20B. It is longitudinally located between 1,000 to 3,000 feet from the approach end of the runway and is clear of development such as buildings, hangars, and paved surfaces that could impact weather measurement readings by sensors and other ASOS instrumentation.

Tree clearing to the west of this site within the 500 foot critical area may be needed if it is determined these objects could shield the ASOS instrumentation from accurately recording weather conditions at the Airport.

- **Economic Factors –** Relocating the ASOS to Site 2 may result in additional costs for tree clearing within the 500 foot critical area if it is determined this is necessary for instrumentation to accurately record undisturbed wind conditions at the Airport. It should be noted that placement of an ASOS at Site 2 would greatly impact the Airport's ability to generate aeronautical-related revenue at the southwest development area since the critical area would need to be kept free of structures and other infrastructure elements that could affect the measurement of accurate weather conditions.

- **Environmental Factors –** Trees within the 500 foot ASOS critical area, in particular to the west and northwest of the site, that are found to be higher than 15 feet less the elevation of the wind sensor may require pruning or removal in order for accurate, undisturbed wind conditions to be measured at the Airport.

- **Implementation Factors –** An important factor to consider in evaluating the feasibility of relocating the ASOS to Site 2 is that the 500-foot critical area surrounding the site limits opportunities to develop the southwest development area for aeronautical uses. Since this critical area should be free of obstructions such as trees and buildings in order for instrumentation to accurately record local weather conditions, a significant portion of airside land within the southwest development area would need to be free of development. This may significantly impact the ability of the Airport to develop the site for aeronautical uses such as an air cargo operation since there are limited areas elsewhere on Airport property to support aeronautical-related development.

The advantages and disadvantages of relocating the ASOS to Site 2 are summarized in **Table 5-11**.

Table 5-11: Alternative 8 – ASOS Site 2 Summary

Advantages	Disadvantages
• Located adjacent to touchdown zone of runway approach with lowest minimums • ASOS critical area free of most obstructions such as trees and structures that could impact accurate weather condition readings	• Tree clearing within the critical area may be necessary, resulting in additional costs • The ASOS critical area would significantly impact the ability to develop the southwest development area for aeronautical uses and generate aeronautical related revenue

5.5.c Alternative 8 – ASOS Site 3

ASOS Site 3 is located approximately 500 feet southwest of the Runway 16 glide slope antenna within the northwest development area and includes a 500-foot critical area surrounding the site to protect sensors and instrumentation from obstructions that could lead to inaccurate measurements of true airfield weather conditions.

- **Operational Factors –** An operational advantage of Site 3 is that no existing infrastructure is located within the ASOS critical area that could interfere with the ability of wind sensors and other instrumentation to accurately measure local weather conditions; however, the site is not located adjacent to the touchdown zone of Runway 34, which has the lowest approach minimums. Further evaluation may be necessary to determine the feasibility of relocating the ASOS to Site 2 as there may be instances when local weather conditions at Site 2 could vary from those found within touchdown zone at the approach end of Runway 34.

- **Economic Factors –** Significant additional costs are anticipated to relocate the ASOS to Site 3 to meet standards identified in FAA Order 6560.20B. These include tree clearing necessary to free the critical area of obstructions and grading and filling to raise the elevation of the site to more closely match the elevation of the runway in order. Placement of the ASOS at Site 3 may also significantly impact the ability of the Airport to generate aeronautical-related revenue from the northwest development area in this scenario since the boundary of the critical area would prevent development from occurring within a significant portion of land adjacent to the airfield.

- **Environmental Factors –** Significant tree clearing may be necessary to relocate the ASOS to Site 3 since more than half of the critical area has tree obstructions that may affect sensors and instrumentation from accurately measuring local airfield weather conditions. Additionally, significant grading and filling may be necessary to more closely align the elevation of Site 3 with the elevation of the runway so that airfield weather conditions can be accurately recorded as recommended in FAA Order 6560.20B.

- **Implementation Factors –** Relocation of the ASOS to Site 3 would most significantly impact the Airport's ability to offer the northwest development area for aeronautical uses since the 500-foot critical area around the site would need to be kept free of obstructions and development such as hangars, taxiways, and aprons. Since there is limited land available on existing Airport property that can be utilized for the expansion of aeronautical-related facilities, relocation of the ASOS to Site 3 may impact the ability of the Airport to use this area for the accommodation of aviation infrastructure demands.

Advantages and disadvantages of relocating the ASOS to Site 3 are summarized in **Table 5-12**.

Table 5-12: Alternative 8 – ASOS Site 3 Summary

Advantages	Disadvantages
• No existing development located within the ASOS 500 foot critical area	• Not located adjacent to the touchdown zone of runway with the lowest approach minimums • Significant tree clearing necessary • Additional project costs anticipated for tree removal and grading/filling • Ability to develop northwest development area for aeronautical uses significantly impacted

5.5.d Automated Surface Observation System Preferred Alternative

Considering operational, economic, environmental, and implementation factors, it is recommended Site 1 be considered as the preferred location to relocate the ASOS. This option most closely meets the siting requirements identified in FAA Order 6560.20B without impacting the ability of the Airport to develop the west side of the airfield for future aeronautical uses. Relocation of the ASOS to a site approximately 600 feet southwest of the Runway 34 glide slope allows it to be adjacent to the touchdown zone of the primary runway with the lowest approach minimums (Runway 34) meeting siting criteria identified in FAA Order 6560.20B. The 500 foot critical area surrounding Site 1 is free of most obstructions and would require minimal tree clearing unlike Site 2 and Site 3. Site 1 also offers opportunities to develop the northwest and southwest development areas for future aeronautical uses since the critical area boundary does not lie over a large portion of developable land. Placement of an ASOS at Site 2 or Site 3 may restrict or prevent aeronautical development from occurring within these areas since the critical area boundary at these sites overlays a significant portion of developable land that is adjacent to the airfield. It should be noted that relocation of the ASOS to Site 1 will require a siting study to determine if the location meets requirements of FAA Order 6560.20B. Considering the advantages and disadvantages of all three ASOS alternative sites, planning should be initiated to preserve Site 1 for the future relocation of the Airport's weather measuring equipment.

5.6 Terminal Area

It is recommended that the size and configuration of the terminal area including the terminal building, boarding gates, aircraft parking positions, and apron, be able to accommodate the fleet mix of commercial aircraft types during periods of peak demand. A review of the existing terminal area found that additional aircraft parking positions, boarding gates, and expansion of the terminal building may be necessary to accommodate future demand throughout the planning period. It is anticipated that the Airport will need an additional one or two aircraft parking positions on the terminal apron, one to three boarding bridges with holding rooms, and additional area in the terminal building by 2030 in order to meet the projected increase in commercial airline passenger demand. Given the proximity of other infrastructure surrounding the terminal area and the limited room for expansion, four alternatives were prepared to conceptualize layouts on how these improvements could be implemented. The following section presents each of the terminal area alternatives, compares advantages and disadvantages, and recommends a preferred plan for the future expansion projects.

5.6.a Alternative 9 – Terminal Expansion Alternative 1a

Alternative 9 proposes to expand the terminal apron 85,773 square feet to the east adding an additional aircraft parking location for a Boeing 737 sized aircraft, and providing an expanded area for the parking and storage of airline ground service equipment (GSE). This would provide sufficient space for an additional remote aircraft parking position which could be located at the northwest corner of the terminal apron. Expansion and renovation of the terminal building is also proposed to create an additional area to accommodate the installation of three additional boarding bridges.

- **Operational Factors –** Alternative 9 provides for eight boarding bridges to meet demand projected throughout the planning period; however, only 10 aircraft parking positions would be available for remain overnight (RON) aircraft which is one short of the projected need. Additional RON aircraft would need to be parked at a remote location on the south end of the terminal apron until a parking position or boarding gate became available on the terminal apron. Requiring overflow RON aircraft to park on the south apron may result in inefficient commercial airline operations at the Airport due to the repositioning of aircraft between aprons.

  Alternative 9 also impacts the existing employee parking lot located south of the terminal apron since the amount of fill and grading required to increase the topography of the land for the apron expansion would result in a loss of parking spaces in the lot. In addition, the number parking spaces in the rental car ready/return lot would be eliminated as a result of the expanded terminal apron and terminal building.

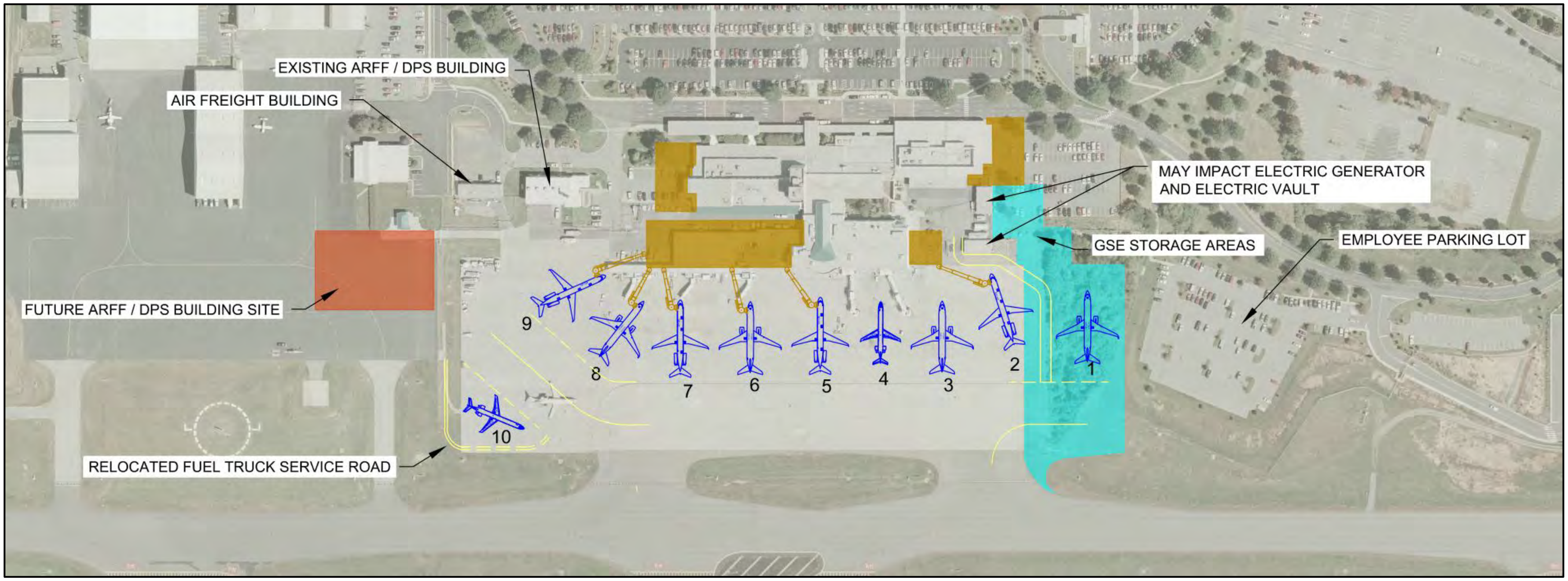
- **Economic Factors** – The most significant economic factor to consider with Alternative 9 is the cost to fill and grade the topography of the land within the proposed terminal apron expansion area. Significant project costs for fill and grading are anticipated to implement Alternative 9 as a result of the elevation change between the existing apron and the topography of the land within the apron expansion area since it varies approximately 35-40 feet in some areas.

- **Environmental Factors** – As a result of the fill and grading necessary for the terminal apron expansion, an environmental factor to consider with the implementation of Alternative 9 is the potential for erosion and storm water runoff impacts to areas south and east of the terminal area. Industry best practices should be considered if Alternative 9 is implemented to mitigate any potential erosion and storm water impacts as a result of terminal apron expansion.

- **Implementation Factors** – Though Alternative 9 provides enough boarding bridges and terminal building area to meet demand anticipated throughout the 20-year planning period, it does not provide adequate space on the terminal apron for RON aircraft parking. An additional expansion project would be necessary in addition to the implementation of Alternative 9 in order for the Airport to accommodate this projected demand.

Figure 5-9 illustrates Alternative 9 while a summary of its advantages and disadvantages is presented in **Table 5-13**.

Figure 5-9: Alternative 9 – Terminal Expansion Alternative 1a



Source: Mead & Hunt, Inc. (2012)

Table 5-13: Alternative 9 Summary	
Advantages • Provides 8 terminal gates (need 8 to meet projection)	**Disadvantages** • Does not meet projected need for 11 remain overnight (RON) positions as only 10 are provided; any additional RON aircraft would have to be parked remotely on south apron • Substantial grade and fill required for terminal apron expansion to the south resulting in significant cost and environmental considerations • Apron expansion fill and grade impacts employee parking lot and rental car ready/return lot

5.6.b Alternative 10 – Terminal Expansion Alternative 1b

Alternative 10, presented in **Figure 5-10**, is similar to Alternative 9 as it proposes a renovation and expansion of the terminal building to accommodate the installation of three additional boarding bridges. An approximate 142,992 square foot expansion of the terminal apron to the east is proposed to accommodate two additional parking positions for Boeing 737 and 757 sized aircraft, respectively, and additional parking areas for GSE equipment. An additional remote aircraft parking position within the northwest corner of the terminal apron is also proposed with this alternative that would incorporate relocation of the fuel truck service road from the south end of the terminal apron.

- **Operational Factors –** Alternative 10 provides eight boarding gates and eleven RON aircraft parking positions meeting anticipated demand projected throughout the planning period. Accommodating the RON parking needs of all commercial airline aircraft on the terminal apron eliminates the need for overflow parking to occur on the south apron and increases the efficiency of aircraft repositioning at the boarding gates in between arrivals and departures.

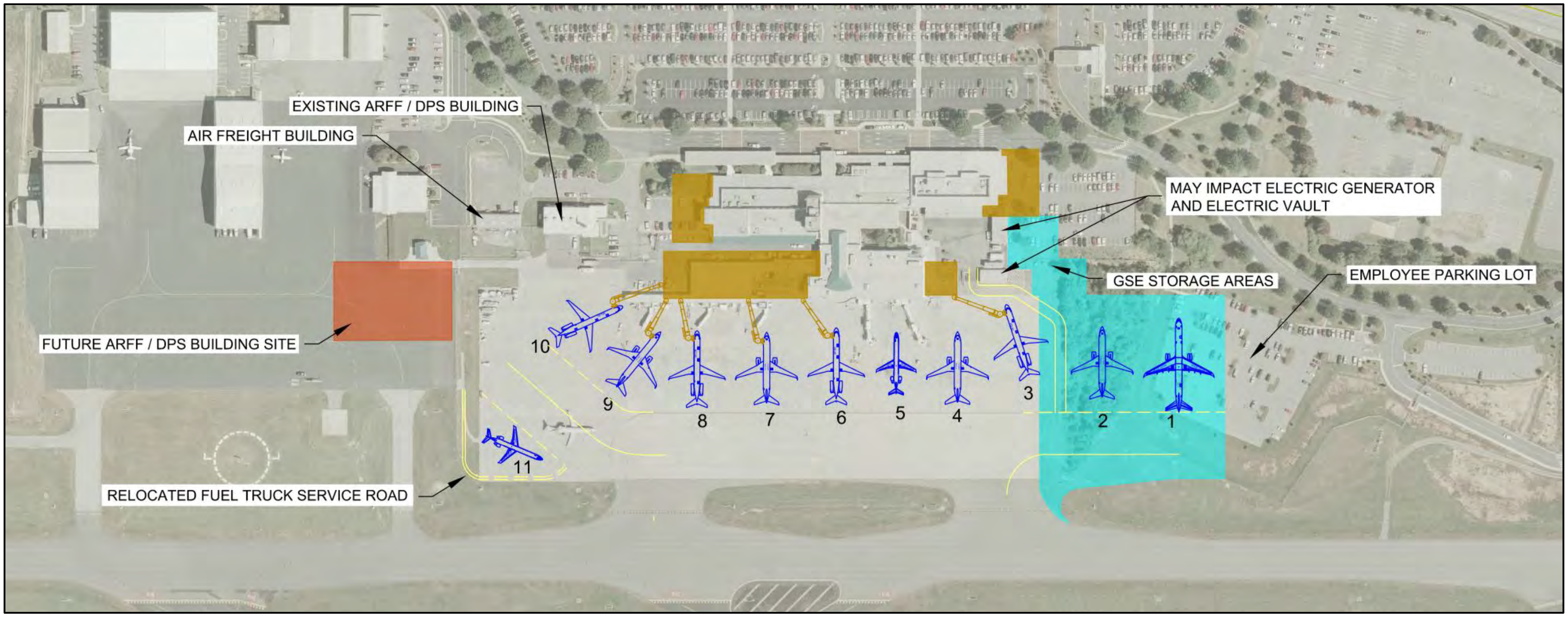
- **Economic Factors –** A significant economic factor to consider with Alternative 10 is the cost to fill and grade the topography of the land for the expansion of the terminal apron since the elevation change in this area varies from 35 to 40 feet in some places. Additional project costs might be necessary if it is found relocation of the airfield generator and electrical vault is necessary to accommodate the expansion of the terminal apron.

- **Environmental Factors –** A significant environmental concern with Alternative 10 is the amount of fill and grading necessary for the terminal apron expansion and its potential for erosion and storm water runoff impacts. If Alternative 10 is implemented, industry best practices should be followed during the fill and grading phase of the terminal apron expansion project to mitigate any potential erosion and storm water runoff impacts.

- **Implementation Factors –** The terminal apron expansion proposed in Alternative 10 would eliminate a significant number of vehicle parking spaces in the both the rental car ready/return and employee parking lots, requiring the Airport to create additional parking elsewhere for these uses.

Advantages and disadvantages discussed in the evaluation of operational, economic, environmental, and implementation factors are summarized in **Table 5-14**.

Figure 5-10: Alternative 10 – Terminal Expansion Alternative 1b



Source: Mead & Hunt, Inc. (2012)

Table 5-14: Alternative 10 Summary	
Advantages • Provides 8 terminal gates to meet projected demand throughout planning period • Provides 11 RON aircraft parking positions on terminal apron to meet projected demand anticipated throughout the next 20 years	**Disadvantages** • Substantial fill and grading required to expand terminal apron resulting in significant project cost and environmental considerations • Impacts existing employee parking lot and rental car ready/return lot which may require development of additional parking lots for these uses

5.6.c Alternative 11 – Terminal Expansion Alternative 2a

Figure 5-11 illustrates Alternative 11 which proposes to create an additional 93,515 square feet of terminal apron area through a 38,909 square foot expansion to the south of Gate 1 and a 54,606 square foot expansion to the east of Gate 7. This requires the removal of the existing ARFF facility, air freight building, airport administration parking lot, and a small portion of rental car ready/return lot parking spaces. This apron expansion, in addition to establishing a remote aircraft parking position in the northwest corner of the terminal apron, would create 11 RON aircraft parking positions and an additional storage area for GSE equipment. Other improvements proposed by Alternative 11 include the relocation of the fuel truck service road from the south apron, construction of a blast wall between the terminal apron expansion and Terminal Drive, and a renovation and expansion to the terminal building for the installation of four additional aircraft boarding bridges.

- **Operational Factors –** The terminal area expansion proposed by Alternative 11 provides nine aircraft boarding bridges and 11 RON aircraft parking positions meeting the demand projected for the 20-year planning period. It should be noted that only a single taxi route exists for aircraft to maneuver into and out of parking positions 7 through 10, which might cause a conflict if aircraft are simultaneously exiting or entering this area.

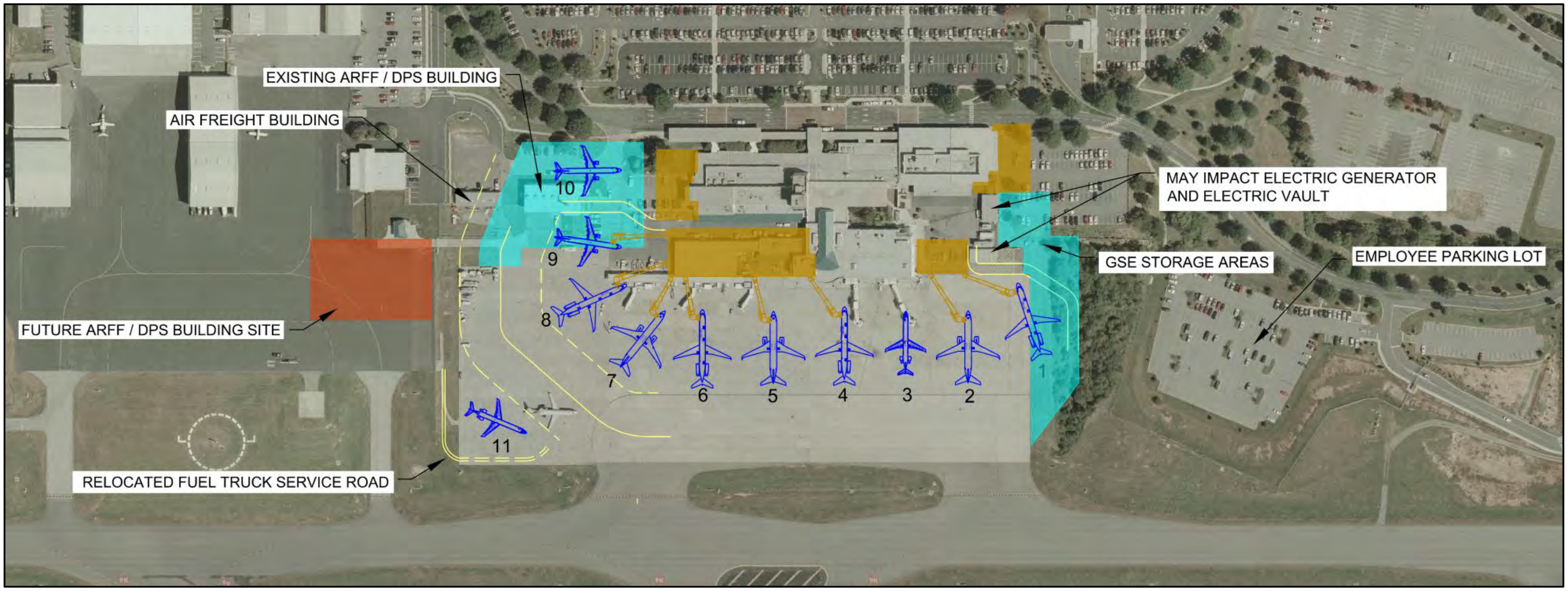
- **Economic Factors –** An economic factor to consider with Alternative 11 is the cost to remove the existing air freight building, ARFF/DPS facility, and Airport administration parking lot to the east and the fill and grading necessary to the south for the terminal apron expansion. Additional project costs may be accrued if it is found relocation of the generator and airfield electrical vault is necessary for the southward expansion of the terminal apron.

- **Environmental Factors –** To protect vehicular traffic on Terminal Drive and pedestrians from the effects of jet blast, construction of a blast wall may be necessary along the eastern edge of the eastern terminal apron expansion if Alternative 11 is implemented. Additional environmental protection measures may also be necessary to prevent erosion and storm water runoff impacts as a result of the southern terminal apron expansion since significant fill and grading will be necessary to raise the topography of this site to match the elevation of the terminal apron.

- **Implementation Factors –** This alternative requires the removal and replacement of the air freight building, the ARFF/DPS facility, and the Airport administration parking lot prior to or during construction of the terminal apron area improvements. In addition, the rental car ready/return lot will lose a small portion of vehicle parking spaces in order to accommodate the proposed terminal apron expansion.

The advantages and disadvantages of the terminal area improvements proposed by Alternative 11 are summarized in **Table 5-15**.

Figure 5-11: Alternative 11 – Terminal Expansion Alternative 2a



Source: Mead & Hunt, Inc. (2012)

Table 5-15: Alternative 11 Summary

Advantages	**Disadvantages**
• Provides 9 terminal gates to exceed projected demand throughout planning period • Provides 11 RON aircraft parking positions on terminal apron to meet projected demand • Does not impact employee parking lot	• Requires removal of existing air freight building, ARFF/DPS facility, and Airport administration parking lot • May require construction of a blast wall between eastward apron expansion and Terminal Drive • Fill and grading required for southward terminal apron expansion • A single taxi route is available for aircraft at terminal apron parking positions 7 through 10 • Impacts rental car ready/return lot which may require development of additional parking to meet demand

5.6.d Alternative 12 – Terminal Expansion Alternative 2b

Terminal area improvements proposed by Alternative 12, which are presented in **Figure 5-12**, include an 118,879 square foot expansion of the terminal apron that would provide 11 RON aircraft parking positions through a 27,227 square foot expansion east of boarding gate 7 and a 91,652 square foot expansion south of boarding gate 1. This apron expansion would require the removal of the air freight building, ARFF/DPS facility, Airport administrative parking lot, and a portion of the rental car ready/return lot. Relocation of the fuel truck service road connecting to the south apron is also proposed with this alternative to create an additional aircraft parking location at the northwest corner of the terminal apron. Finally, a renovation and expansion of the terminal building is proposed to accommodate the installation of four additional aircraft boarding bridges.

- **Operational Factors –** Alternative 12 provides nine aircraft boarding bridges and 11 RON aircraft parking positions to meet anticipated demand throughout the planning period. The additional boarding bridges and expansion of the terminal apron will allow the Airport to accommodate occasional charter flights or RON aircraft from irregular operations situations. It should be noted that only a single taxi route is available for aircraft to access boarding gates 8, 9, and 10 which may impact terminal apron operations if aircraft are simultaneously positioning into and out of these gates.

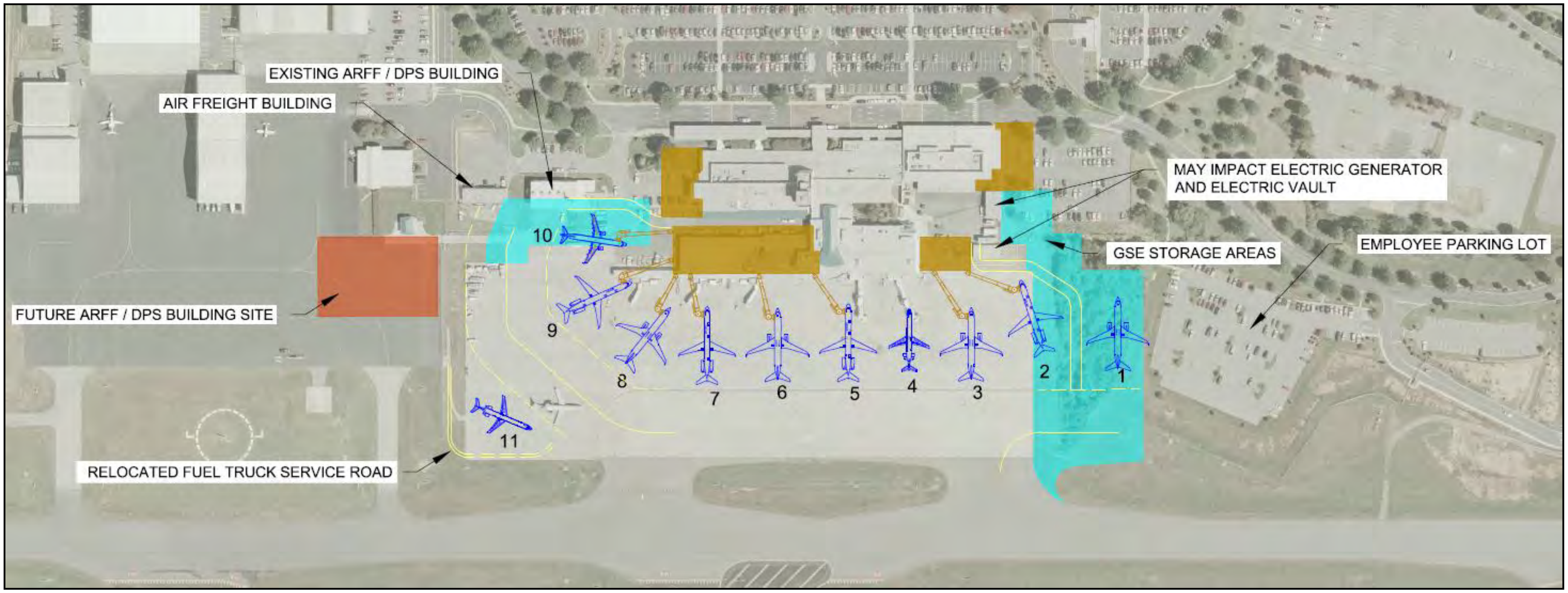
- **Economic Factors –** Fill and grading for the southward expansion of the terminal apron and removal of existing infrastructure such as the ARFF/DPS facility and air freight building for the eastward expansion of the terminal building will contribute significant cost to the overall project. Other items such as the airfield generator and electric vault may also contribute additional costs to the project if they need to be relocated.

- **Environmental Factors –** Due to the varying topography in this area, significant fill and grading necessary for the southward apron expansion could result in erosion and storm water drainage impacts if not properly mitigated. Industry best practices in compliance with local, state, and federal environmental laws will be necessary during the implementation of this phase of the project.

- **Implementation Factors –** An advantage of Alternative 12 over the other alternatives is that it provides the necessary amount of terminal apron space, boarding gates, and terminal building area to meet demand for the next 20 years without significantly impacting existing infrastructure or other future planned infrastructure improvements. Future plans by the Airport to relocate air freight operations and the ARFF/DPS facility would open up an area adjacent to the terminal building for development that could be utilized for a terminal area expansion, limiting the impact to other infrastructure elements such as the employee and rental car ready/return parking lots.

Table 5-16 summarizes the advantages and disadvantages of Alternative 12.

Figure 5-12: Alternative 12 – Terminal Expansion Alternative 2b



Source: Mead & Hunt, Inc. (2012)

Table 5-16: Alternative 12 Summary

Advantages	Disadvantages
• Provides 9 terminal gates to exceed projected demand • Provides 11 RON aircraft parking positions on terminal apron to meet projected demand • Offers a method to expand terminal building, terminal apron, and boarding gates without significantly impacting existing infrastructure or future planned development	• Requires removal of air freight building, ARFF/DPS facility, and Airport administration parking lot • Significant cost and environmental factors associated with the fill and grading for the southward terminal apron expansion • A single taxi route is available for aircraft at terminal apron parking positions 8 through 10 • May require relocation of airfield generator and electrical vault

5.6.e Preferred Terminal Expansion Alternative

Considering operational, economic, environmental, and implementation factors, it is recommended Alternative 12 (Terminal Expansion Alternative 2b) be considered as the preferred development option to improve terminal area infrastructure to meet the demand that is projected for the next 20 years. It should be noted that Terminal Expansion Alternative 2b is very similar to Terminal Expansion Alternative 2a in the following ways:

- Provide 11 RON aircraft parking positions on the terminal apron and four additional aircraft boarding bridges (for a total of nine) to meet the demand that is projected for the planning period.
- Provide additional area on the terminal apron for the storage of ground service equipment.
- Provide additional area in the terminal building through renovation and expansion.
- Require removal of the ARFF/DPS facility, air freight building, airport administration parking lot, and a small portion of the rental car ready/return lot prior to expansion of the terminal apron. In addition, both alternatives may require relocation of the electrical vault and airfield generator.

While each alternative shares several similarities, Alternative 2b should be considered as the recommended terminal expansion development option over Alternative 2a for several reasons. First, Alternative 2b offers a more linear layout that provides the greatest amount of terminal apron space without significantly impacting existing landside infrastructure. The 118,879 square foot terminal apron expansion proposed by Alternative 2b is greater than the 93,515 square foot expansion proposed by Alternative 2a and reduces impacts to the employee parking lot to the south and land adjacent to the terminal building to the north. It is important to note that Alternative 2b offers greater separation between Terminal Drive and the proposed expansion of the terminal apron to the north, which eliminates the need for a blast wall as would be necessary if Alternative 2a is implemented. Second, Alternative 2b does not impact land north of the terminal building as much as 2a would. Therefore, more land could be utilized for future terminal area improvements such as a relocated airport administration parking lot or a further northward expansion of the terminal building if demand unexpectedly exceeds projected capacity. Finally, Alternative 2b reduces the number of parking positions on the terminal apron to the north that would be impacted by a single taxi route as a result of its linear layout and the additional apron area that would be available for aircraft maneuvering.

One remaining factor to be considered when comparing Alternative 2a to 2b is the amount of fill and grading that will be necessary for a southward expansion of the terminal apron. While conceptually the layout of the terminal apron expansion varies between the two alternatives, a substantial difference in the amount of fill material that would be necessary for a southward expansion is not anticipated. This is the result of the topography within this proposed development area which sharply drops away from the north of the terminal apron and varies 30 to 40 feet from elevation of the terminal apron. While Alternative 2b would require a substantial amount of fill material to expand the terminal apron, it is not anticipated to be at a level that would be significantly greater than what would be necessary to implement the southward terminal apron expansion proposed in Alternative 2a. Considering the advantages and disadvantages of each terminal area alternative, it is recommended Alternative 2b be considered as the preferred development option to expand the terminal area so that adequate apron space, boarding gates, and terminal building area is available to meet the demand that is projected for the planning period.

5.7 Terminal Curb Front

During peak hours, the curb front of the terminal building is often congested with pedestrians, circulating traffic, and commercial vehicles involved in the transfer of passengers to and from arriving and departing commercial airline flights. Congestion occurs because the existing terminal curb front configuration does not provide a dedicated vehicle lane to separate waiting commercial vehicles from the flow of traffic on Terminal Drive. Providing a dedicated commercial vehicle curb and separating traffic lanes away from the front of the terminal building would help eliminate congestion related to waiting vehicles that become blocked in by pedestrians, circulating traffic, and other parked waiting vehicles on Terminal Drive. To address this need, a single logical alternative was prepared to plan for the construction of a dedicated commercial vehicle curb and traffic lanes away from the front of the terminal building. The following section reviews this alternative and discusses why is should be considered as the preferred development option to address this need.

5.7.a Alternative 13 – Commercial Vehicle Curb and Traffic Lanes

Alternative 13 (**Figure 5-13**) proposes the construction of a dedicated commercial vehicle curb and two traffic lanes east of Terminal Drive in front of the terminal building. One of the two traffic lanes would be dedicated to commercial vehicle staging, loading, and off-loading while the other would be intended for entering and exiting traffic. Construction of a retaining wall between the commercial vehicle lanes and the short-term parking lot may be necessary to reduce impact on the short-term lot as a result of the change in topography between the two areas.

- **Operational Factors –** As previously mentioned, separating waiting commercial vehicles from circulating traffic on Terminal Drive would help ease congestion in front of the terminal building by eliminating the need for taxis, limousines, and vans to occupy curb space in front of the terminal. Relocating these vehicles away from the front of the terminal would improve circulating traffic flow on Terminal Drive through the reduction of vehicles waiting curb side to pick up and drop off passengers and will provide a safe, visible, and dedicated area for passengers to board and off-load taxis, limousines, and vans.

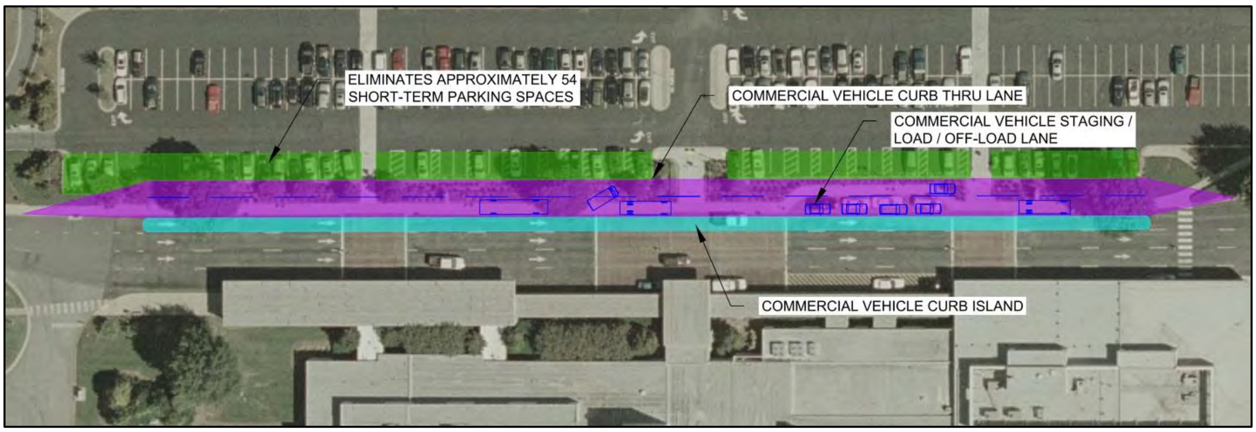
- **Economic Factors –** Alternative 13 provides an expanded area to support commercial vehicle operations; this creates an opportunity for the Airport to generate additional non-aeronautical revenue through contracts that could be negotiated with an increased number of commercial transportation providers. An additional economic factor to consider with the implementation of Alternative 13 is that short-term parking spaces adjacent to the terminal may be lost, reducing the potential parking revenue that could be generated from this lot.

- **Environmental Factors –** An environmental factor to consider with Alternative 12 is that fill and grading will be necessary for the construction of the commercial vehicle curb and traffic lanes as a result of the topography change between the elevation of Terminal Drive and the short-term parking lot. Industry best practices will be necessary to prevent and mitigate any potential storm water and erosion environmental impacts as a result of the fill and grading that will be necessary for the project.

- **Implementation Factors –** An implementation factor to consider is the loss of approximately 54 short-term parking spaces adjacent to the terminal building to implement Alternative 13; however, incorporating a retaining wall into the design of the commercial vehicle curb and traffic lanes may help reduce the number of parking spaces that are lost in the short-term lot. It is encouraged that a plan be established to expand parking in the short-term lot if parking spaces need to be eliminated to implement Alternative 13.

A summary of advantages and disadvantages is presented in **Table 5-17**.

Figure 5-13: Alternative 13 – Commercial Vehicle Curb and Traffic Lanes



Source: Mead & Hunt, Inc. (2012)

Table 5-17: Alternative 13 Summary

Advantages	Disadvantages
• Separates waiting commercial vehicles from circulating traffic • Improves traffic flow on Terminal Drive in front of terminal building • Reduces congestion in front of terminal building during peak hours caused by waiting vehicles	• May eliminate up to 54 short-term parking spaces • Fill and grading necessary for commercial vehicle lane construction

5.7.b Terminal Commercial Curb Front Preferred Alternative

Since limited area is available for development in front of the terminal, a single logical alternative was prepared to address terminal curb side congestion during peak hours as a result of pedestrians, circulating traffic, and waiting commercial vehicles. Alternative 13 offers the most feasible solution to improve traffic flow in front of the terminal by separating waiting commercial vehicles from the circulating traffic flow and other vehicles involved in the pick-up and drop off of passengers. It is recommended that planning be initiated to implement Alternative 13 to replace any lost parking capacity in the short-term lot as a result of the commercial vehicle curb and traffic lane construction.

5.8 General Aviation Development

Activity forecasts prepared for the Airport project that general aviation (GA) operations will increase 32 percent by 2030; therefore, it is recommended that the Airport expand GA facilities to accommodate the increase in apron space and hangars needed. A review of existing GA infrastructure at the Airport in comparison with the activity projections indicate that an additional 37,912 square feet of apron space, 52,500 square feet of box-style hangars, and 15 T-style hangars will be needed to accommodate GA operations.

Two areas on Airport property that are well-suited for GA development are north of the Landmark Aviation facility and west of the approach end of Runway 16 within the northwest development area. Alternatives were prepared for each location to conceptualize how GA development could occur in an effort to establish a recommended plan for GA infrastructure expansion at the Airport. The following section presents each alternative, reviews factors that should be considered if the alternative is implemented, and identifies a recommended layout plan that should be considered when development is ready to occur at each location. It should be noted that the recommended alternatives presented at the end of this section are conceptual in nature and are not intended to be a concrete plan of how development will actually occur within these areas.

5.8.a Alternative 14 – General Aviation Expansion Alternative 1

Alternative 14, illustrated in **Figure 5-14**, proposes a GA facility expansion that incorporates one 18,000 square foot box-style hangar, three 100- by 100-foot box-style hangars, five 80- by 80-foot box-style hangars, twelve 60- by 60-foot box box-style hangars, and two T-style hangar structures with ten aircraft parking positions each. A 135,775 square foot expansion of the north apron to support itinerant aircraft operations at Landmark Aviation is also proposed as well as an additional 145,136 square feet of apron space for maneuvering and parked aircraft in front of the hangar structures. Other airside infrastructure elements proposed in Alternative 14 include a north/south taxilane to join the hangar aprons with the north apron, connector taxiways to join the expanded GA area to Taxiway A, and a widening of Taxiways D1 and D2. Landside infrastructure improvements include a rerouting of Wright Brothers Way and construction of service roads and parking lots to access the expanded hangar areas.

- **Operational Factors –** The expansion of apron space, box-style hangars, and T-style hangars proposed by Alternative 14 would exceed the demand that is anticipated throughout the planning period; this is intended to illustrate how the site could be developed to its fullest extent. The layout of the taxilanes and supporting landside infrastructure would allow for the incremental phasing of development over time based upon demand so the site could remain flexible to meet future needs.

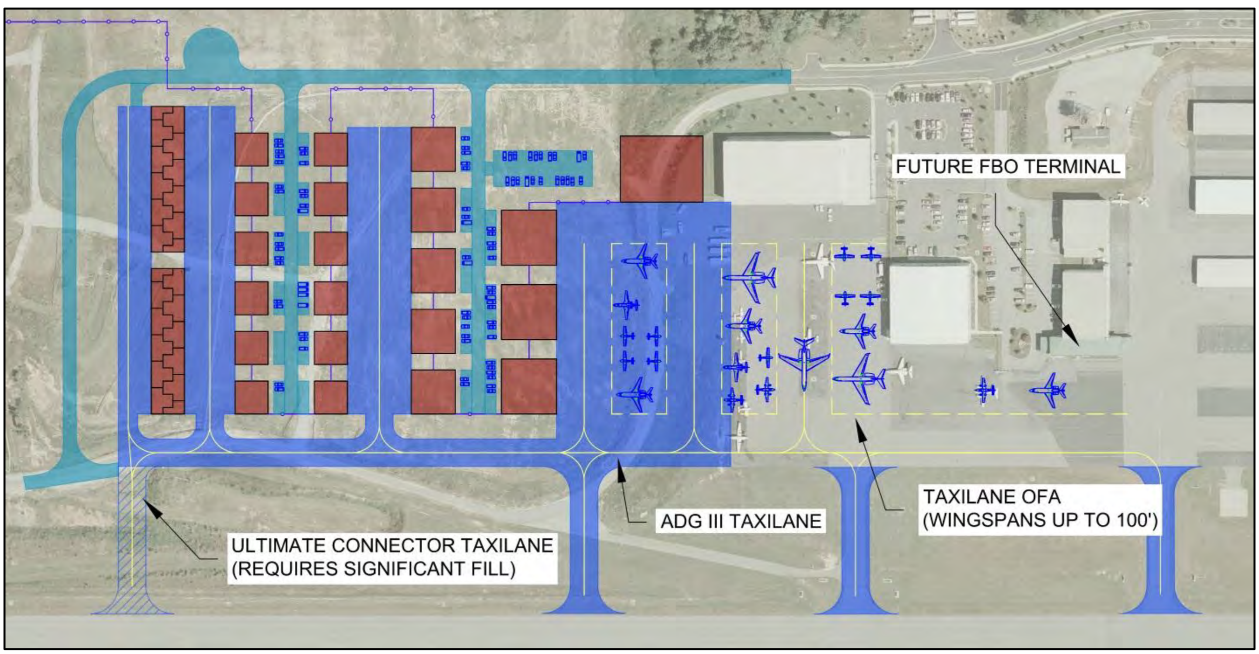
- **Economic Factors –** Expanding the general aviation area would not only increase opportunities for the Airport to generate additional aeronautical related revenue through hangar rents and building leases, but also would help contribute to the overall economy of Airport-based businesses through the ability to support an increase in aeronautical activity.

- **Environmental Factors –** Significant fill would be necessary for development to occur within this area since the topography of the land varies 40 to 50 feet in some places from the elevation of the airfield and existing general aviation infrastructure. Construction of a supplementary connector taxiway to the north would also require significant fill due to this varying topography.

- **Implementation Factors –** The orientation of some box-style and T-style hangars proposed in Alternative 14 face would north, which is undesirable during winter months since the front of these buildings would have limited exposure to sunlight from the south. Permitting the front of the building to face towards the south during winter months would allow sunlight to assist in the melting of snow and ice, which would prevent contaminates from freezing on hangar doors and apron surfaces. Though the Airport is not exposed to sub-freezing temperatures for long durations of time during the winter months, this may be a factor for those wishing to lease or build hangars within the development area.

Alternative 14 advantages and disadvantages are summarized in **Table 5-18**.

Figure 5-14: Alternative 14 – General Aviation Expansion Alternative 1



Source: Mead & Hunt, Inc. (2012)

Table 5-18: Alternative 14 Summary

Advantages	Disadvantages
• Meets aircraft storage needs • Provides for a variety of hangar sizes • Site can be developed incrementally over time as needed • Increase aeronautical revenue generating capability of the Airport	• Some hangars have north facing doors • Significant fill needed for development and supplemental connector taxiway

5.8.b Alternative 15 – General Aviation Expansion Alternative 2a

A set of three alternatives were prepared that focus on providing additional itinerant aircraft parking through an apron expansion between the existing north apron and Taxiway A. Alternative 2a, presented in **Figure 5-15**, is the first alternative that presents this concept by proposing a 71,761 square foot itinerant aircraft apron between Taxiway D1 and Taxiway D2. In addition to this apron, Taxiway D1 and D2 would be widened and the north apron would be expanded 49,883 feet to the north. Other taxiway/taxilane improvements would include the construction of a north/south taxilane and up to two additional connector taxiways between Taxiway A and the expanded general aviation area. These improvements would support the construction of three additional 100- by 100-foot box-style hangars, five 80- by 80-foot box-style hangars, twelve 60- by 60-foot box-style hangars, and four T-style hangars capable of parking ten aircraft each. Landside improvements proposed by Alternative 2a include an extension of Wright Brothers Way and the construction of service roads and parking lots to access the hangar facilities.

- **Operational Factors –** The additional 186,819 square feet of hangar facilities provides sufficient capacity to meet the demand that is projected for the planning period. The configuration also maximizes the number of aircraft hangars which could be built in the area and provides flexibility to develop the site incrementally over time with a variety of hangar styles and sizes as needed. Construction of the apron between Taxiway D1 and D2 would also provide additional itinerant aircraft parking near the future FBO Terminal.

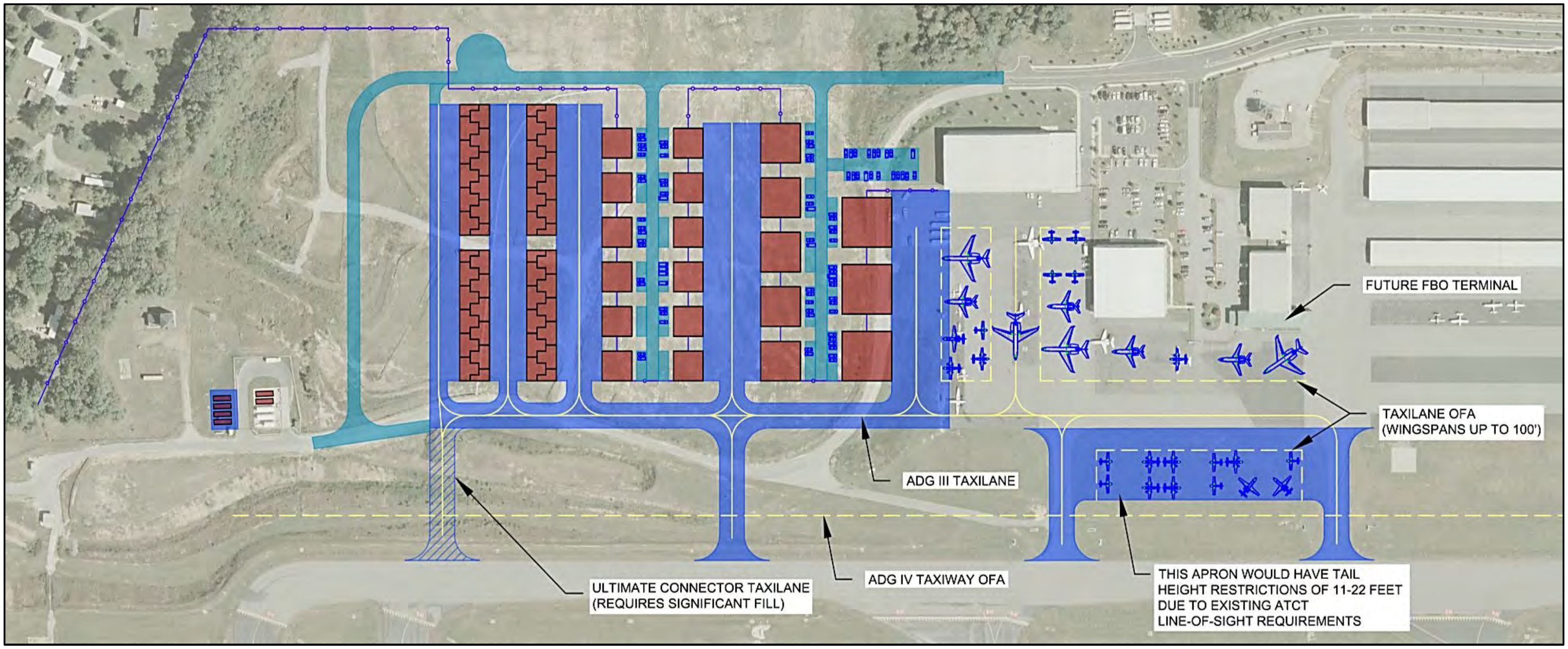
- **Economic Factors –** Expanding the general aviation area would offer an opportunity for the Airport to increase its aeronautical related revenue through additional hangar rents and leases as well as revenue that could be earned by an increase in aviation activity such as fuel purchases and landing fees. However, consideration should be given to the significant cost that would be necessary to fill and grade the land to the north for development as the topography within this area varies 40 to 50 feet in some locations.

- **Environmental Factors –** As noted, significant fill and grading would be necessary for implementing Alternative 2a. Erosion and storm water runoff controls would also be needed to reduce or eliminate and environmental impacts as a result of the fill and grading.

- **Implementation Factors – One** implementation factor to consider with Alternative 2a is that some hangars would have north facing doors, which is typically not desired during winter months in northern climates due to snow and ice melt concerns. An additional implementation factor is that tail height restrictions may be necessary for aircraft parked on the expanded apron between Taxiway D1 and D2 due to line-of-sight requirements with the existing ATCT. Aircraft parked on this expanded apron may be restricted to tail heights between 11 to 22 feet in order for air traffic controllers to have an unobstructed view of airfield surfaces within this area. It should be noted that the construction of a new ATCT would offer improved line-of-sight for controllers, which might eliminate the need for tail height restrictions on the expanded apron.

Table 5-19 summarizes the advantages and disadvantages of GA expansion Alternative 2a.

Figure 5-15: Alternative 15 – General Aviation Expansion Alternative 2a



Source: Mead & Hunt, Inc. (2012)

Table 5-19: Alternative 15 Summary

Advantages	**Disadvantages**
• Meets aircraft storage needs • Provides additional itinerant aircraft parking in close proximity to future FBO terminal • Provides variety of box-style hangar sizes • Can be implemented incrementally over time • Maximizes development area for aircraft storage hangars • Offers opportunity for Airport to increase aeronautical related revenue through hangar rents and leases	• Some hangars have north facing doors • Apron expansion towards Taxiway A would have tail height restrictions due to ATCT line-of-sight requirements • Significant fill required for development towards north and supplemental connector taxiway • Cost necessary to fill and grade land for development

5.8.c Alternative 16 – General Aviation Expansion Alternative 2b

General Aviation Expansion Alternative 2b, **Figure 5-16**, is the second alternative that incorporates an apron expansion between Taxiway A and the north apron to provide additional itinerant aircraft parking. The approximate 72,000 square foot expansion of the apron proposed in this alternative is also located between Taxiway D1 and Taxiway D2. This alternative also proposes to expand the north apron by approximately 49,900 square feet as well as construct a series of taxilanes to support development of three 100- by 100-foot box-style hangars, five 80- by 80-foot box-style hangars, fourteen 60- by 60- foot box-style hangars, and one T-style hangar capable of parking 10 aircraft. Landside improvements include an extension of Wright Brothers Way and construction of access roads and parking lots to support the hangar development. Nearly all development proposed by Alternative 2b would occur within the existing perimeter fence line of the Airport.

- **Operational Factors –** General Aviation Expansion Alternative 2b offers sufficient box-style hangar space to meet the demand that is projected for the planning period; however, the configuration is only capable of supporting one (1) T-style hangar structure which would not be capable of meeting the demand for 15 T-style hangar units by 2030. Alternative 2b also offers the ability to incrementally develop the site with a variety of box-style hangar sizes over time. Expansion of the north apron towards Taxiway A also provides additional itinerant aircraft parking in close proximity to the future FBO terminal building.

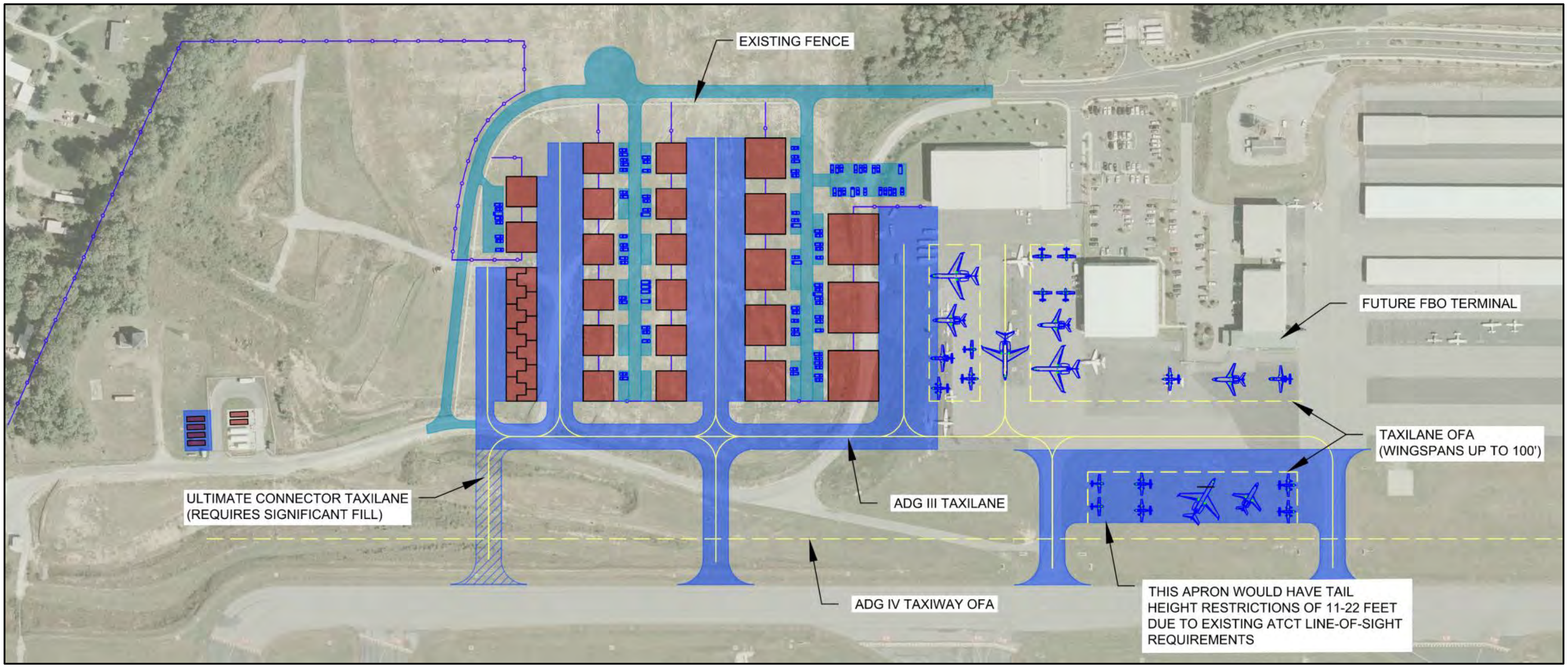
- **Economic Factors –** Expanding general aviation facilities offers an opportunity for the Airport to collect additional aeronautical-related revenue through hangar rents, leases, and fees earned through increased fuel purchases and aircraft landings. Since the expansion of facilities would occur within the existing perimeter fence line of the Airport, costs for fill and grade would not be as significant since this area has already been initially prepared for infrastructure development.

- **Environmental Factors –** Though fill and grade will be needed for development, it is not anticipated to be as significant as what would be necessary to implement General Aviation Expansion Alternatives 1 and 2a since the elevation of the topography within this area does not vary as greatly as it does to the north. Erosion and storm water runoff controls would be necessary; however, to reduce or eliminate any potential environmental impacts during any filling or grading activities.

- **Implementation Factors –** Some hangars will have northward facing doors, which is typically undesired during the winter months since sunlight from the south would not assist in the melting of snow and ice from hangar doors. In addition, the apron expansion towards Taxiway A may limit the types of aircraft that can be parked on the surface due to ATCT line-of-sight requirements. Since air traffic controllers in the ATCT need to have a clear view of Taxiway A and its adjoining connector taxiways, tail height restrictions between 11 to 22 feet would be necessary depending on an aircraft's parking position.

Advantages and disadvantages of GA expansion Alternative 2b are summarized in **Table 5-20**.

Figure 5-16: Alternative 16 – General Aviation Expansion Alternative 2b



Source: Mead & Hunt, Inc. (2012)

Table 5-20: Alternative 16 Summary

Advantages

- Provides sufficient box-style hangar space to meet demand
- Provides additional itinerant aircraft parking in close proximity to future FBO terminal
- Provides variety of box-style hangar sizes
- Can be implemented incrementally over time
- Offers opportunity for Airport to increase aeronautical related revenue through hangar rents and leases
- Significant fill and grade not needed since development occurs within existing fence line of Airport

Disadvantages

- Some hangars have north facing doors
- Apron expansion towards Taxiway A would have tail height restrictions due to ATCT line-of-sight requirements
- Does not provide enough T-style hangar units to meet anticipated demand

5.8.d Alternative 17 – General Aviation Expansion Alternative 2c

General Aviation Expansion Alternative 2c (Alternative 17), illustrated in **Figure 5-17**, is the third and final alternative that incorporates an expansion of the north apron towards Taxiway A and, like Alternative 2b, proposes that nearly all development would occur within the existing perimeter fence line of the Airport. The approximate 72,400 square foot expansion of the north apron towards Taxiway A between Taxiways D1 and D2 as proposed by Alternative 2c would be complemented by an approximate 49,900 square foot expansion of the apron to the north. Taxilanes and connector taxiways proposed by Alternative 2c would provide access to three 100- by 100-foot box-style hangars, five 80- by 80-foot box-style hangars, twelve 60- by 60-foot box-style hangars, and two 9-unit T-style hangars. Landside improvements proposed by Alternative 2c include an extension of Wright Brothers Way and construction of service roads and parking lots to access the hangar structures.

- **Operational Factors –** Alternative 2c offers a layout that would meet the demand for box-style and T-style hangars while providing for a variety of box-style hangar sizes that could be implemented incrementally over time to meet demand. It also offers the operational advantage of additional itinerant aircraft parking in close proximity of the future FBO terminal building.

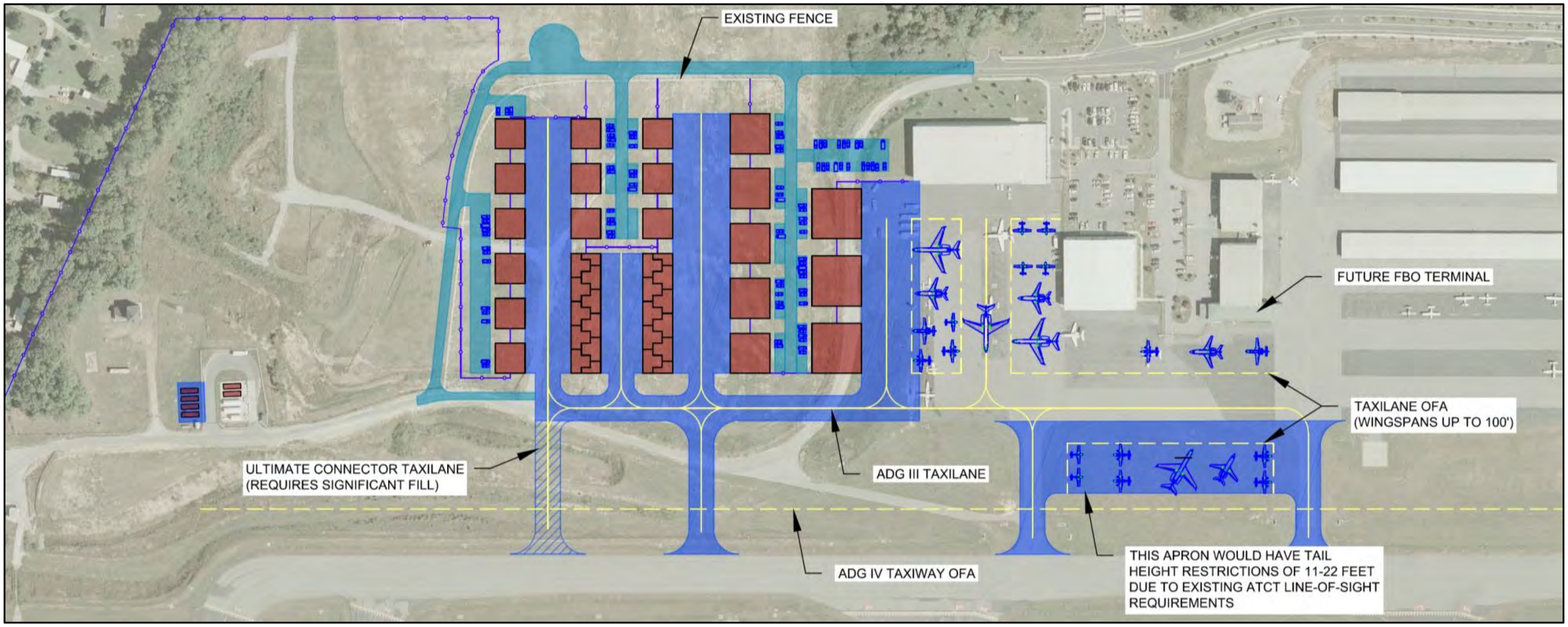
- **Economic Factors –** Expanding general aviation infrastructure offers an opportunity for the Airport to earn additional aeronautical-related revenue through hangar rents, building leases, increased fuel flowage fees and landing fees as a result of the increased number of based aircraft. The layout also offers the most cost-effective solution for expanding general aviation facilities within the existing fence line of the Airport since it offers a way to meet the anticipated demand for box- and T-style hangars without the need for significant fill and grading.

- **Environmental Factors –** Since all facility development is proposed to occur within the existing fence line of the Airport, significant fill and grading will not be necessary due to efforts that have been underway to prepare this land for development. However, erosion and storm water runoff controls may be necessary for any additional fill or grading that may occur within this area for development.

- **Implementation Factors –** Alternative 2c best maximizes the space available within the existing perimeter fence line of the Airport to expand general aviation facilities on the east side of the airfield to meet projected demand. While this is a significant advantage, some hangars will have northward facing doors which are typically not desired at airports which receive snow, ice, and sub-freezing temperatures during the winter months. In addition, tail height restrictions may be necessary for aircraft parked on the itinerant apron expansion between Taxiways D1 and D2 due to line-of-sight requirements from the ATCT.

A summary of advantages and disadvantages with GA Expansion Alternative 2c are presented in **Table 5-21**.

Figure 5-17: Alternative 17 – General Aviation Expansion Alternative 2c



Source: Mead & Hunt, Inc. (2012)

Table 5-21: Alternative 17 Summary

Advantages	Disadvantages
• Provides sufficient hangar space to meet demand • Provides additional itinerant aircraft parking in close proximity to future FBO terminal • Provides variety of box-style hangar sizes • Can be implemented incrementally over time • Cost effective option to meet anticipated hangar demand within existing perimeter fence line of Airport • Offers opportunity for Airport to increase aeronautical related revenue through hangar rents and leases • Significant fill and grade is not necessary	• Some hangars have north facing doors • Apron expansion towards Taxiway A would have tail height restrictions due to ATCT line-of-sight requirements

5.8.e Alternative 18 – General Aviation Expansion Alternative 3

General Aviation Expansion Alternative 3, presented in **Figure 5-18**, was prepared to illustrate how an expansion of the general aviation area could be developed without the need for northward facing hangars. The configuration of taxilanes, hangar aprons, and connector taxiways supports development of three 100- by 100-foot box-style hangars, four 80- by 80-foot box-style hangars, ten 60- by 60- foot box-style hangars, and three T-style hangar structures each capable of housing 10 aircraft. Expansion of the north apron is also proposed by this alternative through an approximate 49,900 square foot expansion towards Taxiway A, which would be located between Taxiways D1 and D2, and an approximate 69,770 square foot expansion to the north of Landmark Aviation. Landside improvements proposed by this alternative include the development of access roads, parking lots, and an extension of Wright Brothers Way to support the hangar development.

- **Operational Factors –** The anticipated demand for box- and T-style hangars throughout the planning period would be met with this alternative without the need for northward facing hangars. This orientation of hangar structures would allow sunlight from the south during the winter months to assist in melting of snow and ice away from all hangar doors. General Aviation Expansion Alternative 3 would also provide additional itinerant aircraft parking in close proximity to the future FBO terminal.

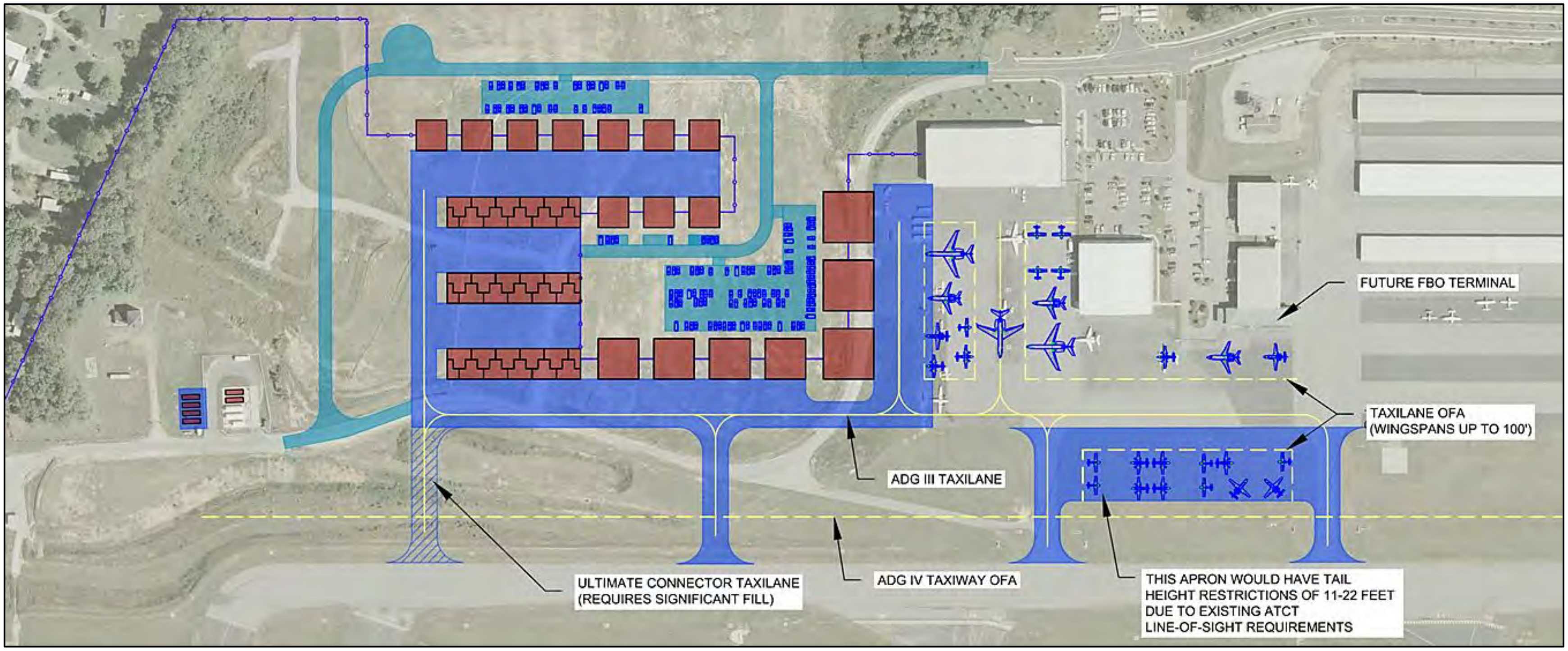
- **Economic Factors –** Expanding general aviation infrastructure would offer an opportunity for the Airport to earn additional aeronautical-related revenue through hangar rents and leases as well as through fees collected from fuel purchases and landings as a result of increased aviation activity. However, consideration should be given to the significant cost that would be necessary to prepare the site for development as a result of the fill material that would be needed to level the topography of the land which varies 40 to 50 feet from the elevation of the airfield in some areas.

- **Environmental Factors –** Significant fill would be needed to prepare the site for the development since the topography of the land varies 40 to 50 feet in some areas from the elevation of the airfield. Erosion and storm water runoff controls would need to be implemented during the process of filling and grading the land for development, which would mitigate and prevent any impacts to the surrounding environment.

- **Implementation Factors –** While the proposed layout eliminates the need for northward facing hangar doors, it would only provide a single taxi route for aircraft to access the T-style and 60- by 60-foot box-style hangars. Also, expansion of the north apron towards Taxiway A may result in tail height restrictions that vary between 11 and 22 feet for aircraft parked on the surface due to line-of-sight requirements from the ATCT.

A summary of GA expansion Alternative 3 advantages and disadvantages is presented in **Table 5-22**.

Figure 5-18: Alternative 18 – General Aviation Expansion Alternative 3



Mead & Hunt, Inc. (2012)

Table 5-22: Alternative 18 Summary

Advantages	**Disadvantages**
• Provides sufficient hangar space to meet demand • No northward facing hangar doors • Provides additional itinerant aircraft parking in close proximity to future FBO terminal • Offers opportunity for Airport to increase aeronautical related revenue through hangar rents and leases	• Significant fill and grade needed, resulting in increased project costs • A single taxi route is available for aircraft to access the T-style and 60 by 60 foot box-style hangars • Apron expansion towards Taxiway A would have tail height restrictions due to ATCT line-of-sight requirements

5.8.f General Aviation Expansion Recommended Alternative

It is recommended that Alternative 17 – General Aviation Expansion Alternative 2c be considered as the preferred development plan to expand general aviation infrastructure on the east side of the airfield. Alternative 2c is similar to the other general aviation expansion alternatives in that it would provide a variety of box-style hangar sizes that could be incrementally implemented over time to meet the demand projected for the planning period. In addition, it also would provide a sufficient number of T-style hangar units to meet the demand that is projected for the planning period. Unlike the other alternatives, Alternative 2c offers the most cost-effective way to expand general aviation infrastructure since all facility development would occur within the existing airfield perimeter fence line of the Airport. Land within the existing airfield perimeter fence line to the north of the existing general aviation area has been initially prepared for development through a fly ash fill material project. Topography of the land to the north of the airfield perimeter fence line in this area varies 40 to 50 feet in places from the elevation of the airfield, requiring significant fill if development were to occur within this area.

Alternative 2c requires that some hangars have northward facing doors, which are typically undesired at airports that experience snow, ice, and sub-freezing temperatures for prolong periods during the winter season. , The angle of sunlight from the south during the winter cannot assist in the melting of snow and ice buildup on the front of northward facing hangar doors. This is often a factor that is considered by pilots and aircraft owners when deciding to lease, rent, or construct a hangar in locations that are subjected to snow, ice, and below-freezing temperatures. Although the Airport experiences snowfall and ice, it is not typically subjected to below freezing temperatures for prolong periods; therefore, the buildup of these contaminates on pavement surfaces often melt away after only a few days due to air temperatures. As such, it is not anticipated that construction of northward facing hangars will be a significant detrimental factor in the development of the site for expanded general aviation facilities.

Alternative 2c also provides additional itinerant aircraft parking within close proximity of the future FBO building where pilots, passengers, and flight crews originate and depart for flights. It should be noted that construction of this apron expansion towards Taxiway A between Taxiways D1 and D2 may require the ATCT to accept some minor line-of-sight shadowing on Taxiway A or a tail height restriction letter agreement between the Airport, FBO, and ATCT. Pending the location of the aircraft parked on the apron expansion, tail heights may be restricted between 11 to 20 feet. Though this may limit the use of the apron to park larger general aviation aircraft such as Gulfsteams, Global Expresses, and some Dassault Falcon and Bombardier manufactured business aircraft, it is still anticipated to have significant usefulness even with tail height restrictions. Given that the ATCT may be eventually relocated resulting in the possible removal or increase of tail height restrictions for aircraft parked on the apron expansion, it is recommended General Aviation Expansion Alternative 2c (Alternative 17) be considered as the development plan to expand general aviation infrastructure at the Airport to meet demand projected for the planning period.

5.8.g Alternative 19 – Northwest Development Area Expansion Alternative

Significant land within the existing property line of the Airport is available for a combination of aeronautical and non-aeronautical development to the west of Runway 16/34. One site near the approach end of Runway 16, designated the Northwest Development Area, is well suited to support these uses and serve as a supplemental area for general aviation infrastructure development. This area should be considered as a long-term planning option for expanding general aviation infrastructure at the Airport after the build-out of facilities on the east side of the airfield or when sufficient. In an effort to preserve this land for the additional expansion of general aviation facilities, Alternative 19 was prepared to illustrate how the site could be developed for a variety of aeronautical and non-aeronautical uses.

Alternative 19 proposes the construction of connector taxiways, aprons, and taxilanes that would be capable of support aircraft types up to Airplane Design Group III, which includes most business jets such as Gulfstreams, Dassault Falcons and the Bombardier Global Express. A west side parallel taxiway would provide airside access to the Northwest Development Area which is anticipated to be constructed as part of a runway relocation and airfield improvement project. The configuration of taxilanes and apron space proposed by Alternative 19 would be capable of supporting a variety of box-style hangar sizes capable of supporting aeronautical-related activities such as general aviation aircraft manufacturing and maintenance, corporate aircraft storage, and charter aircraft operations. Approximately 74 acres of land in Alternative 19 is reserved for non-aeronautical development and can include a variety of uses such as light industrial manufacturing facilities, warehouses, public storage facilities, and distribution centers. Landside access to the aeronautical and non-aeronautical facilities would be provided through an extension of Pinner Road and the construction of additional access roads and vehicle parking lots. It should be noted that all development within the Northwest Development Area would be planned for outside of the French Broad River flood plain boundary to the west.

- **Operational Factors –** Alternative 19 offers a long-term expansion plan for general aviation infrastructure that would be capable of meeting demand well beyond the planning period. It also offers an opportunity to utilize this property for non-aeronautical uses such as commercial and non-commercial development that might benefit from being in close proximity to the Airport.

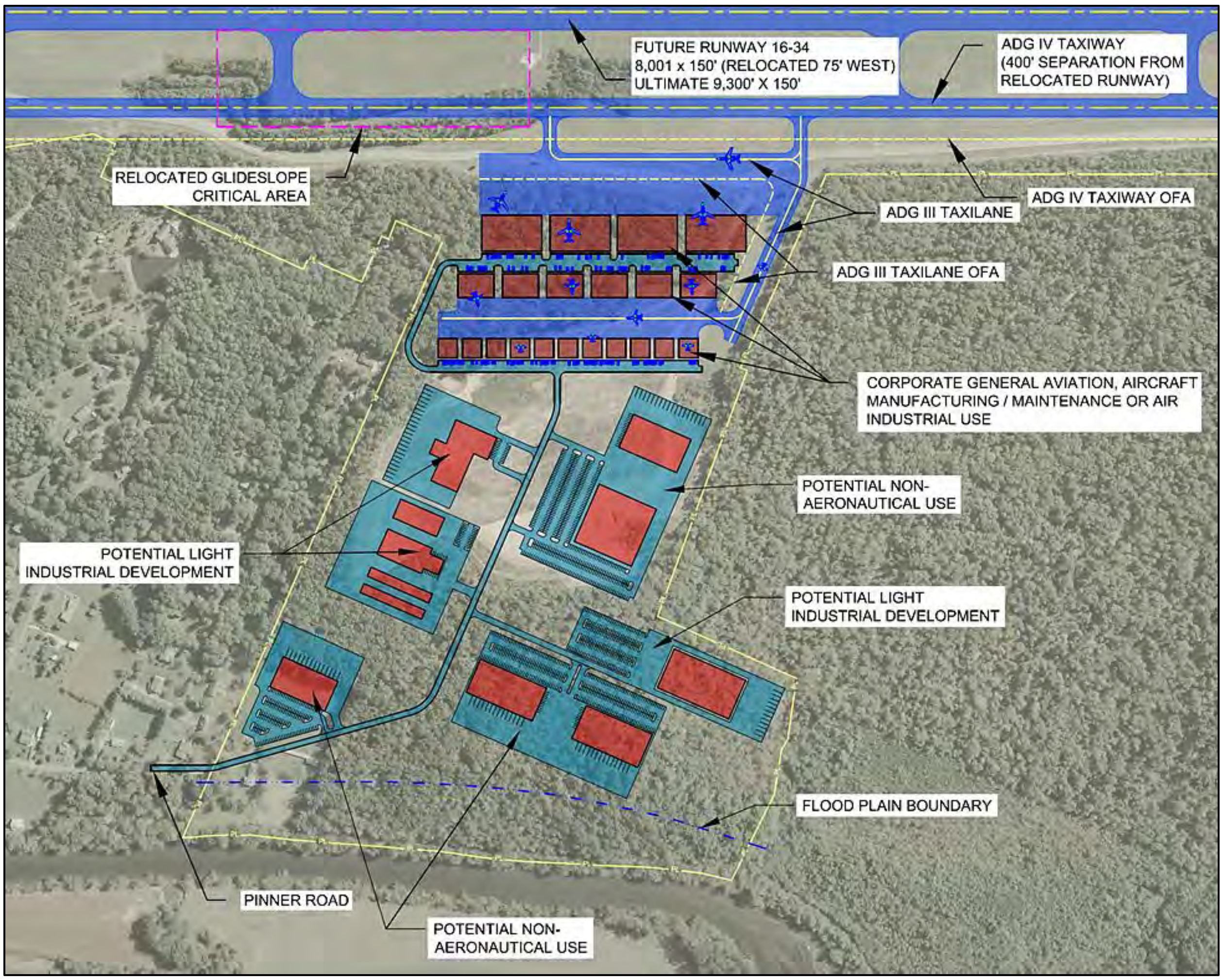
- **Economic Factors –** The expansion of aeronautical and non-aeronautical facilities within this area would offer an opportunity for the Airport to collect additional revenue through rents, leases, and other contractual development agreements. Consideration should be given to the cost necessary to fill and grade the site for development as a result of the varying topography within this area.

- **Environmental Factors –** The topography of the land within this area varies significantly from the elevation of the airfield and would require considerable fill and grading to prepare it for development. Erosion prevention measures, storm water runoff controls, and other measures to preserve water quality will be necessary due to the proximity to the French Broad River. Consideration should also be given to the potential environmental and quality of life impacts of increased commercial truck traffic on Pinner Road that would be traveling through existing residential areas.

- **Implementation Factors –** This site is rather isolated from the infrastructure on the east side of the airfield; significant taxiway and roadway infrastructure improvements would be necessary to prepare the site for development. Construction of a west side parallel taxiway would be necessary to provide airside access to the site for aeronautical activities while an extension of Pinner Road and construction of access roads and parking lots would be needed to provide landside access to the site. Additional improvements to the condition and strength of pavement on the existing segment of Pinner Road may be necessary if significant truck traffic is anticipated as a result of commercial and non-commercial development within the Northwest Development Area.

Figure 5-19 illustrates Alternative 19 while advantages and disadvantages are discussed in **Table 5-23**.

Figure 5-19: Alternative 19 – Northwest Development Area Expansion Alternative



Source: Mead & Hunt, Inc. (2012)

Table 5-23: Alternative 19 Summary

Advantages	Disadvantages
• Supplemental site for long-term general aviation infrastructure expansion • Site for non-aeronautical development • Opportunity for additional aeronautical and non-aeronautical related revenue	• Significant fill and grading needed • Cost for fill and grading • Airside and landside improvements needed for access

5.9 Vehicle Parking

Currently, there is an immediate need for additional parking capacity at the Airport to meet existing and projected demand. As illustrated in the parking supply/demand summary presented in **Table 5-24**, the demand for public parking is anticipated to grow from 1,482 spaces in 2010 to 2,065 spaces in 2030, resulting in a need for 600 additional public parking spaces. Additional parking capacity is also needed in the rental car ready/return lot to meet demand; a deficit of 29 spaces existed in 2010 and is projected to grow to a deficit of 83 parking spaces by 2030. Walker Parking Consultants was tasked with the development and evaluation of alternatives to increase parking capacity at the Airport so that a recommended plan can be implemented to meet the demand for parking throughout the planning period. The follow sections reviews methods that are available to expand parking capacity, presents a series of alternatives, analyzes the advantages and disadvantages of each, and recommends a course of action that should be taken to expand parking infrastructure at the Airport once funding becomes available.

Table 5-24: Parking Supply/Demand Summary

Year	Projected Annual Enpl.	Public Parking			Employee Parking			Rental Ready/ Return			Total		
		Projected Parking Demand	Parking Supply	Parking Surplus/ (Deficit)	Projected Parking Demand	Parking Supply	Parking Surplus/ (Deficit)	Projected Parking Demand	Parking Supply	Parking Surplus/ (Deficit)	Parking Supply	Parking Demand	Surplus/ (Deficit)
2010	378,087	1,482	1,465	(17)	238	381	143	136	107	(29)	1,953	1,856	97
2015	410,793	1,610	1,465	(145)	263	381	118	148	107	(41)	1,953	2,021	(68)
2020	446,328	1,750	1,465	(285)	286	381	95	161	107	(54)	1,953	2,197	(244)
2025	484,937	1,901	1,465	(436)	310	381	71	175	107	(68)	1,953	2,386	(433)
2030	526,886	2,065	1,465	(600)	337	381	44	190	107	(83)	1,953	2,592	(639)

Source: Walker Parking Consultants (2012)

Notes: 1 – Parking supply figures exclude the 4 visitor spaces at the Maintenance Facility and the 578 RAC storage spaces.

5.9.a Short-Term, Premium, and Rental Car Ready/Return Parking

The duration of short term parking at an airport is generally considered to range from three to four hours or less. Patrons who use short-term parking are generally spending a short period of time at an airport to pick up, drop off, or meet and greet passengers prior to or after flights. At most airports, this user group comprises of two-thirds to three-quarters of all parking transactions; however, because the duration of the stays are short and turnover in the short term lot is high, only about three to five percent of the total public parking supply is needed to accommodate short term demand. Since this is the largest group of parking customers by far, and due to the fact that stays are short, the most convenient spaces at an airport are usually reserved for short term parking with appropriate measures taken to assure that adequate short term parking is available.

At the Airport, 193 of the total 1,465 public spaces are designated short-term, or 13 percent of the available capacity. The parking occupancy counts examined as part of the parking supply/demand analysis revealed that on average 70 spaces in the short-term lot were occupied overnight with a maximum around 120 spaces each month. Thus, a large number of parking patrons are using the short-term lot as a de facto premium parking area and are willing to pay the premium overnight charge for the chance to park as close as possible to the terminal. Another contributing factor may be that the long-term lot becomes congested and the user is willing to pay the premium rather than park in the overflow long-term parking lots that have a longer and uphill walk to the terminal. In any event, there is a readily identified group of parking patrons who use the Airport that are willing to pay a premium price for a premium service.

In addition, the current rental car ready/return lot, located adjacent to the terminal at its south end, has inadequate capacity to meet existing demand and is very difficult to expand due to surrounding topography. As more ready/return capacity is needed, a decision must be made whether the ready/return operation will be in one location, or if the operation will be split by retaining the existing lot and creating more spaces elsewhere. If the operation moves completely to another location, then the ready/return lot would be available for another use.

The above two circumstances – premium parkers who need a "home" and a vacant lot immediately next to the terminal – create an opportunity. We recommend that the Airport consider relocating the rental car ready/return operation to another location and create a new premium parking product using the existing rental car ready/return lot. Such an initiative may take on the following characteristics:

- The lot is converted to a premium frequent parking lot with entry and exit via a credential such as a proximity card or an Automatic Vehicle Identification (AVI) tag.
- Patrons sign up for the frequent parker program to receive their credential and pay an annual or monthly fee.
- When a patron parks in the lot, his or her credit card on file is automatically charged and they receive a receipt via email the next day or they are billed monthly based on usage.
- The fee for parking overnight in the short-term lot is raised substantially, so that the lot is reserved and available for the true short-term parker. The hourly fee does not need to be changed. The idea is not to charge the true short-term parker more, but to encourage the premium parker to park elsewhere so that spaces are available for true short-term parkers.
- The fee for parking in the premium frequent parker lot is set higher than the long-term overnight rate, but lower than the new short-term overnight rate, reflecting the higher level of service provided.

5.9.b Options To Expand Long-Term Parking Infrastructure

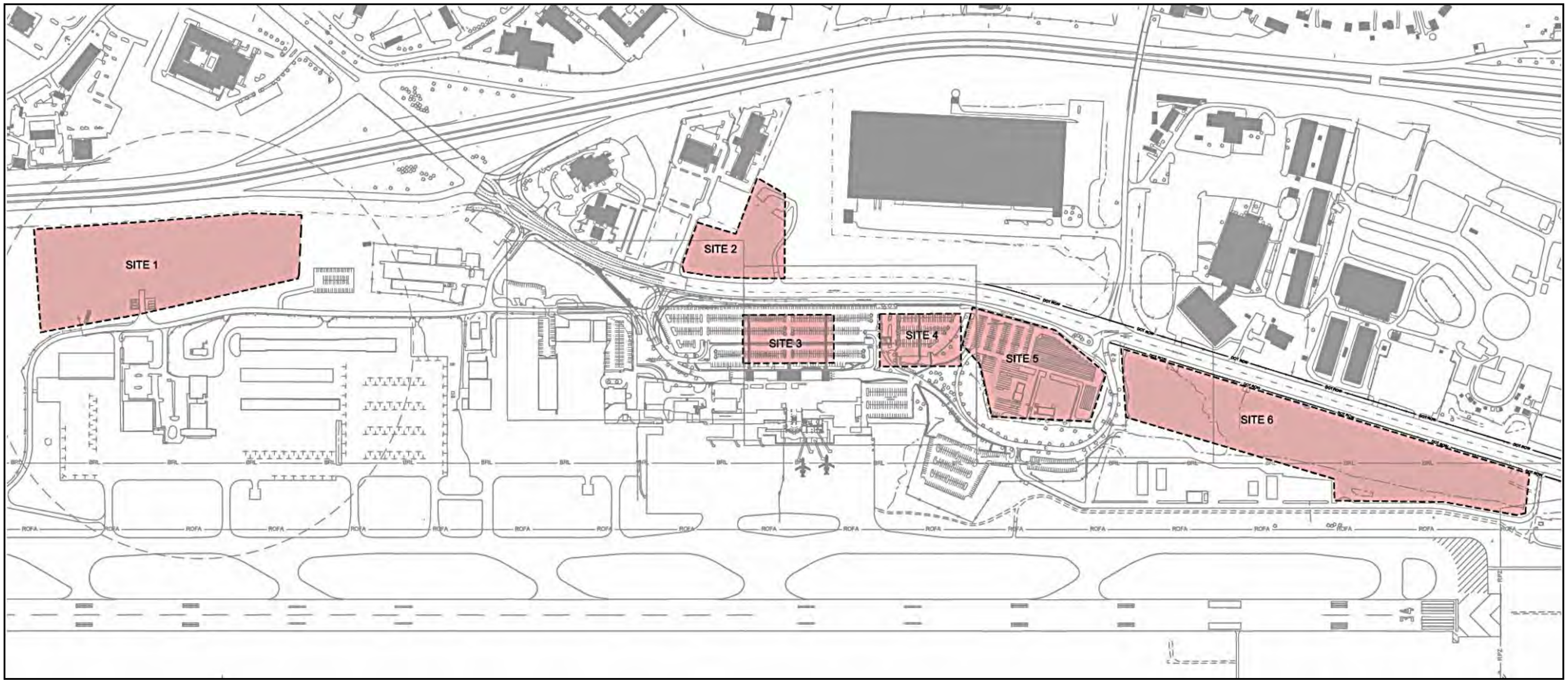
Construction of a parking garage or the use of a remote parking lot accessed by shuttle buses (also known as a "shuttle lot") are two feasible options to expand long-term parking infrastructure at the Airport. Each type of facility has relative advantages and disadvantages. Parking garages offer the advantage of placing a large concentration of spaces in a convenient location for users. Most of the parking spaces in a garage are covered and protected from the elements and can be phased to meet growing demand. While they are expensive to build, they usually create more net revenue for an airport because they are relatively inexpensive to operate and the parking fees can be high compared to further, less convenient locations.

Remote parking lots with shuttle service to the terminal are usually inexpensive to develop but are expensive to operate due to the shuttle bus service. To provide an acceptable level of service to the user, buses must run frequently and must begin service well before the first flight in the morning and continue to operate well after the last flight arrives at night. Since the level of service to the user is low compared to other options, parking fees are often lower compared to garages and lots nearer to the terminal building. Low fees combined with high operating costs limit the net revenue that can be generated by these facilities.

It is recommended that the Airport consider both parking garage and shuttle lot options to meet its parking needs, so that all the relative advantages and disadvantages can be considered when moving forward with a recommended parking infrastructure improvement plan. **Figure 5-20** identifies six sites on Airport property that are available to expand parking infrastructure either through the construction of a parking garage or a remote shuttle lot. The following alternatives highlight various ways each site can be developed for the expansion of parking infrastructure at the Airport.

It should be noted that the shuttle lot alternatives include a designation of a shuttle bus route that would enter, exit, and circulate through the lot. Also, each of the sites identified for shuttle lot development are currently vacant so there would be no displacement of existing surface lot spaces during construction. A temporary reduction in capacity would be necessary during construction of a parking garage since these alternatives occur on sites where there is currently surface parking. It is anticipated that during construction of a parking garage, up to 280 spaces would be temporarily displaced. Replacement of these displaced spaces would need to be incorporated into the final design of the garage. In addition, should a future curb lane be constructed in front of the terminal building, an additional 54 spaces would also need to be recuperated into the design of the parking garages proposed at each site.

Figure 5-20: Parking Alternative Sites



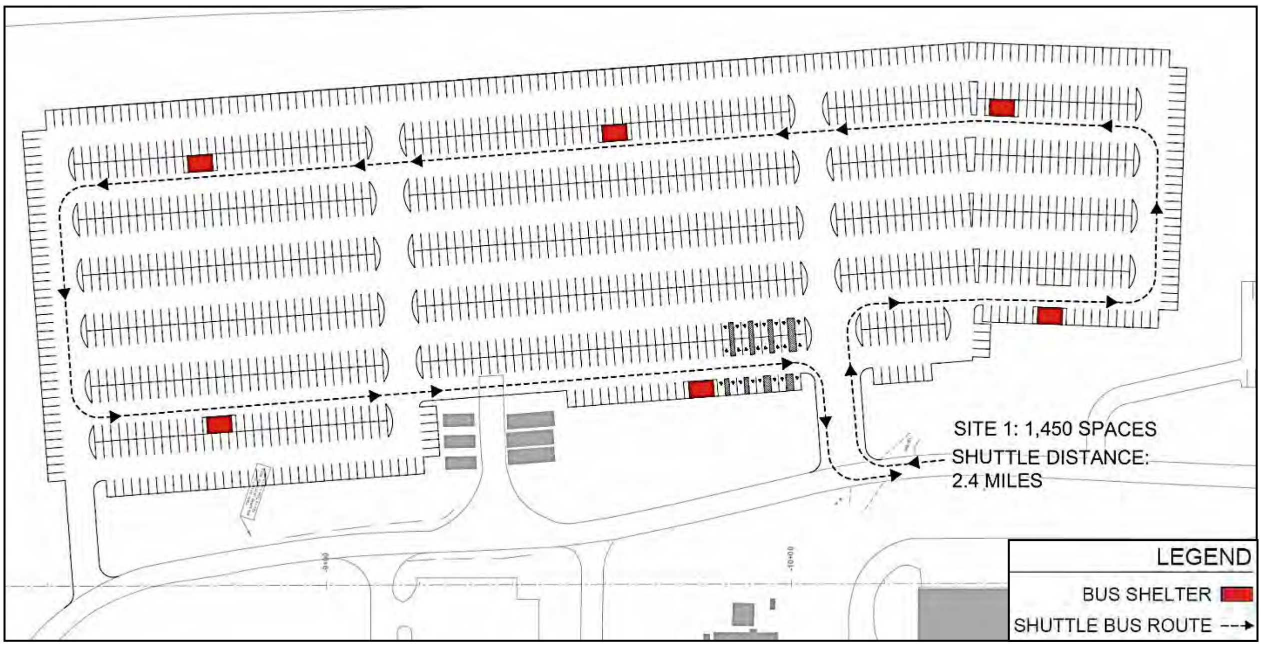
Source: Walker Parking Consultants (2012)

5.9.c Alternative 20 – Shuttle Lot at Site 1

A shuttle lot developed at Site 1 identified in **Figure 5-21** is located on Wright Brothers Way east of the Landmark Aviation facility and would accommodate approximately 1,450 spaces, well more than the number projected throughout the 2030 planning horizon. Thus, only a portion of the lot as illustrated would be required to meet the anticipated demand. Routing of the shuttle bus to access this lot is anticipated to be quite circuitous and its location would not be obvious to vehicles entering the Airport. Access to this lot would need to be enhanced by the new Airport entrance planned as a result of the Interstate 26/North Carolina Route 280 interchange redesign project. The shuttle route to, from, and through this lot would total 2.4 miles. Three shuttle buses would be needed to operate at all times to maintain a maximum shuttle bus wait time of about five minutes.

The relative advantages and disadvantages of this alternative are summarized in **Table 5-25**.

Figure 5-21: Alternative 20 – Shuttle Lot at Site 1



Source: Walker Parking Consultants (2012)

Table 5-25: Alternative 20 Summary

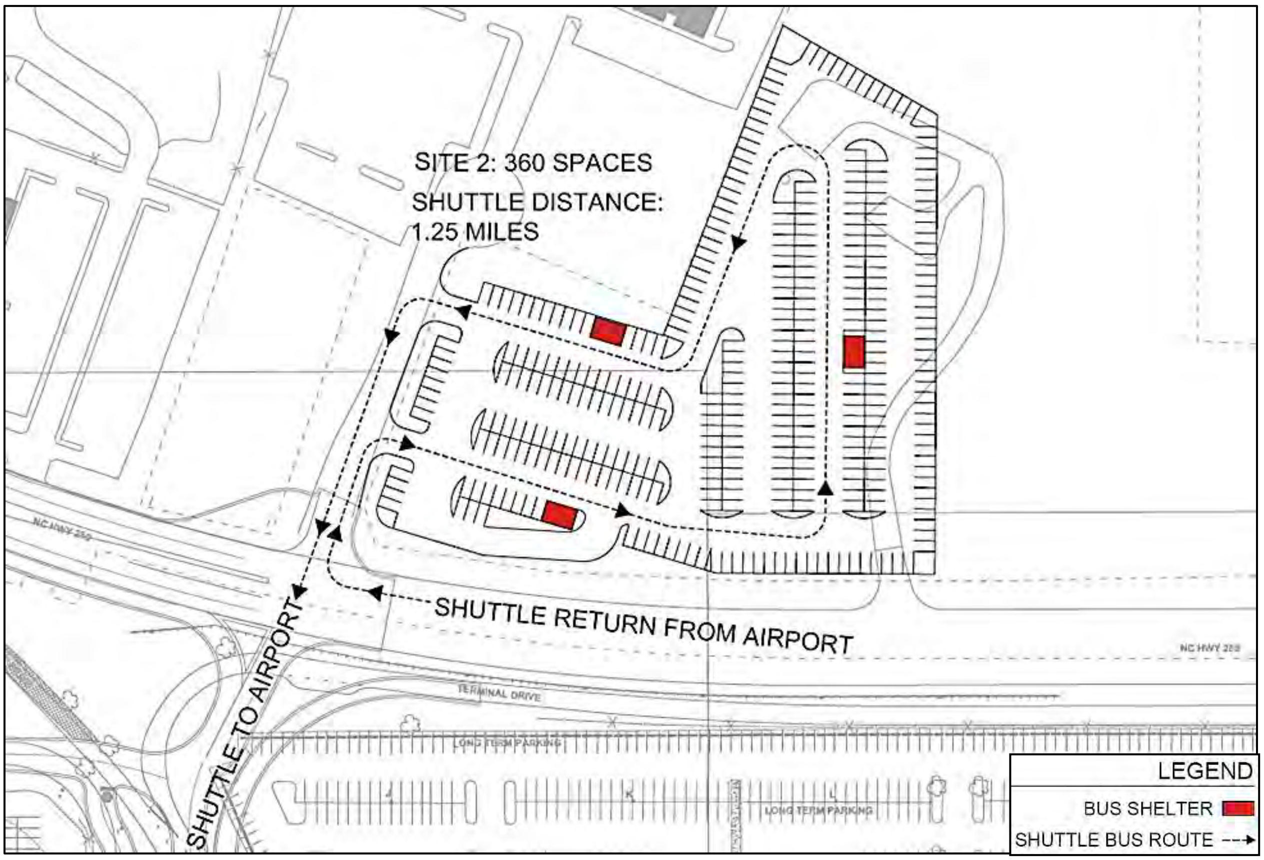
Advantages	Disadvantages
• More than enough area to meet demand • Can easily be phased • All spaces are a net add to the supply • No existing spaces are displaced • Shuttle route entirely on Airport property	• Route to reach lot is not intuitive with traffic flow to terminal building • Access to lot is difficult

5.9.d Alternative 21 – Shuttle Lot at Site 2

Alternative 21 (**Figure 5-22**) proposes a shuttle lot at Site 2 located east of North Carolina 280 on Airport property at the southeast corner of Airport Park Road and North Carolina 280. Approximately 360 spaces could be developed on this site, though it would not be enough to satisfy the Airport's needs through the planning period. It would be sufficient to meet the demand for parking until 2020 or 2025 according to parking demand forecasts. Access to and from the lot would occur via a traffic signal at Airport Park Road and North Carolina 280. The shuttle route to, from, and through this lot would be approximately 1.25 miles long and two buses would be necessary to operate at all times in order to maintain a maximum shuttle bus wait time of approximately four minutes.

The advantages and disadvantages of Alternative 21 are summarized in **Table 5-26**.

Figure 5-22: Alternative 21 – Shuttle Lot at Site 2



Source: Walker Parking Consultants (2012)

Table 5-26: Alternative 21 Summary	
Advantages	**Disadvantages**
• All spaces are an addition to existing capacity; no existing spaces are displaced • Provides capacity to meet demand through 2020 • Lot is well visible from North Carolina 280	• Lot cannot be expanded to meet the Airport's long term needs • Shuttle bus route must access North Carolina 280 • Wayfinding to the lot may be difficult as it is located across North Carolina Route 280 away from the terminal • Site may be more appropriate for commercial development

5.9.e Alternative 22 – Parking Garage at Site 3

Construction of a parking garage at Site 3 located directly in front of the terminal building would need a capacity of 1,017 spaces to meet the demand projected through 2030. It would replace existing surface lot spaces that would be displaced by the construction of both the garage itself and a commercial vehicle curb lane. A summary of the needed parking capacity for a garage at Site 3 is presented in **Table 5-27** and assumes the existing rental car ready/return lot is converted into a premium frequent parker lot. It also assumes that a maximum of 280 existing parking spaces would be displaced with construction of a parking garage.

Table 5-27: Site 3 Parking Garage Capacity Projections

Year	Public Deficit	Premium Pkg Capacity in former R/R Lot	Rental Car Ready/Return Demand	Displaced by Commercial Vehicle Curb	Subtotal	Existing Spaces Displaced	Garage Spaces Needed
2010	17	-107	136	54	100	280	380
2015	145	-107	148	54	240	280	520
2020	285	-107	161	54	393	280	673
2025	436	-107	175	54	558	280	838
2030	600	-107	190	54	737	280	1,017

Source: Walker Parking Consultants (2012)

Alternative 22 (illustrated in **Figure 5-23**) proposes a parking garage at Site 3 with four levels that would include short-term and rental car ready/return parking on the ground level. This would give a maximum level of service to these two user groups with long-term parking spaces designated for the upper levels. Vertical vehicular circulation would be achieved through an express ramp system and parking spaces on all levels would be on level floors. It should be noted that the garage could be designed and phased for additional vertical expansion. A small number of short-term parking spaces and approximately half of the rental car ready/return spaces would be uncovered with both lots located adjacent to the garage. The existing access to the short- and long-term parking lots from Terminal Drive would also be used to provide access to the garage.

The advantages and disadvantages of Alternative 22 are summarized on the following page in **Table 5-28**.

Figure 5-23: Alternative 22 – Parking Garage at Site 3

Source: Walker Parking Consultants (2012)

Table 5-28: Alternative 22 Summary	
Advantages	**Disadvantages**
• Locates the maximum number of parking spaces in the most convenient location • All rental car ready/return spaces are in the same location	• Approximately half of the rental car ready/return spaces are uncovered • Garage blocks the view between North Carolina 280 and terminal building • Long-term vertical expansions of garage could impact line of sight from existing ATCT

5.9.f Alternative 23 – Parking Garage at Site 4

Alternative 23 proposes the construction of a parking garage at Site 4, which would be located on the site of the existing exit plaza and portion of the long-term lot to the south. This garage would feature four levels and due to the topography of the site, only the top level would be above the grade of the terminal roadway at the northwest corner of the garage nearest the terminal. Rental car ready/return spaces would be located on the "grade" level nearest the terminal (Level 3 of the garage), with long-term parking on the other levels. Access to the two lowest levels would occur through a roadway leading to the overflow parking and the relocated exit plaza. Floor-to-floor circulation of traffic would be made available through an express ramp system located along the south edge. This garage alternative would require fewer spaces than the proposed Site 3 garage because fewer existing surface lot spaces would be displaced during construction. **Table 5-29** illustrates the needed capacity for a garage at Site 4 and assumes the existing rental car ready/return lot is converted to a premium frequent parker lot.

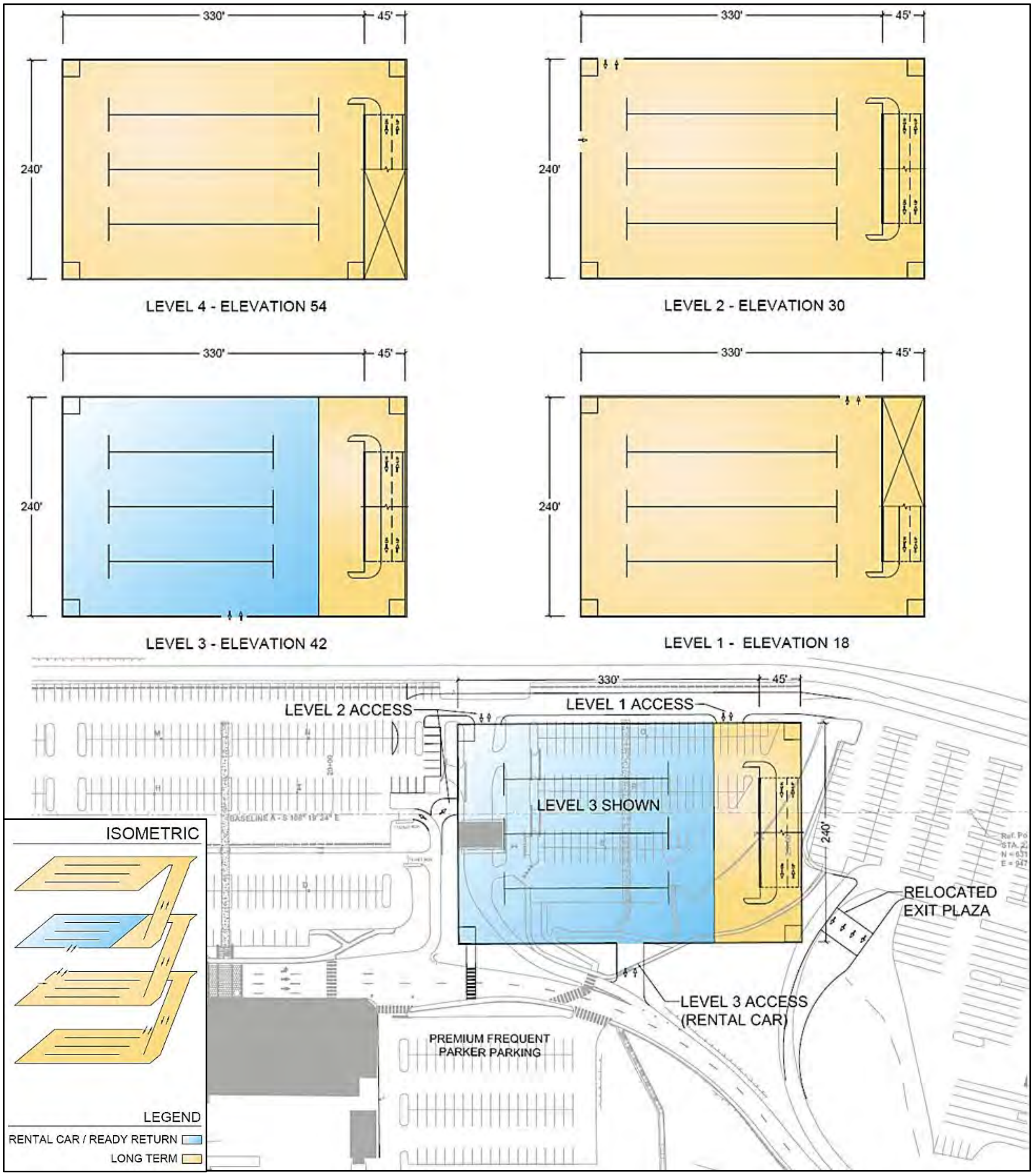
Table 5-29: Site 4 Parking Garage Capacity Projections

Year	Public Deficit	Premium Pkg Capacity in former R/R Lot	Rental Car Ready/Return Demand	Displaced by Commercial Vehicle Curb	Subtotal	Existing Spaces Displaced	Garage Spaces Needed
2010	17	-107	136	54	100	174	274
2015	145	-107	148	54	240	174	414
2020	285	-107	161	54	393	174	567
2025	436	-107	175	54	558	174	732
2030	600	-107	190	54	737	174	911

Source: Walker Parking Consultants (2012)

Figure 5-24 on the following page graphically illustrates the parking garage proposed for Site 4 while **Table 5-30** (located on Page 5-69) summarizes its advantages and disadvantages.

Figure 5-24: Alternative 23 – Parking Garage at Site 4



Source: Walker Parking Consultants (2012)

Table 5-30: Alternative 23 Summary	
Advantages	**Disadvantages**
• All rental car ready/return spaces are covered • Garage has a low profile; due to topography, only one level is above the terminal roadway • Fewer existing surface lot parking spaces are displaced	• Not as convenient to the terminal • Lower levels may need to be sprinkled and ventilated, increasing cost • Exit plaza may need to be relocated

5.9.g Alternative 24 – Parking Garage at Site 5

Alternative 24 proposes a parking garage at Site 5 which would be located within the existing overflow long-term parking lot. It would contain four levels to meet the projected demand for parking. Due to the topography of the site, the entire garage would be at or below the ground floor elevation of the terminal, thus eliminating concerns about visibility between North Carolina 280 and the terminal building. With this alternative, rental car ready/return parking would be relocated to the site of the current exit plaza and a portion of the existing overflow long-term parking lot to the south. Floor-to-floor vehicular circulation in the garage would be provided via an express ramp system along the south edge of the structure. Pedestrian access to and from the terminal would be provided via an elevated pedestrian walkway from the top level of the garage, which would cross over Terminal Drive and parallel an existing sidewalk. The walk from the center of the garage to the nearest corner of the terminal would be approximately 850 feet, or the distance of about two city blocks. It should be noted that the Airport may want to study the possibility of locating rental car ready/return spaces in the garage, if this option is desired.

Construction of a parking garage at Site 5 would require fewer parking spaces than a parking garage located at Site 3 or Site 4 since fewer existing surface lot spaces would be displaced. **Table 5-31** shown below illustrates the capacity that would be needed for a garage at Site 5, assuming the existing rental car ready/return lot would be converted to a premium frequent parker lot.

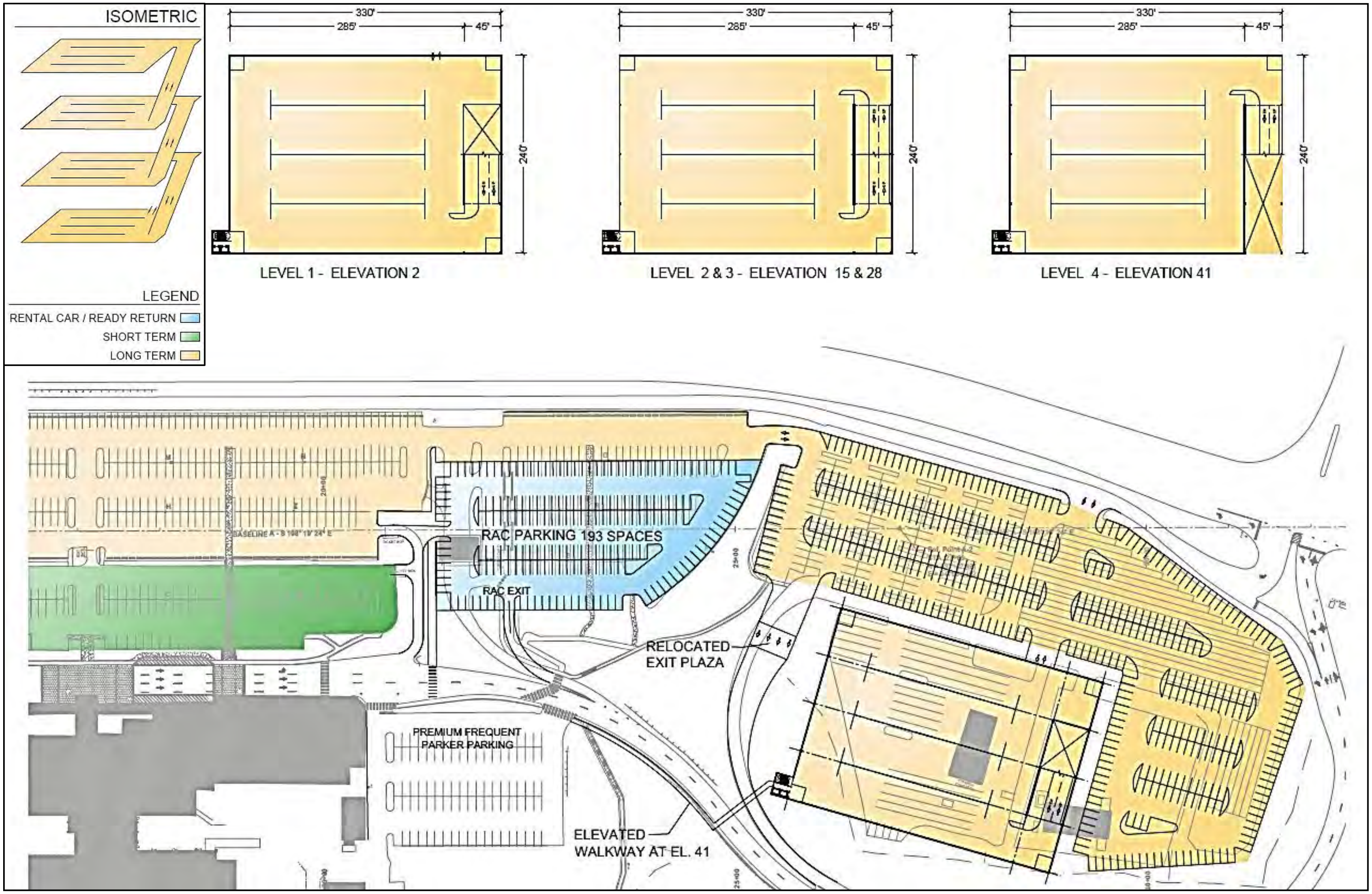
Table 5-31: Site 5 Parking Garage Capacity Projections

Year	Public Deficit	Premium Pkg Capacity in former R/R Lot	Rental Car Ready/Return Demand	Displaced by Commercial Vehicle Curb	Subtotal	Existing Spaces Displaced	Garage Spaces Needed
2010	17	-107	136	54	100	120	220
2015	145	-107	148	54	240	120	360
2020	285	-107	161	54	393	120	513
2025	436	-107	175	54	558	120	678
2030	600	-107	190	54	737	120	857

Source: Walker Parking Consultants (2012)

An illustration of Alternative 24 is presented in **Figure 5-25** while advantages and disadvantages of the construction of a garage at Site 5 are presented on Page 5-71 in **Table 5-32**.

Figure 5-25: Alternative 24 – Parking Garage at Site 5



Source: Walker Parking Consultants (2012)

Table 5-32: Alternative 24 Summary

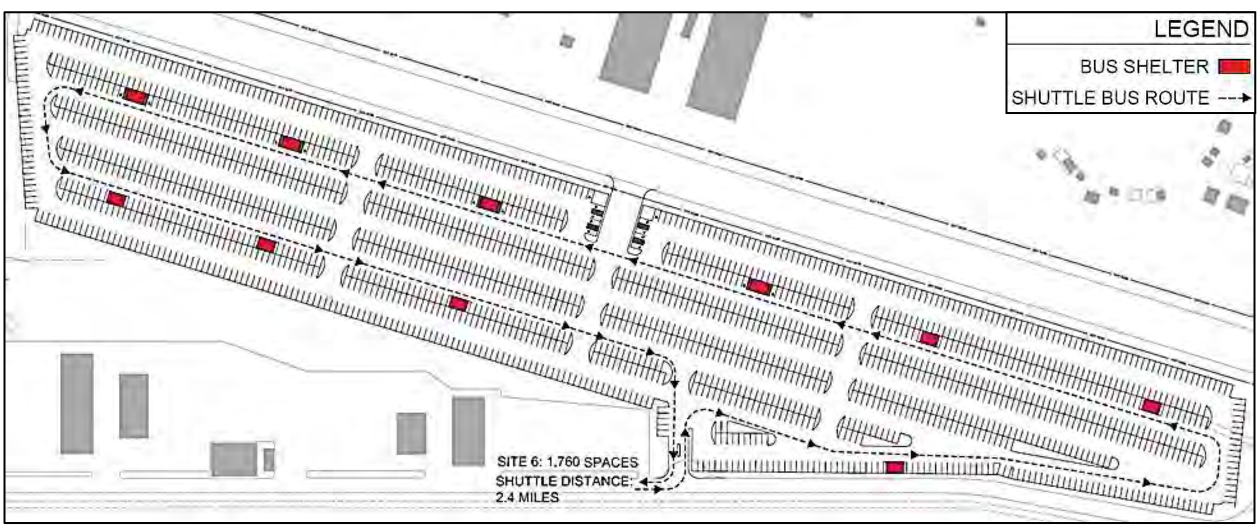
Advantages	Disadvantages
• Parking garage has a low profile; due to the topography of the site, there would be little or no visual impacts on the view between North Carolina 280 and the terminal building • Fewer existing long-term surface lot spaces are displaced than a garage at Site 3 and Site 5 • All rental car ready/return spaces are in the same location and are in close proximity to baggage claim	• Not as convenient to the terminal, especially to the ticketing entrance • The walk from the center of the garage to nearest terminal entrance is over two blocks long • Construction of an elevated walkway increases cost to the project • Exit plaza relocation is necessary to allow sufficient space for rental car ready/return parking

5.9.h Alternative 25 – Shuttle Lot at Site 6

Alternative 25, as illustrated in **Figure 5-26**, proposes the construction of a shuttle lot on Airport property between North Carolina 280 and the rental car service facility south of the main Airport entrance; public access to the lot would be made available through North Carolina Route 280. Alternative 25 proposes 1,760 parking spaces at Site 6, which is almost three times the number of spaces needed to meet the demand projected for the Airport through the 2030 planning period. Therefore, a shuttle lot could be developed for public parking while still reserving a large portion of the site for other uses, including commercial development and/or the eventual expansion of the rental car service facility. The shuttle bus route to, from, and through the lot would total 2.4 miles and would enter and exit the lot through access from Rental Car Drive. Three buses would need to be in continual operation throughout the shuttle bus circuit in order to maintain a maximum wait time between buses of approximately 5 minutes. Construction of fewer parking spaces within Site 6 may reduce the wait time necessary between buses and/or require two buses to be in continual operation throughout the circuit.

The advantages and disadvantages of Alternative 25 are presented in **Table 5-33**.

Figure 5-26: Alternative 25 – Shuttle Lot at Site 6



Source: Walker Parking Consultants (2012)

Table 5-33: Alternative 25 Summary	
Advantages	**Disadvantages**
• More than enough area to meet demand • Only development of a portion of the site is needed to meet parking demand • Public access to the site made possible from North Carolina 280 • All spaces are a net addition to supply; no existing spaces are displaced • Shuttle bus route entirely on Airport	• Alternative uses land that could be better suited to support future commercial and non-commercial development

5.9.i Parking Expansion Alternative Financial Feasibility Analysis

In an effort to determine the most financially feasible alternative to expand parking at the Airport, an order-of-magnitude cost estimate was prepared to determine the affordability of constructing and operating a parking garage versus a remote shuttle lot. This evaluation reviewed order-of-magnitude cost estimates prepared by Walker Parking Consultants as well as existing parking revenues, expenses, and debt information obtained from the Airport. For cost estimate purposes, it was assumed that the construction of each alternative would not be phased and would be completed as a single project. It was also assumed that the Airport would finance construction of an alternative through taxable revenue bonds and 25-year bonds issued at 5.5 percent. Financing costs such as capitalized interest, a debt service reserve fund, financing fees, and costs of issuance were not factored into the cost estimates.

The following conclusions were made from the financial feasibility analysis determining the affordability of constructing and operating a parking garage versus as remote shuttle lot:

Remote Shuttle Lot – These conclusions assume construction of a 940-space shuttle parking lot.

- Per stall construction cost is estimated to be $2,500 to $3,000 plus 25 percent for project soft costs (planning, design, construction administration, etc.) or $3,125 to $3,750 per space. Assuming $3,500 per stall, the total project cost is estimated at $3,290,000.
- The annual debt service payment for the project is estimated at $242,500.
- The annual cost for a shuttle bus operation assuming 3 shuttle vans are in continual operation for 18 hours a day, 365 days a year, with an hourly cost of $60 is $1,200,000 a year.
- Assuming all 940 parking spaces are constructed at one time and shuttle buses are operating year-round, the total annual operating cost is estimated to be $1,442,500.
- If a remote shuttle lot were constructed immediately, the estimated revenue per passenger would need to increase by 54.3 percent to cover additional debt and operating costs, considering all other factors remain equal.

Parking Garage – These conclusions assume construction of a 1,017-space parking garage.

- The cost to construct a 1,017 space garage at $13,569 per stall is $13,800,000.
- Total project soft costs (planning, design, construction administration, etc.) are estimated at 25 percent of the total construction costs, and are estimated at $3,450,000.

- The total estimated cost for a 1,017 parking garage including construction and soft project costs is $17,250,000.
- The estimated annual debt service cost is $1,271,161.
- The annual operating cost for a parking garage at $650 per space per year is $661,050. This is assuming the Airport incurs annual operating costs for parking operations and incremental costs for structure operations such as elevator maintenance, joint repairs, preventative maintenance, electrical costs, etc.
- If the facility were constructed immediately, the revenue per passenger would need to increase 48 percent to cover additional debt, assuming all other factors remain equal.

In conclusion, it would cost $1.422 million per year to construct, finance, and operate a 940-space remote shuttle lot and $1.271 million per year to construct and finance a 1,017 space garage. However, these figures do not include the incremental costs of operating structured facility over a surface parking lot. A remote shuttle lot with associated shuttle operation will require $151,000 more per year (12%) than a parking garage; however, this variance will decrease over time based on the fact that incremental costs of operating a garage are not factored into this analysis. Therefore, on an order-of-magnitude basis, the costs per year for a remote shuttle lot are roughly equal to the costs per year for a structured parking facility. Since a parking garage provides a higher level of service, it can also demand higher parking fees. Likewise, since a remote shuttle lot provides a lower level of service, it typically generates lower parking fees. Given that costs are roughly equal between the two options, the revenue potential is greater for a parking garage over a remove shuttle lot.

5.9.j Recommended Parking Alternative

It is recommended that the Airport construct a parking garage to meet the demand for parking that is projected for the next 20 years. While the upfront cost to construct a parking garage would be greater than a remote shuttle lot ($17.25 million compared to $3.3 million), its annual operating expense is much less ($661,050 a year as compared to $1.4 million) which results in long-term cost savings for the Airport. In addition, a parking garage also offers a perceived higher level of customer service as compared to a remote shuttle lot. A parking garage that is located in close proximity to the air carrier terminal offers a more desirable parking option for Airport patrons since customers can quickly transfer between their vehicles and the terminal building. If a remote shuttle lot were constructed, customers may be required to wait several minutes for a shuttle in addition to the time it would take for the shuttle to transverse between the lot and terminal building.

Another advantage that supports the recommendation of constructing a parking garage to enhance customers' experience is through the opportunity to consolidate public and rental car ready/return parking into a single location that is close to the terminal building and is protected from weather elements. The current arrangement of parking at the Airport may require long-term parking customers to walk a considerable distance to their vehicles while being exposed to weather elements. Likewise, if a remote shuttle lot were constructed, customers may also be required to walk a considerable distance between their vehicles and the shuttle bus shelters which would also expose them to weather elements. Likewise, existing rental car customers are subjected to the same experience as they are required to exit the terminal and walk around to the side of the building to access the rental car ready/return lot which may be not be easily located for those patrons who are unfamiliar with the Airport. Consolidating long-term and rental car ready/return parking into a parking garage not only offers protection for customers and vehicles from weather elements, it also serves as an easily identifiable landmark for those unfamiliar with the location of the Airport's parking facilities.

It is also recommended that the Airport undertake a financial feasibility analysis to more thoroughly evaluate the demands for parking so that a plan can be establish to address the financial and preliminary design concepts of a parking garage. The feasibility analysis should review the parking needs of passengers, meeters/greeters, employees, and the rental car agencies relative to historical/forecast originating passenger trends in order to plan for this facility in a timely and prudent manner. This analysis should also more closely examine:

- A phased approach to incrementally provide parking facilities.
- The proposed rate structure for the garage.
- The scope/magnitude of its incremental operating costs.
- A desired parking revenue control system.
- The feasibility of incorporating rental car ready/return spaces into the garage and its financial impacts.
- A clearer definition of the financing costs expected for the issuance of bonds.
- Alternative delivery methods.
- Public/private partnerships for financing/operations.
- Impacts to current surface lot operation during construction and potential need to construct and operate a temporary remote shuttle lot during construction.

While a financial feasibility analysis will more closely evaluate possible locations for a parking garage, it is the desire of the Airport that planning be initiated to preserve a site across from the terminal building as illustrated in Alternative 22 and a site occupied by existing overflow long-term parking lots as identified in Alternative 24. The site illustrated in Alternative 22 offers a location that is closest to the terminal building while the site illustrated in Alternative 24 offers a visually appealing location for a garage due to the surrounding topography which has already been protected by the Airport for the expansion of parking facilities. Preservation of each site is recommended until further evaluation can be conducted as part of the parking garage financial feasibility analysis to identify a location that is most financially viable to the Airport, convenient for customers, and most adequately meets demand throughout the planning period while providing a high level of customer service. It should be noted that the site occupied by existing overflow long-term parking lots as illustrated by Alternative 24 has been identified as Proposed Parking Deck Alternative 1 on the Airport Layout Plan (ALP) drawing set while the site across from the terminal building (Alternative 22) is identified on the ALP as Proposed Parking Deck Alternative 2.

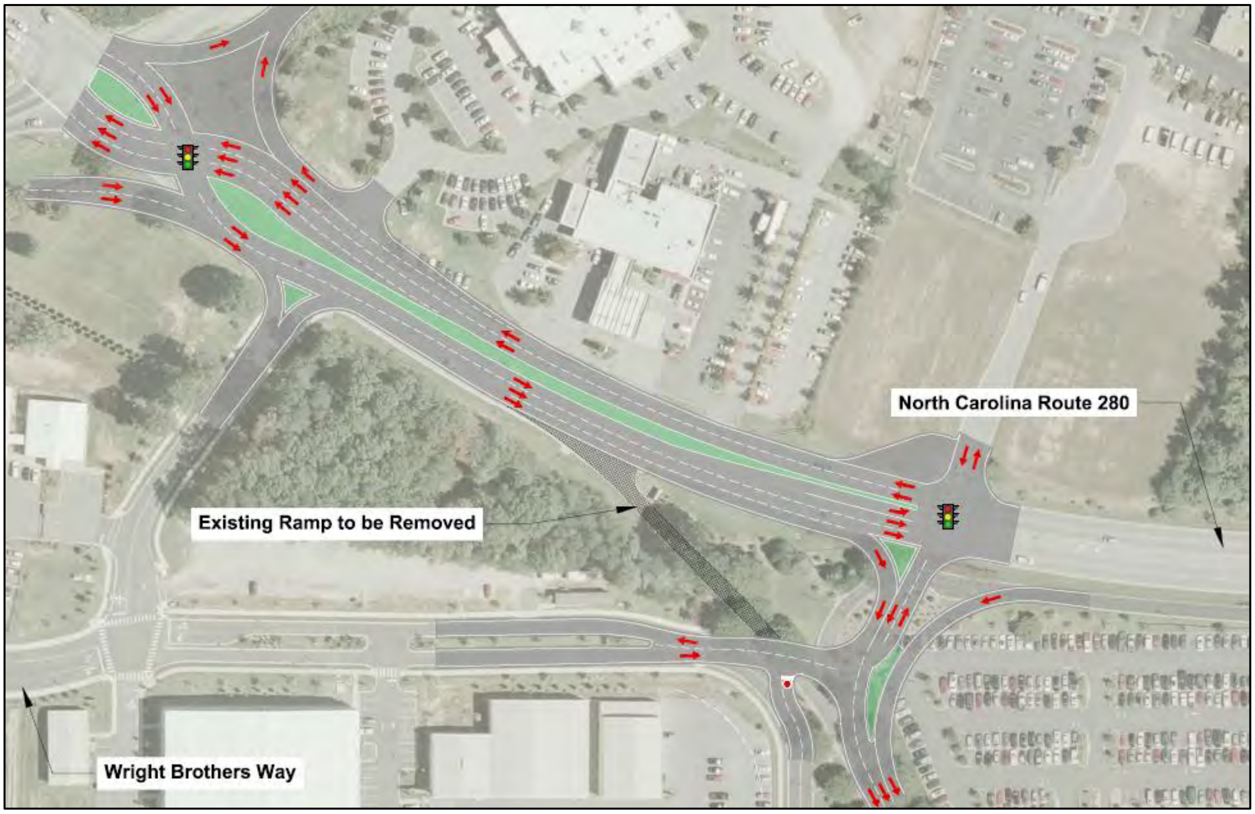
5.10 Landside Access

The North Carolina Department of Transportation (NCDOT) is in the process of redesigning the Interstate 26/North Carolina 280 interchange into a diverging diamond configuration where traffic on North Carolina 280 would cross over to the opposite side of the road for travel on the bridge over Interstate 26. As a result of the approaches that are necessary on North Carolina 280 for this type of interchange, and its proximity to the interchange with Aviation Way, access to the general aviation area will be impacted since left hand turns will not be permitted. In an effort to continue to provide access to the general aviation area for traffic in both directions on North Carolina 280, as well as improve the circulation of traffic into the terminal area, a single, logical landside access alternative was prepared based on the preliminary design of the diverging diamond interchange redesign. This alternative is presented in the following section and includes a discussion of factors, advantages, and disadvantages that should be considered for its implementation.

5.10.a Alternative 26 – Landside Access Alternative

Alternative 26 proposes a new airport entrance for both the general aviation and terminal areas to address landside access impacts as a result of the Interstate 26/North Carolina 280 interchange redesign. As illustrated in **Figure 5-27**, the intersection of North Carolina 280 and Aviation Way would be redesigned to allow right turns only for southbound North Carolina 280 traffic and traffic exiting the Airport on Aviation Way. To allow traffic on northbound North Carolina 280 to access the general aviation area, a new Airport entrance with a traffic light is proposed so that traffic entering from North Carolina 280 in both directions can access the general aviation and terminal areas. A realignment of Wright Brothers Way would be necessary so that traffic entering the Airport from the new entrance could access the general aviation area. Removal of an existing ramp for southbound North Carolina 280 traffic to enter the terminal area is also planned with this alternative. It should be noted that as a result of the proposed new Airport entrance, a rerouting of the Terminal Drive loop road around the long-term parking lot would be necessary, resulting in a slight loss of parking spaces.

Figure 5-27: Alternative 26 – Landside Access Alternative



Source: Mead & Hunt, Inc. (2012)

- **Operational Factors –** The proposed new Airport entrance would maintain a continuous traffic flow to the terminal area while permitting northbound traffic on North Carolina 280 to access the general aviation area. While a loss of parking spaces is anticipated as a result of the proposed rerouting of the Terminal Drive loop road, the reduction would be nominal and can be recuperated as a part of a future parking expansion project.

- **Economic Factors –** It is anticipated that the proposed landside access improvements proposed by this alternative would be funded by the NCDOT as a part of the Interstate 26/North Carolina 280 interchange redesign project. It is not anticipated that the Airport would need to contribute significant funding towards the implementation of this alternative.

- **Environmental Factors –** There are no significant environmental impacts anticipated with the implementation of this alternative since most development would occur on land that has been previously developed.

- **Implementation Factors –** The proposed alternative accommodates the roadway improvements that are planned for North Carolina 280 as a part of the interchange redesign project with Interstate 26. The proposed new Airport entrance would allow for a continuous flow of traffic on the Airport campus while allowing for controlled left turns onto North Carolina 280. It should be noted, though, that inbound traffic to the general aviation area would be combined with traffic destined for the terminal area; as a result, signage may be necessary to redirect inbound and outbound traffic to their desired destinations.

Advantages and disadvantage of Alternative 26 are summarized in **Table 5-34**.

Table 5-34: Alternative 26 Summary

Advantages	**Disadvantages**
• Accommodates North Carolina 280 / Interstate 26 interchange improvements • Maintains continuous traffic flow to terminal building curb front and parking • Permits left turns to / from general aviation area and North Carolina 280	• Impacts a small number of long-term parking spaces • Mixes terminal area traffic with general aviation area traffic

In addition to a new entrance, it is recommended that a dedicated right turn lane be installed on Terminal Drive for traffic to turn onto southbound North Carolina 280. Currently, left hand turns are permitted from both lanes on Terminal Drive at the intersection that often results in traffic backups and restricts right hand turns. Installation of a dedicated right turn lane is recommended so that traffic backups can be alleviated by allowing traffic to turn right without need to wait for left turn traffic to clear from the right lane.

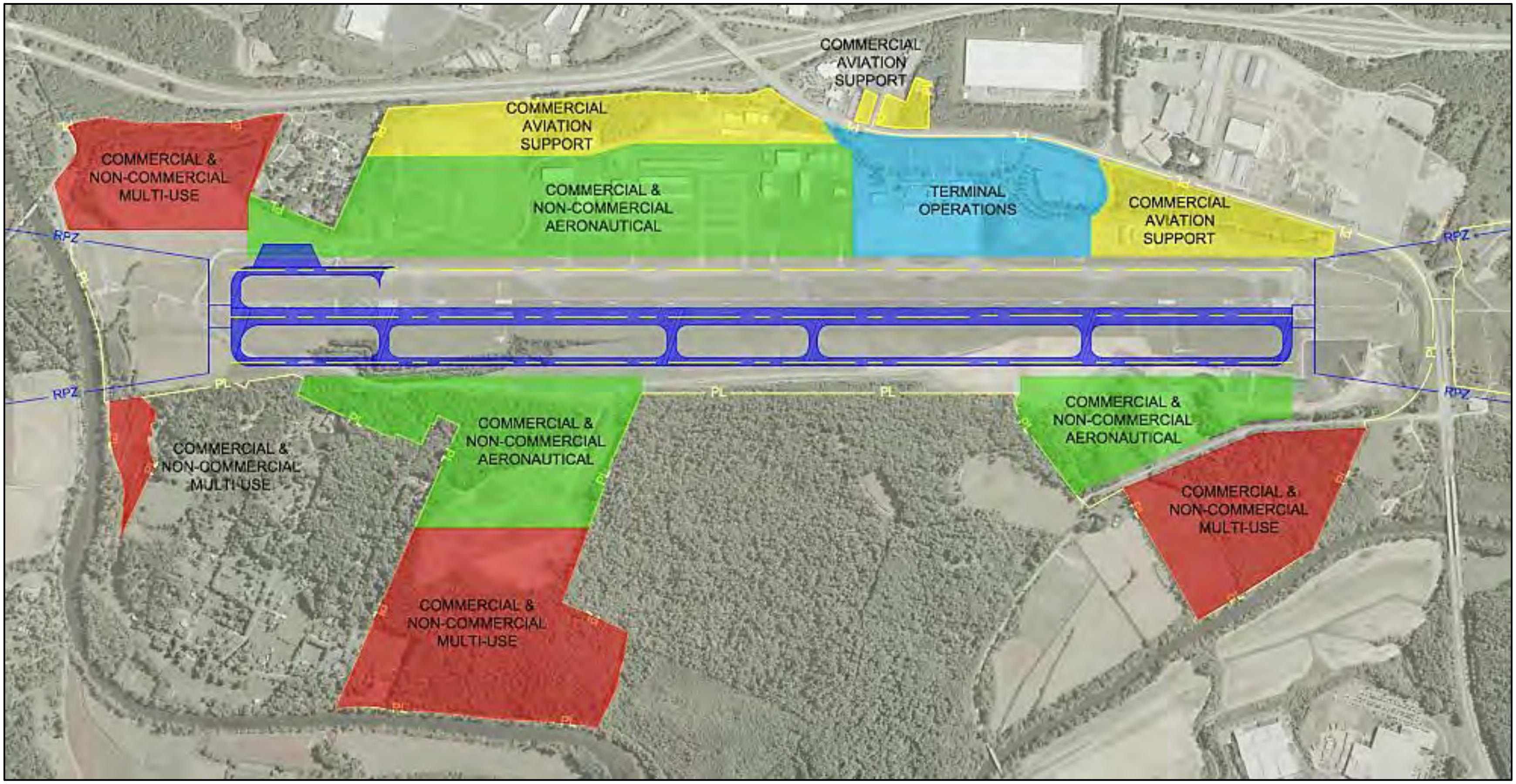
5.11 Land Use

Portions of Airport property not well suited for aeronautical development should be considered for non-aeronautical uses in an effort to create additional revenue generating opportunities for the Airport. It is recommended a land use plan be established to identify those areas that are best suited for non-aeronautical development while protecting sites that are anticipated to be needed for the future expansion of Airport facilities. In an effort to designate sites for aeronautical and non-aeronautical uses, a land use plan identifying zones for specific activities was developed. The following alternative identifies each of these zones and discusses the types of activities that are intended for each site. It is recommended this land use plan is referenced for future planning and development purposes as aeronautical and non-aeronautical development opportunities are presented to the Airport.

5.11.a Alternative 27 – Land Use Plan

As illustrated in **Figure 5-28**, the land use plan designates areas of Airport property for both aeronautical and non-aeronautical uses. Land adjacent to the airfield is reserved for aeronautical uses that include, but are not limited to, hangars, aprons, charter operations, air cargo, aircraft maintenance/repair, and FBOs. Land adjacent to North Carolina 280 has been designated for commercial non-aeronautical development since it is highly visible to traffic and is well suited to support development such as restaurants, hotels, strip mall shopping complexes, and offices. Land adjacent to the terminal area is designated for future terminal building renovation/expansion and parking lot expansion projects. Finally, land that is not suited to support aeronautical development is designated for commercial and non-commercial uses which includes, but is not limited to, light industrial, warehouses, distribution centers, private storage facilities, and offices.

Figure 5-28: Alternative 27 – Land Use Plan



Source: Mead & Hunt, Inc. (2012)

5.11.b Alternative 28 – Air Cargo Development

Projections indicate that air cargo activity could substantially increase from approximately 128,000 pounds a year to 30.5 million pounds a year by 2030 if a dedicated air cargo forwarded establishes an operation at the Airport. Given that the existing air cargo facility at the Airport would be unable to process this level of activity, it is recommended the Airport plan for an expansion of its air cargo facilities. Since the Airport has received interest in the past from freight forwarders about the availability of space to establish an air cargo operation, planning has been initiated to prepare an area for the expansion of air cargo facilities. An engineered fly ash fill project on the west side of the airfield adjacent to the approach end of Runway 34 has been undertaken by the Airport to prepare an area for future aeronautical development. It is recommended that this be considered for the development of future air cargo facilities if the Airport receives such an inquiry in the future from an air cargo operator.

While the layout of an air cargo facility will depend on the specific needs of an air cargo operator, **Figure 5-29** illustrates a configuration that should be considered in developing facilities at this site. As proposed in the drawing, approximately 376,300 square feet of apron and taxiway pavement is available to accommodate two to three Boeing 757 aircraft as well as four to six single- and small twin-engine feeder aircraft. This approximate 376,300 square feet of apron and taxiway area also includes a smaller apron which could be available for other aeronautical uses such as an aircraft maintenance facility, FBO service provider, or corporate hangars. Anticipated improvements to Old Fanning Bridge Road that include a traffic circle could be utilized to provide access roads and parking lots for facilities on the site that include an approximate 13,100 square feet package sorting facility.

Listed below are the operational, economic, environmental, and implementation factors that should be considered when developing an air cargo facility on this site. A summary of advantages and disadvantages is presented in **Table 5-35**.

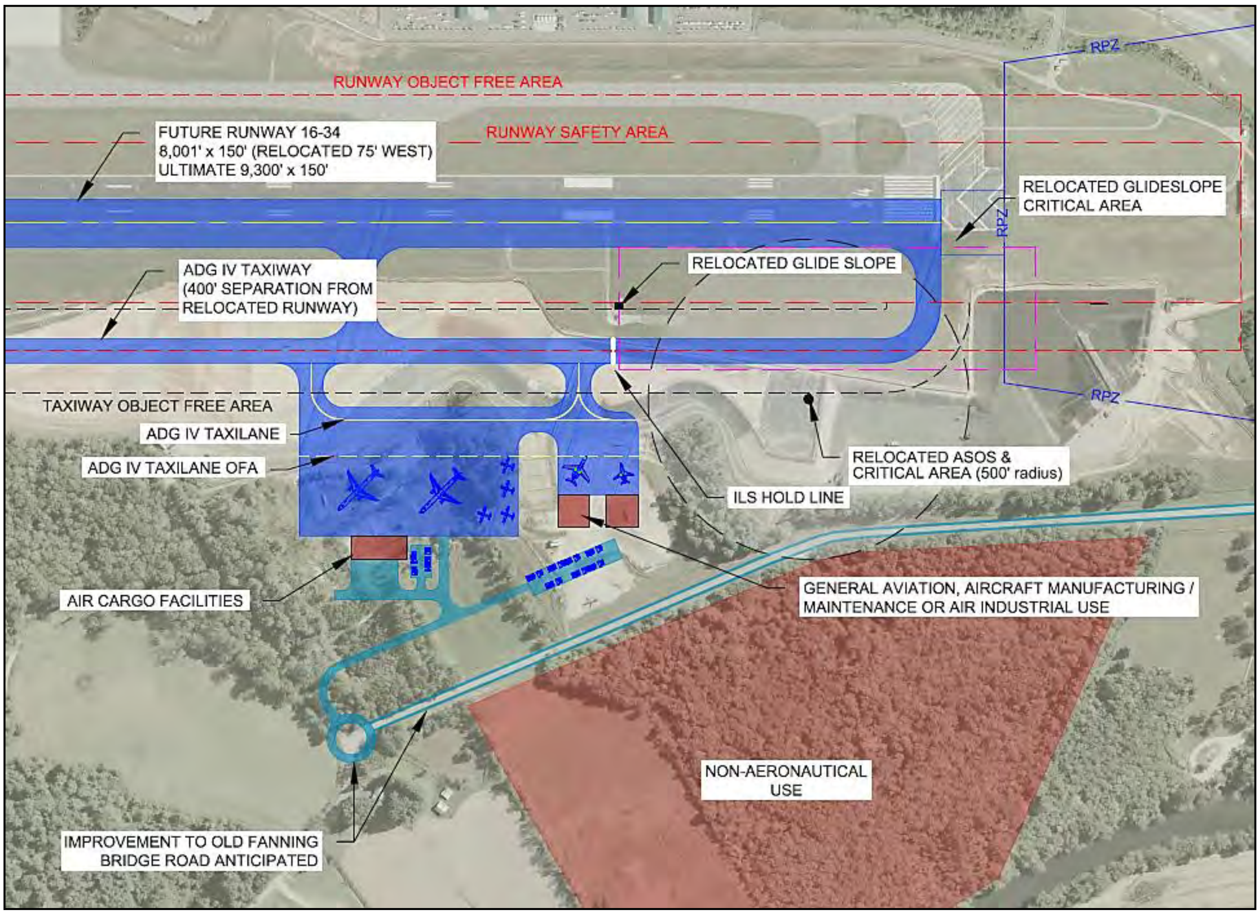
- **Operational Factors –** An operational advantage of this site is that sufficient space is available to meet the facility requirements of an air cargo forwarder that would be well capable of processing upwards of 30.5 million pounds of air freight a year. While the future construction of a west side parallel taxiway would help alleviate the need for aircraft to cross Runway 16/34 to access the facility, runway crossings would still be necessary for aircraft to transition between the east and west of the airfield.

- **Economic Factors –** Economic benefits would be realized with the establishment of an air cargo operation at the Airport. For the Airport, it would offer an opportunity to earn additional aeronautical related revenue through rents, leases, landing fees, and fuel purchases that would be associated with air cargo activities. The surrounding region also serves to economically benefit from an air cargo operation at the Airport through the creation of several jobs and a more effective and efficient way to process the movement of air freight.

- **Environmental Factors –** As a result of the ongoing engineered fly ash fill project, minimal fill and grading would be necessary to prepare the site for future development. Given the proximity of the French Broad River, care should be taken, however, to control storm water runoff from the site since the surrounding topography slopes away from the land that has been prepared for development.

- **Implementation Factors –** An advantage with the size of the air cargo facilities planned for the site is that additional developable area would be available for other aeronautical related uses. Planning should be initiated so that any future development does not occur within the relocated ASOS critical area.

Figure 5-29: Alternative 28 – Air Cargo Development



Source: Mead & Hunt, Inc. (2012)

Table 5-35: Alternative 28 Summary

Advantages	Disadvantages
• Meets air cargo space needs • Provides additional area for aeronautical related development • Opportunity to increase aeronautical related revenue • Provides region with jobs and air freight forwarding facility • Minimal fill and grading needed for development	• West side airfield access

5.12 Summary of Recommended Alternatives

In conclusion, the Airport is well-positioned to be able to expand and improve infrastructure so that the demands of users are adequately met throughout the planning period. The following summary lists the recommended alternatives that should be considered to address needs that were identified through the review of facility requirements. It should be noted that these alternatives have been selected because either they are the most logical option to address a facility need or, in comparison with operational, economic, environmental, and implementation factors, offer the best solution to improve existing infrastructure or expand facilities at the Airport.

A summary drawing of the recommended alternatives is presented in **Figure 5-30**.

- **Runway 16/34 –** It is recommended Runway 16/34 be relocated 75 feet to the west to provide separation between the runway and parallel Taxiway A that meets design standards identified in FAA AC 150/5300-13A, *Airport Design*. In addition, planning should be initiated to protect for a 1,300 foot extension of Runway 16/34 to the north should there be a need for additional runway length.

- **Taxiway System –** The following improvements are recommended for the taxiway system:

    - Paved shoulders are recommended for Taxiway A to meet ADG III and IV airfield design standards.
    - The Taxiway A safety area and object free area should be improved to meet ADG IV airfield design standards.
    - Connector taxiways between Taxiway A and the general aviation aprons should be widened to meet ADG III and IV airfield design standards
    - Various improvements are recommended to the connector taxiways to correct pavement grade variations between Runway 16/34 and Taxiway A.
    - Construction of a temporary runway for the relocation of Runway 16/34 is recommended. The temporary runway should be converted into a west side parallel taxiway after the new runway is completed to support aeronautical-related development opportunities on the west side of the airfield.

- **Air Traffic Control Tower –** It is recommended planning be initiated to protect for the future construction of a new ATCT at a site located adjacent to Wright Brothers Way on the south apron.

- **Automated Surface Observing System** – The ASOS should be relocated to a site adjacent to the southwest development area that most closely meets siting requirements identified in FAA Order 6560.20B while preserving land for future aeronautical related development. A siting study is recommended to further evaluate this location to determine the exact site upon which to relocate the ASOS unit.

- **Terminal Area –** An expansion of the terminal apron as well as renovation and expansion of the terminal building is recommended to accommodate additional aircraft boarding gates and parking positions that are needed to meet demand projected for the planning period.

- **Terminal Curb Front –** Construction of a dedicated commercial vehicle curb lane in front of the terminal building for waiting taxis, vans, buses, and other commercial vehicles is recommended to improve traffic flow and reduce vehicle/pedestrian congestion.

- **General Aviation Development –** To accommodate the demand for additional hangars and apron space for the planning period, an expansion of the general aviation area on the east side of the airfield is recommended to include an additional 122,300 square feet of apron space and box- and T-style hangars. In addition, land within the northwest development area on the west side of the airfield should be protected for the long-term expansion of general aviation facilities as well as for commercial and non-commercial non-aeronautical uses.

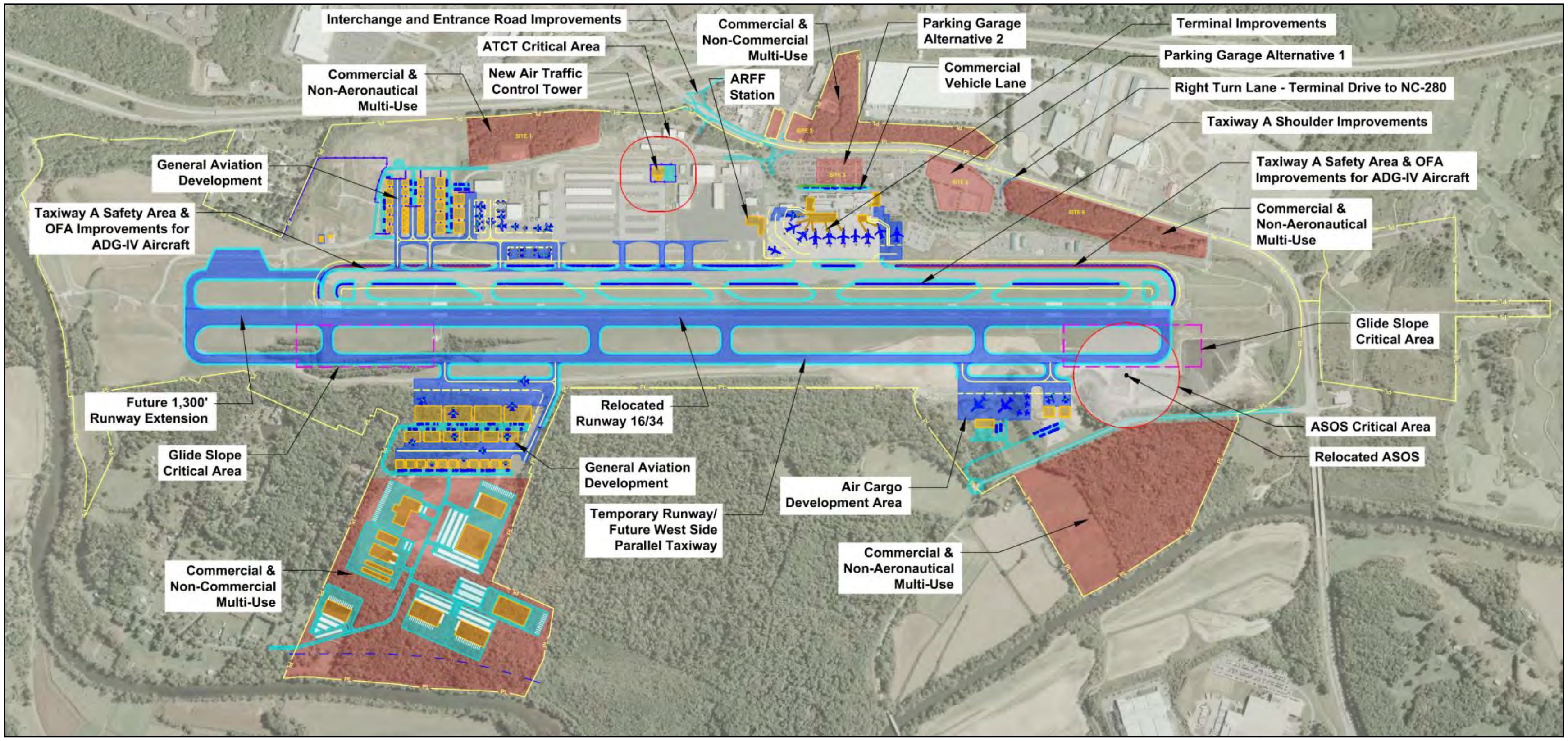
- **Vehicle Parking –** The Airport should consider constructing a parking garage to address capacity issues with long-term and rental car ready/return parking projected for the planning period. A parking garage financial feasibility analysis is recommended to further evaluate whether the parking garage should be constructed at a site adjacent to the terminal building or at site within the long-term overflow parking lot.

- **Landside Access –** Due to the Interstate 26/North Carolina 280 interchange redesign project, landside access improvements to Wright Brothers Way, Aviation Way, and Terminal Drive are recommended to preserve access into the general aviation area. In addition, a dedicated right turn lane is recommended on Terminal Drive so traffic can turn more efficiently onto North Carolina 280.

- **Land Use –**Future aeronautical and non-aeronautical development should be planned for specific sites that are designated for these uses according to the Airport's land use plan. This will protect land for future aeronautical-related infrastructure expansions while allowing the Airport to develop remaining portions of its property for non-aeronautical related uses.

- **Air Cargo Facilities –**Planning should be initiated to expand air cargo facilities in the event an air freight forwarder decides to establish an air cargo operation at the Airport. Any future expansion of air cargo facilities should be planned for an area west of the approach end of Runway 34 that has already been prepared for development through an engineered fly ash material project.

Figure 5-30: Summary of Recommended Alternatives



Source: Mead & Hunt, Inc. (2012)

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Chapter 6 Environmental Overview

The objective of this inventory is to document all environmentally-sensitive areas governed by the National Environmental Policy Act (NEPA) of 1969 within the existing Airport property boundaries; however, the assessment of impacts is not a part of this report. This inventory follows applicable Federal Aviation Administration (FAA) guidelines and examines impact categories identified in FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures.* NEPA has a significant impact on Airport planning and development by requiring that environmental impacts of proposed developments be considered early and throughout the entire planning process. Environmental feasibility is as critical as economic, engineering, or operational feasibility in determining the Airport's future development. In accordance with FAA Orders 1050.1E, *Environmental Impacts: Policies and Procedures,* and 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instruction for Airport Actions*, a brief examination of each of the impact areas has been conducted for the impact categories listed below:

- 6.1 Air Quality
- 6.2 Compatible Land Use
- 6.3 Construction Impacts
- 6.4 Department of Transportation Act, Section 4(f)
- 6.5 Farmlands
- 6.6 Fish, Wildlife, and Plants
- 6.7 Floodplains
- 6.8 Hazardous Materials, Pollution Prevention, and Solid Waste
- 6.9 Light Emissions and Visual Impacts
- 6.10 Natural Resources and Energy Supply
- 6.11 Noise
- 6.12 Secondary (Induced) Impacts
- 6.13 Socioeconomic Impacts, Environmental Justice, Children's Environmental Health, and Safety Risks
- 6.14 Water Quality
- 6.15 Wetlands

FAA Order 1050.1E addresses the types of impacts and the thresholds that determine whether an impact is considered significant. Each of the impact categories has been reviewed in relation to the Asheville Regional Airport (Airport) throughout the following sections. Again, it is critical to note that this review only reports existing conditions as they relate to FAA guidelines. Compliance with NEPA guidelines, permitting, and coordination activities with agencies will need to be conducted prior to the development of any projects illustrated on the Airport Layout Plan (ALP).

The data and information contained in this chapter was obtained directly from the 2011 Runway Reconstruction and New Parallel Taxiway Environmental Assessment (EA), with the exception to Section 5.2, Compatible Land Use.

The applicability of 15 of the 18 impact categories was considered for this environmental overview. It was determined that three categories were not present in the study area as illustrated in **Table 6-1**. Consequently, they are not further discussed in this chapter.

Table 6-1: Impact Categories Not Present in Study Area

Impact Category	Status
Coastal Resources	No coastal resources are located in Buncombe County.
Historic & Cultural Resources	No National Register of Historic Places (NRHP) listed or NRHP-eligible properties are located within the Airport boundaries. Section 106 consultation with the North Carolina State Historic Preservation Office (NC SHPO) was completed during the 2011 EA.
Wild & Scenic Rivers	No Federal Wild or Scenic Rivers, Congressionally Authorized Study Rivers, or Nationwide River Inventory Listed Rivers are located within Buncombe County

Source: Asheville Regional Airport, Runway Reconstruction and New Parallel Taxiway Environmental Assessment, The LPA Group Aviation Consultants (August 2011)

6.1 Air Quality

The North Carolina Department of Environment and Natural Resources (NCDENR) Division of Air Quality is primarily responsible for the regulation of statewide air quality as well as air quality in Buncombe County. On the federal level, the United States Environmental Protection Agency (EPA) establishes air quality goals and sets standards under the federal Clean Air Act (CAA). For airport projects, the FAA is responsible for the assessment of air quality impacts to comply with the NEPA as well as compliance with the CAA's General Conformity Rule.

The CAA requires that the EPA establish National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to the health of the public and the environment. The EPA defines ambient air within 40 Code of Federal Regulations (CFR) Part 50, as "that portion of the atmosphere, external to buildings, to which the general public has access."

The EPA established two types of NAAQS. *Primary standards* are pollutant limits that protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. *Secondary standards* are pollutant limits that protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings. The EPA Office of Air Quality Planning and Standards (OAQPS) established NAAQS for six principal pollutants, referred to as the "criteria" pollutants; these are carbon monoxide (CO), sulfur oxides (SO_x), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM), and lead (Pb). The primary and secondary NAAQS standards for these pollutants are provided in **Table 6-2**. Notably, O_3 and certain types of PM (those formed secondarily), are not emitted directly by an air pollutant source. Rather, in certain meteorological conditions, these pollutants are formed by pollutant precursors. For instance, in the presence of sunlight, emissions of volatile organic compounds (VOC) react with emissions of nitrogen oxides (NO_x) to form O_3.

Table 6-2: National Ambient Air Quality Standards

Criteria Pollutant	Averaging Time[1]	PPM[2]	µG/M[3]	Type of Standard[4]
Carbon monoxide (CO)	1-hour	35	40,000	Primary
	8-hour	9	10,000	Primary
Sulfur oxides (SO_x)	1-hour	0.075	--	Primary
	3-hour	0.5	1,300	Secondary
	24-hour	0.14	--	Primary
	Annual Mean	0.03	--	Primary
Nitrogen dioxide (NO_2)	1-hour	0.100	--	Primary & Secondary
	Annual Mean	0.053	--	
Ozone (O_3)	1-hour	0.12	--	Primary & Secondary
	8-hour	0.08	--	
Particulate matter, diameter ≤ 10 µm (PM_{10})	24-hour average	--	150	Primary & Secondary
Particulate matter, diameter ≤ 2.5 µm ($PM_{2.5}$)[b]	24-hour average	--	35	Primary & Secondary
	Annual Mean	--	15	Primary & Secondary
Lead (Pb)	Quarterly average	--	1.5	Primary & Secondary
	Rolling 3-month average	--	0.15	

Notes: 1 = The averaging time is the time period over which air pollutant concentrations are averaged for the purpose of determining attainment with the NAAQS
2 = Parts per million (PPM)
3 = Micrograms per cubic meter (µG/M)
4 = Primary standards are set to protect public health. Secondary standards are designed to protect public welfare.
1997 standards are currently in place, pending re-evaluation of the 2008 standards by the US EPA.
Source: US EPA, Office of Air and Radiation, http://www.epa.gov/air/criteria.html (November 17, 2010)

Regions that comply with the NAAQS are designated as “attainment” areas; however, areas that do not meet the NAAQS are designated from marginal to extreme “non-attainment” areas. Under the CAA and associated amendments, state and local air pollution agencies have the authority to adopt and enforce ambient air quality standards (AAQS) more stringent than the NAAQS. The state of North Carolina has adopted the NAAQS. Buncombe County and Henderson County have been designated attainment areas by the U.S. EPA for all criteria pollutants as of August 30, 2011.

6.2 Compatible Land Use

Land use plays a critical role in the ability of an airport to expand and develop into the future. More importantly, land uses surrounding an airport can impact the safety of aircraft operations and persons in the air and on the ground. Beyond the need to protect the safety, airport sponsors are obligated to promote and maintain compatible land uses around their respective airports according to Grant Assurances they agree to when they accept FAA grant funding for airport improvements. Specifically, Grant Assurance 21 states:

“All airports that accept federal money must take appropriate action, to the extent reasonable, including the adoption of zoning laws, to restrict the use of land adjacent to or in the immediate vicinity of the airport to activities and purposes compatible with normal airport operations, including landing and takeoff of aircraft.”

Land use near airports should be evaluated for five main areas of concern: noise, tall structures, visual obstructions, wildlife and bird attractants, and high concentrations of people. Each of these concerns is discussed in the following paragraphs.

Noise – When addressing compatible land use, aircraft noise is often a primary concern. At times noise is considered the key factor affecting or limiting airport operations since it is most often noticed by individuals living near an airport. Aircraft operations can create sound levels that produce annoyance in communities near airports, as well as affect speech, sleep, and classroom learning. These annoyances are of concern as they impact the quality of life for residents located in proximity to an airport.

Tall Structures – It is critical to avoid tall structures within the approach and departure surfaces of an airport, as described in Federal Aviation Regulation (FAR) Part 77. Low-level flight occurs on or near an airport during approach and departure, as well as during flights such as crop dusting and search-and-rescue operations. Inadvertent collisions with tall structures during any stage of flight are detrimental to the safety and welfare of those in the aircraft and those on the ground. Tall structures include buildings, objects, and natural vegetative growth such as trees. Tall objects adversely affect approach corridors and instrument approach altitudes. Therefore, the siting of tall objects such as multi-story structures, power lines, wind farms, and telecommunication towers, or allowing trees to grow to substantial heights near airport traffic patterns and flight paths, should be discouraged. The risk to aircraft safety associated with tall structures can be minimized if structures are clearly marked with lighting and if the airport issues a Notice to Airmen (NOTAM) to pilots. Typically, the location and height of tall structures that are obstructions to airspace are identified on aeronautical charts and/or approach protection plans as a part of the Airport Layout Plan drawing set.

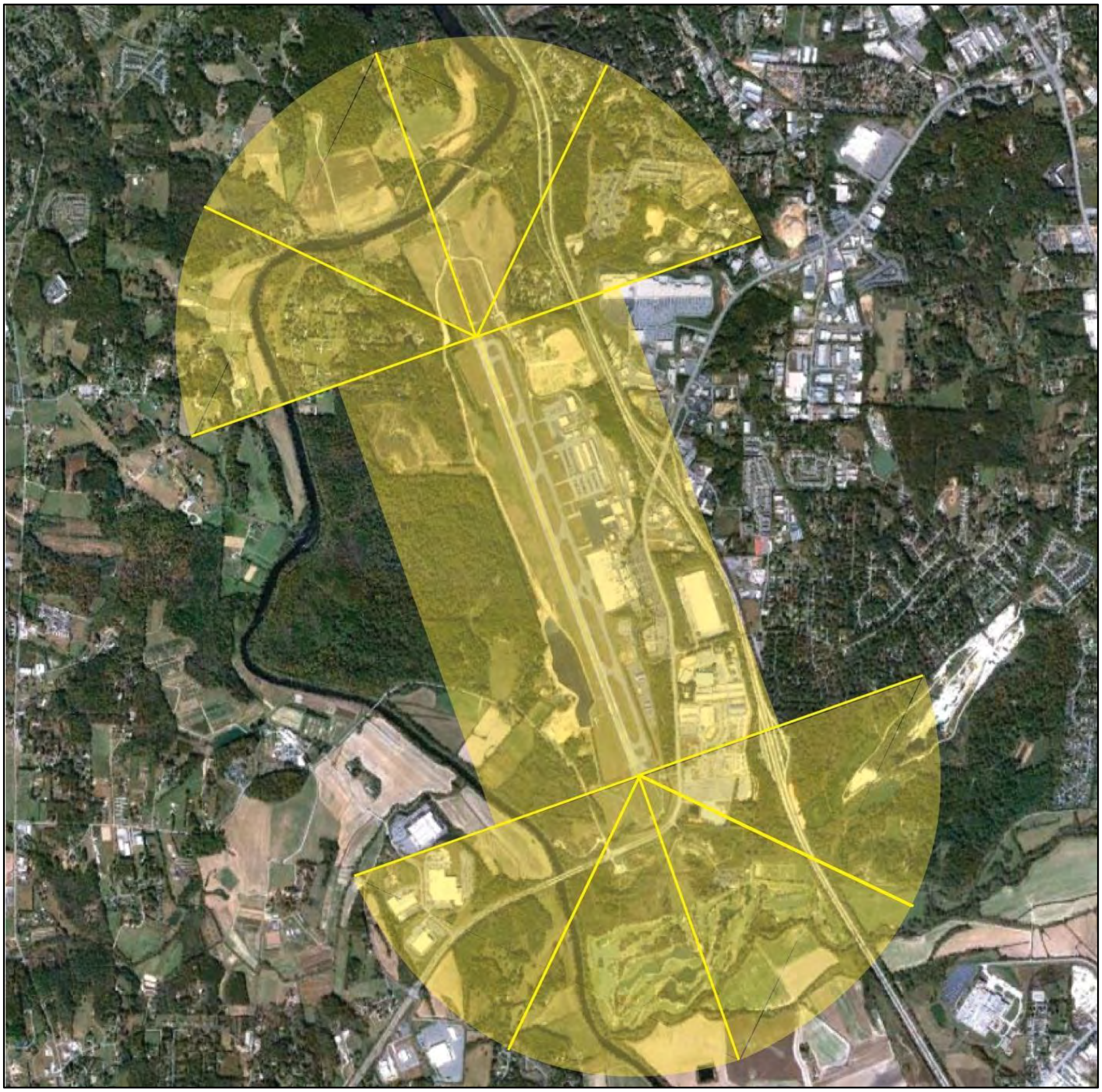
Visual Obstructions – Although not a physical obstruction in the same sense as tall structures, visual obstructions also pose hazards to flight by reducing pilot visibility. Many aircraft operations occur without navigational aids (NAVAIDs); therefore, clear visibility in the area surrounding an airport is vital. Land uses that obscure pilot visibility should be limited to ensure safe air navigation. Visibility can be obscured by dust, glare, light emissions, smoke, steam, and smog. Consequently, each of these should be managed when feasible to limit adverse impacts.

Wildlife and Bird Attractants – Aircraft collisions with wildlife are a threat to human health and safety. Wildlife strikes killed 194 people and destroyed 163 aircraft according to the FAA report *Wildlife Strikes to Civil Aircraft in the United States 1990-2005*. Since 1990, 82,057 wildlife strikes have been reported to the FAA; 97.5 percent involved birds, 2.1 percent involved terrestrial mammals, 0.3 percent involved bats, and 0.1 percent involved reptiles. The number of strikes reported annually has quadrupled since 1990 resulting from an increase in the number of aircraft operations as well as populations of hazardous wildlife species. Some common wildlife attractants include landfills, waste disposal receptacles and facilities, and bodies of water.

High Concentrations of People – Concentrations of people, or density, can be defined as the number of people within a particular land area. Density is measured by the number of people per unit of area and is often categorized as high, medium, or low depending on the number of people a development contains. Available accident data suggests that the greatest percentage of aircraft accidents occur near runway ends during approach and departure. The risk of damage and personal injury to both people on the ground and in the aircraft can be reduced significantly by limiting the number of people in areas adjacent to an airport, particularly near runway ends. In general, the higher the concentration of people that a land use supports or attracts the less compatible it will be in proximity to an airport. The lower the concentration of people the more compatible the land uses will be near an airport.

Current Conditions – A general analysis of land uses near the Airport is provided in Chapter 2 – Inventory of Facilities. As noted in the inventory, the Airport is located in both Buncombe and Henderson counties and the zoning around the Airport is divided between four entities: Buncombe County, the City of Asheville, the Town of Fletcher, and the Town of Mills River. The zoning in all four entities has been analyzed for compatibility with Airport operations within the surrounding vicinity (generally one mile from the runway ends and a half-mile parallel to Runway 16/34), shown in **Figure 6-1** as the influence area. A detailed discussion of the level of compatibility in the surrounding jurisdictions is provided in the following subsections. In general, the zoning classifications that fall within the influence area are not impacted by aircraft noise; however, the few areas that allow residential development may be impacted by aircraft noise due to the proximity to the Airport. To help minimize the incompatibility resulting from noise, local jurisdictions can take action to require real estate disclosures for any residential property within the influence area so that potential buyers are made aware of the proximity to the Airport and potential noise issues.

Figure 6-1: Land Use Influence Area



Source: Mead & Hunt, Inc. (2012)

6.2.a Buncombe County

As noted in Chapter 2, the land to the north of the Airport in Buncombe County is zoned primarily for office use, industrial use, storage, warehousing, wholesale trade (Employment District), and various residential developments that include low-density (R-LD) and single family uses (R-1). While the majority of these land uses are generally found to be compatible with Airport operations, precautions should be taken to reduce any potential concerns. Actions that should be taken include down shielding lights (neighborhood lights, parking lot lighting, etc.), frequently emptying waste receptacles (dumpsters, parking lot trash cans, etc.), minimizing the number and/or size of water detention ponds (subdivision developments, etc.), and ensuring the height of tall structures (lights, water towers, communication towers, trees, etc.) do not exceed the height allowable by FAR Part 77. While Chapter 2, Article II, Division 3 of the Buncombe County Code of Ordinances prohibits telecommunication towers from exceeding 200 feet in height, no language is included in County ordinances that protect FAR Part 77 airspace around the Airport. It is encouraged the Airport work with the Buncombe County Planning and Development Department to include language in its zoning ordinance or develop an FAA model height zoning ordinance that protects FAR Part 77 airspace surfaces around the Airport.

According to the zoning regulations of Buncombe County, uses that are permitted in the Employment District include vocational or business schools and hospitals. It should be noted that these uses are typically considered incompatible with Airport operations because of the high density of people that are associated with them. Schools and hospitals should be strongly discouraged or prohibited near the Airport, especially within the influence area. Also, it should be noted that the permitted height of structures in this district is 90 feet above ground level. Currently, there are no structures in the employment districts identified north of the Airport that penetrate FAR Part 77 surfaces; however, construction of future structures in this area that meet the height requirements of the zoning ordinance may penetrate existing or future FAR Part 77 surfaces as a result of the contour of the land within these areas. The Airport should work with Buncombe County to prevent incompatible land uses and obstructions to FAR Part 77 surfaces in these areas that could impact existing and future Airport development.

Finally, an area to the northeast of the Airport that falls within the influence area is zoned R-3, or higher density residential use. This zoning should be reconsidered by zoning officials in Buncombe County as this zone allows a greater density of people which is considered to be incompatible with Airport operations. If this area were zoned low density residential (LD-R) or single-family residential (R-1), it would be more compatible.

6.2.b City of Asheville

The Airport and an area of land to the northeast lie within the City of Asheville and are subject to the City's zoning and land use controls. The land immediately surrounding the vicinity of the Airport within the influence area is zoned for a wide range of commercial and industrial uses such as light manufacturing, wholesale, warehousing, services, offices, and automobile-oriented commercial development. These uses are generally considered compatible with Airport operations; however, special attention needs to be paid to any industrial use that would include the emission of smoke or tall structures such as smoke stacks. Any use that could impair a pilot's ability to see while navigating upon takeoff or landing (smoke or steam emissions, for example), is considered incompatible. Development in this zone is restricted in height to 80 feet which appears to prevent obstructions to FAR Part 77 surfaces that lie over these areas. It should be noted that the Progress Energy Plant located three miles northeast of the Airport has multiple smoke stacks that exceed 400 feet above ground level (AGL) which occasionally emit steam across the arrival/departure path of aircraft north of the Airport. However, these smoke stacks have been clearly identified on aeronautical charts and instrument approach plates and are not located within the arrival and departure paths of aircraft at the Airport.

A small portion of an area zoned for Highway Business falls within the influence area. Some of the development in this area can be expected to have a high turnover rate of patrons entering and exiting businesses (fast food restaurants, gas stations, etc.); therefore, there is limited concern for large concentrations of people. However, according to the Asheville Code of Ordinances, this zone also allows for multi-family residential uses, colleges, universities (including dormitories), hospitals, medical centers, orphanages, and schools which all are considered incompatible due to the large concentrations of people that are associated with them. For safety reasons these uses should be strongly discouraged or prohibited near the Airport, especially within the influence area. Parking decks, amphitheaters, and auditoriums are also among the permitted uses in this zone that cause concern because of the tall and bright lighting typically associated with these uses. Should these uses be constructed, they must down shield their lights and comply with local height restrictions for this zone (60 feet) which appear adequate in preventing buildings from penetrating FAR Part 77 surfaces. It should also be noted in Article XVI, Section 7-16-1 of the City of Asheville Code of Ordinances that antennas located in all zoning districts must comply with FCC and FAA rules and regulations. It is also recommended the City of Asheville adopt an FAA model height zoning ordinance to further protect FAR Part 77 surfaces and prevent airspace obstructions around the proximity of the Airport.

6.2.c Town of Fletcher

The influence area for the Town of Fletcher includes several areas to the immediate south and southwest of the Airport and a small area to the east. The majority of this land is zoned C-2 (Interstate Commercial District) which allows mixed commercial, residential, and service oriented uses. The same mitigation strategies presented for land use compatibility in the City of Asheville also apply to the uses allowed in the C-2 zone. Lighting should be down shielded, water detention ponds should be small or minimized completely, and waste receptacles need to be emptied frequently. The zoning provisions of the Town of Fletcher do not limit the development density or the height in stories of development within the C-2 zone. Furthermore, district provisions for the C-2 zone state that individual buildings in these areas are encouraged to be multi-story with uses mixed vertically (i.e. street level commercial with upper level office and residential) and promotes higher densities of residential development. It is critical that the Airport work with zoning officials from the Town of Fletcher to identify reasonable standards for height and density to protect the safety of persons on the ground and preserve FAR Part 77 airspace around the Airport. This is recommended to be accomplished through the adoption of an FAA model height zoning ordinance.

Because mixed-use development can occur in this zone, it is important that buildings do not exceed reasonable height restrictions (i.e. multi story buildings with commercial uses on the first floor and residential uses above). Residential uses within this zone should be required to be low-density (i.e. single family) to minimize the concern for attracting large concentrations of people, especially within the approach to the Airport.

According to the district provisions for the C-2 zone, outdoor amusement parks are allowed in this zone which is incompatible with Airport operations, especially if located within the approach to the Airport. Amusement parks are typically considered incompatible for these reasons: they attract birds and other wildlife with the food and waste that is often left behind by people, they usually have high intensity lighting associated with parking lots and infrastructure, they attract a large concentration of people, and they typically feature tall structures.

In addition, colleges, universities, hospitals, and schools are permitted in the C-2 zone which is also considered incompatible with Airport operations. There is a significant safety concern associated with these uses as they have large concentrations of people present for the majority of the day and sometimes overnight. Just as in Buncombe County and the City of Asheville, these uses should be strongly discouraged or prohibited near the Airport, especially within the influence area.

A small area to the southwest of the Airport is zoned M-1 which allows manufacturing, processing, assembling of parts, and distribution of products and services. The same concerns surrounding industrial uses allowed in the City of Asheville apply to uses within this zoning designation. The size of the use (manufacturing plant, etc.) and the density of people (employees, patrons) also need to be considered as population density could be an issue with large developments within this zone. Development within this zone is restricted to three stories in height according to the district provisions for the M-1 zone. Since the allowable height of a three-story building is not defined, it is encouraged that language defining this zone is strengthened to prevent the construction of three-story buildings that may penetrate FAR Part 77 surfaces associated with the Airport.

6.2.d Town of Mills River

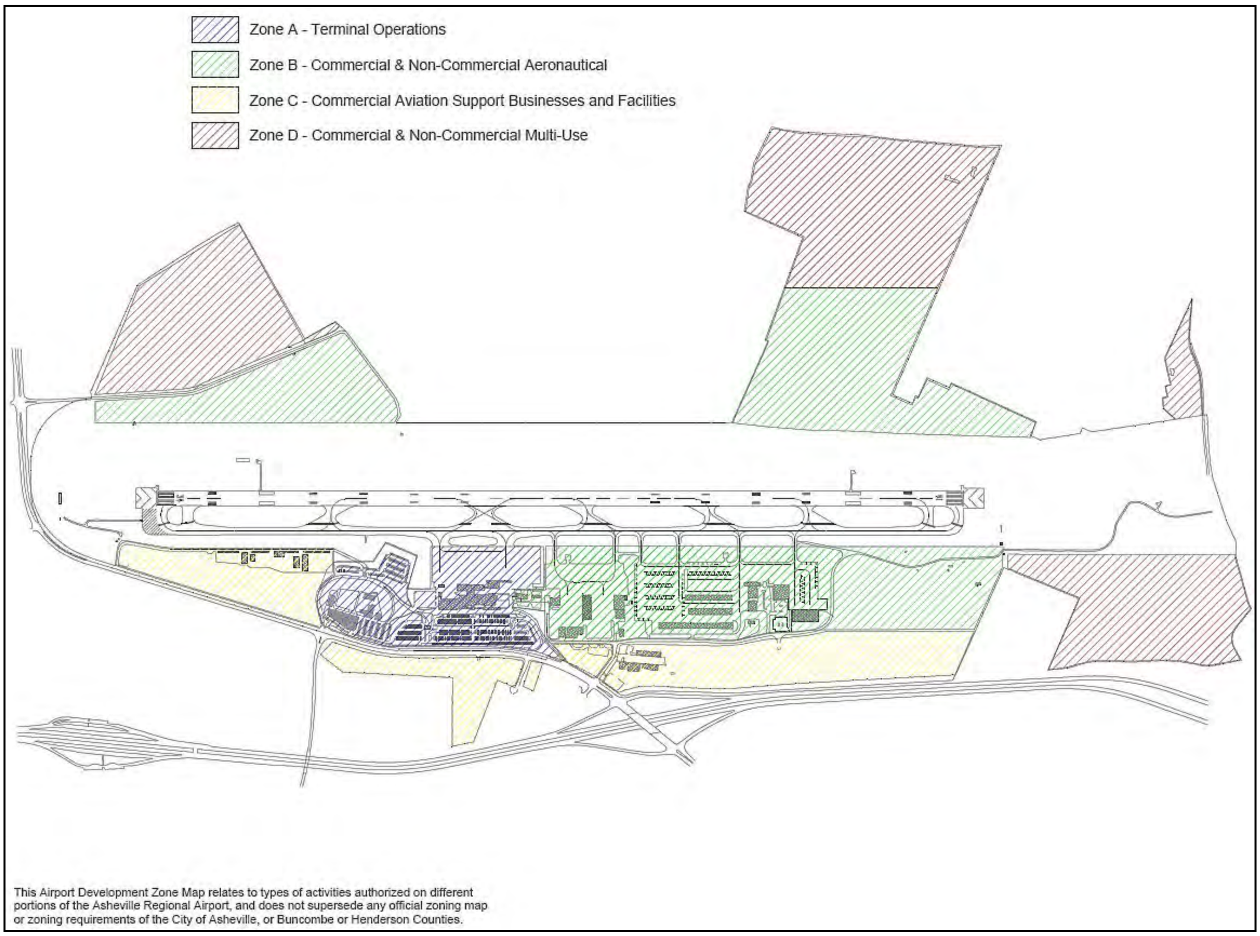
Land west of the Airport falls within the zoning jurisdiction of the Town of Mills River. This land is zoned MR-LI or light industrial use which includes manufacturing, storage, processing, distribution, and sale of equipment. The same concerns for the area zoned M-1 in the Town of Fletcher apply to this zoning designation to protect the Airport from incompatible uses that may affect existing infrastructure or future planned projects such as a runway relocation or extension. Structures may have a maximum height of 50 feet according to Chapter 154, Zoning of the Town of Mills River Code of Ordinances. While it appears this 50 feet height limitation is sufficient in protecting FAR Part 77 surfaces at the Airport, it is recommended additional language be included in the zoning ordinance and/or an FAA model height zoning ordinance be adopted to protect FAR Part 77 airspace surrounding the Airport for existing infrastructure and future planned projects. Such projects as a relocation and/or extension of the runway may shift the transitional and horizontal surface over existing or future planned developments in these areas that could become obstructions to airspace. It is encouraged the Airport share its future development plans with the Town of Mills River to help protect airspace and persons and property on the ground.

6.2.e Future Considerations

The *Asheville Regional Airport Master Land Use and Site Development Plan* was developed in 2008 to help identify relationships between aviation and real estate while also determining which types of development are appropriate for the Airport and desired by the Greater Asheville Regional Airport Authority. This plan identified current zoning conditions in the municipalities surrounding the Airport which coincide with those presented previously in this Chapter. The *Asheville Airport Master Land Use and Site Development Plan* references two economic development studies pertaining to the Asheville area. This plan identifies two possible industries to target, healthcare and education, to boost local economies. Some healthcare (hospital) and educational (university) facilities are considered incompatible with Airport operations due to the safety concerns associated with high concentrations of people. Should these industries be targeted in the greater Asheville area, it is important to keep in mind the safety considerations associated with these specific uses, especially if they are to be located near the Airport. It should also be noted that land use plans and zoning ordinances in all jurisdictions may need to be updated if significant development such as a runway extension or relocation occurs to continually protect airspace from obstructions and encourage land uses that are compatible with Airport operations.

Figure 6-2 illustrates the Development Zone Map from the Airport's development guidelines that identifies types of authorized activities on different portions of Airport property. It should be noted that the Development Zone Map does not supersede any official zoning map or zoning requirements of the City of Asheville, Buncombe County, or Henderson County.

Figure 6-2: Airport Development Zone Map



Source: Asheville Regional Airport (2012)

6.3 Construction Impacts

Construction impacts are typically temporary conditions that result from infrastructure development that includes short-term degradation of noise, air, and water quality. The following specific areas of concern should be considered for all construction activities that occur in proximity to the Airport.

Noise – Noise from construction equipment and related activities of the site development may temporarily increase during various stages of construction. In the immediate vicinity of construction activity the level of noise would be the greatest, but would drop off significantly a short distance from the site.

Dust – Dust from the delivery of materials to a construction site at the Airport would pose only minor impacts to residential areas and to the traveling public. Overall, the impacts of noise and dust from delivery of equipment and materials would be for a short duration and would be considered negligible.

Water Quality – Risk to water quality during construction would be from erosion and siltation created during clearing, grubbing, earthmoving, and excavating activities. The means of reducing the risk would involve both temporary and permanent control measures to ensure that erosion and siltation are kept to a minimum.

These measures are outlined in FAA Advisory Circular (AC) 150/5370-10E, Item P-156, *Temporary Air and Water Pollution, Soil Erosion, and Siltation Control*. A Storm Water Pollution Prevention Plan (SWPPP) was completed in January 2011 for the airport consistent with NCDENR and EPA. The SWPPP would be updated upon completion of any development affecting the contents of the plan. Contents to be revised include, but are not limited to, those that change the location or size of the discharge outfalls, that require any changes to the location or capacity of the fuel farm, or that significantly increase the impervious surface resulting in significant volume increase and/or velocity of storm water runoff.

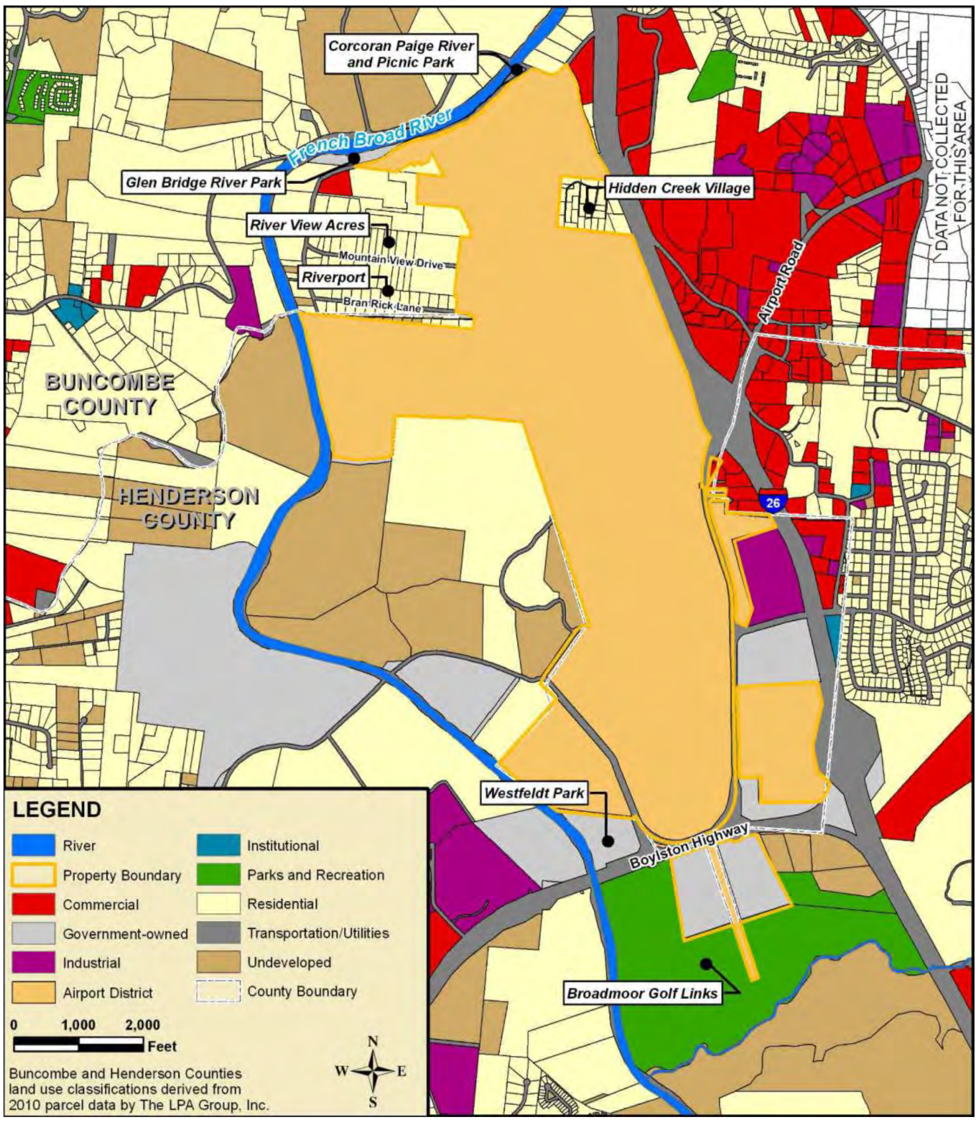
Air Pollution – Air pollution, as a result of the open burning of construction debris, may be permitted provided there is strict adherence to all local and state laws, ordinances, and regulations.

Material Storage/Disposal – Airport development may require significant excavation of unsuitable material, placement of embankments, and the use of materials such as aggregates, and bituminous and Portland Cement Concrete. The stockpiling of the construction and excavation materials may be visually displeasing to some traveling in the area. However, this is a temporary condition and would pose no permanent impacts.

6.4 Department of Transportation Act, Section 4(f)

Section 4(f) of the federal Department of Transportation Act states that any project requiring the use of any publicly-owned land from a public park or recreation area, or from a historic site of national, state, or local significance shall not be approved unless there is no feasible and prudent alternative for the use of such land. There are no Section 4(f) lands within the boundaries of the Airport; however, three parks are located adjacent to the Airport: Glen Bridge River Park, Corcoran Paige River and Picnic Park, and Westfeldt Park (**Figure 6-3**). Glen Bridge River Park (one acre) and Corcoran Paige River and Picnic Park (0.85 acre) are both northwest of the Airport and owned by Buncombe County. The primary use of these parks is to provide access to the French Broad River. Westfeldt Park is a significantly larger recreation area (17 acres) owned by Henderson County and is located southwest of the Airport. This park also provides access to the French Broad River as well as offers picnic areas. Westfeldt Park received funding from the Land and Water Conservation Fund Act of 1965, protecting it as a Section 4(f) resource from conversion to non-public recreational uses.

Figure 6-3: Section 4(f) Properties



Sources: Asheville Regional Airport, Runway Reconstruction and New Parallel Taxiway Environmental Assessment, The LPA Group Aviation Consultants (August 2011).
Delta Airport Consultants, Inc. per information received from Asheville Regional Airport (August 2012)

6.5 Farmlands

Farmlands are protected under the Farmland Protection Policy Act (FPPA). According to Order 1050.1E, the FPPA authorizes the Department of Agriculture (USDA) to develop criteria for identifying the effects of Federal programs on the conversion of farmland to non-agricultural uses. This is done to minimize the extent to which those programs contribute to the unnecessary and irreversible conversion of prime, unique, and statewide or locally important farmlands to nonagricultural uses.

Guidelines established by the USDA under the FPPA for identifying the effects of federal programs on the conversion of farmland to nonagricultural uses became effective August 1, 1989. However, according to the provisions of the FPPA, it does not apply if the following exists: 1) the land for development was purchased prior to August 6, 1984 and 2) the potential area for development is zoned for airport development.

According to 7 CFR Part 658.2(a) of the FPPA, the Airport property does not meet the definition of farmland because it is "already in or committed to urban development," and therefore exempt from the FPPA. Buncombe and Henderson Counties have 11 soil series designated as prime farmland soils, eight designated as soils of statewide importance, and six designated as soils of local importance.

6.6 Fish, Wildlife, and Plants

The majority of Airport property is comprised of actively managed herbaceous cover. Although forested habitats do occur within the property boundary, they provide little in the way of high quality or unique wildlife habitat since aircraft noise and active management of the Airport makes the area less desirable for wildlife.

A Wildlife Hazard Assessment (WHA) was completed for the Airport from January 2008 to January 2009 to investigate wildlife species and habitats near the aircraft operation area (AOA) that may pose potential hazards to aviation. Nearby habitats that were documented during the WHA include stands of mature hardwoods, pine stands, and large grassed areas interspersed with occasional scrub-shrub vegetation. A total of 72 different bird species were observed during the 12-month survey with locking and soaring birds (i.e. Canada geese, turkey vultures, blackbirds, and starlings) posing the most significant threat to air traffic safety. A total of four different mammal species were documented during the WHA, consisting primarily of cottontail rabbits. Although no deer were observed inside the 12-foot tall wildlife perimeter fence, several were observed outside of the fence. Field signs or observations of coyote, gray fox, woodchuck, opossum, rabbit, and skunk were also documented during the WHA.

6.6.a Endangered Species

Section 7 of the Endangered Species Act of 1973, as amended, requires federal agencies to ensure that any proposed action does not jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of associated habitat. Section 7a(3) also requires that consultation occur with the United States Fish and Wildlife Service (USFWS) regarding the presence of threatened and endangered species within a proposed project area. Under the act, an endangered species is defined as any species that is in danger of extinction throughout all, or a significant portion, of its range. A threatened species is considered to be any species that is likely to become an endangered species within the foreseeable future.

The Airport property was evaluated for the presence of protected species or their suitable habitats during field surveys conducted in November and December of 2009 as well as in April, November, and December of 2010 as part of the 2011 EA. Additionally, the NCDENR Natural Heritage Program (NHP) species database was searched to verify any known occurrences of federally or state protected species within a five-mile radius of the Airport. Although, species were found in the five-mile radius, existing habitat combined with the field survey results concluded it was unlikely that any federally or state protected species are present within Airport boundaries.

6.6.b Biotic Communities

Biotic communities may be directly or indirectly affected by aviation development and aviation activities. Specifically, development that affects existing watercourses or vegetation may alter wildlife habitat in the area, resulting in potentially significant impacts to flora and fauna. **Table 6-3** details upland communities that were documented within the 2011 EA.

Table 6-3: Upland Communities

Community Type	Description
Riparian Forest	Located adjacent to the French Broad River and unnamed tributaries. Represent the interface between the wetland and upland areas on site. Tree growth rate is generally high and sub-canopy typically denser than other forested habitats. Undergrowth includes a wide variety of shrubs, grasses, and other herbaceous species.
Mixed Pine/Hardwood	Well-developed on airport and is comprised of a closed-canopy dominated by deciduous hardwood trees. Diverse assemblage of deciduous and evergreen tree species in canopy and understory, shade-tolerant shrubs, and a sparse groundcover.
Mixed Upland Hardwood	Occurs on upland sites that have dry soils and lack a significant presence of pine; characterized by a continuous, often dense, canopy of deciduous trees.
Mountain Mixed Pine	Occurs on upland sites that have acidic soils and lack a significant presence of hardwoods; characterized by a continuous, often dense, canopy of pines and a locally dense shrub layer.
Herbaceous Cover	Lack a significant presence of trees and shrubs as actively managed for airport operation and safety; abandoned borrow areas and herbaceous wetlands. Herbaceous plants are non-woody and usually die back following each growing season.

Source: Asheville Regional Airport, Runway Reconstruction and New Parallel Taxiway Environmental Assessment, The LPA Group Aviation Consultants (August 2011)

6.7 Floodplains

Floodplains are a critical element to both the environment and the community. They perform vital natural functions that include temporarily storing floodwater, moderating peak flood flows, maintaining water quality, recharging groundwater, providing a habitat for wildlife, and controlling erosion. They also provide recreational grounds and establish an aesthetic quality to natural areas.

Critical elements of Executive Order (E.O.) 11988, *Floodplain Management,* state:

- Federal agencies should make efforts to avoid, to the extent possible, long and short-term adverse impacts associated with the occupancy and modification of floodplains.

- Federal agencies should avoid direct or indirect support of floodplain development wherever there is a practicable alternative.

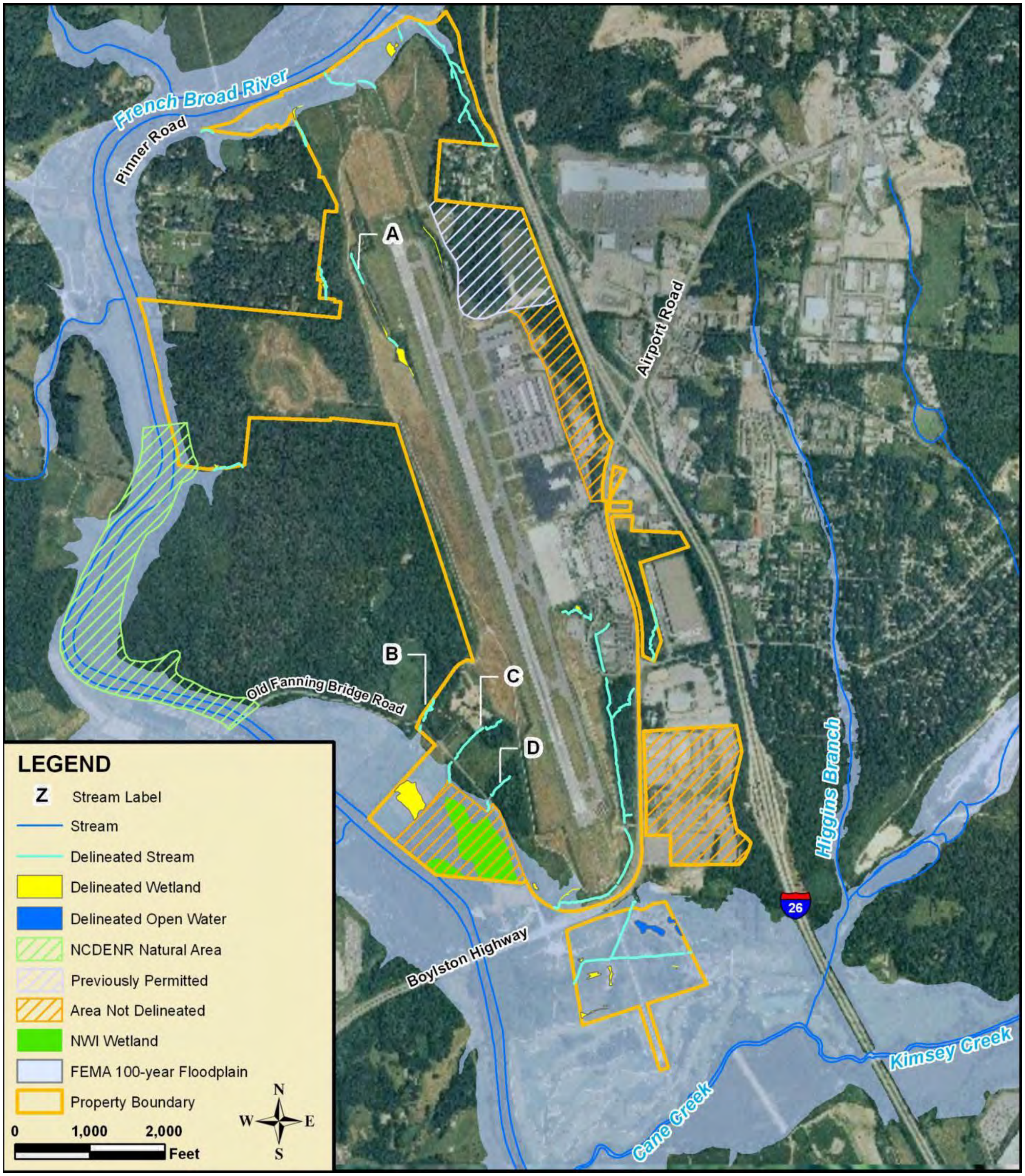
- Floodplain encroachments that are uneconomical, hazardous, or result in an incompatible development of the floodplain are prohibited.

- Any action that would cause a critical interruption of an emergency transportation facility, a substantial flood risk, or an adverse impact on the floodplain's natural resource values is prohibited.

The 100-year floodplain boundary delineates a flood elevation that has a one percent chance of being equaled or exceeded each year.

The Airport is located on Flood Insurance Rate Maps (FIRM) for Buncombe County and Henderson County (map numbers 3700964300K and 3700964200K, respectively, effective January 6, 2010). The FIRM indicates that the majority of the Airport is located in Zone X, an area determined to be outside the 100- and 500-year floodplains. However, 100-year floodplains are located along the periphery of the Airport boundary associated with the French Broad River to the west and its tributaries. The 100-year floodplains are classified as Zone AE, an area inundated by 100-year flooding, for which base flood elevations (BFEs) have been determined. The 100-year floodplain on Airport property to the north has BFEs ranging from 2,048 to 2,049 feet and to the south the BFEs range from 2,060 to 2,061 feet. **Figure 6-4** illustrates the 100-year floodplain.

Figure 6-4: Wetlands, Streams, and Floodplains



Source: Asheville Regional Airport, Runway Reconstruction and New Parallel Taxiway Environmental Assessment, The LPA Group Aviation Consultants (August 2011)

6.8 Hazardous Materials, Pollution Prevention, and Solid Waste

Hazardous materials are those substances defined by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, by the Superfund Amendments and Reauthorization Act (SARA), and by the Toxic Substances Control Act. In general, hazardous materials include substances that, because of their quantity, concentration, physical, chemical, or infectious characteristics, may present substantial danger to public health or welfare, or to the environment, when released or otherwise improperly managed.

Analysis of this impact category involves the evaluation of three potential areas of impact. These are:

- The release of any existing undisturbed toxic substances;
- The release of toxic substances from construction equipment maintenance and materials; and
- The release of toxic substances from any newly constructed facilities.

Hazardous substances known to be found at airports include aircraft and ground equipment fuel and aircraft deicing fluid. As a part of the 2011 EA a regulatory record search was performed to identify known or potential hazardous material sites, hazardous waste generators, and hazardous material users in the vicinity of the Airport. Environmental databases containing information about hazardous sites from multiple federal and state agencies, including the EPA and NCDENR, were used to identify potentially hazardous materials. According to the EPA and NCDENR databases, no National Priority List sites or Solid Waste Management Units exist on the Airport.

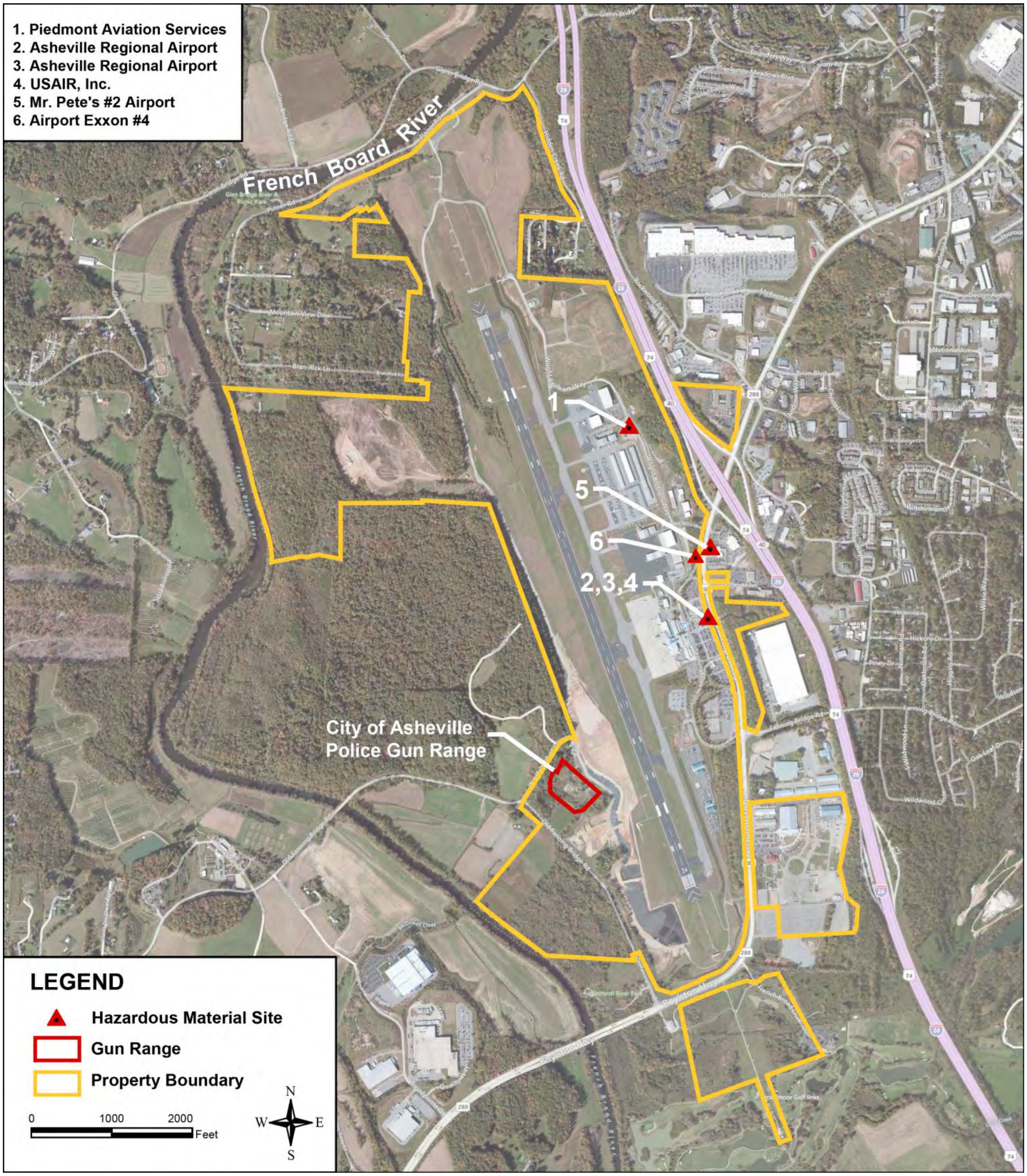
The database searches did identify six documented hazardous material and waste sites located along the eastern portion of Airport property. **Table 6-4** lists the status of each site while **Figure 6-5** identifies their locations. Four of the six sites are considered closed; the other two identified as US Airways, Inc. (Map ID 4) and Airport Exxon #4 (Map ID 6) are identified in the Leaking Underground Storage Tank (LUST) database as both having leaks in 1991 with corrective action taken in the same year.

Table 6-4: Potential Hazardous Material Sites

Map ID	Name	Database/Status
Regulatory Record Search Sites		
1	Piedmont Aviation Services	FINDS, UST / Closed
2	Asheville Regional Airport	LUST / Closed
3	Asheville Regional Airport	LUST / Closed
4	US Airways, Inc.	LUST / Remedial Action Implemented
5	Mr. Pete's #2 – Airport	LUST / Closed
6	Airport Exxon #4	LUST / Follow Up
Additional Sites		
-	City of Asheville Police Gun Range	Closed

Notes: FINDS – Facility Index System, listing of EPA regulated facilities; UST – Underground Storage Tank database; LUST – Leaking Underground Storage Tank, database of USTs with reported releases; NFRAP – No Further Remedial Action Planned
Sources: FirstSearch Technology Corp. (November 4, 2010); EA, The LPA Group Aviation Consultants (August 2011); Delta Airport Consultants, Inc. updated per information received from Asheville Regional Airport (2012)

Figure 6-5: Hazardous Sites



Sources: Asheville Regional Airport, Runway Reconstruction and New Parallel Taxiway Environmental Assessment, The LPA Group Aviation Consultants (August 2011)
Delta Airport Consultants, Inc. updated per information received from Asheville Regional Airport (August 2012)
Aerial imagery obtained from Bing maps (October 25, 2012)

6.9 Light Emissions and Visual Impacts

FAA Order 1050.1E requires the operator to consider the extent to which any lighting associated with a development action will create an annoyance among residents in an airport region. Any project that involves the installation, replacement, or relocation of airfield lighting such as runway/taxiway edge lights, approach lighting systems, and other forms of visual NAVAIDs should be evaluated for adverse light emissions and visual impacts. Improvements to existing lighting or the installation of new lights could potentially impact land uses to the east of the Airport during nighttime hours. Airport management reports that no formal complaints have been made from nearby residences and no adverse light emissions and visual impacts are anticipated with future airside and landside infrastructure improvements.

6.10 Natural Resources and Energy Supply

Energy and natural resource impacts are those that are related to the amount of energy required to operate aircraft, Airport-related service vehicles, terminal lighting, and other uses such as heating and air-conditioning. Energy requirements for the Airport with the exception of lighting are largely dependent upon the level of aviation activity.

Impacts to energy supplies and natural resources from Airport development could result from a host of factors, including energy required for ground support vehicles, aircraft, airfield lighting, and terminal heating and cooling. The FAA defines two types of energy use to consider when determining potential environmental impacts of a proposed project:

- Uses related to major changes in stationary facilities (e.g. airfield lighting, terminal building heating and cooling) that may exceed local supplies or capacities.

- Uses related to major changes in the movement of aircraft and ground vehicles to the extent that demand exceeds energy supplies.

Increased aviation activity levels translate into higher energy requirements for operation of aircraft, vehicles, and Airport facilities. According to FAA Order 1050.1E, most airport development projects will not produce changes in energy use or other natural resource consumption resulting in significant impacts.

Existing demand for electrical power at the Airport is within the capacity currently provided and current operations do not have an adverse impact on energy supplies or natural resources.

6.11 Noise

Noise is typically the most significant off-airport environmental impact associated with aircraft operations. Noise is measured in decibels (dB) on a scale from 1 to 180 through a mathematical process called a logarithm. Aircraft sound levels are quantified for single events using the A-weighted decibel scale (dBA), which was developed to measure sounds with more emphasis on frequencies that can be heard by the human ear. Generally, it would take at least a five dBA difference for the human ear to perceive a difference in sound in most exterior environments.

The FAA has a national policy that airports be constructed and operated to minimize current and future noise impacts on surrounding communities. The FAA also specifies metrics to be used in measuring aircraft noise. The metric used in this analysis is the Day Night Average Sound Level (DNL). The DNL noise metric was developed by the EPA and is used by the FAA, the United States Department of Housing and Urban Development, and other federal agencies concerned with community noise levels. DNL is the average cumulative sound level that provides a measure of the total sound energy during a 24-hour period. A 10-decibel (dB) weighting penalty is added to aircraft noise occurring during the nighttime hours (between 10:00 p.m. and 7:00 a.m.). The 10 dB penalty represents the added intrusiveness of noise events that occur during normal sleep hours when ambient sound levels are typically about 10 dB lower than during the day because of the annoyance associated with sleep disruption.

The FAA's Integrated Noise Model (INM) is used to prepare noise contours to evaluate potential aircraft noise effects. INM is the computer program used to determine the total effect of aircraft noise in an airport environment. INM produces noise contours, which are computer-generated lines that connect points of equal noise levels resulting from aircraft operations. Using standard methodology, cumulative noise produced by aircraft operations at the Airport was modeled using the INM, version 7.0b as part of the 2011 EA. Lines of contiguous noise levels at 65, 70 and 75 DNL are represented as noise contours overlaid onto a base map. Noise contours generated by the INM do not show a distinct demarcation of where the noise levels end or begin. Rather, their purpose is to describe the generally expected noise exposure. Although the INM is the current state-of-the-art aircraft noise modeling software, input variables to the INM require several simplifying assumptions to be made.

Estimates of noise effects resulting from aircraft operations can be interpreted in terms of the probable effect on human activities characteristic of specific land uses. 14 CFR Part 150 guidelines for evaluating land use compatibility with noise exposure are presented in **Table 6-5**. These guidelines reflect the average response of large groups of people to noise. Therefore, the guidelines might not reflect an individual's perception of an actual noise environment. Compatible or non-compatible land use is determined by comparing the predicted or measured DNL at a specific site with the compatibility guidelines provided in the table. DNL 75 and higher is considered incompatible with most land uses by the FAA, while the DNL 65 is generally accepted as the threshold level at or below which all land uses are considered compatible. Above 65 DNL, noise sensitive land uses such as residential are typically discouraged unless a degree of noise attenuation has been incorporated into the design of the structure. Furthermore, there are some land uses that are compatible with noise levels between DNL 65-75.

Table 6-5: 14 CFR Sound Exposure/Land Use Compatibility Guidelines

Land Use	Yearly Day-Night Average Sound Level (DNL)					
	Below 65	65-70	70-75	75-80	80-85	Over 85
Residential						
Residential	Y	N[1]	N[1]	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N[1]	N[1]	N[1]	N	N
Public Use						
Schools	Y	N[1]	N[1]	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums, and concert halls	Y	25	30	N	N	N
Governmental services	Y	Y	25	30	N	N
Transportation	Y	Y	Y[2]	Y[3]	Y[4]	Y[4]
Parking	Y	Y	Y[2]	Y[3]	Y[4]	N
Commercial Use						
Offices, business, and professional	Y	Y	25	30	N	N
Wholesale and retail-building materials	Y	Y	Y[2]	Y[3]	Y[4]	N
Hardware and farm equipment	Y	Y	Y[2]	Y[3]	Y[4]	N
Retail trade - general	Y	Y	25	30	N	N
Utilities	Y	Y	Y[2]	Y[3]	Y[4]	N
Communication	Y	Y	25	30	N	N
Manufacturing and Production						
Manufacturing, general	Y	Y	Y[2]	Y[3]	N	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture and forestry	Y	Y[6]	Y[7]	Y[8]	Y[8]	Y[8]
Livestock farming and breeding	Y	Y[6]	Y[7]	N	N	N
Mining and fishing	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas/spectator sports	Y	Y[5]	Y[5]	N	N	N
Outdoor music shells/amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts, and camps	Y	Y	Y	N	N	N
Golf courses, riding stables	Y	Y	25	30	N	N

Key:
SLUCM = Standard Land Use Coding Manual
Y = Land Use and related structures compatible without restrictions.
N = Land Use and related structures are not compatible and should be prohibited.
NLR = Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
25, 30, or 35 = Land use and related structures generally compatible; measures to achieve NLR of 25, 30 or 35 dB must be incorporated into design and construction of structure.

Notes:
1 Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB, thus, the reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.
2 Measures to achieve NLR 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas or where the normal noise level is low.
3 Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas or where the normal noise level is low.
4 Measures to achieve NLR 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas or where the normal level is low.
5 Land use compatible provided special sound reinforcement systems are installed.
6 Residential buildings require an NLR of 25.
7 Residential buildings require an NLR of 30.
8 Residential buildings not permitted.

Source: Federal Aviation Regulations 14 CFR Part 150 (effective January 18, 1985)

The following assumptions were used for modeling noise at the Airport during the 2011 EA:

Aircraft Operations – Existing Airport operations were obtained from the most recent FAA Terminal Area Forecast (TAF) at the time of the EA. The total operations were listed at 66,258, or an average of approximately 182 daily operations. Based on the TAF, operations were divided into itinerant and local operations and then further divided by fleet mix.

Aircraft Fleet Mix – Commercial fleet mix was derived using the published commercial flight schedules from November 2010 for the Airport. General aviation and military fleet mix were developed through analyzing the previous 12 months of FAA Enhanced Traffic Management System Counts (ETMSC). Fleet mixes were refined through discussions with Airport staff and the Air Traffic Control Tower (ATCT). In certain instances, FAA approved substitution aircraft were utilized for aircraft not having an Integrated Noise Model (INM) noise profile.

Runway Utilization and Time of Day – Based on interviews with ATCT personnel at the Airport, it was determined that Runway 34 is used 70 percent of the time and Runway 16 is used 30 percent of the time, on average. In addition, approximately 95 percent of Airport operations occur between 7:00 a.m. and 10:00 p.m., with the remainder occurring from 10:00 p.m. to 7:00 a.m.

Approach and Departure Profiles – Arrival and departure procedures for high performance aircraft at the Airport were considered standard for the noise model.

Stage Length – An aircraft's stage length refers to the distance an aircraft must travel to reach its next destination after departing an airport. All aircraft used in the INM model were assigned a stage length of 500 nautical miles or less.

These assumptions were used to determine the INM operational inputs for the existing and the future scenarios. The 2009 scenario INM operational inputs are shown in **Table 6-6**.

Figure 6-6 illustrates the 2009 noise conditions at the Airport prepared during the 2011 EA. As shown in the figure, the majority of land within the 65, 70, and 75 DNL is contained within the boundary of the Airport with a total of 2.9 acres lying outside of existing property. Using FAA land use guidelines, no incompatible land uses were found within the off-Airport exposure areas.

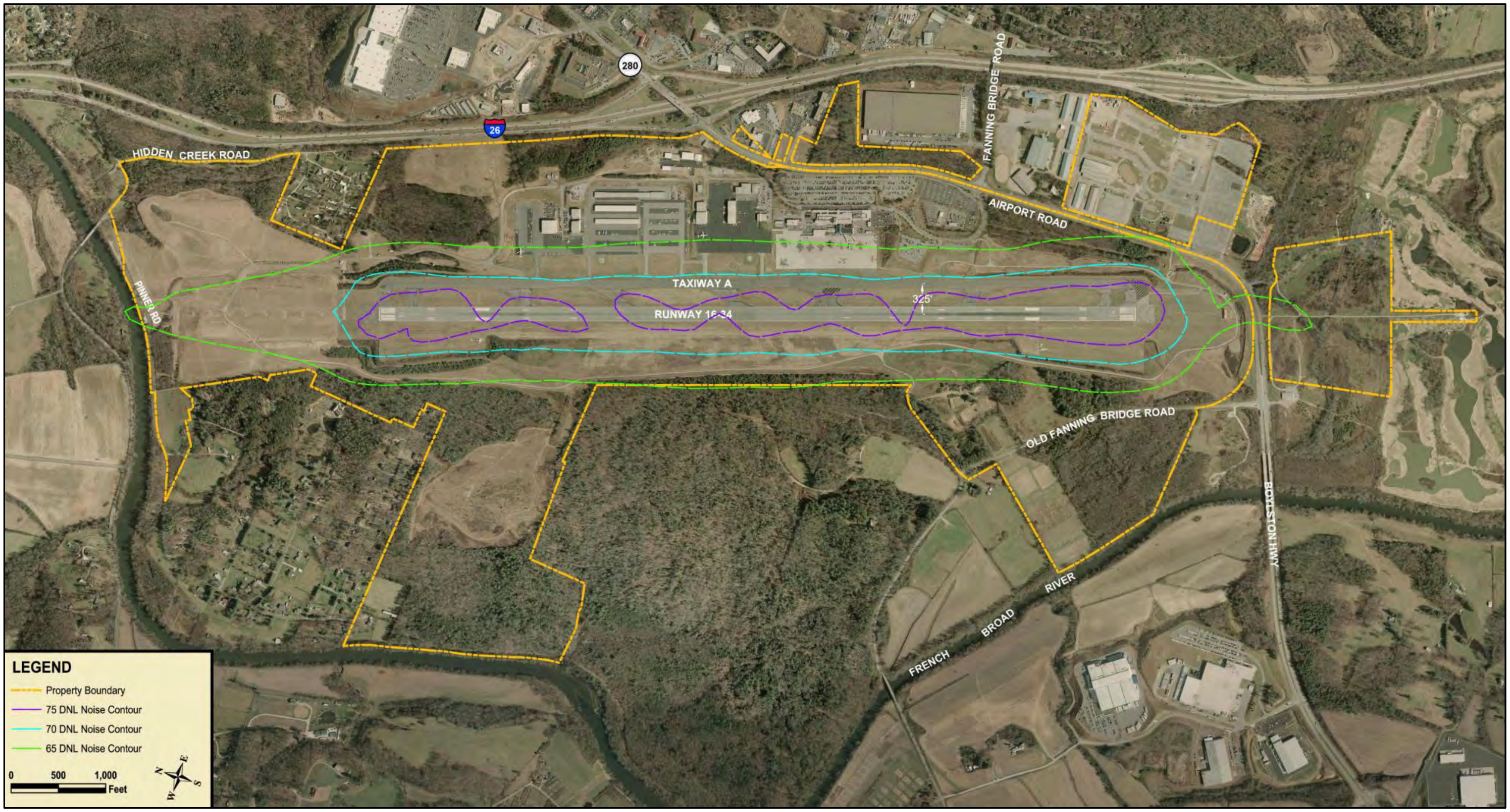
Table 6-6: Summary of INM Inputs for Airport Noise Analysis

Representative Aircraft	INM Profile	% Use	24-hour Operations	Day Operations Arrival	Day Operations Departure	Night Operations Arrival	Night Operations Departure
Itinerant Operations							
Commercial		**37.28**	**49.59**				
Boeing 717	717200	1.67	0.83	0.41	0.41	0.00	0.00
CRJ-700	CRJ9-ER	3.34	1.66	0.41	0.41	0.41	0.41
CRJ-100/200	CL601	78.27	38.82	16.44	16.44	2.97	2.97
Dash 8-100	DHC8	0.84	0.41	0.21	0.21	0.00	0.00
Dash 8-300	DHC830	4.74	2.35	1.17	1.17	0.00	0.00
ERJ-140/145	ERJ145	11.14	5.53	2.76	2.76	0.00	0.00
General Aviation		**57.97**	**77.12**				
Single Engine	GASEPF	15.00	11.57	5.49	5.49	0.29	0.29
Complex	GASEPV	30.00	23.13	10.99	10.99	0.58	0.58
Baron 58	BE58	15.00	11.57	5.49	5.49	0.29	0.29
CNA441	CNA441	17.00	13.11	6.23	6.23	0.33	0.33
CNA500	CNA500	23.00	17.74	8.42	8.42	0.44	0.44
Military		**4.74**	**6.31**				
T-6	U21	40.00	2.52	1.20	1.20	0.06	0.06
T-45	LR45	25.00	1.58	0.75	0.75	0.04	0.04
P-3	P3A	25.00	1.58	0.75	0.75	0.04	0.04
Helicopter	BEL206	10.00	0.63	0.30	0.30	0.02	0.02
	TOTAL	**100.00**	**133.02**	**61.04**	**61.04**	**5.47**	**5.47**
Local Operations							
General Aviation		**94.25**	**45.72**				
Single Engine	GASEPF	70.00	32.00	30.40		1.60	
Complex	GASEPV	25.00	11.43	10.86		0.57	
Beech Baron	BE58	5.00	2.29	2.17		0.11	
Military		**5.75**	**2.79**				
T-6 Texan	U21	100.00	2.79	1.33	1.33	0.07	0.07
	TOTAL	**100.00**	**48.51**	**44.76**	**1.33**	**2.36**	**0.07**

Note: An average of approximately 182 operations occur daily at the Airport, consisting of 133.02 total local and itinerant operations by commercial, GA, and military aircraft, as well as 48.51 total touch and go operations by general aviation and military aircraft.

Source: Asheville Regional Airport, Runway Reconstruction and New Parallel Taxiway Environmental Assessment, The LPA Group Aviation Consultants (August 2011)

Figure 6-6: Noise Contours



Source: Asheville Regional Airport, Runway Reconstruction and New Parallel Taxiway Environmental Assessment, The LPA Group Aviation Consultants (August 2011)

6.12 Secondary (Induced) Impacts

Secondary or induced impacts are alterations in regional growth, development patterns, population, public service demands, or economic activity that are brought about as a result of development actions at an airport. Developments proposed in this master plan are not expected to negatively impact economic activity and quality of life in both the near proximity to the Airport and throughout the region. In fact, beneficial induced impacts are anticipated throughout the region as a result of the proposed Airport development actions. Examples include short-term economic gains earned by the temporary increase in construction jobs and the long-term growth of business activity in the region that is dependent upon the movement of people, goods, and services provided by aviation. The well-being and quality of life in the region is also expected to benefit from the proposed development actions through increased air transportation services that will help to support the vitality of the surrounding community. It is not anticipated that any negative secondary or induced impacts affecting economic development or quality of life will result from development actions proposed in this master plan.

6.13 Socioeconomic Impacts, Environmental Justice, Children's Environmental Health, and Safety Risks

According to FAA Order 1050.1E, the principal social impacts of an alternative to be considered in an environmental assessment are as follows:

- The extensive relocation of residents without sufficient replacement housing;
- The relocation of businesses creating a severe economic hardship for the community;
- Any disruptions of local traffic patterns that would substantially reduce the levels of service of the roads serving the airport and its surrounding communities; and
- A substantial loss in community tax base.

Guidelines for evaluating social impacts are presented in Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Population.* The three general purposes of this executive order are to:

- Focus federal agency attention on human health and environmental conditions in minority and low-income communities with a goal of achieving environmental justice;
- Foster non-discrimination in federal programs that substantially affect human health or the environment; and
- Give minority and low-income communities greater opportunities for public participation in, and access to, public information on matters relating to human health and the environment.

The evaluation of environmental justice must determine if the proposed project would cause a "disproportionate impact" to minority and/or low- income populations.

Children's environmental health and safety risks include those that are attributable to products or substances that a child is likely to come in contact with or ingest, such as air, food, drinking water, recreational waters, soil, or to products which they may use or be exposed.

The 2011 EA utilized the EPA's EJView mapper to find detailed information about residents living adjacent to the Airport. The property to the northwest, encompassing River View Acres and Riverport Subdivisions, have low minority percentages ranging from zero to ten percent based on block level data from the 2000 U.S. Census. The Hidden Creek Village subdivision to the northeast also has a minority population between zero and ten percent, based on block level data. The percentage of those living below the poverty level in these areas was not accounted for in the 2000 U.S. Census at the block level, however, property parcel data from Buncombe County indicates that, in general, the homes to the northwest are above the median home value for the County ($102,200 based on 2000 U.S. Census data), while those in the Hidden Creek Village subdivision are below the County's median home value. This may suggest that the residential area to the northwest of the Airport is not likely to contain many people living below the poverty threshold, while the Hidden Creek Village subdivision on the northeast may have some residents living below the poverty threshold. Therefore, potential environmental justice populations may be adjacent to the Airport in the Hidden Creek Village subdivision.

Since Airport operations are within its existing property boundary, no disruption to or alteration of surface traffic patterns exist. Airport operations also do not currently disrupt established communities, impact future planned development, affect traffic patterns, or result in appreciable changes in employment. Minority and low-income populations are not currently being affected by Airport operations.

6.14 Water Quality

Along with air quality, the quality of water is one of the most sensitive areas of environmental concern with airport development projects. Protection and management of water resources at the Airport is mandated by a number of federal laws, regulations, and guidelines. Water features are under the jurisdiction of the U.S. Army Corp of Engineers (COE) and the NCDENR, Division of Water Resources (DWR).

6.14.a Groundwater

The Airport property and surrounding areas are situated above the Surficial and Fractured Bedrock Aquifers of the Blue Ridge Province in the western portion of North Carolina. An aquifer is an underground layer of porous rock or gravel that serves as a natural storage tank for water. The Surficial Aquifer is used throughout North Carolina for individual home wells, which are up to three feet in diameter and sixty feet deep. Due to its proximity to the surface and lack of a confined layer, the Surficial Aquifer is the most sensitive to pollution and contamination. The Fractured Bedrock Aquifer is widely used by home well users as well as small industrial and municipal users for water supply. Fractured bedrock aquifers are breaks or "fractures" in the bedrock that were created when the Appalachian Mountains were formed, and are capable of storing water collected from rain percolating down from the surface. Six-inch wells are drilled to intercept these water-bearing fractures commonly found in the valleys or draws in the vicinity of the study area.

The NCDENR DWR has established a groundwater resources monitoring well network consisting of 186 water quality monitoring stations and 563 wells to assess North Carolina's water supply and ensure that residents have an adequate water supply; 23 of these wells are located in the Piedmont and Blue Ridge Provinces, while the remaining 540 are located in the Coastal Plain Provinces. No wells or stations are located in either Buncombe County or Henderson County. The closest station is located in Polk County approximately 30 miles southeast of the study area. Due to this, the groundwater quality at the Airport is unknown at this time. Information from the EPA does not identify whether sole-source aquifers are present within the study area.

6.14.b Surface Water

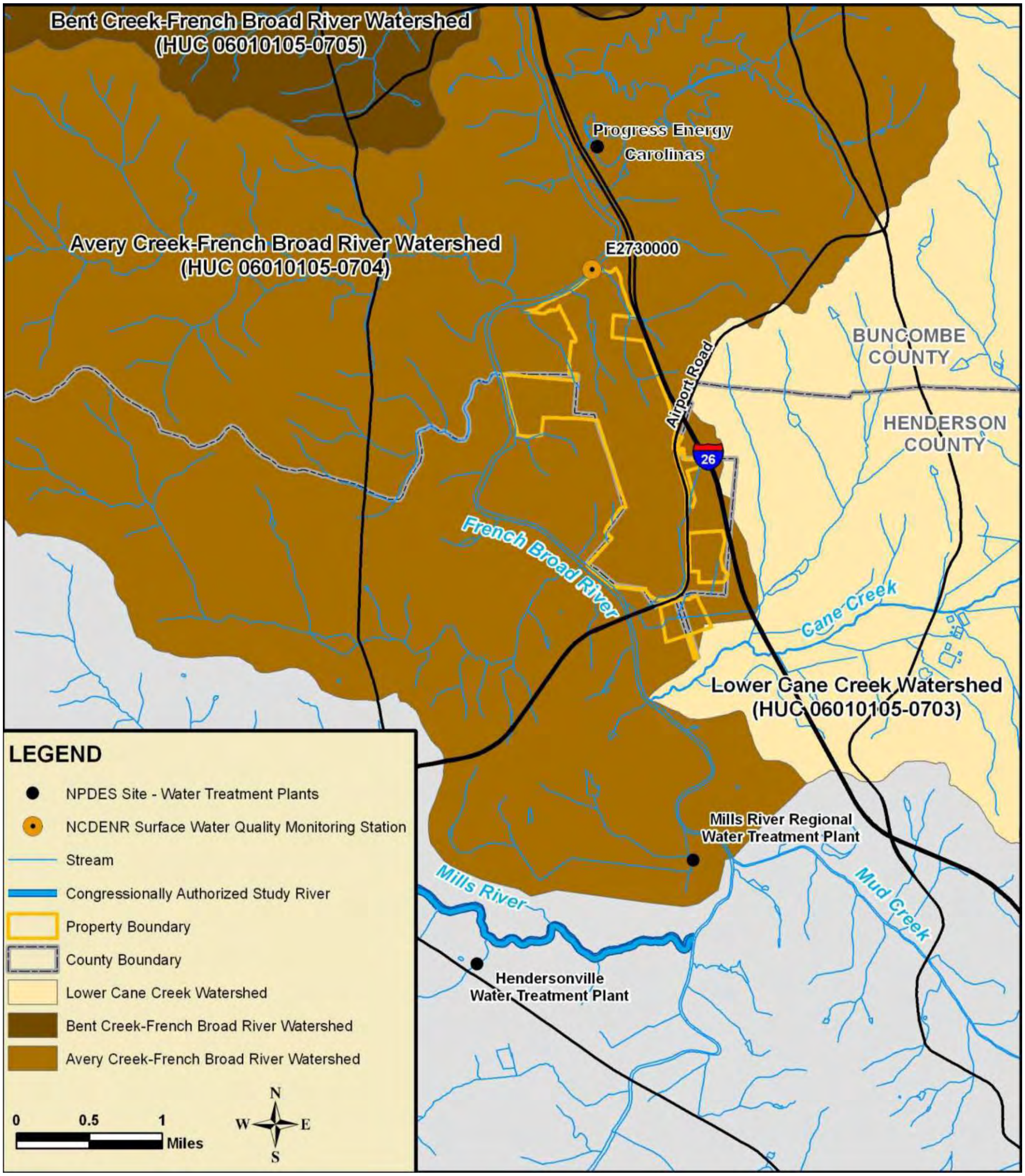
The predominant body of surface water in the vicinity of the Airport is the French Broad River, which forms a portion of the property boundary to the northwest and has several unnamed tributaries that flow through Airport property. The property boundary of the Airport is located almost entirely within the Avery Creek – French Broad River sub-watershed with only a small portion to the southeast located in the Lower Cane Creek sub-watershed. Both sub-watersheds are contained by the Cane-Creek French Broad River Watershed within the larger French Broad River Basin as illustrated in **Figure 6-7**. The Cane Creek watershed unit covers approximately 153.8 square miles of which approximately 15,610 linear feet is located on the Airport, and includes surface water comprised of various channels and wetlands.

Unnamed tributaries on the Airport hold the same stream classification as the named tributary into which they flow. The French Broad River is classified as a Class "B" water by the NCDENR DWQ which is protected for recreation, including frequent or organized swimming and other uses suitable for Class "C" waters. Discharges and sources of water pollution that preclude any of these uses on either a short-term or long-term basis shall be considered to be a violation of water quality standards.

Under the CWA, states are required to record the condition of surface waters in their respective jurisdictions through Section 305(b) and Section 303(d) documentation. Section 305(b) documentation serves to evaluate the extent to which surface waters are supporting their designated uses for categories such as drinking water supply, aquatic life, recreational use, and fish consumption. The NCDENR produces a Basinwide Assessment Report (BAR) to meet the requirement under Section 305(b), publishing an updated BAR every five years for each basin in the state. The most recent draft BAR for the French Broad River Basin was published in 2010.

The Section 303(d) documentation is a comprehensive list of water bodies that do not support their designated use classifications and are considered impaired. The NCDENR develops a priority list of water bodies pursuant to Section 303(d) of the CWA and in accordance with 40 CFR §130.7. The North Carolina Section 303(d) List, published in 2010, lists the water bodies that do not meet state water quality standards after the application of required controls for point and non-point source pollutants. It also lists priority water bodies to which the NCDENR can direct its attention when developing required controls such as Total Maximum Daily Loads (TMDLs).

Figure 6-7: Watershed Locations



Sources: Asheville Regional Airport, Runway Reconstruction and New Parallel Taxiway Environmental Assessment, The LPA Group Aviation Consultants (August 2011)
Delta Airport Consultants, Inc. updated per information received from Asheville Regional Airport (August 2012)

Watersheds that consistently fail to meet their designated uses are required to develop TMDLs per Section 303 of the CWA. A TMDL is a calculation of the total amount of pollutant a water body can accept from point and non-point sources and still meet water quality standards. Existing and future projects or facilities discharging into a watershed with a TMDL in place must coordinate with state water quality agencies to ensure compliance with the TMDL.

The French Broad River, along with two water bodies located within five stream miles of the Airport, are on North Carolina's 2010 Section 303(d) List. These include Cane Creek located approximately 2.8 stream miles upstream from the Airport and Mud Creek located approximately 2.4 stream miles upstream from the Airport. **Table 6-7** summarizes information about the Section 303(d) impaired waters within the proximity of the Airport. No TMDLs are in place for any of the impaired water bodies within five stream miles of the Airport.

Table 6-7: 2010 Section 303(d) Impaired Waters

Name	Impairment	Use Category	First Appearance on 303(d) List	TMDL
French Broad River	Fecal Coliform	Recreation	2006	No
French Broad River	Agricultural Runoff	Aquatic Life	2002	No
Mud Creek	Agricultural/Urban Runoff, Habitat Degradation	Aquatic Life	2006	No
Cane Creek	Agricultural/Urban Runoff, Habitat Degradation	Aquatic Life	2006	No

Source: NCDENR, *NC 2010 Integrated Report Categories 4 and 5 Impaired Waters* (August 31, 2010)

Both Cane Creek and Mud Creek are on the 303(d) list and are considered impaired for aquatic life as indicated by ecological/biological integrity benthos testing. Possible sources of the impairments include runoff from agricultural fields and farming operations, as well as local habitat degradation and urban runoff. Both water bodies are tributaries of the French Broad River, which is also listed as impaired from Mud Creek to North Carolina Route 146. Each water body is classified for recreational use by level of fecal coliform contamination present and classified for aquatic life use as indicated by ecological/biological integrity benthos sampling due to agricultural runoff. A NCDENR water quality monitoring station is located just north of the Airport property boundary on the impaired portion of the French Broad River. Three tributaries of Mud Creek, including Bat Fork, Devils Fork, and Clear Creek, are also on the 303(d) list; however, these are not within five stream miles of the Airport.

In 1975, the EPA granted NCDENR the authority to administer the National Pollutant Discharge Elimination System (NPDES) permit program as outlined in Section 402 of the CWA for all point source and non-point source discharges. Point source discharges are those from a discreet source such as the wastewater from a sanitary sewer treatment facility or an industrial plant. Ten NPDES-permitted sites are located within five stream miles of the Airport, including the Mills River Regional Water Treatment Plant and Hendersonville Water Treatment Plant, both of which are located upstream along the Brandy Branch. The Progress Energy Carolinas plant is also located in proximity to the Airport to the north which is downstream along the French Broad River.

Non-point source discharges are those from diverse or unknown sources such as stormwater runoff. According to the NCDENR, no non-point source NPDES-permitted facilities are found within the boundary of the Airport.

6.14.c Stormwater

Stormwater occurs during and immediately after rain events when water flows across land surfaces. The presence of impervious surfaces such as roadways, runways, parking lots, buildings, and other hard surfaces allows stormwater to flow more quickly while picking up pollutants which then can be deposited into natural waterways such as wetlands, streams, rivers, and lakes.

Stormwater is regulated by NCDENR under the NPDES as a non-point source discharge. The NCDENR also regulates stormwater under the *North Carolina Clean Water Responsibility Act* and NCDENR regulations. The City of Asheville requires that a stormwater permit be obtained when the amount of disturbed area equals or exceeds five acres, the proposed impervious area equals or exceeds 50 percent of the development property, or 5,000 square feet or more of impervious surface is being added to an existing development.

The Airport completed its Stormwater Pollution Prevention Plan (SWPPP) in January 2011 which specified actions to be taken to control and monitor stormwater. Any development action at the Airport automatically triggers a review of the SWPPP to determine if revisions need to be made. Actions likely to require revisions to the SWPPP include, but are not be limited to, those that change the location or size of the discharge outfalls, that require any changes to the location or capacity of fuel farms, or that significantly increase an impervious surface that significantly increases the volume and/or velocity of stormwater runoff. Currently, all runoff from the runway and taxiways is treated through grassed waterways adjacent to the runway and taxiways. The grassed waterways filter the runoff before it is collected through various outfalls to the French Broad River.

As part of the SWPPP, the Airport has a Spill Prevention, Control, and Countermeasures (SPCC) plan that specifies actions to be taken in the event of an accidental release of hazardous material and/or hazardous wastes. Compliance with this plan helps prevent contamination of stormwater as required by the SWPPP. The SPCC Plan is reviewed annually to determine if there are changes that would require revisions.

6.15 Wetlands

Wetlands are defined in Executive Order 11990 as areas that are inundated by surface or ground water with a frequency sufficient to support under normal circumstances a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds. Wetlands also include estuarine areas, tidal overflows, and shallow lakes and ponds with emergent vegetation. Furthermore, the wetlands ecosystem includes those areas that affect or are affected by the wetland itself, such as adjacent uplands or regions upstream and downstream of the wetland area. Those areas that are covered with water for a short period of time (where there is no effect on moist soil vegetation) are not included within the definition of wetlands nor are the permanent waters of streams, reservations, and deep lakes.

6.15.a Identification and Classification

On-site wetland delineations were performed for the majority of the Airport property in November and December of 2009 as well as in April, November, and December of 2010 during the preparation of the 2011 EA. Wetlands around the proximity of the Airport were identified on the basis of soils, hydrology, and vegetation as set forth by the *1987 Corps of Engineers Wetlands Delineation Manual.* The jurisdictional areas identified on Airport property are depicted in **Figure 6-4.** These areas were determined by the COE in a Jurisdictional Determination (JD) issued on February 9, 2011.

Wetlands identified on site include areas within the presence of three criteria as outlined in the *Corps of Engineers Wetlands Delineation Manual*: the presence of hydric soil, hydrophytic vegetation, and evidence of wetland hydrology and connectivity. Forested, shrub scrub (dominated by woody vegetation less than 20 feet in height), and herbaceous wetlands also exist within wetlands found on the Airport. Approximately 5.2 acres of wetlands were delineated on Airport property. This acreage is in addition to the two National Wetland Inventory (NWI) wetland areas (totaling 13.8 acres) that were identified on the southwestern portion of Airport property that was not delineated as illustrated in **Figure 6-4**.

6.15.b Jurisdictional Streams

Channel determinations are based primarily on the definition of “waters of the US” found in 33 CFR 328. The jurisdictional extent is considered the upper limits of the ordinary high water mark (OHWM) as identified in the field. The COE District Office has provided additional regional guidance for jurisdictional designations on drainage features. Only those channels with adequate groundwater discharge to maintain intermittent or perennial flow are found to be jurisdictional.

Drainage features that exhibited an OHWM during the field investigations are considered to be U.S. jurisdictional waters and are included in **Figure 6-4**. Streams within or adjacent to the Airport include the French Broad River and unnamed intermittent and perennial tributaries. There are approximately 16,766 linear feet of streams on airport property, all of which originate in close proximity to the toe-of-slope of existing development that are impacted by sediment flow.

6.16 Summary

An environmental inventory of Airport property was conducted in accordance with FAA Order 1050.1E, *Airport Environmental Handbook*, to document the Airport’s existing environmental conditions. Existing conditions were based upon information contained in the 2011 Runway Reconstruction and New Parallel Taxiway EA. The EA documented both existing conditions and impacts to each category based upon the proposed development and a Finding of No Significant Impact was received, dated August 19, 2011 (see Appendix B).

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Chapter 7
Capital Improvement Plan

Implementation of the recommended alternatives is guided by a Capital Improvement Plan (CIP) that establishes a timeline and cost estimate for each planned improvement. CIPs help identify the level of financial, staffing, and scheduling resources needed for each improvement while organizing the timing of necessary preliminary projects such as design plans, land acquisitions, and environmental reviews. CIPs also help illustrate the capital needs of an airport, assisting the funding allocation decisions of federal, state, and local officials.

The CIP prepared for the Asheville Regional Airport (Airport) outlining projects identified in this Master Plan is contained in the Fiscal Year 2013-2032 Capital Improvement Plan and is presented in this Chapter in the following sections:

7.1 Capital Improvement Plans

CIPs summarize the short-, medium-, and long-term development plans of an airport, outlining infrastructure improvement projects such as runway and taxiway extensions, operational needs such as pavement rehabilitations, and equipment purchases such as Aircraft Rescue and Fire Fighting (ARFF) and snow removal equipment (SRE) vehicles. Typically covering a 20-year planning period, CIPs include the capital needs associated with each proposed project and are updated regularly based on changing conditions and priorities. CIPs must also be coordinated with projects identified in master plans and Airport Layout Plans (ALPs) and include projects both eligible and ineligible to receive federal funding. Projects eligible to receive federal funding from the Airport Improvement Program (AIP) must be identified on an airport's CIP as this source of information updates the Federal Aviation Administration (FAA) database used in awarding funds. In addition to projecting the level of financial resources needed for each proposed project, CIPs also help balance scheduling conflicts, identify timelines for environmental review requirements, and address property needs such as leases, easements, and land acquisitions.

7.2 Estimated Costs for Future Development

As summarized in **Table 7-1**, nearly $200 million in improvement projects, equipment purchases, and planning initiatives are listed on the Airport's CIP over the next 20 years with a breakdown of the funding share for each project also included. There are also a number of privately-funded and FAA-funded projects included in the summary. Projects are listed chronologically based upon priority and grouped by short-term (2013-2017), mid-term (2018-2022), and long-term (2023-2032) needs.

It should be noted that AIP funds typically account for 90 percent of eligible projects while the remaining 10 percent of costs are the responsibility of an airport sponsor. North Carolina provides a fixed amount of dollars each year to commercial service airports which can be used to help meet this local share of AIP-eligible projects. North Carolina's "State Aid to Airports" program may also offer funding support for a variety of non-AIP-eligible projects. It is assumed for some cost estimates in the table that five percent of the local share will come from state aid, while the remaining five percent will come from local funding sources. It is also assumed in the short term (2013-2017) that state aid totaling $600,000 per year will be available from NCDOT Division of Aviation funds to complete the ARFF station project and the airfield improvement program.

Significant investment ($71.1 million) is planned during the short-term to address Airport needs through 2017. The most significant use of funds will go toward airfield improvements to relocate the runway so that increased separation can be obtained between its parallel taxiway to meet current FAA design standards. Other improvements during this period include the new ARFF facility and a few equipment purchases to update and maintain the Airport's vehicle fleet.

Mid- and long-term projects planned after 2017 are more susceptible to changing priorities and needs and could see the time frame of their implementation adjusted based on varying factors. Significant projects within these periods include a parking expansion, the rehabilitation of Taxiway A, site development of the north general aviation (GA) area, and terminal building and apron expansions.

Table 7-1: Capital Improvement Plan Summary

Year	Project	Total Cost	AIP Eligible	FAA Entitlement	FAA Discretionary	NC DOT	PFC	Airport Authority	Other
				Potential Funding Sources					
Short-term Improvements (2013-2017)									
2013	ARFF Facility	$ 4,534,750	Yes	$ 2,933,979	$ -	$ 1,300,000	$ 300,771	$ -	$ -
	Airfield Improvements Program - Phase I (Design)	$ 2,340,195	Yes	$ 560,000	$ 1,260,000	$ -	$ 520,195	$ -	$ -
	Total 2013	**$ 6,874,945**		**$ 3,493,979**	**$ 1,260,000**	**$ 1,300,000**	**$ 820,966**	**$ -**	**$ -**
2014	Airfield Improvements Program - Phase II Taxiway (Sitework/Utilities)	$ 10,485,000	Yes	$ 2,725,339	$ 5,774,661	$ 600,000	$ 1,385,000	$ -	$ -
	Terminal Rood Replacement (Phase I)	$ 244,300	No	$ -	$ -	$ -	$ 244,300	$ -	$ -
	Aviation Way/Terminal Drive Airport Entrance Redesign	$0*	No	*NCDOT project as a part of the NC-280/I-26 Interchange Redesign*					
	Total 2014	**$ 10,729,300**		**$ 2,725,339**	**$ 5,774,661**	**$ 600,000**	**$ 1,629,300**	**$ -**	**$ -**
2015	Airfield Improvements Program - Phase III Taxiawy (Paving/Electrical)	$ 13,397,284	Yes	$ 2,000,000	$ 6,500,000	$ 600,000	$ 4,297,284	$ -	$ -
	Total 2015	**$ 13,397,284**		**$ 2,000,000**	**$ 6,500,000**	**$ 600,000**	**$ 4,297,284**	**$ -**	**$ -**
2016	Airfield Improvements Program - Phase IV Runway (Sitework/Utilities)	$ 20,047,250	Yes	$ 2,000,000	$ 13,000,000	$ 600,000	$ 4,447,250	$ -	$ -
	ARFF Truck	$ 1,000,000	Yes	$ -	$ 574,750	$ -	$ -	$ 425,250	$ -
	Snow Removal Equipment - Broom and Blower	$ 1,300,000	Yes	$ 900,000	$ -	$ -	$ -	$ 400,000	$ -
	Total 2016	**$ 22,347,250**		**$ 2,900,000**	**$ 13,574,750**	**$ 600,000**	**$ 4,447,250**	**$ 825,250**	**$ -**
2017	Airfield Improvements Program - Phase V Runway (Paving/Electrical)	$ 17,405,216	Yes	$ 2,000,000	$ 13,000,000	$ 600,000	$ 1,805,216		
	Snow Removal Equipment - Plow Trucks	$ 333,333	Yes	$ 300,000		$ -	$ -	$ 33,333	
	Total 2017	**$ 17,738,549**		**$ 2,300,000**	**$ 13,000,000**	**$ 600,000**	**$ 1,805,216**	**$ 33,333**	**$ -**
	Total Short-term Improvements	**$ 71,087,328**		**$13,419,318**	**$ 40,109,411**	**$ 3,700,000**	**$13,000,016**	**$ 858,583**	**$ -**
	Projected Available Funding			**$14,485,578**			**$ 8,128,248**		
Mid-Term Improvements (2018-2022)									
	Commercial Vehicle Curbfront Improvements w/ Ped. Canopies	$ 3,500,000	Yes	$ 1,200,000	$ -	$ -	$ 1,500,000	$ 800,000	$ -
	Wright Brothers Way Road Extension	$ 3,000,000	Yes	$ 1,000,000	$ -	$ 300,000	$ 1,374,750	$ 325,250	$ -
	Ready/Return Lot Expansion & Improvements	$ 1,000,000	No	$ -	$ -	$ -	$ -	$ -	$ 1,000,000 [1]
	Parking Expansion & Improvements (Garage or Remote Lot)	$ 13,800,000	No	$ -	$ -	$ -	$ -	$13,800,000	$ -
	Taxiway A Rehabilitation & Improvements/Shoulders	$ 12,300,000	Yes	$ 5,000,000	$ 6,070,000	$ 615,000	$ 615,000	$ -	$ -
	Parking Lot Rehabilitation (Lower public and lower employee lots)	$ 1,000,000	No	$ -	$ -	$ -	$ -	$ 1,000,000	$ -
	ASOS Relocation (FAA funded or part of Airfield Improvements Program)	$ 400,000	No	$ -	$ -	$ -	$ -	$ -	$ 400,000 [2]
	Terminal Drive/NC280 Intersection Improvements (Right Turn Lane)	$ 150,000	Yes	$ 135,000	$ -	$ 7,500	$ 7,500	$ -	$ -
	North General Aviation Site Development	$ 9,900,000	Yes	$ 4,255,000	$ 3,150,000	$ 495,000	$ 2,000,000	$ -	$ -
	Box Hangars (20,000 Square Feet)	$ 2,200,000	No	$ -	$ -	$ -	$ -	$ -	$ 2,200,000 [3]
	9-Unit T-Hangar	$ 400,000	No	$ -	$ -	$ -	$ -	$ -	$ 400,000 [3]
	Roadway Improvements and Rehabilitation	$ 5,000,000	Yes	$ 4,500,000	$ -	$ 250,000	$ 250,000	$ -	$ -
	Security System Improvements	$ 3,000,000	Yes	$ -	$ -	$ -	$ 3,000,000	$ -	$ -
	ARFF Truck	$ 1,200,000	Yes	$ -	$ -	$ -	$ 1,200,000	$ -	$ -
	Terminal Apron Rehabiliation/Repairs	$ 950,000	Yes	$ -	$ -	$ -	$ 950,000	$ -	$ -
	Total Mid-term Improvements	**$ 57,800,000**		**$16,090,000**	**$ 9,220,000**	**$ 1,667,500**	**$10,897,250**	**$15,925,250**	**$ 4,000,000**
	Projected Available Funding			**$15,139,283**			**$ 8,824,377**		
Long-term Improvements (2023-2032)									
	Terminal Expansion (Boarding Gates & Terminal Building)	$ 14,720,000	Yes	$ 6,000,000	$ -	$ 736,000	$ 7,984,000	$ -	$ -
	Terminal Apron Expansion - North	$ 2,180,000	Yes	$ 1,962,000	$ -	$ 109,000	$ 109,000	$ -	$ -
	Master Plan Update	$ 1,000,000	Yes	$ 900,000	$ -	$ 50,000	$ 50,000	$ -	$ -
	Parking Lot Rehabilitation (Upper public and rental lots)	$ 1,100,000	No	$ -	$ -	$ -	$ -	$ 1,100,000	$ -
	Fleet Vehicle Replacement	$ 200,000	Yes	$ 180,000	$ -	$ 10,000	$ 10,000	$ -	$ -
	ARFF Apron Rehabilitation	$ 600,000	Yes	$ 540,000	$ -	$ 30,000	$ 30,000	$ -	$ -
	GA Apron and Taxilanes Pavement Rehabilitation	$ 6,700,000	Yes	$ 6,030,000	$ -	$ 335,000	$ 335,000	$ -	$ -
	Maintenance Facility Improvements	$ 4,000,000	Yes	$ 3,600,000	$ -	$ 200,000	$ 200,000	$ -	$ -
	Heavy Equipment Replacement	$ 1,000,000	Yes	$ 900,000	$ -	$ 50,000	$ 50,000	$ -	$ -
	Air Traffic Control Tower Relocation	$ 8,000,000	No	$ -	$ -	$ -	$ -	$ -	$ 8,000,000 [2]
	Fuel Farm	$ 1,500,000	No	$ -	$ -	$ -	$ -	$ -	$ 1,500,000 [3]
	Terminal Apron Expansion - South	$ 7,000,000	Yes	$ 6,300,000	$ -	$ 350,000	$ 350,000	$ -	$ -
	Box Hangars (32,000 Square Feet)	$ 3,520,000	No	$ -	$ -	$ -	$ -	$ -	$ 3,520,000 [3]
	9-Unit T-Hangar	$ 400,000	No	$ -	$ -	$ -	$ -	$ -	$ 400,000 [3]
	Parking Expansion & Improvements (Garage or Remote Lot)	$ 13,800,000	No	$ -	$ -	$ -	$ -	$13,800,000	$ -
	Total Long-term Improvements	**$ 65,720,000**		**$26,412,000**	**$ -**	**$ 1,870,000**	**$ 9,118,000**	**$14,900,000**	**$13,420,000**
	Projected Available Funding			**$33,269,616**			**$19,996,497**		

Notes [1]Customer Facility Charge (CFC)
[2]FAA funded project
[3]Privately funded project
This CIP is subject to revision and is to be updated regularly by the Airport

Source: Asheville Regional Airport, Mead & Hunt, Delta Airport Consultants

7.3 Funding Resources

Several funding resources are available to accommodate the capital demands of the Airport to implement projects listed in their CIP plan. These funding sources range from federal and state programs to local mechanisms based on Airport revenue and number of transactions conducted by tenants. The following section reviews these resources and identifies projects included in the CIP plan that are eligible to receive funding from each.

7.3.a Airport Improvement Program

AIP was created by the Airport and Airway Improvement Act of 1982 and is administered by the FAA. Federal funding set aside for this program is distributed for eligible non-revenue producing projects at an airport, including planning, airfield construction and navigational equipment, navigational aids (NAVAIDs), and environmental mitigation. AIP funds are distributed to different categories of public-use airports owned by public entities that are included in the National Plan of Integrated Airport Systems (NPIAS), with some exceptions made for public use airports under private ownership identified in the NPIAS.

Airports supporting commercial airline service are classified as Primary (over 10,000 enplanements) or Non-Primary (from 2,500 up to 10,000 enplanements) based on the number of annual enplanements. Primary commercial service airports are further classified based on the percentage of annual passenger enplanements in comparison with all passenger enplanements that occur annually at airports in the U.S. Since the Airport boards more than 10,000 passengers annually but accounts for less than 0.05 percent of all annual enplanements in the United States it is categorized as a non-hub primary airport. Both entitlement and discretionary AIP funds are available to Primary non-hub airports with entitlement amounts awarded based on the level of annual enplanements and discretionary amounts awarded on a project-by-project basis.

Utilization of this funding source can be applied to most of the projects identified on the CIP plan, most notably those that require a significant amount of capital such as the ARFF facility and airfield improvements program. Longer-term capital needs requiring a significant amount of funds will also benefit from this program such as taxiway rehabilitation, general aviation site development, terminal facilities expansions and others.

7.3.b State of North Carolina Funding Assistance

"State Aid to Airports" is the basic airport aid program of the North Carolina Department of Transportation (NCDOT). Under the terms of North Carolina General Statutes Chapter 63, the Department of Transportation is authorized to provide State aid in the forms of loans and grants to cities, counties, and public airport authorities for the purpose of planning, acquiring, constructing, or improving municipal, county and other publicly owned or controlled airport facilities, and to authorize related programs of aviation safety, promotions, and long-range planning.

The "State Aid to Airports" program provides state funds on a local matching formula basis. All North Carolina airports meeting the eligibility standards are eligible for state funds ranging from 50 percent of the non-federal share of eligible project costs to 100 percent of the non-federal share of eligible project costs. The final share is stipulated by the NCDOT and depends upon the size of the airport, the location of the airport and the category of project.

In addition to utilizing State funding to meet the required local share on Federal AIP grants, funds available from State program could also help finance pavement preservation and airfield safety projects identified on the CIP.

7.3.c Passenger Facility Charges

Passenger Facility Charges (PFCs) allow an airport to collect a fee from each enplaned passenger to help fund projects that preserve or enhance safety, security, and capacity; reduce the impacts of aircraft noise; or provide enhanced competition between air carriers. This funding mechanism helps an airport raise local funds for improvement projects that can be used in conjunction with other federal and state resources. Currently, federal regulations allow an airport to collect a PFC fee up to $4.50 per enplaned passenger.

Fees collected from PFCs for each enplaned passenger at the Airport could be applied to safety and security improvement projects included on the CIP. In addition to helping the Airport meet the local share necessary to receive federal funding for the Airfield Improvements Program, PFCs could help finance most projects listed on the CIP including the acquisition of a new ARFF vehicle and de-icing area modifications to accommodate additional aircraft. An increase in the $4.50 limit per enplaned passenger (which is being discussed by industry and government officials) would benefit the Airport as additional local funds could be generated for improvement projects.

7.3.d Customer Facility Charges

Customer Facility Charges (CFCs) are a local source of revenue set forth by an agreement with an airport and rental car concessionaires to collect a fee from rental car transactions to help finance the construction of car rental infrastructure such as service facilities and parking facilities. The level of these fees vary based upon an agreed level between the Airport and rental car concessionaires with method of collection ranging from a per transaction basis or a per transaction day basis. CFCs are not subject to federal or state requirements limiting the application of their use, or the fee amount that can be placed on a rental car transaction.

CFCs were used to fund the construction of the rental car service facilities located to the south of the terminal building, and are a likely source of funding for other rental related facilities such as ready/return lot expansion and other improvements for the rental car concessionaires

7.3.e Additional Airport Financing Sources

Revenue earned from other Airport funding sources that help finance the day-to-day operations of the Airport could also be utilized for improvement projects listed on the CIP. These sources of revenue include rents from commercial air carriers, concessionaires, Fixed Based Operators (FBOs), and hangar tenants; landing fees collected from aircraft operations; and automobile parking charges. Funds raised from these sources are not subject to federal or State requirements limiting their applicability and can be utilized to fund all improvement projects at the Airport.

Revenue available from these sources is most beneficial for projects that are not eligible to receive federal or state funding or are only able to take advantage of a limited portion of federal or state funds that are available. Funding gaps experienced in other improvement projects, such as the ability of PFCs and CFCs to meet the required local match, could also benefit from revenue earned through these additional resources. Projects on the Airport's CIP most likely to benefit from these additional funding sources, either because of ineligibility for federal or state funding or limited available funds, include the expansion and improvements of the Airport's revenue parking lots.

7.4 Summary

Development of a CIP allows an Airport to create an implementation schedule addressing the timing of future capital needs for proposed infrastructure improvements. In addition to identifying the level of financial, staffing, and scheduling resources needed for each improvement project, CIPs help demonstrate the short-, mid-, and long-term financial needs of an airport to federal, state, and local officials. Several funding resources made available through federal and State of North Carolina programs or local mechanisms such as PFCs and CFCs are available to assist the Airport in raising the necessary capital for each improvement project. Periodic updates of the CIP to reflect changing demands and priorities throughout the planning period will position the Airport well to continually meet the aviation demands of western North Carolina.

Asheville REGIONAL AIRPORT Master Plan Update

Chapter 8
Financial Analysis

This chapter analyzes the capacity of the Greater Asheville Regional Airport Authority (Authority) to undertake the recommended short-term capital improvement plan (CIP) described in Chapter 7 of this report for Fiscal Years (FY) 2013-2017. The primary objective of this short-term plan is to complete a multi-year phased construction program designed to provide a runway and taxiway system configuration for the Asheville Regional Airport (Airport) that conforms to current Federal Aviation Administration (FAA) design and safety standards. It is further envisioned that during this period a new Aircraft Rescue and Firefighting (ARFF) facility will be constructed and additional snow removal equipment (SRE) and a replacement ARFF vehicle will be purchased. These projects will require approximately $71.1 million in federal, state, Authority, and Passenger Facility Charge (PFC) funds to complete. The following funding sources detailed in **Table 8-1** are preliminarily programmed at this time to finance this short-term phase of the Master Plan as more fully described later in this chapter:

Table 8-1: Short-Term CIP Proposed Funding Sources

Funding Source	Amount	Percent of Total
FAA Discretionary	$ 40,109,411	56.4%
FAA Entitlement	$ 13,419,318	18.9%
North Carolina Department of Transportation	$ 3,700,000	5.2%
Passenger Facility Charges	$ 13,000,016	18.3%
Airport Funds	$ 858,583	1.2%
TOTAL	**$ 71,087,328**	**100.0%**

Source: Greater Asheville Regional Airport Authority
Table 7-1, Asheville Regional Airport Master Plan Update (2013)

Of equal importance to the Authority's ability to garner sufficient funding to complete this capital program is the need to understand its capability to generate sufficient revenues to fund ongoing operations and obligations. To this end, this chapter includes an analysis of historical and forecasted operating revenues and expenditures for the Authority.

In the context of examining both the proposed development plan and operating capacity of the Authority, the following factors were considered in developing this financial feasibility analysis:

- Projections of enplaned passengers as presented in Chapter Two coupled with actual enplanement data for the period FY 2010-2012 to derive estimated FAA Airport Improvement Program (AIP) entitlements and PFC revenues required to complete the program.
- A funding plan for the five year capital improvement plan utilizing FAA AIP entitlement and discretionary funds as well as the North Carolina Department of Transportation (NCDOT) Division of Aviation State Aid to Airports Program resources; PFC revenues; and Authority funds.
- The financial structure of the Airport and its agreements with airlines and other major tenants.
- Actual revenues and expenses for the period FY 2007 through FY 2012.
- Estimated actual revenues and expenses for the Airport for FY 2013.
- Preliminary budgeted revenues and expenses for the Airport for FY 2014.
- Projections of revenues, expenses, and net cash flows from the operation of the Airport between FY 2015 through FY 2018 based on historical actual (FY 2007–2012), estimated actual (FY 2013), and the Authority's preliminary budget for FY2014.
- A cash flow analysis for the planning period FY 2015 through FY 2018 identifying the sources and uses of funds applied to the CIP.

The techniques utilized in this analysis are consistent with industry practices for similar studies which are used to evaluate the feasibility of large-scale capital improvement plans. While it is believed that the approach and assumptions are reasonable, it should be recognized that some assumptions regarding future trends and events might not materialize. Achievement of the proposed capital improvement plan as well as the operating results described herein is dependent upon the occurrences of future events and variations may be material.

8.1 Capital Improvement Plan

All airports receiving federal AIP funding are required to maintain a current CIP with the FAA which identifies projects to be undertaken at an airport over a specified period of time. This plan further estimates the order of implementation as well as calculates total project costs and funding sources.

The recommended short-term CIP and its corresponding cost estimates are based on a planning level of detail and are presented in **Table 8-2**, Capital Improvement Plan. The projects and cost estimates presented in this plan reflect data contained in Chapter 7 of this report. While accurate for master planning purposes, actual project costs will likely vary from these planning estimates once project design and engineering estimates are developed. Costs shown are based on current year (2013) construction dollar values and also include contingencies, design, and construction management costs. Airport staff analyzed each project for AIP, NCDOT Division of Aviation, and PFC funding eligibility and has projected known amounts available from these sources at this point in time to complete the projects described herein. It incorporates all projects recommended as part of this Master Plan Update for the short-term planning horizon (FY 2013-2017) and includes projects currently addressed in the Airport's existing CIP and PFC application 11-05-C-00-AVL as approved by the FAA in April 2011.

Table 8-2: Capital Improvement Plan

Year	Project	Total Cost	Projected Funding Sources: FAA* Entitlement	FAA* Discretionary	NCDOT	PFC	Airport Authority
2013	ARFF Facility	$4,534,750	$2,933,979	$0	$1,300,000	$300,771	$0
	Airfield Improvements Program – Phase I (design)	$2,340,195	$560,000	$1,260,000	$0	$520,190	$0
	Year 2013 Total Project Costs	**$6,874,945**	**$3,493,979**	**$1,260,000**	**$1,300,000**	**$820,966**	**$0**
2014	Airfield Improvements Program – Phase II (taxiway sitework/utilities)	$10,485,000	$2,725,339	$5,774,661	$600,000	$1,385,000	$0
	Terminal Road Replacement (Phase I)	$244,300	$0	$0	$0	$244,300	$0
	Aviation Way/Terminal Drive Airport Entrance Redesign**	$0	$0	$0	$0	$0	$0
	Year 2014 Total Project Costs	**$10,729,300**	**$2,725,339**	**$5,774,661**	**$600,000**	**$1,629,300**	**$0**
2015	Airfield Improvements Program – Phase III (taxiway paving/electrical)	$13,397,284	$2,000,000	$6,500,000	$600,000	$4,297,284	$0
	Year 2015 Total Project Costs	**$13,397,284**	**$2,000,000**	**$6,500,000**	**$600,000**	**$4,297,284**	**$0**
2016	Airfield Improvements Program – Phase IV (runway sitework/utilities)	$20,047,250	$2,000,000	$13,000,000	$600,000	$4,447,250	$0
	ARFF truck	$1,000,000	$0	$574,750	$0	$0	$425,250
	Snow Removal Equipment – Broom and Blower	$1,300,000	$900,000	$0	$0	$0	$400,000
	Year 2016 Total Project Costs	**$22,347,250**	**$2,900,000**	**$13,574,750**	**$600,000**	**$4,447,250**	**$825,250**
2017	Airfield Improvements Project – Phase V (runway paving/electrical)	$17,405,216	$2,000,000	$13,000,000	$600,000	$1,805,216	$0
	Snow Removal Equipment – Plow Trucks	$333,333	$300,000	$0	$0	$0	$33,333
	Year 2017 Total Project Costs	**$17,738,549**	**$2,300,000**	**$13,000,000**	**$600,000**	**$1,805,216**	**$33,333**
	TOTAL PROJECT COSTS FY 2013 - 2017	**$71,087,328**	**$13,419,318**	**$40,109,411**	**$3,700,000**	**$13,000,016**	**$858,583**

Notes: *FY 2013 $1.519 million in prior entitlements are to be carried forward for FY 2013 projects.
**It is assumed the NCDOT will fund improvements to the Airport entrance redesign as a part of the NC-280/I-26 interchange redesign project.

Sources: Greater Asheville Regional Airport Authority
Delta Airport Consultants, Inc.
FAA PFC Record of Decision letter dated April 21, 2011

As presented in **Table 8-2**, the overall funding strategy for the completion of the Airport's five-year (FY 2013-2017) Airport Development Program is based on a phased approach to accomplish all necessary construction and equipment acquisition program elements. It is important to note that these estimates represent the amount of project costs that are currently believed to be available from the FAA, state, PFC revenues, and the Authority; not necessarily the level at which projects included in the program will ultimately be funded by these sources or eligible for grant-in-aid support. The FAA has informed the Airport that it intends to provide the level of discretionary funding recommended in this plan; however, given that the AIP is subject to annual Congressional appropriation, the FAA is not capable of fully committing to the total allocation of this sum.

FAA funding participation in the proposed plan is based on the AIP as reauthorized in 2012. To this end, this analysis assumes continuance of AIP and PFC funding through the planning period absent major changes to appropriation levels by Congress. However, in the past, the AIP has experienced fluctuations in levels of funding and interruptions in availability of resources. Despite historical fluctuations in authorized appropriations and current potential threats to existing funding levels, the controlling objectives of this proposed plan are to maximize the use of resources from the AIP and PFC revenues and to minimize costs to the Airport. The Authority currently has available $1.3 million in NCDOT Division of Aviation funds to complete the ARFF station project and is programming $600,000 per year in state aid going forward for the airfield improvement program.

8.1.a Federal AIP Grants

Table 8-3, Projected Airport Entitlement Funds and Passenger Facility Charge Revenue, compares and contrasts forecasts of FAA Entitlement funds against programmed allocations during the period FY 2013-2017. The forecast presented in this table reflects actual enplanements during the period 2010-2012, Airport estimates for 2013-14, and forecasted enplanements for the period 2015-2017 assuming a 1.7 percent growth rate during this two-year period. The forecast entitlement funds presented in the table also indicates the availability of $14.1 million in resources for the period compared to $13.4 million in programmed funds. Given the uncertainty surrounding future funding of AIP and passenger enplanement levels, it is prudent to utilize programmed funding levels in lieu of forecast estimates. However, in doing so, it is important to recognize that the Airport's PFC program and/or Airport Authority funds will be required to underwrite the $0.72 million variance in these amounts since no additional FAA discretionary or NCDOT Division of Aviation funding appears available at this time. It is also worth noting that the Airport is also utilizing prior-year unencumbered FAA entitlement funds totaling $1,519,318 to provide the total $13.4 million required from this funding source for its program. These "carryover" funds are available for the Airport's use because projects undertaken in previous fiscal years did not require use of all allocated entitlement funds. FAA policy allows an airport sponsor to rollover these available balances into subsequent years to complete its approved CIP.

Table 8-3: Projected Airport Entitlement Funds						
Fiscal Year	Projected Enplanements	Forecast Entitlement Funds	Programmed Entitlement Funds	Forecast PFC Funds	Programmed PFC Funds	Total Programmed Funds
Prior Year Carryover		$1,519,318	$1,519,318			$1,519,318
2013	300,000	$2,701,795	$1,974,661	$1,185,300	$1,050,000	3,750,000
2014	320,000	$2,663,934	$2,725,339	$1,264,320	$1,150,000	3,150,000
2015	325,440	$2,340,000	$2,000,000	$1,285,813	$1,169,550	3,169,550
2016	330,972	$2,444,000	$2,900,000	$1,307,672	$1,189,432	4,089,432
2017	336,599	$2,472,288	$2,300,000	$1,329,903	$1,209,653	3,209,653
2018	342,321			$1,352,511	$1,230,217	1,230,217
2019	348,141			$1,375,504	$1,251,130	1,251,130
2020	354,059			$1,398,887	$1,272,400	1,272,400
2021	360,078			$1,422,668	$1,294,030	1,294,030
2022	366,199			$1,077,437	$1,316,029	1,316,029
2023	372,425			$0	$867,574	867,574
TOTAL:		**$14,141,335**	**$13,419,318**	**$13,000,016**	**$13,000,016**	**$26,419,334**

Source: Delta Airports Consultants, Inc.

The AIP program also allows for discretionary funding to be made available from the FAA to provide financial support for major capacity or safety-related projects. The Airport's CIP also anticipates FAA discretionary funds of approximately $40.1 million will be made available for this program over the next five years. The likelihood of receiving the required level of discretionary funding is considered extremely high given that the airfield improvement program is designed to provide an airport configuration that conforms to FAA safety design standards.

8.1.b North Carolina Department of Transportation

The recommended plan proposes securing $3.7 million in grant-in-aid funding from the NCDOT Division of Aviation. As previously noted the Airport currently has $1.3 million in state funds amassed from prior year allocations to complete the ARFF facility and is reasonably certain that the NCDOT Division of Aviation will provide $600,000 a year in aid to underwrite its share of the airfield program.

8.1.c Passenger Facility Charge Revenue

The FAA authorized the Airport to collect a PFC in 1994 and is currently in the midst of completing work in conjunction with its fifth application which the FAA approved in April 2011. Collectively, the Airport is authorized to impose approximately $22.8 million in PFC fees and use $20.7 million through February 2018. With its April 2011 determination, the FAA has approved $2,134,568 for impose-only authorization for the runway improvement program. For purposes of this short-term plan, the Airport is required to file with the FAA a PFC Use Application prior to utilizing dedicating funding for the airfield improvement program. The Airport is currently levying and collecting a $4.50 PFC.

During the next five years, programmed PFC collections for the Airport are projected to total $5.8 million as compared to a forecast level of $6.3 million. The variance in these estimates is a function of a more conservative "low-growth" model for the programmed scenario capturing the effects of the recent downturn in enplanements and a slower recovery period. This is in comparison to the “forecast” plan which anticipates a 1.7 percent growth pattern during the period FY 2015-2017.

Regardless of which level of PFC revenue is achieved, the $13.0 million revenue required for this plan will require the Airport to seek authorization to collect this level of funds for both its short-term plan and extend collection authorization into 2023. As noted in **Table 8-4** on the following page, a shortfall of approximately $7.2 million in forecast PFC revenue will exist in the plan on a “pay-as-you” go basis beginning in FY 2017; therefore, additional PFC impose/use authority will need to be sought into FY 2023 to provide the needed funds from this source. In addition, the Airport will need to temporarily utilize available funds or seek short-term financing to provide sufficient local funding for this plan.

The Airport is in the process of evaluating its PFC program to seek approval to amend both its impose and use authority to provide the necessary funds from this source to finance this five year plan.

8.1.d Airport Authority Funding

Airport Authority funding totaling $0.86 million is programmed for FY 2016-2017 for acquisition of an ARFF apparatus and snow removal equipment vehicles. In addition, the Authority will need to evaluate the feasibility of providing short-term funding support totaling approximately $7.2 million for the airfield improvement program to temporarily supplement PFC revenue funding for the plan. Alternatively, the Authority could choose to seek short-term financing for these resources and utilize PFC collections to retire the debt associated with this action.

8.2 Funding Plan Analysis

Table 8-4, Capital Improvement Plan Funding Analysis, depicts the required annual allocations of funding from the FAA, NCDOT Division of Aviation, PFC revenues, and Airport Authority in order to complete the short-term CIP. As previously stated, the most critical elements for the successful implementation of this plan are receipt of AIP discretionary grant-in-aid funds, additional PFC impose/use authorization, and Airport Authority funding to cover the short-term lag in PFC collections for the airfield development program. Assuming both the FAA and NCDOT Division of Aviation allocate the amount of funding requested, and additional PFC impose/use authorization is granted by the FAA, it is reasonable to assume that completion of this program is attainable within the proposed timeframe. Equally important for the Airport Authority is to examine its ability to provide the airfield development program $7.2 million to the program and utilize the additional PFC impose/use collection period to refund this sum.

Table 8-4: Capital Improvement Plan Funding Analysis								
Year	**Capital Improvement Costs**	**Required FAA Entitlements**	**Anticipated FAA Discretionary**	**Anticipated State Funds**	**Annual PFC Collections**	**Required PFC Funds**	**Annual PFC Balance**	**Airport Authority Funds**
2013	$6,874,945	$3,493,979	$1,260,000	$1,300,000	$1,050,000	$820,966	$229,034	$0
2014	$10,729,300	$2,725,339	$5,774,661	$600,000	$1,150,000	$1,629,300	($250,266)	$0
2015	$13,397,284	$2,000,000	$6,500,000	$600,000	$1,169,550	$4,297,284	($3,378,000)	$0
2016	$22,347,250	$2,900,000	$13,574,750	$600,000	$1,189,432	$4,447,250	($6,635,818)	$825,250
2017	$17,738,549	$2,300,000	$13,300,000	$600,000	$1,209,653	$1,805,217	($7,231,381)	$33,333
CIP TOTAL	**$71,087,328**	**$13,419,318**	**$40,109,411**	**$3,700,000**	**$5,768,635**	**$13,000,016**	**n/a**	**$858,583**

Source: Delta Airport Consultants, Inc.

8.3 Conclusions and Recommendations – Capital Plan

To ensure there is sufficient funding to complete the plan as detailed herein, it is recommended that the Airport undertake the following initiatives:

- Confirm the Airport's adopted CIP includes the funding required for acquisition of the ARFF and SRE apparatus in FY 2016-2017 in the amount of $0.858 million.
- Evaluate available reserves and contingency funds to determine whether sufficient capacity exists to temporarily allocate $7.2 million toward the short-term plan to provide sufficient local resources for this plan. If sufficient capacity does not exist, evaluate options for short-term financing to provide these needed funds.
- Initiate a new PFC application process in FY 2013 to enable the collection and use of an additional $7.2 million to provide resources for projects to be undertaken in FY 2014-2017. This initiative is estimated to extend the Airport's authorization to collect PFC funds from May 2017 to approximately November 2023.

8.4 Financial Structure

The Authority was established in 1980 by the provisions of Article 20 of Chapter 160A of the General Statutes of North Carolina and by the Agreement of November 29, 1979 and between the County of Buncombe and the City of Asheville. It was organized for the sole purpose of managing, operating, and maintaining of the Airport. On June 28, 2012, the General Assembly of North Carolina passed Session Law 2012-121 which changed the structure of the entity to an independent airport authority with more regional representation and governance. The law also changed the official name to the Greater Asheville Regional Airport Authority. Pursuant to the State statute, the agreement with Buncombe County and the City of Asheville is no longer applicable.

The Authority is governed by seven members: two registered voters of the County appointed by the Board of Commissioners of Buncombe County, two registered voters of the City of Asheville appointed by the City Council, two registered voters of the County of Henderson appointed by the Board of Commissioners of Henderson County, and one member appointed by the other six members of the Authority. Members of the Authority serve four-year terms and any member may serve a total of two consecutive terms, after which said member may not be reappointed to the Authority until four years after his or her most recent appointment.

The Authority employs a Managing Director (the Executive Director), who is the chief administrative and executive officer of the Authority. The Executive Director manages the Airport under the Authority's control with a staff of 60 employees. The staff is responsible for the day-to-day financial, administration, and operational matters pertaining to the Airport and for the contractual arrangements with various aeronautical and non-aeronautical businesses at the Airport. The Authority's Finance and Accounting Department acts as the fiscal agent for the Airport and is responsible for maintaining its budgetary as well as revenue and expenditure accounts. The Authority maintains discrete financial records to account for the itemized revenues and expenses of the Airport and also prepares an Annual Financial Report on the Airport's financial condition. The Authority's fiscal year runs from July through June and it utilizes the accrual basis of accounting for reporting financial results. As such, revenues are recognized when they become available and measurable and expenditures are posted when liabilities are incurred. The Authority has one Enterprise Fund for Airport operations. The daily operations of the Airport are funded through the collection of user fees such as parking receipts, rental car privilege fees, landing fees, space rental, and concessions fees.

The Authority deploys a proactive property management and lease administration program to ensure that the Airport charges market-based fees and rental rates to its users/tenants, which enables it to provide aviation services and amenities in the most cost-effective and self-sufficient basis possible. The Authority has in effect an airline lease and use agreement with scheduled airlines serving the Airport based upon a compensatory model of ratemaking. It further maintains multi-year rental car concession agreements and contracts with a firm to manage its public parking concession operation. The Authority also has in effect several agreements with firms to provide general aviation services including a long-term agreement for a full service FBO. The current airline agreement establishes landing fees, terminal building rentals, and terminal building joint use and common use fees. Air carrier tenants are presently charged $36.02/square foot per year for both exclusive and non-exclusive space for use of terminal facilities while the airline landing fee is calculated at a rate of $1.51 per thousand pounds of certified landed weight. In addition, the Authority holds a myriad of land and hangar leases and receives revenue from the operation of the public parking facility. These activities generate the majority of operating revenue for the Airport.

The purpose of this analysis is to offer the Airport a baseline evaluation of revenues and expenses over the past seven years in order to provide a framework for understanding future impacts associated with implementation of the short-term (FY 2013-2017) Master Plan CIP as well as ongoing expenditures and revenue streams. It seeks to provide on a very broad basis reasonable guidelines for matching projected financial resources with financial needs. It is not intended to serve as a true airport profit and loss statement; instead, it offers insight to emerging trends that could impact the future performance of the Airport and the affordability of the proposed CIP.

8.4.a Historical and Projected Airport Revenues

To aid this analysis as well as provide a clearer understanding of historical trends, the following broad revenue categories established by the Authority were utilized:

Airline Revenue

- Airline landing fees.
- Terminal Area – Terminal fees and rents, terminal area apron charges, loading bridge fees, and turn fees (non-scheduled airlines).

Non-Airline Revenue

- Airfield/General Aviation (GA) Revenue – Percentage fee, hangar rentals, Fixed Base Operator (FBO) land/apron rent and parcel fee, and fuel flowage fees.

- Terminal Area Concessions – Terminal space rentals (non-airline), food/beverage/gift, advertising, ground transportation fees, brochure sales, and ATM/guest services/baggage carts/ miscellaneous charges.
- Rental Cars – Rental auto concessions (MAG/fees and off airport), counter & office, ready/return, service facility, and Common Area Maintenance (CAM) fees.
- Parking Area – Public parking facility, commuter parking, and tenant employee parking.
- Other – Building leases, land leases, and other leases and fees.
- Administration – Interest income.

Table 8-5 on the following page depicts the Airport's historical operating revenues from FY 2007 through FY 2012 along with projected operating revenues for FY 2013. During this six-year period, total airport operating revenue grew from $7,313,562 in FY 2007 to an expected $8,309,941 in FY 2013, representing an increase of approximately $0.99 million translating to a two percent compounded annual growth rate (CAGR).

Table 8-5: Historic Airport Revenue

	2007	2008	2009	2010	2011	2012	Projected 2013
AIRLINE REVENUES							
LANDING AREA							
Airline Landing Fees	$523,786	$493,246	$372,404	$394,142	$477,342	$587,645	$513,204
TERMINAL AREA							
Prior Year True-Up	$0	$0	$0	$434,914	$0	$0	$0
Terminal Fees and Rents	$783,795	$846,250	$898,621	$895,228	$1,056,167	$1,066,701	$1,058,791
Terminal Area Apron Charges	$218,074	$262,826	$195,312	$241,219	$252,243	$224,988	$182,782
Turn Fees Non-Scheduled Airlines	$0	$0	$0	$0	$0	$0	$11,070
Total Airline Revenue	**$1,525,655**	**$1,602,322**	**$1,466,337**	**$1,965,503**	**$1,785,752**	**$1,879,334**	**$1,765,847**
NON-AIRLINE REVENUES							
AIRFIELD/GA REVENUE							
Percentage Fee	$444,797	$466,263	$380,104	$272,927	$191,946	$30,964	$38,324
Hangar Rentals	$160,286	$211,876	$175,832	$359,124	$403,463	$393,025	$401,832
FBO Land/Apron Rent & Parcel Fee	$0	$0	$29,403	$115,644	$235,999	$467,004	$461,491
Fuel Flowage Fees	$0	$0	$1,827	$19,658	$51,790	$64,616	$75,473
TERMINAL AREA CONCESSIONS							
Terminal Space Rentals Non-Airline	$250,300	$228,431	$173,369	$187,123	$197,462	$206,205	$208,505
Food, Beverage, Gift	$33,826	$34,906	$41,466	$57,379	$52,610	$110,572	$109,680
Advertising	$75,348	$60,836	$69,941	$54,057	$71,505	$84,107	$90,900
Ground Transportation Fees	$5,739	$12,190	$18,353	$26,680	$7,150	$37,062	$22,400
Brochure Sales	$9,611	$7,356	$7,374	$21,648	$19,333	$21,405	$24,445
ATM, Guest Services, Bag Cart, Misc.	$1,731	$5,916	$4,556	$2,931	$6,331	$4,980	$5,492
RENTAL CARS							
Rental Auto Concessions (MAG/Fees)	$1,107,917	$1,261,216	$1,116,753	$1,203,264	$1,310,500	$1,414,279	$1,447,577
Rental Auto Concessions – Off Airport	$83,725	$0	$0	$0	$29,972	$23,183	$22,164
Counter & Office	$101,114	$70,250	$126,551	$142,517	$147,514	$148,974	$169,449
Ready/Return	$42,174	$45,406	$44,110	$43,732	$45,263	$46,876	$48,518
Service Facility	$41,988	$4,873	$192,145	$202,223	$208,696	$216,128	$223,706
CAM Fee	$0	$830	$58,358	$55,391	$72,284	$75,437	$66,853
All Companies (Storage Lot)	$0	$49,633	$0	$0	$0	$0	$0
PARKING AREA							
Public Parking Facility	$2,148,207	$2,288,792	$2,307,314	$2,289,550	$2,520,421	$2,586,409	$2,400,000
Commuter Parking	$13,686	$21,674	$14,445	$14,540	$16,602	$18,852	$15,800
Tenant Employee Parking	$0	$10,010	$8,395	$10,245	$11,260	$13,075	$13,841
OTHER							
Building Leases	$104,611	$100,542	$96,486	$126,329	$122,433	$124,220	$126,372
Land Leases	$57,620	$43,861	$38,968	$28,810	$23,228	$24,723	$24,936
Other Leases & Fees	$460,706	$541,678	$513,765	$491,837	$540,331	$556,428	$516,336
ADMINISTRATION							
Interest Income	$644,521	$492,503	$112,577	$28,124	$32,230	$24,230	$30,000
Total Non-Airline Revenue	**$5,787,907**	**$5,959,042**	**$5,532,092**	**$5,753,733**	**$6,318,323**	**$6,692,484**	**$6,544,094**
TOTAL AIRPORT OPERATING REVENUE	**$7,313,562**	**$7,561,364**	**$6,998,429**	**$7,719,237**	**$8,104,075**	**$8,571,818**	**$8,309,941**
Annual Enplanements	286,775	282,538	288,941	319,692	364,843	356,098	330,000
AIRLINE COST PER ENPLANEMENT	$5.32	$5.67	$5.07	$6.15	$4.89	$5.28	$5.35

Note: CAGR = Compound Annual Growth Rate Sources: Greater Asheville Regional Airport Authority, Delta Airport Consultants, Inc.

As of FY 2013, non-airline sources of revenue are expected to account for approximately 79 percent of the Airport's revenue base. For FY 2013 it is anticipated that the primary sources of non-airline revenue for the Airport will be Parking (29.2 percent Total Revenue), Rental Cars (23.8 percent Total Revenue), and Airfield/GA Revenue (11.8 percent Total Revenue). Collectively, revenue derived from these sources is expected to provide $5,385,028 or 64.8 percent of funds to support Airport operations during the current fiscal year. These activities have historically been the largest generators of non-airline revenues. On a broader perspective, the following activities/initiatives contributed to the Airport being able to generate a compound annual growth rate of 2 percent during this period:

- The Airport entered into a new long-term FBO Operating Agreement in February 2011.
- Parking Rate changes for hourly/daily use were implemented in January 2012.
- Airline leases were renegotiated during FY 2009 to a compensatory ratemaking methodology which changed how the Authority calculates airline rents and fees.
- A five year rental car concession agreement, with an additional five year renewal option was entered into in 2008.
- Lease agreements with Advantage West/Western North Carolina Regional Economic Development and WNC Aviation were negotiated in 2009.
- A new concession contract for food/beverage/gift concessions was entered into in 2011.
- In 2010, new FAA and TSA rental agreements were negotiated.

With the exception of the food/beverage/gift concession and TSA contracts, these long term agreements are expected to provide for annual rental adjustments based upon changes in the consumer price index (CPI) or other established metric.

It is noteworthy that the Airport provides a favorable operating environment for air carriers as reflected in its airline cost per enplaned passenger calculation which is a key efficiency benchmark for airlines/airports to gauge reliance on airline rents and fees. This indicator is utilized to convey the relative "cost of doing business" for an airline at an airport as reflected in an airline's ability to spread its expense associated with renting and utilizing airport facilities among its passengers. For FY 2013, the airline cost per enplaned passenger ratio for the Airport is forecast to be $5.35 which is reasonably consistent with other comparable commercial service airports. Overall fees paid by airlines to AVL grew at a compounded annual growth rate of two percent during the period FY 2007 to FY 2013 (projected): however, their cost per enplaned passenger ratio grew very modestly from $5.32 to $5.35.

Estimates of the Airport's future revenues were developed based on historical trends from FY 2007 through FY 2012, the Airport's FY 2013 projected results, its preliminary FY 2014 budget, and an analysis of future revenue potential. **Table 8-6** presents FY 2012 actual revenues, expected results for FY 2013, preliminary budget estimates for FY 2014, and projected revenues for the period FY 2015 through FY 2018, which is the end of the short-term planning period for the Airport's CIP. It is expected that during this period revenue growth will continue for the Airport at a compounded annual growth rate of one percent resulting in overall revenue levels increasing from approximately $8.5 million to $9.2 million.

Table 8-6: Projected Airport Revenue

	2012	Projected 2013	Preliminary 2014	Projected 2015	Projected 2016	Projected 2017	Projected 2018
AIRLINE REVENUES							
LANDING AREA							
Airline Landing Fees	$587,645	$513,204	$548,000	$564,440	581,373	$598,814	$616,779
TERMINAL AREA							
Terminal Fees and Rents	$1,066,701	$1,058,791	$1,030,000	$1,060,900	$1,092,727	$1,125,509	$1,159,274
Terminal Area Apron Charges	$224,988	$182,782	$200,000	$206,000	$212,180	$218,545	$225,102
Turn Fees Non-Scheduled Airlines	$0	$11,070	$30,000	$30,900	$31,827	$32,782	$33,765
Total Airline Revenue	**$1,879,334**	**$1,765,847**	**$1,808,000**	**$1,862,240**	**$1,918,107**	**$1,975,650**	**$2,034,920**
NON-AIRLINE REVENUES							
AIRFIELD/GA REVENUE							
Percentage Fee	$30,694	$38,324	$25,000	$25,500	$26,010	$26,530	$27,061
Hangar Rentals	$393,025	$401,832	$409,066	$419,293	$429,775	$440,519	$451,532
FBO Land/Apron Rent & Parcel Fee	$467,004	$461,491	$462,673	$471,926	$481,365	$490,992	$500,812
Fuel Flowage Fees	$64,616	$75,473	$70,000	$72,100	$74,263	$76,491	$78,786
TERMINAL AREA CONCESSIONS							
Terminal Space Rentals Non-Airline	$206,205	$208,505	$213,411	$217,679	$222,033	$226,473	$231,003
Food, Beverage, Gift	$110,572	$109,680	$100,000	$103,000	$105,060	$107,161	$109,304
Advertising	$84,107	$90,900	$100,000	$200,000	$210,000	$220,500	$231,525
Ground Transportation Fees	$37,062	$22,400	$23,000	$23,460	$23,929	$24,408	$24,896
Brochure Sales	$21,405	$24,445	$24,750	$25,740	$26,770	$27,840	$28,954
ATM, Guest Services, Bag Cart, Misc.	$4,980	$5,492	$5,165	$5,268	$5,374	$5,481	$5,591
RENTAL CARS							
Rental Auto Concessions	$1,414,279	$1,447,577	$1,352,510	$1,345,584	$1,372,496	$1,399,946	$1,427,945
Rental Auto Concessions – Off Airport	$23,183	$22,164	$21,000	$24,000	$24,480	$24,970	$25,469
Counter & Office	$148,974	$169,449	$176,796	$182,984	$189,388	$196,017	$202,877
Ready/Return	$46,876	$48,518	$50,218	$51,976	$53,795	$55,678	$57,626
Service Facility	$216,128	$223,706	$231,534	$239,638	$248,025	$256,706	$265,691
CAM Fee	$75,437	$66,853	$66,631	$67,964	$69,323	$70,709	$72,124
PARKING AREA							
Public Parking Facility	$2,586,409	$2,400,000	$2,350,000	$2,397,000	$2,444,940	$2,493,839	$2,543,716
Commuter Parking	$18,852	$15,800	$21,000	$21,420	$21,848	$22,285	$22,731
Tenant Employee Parking	$13,075	$13,841	$13,900	$14,178	$14,462	$14,751	$15,046
OTHER							
Building Leases	$124,220	$126,372	$137,752	$143,262	$148,993	$154,952	$161,150
Land Leases	$24,723	$24,936	$25,208	$25,964	$26,743	$27,545	$28,372
Other Leases & Fees	$556,428	$516,336	$541,800	$555,345	$569,229	$583,459	$598,046
ADMINISTRATION							
Interest Income	$24,230	$30,000	$20,000	$20,000	$20,000	$20,000	$20,000
Total Non-Airline Revenue	**$6,692,484**	**$6,544,094**	**$6,441,414**	**$6,653,281**	**$6,808,299**	**$6,967,254**	**$7,130,256**
TOTAL AIRPORT OPERATING REVENUE	**$8,571,818**	**$8,309,941**	**$8,249,414**	**$8,515,521**	**$8,726,406**	**$8,942,904**	**$9,165,176**
Annual Enplanements	356,098	330,000	320,000	325,440	330,972	336,599	342,321
AIRLINE COST PER ENPLANEMENT	$5.28	$5.35	$5.65	$5.72	$5.80	$5.87	$5.94

Sources: Greater Asheville Regional Airport Authority, Delta Airport Consultants, Inc.

Airline Landing Fees – Scheduled commercial airlines operating at the Airport are currently charged a landing fee of $1.51 per thousand pounds of gross landed weight. For FY 2013, it is anticipated that $513,204 in revenue will be derived from airline aircraft operations constituting approximately 6.2 percent of the Airport's revenue base. In FY 2009, the Authority renegotiated its airline use agreement resulting in a change to its ratemaking methodology. As a result of this change, the annual landing revenue is determined based upon budgeted airfield costs for the ensuing year factored by the expected percentage of commercial airline operations. The corresponding rate is set by taking this amount and dividing it by the number of expected enplanements. Projections of future landing fee collections for the period FY 2014 through FY 2018 assume growth of three percent each year increasing from $548,000 in FY 2014 to $616,779 in FY 2018.

Airline Revenues – Terminal – This category of revenue represents fees the Authority charges airlines operating at the Airport for the use and occupancy of exclusive and non-exclusive space in its air carrier terminal building, use of Airport-owned aircraft loading bridges, and the airline aircraft parking apron area. Leasing activities associated with airline use and occupancy of the terminal building is expected to produce 15.1 percent of total revenue for the Airport or approximately $1.3 million in FY 2013. Through its current airport use agreement, the Authority assesses five charges for airline use and occupancy of its air carrier terminal building. For the FY 2013 adopted budget, the square foot terminal building rental rate was $36.02, the common use per passenger facility fee was set at $2.58, the apron fee turn was $26.67, and the passenger loading bridge fee was $7.09 per passenger. Going forward, it is expected that total terminal fees and rents will increase from $1,030,000 to $1,159,274 while terminal apron charges will grow from $200,000 to approximately $225, 102. Turn fees for non-scheduled airlines will also increase from $30,000 to $33,765 mirroring the 3 percent annual growth rate for terminal fees and rents as well as terminal area apron charges.

Airfield/GA Revenue – This category of revenue includes fees collected for hangar rent, fuel flowage fees, FBO land/apron rent and revenue derived from FBO operations. These sources of revenue increased from $605,083 in FY 2007 to an anticipated level of $977,120 in FY 2013 due primarily to establishment of a new FBO agreement in 2011. During this period, the Airport witnessed a CAGR of 13 percent in these fees. Although FBO revenues were the primary driver of increased revenue for this category, it is noteworthy that fuel flowage fees, the per-gallon charge the Authority assesses for fuel dispensed at the Airport, grew at the highest pace to approximately $75,473 in FY 2013.

Based upon historical trends and recently established FBO agreement, the Authority can expect airfield/GA revenue to continue to increase at an annual growth rate of two percent resulting in total revenue from these sources of $1,058,191 by FY 2018.

Terminal Area Concessions – Terminal Area Concessions represents fees received by the Authority for rent of all terminal area space except for airline operations and includes non-airline terminal space rentals, food/beverage/gift sales, advertising, ground transportation fees, brochure sales, and miscellaneous charges for services. Revenue from these activities increased from $376,555 in FY 2007 to an expected level of approximately $461,422 in FY 2013, which translates to a CAGR of two percent during this period. Terminal space rentals – non-airline, which consists of fees from the FAA and the

Transportation Security Administration (TSA) for use of Airport office space and the air traffic control tower (ATCT), generates approximately 50 percent of revenue for this category and is utilized to offset the cost of providing custodial, maintenance and utility services to these areas. The food/beverage/gift concession was renegotiated in 2011 and generates approximately 21 percent of revenue for this category. Advertising fees increased 3 percent per year from $75,348 in FY 2007 to an estimated $90,900 in FY 2013. Brochure sales increased more robustly during this period increasing 17 percent each year from $9,611 to an anticipated level of $22,400 in FY 2013. Historically, revenue derived from the sum of these activities has grown at two percent per year and it is expected that in FY 2013 this will translate to $461,422 in revenue for the Airport. Moving forward, it is assumed the Authority will assume operation of the advertising concession and continue a market based ratemaking approach for these concession agreements. The net result of these activities should equate to increased levels of growth in revenue derived from display advertising. While these gains will be partially offset in the earlier years of this transition by increased operating expenses, in the long-run the Airport stands to gain significant increases in fees from this source. Collectively, rentals/fees received from non-airline use of the terminal areas are projected to increase from $466,326 to approximately $631,273 in FY 2018 representing an annual growth rate of eight percent.

Rental Cars – Based upon the current concession agreement between the Authority and its rental car concession operators, four distinct sources of revenue are provided to the Airport from this activity including concession fees, facility rent (ticket counter and ready/return parking spaces), rental car service facility rent and CAM fees associated with this facility. Collectively, revenue from these sources comprises 23.8 percent of all operating revenue and grew at a CAGR of five percent during the period FY 2007 to FY 2013 (projected) from $1,376,918 to $1,978,267. Land rent associated with the rental car service facility, which opened in 2009, generated the greatest source of revenue gain for this category. This facility, which is being financed through a customer facility charge, provides all rental car concession companies with an on-site car wash, fueling and vehicle storage area.

The Authority's rental car concession agreement is effective through July 31, 2013; however, the Authority has the option of renewing this agreement for an additional five year term. The Authority is currently evaluating this option and the appropriate concession fee structure for this period. Concession fee revenue has experienced a decline since 2012; therefore, preliminary estimates for FY 2014 are proposed to be at the same level as FY 2013 collections. For the period FY 2014 to 2018, it is expected that revenue derived from rental car operations will increase two percent per year from $1,898,689 to $2,051,731.

Parking Area – Parking facility revenues represent fees collected from the Airport's 1,465-stall surface parking facility as well as 240-space tenant employee parking area. The Authority currently operates its public parking facility through a management agreement with Standard Parking Company, Inc. Parking facility revenue increased from $2,161,893 in FY 2007 to an expected level of $2,429,641 in FY 2013; translating to a CAGR of two percent during this period. Future projections of public parking revenue are based on projections of passenger activity and previous results. While a rate increase was instituted in January 2012, this model does not assume further increases during this planning period. Accordingly, parking revenue is projected to increase from an expected level of $2,384,900 in FY 2014 to $2,581,492 in FY 2018 continuing its historical rate of growth of two percent per year.

Other Revenue – Lease of Authority-owned buildings and land as well as collection of fees for shared terminal services and other services provided to tenants comprise this category of revenue. These activities include reimbursement for law enforcement officer (LEO) services provided by the Authority to tenants, lease of land to the U.S. Forest Service, and lease of the Lacy Griffin Building. Historically, these activities have generated on average approximately $733,000 each year for the Airport or approximately 10 percent of all non-airline revenue. These sources of revenue are projected to increase from an expected level of $704,760 in FY 2014 to $787,568 in FY 2018 continuing its historical rate of growth of three percent per year.

Summary of Airport Revenue – Total operating revenues for the Airport are projected to increase from $8,249,414 in FY 2014 to $9,165,176 in FY 2018, representing a CAGR of approximately one percent. These projections were developed by examining several key business factors that have an impact on major elements of Airport revenue. While such estimates are believed reasonable, actual levels of future revenue may differ from these projections. Examples of factors that could impact future levels of Airport revenue include changes in the level of passenger and GA activity, which could impact key revenue sources such as rental car concessions, automobile parking and fuel flowage fees.

While not discussed in detail as part of this analysis, it is critical that the Authority examine its ability to utilize vacant Airport property for non-aeronautical purposes and generate revenues from these activities on par with what it accomplished with its on-site rental car service facility. Development of these alternative streams of revenue diversifies the Airport's revenue base making it less susceptible to downturns in core aviation business lines such as passenger activity levels and GA operations. Success in these areas could yield a greater level of revenue than projected in this analysis. The Airport Layout Plan (ALP) that has been developed as part of this study identifies Authority-owned property with the potential for such use and revenue generation.

8.4.b Historical and Projected Operating Expenses

The Airport's historical operating expenses for FY 2007 through FY 2013 (projected) are presented in **Table 8-7**, Historical Airport Operating Expense. During this seven year period, total Airport operating expenses grew at a CAGR of seven percent, increasing from $4,921,211 in FY 2007 to an expected level of $7,342,180 in FY 2013. Escalating costs for employee salaries and benefits, operating supplies, and contractual services were the primary reasons for this rate of growth during this period.

Salaries, wages, benefits, operating supplies, contractual services, promotional activities, utilities, repairs, and maintenance have consistently represented the largest categories of expenditures for the Airport. It is expected that during FY 2013 salaries, wages, and benefits will total $4,136,847 and represent approximately 56 percent of all operating expenses. It is common for airports to allocate in excess of 50 percent of its annual operating budget for personnel costs due to the highly regulated environment in which it operates requiring staffing to meet federal standards for fire rescue, law enforcement and airport operations. The next largest components of total Airport operating expenditures are contractual services

($747,508), utilities ($453,509), operating supplies ($389,093), repairs and maintenance ($333,200) and promotional activities ($290,992).

The Authority tracks expenditures through the use of 81 line item accounts categorized into 15 broader functional areas:

- Personnel Services
- Operating Supplies
- Printing & Binding
- Rentals & Leases
- Contractual Services
- Professional Services
- Communications and Freight
- Travel and Training
- Utilities
- Promotional Activities
- Insurance
- Repairs and Maintenance
- Books, Publications, Subscriptions and Memberships
- Other Current Charges and Obligations
- Emergency Repair

Due to the scope and magnitude of several expenditures/obligations in the Authority's budget, this analysis offers further evaluation and consideration of the following areas:

- Personnel Services
- Contractual Services
- Utilities
- Operating Supplies
- Repairs and Maintenance
- Promotional Activities

These operating expense categories represent all expenses associated with the day-to-day operations of the Airport. Major expense categories, and the assumptions used to project expenses for each, are discussed in the following sections.

Table 8-7: Historical Airport Operating Expenses

	2007	2008	2009	2010	2011	2012	Projected 2013
OPERATING EXPENSES							
Regular Salaries & Wages	$1,726,986	$1,809,627	$2,407,044	$2,230,127	$2,318,335	$2,581,816	$2,742,000
Overtime	$25,625	$24,538	$65,757	$79,413	$68,132	$55,876	$60,500
Benefits	$691,479	$727,992	$810,074	$925,900	$980,903	$1,073,915	$1,187,436
Salary Adjustment/Bonus Pool	$0	$0	$72,847	$68,038	$0	$0	$34,174
Other Benefits (LEO, Longevity, Unemployment, Retiree Health)	$0	$0	$0	$48,108	$101,801	$118,980	$112,737
Subtotal: Salaries, Wages & Benefits	**$2,444,090**	**$2,562,157**	**$3,355,722**	**$3,351,586**	**$3,469,171**	**$3,830,587**	**$4,136,847**
Operating Supplies	$232,363	$242,848	$231,409	$202,924	$216,935	$234,454	$389,093
Printing & Binding	$7,546	$11,982	$11,814	$7,022	$8,345	$8,440	$12,800
Rentals & Leases	$11,285	$14,235	$20,001	$12,974	$14,831	$14,437	$15,020
Contractual Services	$551,494	$631,219	$524,021	$539,787	$576,987	$599,554	$747,508
Professional Services	$265,225	$268,495	$264,930	$205,264	$352,963	$218,066	$282,500
Communications & Freight	$92,445	$50,543	$64,732	$53,949	$60,989	$63,049	$72,348
Travel and Training	$141,703	$140,621	$149,333	$122,227	$106,424	$132,964	$187,240
Promotional Activities	$188,059	$230,316	$230,380	$228,324	$225,035	$258,506	$290,992
Insurance	$191,293	$347,555	$208,601	$195,071	$181,606	$185,334	$201,308
Utilities (Water, Sewer, Electric, Gas)	$387,587	$386,151	$407,337	$361,116	$410,621	$381,202	$453,509
Repairs & Maintenance	$382,601	$390,148	$275,668	$230,533	$273,803	$330,358	$333,200
Books, Publications, Subscriptions, & Memberships	$25,519	$32,312	$26,568	$25,504	$23,753	$31,500	$37,135
Other Current Charges & Obligations	$0	$77,388	$52,364	$59,411	$189,586	$71,844	$82,680
Emergency Repair	$0	$0	$0	$62,005	$21,552	$63,619	$100,000
Subtotal: Services & Materials	**$2,477,121**	**$2,823,813**	**$2,467,158**	**$2,306,111**	**$2,663,430**	**$2,593,327**	**$3,205,333**
TOTAL OPERATING EXPENSES	**$4,921,211**	**$5,385,970**	**$5,822,880**	**$5,657,697**	**$6,132,601**	**$6,423,914**	**$7,342,180**

Source: Greater Asheville Regional Airport Authority, Delta Airport Consultants, Inc.

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Personnel Services – Personnel services expenditures are for the current 60 full time equivalent (FTE) Airport Authority employees who provide Airport management, clerical, public safety, and building/facilities maintenance functions for the Airport. During FY 2009, the Authority assumed responsibility for providing custodial services for the air carrier terminal building and hired additional staff to perform this work. This decision generated the bulk of the cost increase for this category during this period. Between FY 2007 and FY 2013 (projected), personnel services increased from $2,444,090 to $4,136,847. In addition, employee benefits increased 9 percent per year from $691,479 to $1,187,436 due to increases in health care and retirement contributions. These factors, coupled with higher payroll tax payments associated with additional staffing and increased salaries and wages, drove the increase in personnel services during this period resulting in a CAGR of nine percent. As shown in **Table 8-8**, future personnel service costs are projected to increase from $4,493,085 in FY 2014 to $5,944,815 in FY 2018, representing a compounded annual increase of approximately eight percent. These projections were developed based on an estimated rate of inflation and assume the hiring of five new positions in FY 2014. Three of these positions will be assigned to the Airport operations division to assist with increased airfield safety requirements during construction of the airfield improvement program. One position will assume responsibility for the marketing, promotion, and sales of display advertising program for the air carrier terminal while the remaining position will be charged with a myriad of duties related to the Airport's information technology (IT) systems. All five positions have revenue offsets to reduce their overall impact to the operating budget. It is assumed that the position hired for the display advertising program will increase Airport revenues over and above current levels while the IT position will decrease reliance on outside contractors. Finally, the cost of the additional operations staff will be partially offset through the FAA AIP grants issued for the airfield project.

Contractual Services – Expenditures associated with this category include ongoing contracts the Airport maintains for landscaping, computer technical support, automobile parking management, and elevator maintenance. Collectively, these expenditures increased from $551,494 in FY 2007 to $747,508 in FY 2013 (projected) representing a five percent CAGR. As previously noted, the Authority cancelled its janitorial services contract in FY 2009; however, these savings were offset by fees paid for management of the parking area and IT services. Public parking area and IT services represent the majority of expenditures for this category. With the establishment of an Authority position focused solely on IT, it is envisioned that for the period FY 2014 - FY 2018 expenses in this category will moderately grow from $634,001 in FY 2014 to $659,744 in FY 2018 or one percent each year.

Utilities – Public utility service expenses are comprised of charges for electricity, gas, water, and sewer service for Airport facilities. These expenditures have ranged from a low of $387,587 in FY 2007 to $453,509 in FY 2013 (projected), yielding a compounded annual increase of approximately three percent. During this period, electrical costs increased approximately $83,000, gas service decreased $16,000, and water and sewer fees remained relatively unchanged. Utility expenses are projected to increase from $432,015 in FY 2014 to $467,627 in FY 2018, representing a compounded annual increase of approximately two percent. The Authority can expect further increases in utility costs upon completion of the ARFF facility and airfield improvement program. While both projects will include energy conservation measures, the mere number of new airfield lighting fixtures and energy consumption in the ARFF building will increase utility consumption and costs beyond those anticipated for FY 2018.

Table 8-8: Projected Airport Operating Expenses

	2012	Projected 2013	Preliminary 2014	Projected 2015	Projected 2016	Projected 2017	Projected 2018
OPERATING EXPENSES							
Regular Salaries & Wages	$2,581,816	$2,742,000	$2,879,905	$3,124,779	$3,312,266	$3,511,002	$3,721,662
Overtime	$55,876	$60,500	$67,900	$75,328	$80,601	$86,243	$92,280
Benefits	$1,073,915	$1,187,436	$1,357,240	$1,479,392	$1,612,537	$1,757,665	$1,915,855
Salary Adjustment/Bonus Pool	$0	$34,174	$76,142	$79,188	$82,355	$85,649	$89,075
Other Benefits (LEO, Longevity, Unemployment, Retiree Health)	$118,980	$112,737	$111,898	$115,255	$118,713	$122,274	$125,942
Subtotal: Salaries, Wages & Benefits	**$3,830,587**	**$4,136,847**	**$4,493,085**	**$4,873,942**	**$5,206,472**	**$5,562,834**	**$5,944,815**
Operating Supplies	$234,454	$389,093	$312,277	$326,329	$341,014	$356,360	$372,396
Printing & Binding	$8,440	$12,800	$11,900	$12,257	$12,625	$13,003	$13,394
Rentals & Leases	$14,437	$15,020	$12,316	$12,685	$13,066	$13,458	$13,862
Contractual Services	$599,554	$747,508	$634,001	$640,341	$646,744	$653,212	$659,744
Professional Services	$218,066	$282,500	$247,928	$250,407	$252,911	$255,440	$257,995
Communications & Freight	$63,049	$72,348	$80,323	$82,733	$85,215	$87,771	$90,404
Travel and Training	$132,964	$187,240	$167,885	$172,922	$178,109	$183,452	$188,956
Promotional Activities	$258,506	$290,992	$291,925	$300,683	$309,703	$318,994	$328,564
Insurance	$185,334	$201,308	$229,500	$234,090	$238,772	$243,547	$248,418
Utilities (Water, Sewer, Electric, Gas)	$381,202	$453,509	$432,015	$440,655	$449,468	$458,458	$467,627
Repairs & Maintenance	$330,358	$333,200	$321,969	$328,408	$334,977	$341,676	$348,510
Books, Publications, Subscriptions, & Memberships	$31,500	$37,135	$41,282	$42,108	$42,950	$43,809	$44,685
Other Current Charges & Obligations	$71,844	$82,680	$93,700	$95,574	$97,485	$99,435	$101,424
Emergency Repair	$63,619	$100,000	$90,000	$90,000	$90,000	$90,000	$90,000
Subtotal: Services & Materials	**$2,593,327**	**$3,205,333**	**$2,967,021**	**$3,029,193**	**$3,093,040**	**$3,158,617**	**$3,225,978**
TOTAL OPERATING EXPENSES	**$6,423,914**	**$7,342,180**	**$7,460,106**	**$7,903,134**	**$8,299,512**	**$8,721,450**	**$9,170,793**

Source: Greater Asheville Regional Airport Authority, Delta Airport Consultants, Inc.

Operating Supplies – This category of expenditure represents the cost of materials and supplies needed for a host of activities aimed at maintaining and repairing all of the Airport's grounds and facilities. The cost of materials and supplies for the Airport grew at a CAGR of nine percent between FY 2007 and FY 2013 (projected), increasing from $232,363 in the first year of this model to $389,093 by FY 2013. Most of the increases experienced in this category of expenditures are attributable to the Authority's assumption of custodial duties in FY 2009 as well as escalating costs for fuel and snow removal supplies including pavement deicing chemicals. This category is expected to increase from the expected FY 2014 level of $312,277 to $372,396 in FY 2018. Consistent with utility expense trends, the Airport should program additional funds for operating supplies upon completion of the airfield improvement project due to the additional pavement that will need to be cleared during inclement weather.

Repairs and Maintenance – Maintenance and repair expenses represent the cost of maintaining and repairing all of the Airport's grounds, facilities, vehicles, and equipment. Over the past seven years, this category of expenditure decreased by two percent per year from $382,601 in FY 2007 to $333,200 in FY 2013 (projected). Maintenance and repair expenses are projected to increase from $321,969 in FY 2014 to $348,510 in FY 2018 or two percent per year. Although the Authority was successful in reducing repair and maintenance expenses between FY 2007 and FY 2013 (projected), the age of its facilities will necessitate repair and renovation work that will result in modest expenditure increases going forward.

Promotional Activities and Publicity - In order for the Airport to retain and recruit the strongest possible mix of commercial air service for the greater Asheville region, the Authority has invested significant resources into targeted marketing and advertising programs over the past seven years. These efforts, coupled with the investment of non-operating funds for business development and airline marketing incentives, resulted in Allegiant Air launching new service in the market and Delta providing larger aircraft with greater seat capacity. These activities also enhanced the overall awareness of air service and related Airport amenities in the region. Advertising, Promotion and Publicity expenditures increased from approximately $188,059 in FY 2007 to $290,992 in FY 2013 (projected). It is expected that the Authority will continue its air service development and marketing activities, including its website/electronic marketing efforts, throughout the next five years. To this end, it is expected that during this period these operating expenditures will increase three percent per year from $291,925 in FY2014 to $328,564 in FY2018 and the Authority will continue to dedicate non-operating resources for its airline incentive and business development activities.

Summary of Historical and Projected Total Airport Expense – Airport operating expenditures increased from $4,921,211 in FY 2007 to $7,342,180 in FY 2013 (projected) reflecting a CAGR of seven percent. This rate of change was primarily the result of assuming building custodial responsibilities in FY 2009; increases in salaries, wages, and benefits; utilities; operating supplies; increased reliance on contractual services; and an ongoing robust investment in airport promotional and air service development efforts. It is forecasted that expenditure levels will increase from $7,460,106 in FY 2014 to $9,170,793 in FY 2018 representing a CAGR of six percent.

Cash Flow Analysis – The Airport's projected cash flow from operating activities is presented in **Table 8-9** for the period FY 2015 through FY 2018. Given the revenue and expenditure assumptions and trends discussed in this chapter, it is projected that the Airport will generate positive operating cash flow for the period FY 2015 – FY 2017 and will be in a breakeven position in FY 2018.

Table 8-9: Airport Cash Flow From Operating Activities

	Projected 2013	Preliminary 2014	Projected 2015	Projected 2016	Projected 2017	Projected 2018
Revenues						
Operating Revenue & Interest	$8,309,941	$8,249,414	$8,515,521	$8,726,406	$8,942,904	$9,165,176
Expenses						
Operating Expenses	$7,342,180	$7,460,106	$7,903,134	$8,299,512	$8,721,450	$9,170,793
Net Operating Cash Flow*	**$967,761**	**$789,308**	**$612,387**	**$426,895**	**$221,454**	**($5,617)**

Note: *Excludes Non-Operating Revenues & Expenses (Business Development, Airline Incentives, Contingencies, debt service, PFC & CFC Revenues)

As shown in the table, the growth rate for operating expenditures is expected to eclipse gains in operating revenue mitigating positive cash flow by year five of the model. It is possible for this trend to be reversed through the combination of the Authority's efforts to generate additional revenue from non-traditional non-aeronautical sources and periodic rate adjustments for its major concessions such as parking facilities. Furthermore, through the Authority's compensatory ratemaking model for airline fees and charges, sufficient revenues may be raised to offset the cost of providing services and facilities for airlines serving the Airport.

In terms of expenditures, the Authority, like many governmental entities, continues to confront significant increases in employee healthcare premium and defined benefit retirement plan costs. These factors, coupled with the cost impact of the extensive regulatory environment in which it operates, dictates that the Authority has little to no latitude in making significant changes to its cost structure. The extensive web of regulatory matters alone requires the Authority to maintain a core number of staff in order to ensure ongoing compliance. The new positions the Authority is seeking to create during the short-term planning period do have offsetting revenue streams associated with them to minimize the impact to the budget. However, the full effect of these savings and revenue are not expected to be realized until after the short-term plan is complete. Beyond personnel costs, the Authority does utilize best management practices to contain costs through use of preventative maintenance programs on equipment and systems, deployment of energy conservation measures to increase efficiency, and thorough review and justification of line item expenditures in its budget development and implementation processes.

8.5 Conclusion

Based on the foregoing analysis, including the underlying assumptions under which it was made, the short-term CIP recommended for the Airport is expected to be both feasible and implementable.

Moreover, the Airport is capable of sustaining its operations during the next five years void of placing extended or undue burdens on its tenants, operators, and concessionaires. The results of this analysis affirm that from an operational and financial perspective the Airport is well-positioned to be:

> ***"...the premier airport of choice for Western North Carolina travelers by providing an array of choices and amenities, distinctive customer service, value and convenience."*** (Mission Statement)

The following factors and key indicators substantiate this assessment:

- The Airport maintains a very low debt profile requiring approximately $627,000 per year in payments and derived from a dedicated funding stream (Airport rental car customer facility charge program).

- The Airport maintains a strong cash balance position reflective of an organization that acts prudently, has strong business acumen, and takes action that will produce positive results for its constituents.

- A proactive lease management and monitoring system in use ensures market rate rents are set and fees are collected in a timely manner. Lease rates are established to be consistent with market conditions and a database is maintained to track major terms and payment requirements of tenants/concessionaires.

- Best management practices are used by Airport management including:

    - Five year capital planning for vehicles/equipment/buildings, grounds repairs, and maintenance projects not otherwise eligible for federal or state funding.
    - Use of preventative maintenance practices for Airport facilities and grounds.
    - Implementation of strategies aimed at diversifying the Airport's revenue base to minimize reliance on airline rates and charges through lease of Authority property for non-aeronautical uses.
    - An aggressive air service retention and recruitment program including strong Airport advertising and promotional efforts in the region.

- Little to no growth in insurance premiums over the past seven years indicates an organization that stresses safety and mitigation of risk.

As the Airport commences work on implementing the recommended capital improvement program highlighted in this analysis it should remain focused on these unique endowments and seek to further capitalize on the positive benefits they provide. In the end, it is imperative that the Airport strives to continue to provide an economical and sustainable platform for airlines and other key tenants to operate and prosper in order to fulfill the Airport's mission.

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Appendix A
Airfield Demand/Capacity Analysis

This white paper document contains the detailed Airfield Demand/Capacity analysis conducted as part of the Asheville Regional Airport Master Plan.

A.1 Airfield Demand/Capacity Analysis

The purpose of the airfield demand/capacity analysis is to assess the capability of the airfield facilities to accommodate projected levels of aircraft operations. The Federal Aviation Administration (FAA) identifies two definitions of airfield capacity in FAA Advisory Circular (AC) 150/5060-5, *Airport Capacity and Delay*. The first definition of airfield capacity pertains to the maximum number of aircraft operations that a specific configuration can accommodate during a specified time interval of continuous demand (i.e. an aircraft is always waiting to depart or land). This level of capacity is influenced by weather conditions, number and configuration of exit taxiways, types of aircraft that use a facility, and air traffic control/airspace handling procedures.

The second definition of airfield capacity is the number of aircraft operations that may occur during a specific time that corresponds with a tolerable aircraft delay. An important difference between these two measures of capacity is that one is defined in terms of delay, while the other is not. Among the reasons to determine delay is that each individual airfield has multiple factors that contribute to its ability to accommodate aircraft. Additionally, the relationship between demand and delay is significantly impacted by patterns of peak demand, which is also unique to an airfield.

The following airfield capacity and delay components are used in this evaluation:

- **Peak hour capacity** – The maximum number of aircraft operations that can occur in one hour under specific operating conditions assuming a continuous demand for service. This is also known as an airfield's maximum hourly throughput capacity.

- **Annual Service Volume (ASV)** – Used by the FAA as an indicator of relative operating capacity. ASV is a reasonable estimate of an airport's annual capacity that accounts for differences in various conditions (i.e. runway use, aircraft mix, weather conditions, etc.) that would be encountered over a year's time. ASV assumes an acceptable level of aircraft delay as described in FAA AC 150/5060-5, *Airport Capacity and Delay*.

- **Average annual delay per operation** – An estimate of the average delay each aircraft operation will experience in a given year. Some operations such as those that occur in peak periods of activity would likely experience longer delays on average while others such as nighttime operations, would likely experience shorter average delays.

A.1.a Factors Affecting Runway Capacity

A number of factors can impact airfield capacity and delay, including:

- Airfield layout and runway configuration
- Number and location of exit taxiways
- Runway use restrictions
- Runway use as dictated by wind conditions
- The percentage of time the airport experiences poor weather conditions
- The level of touch-and-go activity
- Types of aircraft that operate at the airport
- Surrounding terrain/local geography
- Changes in air traffic control procedures

A.1.b Weather Conditions

Weather conditions can impact an airport's capacity by causing conditions that require the facility to close or slow down aircraft operations. There are two categories for weather conditions related to operating aircraft: instrument flight rules (IFR) and visual flight rules (VFR). VFR weather conditions exist when the cloud ceiling is 1,000 feet or greater and visibility is three statute miles or greater. IFR conditions are those below the stated VFR minimums.

It is important to differentiate IFR and VFR conditions because greater separation distances are required under IFR conditions. According to the most recent weather data available through the National Climatic Data Center (NCDC) that is compatible with existing FAA wind analysis software from the Automated Surface Observation System (ASOS) unit located on the Airport observed the following weather conditions for the period from 2000 to 2009:

- 69,638 hourly observations with VFR weather conditions (88.7 percent).
- 8,836 hourly observations with less than VFR weather minimum (11.3 percent) of which:
    - 7,053 hourly observations were with weather conditions below VFR minimums and at or above standard Category I ILS approach minimums of 200 cloud ceiling and 1/2 mile visibility (9.0 percent).

- 1,783 hourly observations of which weather is below standard Category I ILS approach minimums (2.3 percent).

A.1.c Touch and Go Operations

Touch and go operations are defined as those conducted by a single aircraft that lands and departs on a runway without taxiing. Such operations are typically associated with training or recurrence exercises. Typically, airfield capacity increases with the ratio of touch and go operations as aircraft are within the local traffic pattern and available for approaches. ATCT records indicate that local operations account for approximately 20 percent of the total operations, and according to the Asheville ATCT staff, touch and go operations account for approximately 90 percent of local operations. Therefore 18 percent of the total operations are touch and go operations at Asheville Regional Airport.

A.1.d Aircraft Mix Index

The aircraft mix is the relative percentage of operations conducted by four categories of aircraft that operate at an airport. The mix index has a significant impact on airfield capacity. Aircraft are categorized by their physical aspects and their relationship to terms used in wake turbulence standards (see **Table A-1**). It should be important to note that the aircraft categories used in evaluating the aircraft mix index for capacity purposes in FAA AC 150/5060-5, *Airport Capacity and Delay*, varies from the Aircraft Approach Categories (AACs) identified in FAA AC 150/5300-13, *Airport Design*. The primary difference is that the aircraft categories listed below are based on the takeoff weight and wake turbulence factor of an aircraft while the AAC is based upon the approach speed of an aircraft.

Table A-1: Aircraft Categories

Aircraft Category	Take-off Weight (pounds)	Types of Aircraft	Wake Turbulence Factor
A	12,000 or less	Small single engine aircraft	Small
B	12,500 or less	Small multi-engine aircraft	Small
C	12,500 – 300,000	Large aircraft	Large
D	300,000 or more	Heavy aircraft	Heavy

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

The 2010 aircraft mix index has been determined based upon FAA operational data. Airport Traffic Control Tower (ATCT) records obtained through the FAA Air Traffic Activity Data System (ATADS) provides the number of local and itinerant operations. Local operations are assumed to be primarily general aviation and military aircraft that conduct training and touch and go operations. The local general aviation operations are assumed to be nearly all small aircraft in categories A and B. The local military traffic mix is assumed to equal that of itinerant military fleet. For itinerant operations aircraft weight class information was obtained through the FAA's Enhanced Traffic Management System Counts (ETMSC), which provides traffic count information by airport from pilot flight plans and radar track information. **Table A-2** presents the 2010 number of operations by category of aircraft for mix index determination.

Table A-2: Operations by Aircraft Category						
Aircraft	Itinerant		Local		Total	
Category	% by Class	Operations	% by Class	Operations	% by Class	Operations
A & B	36.9%	19,537	92.3%	13,348	48.8%	32,884
C	62.8%	33,204	6.9%	998	50.8%	34,204
D	0.3%	139	0.8%	116	0.4%	254
Total		**52,879**		**14,461**		**67,340**

Source: FAA Enhanced Traffic Management System Counts (ETMSC), FAA Air Traffic Activity System (ATADS)

The aircraft mix index in accordance with FAA AC 150/5060-5, *Airport Capacity and Delay*, is the percent of C aircraft plus three times the percent of D aircraft. For VFR weather the total operations by aircraft class have been used. Since very little local activity occurs during IFR weather only the iterant operations have been used in the IFR Mix Index calculation.

- VFR Mix Index = %(C+3D) = %(50.8+3*(0.4)) = 52.0
- IFR Mix Index = %(C+3D) = %(62.8+3*(0.3)) = 63.7

A.1.e Peak Hour Airfield Capacity

Peak hour airfield capacity is defined as the measure of the maximum number of aircraft operations that can be completed on a runway system in one hour. These calculations incorporate runway use configuration, dimensional criteria and spacing, fleet mix, touch and go activity, and runway exit factor. Asheville Regional Airport has a single runway, therefore only a single runway use configuration under VFR and IFR weather conditions was evaluated. The following presents the runway exit information obtained from the ATCT's diagram of intersection distances remaining. It should be noted that intersection distances listed were rounded down to the nearest 50 feet and are not the actual distance from the intersection to the end of the runway. This is done in accordance with air traffic procedures to provide a margin of safety when pilots inquire about intersection distances from air traffic control. For the purposes of the peak hour airfield capacity analysis, these rounded intersection distances were used in the evaluation.

- Runway 16: 300', 1500', 2500', 3700', 4700', 6250', 7700'
- Runway 34: 250', 1700', 3250', 4250, 5450, 6450', 7650'

Utilizing guidelines contained within to FAA AC 150/5060-5, *Airport Capacity and Delay,* hourly capacities for the airfield were computed separately under VFR and IFR conditions. The respective capacities were found to be:

- VFR Capacity = 65 operations
- IFR Capacity = 51 operations

A.1.f Annual Service Volume

Annual Service Volume (ASV) is a reasonable estimate of an airport's annual practical capacity. It accounts for differences in runway use, aircraft mix, weather conditions, pattern of demand (peaking), and other factors that impact an airport. The formula for calculating ASV contains three variables: C_w

(weighted hourly capacity), D (the ratio of annual demand to average daily demand in the peak month), and H (the ratio of average daily demand to average peak hour demand during the peak month). These variables are multiplied to obtain the ASV for the Airport.

Weighted hourly capacity, $C_{w,}$ has been calculated in accordance with FAA AC 150/5060-5, *Airport Capacity and Delay* as follows:

$$C_w = \frac{(P_1 \times C_1 \times W_1) + (P_2 \times C_2 \times W_2)}{(P_1 \times W_1) + (P_2 \times W_2)} = \frac{(0.887 \times 65 \times 1) + (0.113 \times 51 \times 15)}{(0.887 \times 1) + (0.113 \times 15)} = 55.8$$

P_1, P_2 = Percentage of time runway configuration is used (VFR/IFR)
C_1, C_2 = Capacity under configuration use (VFR/IFR)
W_1, W_2 = ASV weighting factors

The Daily Demand Ratio (D) is the ratio of annual demand to average daily demand in the peak month. Using the data in Chapter 3, *Aviation Forecasts*, this has been calculated as follows:

D = Annual Demand / Peak Month Average Daily Demand
D = 67,340 / 224
D = 300.6

The Hourly Demand Ratio (H) is the ratio of average daily demand to average peak hour demand during the peak month which is 6.65. Using the data in Chapter 3, *Aviation Forecasts*, this has been calculated as follows:

H = Peak Month Average Day Demand / Peak Hour Demand
H = 224 / 31
H = 7.23

Annual Service Volume (ASV) for Asheville Regional Airport is defined as follows:

ASV = C_w* D * H
ASV = 55.8 * 300.6 * 7.23
ASV = 121,272 operations

A single runway with a parallel taxiway can typically accommodate approximately 200,000 annual aircraft operations. The ASV calculated for Asheville Regional Airport is quite a bit below this typical capacity. The lower than typical ASV is primarily being driven by the airport's operational peaking characteristics. The airport has a high percentage of daily activity occurring in the peak hour (13.8 percent was the average peak hour percentage for each day in July 2010), which resulted in a relatively low hourly demand ratio of 7.23. The FAA methodology resulted in a low hourly demand ratio with higher percentages of activity in the peak hour due to the fact that delays increase rapidly as demand nears capacity.

For a mix index of approximately 50 like Asheville's, FAA AC 150/5060-5, *Airport Capacity and Delay* notes that typical hourly demand ratios are between 10 and 13 (between 7.7 percent to 10.0 percent of the daily operations in the peak hour). If Asheville's hourly demand ratio were to increase to the typical averages of 10 to 13, its ASV would increase to between 167,735 and 218,055 annual operations. Therefore while the ASV at Asheville is currently 121,272 operations, there is the potential for changes in the peaking characteristics to alter and actually increase the ASV. The following sections highlight the aircraft delays and results of airfield demand/capacity analysis.

A.1.g Range of Delay

The second factor in determining an airport's practical capacity is to calculate the amount of delay an aircraft may experience at the facility, which is described in minutes per aircraft operation. As was noted earlier, ASV assumes an acceptable level of average aircraft delay. FAA AC 150/5060-5, *Airport Capacity and Delay,* indicates that for air carrier airports this is the level of annual activity at which the average delay per aircraft is between 2.30 and 3.5 minutes. The relationship between the ratio of demand to ASV and delay is shown in **Table A-3**. The chart depicts the average delay per aircraft based upon the ratio of annual demand to annual service volume; FAA guidance notes that the upper part of the band applies to air carrier airports and the full band applies to general aviation airports. The upper part of the band has been used to determine annual average delay per aircraft at the Airport. FAA guidance also notes that individual aircraft delays can be 5 to 10 times the average delay.

Table A-3: Ratio of Demand to ASV and Delay

Ratio of Annual Demand to ASV	Annual Average Aircraft Delay (min)	Peak Delays for Individual Aircraft (min)
0.1	0.05 - 0.05	0.25 - 0.50
0.2	0.10 - 0.15	0.50 - 1.50
0.3	0.20 - 0.25	1.00 - 2.50
0.4	0.25 - 0.30	1.25 - 3.00
0.5	0.35 - 0.50	1.75 - 5.00
0.6	0.50 - 0.75	2.50 - 7.50
0.7	0.65 - 1.05	3.25 - 10.50
0.8	0.95 - 1.45	4.75 - 14.50
0.9	1.40 - 2.15	7.00 - 21.50
1.0	2.30 - 3.50	11.50 - 35.00
1.1	4.40 - 7.00	22.00 - 70.00

Source: FAA AC 150/5060-5, *Airport Capacity and Delay*

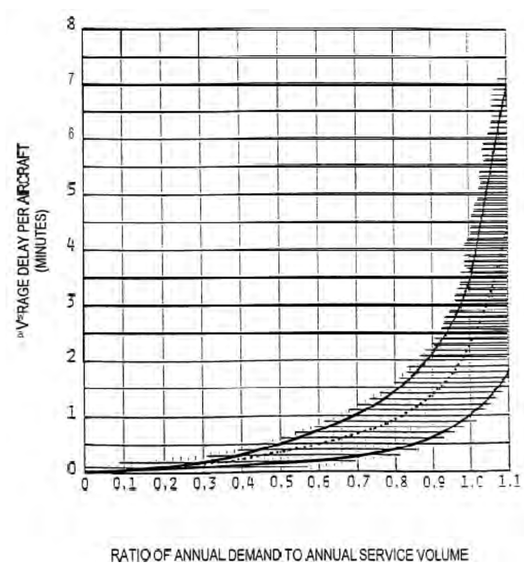

Table A-4 depicts the ratio of annual demand to annual service volume for Asheville Regional Airport and the anticipated range of average and peak aircraft delays. Average delays are anticipated to increase from a range of 0.41 to 0.57 minutes to a range of 0.66 to 0.96 minutes in 2030.

Table A-4: FAA Estimated Delay Ranges

Year	Annual Demand	Ratio of Demand to ASV*	Range of Avg Aircraft Delay (min)	Range of Peak Aircraft Delays (min)
	ASV =	121,272		
Historical:				
2005	70,532	0.58	0.45 - 0.64	2.27 - 6.37
2006	74,373	0.61	0.52 - 0.73	2.58 - 7.31
2007	81,674	0.67	0.66 - 0.95	3.28 - 9.49
2008	76,840	0.63	0.56 - 0.80	2.80 - 7.98
2009	66,437	0.55	0.40 - 0.55	1.98 - 5.51
2010	67,340	0.56	0.41 - 0.57	2.04 - 5.69
Projected:				
2015	70,191	0.58	0.45 - 0.63	2.25 - 6.30
2020	74,025	0.61	0.51 - 0.72	2.55 - 7.22
2025	77,868	0.64	0.58 - 0.83	2.89 - 8.28
2030	82,066	0.68	0.66 - 0.96	3.32 - 9.62

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

A.1.h Runway Demand/Capacity Summary

FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems (NPIAS)*, notes that capacity improvements should be recommended with sufficient lead-time so that the improvement can be made before the problem becomes critical and delays are excessive. For runway capacity it recommends that capacity development begin when demand reaches 60 percent to 75 percent of annual capacity. As shown in **Table A-4**, at Asheville Regional Airport, demand in 2010 was 56 percent of capacity and demand in 2030 is projected to be 68 percent of capacity. These levels are near the FAA recommended thresholds, but are not anticipated to exceed the 75 percent threshold within the planning period.

Additionally, as was noted earlier, the annual service volume or annual capacity at Asheville Regional Airport is somewhat lower than what is typical for an airport of its type due to the high level of activity occurring in the peak hour(s) each day in the peak months. The high volume of activity in these peak hours is being driven primarily by general aviation activity. During the peak month of July, on average, operations at the airport were 30.4 percent commercial, 62.3 percent general aviation, and 7.3 percent military; however, during peak hours when total operations were more than25 per hour, operations were 20.0 percent commercial, 69.4 percent general aviation, and 10.6 percent military. This indicates that commercial operations are nearly one third of total operations; however, during peak hours commercial operations are only one fifth of operations. It is anticipated that as demand increases and delays increase, the general aviation activity would likely alter its characteristics either by using less busy times of the day for training activity or by transitioning to other surrounding airports for touch and go training activity due to the delays at the Airport.

The amount of daily activity currently occurring in the peak hour, 13.8 percent, has been maintained in the activity projections trough the projected period as a conservative projection; however if the peaking characteristics of the operational demand were to change from 13.8 percent of the daily demand occurring in the peak hour to a more typical 10.0 percent for air carrier airports, the ASV of the airport would increase from 121,272 to 167,735. This would lower the ratio of annual demand to capacity below 50 percent and alleviate any capacity concerns within the planning period. It is also likely that near the end of the projection period as peak hour delays begin to increase, general aviation users will alter their usage characteristics to avoid the delays experienced during these busy or congested periods. Therefore, capacity at the Airport appears adequate for demand projected throughout the planning period.

Appendix B
Environmental Assessment
Finding of No Significant Impact (FONSI)

U.S. Department
of Transportation

**Federal Aviation
Administration**

Atlanta Airports District Office
1701 Columbia Ave., Campus Bldg.
Atlanta, GA 30337-2747
Phone: (404) 305-7150 Fax: (404) 305-7155

August 19, 2011
Mr. Lew S. Bleiweis
Asheville Regional Airport, Airport Director
61 Terminal Drive, Suite1
Fletcher, NC 28732

Dear Mr. Bleiweis:

Enclosed is a copy of the Environmental Assessment (EA) Cover Sheet and the Finding of No Significant Impact (FONSI)/Record of Decision (ROD) for the proposed Runway Reconstruction and Parallel Taxiway at the Asheville Regional Airport, Fletcher, North Carolina. The associated development projects have been evaluated and environmentally approved. This is not an obligation for funding.

The FONSI/ROD addresses the immediate proposed action as defined and analyzed in the corresponding EA. If there are changes to the proposed action or if the improvements as described and analyzed in the EA are not initiated within three (3) years, this FONSI/ROD and corresponding EA must be reevaluated to determine if they are still adequate to fulfill the requirements of the National Environmental Policy Act.

A Public Notice announcing the availability of the EA and FONSI/ROD and the location where they may be reviewed should be made. A draft example of this notice is enclosed for your use. This notice is not to solicit public comments but rather to notify the public that the Final EA and FAA decision document has been issued and is available for review/information.

If you have any questions or require additional information please contact me at (404) 305-7152.

Sincerely,

Dana L. Perkins
Environmental Program Manager

Enclosures:
1) 05-05-10 FAA Executed Acceptance of Final EA/Cover Page
2) 05-05-10 FAA Executed FONSI-ROD
3) Example Final NOA

cc
Mike Reisman, Asheville Regional Airport, 61 Terminal Dr., Suite1, Fletcher, NC 28732
Laura Stevens, The LPA Group, P.O. Box 5805, Columbia, SC 29250
Jeff Kirby, The LPA Group, 7800 Airport Center Drive, Suite 100, Greensboro, NC 27409
Rick Barkes, NC Department of Transportation, Division of Aviation, 1560 Mail Service Center, Raleigh, NC 27699-1560

Asheville Regional Airport
Runway Reconstruction and New Parallel Taxiway

ENVIRONMENTAL ASSESSMENT

prepared for:

Asheville Regional Airport Authority

prepared by:

THE LPA GROUP
TRANSPORTATION CONSULTANTS
A Unit Of Michael Baker Corporation

August 2011

This Environmental Assessment becomes a Federal document when evaluated, signed, and dated by the Responsible FAA Official.

08/19/11

Responsible FAA Official	Date

RECORD OF DECISION

and

FINDING OF NO SIGNIFICANT IMPACT

Proposed Runway Reconstruction and
New Parallel Taxiway at the
Asheville Regional Airport
Fletcher, North Carolina
August, 2011

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
ATLANTA AIRPORTS DISTRICT OFFICE
ATLANTA, GEORGIA

I. INTRODUCTION / BACKGROUND

In compliance with the *National Environmental Policy Act* (NEPA), this Finding of No Significant Impact (FONSI) and Record of Decision (ROD) announces final agency determinations and approvals for those Federal actions by the Federal Aviation Administration (FAA) that are necessary to support implementation of a capital improvement project to construct a new parallel taxiway for use as a temporary runway while the existing Runway 16-34 at the Asheville Regional Airport (AVL), located in Buncombe and Henderson Counties, North Carolina, is reconstructed in accordance with FAA standard design criteria, as requested by the airport sponsor, the Asheville Regional Airport Authority. Once the existing runway is completed, aircraft operations will move back to the primary runway and the new parallel taxiway will be signed and designated as a taxiway. The Proposed Action also includes development of a cargo facility with associated infrastructure.

This ROD provides the FAA's final determinations and approvals based on analysis described in detail in the *Asheville Regional Airport Runway Reconstruction and New Parallel Taxiway Final Environmental Assessment, August 2011.* The agency decision is based on information contained in the Final Environmental Assessment (EA), incorporated by reference, and all other applicable documents available to the agency.

This ROD is issued in accordance with the requirements of the Council on Environmental Quality (CEQ), 40 Code of Federal Regulations (CFR) §1505.2.

II. PROPOSED FEDERAL ACTION

The Sponsor has requested FAA Airport Improvement Program (AIP) financial assistance and approval to implement a capital improvement project that would reconstruct Runway 16-34 in accordance with FAA standard design criteria outlined in AC 150/5300-13 at AVL. The Proposed Action would involve disturbance of approximately 230 acres of land and require approximately 11.2 acres of property acquisition. Elements of the proposed capital improvement project include:

- Construction of an 8,000-foot by 100-foot parallel taxiway to be used as a temporary runway during the 75-foot shift west and reconstruction of Runway 16-34;
- Correction of the non-standard separation distance between Runway 16-34 and Taxiway A from the existing 325 feet to 400 feet of separation;
- Correction of the non-standard longitudinal gradient from 1.1 percent to less than 0.8 percent on the Runway 34 end;
- Replacement of airfield electrical cabling and airfield lighting;
- Installation of new airfield signage;
- Construction of an air cargo apron and associated facilities/infrastructure;
- Construction of associated stormwater controls; and,
- Installation and temporary use of staging areas, haul roads, and sedimentation and erosion control features during construction activities.

III. PURPOSE AND NEED

The Sponsor has defined the purpose and need for implementing the Proposed Action as being necessary to correct the critical pavement, lighting, and electrical deterioration on Runway 16-34 in such a way that the runway meets FAA criteria for pavement condition, resolves the existing FAA non-standard design issues, minimizes operational impacts to the Airport during construction, and ensures the lighting system and Airport signage will continue to function satisfactorily. The purpose for the associated cargo apron project is to accommodate future air cargo activity and development at AVL.

The need for the proposed runway improvements was recognized as a result of recent airfield evaluations that identified deficient runway pavement and lighting systems. Based on visual evaluation and geotechnical investigation, a 2009 report[1] determined that although Runway 16-34 has adequate sub-base integrity, the asphalt pavement has deteriorated to a weighted Pavement Condition Index (PCI) value of 50, as compared to a PCI of satisfactory runway pavements being greater than 70. The weighted PCI is expected to decrease to 35, or very poor condition, by 2013. Based on this analysis, the pavement requires major rehabilitation/reconstruction in the immediate future. Having identified the need to rehabilitate/reconstruct Runway 16-34 pavement, the Airport must also consider solving the existing FAA airport design deficiencies for runway to taxiway separation and runway gradient. Finally, inquiries by prospective air cargo tenants have highlighted the need for the associated cargo apron project.

IV. ALTERNATIVES

Federal guidelines concerning the environmental review process require that all reasonable and practicable alternatives that might accomplish the objectives of a proposed project be identified and evaluated. Such an examination ensures that an alternative that addresses the project's purpose and that might enhance environmental quality, or have a less detrimental effect, has not been prematurely dismissed from consideration. In the EA, reasonable and practicable alternatives for both the runway improvements and the proposed location of the cargo facility were carefully examined.

Runway Alternatives

Five runway alternatives were evaluated, including runway rehabilitation with full-time closure, nighttime closure, or reconstruction with use of existing Taxiway A as a temporary runway. However, reconstruction while using a new parallel taxiway as a temporary runway was the only alternative that satisfies the Sponsor's overall purpose and need of reconstructing Runway 16-34 and correcting the non-standard centerline separation distance. Thus, the runway alternatives considered in greater detail in the EA included the No-action Alternative and Runway Reconstruction with use of a New Parallel Taxiway, as described below:

[1] RS&H, *Runway 16-34 Rehabilitation/Reconstruction – Phase 1 – Runway and Lighting Condition Assessment*, prepared for the Asheville Regional Airport Authority, April 16, 2009.

No-Action Runway Alternative

The No-action Alternative was evaluated pursuant to the CEQ Regulation 40 CFR § 1502.14(d). Under the No-action alternative, the existing deficiencies with the runway pavement, airfield lighting system, and signage at AVL would not be improved, nor would the non-standard separation distance between Runway 16-34 and Taxiway A be corrected. While the No-action Alternative would not impact the natural environment, it would not meet the Sponsor's overall purpose and need.

Runway Reconstruction while using a New Parallel Taxiway as a Temporary Runway (Sponsor's Preferred Alternative)

This Alternative would construct a full-length parallel taxiway to the west of the runway. The new taxiway centerline would be 475 feet from the existing runway centerline to meet FAA airport design and safety standards necessary to support its use as a temporary parallel runway for approximately 12 months while the existing runway would be reconstructed. During its temporary use as a runway, the new taxiway would also be temporarily striped, lighted, and signed for such use. Meanwhile, the existing runway would be removed and a new base, sub-base, and overlay would be constructed 75 feet to the west of the existing runway to correct the non-standard runway centerline to taxiway centerline separation distance (for existing Taxiway A). This new runway would be 8,000 feet long, 150 feet wide, and would meet FAA airport design standards, including correction of the existing non-standard longitudinal runway gradient on the Runway 34 end. The airfield circuits, lighting fixtures, and transformers would be replaced during reconstruction. In addition, new luminescent-paint sign panels that are in conformance with FAA standards would be installed.

Once the runway reconstruction is finished, Airport operations would move back to the primary runway and the new parallel taxiway would be designated as a taxiway and would provide airfield access for future development on the western side of the Airport. Total construction time to complete the Sponsor's Preferred Alternative is anticipated to be 48 months.

Cargo Facility Alternatives

With regard to the potential locations for the proposed air cargo facility, various screening criteria were used to evaluate nine undeveloped areas on existing Airport property. The following alternatives were considered in greater detail in the EA:

No-Action Cargo Facility Alternative

Although the No-action Alternative would avoid impacting human natural resources, it would fail to meet the purpose and need of accommodating future air cargo activity and development at AVL.

Area West of Runway 16-34 - Site G

Site G would provide adjacent airfield access and would be considered compatible with existing and future land use plans. Although the site does provide off-site road access, the existing roadway system would require truck traffic to travel approximately four miles via Pinner Road, Glen Bridge Road, and Bradley Branch Road to access I-26 from the north, or would necessitate construction of a new road to access Old Fanning Bridge Road approximately one mile to the south of Site G.

Area Southwest of Runway 16-34 - Site I (Sponsor's Preferred Alternative)
Located just east of Old Fanning Bridge Road and near the southern end of the proposed parallel taxiway, Site I would provide adjacent airfield and off-site road access. Off-site road access would consist of tying into Old Fanning Bridge Road to the south, approximately 800 feet from its intersection with North Carolina Highway 280 (Airport Road/Boylston Highway), and then traveling 1.5 miles to I-26. Site I is also consistent with future aviation development identified on the Airport Layout Plan (ALP).

Based on the lack of convenient highway access for truck traffic using the existing roadway system to the north of Site G and the cost associated with acquiring property and constructing a new access road to Old Fanning Bridge Road to the south, Site I was considered more favorable than Site G for the location of the proposed cargo facility. Site I was therefore incorporated into the Proposed Action.

V. ENVIRONMENTAL IMPACTS

As documented in the attached EA, the Proposed Action and No-action Alternatives were evaluated for potential impacts to all environmental resource topic areas outlined in FAA Order 1050.1E, *FAA's Order implementing the NEPA*.

Under the No-action Alternative, no action would be taken and there would be no associated environmental impacts.

The following is a discussion of those resources identified as present and with potential to be significantly affected under the Proposed Action (Sponsor's Preferred Alternative):

Noise:
Seven single family residences are located within or immediately adjacent to the 65 DNL contour in the 2016 Proposed Action scenario. Based on a single point analysis, the noise levels on the exterior of six homes would increase by 3.5 to 5.8 dBA over the No-action Alternative in 2016 during the time the temporary runway was in use. Once the primary runway reconstruction was finished, with the 75-foot shift to the west and the temporary runway was converted back to a parallel taxiway, the exterior noise levels would decrease to be only 0.5 to 0.8 dB greater than the No-action Alternative in 2021. FAA guidelines discourage residential land uses within the 65 DNL. However, this noise exposure would be limited to the period of time (approximately one year) that the temporary runway is in operation. At the conclusion of the project, when the reconstructed Runway 16-34 is reopened, one residence, a mobile home located at 541 Glenn Bridge Road, would be located within the 65 DNL. Although the 0.4 dBA increase in noise experienced at this residence would not be considered significant from a NEPA perspective, the property would be located within the 65 DNL contour and thus, would not meet FAA guidelines for noise compatibility. Since mobile homes cannot generally be acoustically treated to achieve compatibility, the airport would make an offer to purchase the property and relocate this resident in accordance with the Uniform Relocation Assistance and Real Property Acquisition

Act of 1970.

Hazardous Materials and Waste Sites:
The City of Asheville Police Training Firing Range is located within the construction footprint of the Proposed Action and has been previously identified as a Recognized Environmental Condition (potentially hazardous site). The City of Asheville has committed to vacating the Police Training Firing Range with clean closure documentation by March 2012.

Jurisdictional Wetlands and Other Waters of the United States/Water Quality:
There will be permanent unavoidable impacts to approximately 0.9 acre of wetlands and approximately 2,276 linear feet of stream. As such, Federal and State permits and/or certificates must be applied for and adhered to, including a *Clean Water Act*, Section 404 Individual Permit and Section 401 Water Quality Certification. The Sponsor's agent has been in coordination with the appropriate regulatory agencies regarding a wetland mitigation plan as required by the Section 404 and 401 permitting and certification process and has obtained reasonable assurance that the proposed mitigation will support issuance of the necessary permits/certificates, indicating that these impacts will be less than significant.

While there would be impacts to water quality and wetlands if the Proposed Action is implemented in accordance with the Sponsor's Preferred Alternative, these impacts are not considered significant due to the mitigating factors that are already addressed and required by FAA grant assurances and in the regulatory permitting process for these resources.

The Proposed Action would involve disturbance of approximately 230 acres of land and require approximately 11.2 acres of property acquisition. However, prior to land disturbance the North Carolina Department of Environment and Natural Resources requires approval under the National Pollutant Discharge Elimination System (NPDES) Construction Stormwater Permit (NCG010000). Due to the amount of impervious surface proposed for the new parallel taxiway and cargo apron, a Phase II NPDES Stormwater Permit, which regulates post construction run-off, will also be required and will adhere to FAA Advisory Circular 150/5200-33B, "Hazardous Wildlife Attractants on or Near Airports."

Floodplains:
Although the Proposed Action would not impact the floodway, fill from the proposed construction footprint would result in approximately 5.6 acres of unavoidable encroachment into the 100-year floodplain. Based on coordination with the City of Asheville Floodplain Manager, encroachment into the 100-year floodplain is permissible for the proposed action under City regulations, as long as no practicable alternatives exist and the fill remains a minimum of 10 feet outside of the floodway.

Light Emissions/Visual Effects:
Finally, construction of the Proposed Action would result in visual effects associated with the clearing of approximately 8.8 acres of trees that are located within the proposed construction footprint, adjacent to the residential area northwest of the runway. The clearing of trees would result in a diminished buffer between the residential area and the Airport, making airport operations more visible to the adjacent Riverport and River View Acres subdivisions. However, due both to height restrictions in the vicinity of the airfield and the significant

elevation difference from the runway end to the toe-of-fill or approximate elevation of the adjacent residences (approximately 45 feet difference), constructing a screen or providing a vegetative buffer is not practicable. From north to south, the closest residences to Airport property would be located from 350 to 560 feet, respectively, away from the temporary approach lighting system and temporary runway/new parallel taxiway.

Agency Coordination/Comments:
The information presented in the EA, including comments from Sovereign Nations, Federal, State and local agencies did not identify any significant impacts to the human environment.

VI. ENVIRONMENTAL MITIGATION

Since no significant impacts were identified in association with implementing the Proposed Action, except for assuring clean closure on the City of Asheville Police Training Firing Range, carrying out standard best management practices required by FAA grant assurances as outlined in FAA Advisory Circular (AC) 150/5370-10, "Standards for Specifying Construction of Airports," and minimization and mitigation measures mandated by permitting requirements and/or other special purpose laws, no additional mitigation measures are necessary to ensure less than significant impacts.

As referenced above, there are regulatory permits or certifications that impose mitigation requirements to minimize environmental impacts during implementation of the Proposed Action. The Sponsor is responsible to acquire and comply with all applicable permits and certifications throughout the implementation/construction of the Proposed Action.

Regulatory permits or certificates required for this Proposed Action include:

- *Clean Water Act* Section 404 Individual Permit;
- *Clean Water Act* Section 401 Water Quality Certification;
- NPDES Construction Stormwater Permit NCG010000; and,
- Phase II Stormwater Permit (post construction).

VII. PUBLIC PARTICIPATION / PUBLIC COMMENT

The Asheville Regional Airport Authority issued a public notice of availability of an EA and notice of opportunity for a public hearing for the proposed project, in *The Asheville Citizen-Times* on Friday, June 3, 2011, with the last day for comment being July 5, 2011. Additionally, letters were sent to seven adjacent residences that would experience temporary or permanent changes in noise levels as a result of the proposed project. Although one comment letter was received from the public, no requests for a public hearing were made. The comment letter voiced concerns regarding construction impacts, such as noise and dust, which will be mitigated by limiting typical construction hours to between 7:00 A.M. and 5:00 P.M., as much as possible, and through implementation of on-site Best Management Practices to reduce dust and minimize the construction air "footprint" of the Selected Alternative. These Best Management Practices could include: reducing equipment idling times; limiting construction activities during high wind periods to minimize dust generation or when atmospheric conditions are conducive for ozone formation; regularly applying water or dust suppressants to unpaved areas; reducing vehicle speeds on unpaved roads on the Airport property; and covering materials stockpiles.

VIII. AGENCY FINDINGS

In accordance with applicable law, the FAA makes the following findings/determinations for the Proposed Action, based upon the appropriate information and data contained in the EA.

- Certification under 49 U.S.C. §44502(b) (formerly Section 308 of the *Federal Aviation Act of 1958*, as amended). I certify that the proposed improvement project is reasonably necessary for use in air commerce or for national defense.
- Based on the EA, no significant environmental impacts would be incurred as a result of the Federal action.

IX. DECISION AND ORDER

The FAA has determined that environmental and other relevant concerns presented by interested agencies and private citizens have been addressed sufficiently in the EA, hereby acknowledged and fully and properly considered in the decision-making resulting in this ROD. The FAA concludes there are no outstanding environmental issues to be resolved by it with respect to the proposed project.

The No-Action Alternative fails to meet the purpose and need for the proposed project. For reasons summarized earlier in this ROD, and supported by disclosures and analysis detailed in the EA, the FAA has determined that the Sponsor's proposed project is a reasonable, feasible, practicable and prudent alternative for a Federal decision in light of the established goals and objectives. An FAA decision to take the actions and approvals required by the Sponsor is consistent with its statutory mission and policies supported by the findings and conclusions reflected in the environmental documentation and this ROD.

After reviewing the EA and all of its related materials, I have carefully considered the FAA's goals and objectives in relation to various aeronautical aspects of the proposed development actions discussed in the EA, including the purpose and need to be met by this project, the alternative means of achieving them, the environmental impacts of these alternatives, the mitigation necessary to preserve and enhance the environment, and the costs and benefits of achieving the purpose and need.

While this decision does not approve Federal funding for the proposed airport development and does not constitute a Federal funding commitment, it does provide the environmental findings and approval for proceeding to funding actions in accordance with established procedures and applicable requirements.

After careful and thorough consideration of the facts contained herein, the undersigned finds that the proposed Federal action is consistent with the national environmental policies and objectives as set forth in Section 101(a) of NEPA and that with the mitigation that is a part of the project it will not significantly affect the quality of the human environment or otherwise include any condition requiring consultation pursuant to Section 101(2) (C) of NEPA.

This ROD presents the FAA's final decision and approvals for the actions identified, including those taken under the provisions of Title 49 of the United States Code, Subtitle VII, Parts A and B. These actions constitute a final order of the Administrator subject to review by the Court of Appeals of the United States in accordance with the provisions of 49 U.S.C. Section §46110.

Issued in College Park, Georgia

Scott L. Seritt

19 August, 2011

Scott L. Seritt
Manager
FAA, Atlanta Airports District Office

Date

PUBLIC NOTICE

AGENCY: Federal Aviation Administration, DOT

The Federal Aviation Administration (FAA) has assessed the potential environmental impacts for the proposed Runway Reconstruction, and New Parallel Taxiway improvements at the Asheville Regional Airport, Fletcher, North Carolina. The FAA has determined the project as proposed would not significantly affect the quality of the human environment and that an Environmental Impact Statement (EIS) is not necessary. An Environmental Assessment (EA) was prepared and a Finding of No Significant Impact (FONSI)/Record of Decision (ROD) was issued on August 19, 2011. The EA and FONSI/ROD are available for review by the public for thirty (30) days at the following locations:

FAA Southern Region
Atlanta Airports District Office
1701 Columbia Avenue, Suite 2-260
College Park, GA 30337

and

Insert location(s) where the EA and FONSI/ROD are available for review in Sumter County

For additional information contact:

Dana Perkins
Environmental Program
Specialist Atlanta Airports District
Office (404) 305-7152

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