SEVEN PORTALS STUDY

An Investigation of How Economic Development Can be Encouraged in North Carolina Through Infrastructure Investment

Master Report

Final

December 31, 2011

Cover illustrations by Sherman Architect, PLLC
Used with permission from the Piedmont Triad Partnership

TECHNICAL REPORT DOCUMENTATION PAGE

Report No. **FHWA/NC/2010-34-0**	Government Accession No.	Recipient's Catalog No.
4. Title and Subtitle **Seven Portals Study: An Investigation of How Economic Development Can be Encouraged in North Carolina Through Infrastructure Investment − Master Report**		Report Date **December 31, 2011** Performing Organization Code
Author(s) **George F. List and Robert S. Foyle**		Performing Organization Report No.
Performing Organization Name and Address **North Carolina State University** **Department of Civil, Construction and Environmental Engineering** **Campus Box 7908, Raleigh, NC 27695-7908**		Work Unit No. (TRAIS) Contract or Grant No.
Sponsoring Agency Name and Address **North Carolina Department of Transportation** **Research and Analysis Unit** **104 Fayetteville Street, Room 268** **Raleigh, NC 27601**		Type of Report and Period Covered **Final Report** **July 1, 2010 – December 31, 2011** Sponsoring Agency Code **2010-34**
Supplementary Notes:		

Abstract

This report describes ways in which North Carolina's transportation infrastructure investments can help with economic development and the creation of jobs. The ideas unify regional interests—in economic development and infrastructure investment—to create an overarching vision of how transportation investments can help expand the state's economy.

The overall goal of the study was investigating potential logistics villages throughout the state and identifying what infrastructure improvements are needed to support such a village at that location. The initial focus was proximity for air, rail, and highway connectivity at potential sites, but regional studies discovered other possibilities for successful villages. The study does not recommend specific sites above others.

There were 35 sites investigated as potential logistics villages, with strengths, weaknesses, and needs identified for each site. In two cases, a virtual logistics village emerged as appropriate for that region of the state. The report also describes statewide activities for rail and maritime shipping, and highway infrastructure needs across the state. Eventually seven business sectors emerged as common across many regions of the state. They are: Agriculture, Military, Tourism, Aerospace, Transportation, Manufacturing, and Health.

Key Words **Logistics, Freight Shipments, Development, Cargo, Commodity, Infrastructure, Logistics Village, Distribution Center**	Distribution Statement

Security Classif. (of this report) Unclassified	Security Classif. (of this page) Unclassified	No. of Pages 135	Price

Seven Portals Study

An Investigation of How Economic Development Can Be Encouraged in North Carolina Through Infrastructure Investment

MASTER REPORT

By

George F. List, Ph.D., P.E.
Study Principal Investigator and
Professor
Department of Civil, Construction and Environmental Engineering
North Carolina State University

with key faculty and staff at:

East Carolina University
NC A&T State University
NC State University
UNC Chapel Hill
UNC Charlotte
UNC Greensboro

and

Larry R. Goode, Ph.D., P.E., consultant
Mr. Dave Hauser, Piedmont Triad Regional Partnership

For the

Governor's Logistics Task Force
and
The North Carolina Department of Transportation

Final Report

December 31, 2011

Disclaimer

The contents of this report reflect the views of the authors and not necessarily the views of the University. The authors are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the North Carolina Governor's Office, the North Carolina Department of Transportation, the North Carolina Department of Commerce, nor any other state agency or state authority at the time of publication. This report does not constitute a standard, specification, or regulation.

Acknowledgements

This report is the result of dedicated efforts by a diverse study team. Each individual mentioned contributed in some significant way towards the report content. Study team members included:

NCSU/ITRE Team

Dr. George List, P.E. – Principal Investigator responsible for and involved in all aspects of the entire project, lead writer, editor

Mr. Robert Foyle, P.E. – Co-Principal Investigator responsible for and involved in all aspects of the entire project, lead writer, editor, Research Triangle Regional Partnership team leader

Dr. Alixandra Demers, P.E. – Steering Group member, assistant project manager, report formatter and editor, recorder of meeting minutes, and Research Triangle Regional Partnership team member

Dr. John Stone – Advantage West team leader

Mr. Daniel Findley, P.E. – Advantage West team member

Other Universities

Dr. John Kasarda, UNC-Chapel Hill – Steering Group member, North Carolina's Eastern Region team member

Dr. Daniel Rodriguez, UNC-Chapel Hill – Steering Group member, North Carolina's Eastern Region team member

Dr. Steven Appold, UNC-Chapel Hill – North Carolina's Eastern Region team member

Dr. Gary Teng, UNC-Charlotte – Charlotte Regional Partnership team member

Dr. Edd Hauser, UNC-Charlotte – Charlotte Regional Partnership team member

Dr. Joyendu Bhadury, UNCG – North Carolina's Southeast team member

Mr. Sam Troy, UNCG – North Carolina's Southeast team member

Dr. Michael Smith, Western Carolina University – Advantage West team member

Dr. Kay Dobie, NCA&T – Piedmont Triad Partnership team member

Dr. Leslie Pagliari, East Carolina University – North Carolina's Northeast team member

Dr. Richard Monroe, East Carolina University – North Carolina's Northeast team member

Consultants

Dr. Larry Goode, P.E. – Steering Group member, strategist, writer

Mr. Dave Hauser – Strategist, Piedmont Triad Partnership team member

The study team greatly appreciates the support and invaluable contributions and guidance from the North Carolina Department of Transportation, the North Carolina Department of Commerce, the members of the Governor's Logistics Task Force (see next page) and the staff assigned to support the Task Force. Additionally, extensive contacts were made within each commerce region with public and private sector individuals deemed to have relevant input to the study. This study could not have been completed without the cooperation and insights from all of these individuals. The separate region reports contain the organizations and names of individuals contacted as part of this study.

Governor Perdue's Logistics Task Force Membership

Walter Dalton	NC Lt. Governor, Chair
Al Delia	Senior Advisor to the Governor
Gene Conti	Secretary, NC Department of Transportation
Keith Crisco	Secretary, NC Department of Commerce
Dee Freeman	Secretary, NC Department of Environment and Natural Resources
Clark Jenkins	Member, NC State Senate
Michael Walters	Member, NC State Senate
Nelson Cole	Member, NC House of Representatives
Danny McComas	Member, NC House of Representatives
Dawn Clegg	Arvin-Meritor
Allen Joines	Mayor, Winston-Salem
Dan Danieley	Manager, Burlington-Alamance Regional Airport
Patricia Long	Vice-Chair, Longistics International
Earl Brinkley	Director of Global Logistics, John Deere, retired
Guy Shavender	Shavender Trucking
Dee Blackwell	Executive Director, Western Piedmont Council of Governments
Terry Bellamy	Mayor, Asheville
Thomas Eagar	CEO, NC Ports Authority
John Atkins III	Chair, North Carolina Railroad
Jerry Orr	Manager, Charlotte Douglas International Airport
Bob Morgan	President, Charlotte Chamber of Commerce
S. Gary Teng	Director, Center for Logistics, UNC Charlotte
Paul Kauffmann	Chair, ECU Department of Engineering
Larry Wooten	President, NC Farm Bureau
Gen. Beth Austin	Brigadier General, Assistant Adjutant General to the Army, NC National Guard
David Willauer	Manager, Transportation & Geospatial Technologies Division, IEM, Inc.
David Congdon	President and CEO, Old Dominion Freight Line
Lewis Ebert	President and CEO, North Carolina Chamber
Joseph S. Stephens	Managing Director, AGFS Lighthouse District, FedEx Express
Paul Friday	Deputy AC/S G-5, Director Government and External Relations, MCIEAST

Table of Contents

List of Figures

List of Tables

List of Acronyms

APOE: Aerial Port of Embarkation (particularly, a boarding location for troops going overseas)
AVL: Asheville Regional Airport
BCC: Brunswick Community College
BRAC: Base Realignment and Closure Commission
CAGR: Compounded Annual Growth Rate
CFCC: Cape Fear Community College
CGIA: Center for Geographic Information and Analysis
CLT: Charlotte Douglas International Airport
CRISP: Charlotte Railroad Improvement &. Safety Program
CRO: Research Contract Organization
CSX: CSX Corporation at *www.csx.com*
DOD: Department of Defense
ESRI: Environmental Systems Research Institute at *www.esri.com*
E/W: East-West
FAA: Federal Aviation Administration
FAY: Fayetteville Regional Airport
FIS: Federal Inspection Services
FORSCOM: U.S. Army Forces Command
FTZ: Foreign Trade Zone
GIS: Graphic Information Systems
ILP: International Logistics Park of North Carolina
ILM: Wilmington International Airport
ILS: Instrument Landing System
ITRE: Institute for Transportation Research and Education
ITS: Intelligent Transportation Systems
L-M: Laurinburg-Maxton
MEB: Laurinburg-Maxton Airport
MOTSU: Military Ocean Terminal at Sunny Point
MPO: Metropolitan Planning Organization
MSA: Metropolitan Statistical Area
NCDOC: North Carolina Department of Commerce
NCDOT: North Carolina Department of Transportation
NCIT: North Carolina International Terminal
NCRR: North Carolina Railroad
NCSE: North Carolina's Southeast Region
NCSPA: North Carolina State Ports Authority
NCSU: North Carolina State University
N/S: North-South
PNG: Piedmont Natural Gas
PPD: Pharmaceutical Product Development Company
PTI: Piedmont Triad International Airport
PWC: Public Works Commission
RCC: Richmond Community College

RDU: Raleigh-Durham International Airport
RPO: Rural Planning Organization
RR: Railroad
RTP: Research Triangle Park
SEHSR: Southeast High Speed Rail Corridor
SBTDC: Small Business and Technology Development Center
TIP: Transportation Improvement Plan
UNCG: University of North Carolina at Greensboro
UNCW: University of North Carolina at Wilmington
USACE: United States Army Corps of Engineers
USARC: United States Army Reserve Command

Executive Summary

This report describes ways in which North Carolina's transportation infrastructure investments can help with economic development – and the creation of jobs. The ideas unify regional interests – in economic development and infrastructure investment – to create an overarching vision of how transportation investments can help expand the state's economy.

The overall goal of the study was investigating potential logistics villages throughout the state and identifying what infrastructure improvements are needed to support such a village at that location. The initial focus was proximity for air, rail, and highway connectivity at potential sites, but regional studies discovered other possibilities for successful villages. The study does not recommend specific sites above others.

The main findings are that:

- The state has to partner with the private sector in this initiative. Its *supply-push* investments need to be linked to *demand-pull* initiatives undertaken by the business sector.[1]
- The state needs to partner with organizations like the regional partnerships and the Eastern Band of the Cherokee Indians to work locally with business to transform commerce ideas into reality.
- These organizations also need to partner with one another – and with their neighboring states where appropriate – assisted by state-level leadership – to achieve the greatest common good.
- Economic sectors around which the infrastructure investments can be focused include: agriculture, military support, aerospace, transportation and logistics, manufacturing, health and wellness (biomedical, pharmaceutical, and rehabilitation), and tourism.
- The inter-dependencies among these sectors need to be recognized and supported. A good example is the tight connection between agricultural activity and military support.
- Land conservation and zoning measures should complement business activity, such as preserving agriculture land near military bases and over fly zones and restricted zoning for both land use compatibility and height issues surrounding airports.
- High quality higher education and information outreach is critical for continued business prosperity and growth in many areas, e.g., biotechnology, gaming, and healthcare.
- International portals can help tie the state to the world. This includes ocean-side ports as well as inland ports – locations where goods can pass through US Customs. Via these portals, North Carolina can engage more directly in international commerce.[2]
- A portal in every economic development region is a somewhat bold move; but it would tie every local North Carolina doorstep more closely to the world economy. It would be the 21st century equivalent of building the farm-to-market roads. To make this happen,

[1] This includes the military activities in the state and other Federal initiatives.
[2] Related to this is the activation/re-activation of foreign trade zones like the one at Morehead City. These could be linked to the portals, like linking Morehead City to Global TransPark.

partnering with US Customs, the US Department of Agriculture, and possibly other federal agencies would be critically important. Some portals might be large; some small; and they could have varied scopes and purposes that reflect regional identities. Connectivity is the key.

- Such portals already exist in some of the regions, like Wilmington (port and ILM), Morehead City (port), RTP (and RDU), Charlotte (and CLT), and Greensboro (and PTI). Other places that could be considered include GTP, Asheville (and AVL), the I-95/US-70 vicinity (e.g., Selma/Smithfield), and the I-95/US-74 vicinity (e.g., Lumberton/Maxton). This list is not exhaustive. The regional reports describe more than 30 sites. Two regions lack portals: North Carolina's Northeast and Advantage West.
- Increased support for domestic transportation and distribution is also important. The state is in a natural location to play a prominent role in logistics along the eastern seaboard. Future demands for highway, rail, and water commerce—intrastate and interstate—will identify gaps in existing infrastructure where investments now will facilitate goods movements later.
- Both *transportation and land use* need to be planned. After careful environmental analysis, rights-of-way need to be set-aside for future network growth. And those choices then need to have staying power, so the facilities can eventually be built. The state also needs to engage in strategic land use partnerships with the counties and local governments.
- The state needs to make investments that help businesses grow, without over investing. It needs to invest where its dollars can make the biggest difference; and where private sector dollars are relatively scarce and need to be attracted to help the local economy grow faster. For example, investments in the Andrews/Murphy area, made in partnership with the Eastern Band of the Cherokee Indians, have the potential to be a game-changer for that part of the state.
- The state needs to take incremental steps by advancing supply-push initiatives to sensible milestones – while not expending scarce public funds to create underutilized facilities. At the same time, businesses must be engaged to use new infrastructure in support of their needs (demand-pull).
- North Carolina should become the "best wired" state in the nation. This would attract businesses that are IT-intensive (and typically high-valued products and jobs). The service should be ubiquitous, wired and wireless. Businesses could manage their day-to-day activities anytime, anywhere, seamlessly.
- The state should make more extensive use of the North Carolina Railroad (NCRR). NCRR could help build statewide rail service that provides greater accessibility, higher capacity, better competitive rates, shorter lengths of haul, and more frequent service. The state should grow the network of short lines, play a greater role in rail network planning and service provision, freight and passenger, and work with the Class 1 railroads to find win-win solutions.[3] Rail improvements would support both intrastate and interstate commerce and passenger travel, and these demands should be known prior to new investments.

[3] See, for example, the letter of April 12, 2011 from Secretary Conti to Chairman Elliot of the Surface Transportation Board related to Ex Parte 705.

- The state should invest in its ports. The reason is more related to exports than imports. North Carolina can capitalize on its agricultural and other natural assets and help the US with its balance of trade challenges.

Additionally, what emerged from the regional studies, and from presentations at the Task Force meetings held across the state, were seven business sectors where logistics needs must be met for there to be economic success. These seven business sectors are graphically presented in Figure ES-1.

Figure ES-1: **Relationship of Business Sectors to Logistics**

These sectors do not represent all business sectors affecting North Carolina's commerce activities. Rather, they depict a subset of important themes that resonated across many regions of the state and are clearly important sectors for the state in helping identify infrastructure needs that can make a difference in the future economic success of the state.

While not explicitly shown, the excellent university and community college systems in NC certainly support all economic sectors by providing degrees, trades, and information exchange important for business to remain strong throughout the state. High quality education and information exchange is vital for continued business prosperity.

1 Introduction

This report presents ideas about how North Carolina can tie its transportation infrastructure investments to economic development – and the creation of jobs. It ties regional interests into a unified whole – in terms of economic development and infrastructure investment – that speaks to the natural strengths the state enjoys. The report is prepared to support the work of Governor Perdue's Logistics Task Force.[4]

The overall goal of the study was investigating potential logistics villages throughout the state and identifying what infrastructure improvements are needed to support such a village at that location. The initial focus was proximity for air, rail, and highway connectivity at potential sites, but regional studies discovered other possibilities for successful villages. The study does not recommend specific sites above others.

Six university teams developed the materials presented. NC State led the effort, overseeing the work of the other teams, integrating their findings and developing ideas for two regions: the Research Triangle Regional Partnership and Advantage West (western North Carolina). ECU focused on North Carolina's Northeast; UNC-Chapel Hill, North Carolina's Eastern Region; UNC-Greensboro, North Carolina's Southeast; NCA&T, the Piedmont Triad Partnership; and UNC-Charlotte, the Charlotte Regional Partnership.

1.1 *Methodology*

The approach to developing the study's findings had two threads. The first was a set of regional studies that explored investment opportunities at the local level. The second was a statewide look at the status of infrastructure investments, especially for the highway and rail networks as well as the ports, the IT network, and the pipeline and power networks.

Each regional investigation started by gathering information about the demographics and economics of their region: population, employment, major businesses, highway and rail networks, IT, pipelines, airports, ports or supporting ports, current business development plans, and other supporting information.[5] Then, sites were identified where major game-changing growth could occur. Sites were initially selected in proximity to highway, rail, and air access, including land on or adjacent to an airport. About 400-500 acres, or larger, was the target size and would support activities of a logistics village. In the end, some 30+ sites across the state were reviewed in detail – their strengths, shortcomings, and investment needs to expand their success. Initially, these sites were centered on the airports across the state, thinking that air cargo and business jet connectivity might be key ingredients to the best and fastest job creation. But as the investigations unfolded, and the state's economic picture became clearer, the role of the airports altered and other infrastructure needs emerged. It also became apparent that the study needed to look for infrastructure investments that would benefit all businesses.

[4] http://www.governor.state.nc.us/NewsItems/ExecutiveOrderDetail.aspx?newsItemID=815
[5] This input also came from the Logistics Task Force meetings conducted throughout the state.

The statewide study began by collecting information about the status of the various transport networks across the state. It expanded to include IT and power. Each type of infrastructure was then examined to look for needs, studying the current state of the system or network, plans for its maintenance, expansion, and modernization, and the relationship of these systems to the corresponding systems in neighboring states and across the nation.

The investment ideas were vetted by sharing them with the regional development organizations, local metropolitan planning organizations (MPOs) and rural planning organizations (RPOs), NCDOT division staff, the project's steering committee, the Regional Hub Design Subcommittee, and the Logistics Task Force.

The result was this statewide investment report that portrays ways in which North Carolina could place itself and its businesses in a stronger position in the world and domestic economies. It is accompanied by seven regional reports that examine these same issues at the local level by investigating over 30 potential sites. This statewide report ties together the regional studies and talks about ways in which the regions can partner to produce a greater common good.

1.2 *Guide to the Report*

The remainder of the report is organized as follows. Chapter 2 sets the context. It describes global, domestic, and regional trends that help the reader understand why the suggested investments make sense. It also discusses fundamental concepts like the idea of logistics villages, which play pivotal roles in the ideas presented.

Chapter 3 looks at infrastructure investment opportunities from the perspective of economic sectors in which the state seems to have a natural advantage. It sets the stage for the more detailed regional analyses and gives an economic context in which to view them.

Chapter 4 reviews the findings of the individual regional studies. It highlights the regional demographics, the major investment sites that were reviewed, and the conclusions reached.

Chapter 5 presents a cross-cutting analysis of the regional materials, looking across each mode or enabling resource. The chapter highlights opportunities for infrastructure investment within the highway network, the rail network, the airports, and other resources on which the state's commerce depends.

Chapter 6 provides a summary of the entire study.

2 Background and Context

The study's findings are easiest to understand if the background and context of the study are understood. This chapter discusses the history behind the study and the relationship of North Carolina to the world economy. It starts with a quick summary of the highlights from the 2008 Statewide Logistics Plan Study. The importance of engaging the business sector in all discussions and plans is paramount for future success and is discussed next. Some global trends are presented to show the overall patterns and shifts in world commerce that will take place within the next four decades with growth from China, India, Brazil, Italy and Indonesia. This is followed with national and North Carolina trends in population, economy, employment, emphasis sectors, commodity flows, trucking corridors, rail corridors, seaports, airports, and the concept of logistics villages.

2.1 *The 2008 Statewide Logistics Plan Study*

The history of this study begins with the 2008 Statewide Logistics Plan. It emanated from a recognition that an inherent coupling exists between transportation infrastructure investments and economic development.[6] By seeing this, North Carolina returned to what might be the primary motivation for creating transportation infrastructure – getting goods to market.[7] It also recognizes that different types of transportation infrastructure investments are needed to support different commerce sectors.[8] Airports encourage tourism, air freight, and high-value manufacturing; ports encourage distribution and international commerce; intermodal terminals encourage goods distribution and manufacturing.

Consistent with these thoughts, House Bill 1005, Session Law 2007-551, instructed the North Carolina Office of State Budget and Management to develop a statewide logistics plan. With the help of ITRE, an initial draft of that plan was developed.[9] It indicated that NCDOT needed to:

- Identify priority commerce needs.
- Enumerate transportation infrastructure actions that would prompt economic growth.
- Partner with other state agencies and the private sector to fine tune the definition of these needs and actions and garner support for carrying them out.
- Create a timetable and a more detailed plan for making investments.

Outreach was a key element of the study. Six visioning sessions were held across the state during February and March 2008 in Wilmington, Greenville, Raleigh, Greensboro, Charlotte, and Asheville. Participants invited included representatives from federal, state and county agencies, private trucking firms, universities, and other authorities with a total of 61 attendees (47 from

[6] As someone in Iowa once observed, complaints about the local grain elevator destroying the roads should not be seen as a problem to get rid of, but rather a cause for celebration – that the industry is so prosperous that it can by itself support the local need for jobs. To help it succeed, keeping the roads in good shape is paramount.
[7] Consider the Appian Way, the Incan roads, the Silk Road in Asia.
[8] For example, what is needed to support coal exports is not the same as the distribution of vaccines.
[9] The team leadership on this current project is the same as on that prior one.

public agencies and 14 from private companies). The study team also conducted a survey of 600 logistics and trucking firms in North Carolina. A total of 107 survey responses were obtained. It also interviewed over 40 leading transportation, logistics, trucking, legislative, and state agency individuals both within and outside of North Carolina. Moreover, four leading groups came and gave presentations to the study team on global freight activity and what this means for North Carolina. The presentations were provided by Global Insight, Tompkins Associates, Cambridge Systematics, and Prime Focus LLC. All of these efforts were vital in providing the study team with a clear picture of world economics and global logistics that would support this economic activity. At that point in time, North Carolina had 93 companies importing and/or exporting goods through the NC ports.

A model of the state's economy was needed. Figure 2-1 portrays the one that provided a backdrop for the 2008 study's findings. The state's economy was seen as being comprised of businesses and households. These create logistics patterns: supply chains and distribution networks. The freight infrastructure, provided by NCDOT and the freight carriers, attempts to align with these patterns, either pro-actively or in response to emerging trends. These two together produce network-level commodity and vehicle flow patterns: trucks, planes, ships, rail cars, etc. Laws, regulations, and practices influence the way in which these aspects of the logistics system work together and the path they follow into the future. Commerce and land use planners tend to look at the puzzle from the top down: land use → logistics patterns → infrastructure → flows, while transportation people often see it the other way: flows create a demand for infrastructure which then alters logistics patterns and ultimately economic structure. Public policy experts see the sidebar first: that is, laws, regulations and policies that affect the interplay between the stack of boxes. There are metrics that drive this decision making such as maximization of the gross state product (GSP), consistency in the performance (reliability) of the transportation system, sustainability, and enhancement of the quality of life.

Figure 2-1: Structure of the Logistics Economy
(Source: Cambridge Systematics)

One action that seemed to have potentially significant value was the creation of a "freight logistics authority." This authority would guide, oversee, and help synchronize the investments in transportation infrastructure made throughout the state. Possibly comprised of representatives from private industry and public agencies, it would work with private industry (e.g., shippers, carriers, logistics managers) and public agencies (e.g., DOT itself, ports, railroads, toll roads, the Department of Commerce, and the Department of Environmental and Natural Resources) to create plans for investments that would improve the state's prosperity and quality of life. The Governor's Logistics Task Force is an outgrowth of this idea.

Other major thoughts that emerged from the study were:

Embolden the Knowledge-Based Economy: Stress new infrastructure investments in logistics enterprises that support growth in advanced manufacturing, software and information technology, bio-pharmaceuticals, and financial services. A key infrastructure in this sector is aviation. One outside-the-box thought was to ensure that every town and city in North Carolina was within an hour of a 7,000-foot ILS Category III-C runway.[10] That would mean, under any and all weather conditions, that a landing site for a regional jet would be an hour away or less.[11] Products could get quickly to market anywhere in North America. It would mean upgrading some of the lower tier airports; but then all population centers in the state would be reachable, for either inbound or outbound flights, at any time. It would make every area in the state attractive to companies that engage in biotechnology, information and communications technology, and business and financial services, let alone tourism and other person-focused service industries. It was admittedly an avant-garde example of an investment strategy that could be pursued.

Support Existing Industries: Make strategic investments in highway, rail, and air freight capacity to aid the state's already-thriving industries like agriculture,[12] motor vehicle parts and supplies, heavy equipment, chemicals, plastics, and rubber.

Transform NCDOT into an operations-based agency: One that is concerned with the quality of service it provides to its customers, especially highly reliable travel times, levels of safety, and degrees of security. This means minimizing non-recurring congestion, minimizing clearance times for incidents and accidents, providing one-stop-shopping for permits and other clearances, being pro-active at decision-focused meetings among private interests and public agencies, bringing value added to the supply-chain equation for all forms of commerce.

Support Import/ Export Activity: make investments in the ports of Wilmington and Morehead City. Provide on-site improvements and better truck and rail access. Continue to support the development of the North Carolina International Terminal.[13] Carefully determine what customers it should serve and how large it should be. For example, it might strive to compete with Hampton Roads, Charleston, and Savannah, and capitalize on the emerging growth in container traffic entering east-coast ports. It seems like an expensive "me-too" strategy that would involve considerable land use,[14] or a clever plan to move the distribution center logistics activity significantly inland.[15] It might, instead, focus on a niche cargo markets consistent with other strategic initiatives, like support for military activities.

---

[10] http://en.wikipedia.org/wiki/Instrument_Landing_System

[11] For example, http://world.honda.com/HondaJet/ and http://www.crj.bombardier.com/CRJ/en/home_crj.jsp?langId=en&crjId=200

[12] Including crops that would support biofuels or other bio-manufacturing activities.

[13] In light of the Section 905(b) findings by the USACE, this recommendation has been superseded by the study now underway which is intended to determine what logical roles North Carolina could play in the maritime industry.

[14] The amount of land needed by ports like Norfolk, Charleston, and Savannah to handle millions of TEUs per year is considerable. Aerial images suggest areas the size of metropolitan Raleigh. Whether this is compatible with quality of life expectations along the seacoast or not is unclear.

[15] One bold way to disentangle these conflicting objectives would be to move the distribution center activity significantly inland, say near I-95 and build dedicated use facilities, like a rail line and a truckway that connect the new port to this inland location.

Partner with Military Investments: make the state's transportation infrastructure align with military logistics needs. With North Carolina having the fourth largest military presence in the nation, there ought to be ample opportunities to provide support for defense-related industries. This would include day-to-day activities related to troops and supplies as well as major airlifts and sealifts associated with activities abroad (e.g., Iraq, Afghanistan, and future humanitarian and peacekeeping missions). North Carolina could respond to these needs by configuring facilities like the Global TransPark to support major airlifts; to have the rail network (like the path from Fort Bragg to NCIT) be well configured to facilitate shipments of heavy equipment; and, with the intense security already being provided at MOTSU, [16] design NCIT to deal with the very high security military sealifts.[17]

Facilitate Pass-Through Traffic: support the needs of the traffic traveling north-south, particularly on I-95, I-85, and I-77. Use tolls, mileage taxes, or other use-based mechanisms to recover the costs. Provide high value-added services, including expedient incident response to minimize delays, high-quality plazas, and ubiquitous high-bandwidth internet access. It might also mean constructing dedicated use facilities, like truckways that make it possible for such trips to traverse the state without interfering with local travel patterns.

Support Innovations in Transportation Infrastructure: Continue to support, and perhaps expand development, experimental deployment, and implementation of innovations in transportation infrastructure including ubiquitous WiFi support for truckers along major commerce corridors, high-speed tolls, use of RFID tags and other wireless technologies to expedite truck inspections and other types of oversight surveillance, use of ADS-B for aircraft routing, and 24/7/365 electronic permit support.[18]

---

[16] http://www.globalsecurity.org/military/facility/sunny-point.htm

[17] These ideas are relevant today more generally in the context of the maritime study presently underway.

[18] In addition to developing freight analysis tools, FHWA stresses using ITS in freight transportation. Targeted use of ITS for supply chain steps can boost reliability and productivity of freight transportation, and improve global connectivity for domestic and international trading partners. In operational tests at the Chicago O'Hare International Airport and the New York City-JFK International Airport, ITS technologies, such as the Electronic Supply Chain Manifest System, reduced the time spent on processing manifests and transferring loads from one mode to another by 56 to 100 percent. Moreover, processing drivers at air cargo facilities was two to four times faster than using a manual, paper-based system. The time savings resulted in estimated cost savings per shipment of $1.50 to $3.50. ITS technologies are also important for security and safety. "Security and safety have always been a concern, but particularly now because of the potential for threats to the supply chain," says Michael Onder, leader of the Intermodal Freight Technology Team in FHWA's Office of Freight Management and Operations. The use of ITS technologies offers greater visibility and potentially a more secure supply chain. Information about ownership and location of freight as it moves through the supply chain is essential to achieving the reliable, efficient, and secure movement of goods – providing the thread that binds individual operations into an efficient intermodal system. Thus, FHWA has launched several intermodal freight technology initiatives. They include testing of ITS freight technologies and developing models to simulate needed changes in infrastructure and operations at border crossings. They also involve partnering with industry to conduct deployment tests that provide cost/benefit data associated with the implementation of various products and practices. And FHWA is partnering with border working groups to ensure that the technology development and deployment initiatives satisfy transportation and security enforcement needs. The agency also supported a U.S.DOT effort to use electronic seals (E-seals) on container shipments. The E-seal emits a radio frequency as it passes reader devices, displaying information about the container. In an operational test, FHWA affixed E-seals to track cargo between gateways in Canada and the Pacific Northwest. Using this technology in dedicated truck lanes on both sides of the border is expected to reduce truck delays by 800,000 hours per year. This reduction in delays can save an estimated $150 million annually in truck operating costs, including

These principles suggested a plan of action for the short, medium, and long-run that is shown in Table 2-1.

fuel, driver wages, and maintenance. Source: http://www.tfhrc.gov/pubrds/04nov/09.htm. .

Table 2-1: Actions Recommended by the 2008 Statewide Logistics Plan

	Short-term (0 – 5 years)	Medium-term (5 – 15 years)	Long-term (15 – 25 years)
Across all modes	▪ Create a Freight Logistics Authority ▪ Study linkages between transportation and economic development ▪ Develop data and performance metrics ▪ Support existing and future industries ▪ Support innovations in transportation infrastructure	▪ Track and participate in freight initiatives (federal, multi-state, etc.) ▪ Support NC DOC initiatives and grow a knowledge-based economy ▪ Land bank for future freight-related facilities ▪ *Eliminate freight bottlenecks* ▪ *Make investments in a few new corridors (multimodal, military)*	▪ Monitor and support system's health through Programmatic Initiatives ▪ Plan for and create freight hubs (public- private cooperation)
Air	▪ Control land use in flight path areas	▪ *Improve access to airports, esp. highways*	▪ *Create ubiquitous air cargo support*
Highway	▪ Transition NC DOT to an operations-focused agency ▪ *Mitigate moderate to severe congestion in collector/ distributor networks, urban interstates and connectors* ▪ *Provide adequate truck parking*	▪ *Make I-95 investments (supports pass-through traffic)* ▪ *Create Charlotte to Wilmington multimodal corridor* ▪ *Enhance, expand the primary highways of the National Truck Network*	
Ports	▪ Offer support for NCIT EIS process	▪ *Support efforts to build NCIT (supports import/ export activities)*	▪ *Improve rail and road access to/from (supports import/export activities)*
Rail	▪ Encourage the Crescent Rail Corridor ▪ *Retain existing rail corridors; halt track removal* ▪ *Support short-line infrastructure improvements*	▪ Coordinate schedules carefully to optimize freight and passenger services ▪ *Create Charlotte to Wilmington multimodal corridor* ▪ *Expand high-use corridor capacity*	▪ *Provide rail access to NC SPA inland terminals*

Notes:
Underlined text = policy-based actions to support infrastructure decision-making
Italic text = infrastructure actions

In conclusion, the 2008 study team determined that North Carolina should begin taking actions. It should commit to coordinating economic development and infrastructure investment. It should focus on jobs and increasing the income stream, and then also, synchronously, use that income stream to fund infrastructure investments that allow the expanding economy to thrive. It should think about creating a new, small, government authority with full-time staff positions that would coordinate commerce and transportation, and perhaps other government services. The freight logistics authority, comprised of private and public sector representatives, would help steer that coordination.

2.2 *Partnering with the Business Sector*

A major premise of the current study is that the business sector has to be a partner in everything the state does related to logistics. Economic growth, within the state or within a region, is dependent on business-driven increases in the size of the labor force, the wage rates, the investments in capital equipment (factor accumulation), and enhancements in productivity.[19] This means state-led *supply-push* logistics initiatives will only yield value if they are accompanied by *demand-pull* commerce-expanding initiatives undertaken by the business sector. The state can be an enabler and a facilitator, but it cannot by fiat turn its visions into reality. It has to partner with the business sector to make it happen.

The business sector can only be engaged if the state understands what it needs – from a commerce-friendly regulatory environment to attractive, use-ready sites that excel in the attributes shown in Table 2.2.[20] Businesses, like people buying houses, want to find sites that are in "move-in" condition – places where they can begin construction right away or even start operations – where everything is in place. Conversely, deals can be lost – and companies can decide to go elsewhere – if the "to do" list is too long, the hurdles to be overcome are too high, or the wait time is too long. In addition to these siting criteria, business executives need access to air services when and where their needs dictate. And, location decisions are influenced by the ability and cost of serving customers from that location.

Table 2-2: Siting Criteria

- Sites and/or building suitability
- Site preparation
- Utility infrastructure (availability, capacity, cost, reliability)
- Transportation infrastructure
- Demographics
- Labor markets (availability, quality, costs)
- Training resources and delivery
- Education (primary, secondary, postsecondary)
- Taxes
- Financing opportunities
- Quality of life (e.g., medical services, housing availability and cost, etc.)
- Leadership and political climate
- Incentives

Partnering with businesses also involves understanding how the private sector works; and what role transportation costs play.

Transportation cost is one of several factors that affect business economics. Others are the costs of inputs, the cost of capital (equipment) and the cost of labor. Businesses often think first about making productivity-enhancing technological

[19] This includes activities of the Federal government which, from the state's perspective is a "businesses" that chooses to locate in the state. A prime example in North Carolina is the Department of Defense.
[20] These criteria are identified on http://www.mccallumsweeney.com/site_selection.shtml.

improvements, such as those embodied in new equipment, that allow the substitution of machines for labor, resulting in increased economies of scale and lower production costs. Unless they build their own transportation network or have their own transportation company, they often do not control their transportation costs.

Declining costs of transportation and logistics (the focus of this study) are often seen as providing opportunities for specialization (selling a more specialized product to a larger market) and increased production (reaching a larger market with existing products). These are options that arise from investments by the public sector or by firms that provide transportation services.

The level and pattern of national and international trade at any given point in time is a reflection of these comparative advantages on a global scale, the economies of scale in production, and the costs of delivering goods. Logistics infrastructure affects this picture by making trade less costly between specific locations. And this study can be seen as identifying infrastructure investments that can make North Carolina firms more competitive, enable them to expand their markets, empower them to specialize, and encourage new firms to locate here.

Unfortunately, from a regional perspective, capital and technology have very little "stickiness", unless they are closely tied to local research and development activity, as in the Research Triangle Park. Firms can move quickly from one region to another. Accordingly, contemporary regional comparative advantage is, to a large degree, based on the amount, variety, and cost of labor available. Labor is generally the largest cost element in production and, along with transportation costs, the one which varies most saliently across locations. Exceptions are fertile land, which is critical to agriculture and mineral deposits, which are central to mining. Natural amenities, such as mountains, coastlines, lakes, and other bodies of water along with a mild climate also have an attraction. Their impact, while measurable, doesn't appear to have a consistent impact.

Because firms often need to assemble diverse sets of people with complex skills, those that do tend to locate in or near large metropolitan regions. Concentrations of population facilitate the operation of labor markets for specialized skills. While an abundant supply of low-cost, low-skill labor has historically been a competitive factor driving economic growth in North Carolina, the increased sophistication of the production process, on the one hand, and the emergence of other sources of low-cost, low-skill labor, on the other, have increased the importance of low-cost high and mid-skilled labor as a productive factor in the state, favoring the larger metropolitan regions.

Increasing economies of scale in production (much of which is internal to establishments) imply that, in some cases, a single or a small number of establishments can supply the large majority of global demand for a particular product. Such economies of scale in production sometimes create a need for complex supply and distribution systems as final consumer demand is spread across the globe, even if unevenly. The emergence of national and even international supply chains for computer components, pharmaceuticals, and other products, with each producer located in what it believes to be an optimal site with distribution chains which are equally broad has been well-documented.

In making major investment decisions, firms often attempt to minimize the total landed (delivered) cost of their products. Total landed costs are comprised of three major groups of costs: 1) production costs, 2) transportation costs, and 3) inventory costs, each of which has many subsets which vary in salience for particular products. The latter two are often categorized as logistics costs. Often, speed can substitute for inventory holding so that shippers can sometimes reduce their total costs by choosing a faster (and more expensive) means of transportation, particularly when the value/weight ratio is relatively high. More immediately, efficient logistics nodes, operating at sufficient scale, can minimize handling costs and help decrease shipment dwell time.

The continuing long-term decline of transportation and coordination costs has been crucial to the emergence of the contemporary system of supply, production, and distribution. Without low-cost transportation, global supply and distribution channels would not be practical for many goods. East Asia could not have become the "workshop of the world" without low-cost transportation. More immediately, North Carolina could not have become a significant site of national and global manufacturing production without low-cost transportation. While extreme, some economists have begun to consider production location patterns in the case that moving many goods is nearly cost-less.

Institutional factors can have significant impacts on production costs. Direct and indirect taxes, although necessary, impose costs. Lengthy and uncertain approval processes increase the cost of establishing facilities. While taxes and regulations result in net benefit to regions, some can result in losses. Site considerations are critical for some sectors.

Given that the major markets are distant from North Carolina, reducing transportation costs can make North Carolina labor more competitive. The reductions in direct producer costs due to infrastructure investments do not always outweigh the costs of building and maintaining that infrastructure. North Carolina (and the US) has already invested significant funds in transportation infrastructure; and consensus opinion is that careful project selection methods must be increasingly used to avoid misspending public funds.

Transportation improvements have been a double-edged sword for North Carolina. Historically, decreasing transportation costs, brought about by railroads and later highways, increased the value of North Carolina effort by making production for Northeast US markets cost-effective but, more recently, they have also made North Carolina vulnerable to low-cost labor in Asia and elsewhere. Firms often substitute transportation for labor costs. North Carolina has addressed this problem by upgrading the quality of its labor supply in order to be attractive for more complex, capital-intensive production than it was able to support in the past.

Having said this, reducing total logistics costs can allow North Carolina producers to enlarge the geographic span of their markets, resulting in increased production and thus greater employment, and/or raise wages and salaries while keeping product prices competitive. Such benefits to the North Carolina economy are sometimes considered the *direct impacts* of transportation improvements. Reducing transportation costs can also make the state an attractive location of production for a greater number of producers, further increasing regional income by expanding

employment and income. Such benefits are sometimes considered *indirect and cumulative impacts* (catalytic effects) because they are the result of changing firm production patterns.

Improving wages in North Carolina is critical, as well as total employment. For over a decade, North Carolina per capita income, compared to the overall US level, has declined from its peak of 93 percent of the national level to 87 percent. Moreover, earning power has concentrated. In 2008, only four counties – Durham, Forsyth, Mecklenburg, and Wake – could boast average weekly wages which met or exceeded the state average. Moreover, in 93 counties, the average weekly wage was less than 90 percent of the state level.[21]

By reducing transportation and/or inventory costs, or at least reducing the proportion of transportation costs relative to all costs, North Carolina producers can become more competitive, increasing sales in distant national and international markets. The actual impact of logistics costs reductions will vary by sector and region and be affected by labor cost and availability.

The indirect and cumulative impacts of the infrastructure investments can be more significant than the direct effects. The savings in logistics costs have the potential to accelerate private business investment in North Carolina. By reducing logistics costs, the investments shift the wage/transportation cost trade-off in favor of North Carolina locations, and an increase in the state's national investment "capture rate."

Such effects will be dependent upon the national pace of capital investment, which is tied to the trajectory of economic growth. Firm locations are often "sticky" because, in the absence of a need for significant investment in capital equipment, costs are often minimized by staying in place. A lag exists between the infrastructure investments and the response of the business community. Moreover, the response of individual firms will vary with the cost savings possible by choosing a location affected by the investments. Pre-approval and available facilities for target sectors can reduce the costs of transition for new firms.

The increased accessibility created by the investments will be especially attractive to new firms if a sufficient number of employees with needed skills are available. North Carolina community colleges are committed to training skilled entry-level workers within minimal time spans which can vary from a few weeks to a year. A shortage of experienced workers to guide and supervise entry-level personnel could hamper relocation decisions. Some specialized mid-tech skills are still developed primarily in the workplace. The logistics cost savings will need to be sufficiently high to compensate for possible labor supply bottlenecks.

The proposed infrastructure investments can result in a significant benefit to the state's economy by improving the access of North Carolina producers to their sources of supply and to their customers. The decreased costs of access allow for direct and indirect impacts on North Carolina employment and earnings. In the major metropolitan areas, direct effects may be substantial.

Outside of the major metropolitan areas, direct effects are likely to be modest because the volume of production is comparatively low. The indirect effects have the potential to partially

[21] Analysis courtesy of Brent Lane, Director, UNC Center for Competitive Economies

reverse the relative decline of many areas which has been seen over the last several decades. These impacts will not be immediate but could be accelerated by drastic changes in fuel prices (which directly impacts transportation) and the credit situation (which directly impacts inventory holding behavior).

2.3 *Global Trends*

The need for logistics arises because supply and demand are spatially distributed. This is true at the world level, nationally, regionally, and even locally. Otherwise, everyone would print their own newspaper. The law of comparative advantage suggests that people, regions, and nations will specialize in producing the things at which they have a competitive advantage, often because they can do it at a lower cost.

Without a doubt, the world economy is growing. Across the past 40 years it has more than tripled (in 2005 $) from $15.6 Trillion to $50.2 Trillion – an average compounded rate of 3% per year with some years reaching 4.5-4.8%.[22] In spite of the 2.06% decline from 2008-2009, the increase from 2009 to 2010 has been 3.74%, producing a global economy 1.6% greater than 2008 despite the world economic crisis. Moreover, the predictions for 2030 call for the world economy to *almost double* and reach $95.8 Trillion. The growth rates are upwards of 3% every year. Note, this is *only* 20 years away – a *very short time* in the context of how long it typically takes state governments to get things built.

Moreover, the relative sizes of the national economies are changing radically.[23] The rankings in Table 2-3 show that while the top five countries in 2010 were the US, Japan, China, Germany, and the United Kingdom – with the US being three times the size of Japan – in 2030, the situation will be very different, with the top five being the US, China, Japan, India, and Germany; and the US will be only 50% bigger than China. Moreover, India, which is 11th in 2010, will become the 4th largest in

Table 2-3: The World's Largest Economies in 2010 and 2030, in $$Billions (U.S., 2005 $ basis)

Country	2010		Country	2030
World	50158.97		**World**	95858.40
United States	13189.73		United States	22060.00
Japan	4386.07		China	14914.10
China	3727.62		Japan	5117.56
Germany	2940.92		India	4833.68
United Kingdom	2299.88		Germany	4044.98
France	2236.36		United Kingdom	3584.39
Italy	1717.12		France	3236.15
Canada	1284.33		Brazil	3045.69
Brazil	1208.68		Italy	2152.46
Spain	1186.37		Canada	2034.26
India	1131.79		South Korea	1895.17
South Korea	1014.29		Russia	1766.48
Russia	932.29		Mexico	1732.28
Mexico	829.26		Spain	1630.19
Australia	800.14		Australia	1399.92
Netherlands	641.22		Indonesia	1050.28
Belgium-Luxembourg	427.88		Netherlands	903.42
Taiwan	420.82		Turkey	868.23
Switzerland	400.49		Taiwan	847.83
Turkey	395.38		Saudi Arabia	801.09

[22] Based on data from the U.S.DA Economic Research Service, see http://www.ers.usda.gov/Data/Macroeconomics/.
[23] The World Bank, *Global Development Horizons 2011 - Multipolarity: The New Global Economy*, 2011.

2030, rising over Germany, the United Kingdom, France, Italy, Canada, Brazil, and Spain. Germany will be the only European country that remains in the top 5. In fact, according to Global Insight World Service and Goldman Sachs, by 2050 the world's five largest economies *in order* will be *China*, the US, India, Japan and *Brazil*.[24]

The US economy is expected to keep pace with this growth, transitioning from 26.8% of the total in 2010 to 28.6% in 2030 despite the significant economic development in places like China and India. At 2.3% per year, the US is expected to be one of the slower growing countries, while the fastest ones will be China (7.9%) and India (7.7%) – two emerging powerhouses – and smaller countries like Iraq, Macau, and Afghanistan, which are the other three in the top five.

It is also true that the world population is increasing. In the 40 years between 1970 and 2010, it rose from 3.7 billion to 6.8 billion – almost doubling. And with the world economy tripling in that same timeframe, as reported earlier, the standard of living has increased.

The future holds much of the same. Between 2010 and 2030, the world population is projected to increase by another 20% to 8.2 billion. The US will grow from 310 to 365 million, a 17.8% increase; China will grow by 4.6% from 1.33 to 1.39 billion; India will increase by 24.5% from 1.17 to 1.46 billion. (China and India represent one-third of the world's population – i.e., one in every 3 people both in 2010 and 2030.) Some of the places projected to grow the most are close to North Carolina. Brazil will grow by 19.4% to 240 million; Africa will grow 50% to 1.5 billion. Among the largest countries, Ethiopia will grow by 84% to a population half that of the US; Zaire will grow by 76%; Uganda, 101.5%; Mozambique, 42.1%; the Sudan, 59.3%; Egypt, 38.0%; and Rwanda, 62.7%. There are lessons to be learned from this: 1) the number of people needing to be fed is increasing, 2) as their standard of living increases, what they choose to eat will become more sophisticated and come from more places around the globe (including North Carolina), and 3) 1.75 billion of these people will be close by – in Brazil and Africa. These are trends to which North Carolina might want to be responsive. Interestingly, since the world economy will almost double in that same time frame, the standard of living is going to rise even faster than it has in the past – attributable to the rapid growth of places like China and India.

An implication of these changes is that trade patterns are shifting. While the largest trade lanes in the past 40 years have between Asia and the US, by 2050, the major trade lanes will be between China and India. Moreover, and extraordinarily important for this North Carolina logistics study, the widening of the Panama Canal will have profound effects on the ports of call for the worlds container ship fleet. Even the largest vessels will be able to transit the canal, making it possible for ships from Asia to travel directly to Port Elizabeth, Norfolk, and other east coast and gulf coast ports. Figure 2-2 shows that the shipping patterns will become more heavily focused on direct shipments through the Panama Canal as well as trade lanes through the Suez Canal. It is quite possible that the largest size ships will travel around the world, both east- and west-bound, and make stops at ports in the same direction on a continuing basis, rather than going back-and-forth across the Pacific or to-Europe-and-back through the Suez Canal.

[24] Presentation by Global Insight and Tompkins Associates as part of the Statewide Logistics Plan project

Figure 2-2: Emerging Global Trading Patterns[25]

[25] Source: reprinted with permission from Michael Gallis & Associates.

2.4 *National and North Carolina Trends*

2.4.1 Population Trends

On a national scale, the population in the US is shifting southward, to places like North Carolina, with declines in the Northeast and Midwest.[26] As Table 1-2 shows, the population in the South Atlantic region, which includes North Carolina, is projected to grow by 30.6%, surpassed only by the Mountain region, which includes Nevada, Utah, Arizona, and Colorado, which are also fast-growing states.

Table 2-4: Population Trends in the U.S. from 2010 to 2030

Region, division, and state	Projections July 1, 2010	Projections July 1, 2030	Percent Change	Percentage July 1, 2010	Percentage July 1, 2030	Change
United States	**308,935,581**	**363,584,435**	17.7%			
New England	14,738,789	15,623,015	6.0%	4.8%	4.3%	-9.9%
Middle Atlantic	41,046,390	42,048,053	2.4%	13.3%	11.6%	-13.0%
East North Central	47,041,323	48,638,464	3.4%	15.2%	13.4%	-12.1%
West North Central	20,350,110	21,858,834	7.4%	6.6%	6.0%	-8.7%
South Atlantic	59,791,781	78,093,216	30.6%	19.4%	21.5%	11.0%
East South Central	18,063,711	19,902,285	10.2%	5.8%	5.5%	-6.4%
West South Central	35,728,122	45,273,836	26.7%	11.6%	12.5%	7.7%
Mountain	21,740,479	29,909,432	37.6%	7.0%	8.2%	16.9%
Pacific	50,434,876	62,237,300	23.4%	16.3%	17.1%	4.9%
North Carolina	9,345,823	12,227,739	30.8%	3.0%	3.4%	11.2%

Region	States
New England	Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut
Middle Atlantic	New York, New Jersey, and Pennsylvania
East North Central	Ohio, Indiana, Illinois, Michigan, and Wisconsin
West North Central	Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas
South Atlantic	Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, and Florida
East South Central	Kentucky, Tennessee, Alabama, and Mississippi
West South Central	Arkansas, Louisiana, Oklahoma, and Texas
Mountain	Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, and Nevada
Pacific	Washington, Oregon, California, Alaska, and Hawaii

U.S. Census Bureau, Population Division, Interim State Population Projections, 2005.
Internet Release Date: April 21, 2005

"America 2050: A Prospectus" [27] asserts that by mid-century, "megaregions" will become the nation's new competitive engines in the global economy, participating as semi-unified entities, characterized by their inter-regional and international movements of goods, people, and capital. Just as metropolitan regions grew from cities to become the geographical units of the 20th century global economy, these megaregions will become the nation's economic engines of the 21st century.

[26] Please see http://www.census.gov/population/www/projections/projectionsagesex.html.
[27] Please see http://www.america2050.org/pdf/America2050prospectus.pdf.

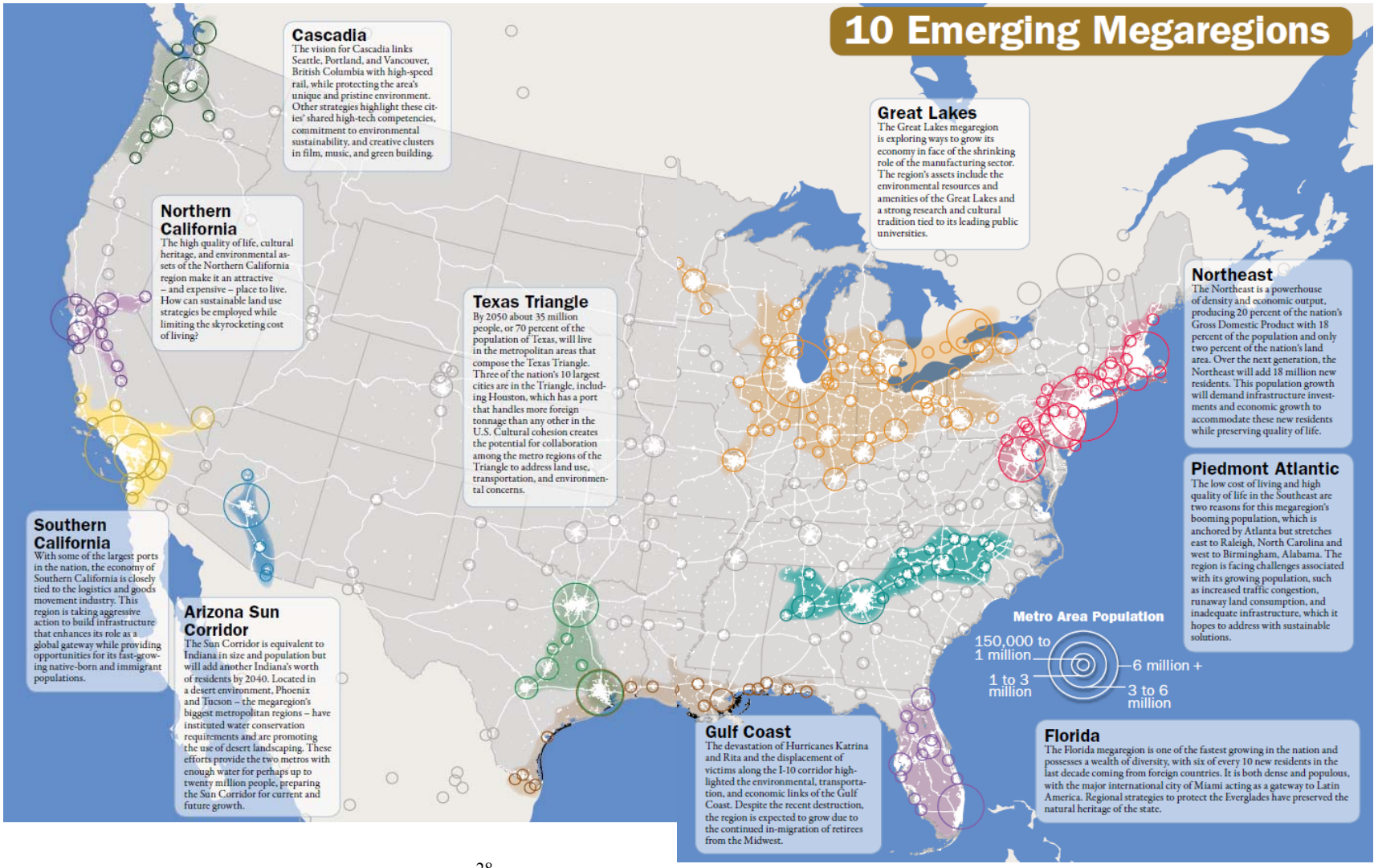

Figure 2-3: Emerging Megaregions in 2050[28]

[28] Please see http://www.america2050.org/pdf/America2050prospectus.pdf.

The America 2050 report goes on to say that "within these megaregions, the problems of growing highway congestion, overcrowded airports and seaports, loss of open space, and aging infrastructure systems will only be compounded by growing populations and rapidly expanding international trade. These constraints [will] limit economic growth and degrade quality of life, essential parts of attracting and retaining both businesses and knowledge workers in a footloose global playing field." It is no wonder the authors of that report had concern about the need for the US to get prepared for the coming economic growth. The authors of the "Big Picture Panel" expressed similar concerns.[29]

For several decades, the state has been transitioning from an economy based on tobacco, textiles, and furniture to a new economy based on technology, pharmaceuticals, financial services, food processing and vehicle parts.[30] That transition has had three aspects:

1) A shift within manufacturing from labor-intensive to capital-intensive industries requiring that labor transform from mill hands to skilled machine operators;
2) A shift within the non-agricultural sector from manufacturing to trade, service, and government employment implying an occupational conversion from blue collar to white collar work; and
3) A shift within the agricultural sector from small farms relying extensively on tobacco income to larger firms diversifying into many commodities but specializing heavily on hogs and poultry which has been tied to the rise of contract farming.[31]

2.4.2 General Trends in North Carolina

Past trends have tended to favor the state's Piedmont region, specifically Charlotte and the Triangle, with some amenity-based growth along the coast and in the mountains. Much of the rest of the state has not grown dramatically, particularly the eastern and western portions of the state, creating what might be a "dual economy."[32] It is often said that the area east of I-95, if it were to be considered separately, would be the poorest state in the nation. Despite its reputation as a prosperous growth state, North Carolina's per capita income is only about 90 percent of the national average – and the ratio has been declining for a decade.

Much has changed since the beginning of the economic crisis. The era of banking consolidation, which helped fuel Charlotte's ascendency, seems to have run its course. While Charlotte is likely to hold on to its position in the management of commercial banking, it has not proved to be competitive for most high-end corporate finance banking functions. The Triangle, which has been counting on medicine and pharmaceuticals to help power its growth, has seen the end of the National Institute of Health's twofold increase in research funding; and research funding in

[29] Please see: www.transportationvision.org/docs/vision_BigPicture.pdf.
[30] Michael L. Walden (2008) *North Carolina in the Connected Age: Challenges and Opportunities in a Globalizing Economy*, Chapel Hill, The University of North Carolina Press.
[31] Bill Finger (1997) "Making the Transition to a Mixed Economy" *North Carolina Insight* 4-18, December.
[32] Greg Sampson, former director of the Employment Security Commission, stated, "The non-metropolitan areas are weaker due in part to a lack of attractiveness to new industry of all kinds." Quoted in Bill Finger, 1997, page 5. The assessment of a "dual economy" is attributed to Sampson.

general is not keeping pace with inflation. Concerns about growing health care costs are pushing healthcare activities overseas, including pharmaceutical production along with research and development and general healthcare (through the growth of medical tourism).

The World is Flat asserts that no jobs are safe from overseas outsourcing.[33] IBM's largest unit may no longer be in the Triangle; that distinction reportedly belongs to a sizeable research facility in India. GlaxoSmithKline has moved much of its production to Asia and also maintains research facilities there.[34] Banking operations have been outsourced to overseas locations.

How the state will prosper in the coming years depends in part on the actions the Logistics Task Force takes. At this point, few economists are hypothesizing a rapid return to high economic growth rates. Research suggests that it can be seven years before full recovery following a financial crisis such as that of 2008-2009. Nevertheless, Treasury Secretary Timothy Geithner, in a recent interview, said that the US can build a broad-based prosperity in the coming years. He said, "America is good at supplying the manufactured goods, the services, and the agricultural products the world needs."[35] Moreover, North Carolina is in the "right spot" in the US to be part of the engine that makes this happen.

Reducing the state's overall logistics costs will help make North Carolina more competitive. However, the state needs to identify investments where the costs of building and maintaining that infrastructure are lower than the reductions in direct producer costs so that net benefits are produced. Given that the US and North Carolina have already invested significant funds in transportation infrastructure, careful project selection methods must be used to ensure that public funds are well spent; and existing infrastructure needs to be re-used wisely.

This positive impact of logistics investments has been seen in the past. In the last 150 years, decreasing transportation costs, brought about by the railroads and later the highways, made North Carolina an attractive location for industry. It made production for the northeastern US markets cost-effective. More recently, though, low-cost labor in Asia has moved North Carolina production overseas. Firms often seek first to lower their labor costs.

Over the last several decades, North Carolina has approached this challenge in a two-pronged manner. It has built job training centers to make its labor force more competitive. Under the leadership of Governor Luther Hodges, Terry Sanford laid the groundwork for what is now the state's community college system. The state also improved worker commutes and freight shipping by constructing four-lane highways that reach to within 10 miles of 90 percent of the state's population through the formation of the state's Highway Trust Fund, led by Governor James Martin.[36]

To fully participate in the prosperity of the coming years, North Carolina needs to take the next step in this logistics investment progression. It needs to invest in infrastructure that makes it easy

[33] Thomas Freidman, *The World is Flat*, Farrar, Straus, and Giroux, New York, April 2005.
[34] It appears that some of this production is returning to the U.S.
[35] Charlie Rose interview,12 October 2010
[36] The 1989 Intrastate Highway Trust Fund legislation was passed during his tenure as Governor.

to get North Carolina products to market, worldwide. It needs to capitalize on its own, natural export sectors – such as agricultural (land-based) products, manufactured goods, and services. The latter might include banking, software development, and product development; as well as "exports" that bring people here to spend money, like tourism, including retirement destinations for the growing number of baby boomers.

Just as it has in the past, North Carolina can capitalize on the product cycle to create the next wave of prosperity. Remember that as textile and furniture production in New England reached the end of its product cycle and production there became too expensive, it found a new home in North Carolina. When electronics production later faced similar cost difficulties, that industry did the same. More recently, North Carolina has seen growth by being a new home for automobile manufacturing. Although the state has yet to successfully attract an assembly plant, the relocation of assembly plants to adjacent states, driven partly by a search for less expensive labor, partly by decreasing transportation costs, and partly by the shifting geographic locus of US population, has made the state an attractive location for parts suppliers.[37] Accordingly, it has gained a number of parts producers which feed supply chains reaching across much of the south. Similarly, the state has had success at attracting aircraft manufacturing, another century-old industry long beset by high costs at its previous locations, with its global supply chains.

2.4.3 Economic Trends

Table 2-5 provides an overview of average annual growth rates for real GDP, population, and total employment compiled from Bureau of Economic Analysis data for the latest two decades available. From the perspective of North Carolina, three points stand out. First, the state outpaces the nation in all three indicators of growth in both time periods. Second, the growth rates have decreased in the more recent decade. Third, the continuing growth of population and lagging of production has resulted in the North Carolina per capita GDP slipping relative to the nation. The growth of North Carolina GDP and employment has become more like that of the lower national rates while the differential related to population has increased.

Table 2-5: Overview of National and State Growth Rates

		1989-1999	1999-2009
Real GDP	U.S.	3.26%	1.81%
	N.C.	4.35%	1.84%
Population	U.S.	1.23%	0.96%
	N.C.	1.91%	1.66%
Total employment	U.S.	1.71%	0.73%
	N.C.	2.26%	0.81%
Source: BEA			

Figure 2-4 shows that all major sectors of the US economy have grown in real terms; but the relative value added by both durable and non-durable goods manufacturing has declined markedly while the contribution of what are collectively known as producer services has correspondingly increased over the last four and a half decades. In 1963, manufacturing

[37] North Carolina may be too far east to support an assembly plant in an era in which a single mid-continent facility often fills national demand. See, for example, Thomas Klier and Jim Rubenstein (2010) "The Changing Geography of North American Motor Vehicle Production," Federal Reserve Bank of Chicago.

accounted for 27 percent of the national economy but by 2008 it was responsible for only 12 percent of GDP. Correspondingly, producer services grew from 21 percent of the national economy to 34 percent.

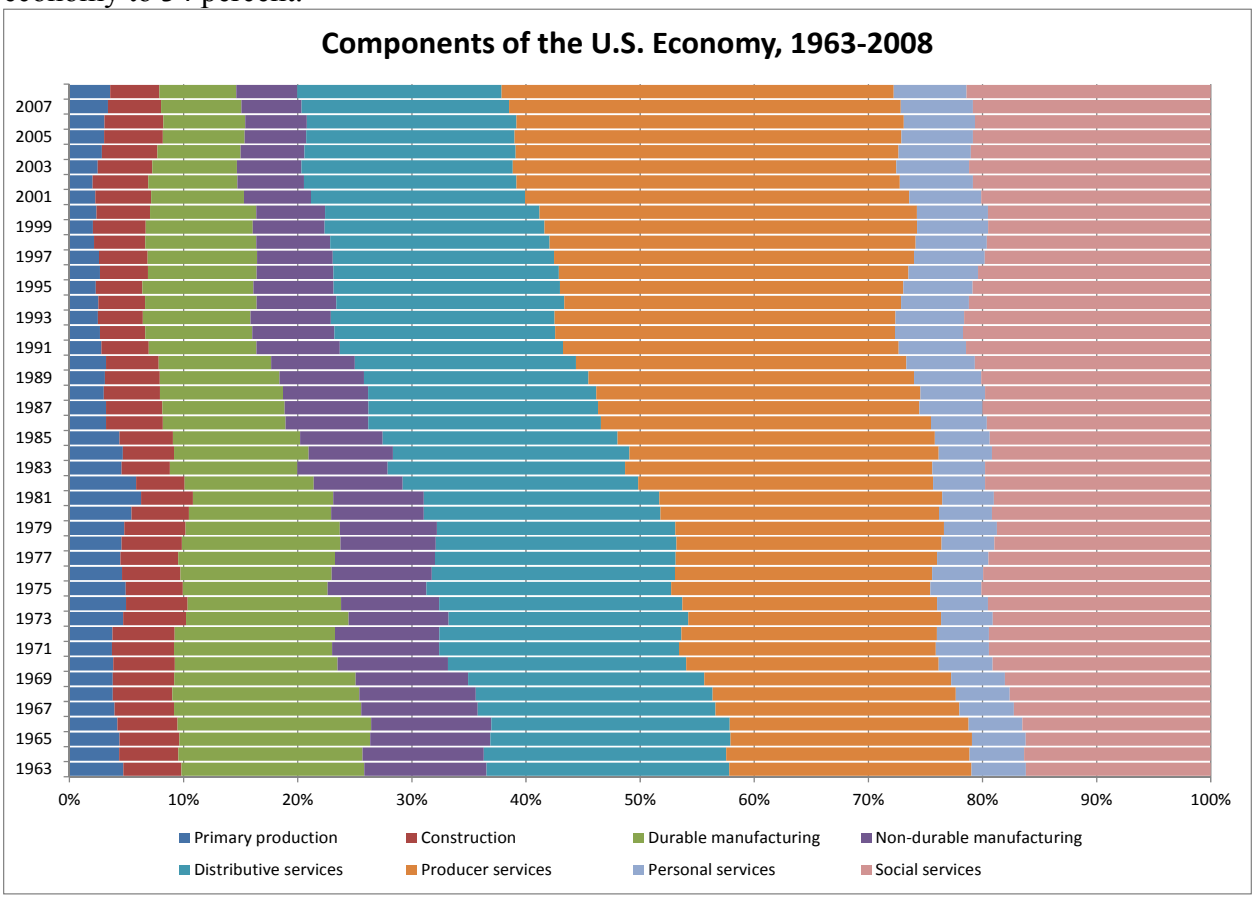

Figure 2-4: **Components of the US Economy, 1963-2008**

North Carolina began and ended the period from 1963-2008 more heavily dependent upon manufacturing than the nation as a whole, as seen in Figure 2-5. In 1963, manufacturing accounted for 41 percent of the state's economy and together with farming and other forms of primary production nearly half. Like the rest of the nation, manufacturing decreased in importance, down to 20 percent in 2008. And like the rest of the nation, producer services grew in importance, in North Carolina from 14 to 31 percent of the economy. Where North Carolina differs from the nation as a whole is in durable manufacturing. While non-durable manufacturing dropped from 33 to 12 percent of the state's GDP (due, in part, to declines in apparel and tobacco), durable manufacturing stayed at approximate 8 percent of the state's economy.

The set of industries in the durable manufacturing sector continues to change, however. In the distant past, as textile production costs became too expensive in the Northeast, rail transportation helped make North Carolina a viable production site for Northeastern markets. The same held true for shoes, furniture, and, to a degree, tobacco (which was home-grown to a much larger degree). Later, electronics, automobiles, aircraft, and producer services followed. Air transportation made it possible for firms based in the Northeast to spinoff research activities and

later grow an array of back office (producer service) functions in the state. Banking was able to grow in North Carolina thanks, in part, to far-sighted leadership and the advantages conveyed by a combination of telecommunications, air transportation, and favorable costs. The military is also becoming a growth sector for the North Carolina economy and an anchor for manufacturing.

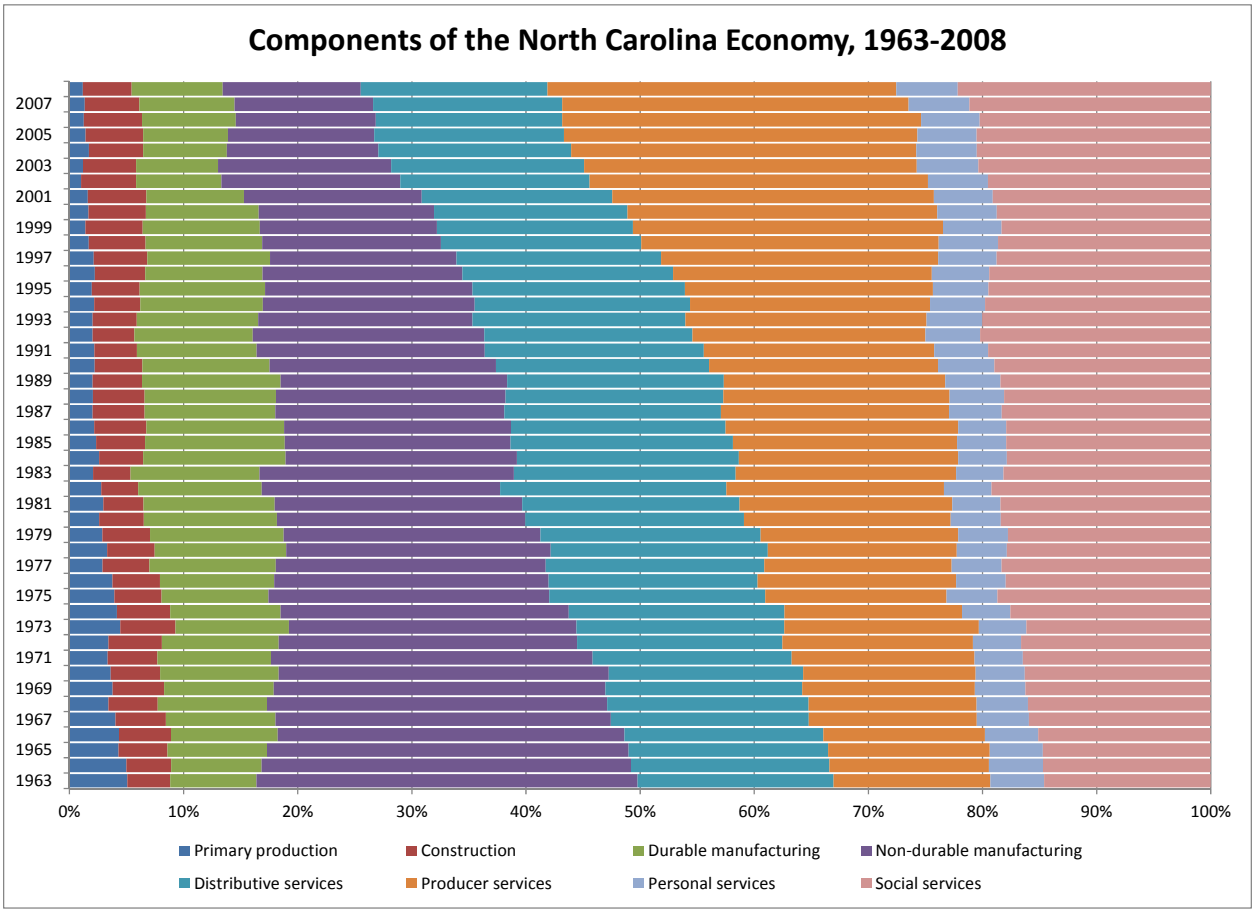

Figure 2-5: Components of the North Carolina Economy, 1963-2008

2.4.4 Employment Trends

The state began 2000 with 3,824,741 jobs and ended 2009 with 3,979,015 for a gain of 154,274. Figure 2-6 shows the statewide trends since 1990. While the 1990s were a time of growth for the state, the 2000s were a period of both growth and decline. The dips after 2000 are due to declines in the technology sector and then the housing sector.

The aggregate employment trends mask a more fundamental change. The growth of health care employment has been a near-perfect substitute for the decline of manufacturing employment. To a large extent, medical care employment has become North Carolina's safety net. The growth of health care employment over the last decade compensated for the decline in manufacturing. There was also a shift within manufacturing with chemical manufacturing (mainly

pharmaceuticals) adding employment while many traditional manufacturing sectors lost employment to overseas competitors and to automation.

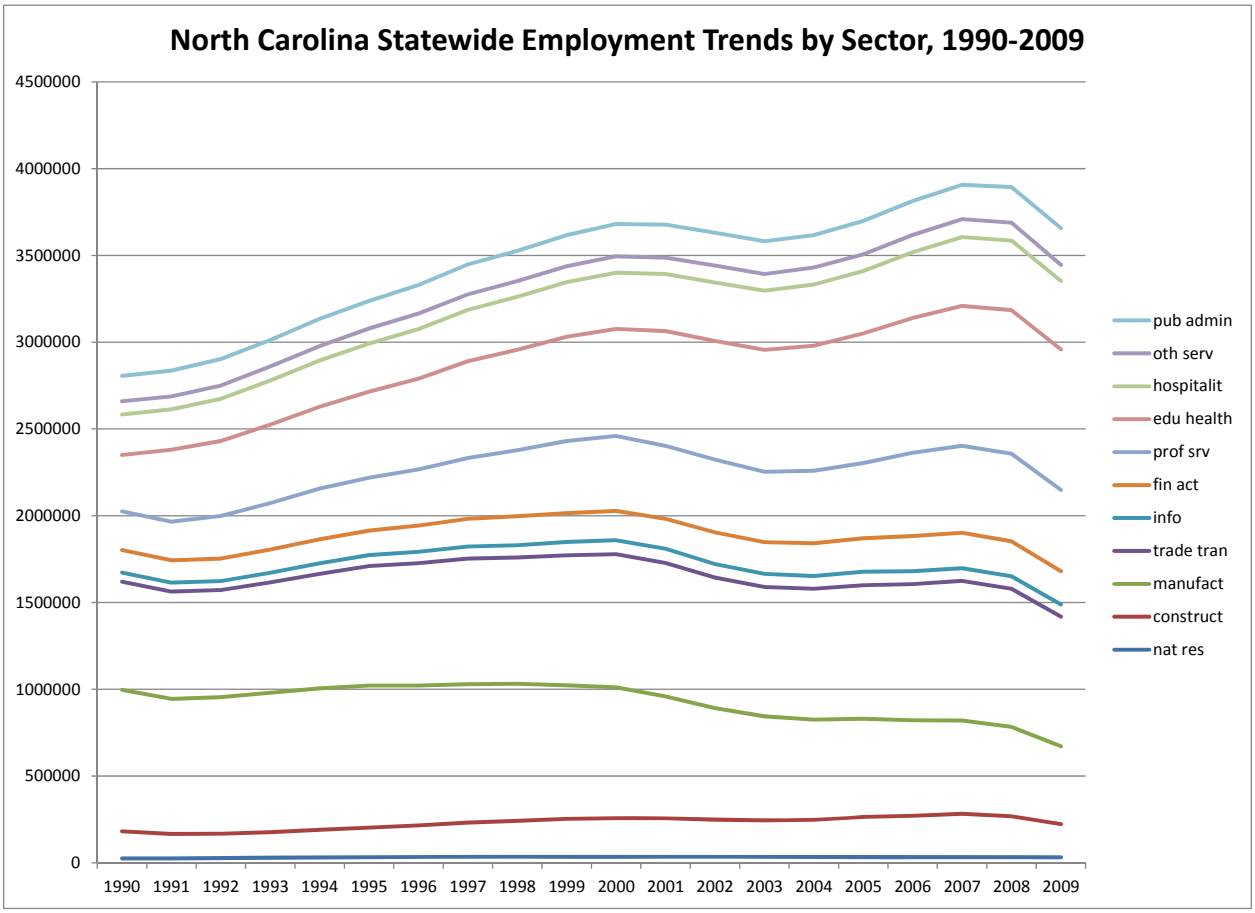

Figure 2-6: North Carolina Statewide Employment Trends by Sector, 1990-2009

2.4.5 Sectors of Emphasis

Table 2-6 provides an overview of the North Carolina Department of Commerce strategic priority sectors for recruitment and support.[38] The Department of Commerce has identified ten areas for support. The regional economic partnerships suggest another eight sectors of mainly regional interest. The sectors named by the state are (in alphabetical order) aerospace, automotive, biotech/pharmaceuticals/life science, chemicals/plastics/rubber, furnishings, information and communications (ICT), military/defense, textiles, international business (export promotion), and tourism and entertainment. Despite the loss of manufacturing employment, textile production, for example, still benefits from an extensive state-wide knowledge support network which continues to make North Carolina an advantageous location for sophisticated textile products. The regional partnerships identify advanced materials, alternative energy (recently adopted by the state as a priority sector), finance/insurance (also recently adopted by

[38] http://www.nccommerce.com/en/BusinessServices/LocateYourBusiness/WhyNC/ProfilesOfIndustry/

the state), food processing/agri-industry, logistics and distribution, marine trades/boat building, metalworking, and nanoscale technologies as regional target areas.[39]

Table 2-6: North Carolina Department of Commerce Strategic Priority Recruitment Sectors

Sector	NC DOC	Triangle	Charlotte	Southeast	Northeast	East	Piedmont	West
Aerospace	#				#	#	#	
Automotive	#	#	#		#		#	
Biotech/Pharma/Life Science	#	#			#	#	#	#
Chemicals/Plastics/Rubber	#						#	#
Furnishings	#			#			#	
Information & Communications (ICT)	#	#					#	#
Military/Defense	#	#	#	#		#		#
Textiles	#			#				
International	#							
Nanoscale Technologies		#						
Logistics & Distribution		#		#	#		#	
Alternative Energy (Environmental)			#	#				#
Finance/Insurance			#					
Marine Trades/Boat Building				#	#	#		
Food Processing/Agri-Industry				#		#	#	
Metalworking				#				#
Tourism & Entertainment	#				#	#		#
Advanced Materials								#

Several actors in the state have suggested building upon the large and growing military presence in the state as an economic growth generator.[40] North Carolina's military installations and related industry have an estimated $23 billion impact on the state's economy, reportedly summing to seven percent of gross state product in 2007.[41] Most of the state's military personnel are located in the coastal region of the state, reaching from the Coast Guard Aviation Depot near Elizabeth City in the Northeast through the several Marine Corps Facilities (Camp Lejeune, Cherry Point, and New River) near Jacksonville to Seymour-Johnson AFB in Goldsboro to the Army's Fort Bragg in the Fayetteville Sand Hills.

[39] A recent document summarizing the Department of Commerce Strategic Marketing Plan focuses on Aerospace, Aviation and Defense, Automotive, Truck and Heavy Equipment, Biotechnology, Pharmaceutical and Life Sciences, Energy, Financial Services, and Information and Communication Technology. http://partners.thrivenc.com/recruitment-and-development-marketing-plan/target-audience-industry-sectors-2/

[40] North Carolina can boast at least three state-wide organizations vying to increase military-related business: North Carolina Military Business Center (http://www.ncmbc.us/), North Carolina Military Foundation (http://www.ncmilitary.org/), and North Carolina Defense Business Association (http://www.ncdba.com/) and at least three regionally-oriented efforts: Military Growth Task Force of North Carolina's Eastern Region (http://www.nceastmgtf.org/), All-American Defense Corridor (http://www.bracrtf.com/documents/all_american_brochure.pdf), and the Northeast Commission's aviation cluster (http://www.ncnortheast.info/Business_Environment/Targeted_Business_Clusters/Aviation.htm).

[41] *The 2009 North Carolina Defense Asset Inventory and Target Industry Cluster Analysis: A Strategy for Growing North Carolina's Defense and Homeland Security Economy*, North Carolina Military Foundation, July 2009

With six major bases and several smaller installations, a pre-BRAC estimate was that one-eighth of all US troops were in North Carolina. Only California, Virginia, and Texas could claim more.[42] The military offers opportunities for North Carolina but also challenges: investments are needed to upgrade infrastructure, facilities, and amenities in order to be attractive for military expansion. Table 2-7 provides an overview of the military bases in Eastern Carolina.

Table 2-7: Military Bases in North Carolina

						BRAC changes	
	Installation	Date Established	Location (county)	Military Positions	Civilian Jobs	Military Positions	Civilian Jobs
1	Fort Bragg	1918	Cumberland, Hoke, Harnett, Moore	*52,000*	*8,500*	4,078	247
2	Pope Air Force Base	1919	Cumberland, Hoke, Harnett	*6,543*	*774*	-4,821	808
3	Camp Lejeune and Air Station New River	1941	Onslow	*43,100*	*4,800*	-182	-1
4	Marine Corps Air Station Cherry Point	1954	Craven	*8,987*	*5,771*	-48	-656
5	Seymour Johnson Air Force Base	1942	Wayne	*4,298*	*542*	345	17
6	Coast Guard Support Center	1940	Pasquotank	*900*	*575*		
7	Sunny Point Military Ocean Terminal	1955	Brunswick	*12*	*230*		
	Total Affflated Jobs:			**115,840**	**21,192**		
Source: N.C. Lieutenant Governor's Office, *www.1tgov.nc.us1BRACLinks.aqp.*							
Source: U.S. Department of Defense: Appendix C, BRAC 2005 Closure and Realignment Impacts by State at *wmv.defenselinkmillbrac.*							

The direct military presence is growing through the 2005 round of Base Closure and Realignment (BRAC) process and the Grow the Force and Grow the Army initiatives. North Carolina, possibly because of its existing military deployments, comparatively low costs, and moderate distance from Washington D.C. is gaining a greater military presence from BRAC. Fort Bragg has been assigned US Army Forces Command and Army Reserve Command and Camp Lejeune is now home to Marine Corps Special Operations Command. The state is likely to benefit from any future military realignment process. The growth initiatives are linked to the military operations in Iraq and Afghanistan and will, therefore, likely be temporary. Nevertheless, the 11,500 additional Marines connected to the Grow the Force initiative have almost all arrived.

By July 2009, all but 170 of the 11,477 new service members and civilian employees allocated by the decisions of the 2005 BRAC Commission, the Marine Corps' "Grow the Force" (GTF) initiative, and, somewhat farther afield, the Army's "Grow the Army" (GTA) plan, had arrived in the region. Particularly in the Eastern Region, the increase in personnel has been rapid. In addition to the military personnel and civilian employees, additional employment will be induced by serving the needs of the new residents (although many of those opportunities may lure regional discouraged workers back into the labor force). Specialized personnel will be needed for the new civilian jobs at Marine Special Operations Command (MARSOC), for those associated with the introduction of the F-35B at Cherry Point, for the increased use of unmanned aircraft systems, and for the full fielding of the MV-22 at MCAS New River. This influx of new

[42] Renée Elder (2006) "More than Economics: The Military's Broad Impact on Eastern North Carolina" *North Carolina Insight* 64-110, February.

growth may represent the largest single job growth event in the state of North Carolina since the World War II era.[43]

2.4.6 Commodity Flow Trends

Figure 2-7 provides an overview of the major surface flows of US cargo.

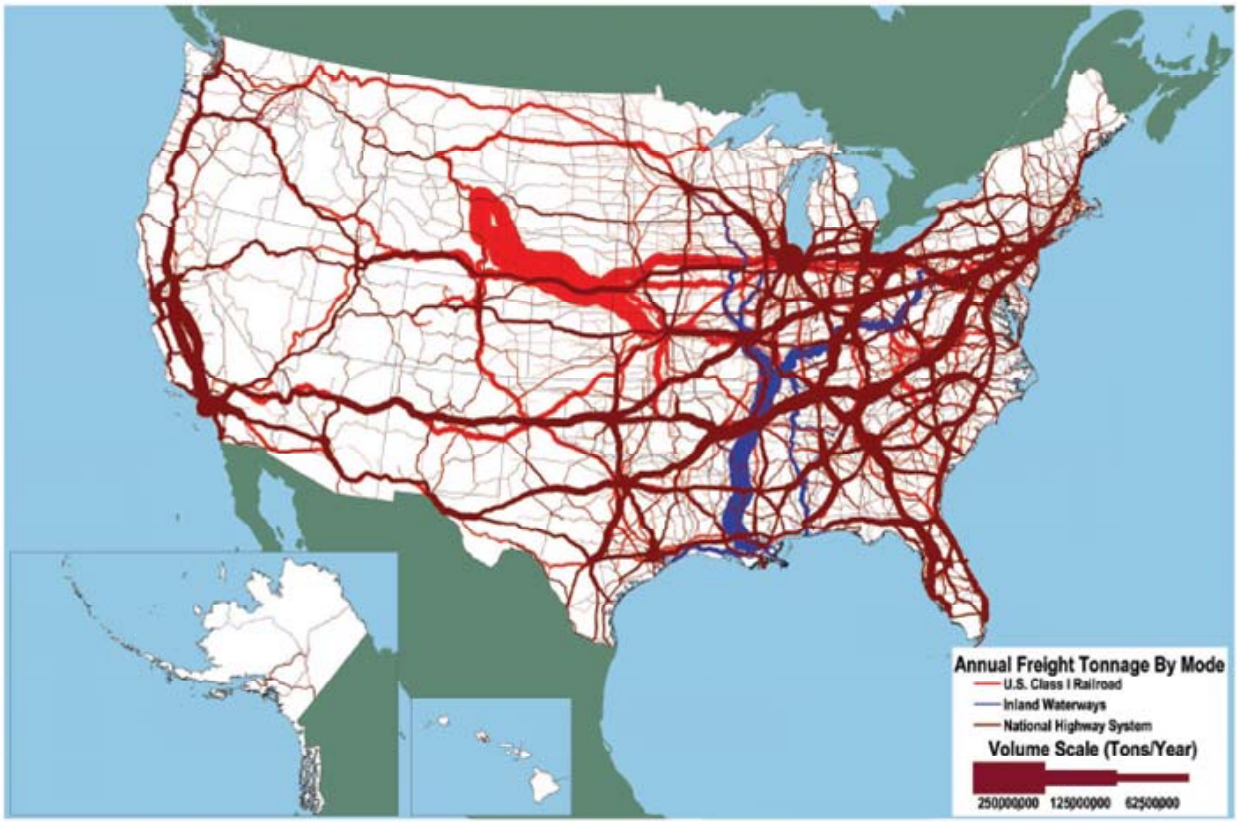

Figure 2-7: Overview of US Cargo Flows

Table 2-8 shows the distribution of freight shipments by mode in 2007 according to the most recently released Commodity Flow Survey data. Truck alone accounts for 71.3 percent of US shipments by value and 40.1 percent of the total ton-miles shipped. Rail alone accounts for 3.7 percent by value but 40.2 percent of the ton-miles shipped. Coal shipments comprise approximately half of the rail ton-miles. Multi-modal truck and rail account for 1.6 percent of US shipments by value and 5.9 percent of the ton-miles. Multi-modal truck and air may account for as much as 15.6 percent of US shipments by air (but less than one percent of the ton-miles). That figure includes parcel, USP.S., and couriers (which includes integrators such as FedEx and UPS). An unknown portion of those shipments are via surface only. Excluding the couriers, 2.2 percent of US shipments by value travel via air.

[43] Regional Growth Management Plan, Military Growth Task Force of North Carolina's Eastern Region, October 2009

The right third of the table provides equivalent figures for the State of North Carolina. North Carolina is more dependent upon truck and less dependent upon rail and intermodal services than the country as a whole, providing preliminary evidence that a system of logistics villages in the state may be viable.

The value of this table is that, if the actual or forecasted commodities shipped from or to a region are known, the information provides a good first approximation to transportation infrastructure needs. Those mode choices need not be static and can shift as cost structures and infrastructure availability evolves. Unfortunately, publicly-available data is not available at a sufficient level of detail to aid in infrastructure planning at a regional level.

Table 2-8: Characteristics of Shipments by Origin, 2007

	United States, All sectors					North Carolina, All sectors				
Meaning of Mode category	Value($mil)	Value %	Ton-miles (mil)	Ton-miles %	Avg miles	Value($ mil)	Value %	miles (mil)	Ton-miles %	Avg miles
All modes	11,684,872	100.0	3,344,658	100.0	619	363,549	100.0	52,366	100.0	463
Single modes	9,539,037	81.6	2,894,251	86.5	234	321,289	88.4	46,632	89.1	232
Truck	8,335,789	71.3	1,342,104	40.1	206	311,617	85.7	41,290	78.9	216
For-hire truck	4,955,700	42.4	1,055,646	31.6	599	197,509	54.3	33,330	63.6	529
Private truck	3,380,090	28.9	286,457	8.6	57	114,108	31.4	7,960	15.2	69
Rail	436,420	3.7	1,344,040	40.2	728	4,235	1.2	5,232	10.0	244
Water	114,905	1.0	157,314	4.7	520	-	0.0	-	0.0	-
Shallow draft	91,004	0.8	117,473	3.5	144					
Great Lakes	-	0.0	6,887	0.2	657					
Deep draft	23,058	0.2	32,954	1.0	923	-	0.0	-	0.0	-
Air (incl truck and air)	252,276	2.2	4,510	0.1	1,304	5,399	1.5	110	0.2	775
Pipeline	399,646	3.4	-	0.0	-					
Multiple modes	1,866,723	16.0	416,642	12.5	975	32,719	9.0	4,727	9.0	720
Parcel, U.S.P.S. or courier	1,561,874	13.4	27,961	0.8	975	28,975	8.0	628	1.2	719
Truck and rail	187,248	1.6	196,772	5.9	1,007	2,873	0.8	3,764	7.2	662
Truck and water	58,389	0.5	98,396	2.9	1,429	847	0.2	320	0.6	2,860
Rail and water	13,892	0.1	47,111	1.4	1,928	-	0.0	-	0.0	-
Other multiple modes	45,320	0.4	46,402	1.4	1,182	22	0.0	5	0.0	580
Other and unknown modes	279,113	2.4	33,764	1.0	116	9,541	2.6	1,007	1.9	101

Table 2-9 provides an overview of the mode choice decisions by US shippers for a moderately detailed categorization of commodities. The table shows the flows by weight (which is indicative of investment cost) and value (which suggests the value of the shipment to shipper).

Three-fourths of the shipments (by weight) remain in state; 87 percent of North Carolina shipments and 61 percent of out-of-state shipments by weight are sent to locations in the state or the three contiguous states with direct Interstate access: South Carolina, Virginia, and Tennessee. (Georgia is also contiguous with North Carolina but it is likely that much of the shipment to that state travels via South Carolina Interstate corridors.) By value, those percentages are 49 percent, 63 percent, and 26 percent, respectively. With respect to inbound shipments, 80 percent by weight originate in North Carolina or the three contiguous neighbors and 37 percent of the out-of-state by weight shipments to North Carolina originate in the three neighboring states. By value, the figures are 71 and 22 percent, respectively.

Table 2-9: US Commodity Shipments by Mode

By weight of shipments
(Total weight/percent of commodity by mode)

Mode	Commodity																				
	Alcoholic beverages	Animal feed	Articles-base metal	Base metals	Basic chemicals	Building stone	Cereal grains	Chemical prods.	Coal	Coal-n.e.c.	Crude petroleum	Electronics	Fertilizers	Fuel oils	Furniture	Gasoline	Gravel	Live animals/fish	Logs	Machinery	Meat/seafood	Metallic ores
Air, air & truck	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.3	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0
Other Intermodal	0.2	0.6	0.6	1.1	1.0	0.7	0.3	1.0	3.8	0.2	0.0	5.8	0.0	1.4	0.8	0.2	0.2	0.2	0.0	0.6	0.2	48.3
Pipeline & Unknown	0.9	1.2	1.7	2.4	24.5	0.5	0.7	1.4	12.3	79.5	91.9	3.7	1.8	30.7	1.7	34.1	2.1	0.0	0.2	1.3	1.6	0.9
Rail	5.7	10.1	3.2	12.6	20.5	0.0	13.4	0.4	68.3	4.5	0.0	0.9	29.3	1.1	0.6	0.7	3.7	0.0	0.3	0.8	0.5	34.7
Truck	92.2	87.8	94.1	81.1	41.1	98.7	79.7	96.6	12.6	13.7	0.9	87.9	66.2	55.3	96.6	59.1	90.6	99.8	99.3	96.9	97.4	10.6
Truck and rail	0.4	0.1	0.1	0.2	0.2	0.0	0.2	0.1	0.3	0.1	0.0	0.7	0.4	0.0	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.6
Water	0.6	0.2	0.2	2.6	12.7	0.1	5.7	0.2	2.7	2.1	7.1	0.1	2.4	11.6	0.0	5.8	3.4	0.0	0.2	0.0	0.3	4.9
Total	107,216	255,398	189,177	346,451	346,719	32,936	1,317,655	115,720	1,270,209	2,536,886	928,767	54,440	301,032	609,687	47,647	1,137,083	2,258,205	107,952	444,726	214,839	98,136	93,580

	Milled grain prods.	Misc. mfg. prods.	Mixed freight	Motorized vehicles	Natural sands	Newsprint/paper	Nonmetal min. prods.	Nonmetallic minerals	Other ag prods.	Other foodstuffs	Paper articles	Pharmaceuticals	Plastics/rubber	Precision instrument	Printed prods.	Textiles/leather	Tobacco prods.	Transport equip.	Unknown	Waste/scrap	Wood prods.	Total
Air, air & truck	0.1	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.1	0.6	0.4	0.3	0.0	1.4	0.0	0.0	0.0	5,296
Other Intermodal	0.1	3.1	0.8	0.8	0.0	0.2	0.1	0.1	0.3	0.1	0.8	3.9	0.8	3.4	2.7	6.2	1.3	0.5	0.0	0.1	0.2	156,571
Pipeline & Unknown	1.0	7.9	1.6	8.2	2.7	1.0	2.3	1.7	0.6	1.7	1.8	19.6	1.8	0.6	4.3	3.9	0.7	0.9	4.3	0.3	2.4	3,909,352
Rail	9.3	0.5	0.3	8.5	3.4	22.4	2.9	13.8	5.6	8.5	1.3	0.0	22.8	0.0	0.5	0.9	0.0	13.9	0.8	7.4	10.9	1,904,603
Truck	87.4	87.8	97.0	80.2	91.4	75.7	93.7	81.4	88.0	88.4	95.4	75.9	73.9	95.4	91.9	88.5	97.9	80.6	94.3	90.7	86.1	12,390,000
Truck and rail	1.3	0.1	0.2	2.0	0.0	0.6	0.2	0.2	0.4	0.7	0.7	0.0	0.5	0.0	0.2	0.2	0.1	0.0	0.0	0.4	0.4	37,210
Water	0.8	0.4	0.0	0.2	2.4	0.1	0.8	2.9	5.1	0.6	0.1	0.0	0.2	0.0	0.0	0.0	0.0	2.6	0.5	1.1	0.1	582,030
Total	119,822	91,942	358,764	141,791	570,663	122,807	1,156,788	214,052	446,039	522,113	76,398	28,040	143,410	20,019	70,392	61,989	5,697	47,118	529,830	1,022,411	418,955	18,980,000

By value of shipments
(Total value/percent of commodity by mode)

Mode(Mode)	Commodity																				
	Alcoholic beverages	Animal feed	Articles-base metal	Base metals	Basic chemicals	Building stone	Cereal grains	Chemical prods.	Coal	Coal-n.e.c.	Crude petroleum	Electronics	Fertilizers	Fuel oils	Furniture	Gasoline	Gravel	Live animals/fish	Logs	Machinery	Meat/seafood	Metallic ores
Air, air & truck	0.0	0.0	0.7	0.4	0.6	0.0	0.0	0.3	0.0	0.0	0.0	10.9	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.6	0.2	0.0
Other Intermodal	0.4	2.5	8.1	1.4	2.2	1.1	0.3	4.4	1.6	0.1	0.0	26.9	0.1	0.5	2.5	0.1	0.2	0.1	0.1	2.9	0.3	3.5
Pipeline & Unknown	2.3	2.2	5.2	3.8	17.5	1.7	1.4	2.6	11.3	86.3	90.9	8.4	3.3	24.9	4.7	30.4	3.9	0.2	4.1	2.5	2.4	2.6
Rail	3.1	7.4	1.0	6.1	13.2	0.1	19.0	0.2	74.8	2.3	0.0	0.3	17.9	0.7	0.2	0.5	3.5	0.0	2.0	0.6	0.3	2.4
Truck	93.3	87.6	84.7	87.8	57.0	97.0	70.3	92.3	9.7	10.0	1.1	53.3	75.8	63.7	92.1	64.4	90.1	99.6	93.2	93.2	96.8	88.1
Truck and rail	0.7	0.2	0.1	0.1	0.5	0.1	0.6	0.1	0.5	0.0	0.0	0.1	0.7	0.0	0.2	0.0	0.0	0.0	0.3	0.2	0.1	2.6
Water	0.2	0.1	0.1	0.4	8.9	0.0	8.5	0.1	2.0	1.2	8.0	0.1	2.2	10.2	0.0	4.6	2.3	0.0	0.3	0.0	0.1	0.7
Total	131,951	56,966	373,882	272,061	149,037	5,015	89,555	247,933	36,120	672,943	82,745	973,469	39,357	120,174	170,895	293,233	15,646	123,454	15,264	1,412,120	238,368	14,458

	Milled grain prods.	Misc. mfg. prods.	Mixed freight	Motorized vehicles	Natural sands	Newsprint/paper	Nonmetal min. prods.	Nonmetallic minerals	Other ag prods.	Other foodstuffs	Paper articles	Pharmaceuticals	Plastics/rubber	Precision instrument	Printed prods.	Textiles/leather	Tobacco prods.	Transport equip.	Unknown	Waste/scrap	Wood prods.	Total
Air, air & truck	0.0	2.3	0.2	0.4	0.0	0.0	0.4	0.1	0.2	0.0	0.1	4.0	0.7	16.9	1.0	0.5	0.0	25.4	0.0	0.1	0.1	270,940
Other Intermodal	0.6	22.9	3.1	2.5	1.1	0.7	2.5	0.5	0.6	0.8	2.7	17.3	5.0	42.4	12.4	12.7	1.2	3.7	0.1	0.1	0.8	842,371
Pipeline & Unknown	1.2	7.6	2.6	18.9	4.2	2.2	4.1	3.8	1.7	2.8	4.5	3.3	4.0	3.9	6.6	7.5	2.0	0.6	21.4	0.5	3.5	1,465,509
Rail	2.6	0.3	0.4	8.8	4.9	15.2	2.9	13.9	2.9	3.8	0.5	0.0	8.5	0.0	0.1	0.1	0.0	2.4	0.1	6.1	7.6	319,232
Truck	94.4	66.9	93.4	65.3	89.2	81.4	89.7	81.0	92.8	91.6	91.6	75.3	81.3	36.7	79.9	79.1	96.8	67.8	78.3	89.7	87.5	9,068,401
Truck and rail	1.1	0.1	0.3	4.0	0.1	0.4	0.2	0.2	0.4	0.9	0.7	0.0	0.6	0.1	0.0	0.1	0.1	0.0	0.0	2.4	0.6	61,588
Water	0.1	0.0	0.0	0.1	0.6	0.1	0.3	0.5	1.5	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	1.1	0.1	74,811
Total	126,851	434,289	969,861	868,085	4,281	96,219	169,084	11,195	204,124	417,190	113,803	543,114	340,525	212,754	251,004	558,667	95,094	270,093	564,980	113,859	203,135	12,100,000

Five or six bulk commodities account for half the weight of the outbound shipments. Six or seven commodities account for half the outbound value. Textiles/leather, mixed freight, electronics, machinery, pharmaceuticals, plastics/rubber, furniture, motorized vehicles and parts, and miscellaneous manufactured products – all broad categories to be sure – account for two-thirds of all North Carolina shipments out of state. As suggested above, North Carolina shipping relies heavily on trucks.

2.4.7 Trucking Corridors

Figure 2-8 shows the forecasted truck traffic in 2035. Interstates 40, 85 and 95 are expected to be the most heavily used corridors. Some freight traffic is also anticipated on several east-west routes in the Eastern Region, including US 64, 264, and 70.

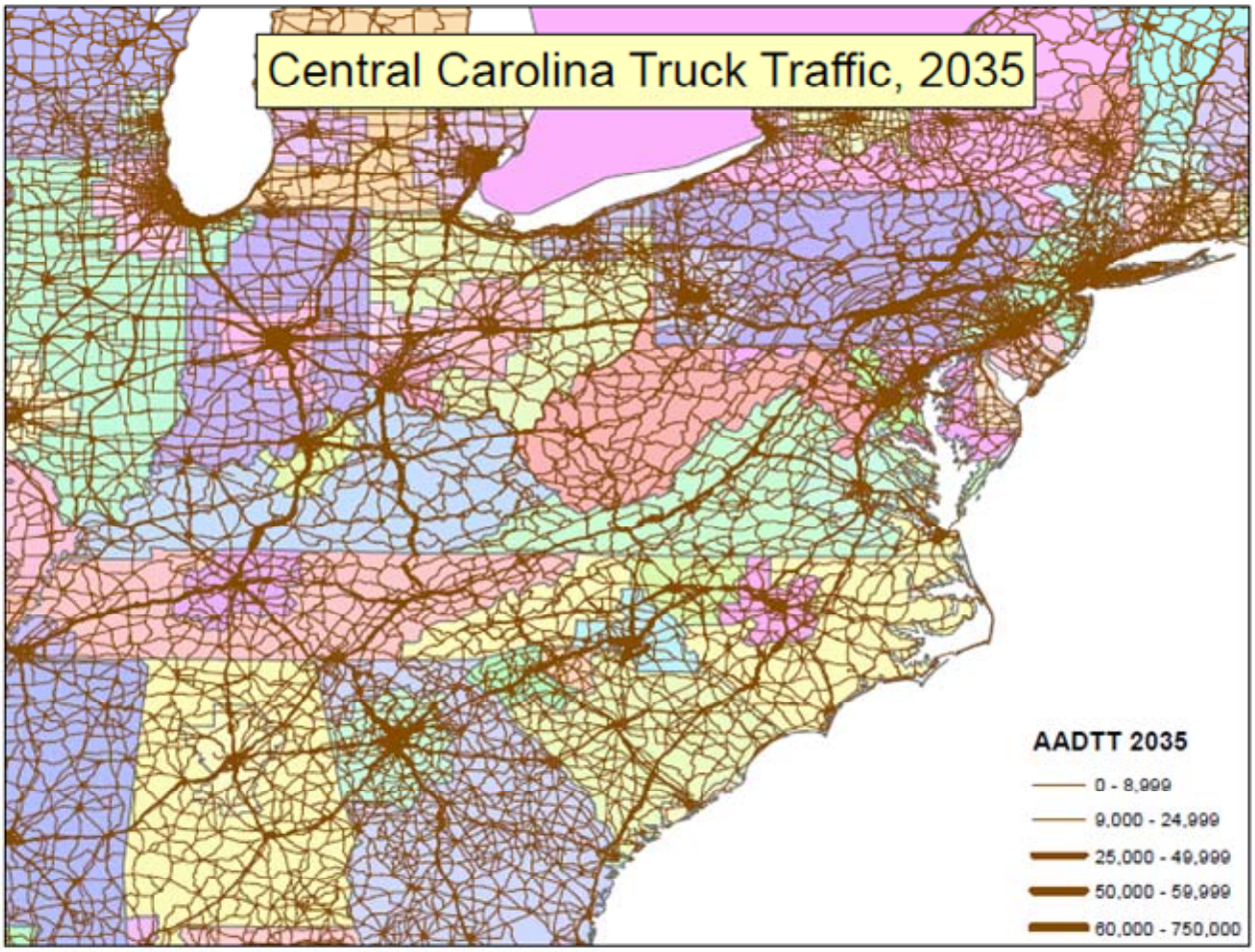

Figure 2-8: Central Carolina Truck Traffic, 2035

Figure 2-9 shows North Carolina truck traffic in 2002. A comparison between Figure 2-8 and this one suggests that most of the increase in truck traffic will be in the Piedmont and on selected Interstate highways.

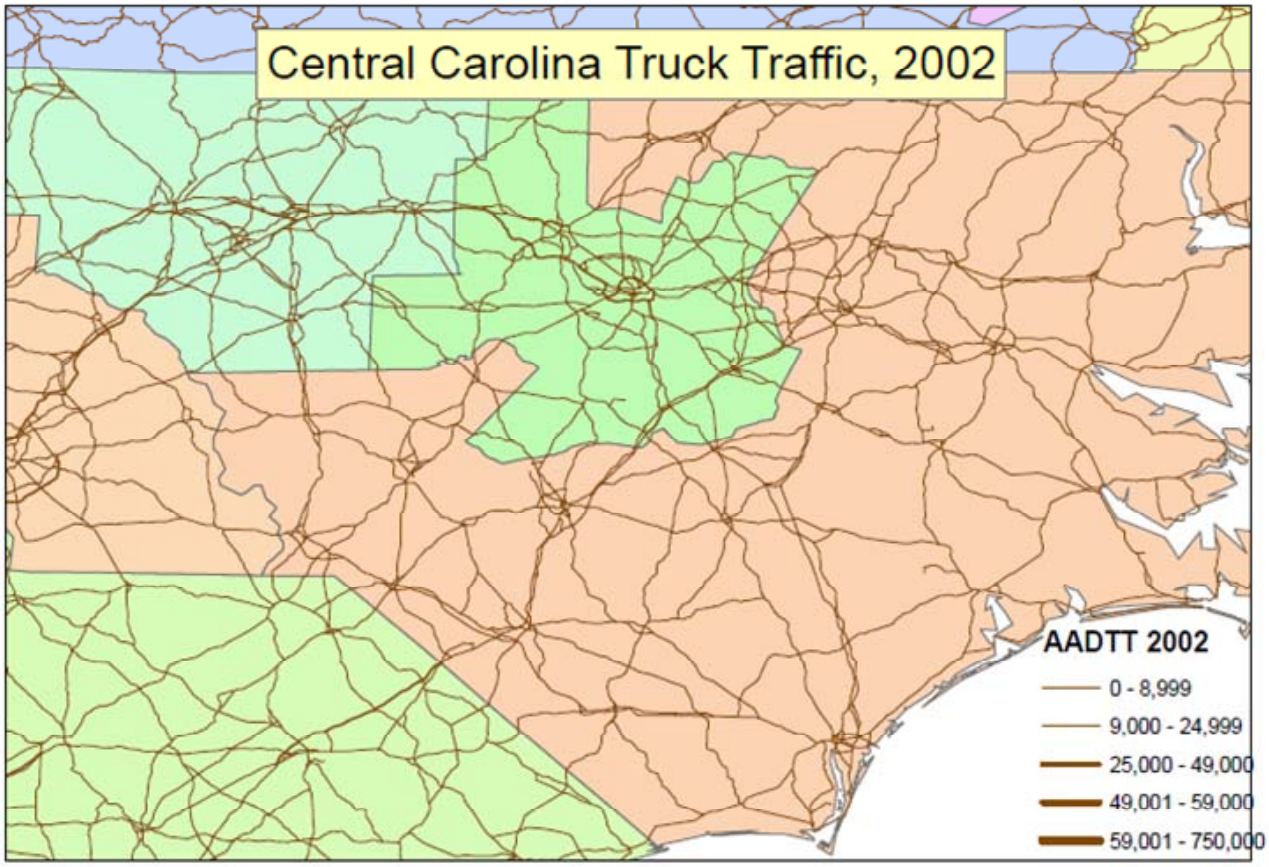

Figure 2-9: Central Carolina Truck Traffic, 2002

2.4.8 Rail Corridors

Figure 2-10 presents recent information on US shipments by rail. Coal accounts for approximately half of US rail tonnage, so that coal shipments dominate the map. Until recently, bulk products have dominated US rail shipments.

Intermodal rail shipments have been growing rapidly. In Figure 2-11, several popular intermodal routes are visible, including one from Los Angeles east to the Chicago distribution yards. An increase in intermodal traffic from Mexico north along the NAFTA Corridor is expected should energy cost, urban Chinese wages, or the relative value of Chinese currency increase. Accordingly, a set of rail-based intermodal terminals are developing along that corridor which also serve east-west traffic.[44]

[44] Unfortunately, the Public Use Rail Waybill sample appears to suppress much needed information for North Carolina.

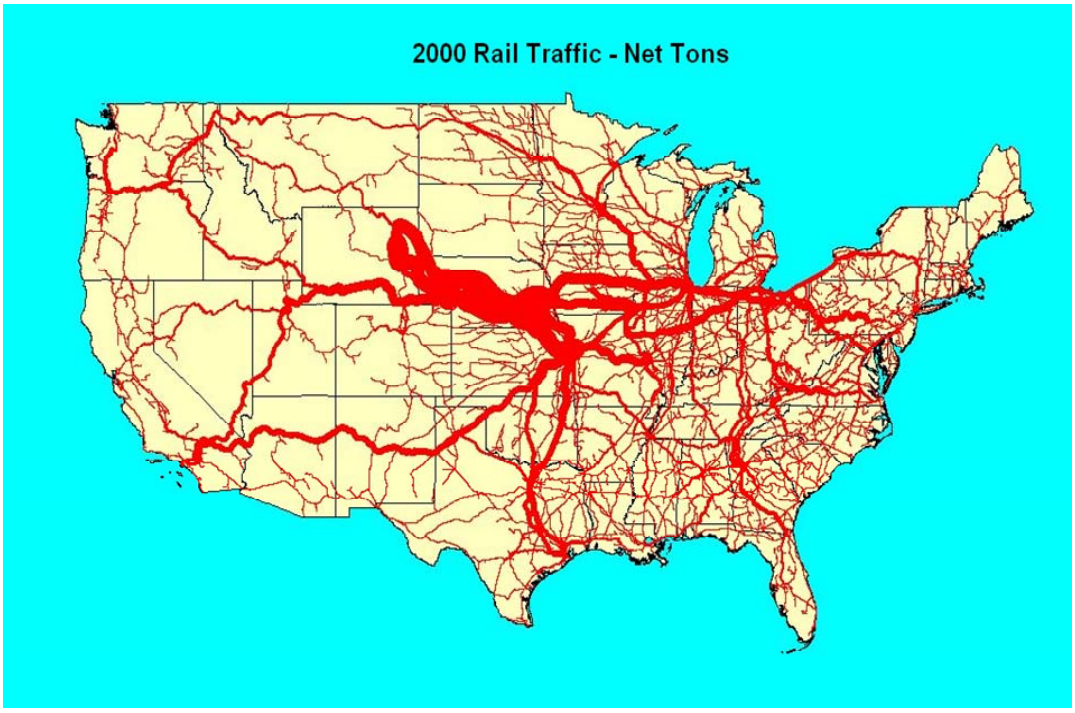

Figure 2-10: US Rail Traffic

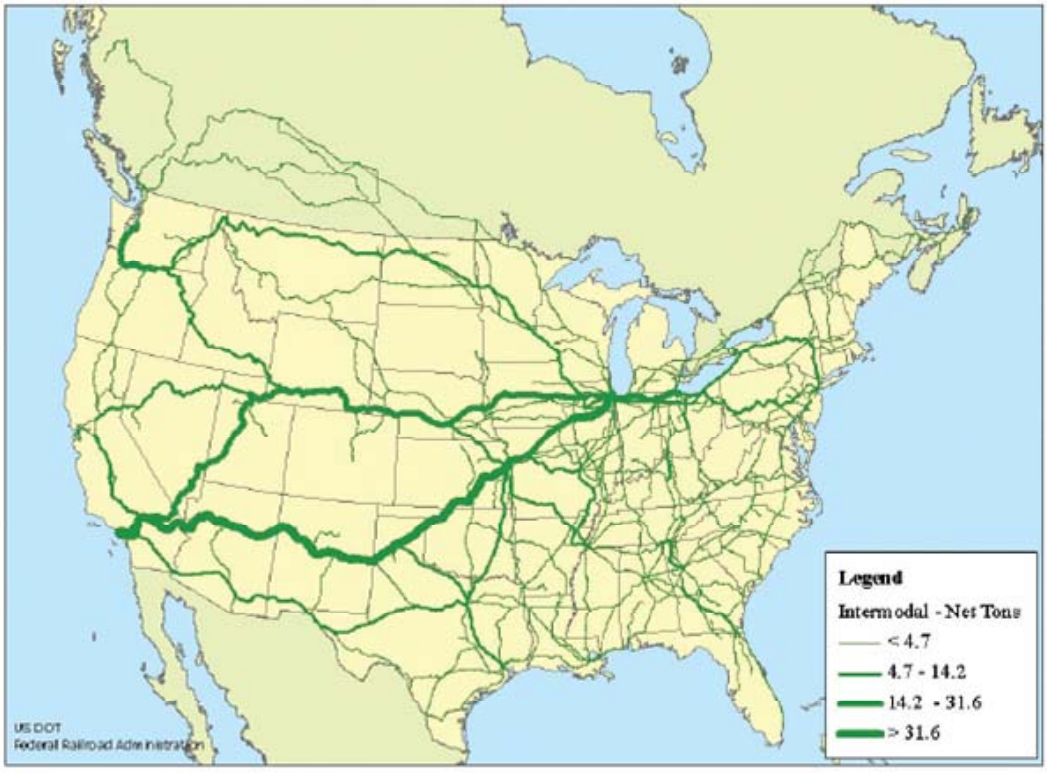

Figure 2-11: US Intermodal Rail Traffic Flows

Figure 2-12 shows the major intermodal routes emerging in the eastern portion of the US. The CSX National Gateway connects the Port of Wilmington to the Midwest by heading north along the coast past Norfolk and Baltimore before turning inland. Norfolk Southern is anticipating three to four double-stack trains daily from the Virginia ports to the Midwest along the recently completed Heartland Express route as Panama Canal traffic increases. It may be possible for cargo moving through North Carolina ports to link into the Norfolk Southern system at Roanoke. The frequent train service will relieve pressure on port land use capacity. Service to the inland port at Front Royal, VA could also increase to serve destinations closer to the East Coast. Norfolk Southern's Crescent Corridor serves an arc from New Orleans to New York City, touching base at Charlotte and the Triad along the way. An intermodal multimodal waterway corridor is also emerging along the Mississippi, Ohio, and Tennessee-Tombigbee waterways to serve Midwest cargo markets.

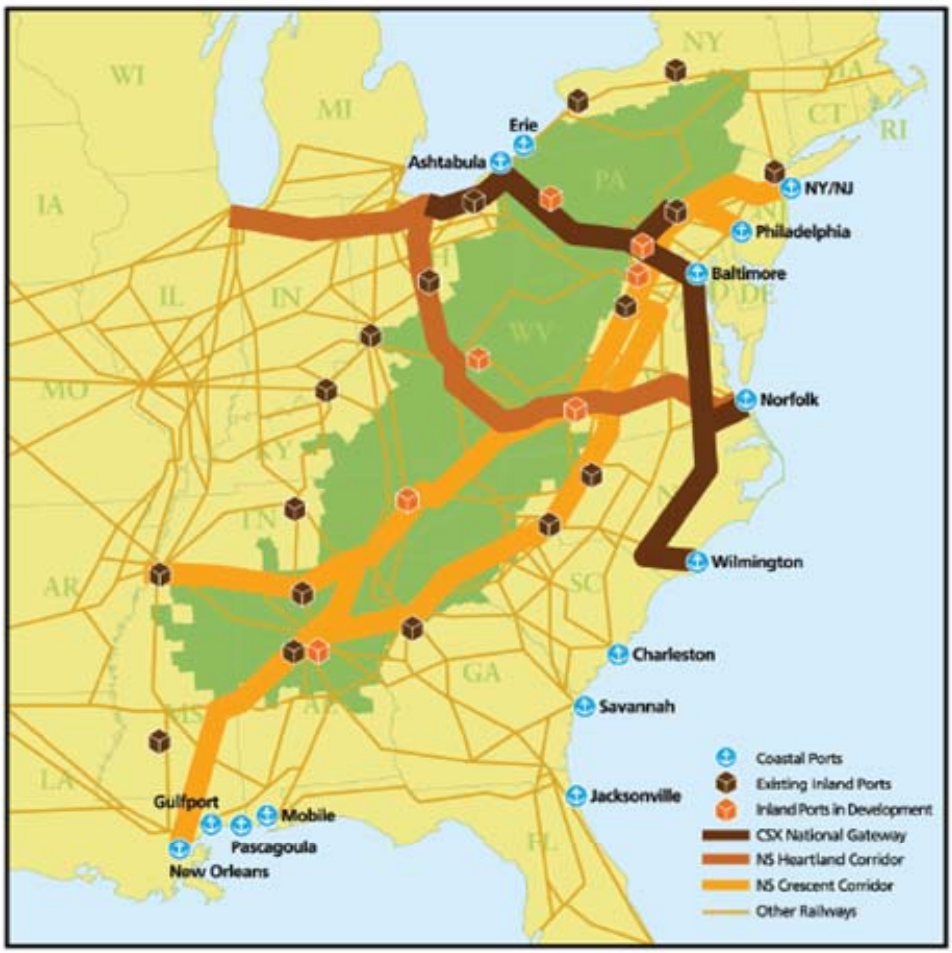

Figure 2-12: Emerging Intermodal Rail Corridors

According to NCDOT documents, the demand for freight rail service in North Carolina will be driven by the state's position midway on the Atlantic Seaboard, by population and income growth, and by five main sectors which are special demand drivers. Manufacturing, agriculture, energy, and construction are particularly dependent upon rail for transporting materials competitively – minimizing the combination of transportation costs, inventory costs, and risks.

In addition, military realignments and the attendant logistics needs will be increasingly important in the coming years.[45] Despite their efforts, the Rail Division is concerned that transportation investments at the state level may not be fully consistent with local and regional economic development. Moreover, the state transportation plan may not fully reflect private sector, city and county development needs. Nor does it encourage urban infill and freight villages.[46]

2.4.9 Seaports

In both absolute terms and in relation to domestic economic production, US international trade has risen substantially over the past several decades. On balance, the US has a deficit in the trade in goods which has generally widened. That is, even with oil excluded, the US imports more than it exports. The increase in overseas sourcing has been held responsible for at least a portion of the manufacturing employment dislocation in North Carolina over the last several decades.

Much of the nation's international trade crosses a land border with its largest trading partner, Canada. A substantial proportion of the trade crosses a land border to the South. Mexico has slipped from its position as the second-largest trading partner at the turn of the century but is still a major partner. Seaports are the gateways for most of the remaining trade (at least by weight). Much of the growth in seaborne shipments has been in containerized cargo with containers being used for seemingly ever broadening types of cargo. Even some bulk goods, including agricultural products such as soy beans, are now shipped in containers. Table 2-10 summarizes traffic at selected US seaports.

North Carolina is home to two seaports that provide import and export services vital to businesses throughout the state. The larger is at Wilmington, the smaller at Morehead City. A new, larger, container port was proposed for Southport. Those development plans have been shelved.[47] According to recent data, the existing ports have been ranked as the 45th and 65th largest ports by tonnage in the US, respectively. Wilmington ranks 36th, 44th, and 45th in terms of export, import, and total value. Morehead City ranks 53rd, 64th, and 64th on the same yardsticks. During the second half of the last decade, Wilmington container traffic grew more quickly than the US port average.

Future port development is currently being studied under the North Carolina Maritime Strategy project.[48] This study also spawned from the Governor's Logistics Task Force and has the following stated goals:

[45] North Carolina Department of Transportation, *2009 Rail Plan Executive Summary*, http://www.bytrain.org/quicklinks/reports/2009_railplanexecsum.pdf. The North Carolina Rail Plan looks at the demographic and economic drivers behind the demand for rail transportation, the status of the current rail system, and the capital investment needs required to maintain a strong rail network.
[46] *2009 Rail Plan Executive Summary,* p. 9.
[47] https://apps.dot.state.nc.us/pio/releases/details.aspx?r=4887
[48] http://www.ncmaritimestudy.com/.

- Facilitate collaboration of freight transportation, economic development and community interests as input to the statewide strategy,
- Define North Carolina's economic context and maritime market positioning strategies that would offer the greatest economic benefit to the State, and
- Identify infrastructure investments and policies that would most significantly enhance North Carolina's economy through improved performance of the State's maritime gateways and related trade corridors.

Initiated in May 2011, the study results are expected in early 2012.

Wilmington's traffic is compared to that in other US ports in order to put the port traffic in national perspective. Wilmington processes approximately 1/50th the number of TEUs as Los Angeles/Long Beach, 1/20th the number of the Port of New York and New Jersey, 1/10th as many as Savannah, more than 1/8th as many as Hampton Roads, and 1/5th the number of Charleston. Just as distance to major markets and through routes helps explain the relatively late development of the Carolina coast, those same factors help explain the relatively small size of the state's ports. Geography and operational costs figure prominently in logistics siting decisions.

Table 2-10: Traffic at Selected US Container Seaports

NORTH AMERICA: CONTAINER PORT TRAFFIC IN TEUs											
	2009	2008	2007	2006	2005	2000	1995	1990	2009-2005	2000-2005	1990-2000
Los Angeles	6,748,995	7,849,985	8,355,039	8,469,853	7,484,624	4,879,429	2,555,206	2,116,410	-9.83%	53.39%	130.55%
Long Beach	5,067,597	6,350,125	7,312,465	7,289,365	6,709,818	4,600,787	2,843,502	1,598,078	-24.47%	45.84%	187.90%
New York/New Jersey	4,561,528	5,265,058	5,299,105	5,092,806	4,785,318	3,050,006	2,262,792	1,898,436	-4.68%	56.90%	60.66%
Savannah	2,356,512	2,616,126	2,604,312	2,160,168	1,901,520	948,699	626,151	419,079	23.93%	100.43%	126.38%
Oakland	2,050,030	2,236,244	2,388,182	2,390,262	2,272,525	1,776,922	1,549,886	1,124,123	-9.79%	27.89%	58.07%
Houston	1,797,198	1,795,320	1,768,627	1,606,786	1,594,366	1,061,525	704,010	502,035	12.72%	50.20%	111.44%
Hampton Roads	1,745,228	2,083,278	2,128,366	2,046,285	1,981,955	1,347,364	1,077,846	788,760	-11.94%	47.10%	70.82%
San Juan (FY)	1,673,745	1,684,883	1,695,134	1,729,294	1,727,389	2,333,788	1,539,000	711,474	-3.11%	-25.98%	228.02%
Seattle	1,584,596	1,704,492	1,973,505	1,987,360	2,087,929	1,488,020	1,479,076	1,171,091	-24.11%	40.32%	27.06%
Tacoma	1,545,853	1,861,352	1,924,934	2,067,186	2,066,447	1,376,379	1,092,087	937,691	-25.19%	50.14%	46.78%
Charleston	1,181,353	1,635,534	1,754,376	1,968,474	1,986,586	1,632,747	1,023,903	801,105	-40.53%	21.67%	103.81%
Honolulu (FY)	1,049,420	1,124,388	1,125,382	1,113,789	1,077,468	461,102	805,036	399,117	-2.60%	133.67%	15.53%
Miami (FY)	807,069	828,349	884,945	976,514	1,054,462	868,178	656,175	373,851	-23.46%	21.46%	132.23%
Port Everglades (FY)	796,160	985,095	948,680	864,030	797,238	676,760	632,789	256,327	-0.14%	17.80%	164.02%
Jacksonville (a) (FY)	754,352	697,494	710,073	768,239	777,318	708,028	529,547	154,491	-2.95%	9.79%	358.30%
Baltimore	525,296	612,877	610,466	627,947	602,475	508,320	534,556	474,301	-12.81%	18.52%	7.17%
Anchorage	343,278	544,315	504,844	485,760	516,367	432,296	345,865	136,279	-33.52%	19.45%	217.21%
Wilmington(DE)	259,964	267,684	284,352	262,856	250,507	192,091	156,940	91,623	3.78%	30.41%	109.65%
New Orleans (a)	229,067	235,324	250,649	175,957	200,766	278,932	198,424	157,037	14.10%	-28.02%	77.62%
Wilmington(NC)	225,176	196,040	191,070	177,634	148,784	105,110	104,038	92,720	51.34%	41.55%	13.36%
Philadelphia	222,900	255,994	253,492	247,211	204,912	198,680	107,094	65,309	8.78%	3.14%	204.22%

Compared to neighboring ports, Wilmington is relatively remote from concentrated centers of cargo demand. The Virginia ports are less than 200 miles from the large Washington, DC market with significant areas of demand, such as Richmond, even closer. Savannah is 250 miles from Atlanta which is also a strong market. At 250 miles, Charleston is somewhat more distant from Atlanta but is closer to the industrial markets of the South Carolina Piedmont and just over 200 miles from Charlotte. Wilmington is only marginally closer to Charlotte and less well connected. Wilmington is more distant than the neighboring ports to the large Atlanta markets and those of the Northeast. Savannah, Charleston, and the Virginia ports each have rail service from both Norfolk Southern and CSX. Wilmington is not as well served.

Table 2-11 shows the throughput for Wilmington and Morehead City across the years 2001-2010. Total tonnage fluctuates but appears to be steady at Wilmington and on a downward trend at Morehead City. The table also shows trends in the number of ships and barges visiting the port. Ship movements also appear to be holding steady or slightly increasing at Wilmington while at Morehead City there is a gradual downward trend with an average of approximately 120 ships calling in the last several years. Barge movements are presently absent at Wilmington while at Morehead City they have been on an upward trend. In 2010, Wilmington handled slightly more than one ship per day while Morehead City handled a ship about every three days and slightly more than one barge every day.

Table 2-11: North Carolina Port Throughput

Wilmington						Morehead City					Total			
Ten Year Tonnage Trend														
Year	Breakbulk	Container	Bulk	Total	TEU's	Breakbulk	Container	Bulk	Total	TEU's	Breakbulk	Container	Bulk	Total
2010	207,335	1,917,237	1,304,755	3,429,237	250,048	198,965	0	1,569,747	1,768,712	0	406,300	1,917,237	2,874,502	5,197,949
2009	413,446	1,338,436	1,322,963	3,074,844	194,608	167,454	0	1,725,432	1,892,886	0	580,900	1,338,436	3,048,395	4,967,730
2008	701,993	1,404,401	1,361,815	3,468,209	204,896	231,072	0	1,652,863	1,883,935	0	933,065	1,404,401	3,014,678	5,352,144
2007	897,776	1,174,335	1,368,550	3,440,661	173,111	276,128	0	1,862,213	2,138,441	0	1,173,904	1,174,335	3,230,763	5,579,102
2006	1,235,331	955,370	1,270,589	3,461,290	166,625	375,998	0	1,922,386	2,298,384	0	1,611,329	955,370	3,192,975	5,759,674
2005	1,271,417	781,046	951,601	3,004,064	133,723	315,440	0	2,115,309	2,430,749	0	1,586,857	781,046	3,066,910	5,434,813
2004	1,054,214	624,170	648,381	2,326,765	96,077	214,948	0	2,000,643	2,215,591	0	1,269,162	624,170	2,649,024	4,542,356
2003	976,082	613,923	630,799	2,220,804	99,677	243,574	0	1,296,618	1,540,692	0	1,219,656	613,923	1,927,417	3,761,496
2002	1,001,728	628,800	490,929	2,121,457	91,784	213,583	0	1,294,005	1,507,588	0	1,215,311	628,800	1,784,934	3,629,045
2001	844,052	600,014	768,376	2,212,442	96,380	240,203	0	2,516,973	2,757,176	0	1,084,255	600,014	3,285,349	4,969,618
10 – Year Vessel Trend														
Fiscal Year	Ships	Barges				Ships	Barges				Ships	Barges		
2010	442	0				122	465				564	465		
2009	362	0				118	415				480	415		
2008	339	0				124	414				463	414		
2007	381	0				153	436				534	436		
2006	429	9				164	411				593	420		
2005	362	14				156	348				518	362		
2004	328	48				168	250				496	298		
2003	320	122				153	191				473	313		
2002	341	100				132	209				473	309		
2001	364	100				177	521				541	621		

2.4.10 Airports

Besides the 80,000 miles of state-owned roadways (nearly 15,000 of which are primary roads), 13,578 state-maintained bridges, and nearly 3,700 miles of track (317 miles of the railroad is owned by the state) which carry 60 freight and 8 passenger lines serving twelve North Carolina cities, North Carolina is home to some 300 airports. Seventy-two of those are publicly-owned components of the National Plan of Integrated Airport Systems (NPIAS).[49] Figure 2-13 provides a state-wide overview. Nine of those airports have regularly scheduled passenger service: Charlotte-Douglas, Raleigh-Durham, Piedmont Triad, Wilmington International, Asheville Regional, Fayetteville Regional, Albert J. Ellis (Jacksonville/Camp Lejeune), Coastal Carolina (New Bern/Morehead/Beaufort), and Pitt-Greenville. Global TransPark has occasional freighter service but no passenger service; it is an APOE. Other airports like Smith-Reynolds have had commercial passenger service in the past. The general aviation airports have been divided into three groups according to local population size and rate of growth, local average annual income, tourist revenues, and potential airport function. There are 16 regional business airports (red), 27 community airports with the capability of handling business aircraft (green), 17 small community rural airports (blue), and three National Park Service airports providing access to the Outer Banks.[50] The Division of Aviation has established a set of ranked requirements for each set of airports and has instituted a program of financing airport improvements according to priorities set by the state.

[49] NCDOT, Division of Aviation (2006) "North Carolina General Aviation Development Plan," October.
[50] Richard Wallis (n.d.) North Carolina – General Assembly Global Engagement Committee: North Carolina Aviation .

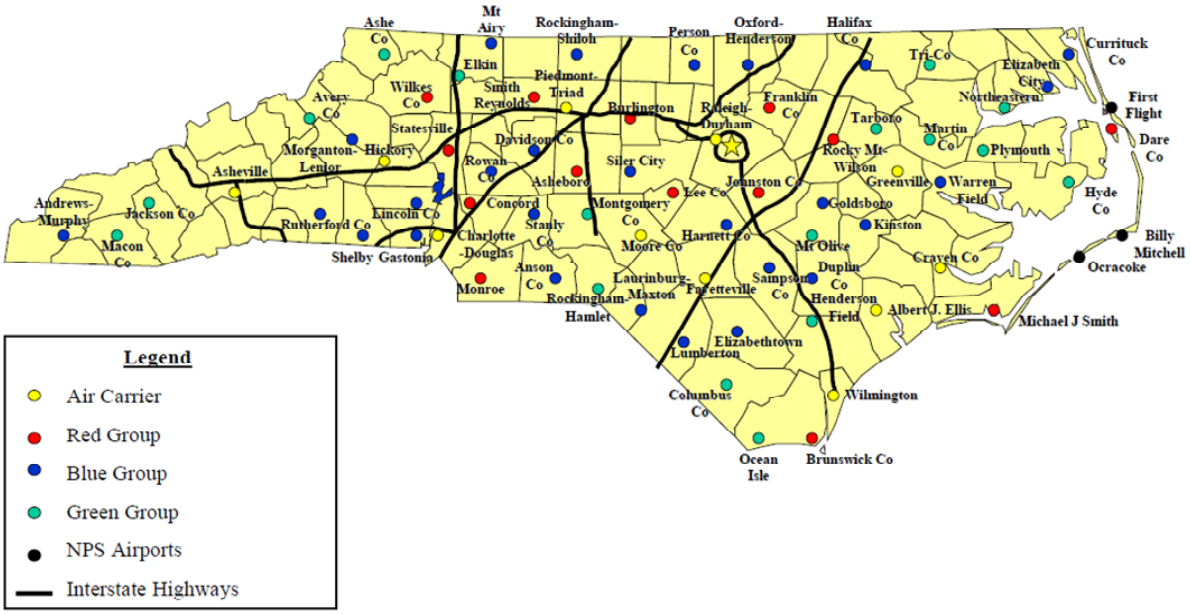

Figure 2-13: North Carolina NPIAS Airports

As seen in Table A-1 in Appendix A, the 72 North Carolina NPIAS public airports represent 103 runways, the key infrastructural component. Eighteen of those runways are over 7,000 feet, the critical length specified for this study. Half are over 5,000 feet long. An eight-passenger Gulfstream 650 can land and take-off in 6,000 feet. A Cessna Citation needs 5,200 feet. A five-passenger HondaJet requires just over 3,000 feet. Single engine propeller aircraft require less runway. A 70-passenger Bombardier Q400 Dash 8 turboprop regional airliner needs less than 5,000 feet. A large number of airports in this state are able to service business jets and larger aircraft.

Table A-2 in Appendix A shows that North Carolina makes use of those airports. Eight airports support significant commercial passenger operations; 13 offer cargo service. Fifty-nine airports log over 10,000 operations (takeoffs and landings) per year. Twenty nine support over 10,000 itinerant general aviation operations per year, suggesting heavy business use. (An assumption is that most pleasure flying begins and ends at the based airport. In tourist areas, a large proportion of itinerant general aviation is likely for pleasure.) The importance of the military can be seen in that 33 support over 1,000 military operations in a year. Many of these may be simple touch-and-go landings for training but the military does use several airports for logistic purposes.

Table A-3 in Appendix A summarizes Bureau of Transportation Statistics information on passenger and cargo flows at each airport. As North Carolina's only passenger airline hub, Charlotte-Douglas accounts for approximately three-fourths of the passenger enplanements in the state. Charlotte-Douglas is notable for having the lowest per passenger cost of enplanement in the US, in part, because it has achieved a volume sufficient to allow its expensive capital investments to be effectively used. The busiest three airports, all in the Piedmont, account for the very large majority of passenger and cargo traffic. Other airports have important regional

impacts, connecting travelers to regional destinations, acting as reliever cargo nodes, and anchoring businesses in particular locations. The Division of Aviation has estimated that of aviation's $11.81 billion overall economic impact on the North Carolina economy in 2006, $1.88 billion was a result of general aviation.

Despite the heavy use of the existing airports, there is modest indication of the need for additional capacity. Charlotte has recently completed a third parallel runway. Piedmont Triad International has also completed the construction of a major parallel runway. Several airports might attract some additional traffic, modest by state standards but possibly with far reaching consequences for the local economy, should runways be lengthened. Charlotte-Monroe Airport has been able to attract several manufacturers on the basis of proximity to Charlotte, a diverse work force, and a 5,500 foot runway. The level of demand may not imply a need for a major new central logistics hub, however.

2.5 *Logistics Villages*

A logistics village can be described as "a defined area within which all activities relating to transport, logistics and the distribution of goods, both for national and international transit, are carried out by various operators."[51] The terms "logistics village," "freight village," and "integrated logistics center" along with many other non-English terms (e.g., Germany: "Güterverkehrszentrum" [GVZ] or Cargo Transport Center; Italy: Interporti; and France: Plate Forme Logistique) have frequently been used interchangeably. "Freight villages reflect a modern way of organizing logistics, transport and goods distribution activities and usually include warehouses, distribution centers, storage areas, offices, truck services, bank, postal, insurance services and in certain cases customs infrastructures."[52] While there are several definitions, most include intermodal transport and the active management of shared facilities as keystone features. A few include the condition of the goods remaining in the same transport load unit for the entire journey but others include load aggregation and disaggregation in their definitions.

Logistics villages are sometimes contrasted with freight-based planned unit developments (PUDs. Similar to logistics villages, freight PUDs are also clusters of modern warehouses and freight facilities with favorable locations along major transport routes. The most important differentiation is that freight PUDs lack the shared transportation and distribution services which are at the heart of the logistic village concept.[53]

Logistics villages are likely to play a major role in North Carolina's future. They can be used to create job growth. They may be physical locations, or they may be virtual; but they can help companies find ways to collaborate and pool their transport needs to generate a transport market

[51] Howard J. Mann, Manager, Freight Planning, NYMTC, "Freight Village: What it is, What it does, Feasibility in NYMTC Region," undated brownbag presentation. Most works cited include a similar definition of a logistics village.
[52] Athanasios Ballis and George Mavrotas (2007) "Freight village design using the multicriteria method PROMETHEE," *Operational Research. An International Journal* 7(2): 213-232.
[53] Roberta E. Weisbrod, Ernest Swiger, Gerhardt Muller, F. Mack Rugg, Mary Kay Murphy, "Global Freight Villages: A Solution to the Urban Freight Dilemma," undated manuscript.

that can support high quality, low cost logistics. They can lower logistics costs. This not only allows for the development of high levels of logistics expertise but it also facilitates the sharing of assets and facilities among shippers. The new paradigms frequently rely on the ability of IT to coordinate large numbers of shipments to maximize operational efficiency while minimizing the need for capital expenditure. This is likely to be the case in North Carolina and there is already evidence that it is happening.

Most existing logistics villages are quite large, being located at the crossroads of busy trade lanes or the origins and destinations of large markets. Correctly assessing and serving demand appears to be the critical factor determining the successful implementation of such a village. As transportation and logistics services providers are critical stakeholders in and near the logistics villages; their interest in specific projects is also a critical success factor.

Figure 2–14 presents one possible schematic view of the maturation of logistics villages over time. Functionality increases as traffic increases, meeting minimum thresholds for a growing set of ancillary services. Accordingly, a high level of traffic is critical to the development of logistics villages.

Logistics villages are elements of integrated transport chains which need to respond to the needs of shippers and consignees, even if they do not create those chains. As such, logistics villages complement transportation networks and their functions will likely continue to expand as logistics needs change. They often focus on transportation, intermodal operations, and ancillary activities. Therefore they are often located on the outskirts of metropolitan areas close to intermodal transport links, seaports, and/or airports. Table 2-12 contains a list of logistics villages and similar logistics-oriented developments.[54]

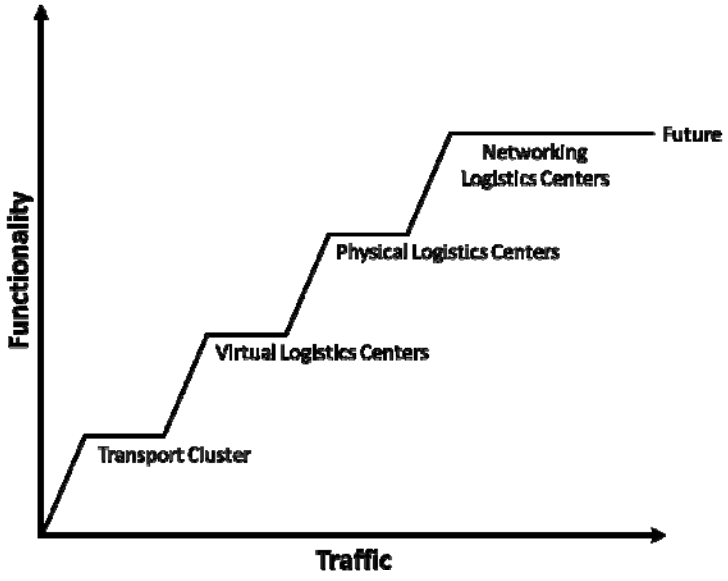

Figure 2-14: Stages in Logistics Villages Growth
Source: Lars Bentzen (2004) "Best Practices on Logistics Centres," Final NeLoC Conference, Turku, 15 January

[54] These were taken from Maria Boile, Sotirios Theofanis, Anne Strauss-Wieder (2008) "Feasibility of Freight Villages in the NYMTC Region: Task 3 – Description of How a Typical Freight Village Works," Center for Advanced Infrastructure and Transportation, Freight and Maritime Program, Rutgers University, which seems to have the most extensive – but not exhaustive – list. A composite list has not yet been compiled from the available sources.

Table 2-12: Partial List of Logistics Villages and Similar Complexes

EUROPE	
Denmark	Denmarks Transport Center, Hoeje-Taastrup Transport Center, Nordic Transport Center, Skandinavisk Transport Center, Taulov Transport Center
France	Rungis-Sogaris
Germany	GVZ-Dresden, GVZ-Bremen NW, GVZ Weil am Rhein, GVZ Nuremberg, GVZ Frankfurt/Oder (ettc), GVZ Osnabrück, GVZ Herne-Emscher, GVZ Kiel, GVZ Kassel, GVZ Hamburg, GVZ Bremen SW, GVZ Rostock, GVZ Koblenz
Greece	Promachon S.A.
Hungary	Budapest Intermodal Logistics Center
Italy	Interporto di Bologna, Interporto Marche, Interporto di Novara, Interporto Quadrante Europa, Interporto di Padova, Interporto di Parma, Interporto Rivalta Scrivia, Interporto di Rovigo, Interporto di Torino, Interporto di Venezia, Interporto di Verona
Portugal	Terminal Multimodal Do Vale Do Tejo S.A.
Spain	Bilkakobo-Aparcabisa, Centro de Transportes Aduana de Burgos, Centro de Transportes de Coslada, Centro de Transportes de Irun, Centro de Transportes de Madrid, Centro de Transporte de Vitoria, ZAL Port de Barcelona, Zona Franca de Barcelona, ZAL Gran Europa, Centro De Transportes de Benavente, Cimalsa, Ciudad del Transporte de Pamplona, Ciudad del Transporte de Zaragoza, Platforma Logistica de Zaragoza
Ukraine	Liski-Ukrainian State Centre of Transport Service
United Kingdom	DIRFT Logistics Park, Keypoint: Swindon's premier logistics park, Kingmoor Park, Port of Tyne, Wakefield Europort, Birch Coppice business park
ASIA	
China	ATL Logistic Center Hong Kong, Beijing Airport Logistics park, Shenzhen Pinghu Logistics, Huaihai Integrated Logistics Park, Shanghai North-West ILP, Nanjing Wangjiawan ILP, Tradeport Hong Kong
Korea	Gwangyang Port Distripark, Busan New Port Distripark, Gamcheon Distripark
Malaysia	Northport Distripark-Port Klang
Singapore	Keppel Distripark, Pasir Panjiang Distripark, Anexandra Distripark
Taiwan	Far Glory FTZ, Taisugar Logistics Park
NORTH AMERICA	
Canada	Atlantic Gateway-Halifax Logistics Park
United States	CenterPoint development in Joliet IL, Alliance TX, Pureland Industrial Complex NJ, Raritan Center NJ, Heller Industrial Park NJ, Hunts Point NY, Winter Haven FL, Mesquite Intermodal Facility/Skyline Business Park TX, Guild's Lake Industrial Sanctuary, Oregon, Dallas Intermodal Terminal / Dallas Logistics Hub TX, Rickenbacker Intermodal Facility OH, California Integrated Logistics Center Shafter CA, Salt Lake City Intermodal Facility UT, Cumberland Valley Business Park PA

Source: Boile et al. (2008)

The logistics village concept promises to deliver public and private benefits by building on economies of scale and scope. Logistics villages aim to provide public benefits primarily by supporting intra- and international trade by reducing logistics costs while relieving road

congestion by reducing truck vehicle miles traveled (VMT). The latter might improve urban air quality by reducing the pollution associated with truck traffic and, especially, traffic congestion. Successful logistics villages may generate congestion in their immediate vicinity, however, as trucks attempt access and egress at peak hours.

Logistics villages may also facilitate the expansion of growth sectors and generate employment in and of themselves, possibly benefiting regional economies. The logistics village concept has become especially popular in areas on the fringes of major metropolitan areas because they may restore disused manufacturing brownfield sites to local tax roles and because they may provide jobs, however limited in number, to under-employed populations. This type of site is sometimes redeveloped as mixed use residential or office complexes but such uses are not supported by market demand in all available locations.

In addition, as logistics activities increase in scale, and thus footprint, logistics villages offer the prospect of rationalized land use wherein freight traffic can blend with other land uses. In developed countries, the conflict between logistic, residential, recreational, and other commercial uses has increased, often resulting in freight sprawl and increasing delivery costs. Owing to the complementary nature of freight networks and infrastructure, logistics villages ameliorate conflict by concentrating facilities, reducing the footprint of externalities and by partially separating passenger and cargo traffic.

If there are to be benefits to the public, logistics villages need to provide advantages to businesses in order to induce them to participate. The primary business benefit, particularly when disused brownfield manufacturing sites near the centers of major metropolitan areas are redeveloped, may be market proximity.

Access to multimodal transport is a second potential benefit to those serving major metropolitan markets. Freight often travels long distances to reach markets. In these cases, a multimodal journey, often sea-land or rail-road but to a lesser extent air-road, becomes either necessary for intercontinental shipments while road-rail-road or road-air-road shipments may be (or become) cost-effective for intra-continental shipments. An efficient multimodal transfer can be an attraction to logistics providers and shippers.

Logistics villages are a largely European invention,[55] with the acknowledged first one, Plate-Form Logistique Sogaris (Sogaris Logistics Center), having been developed in Rungis (outside Paris' Orly Airport) in 1967 with rail, road, and air access.[56] Their appeal in the US has grown as international trade has grown and as land in major metropolitan areas has grown scarce.

As has long been the case in Europe, land for logistics has become difficult to obtain near major metropolitan markets, thus logistics firms find logistics villages with their pre-approved real estate increasingly attractive. The concentrated logistics activities, in the US as in Europe, may

[55] http://www.freight-village.com/ but see also http://www.intermodal.org/ for U.S. intermodal freight stakeholders.
[56] http://www.sogaris.fr/en/pfl_rungis.php Access to the European system of inland waterways is nearby but not on site.

contribute to congestion relief, truck VMT reductions, and, hopefully, more efficient transport along with an improved urban quality of life.

Logistics village developers hope that shared services decrease costs further and boost efficiency. Logistics providers can also be advantaged by high-quality perimeter security, ready access to ancillary business services, and the potential for synergistic opportunities to expand their markets and/or reduce costs. In addition, the land use conflicts noted above mean that businesses often find that esthetic premises can become competitive business considerations.

Table 2-13 provides an overview of logistics village characteristics, activities, and services. In addition to the core logistics activities, logistics villages provide common security and facility maintenance. Office space and conference facilities are often on-site. A broad array of user services including restaurants, business services, and local/regional public transportation is also made available.[57] Further services include hotels, vehicle repairers, and career development facilitation such as training and employment agencies. Inland ports are sometimes part of a logistics village, and so are Foreign Trade Zones, but not always.

Especially in this report, the definition of a logistics village has been relaxed somewhat to include facilities which may be proximate, but not under common management, where the apparent number of logistics villages would expand substantially. Particularly in Asia, logistics facilities and their support services are often concentrated into specific urban areas by strict land use controls. In such cases, urban planners have often created competitive markets for service providers, ensuring efficient overall operation. In the US also, logistics facilities are sometimes located near intermodal terminals but not under common ownership. It is possible that the absence of common ownership reduces synergistic efficiencies somewhat but has not been demonstrated.

Many logistics villages operate as inland ports, allowing for customs and other formalities to be cleared far away from busy land-starved container ports. Moving such processes inland encourages the use of intermodal transportation chains. Many inland ports also function as foreign trade zones allowing the payment of import duties to be delayed as long as possible.

As regional studies unfolded, a new concept emerged called a "virtual logistics village." Instead of one large parcel of developed land, several nearby parcels could synergize their activities by operating as a virtual (i.e. contiguous) parcel, possibly sharing logistics services through a coordinating agent for added cost efficiencies. Such "virtual" villages are explored for the Southeast and Advantage West Regions.

[57] The Westinghouse Road industrial complex in southwest Charlotte employs more people than Uptown. Despite reportedly frequent requests for improved service, the area remains under-served by public transit.

Table 2-13: Summary of Logistics Village Characteristics and Services

Physical Characteristics
Size – Minimum of 125 contiguous acres; most are larger
General Location – In or near metropolitan area, but not close to residential areas
Access – Excellent access by road, possibly with rail connections; secure with controlled access
Proximity – Direct access or proximity to intermodal facilities, ports and waterfront, and/or airport operations
Design - Planned layout with amenities and landscaping
Buildings – State-of-the-art facilities with offices, advanced communications and information technology infrastructure; size may vary, but typically smaller than traditional warehouses

Core On-Site Activities
A combination of:
Integrated distribution
Smart warehousing/specialized warehousing (e.g., refrigerated)
Value added production or processing
Intermodal operations
Logistics
Customs operations with Foreign Trade Zone status

Core On-Site Services
Security
Maintenance and repair of buildings and grounds
Office space
Meeting rooms/conference center or space
Eating facilities – restaurant, cafeteria
Business services – banking, mail, overnight delivery
Public transportation and internal transit

Additional Services and Amenities
Vehicle service, repair, or parts facility
Employment agency/temporary employment firm
Hotel/motel/truck stop for drivers
Training facility
Hotel/conference facility for management

Ownership and Management
Ownership may be largely public or public/private.
Management is generally in the hands of one entity, whether it is the owner or a contractor.

Source: Adapted from Weisbrod et al.

Logistics villages have received a great deal of public support – and often public funding. The evidence that they have achieved the aims set out for them is uneven at best and, in general, lacking. "Even in some successful cases, companies are just locating themselves and simply operate inside the facility, but they do not cooperate. The driver of success is relating to the local conditions and not to the institutional structure of the facility."[58] In other words, logistics villages sometimes operate as real estate but not as efficiency-enhancing logistics ventures.

[58] Maria Boile, Sotirios Theofanis, Anne Strauss-Wieder (2008) "Feasibility of Freight Villages in the NYMTC Region: Task 3 – Description of How a Typical Freight Village Works," Center for Advanced Infrastructure and Transportation, Freight and Maritime Program, Rutgers University.

The range of outcomes, from very positive to negative, points to the need for careful consideration of demand and for project evaluation. Geographic location, in central market locations, appears to be an important success factor and, given sufficient demand, logistics villages can be and have been successful for both high value-to-weight ratio products and for those with a low ratio, such as building supplies, with minimal public support. Further, as intermodal facilities become more efficient and fuel costs increase, they may gradually become cost effective in smaller markets.

A method for determining the viability and optimal design of specific projects will be a critical aspect of a North Carolina Logistic Village development strategy. Present and future demand estimates are the cornerstone of project evaluation.[59] Demand estimations can be based on the committed tenants of the logistic village, considering their immediate and future demands for space, facilities, and services. In the absence of committed tenants, demand can be estimated by forecasting future traffic on the basis of past trends and the added attraction of the site based on the ability of the logistic village to reduce total costs. Based on the traffic estimates, the need for space and services can be estimated. [60]

The expected revenue generated by providing services will constitute the primary revenue for the logistic village while the estimated costs to provide the facilities which have been calculated to be necessary are the primary capital costs. Should external roadways, supplemental rail lines, or other facilities be needed in order to make the particular logistic village viable, their costs should also be taken into account. Should the present value of the estimated revenue stream be larger than the estimated costs, the project may be viable. (An adjustment is often made to incorporate risk financial and business factors.) In some cases, projects are not viable as purely private ventures. In that case, financial viability is still important but public investment expenditure costs can be potentially recovered through the increment in tax revenues brought about by the facility. The latter may balance the equation between freight forecasts, the services needed to support those flows, and the capital and recurring costs needed to provide the services.

As complex, in some respects cooperative ventures, logistics villages need to satisfy the objectives of transportation firms, logistics providers, and other stakeholders. Those objectives include environmental impact goals, profit potential, and meeting cost constraints. Achieving a certain level of demand is critical to all objectives. Meeting threshold demand – and thus traffic flow-through – levels depends upon the position of the facility in the larger freight network and on the nature and destinations of the goods to be shipped.

The functions of the logistics village determine the technical specification for the facility and therefore equipment selection and thus the layout of the site. Site considerations are important as no site is without constraint. Multi-criteria analysis can help resolve design difficulties when the

[59] Dimitrios A. Tsamboulasa and Seraphim Kaprosb (2003) "Freight village evaluation under uncertainty with public and private financing," *Transport Policy* 10: 141–156.

[60] A detailed logistics village evaluation methodology canbe found in several places, including Meidutė, Ieva (2007) "Economical evaluation of logistics centres establishment," *Transport. Vilnius : Technika*. 22 (2): 111-117; and Meidutė, Ieva (2006) "Main establishment conditions of logistics centre and it financing facility," *Transport and telecommunication* Riga: Transport and Telecommunication Institute. 7 (2): 364-374.

fulfillment of various needs conflict.[61] These may likely include 1) maximizing the space available for building construction on the selected site, 2) providing warehousing in the sizes and shapes desired by users, 3) bringing multi-modal services – often truck, rail, and air – to the same site, 4) offering cross-docking, direct transshipment options, and the associated railway access, 5) simplifying way-finding inside the facility, 6) minimizing travel distance from/to the external road network, 7) optimizing traffic density in the internal roadway network, and 8) minimizing or eliminating railroad crossings.

There is an obvious tension inherent in logistics village development. In those places where the demand for such complexes is high, suitable sites are often in short supply because the land is already developed. In areas where land is available, demand is often low. The most common winning strategy is to find sites near high demand to which companies can migrate, or additional growth can be accommodated. This was the recipe used for the now-established complexes at Alliance, TX and at Huntsville, AL. Since demand immediately follows, a revenue stream exists from the opening. Without it, the growth occurs more slowly, as has been the case with Alliance, TX. Other villages, such as Kansas City, have grown because of overflow from other locations.

As with shopping malls, engaging initial anchor tenants is the key. They help ensure that other tenants will follow, because the site is immediately perceived as being a success. There is a strong message in this related to public investments in or decisions to underwrite the creation of physical facilities for logistics villages – get anchor tenants first.

As highway-based shipping continues to grow beyond the capacity of the highway system to accommodate it and as real energy prices resume their upward trend, and as intermodal service providers learn how to be efficient at smaller volumes, freight villages may then diffuse down the regional hierarchy, making the concept applicable to a wider set of North Carolina regions.

Many potential locations for logistics villages in North Carolina do not meet the critical underlying economic pre-conditions identified above at the present time. They may do so in the foreseeable future, if the North Carolina economy continues to grow. Without a labor market which is capable of delivering a steady supply of workers with the skills needed to accomplish the requisite tasks, firms are unlikely to choose locations no matter how attractive the logistics infrastructure. Accordingly, North Carolina economic development policy recognizes the primary importance of skill development and labor market functioning.

[61] Athanasios Ballis and George Mavrotas (2007) "Freight village design using the multicriteria method PROMETHEE," *Operational Research. An International Journal* 7 (2): 213-232.

2.6 *Summary*

This chapter has portrayed a context in which the study's findings should be viewed. Among the chapter's most notable observations are the following:

- A partnership with the business community (including the military) is imperative if the state's infrastructure investments are to bear fruit.
- The state has to understand how businesses operate and the needs they have in terms of site selection if the right infrastructure is going to be provided at the right time to meet industry needs and help businesses decide to locate, grow, prosper, and stay in North Carolina.
- An irrefutable trend is that the world's economy is growing. In fact, a high percentage of the major world population growth is very close to North Carolina, in South America and Africa.
- Major changes in the world economy are unfolding. China and India are emerging as world leaders, along with Brazil, changing the position of the US in the overall mix and placing North Carolina in an advantageous position.
- North Carolina shipping continues to grow beyond the capacity of the highway system to accommodate it and as real energy prices resume their upward trend, and as intermodal service providers learn how to be efficient at smaller volumes, freight villages may then diffuse down the regional hierarchy, making the concept applicable to a wider set of Carolina regions.

3 Supporting Commerce

This chapter considers infrastructure investments by focusing on the sectors of North Carolina's economy in which the state seems to have a natural advantage: agriculture, military support, aerospace, transportation and logistics, manufacturing, health and wellness (biomedical, pharmaceutical, and rehabilitation), and tourism (see Figure 3-1). Other sectors are not intentionally left out or deemed unimportant, particularly the strong role that education plays in supporting business growth and development in all sectors; rather, these seven sectors have helped to crystalize the study's findings between and among the regions.

Figure 3-1: Relationship Between Business Sectors and Logistics

In focusing on these sectors, the study takes into account the world economy described earlier and the role in that economy which North Carolina is poised to play – especially in terms of its niche markets. The ideas are consistent with the growth in the Chinese and Indian markets, the expansion of the Panama Canal, the trend toward use of ever larger container ships, the competition for import and export trade among the east (and west coast) ports, the growing economies of Brazil, Argentina and other countries in Central and South America, etc. It recognizes trends like: the most significant categories of North Carolina exports by dollar value are industrial machinery, pharmaceutical products, electrical machinery, aircraft parts, and optical and surgical equipment. On the rise are pharmaceutical products and aircraft parts. Machinery is on the decline. It also recognizes the contrast between the ranking of economic sectors in terms of gross state product – where agriculture, military support, and tourism are major enterprises. Presenting this summary by economic sector seems to lead to the easiest comprehension.

3.1 *Agriculture*

It may seem unexpected to some that there would be a focus on agriculture. People often talk about transforming agricultural land into something that is more productive – referring to it as developable land. However, for North Carolina, the agricultural land has great value. It makes good sense to use it for agricultural purposes and not convert it into houses, shopping centers, or manufacturing plant footprints. As the world is slowly learning, prime agricultural land is a scarce commodity. People need to eat; and finding good land for growing crops and livestock is a challenge. In North Carolina, even though many of the large-scale enterprises are in the eastern and lower central parts of the state as shown in Figure 3-2, all of the regions have activity in this sector. At $74B/year, it is the state's leading enterprise – more than twice the size of the next largest sector.[62, 63] It also has statewide appeal. It needs to be broadly defined as "land-based production" not just farming, but also post-production activities (e.g., turning cucumbers into pickles), meat,[64] livestock, timber, and forest products – including things seemingly as "non-agricultural" as Christmas trees.

In fact, focusing on agriculture is quite logical. The world population is growing – and people need to eat. To keep pace with this growth, experts say worldwide food production is going to have to double by 2050.[65] In addition, as the world's standard of living continues to increase, the demand for a more protein rich diet will increase.[66] North Carolina can easily help meet these needs. Not only is it well established in growing crops, it also produces pork, poultry, and other meats. The state is fortunate to have good soil conditions, good, consistent rainfall, and immediate access to ocean ports. High quality agricultural land is a scarce commodity – in the US and around the globe. North Carolina is well poised to meet international as well as domestic needs. Its markets can and do span the globe. Moreover, agricultural production can help the US

[62] Troxler, S., presentation to the Governor's Logistics Task Force, April 18, 2010
[63] Walden, M.L., presentation to the Governor's Logistics Task Force, January 19, 2010
[64] Johnson, D. and D. Butler, presentation to the Governor's Logistics Task Force, April 18, 2010
[65] http://www.google.com/hostednews/afp/article/ALeqM5gTDl6xThSI-2wq9K21oVbUNOyRMw
[66] http://www.aheadoftheherd.com/Newsletter/potashisfuelforfood.pdf

with its balance of trade challenges. Agriculture can create synergies between North Carolina objectives and national objectives. It can bring national attention to the role of North Carolina in the nation's future. It can bring infrastructure investment funds to the state. Emphasizing agriculture also builds on the strengths of the vertically integrated agricultural businesses that are based in the state.

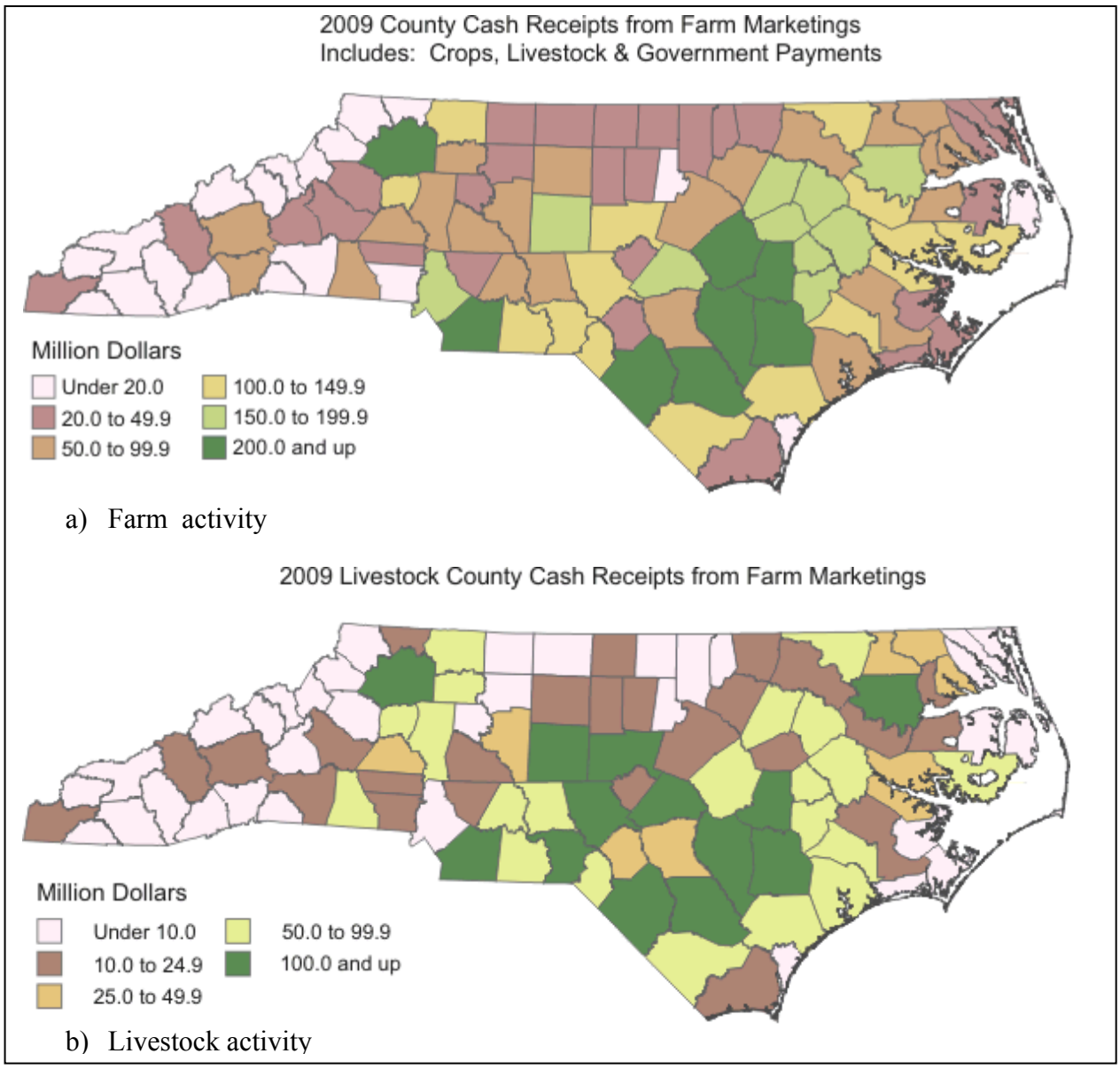

Figure 3-2: Agri-business Activity in North Carolina
Source: http://www.ncagr.gov/stats/economic/cashreceipts/maps.htm

Naturally, there are two distribution patterns associated with the agri-business. One is domestic and the other is international. The domestic pattern probably involves the movement of agri-

products to distribution centers in the middle of the state, and then further distribution to the north, south and west. The international pattern involves transport to warehousing facilities adjacent to ports like Norfolk, Charleston, and possibly Morehead City and Wilmington. Crops such as soybeans, grains, sweet potatoes, tobacco, cotton, forestry products, along with pork and poultry are all strong export commodities. The Department of Agriculture provided these observations about agriculture exports from the state:

Soybeans

- Can take advantage of competitive container rates traveling back to Asia to export soybeans, especially in cooler months.
- Prices paid to farmers are above the national average because of the export trade.
- Demand has outpaced the supply of return containers.
- Need in-state bulk export facilities, along with continued container support.

Grains (like corn, wheat, sorghum)

- Same farmers as soybean growers.
- Movement to grow exports in a similar fashion as what happened with soybeans.
- Wheat and corn are harvested earlier than soybeans. Storage facilities must get rid of these grains to make room for soybeans. Thus, wheat and corn cannot take advantage of lower container shipping costs after the Christmas shipping season like soybeans can.
- Future success for exporting grains will rely on adequate bulk storage and export options.

Sweet Potatoes

- Push in the early 1990's to market this seasonal and regional product to England.
- Today, sweet potato fries are a staple in most English pubs.
- Estimated that one in every five rows of sweet potatoes grown in NC is shipped to Europe. Over the next 10 years, that will become every other row being shipped overseas.
- Sweet potatoes are an alternative crop to tobacco farmers since they also grow well in sandy soils.
- Exported in refrigerated containers, but methods and varieties are being developed to ship without refrigeration and without washing which would expand market reach to virtually any place in the world.
- By 2020, NC will market over 100,000 acres of sweet potatoes, with 40% exported.

Tobacco

- Lower domestic consumption places survival of tobacco farming squarely on export demand. China, Indonesia and Egypt are viable growth markets.
- By 2020, NC expects to grow 500 million lbs of tobacco, with 50% exported.

Cotton

- In 2011, expansion of the cotton industry by 35% in acres planted will place NC 3rd in the US.
- Export numbers will continue rising with worldwide demand for lint and cottonseed.

- Prices have risen 60% over the past two years, with farmers converting corn acreage to cotton to take advantage.
- Crushing plants in the Sino region are demanding more cottonseed for animal rations.
- China is moving to a more integrated model for animal farming which will rely on more feedstuffs that originate in the US.

Forestry Products

- Demand for wood and wood products will continue with world population growth.
- Exports will grow to fill world demand.
- European demand for biomass will require wood chips from the Southeast.
- Southeast softwood will produce craft products (packaging, boxes, and fluff pulp like towels and diapers).
- There will be fewer lumber mills, but the remaining ones will have higher capacity utilization.
- Increased imports of wood, including specialty woods, from South America and Europe.

Pork and Poultry

- Strong US demand for chicken and turkey breast meat, leaving quarters to the export market, including chicken feet.
- Prices for quarters and feet from China are high, often approaching breast meat prices. Without this export market, the price per bird would not be as high for the farmers. With increasing production costs, the added value for the export market keeps farmers in business.
- Pork operations are similar to poultry in that a strong export market and high price for other parts of the pig keep pig farmers in business.
- Higher feed and labor costs will result in the US world poultry trade falling from 35% to 30%, with Brazil rising from 38% to 42%.
- NC is expected to provide 12% of total national poultry volume with increased investment in infrastructure.

Thus, a cameo illustration of possible investments here can focus on Morehead City and Wilmington. If these ports were to become major export locations for agri-products, the transportation infrastructure investments needed to support their roles would include refrigerated warehousing capacity at or near the ports – in fact, given the local land use, near the port seems more likely; better rail service to the ports; possibly minor investments in yard and train handling capacity near the ports and at other locations near major farms and loading points; investments in rail lines that better connect the ports to the major production areas, like restoration of the abandoned right-of-way from Wallace to Castle Hayne, and more short line carriers to meet the needs of local industries if the Class 1 railroads cannot provide the needed support.

Reflecting on the distribution of agricultural activities shown in Figure 3-2, it is obvious that from a highway perspective, facilities like I-95, US 70, and I-40 would play major roles, as would US 74 (I-74) when it is completed. From a rail perspective, both NS and CSX main lines north-south are important, as is the NCRR line from Selma to Morehead City. Expansion of air

cargo capacity should be encouraged at locations close to the major production areas, with GTP and ILM being logical possibilities.

Some of these investments would be needed "now" to help encourage growth; some will not be needed until future points in time; but preparing for those investments – as indicated in the discussions above – is very important. A related need is for land use control – to keep the improved highways from encouraging conversion of the nearby agricultural land to other uses – an issue that needs to be addressed through careful land use management and tax strategies; it highlights the fact that the strategy, policies and actions are not just about transportation but land use as well.

3.2 *Military Support*

Military support is another sector that is critically important to the state.[67, 68, 69] The state is committed to a long-term partnership. The eastern, southeastern, and northeastern regions especially want to focus on it since the military presence is so visible there, as shown in Figure 3-3. The 2008 study by the NC Department of Commerce[70] suggests that by 2013, the military presence in the state will represent 466,000 jobs, or about 9% of the state workforce and $19.7 Billion in output. In fact, except for Washington, DC, North Carolina is about to be the home of more Army Generals than any other state in the nation. And some 45% of all US Marines are based out of North Carolina. Moreover, the list of bases is long – Fort Bragg, Camp Lejeune, Cherry Point, and Seymour Johnson just to name a few – and their value to the armed services is significant. Two of the very largest bases in the nation are located here. Moreover, much of what they do is related to expedited deployment – from paratroopers and Special Forces to the Marines and the Coast Guard. Figure 3-3 shows where the military activity is concentrated in North and South Carolina.

[67] Sutherland, M., presentation to the Governor's Logistics Task Force, March 14, 2011
[68] Nicholson, J., presentation to the Governor's Logistics Task Force, March 14, 2011
[69] Taylor, G., presentation to the Governor's Logistics Task Force, March 14, 2011
[70] Please see http://www.nccommerce.com/NR/rdonlyres/62DA26B5-5B89-4115-AC32-120542018BA4/0/MiiltaryReport_cover2.pdf

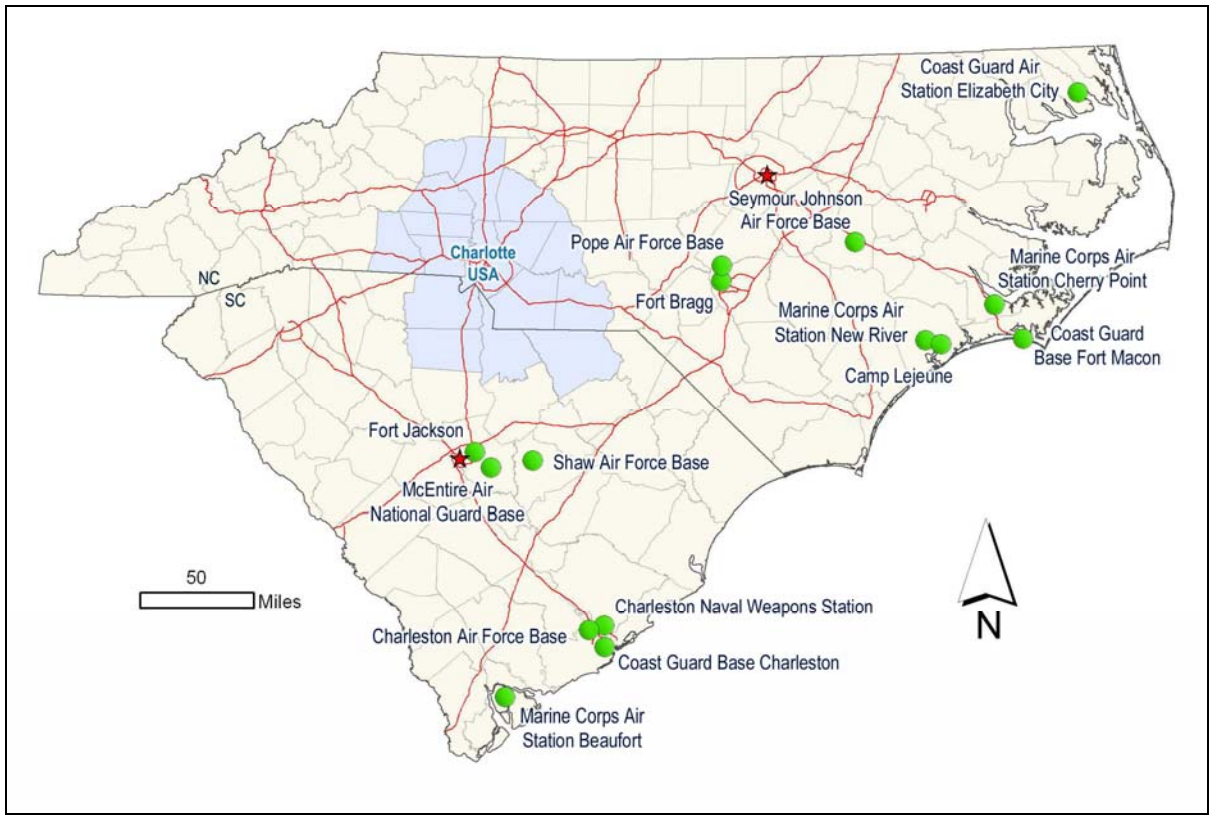

Figure 3-3: Military Bases in North and South Carolina
Source: http://www.charlotteusa.com

Several niche areas seem to make sense for military-related activity, besides supporting the bases themselves. As has been suggested by the Military Growth Task Force being led by the Eastern Economic Region, one focus area is equipment maintenance and rehabilitation.[71] The Coast Guard already does this at Elizabeth City for its aircraft. The North Carolina National Guard does it at Fort Bragg for its transport equipment. It makes sense to have the equipment maintenance activities near to the troops that use the gear, like the marines stationed here; and the paratroopers. The military people that are discharged in North Carolina represent a highly-skilled labor force that can be tapped to staff these maintenance activities. Another is flight training. This activity already exists, at Seymour Johnson, Cherry Point, and Camp Lejeune. In fact, the military sees North Carolina as an attractive place on the east coast to do this flight training because of all the open land and restricted air space that exists. A third area is research and development, especially on robotically controlled equipment – for surveillance and other purposes – again making use of the open land in the state.

Thus, the military support actually needs to have "support" from the agri-business theme described before. It needs to have the agri-business as a *compatible land use* – a very important point. It needs to have the agricultural activity continue so the open spaces can be preserved –

[71] Please see http://www.nceastmgtf.com/

especially in the east – for flight training and other training exercises. This may be a challenge in that many counties in North Carolina have no land use controls. In fact, the military is concerned that if highway improvements are made, urbanization will follow, and the open spaces will be lost – a very important point for North Carolina to keep in mind when it improves highways like US 70 and US 17 from rural arterials to freeways. Hence, to have the military be a long-term employment sector, the state needs to focus on land use and preserve its agricultural activity. The agricultural land cannot be lost. The unexpected implication is that these two sectors that might seemingly be disjoint or unrelated are in fact complimentary and synergistic.

It is also useful to recognize that much of the troop activity in North Carolina relates to expedited deployment. Troops stationed here are often called upon – at a moment's notice – to be sent to the far-reaching locations around the globe. In fact, only about 40% of the troops stationed here are actually on-site in North Carolina at any given point in time. So the infrastructure investments need to support rapid deployment as well.

Consistent with these ideas, the infrastructure investments needed to support this military-related activity include port improvements for expedited troop deployment (e.g., RoRo), similar port investments for expedited material shipments, and improved rail and highway connections from the bases to the ports. High, wide, and overweight routes are also needed from bases like Fort Bragg to the ports. Some of this is actual facility investments for corridors that are needed now (like Castle Hayne to Wallace) and others are *corridor* protection, so that the ability to develop these connections is not lost to other land use developments. There is also a need to maintain airports like Global TransPark for military training operations.

Equally important are *land use* initiatives that ensure the highly-valued agricultural land does not disappear *and* that the parcels adjacent to the major highways do not interfere with continuing use of the training flight corridors that the military values so highly. In fact, this is a challenge for the military itself. More military personnel means more residential space; and this residential land use is near the bases. Careful land use planning is key. More personnel means more training exercises, and that means more land needed for more activity or more intense use of existing land areas. It is important for the military commands to partner with the local communities, NC DOT and other governmental agencies to ensure that the military land use needs are met.

Opportunities for infrastructure investments that support military activity exist throughout the state, especially in the southeastern, eastern, and northeastern regions. For example, drawn from the study of the northeastern region, Elizabeth City is an example of a locale where this military support is already well established.[72, 73] The US Coast Guard already uses Elizabeth City to maintain its aircraft fleet. But the airport is bounded on three sides by highways and on the fourth side by water. In fact, to expand the acreage available for aircraft maintenance today, a railroad crossing-like security gate has been placed across Consolidated Road so that aircraft can cross from the airport property to maintenance facilities in new hangars "across the street" from the airport. Infrastructure improvements that would help this site become more successful in the military support arena include relocation of the roads on the periphery, underpasses where the

[72] Rogerson, V., presentation to the Governor's Logistics Task Force, October 18, 2010
[73] Winz, W., presentation to the Governor's Logistics Task Force, March 14, 2011

roads cannot be moved and need to be maintained, perhaps improved rail service, and better water access. Water access might make it possible to receive and ship large airframe parts by barge or boat – Norfolk would most likely be the major seaport supporting activities at the site. Land use controls would undoubtedly also be valuable – not only to provide land for expansion of aircraft maintenance activities, but also to ensure that other forms of land use do not crowd the airport and interfere with takeoff and landing activities – again evidence of the importance of having proximity between aircraft-related activities and agricultural enterprises – especially farming.

3.3 *Aerospace*

Aerospace closely relates to the military support. It is similar and yet different, because it has non-military elements. Activity in the sector is distributed widely across North and South Carolina as shown in Figure 3-4.

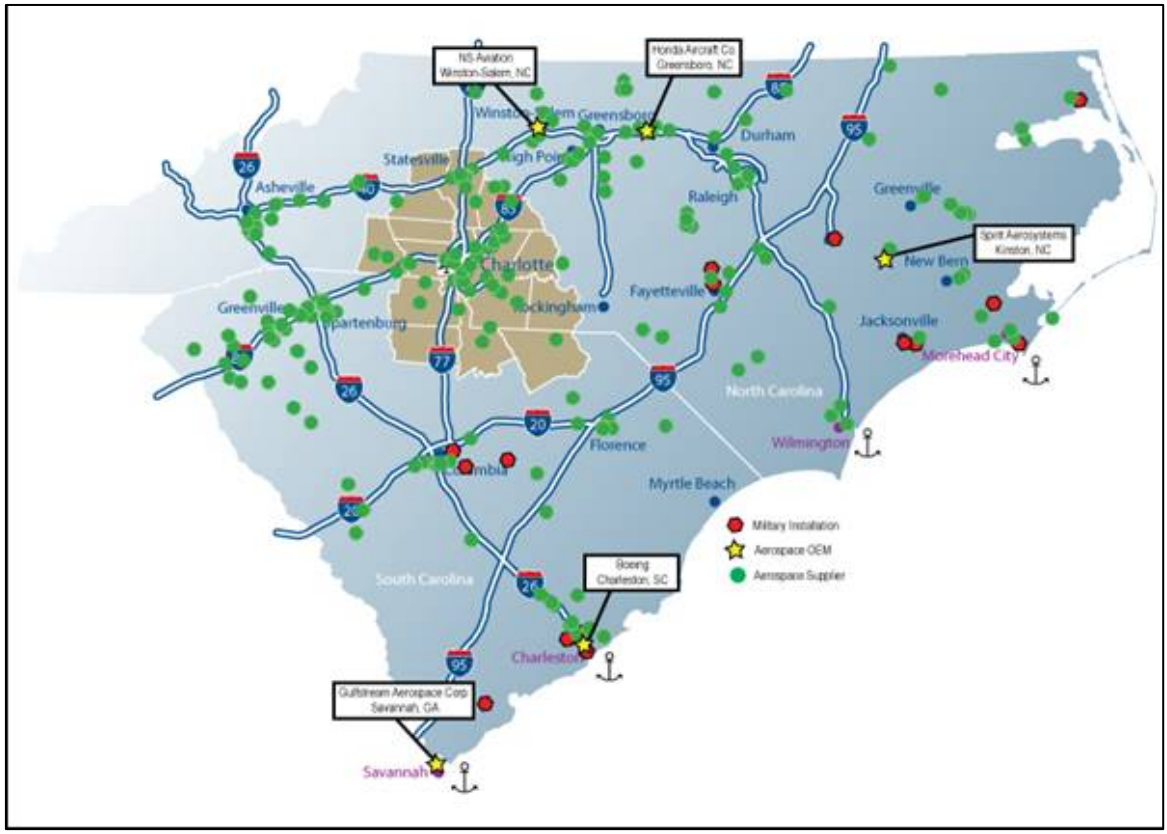

Figure 3-4: Aerospace Activity in North and South Carolina
Source: http://www.charlotteusa.com

The success stories to date, like Spirit AeroSystems and Honda Jet, relate more to commercial than to military aviation. But the two are not far apart. It is entirely plausible to assume that the expanded support for military equipment maintenance, including aircraft, described above, could lead to increased maintenance activity for commercial and general aviation aircraft as well. Moreover, aerospace has statewide appeal. Clearly there are major hubs of aerospace activity

already here, like Global TransPark, Greensboro, Burlington, and Elizabeth City. But even in places likes Wilkesboro, there is aeronautical activity. A firm there, MX Aircraft, builds lightweight racing planes that are shipped worldwide. In fact, these activities can also help with balance of trade issues.

Drawn from the study of the eastern region, Global TransPark is a logical locale for continued investment. The infrastructure investments needed to help facilitate growth in this sector include: high quality airports, especially those that are *not* used by commercial aviation, improved rail access, especially to places like Global TransPark, so that large-scale airframe components can be exported, improved highway access to the airports, effective and efficient distribution of aviation gasoline and other supplies, and power. The areas around all the major airports in the state are logical locations for growth in this sector. The regional reports show this to be the case. Some underutilized airports like Maxton-Laurinburg could see significant growth. There is also a tie between growth in this sector, the NextGen initiatives being encouraged and facilitated by the Aviation Division of NCDOT, and the military's interest in experimenting with unmanned (surveillance) vehicles (both air and ground). This means *land use* controls are important so that corridors used for test flights are protected and preserved.

3.4 *Transportation and Distribution*

Transportation and distribution activity is also a very logical sector to stress. North Carolina is in a strategic location along the eastern seaboard. As Figure 3-5 shows, logistics activity is distributed across the state.

Within a day's travel by truck are almost all of the major economic markets on the east coast – from New York, NY to Jacksonville, FL. Also within a day's travel are points in Ohio, Indiana, Pennsylvania, and Illinois. In the context of the growing mega-regions, envisioned to become reality by 2050, North Carolina is both a natural distribution point as well as a focus of import and export activity – related to or independent of domestic or international intermodal activity.

Already well developed are the transportation and distribution complexes in places like Greensboro (the Triad more generally), Charlotte, Wilmington (especially for maritime activity). Transportation and distribution activity could become a larger emphasis in places like the Triangle region (e.g., at Selma where NS and CSX cross and I-95 crosses US 70); the Eastern region (e.g., Global TransPark, Goldsboro, and Rocky Mount – with the same strengths of service from two railroads and proximity to I-95 and US 70), the southeastern region (e.g., Maxton, Lumberton, and Brunswick/Columbus – with proximity to I-95 and I-74); Charlotte (e.g., Charlotte itself, Charlotte-Douglas Airport specifically, and Project Legacy in Union County); and the Western region (e.g., Asheville).

The investments in transportation infrastructure needed to support this sector include highway and rail facilities, land for distribution centers, improved access to the ports, and quality connections to the major airports. This sector is also one that will benefit from land use planning, not only to protect locations where the distribution centers can be cited, but also the rights-of-way that provide access to and from those centers.

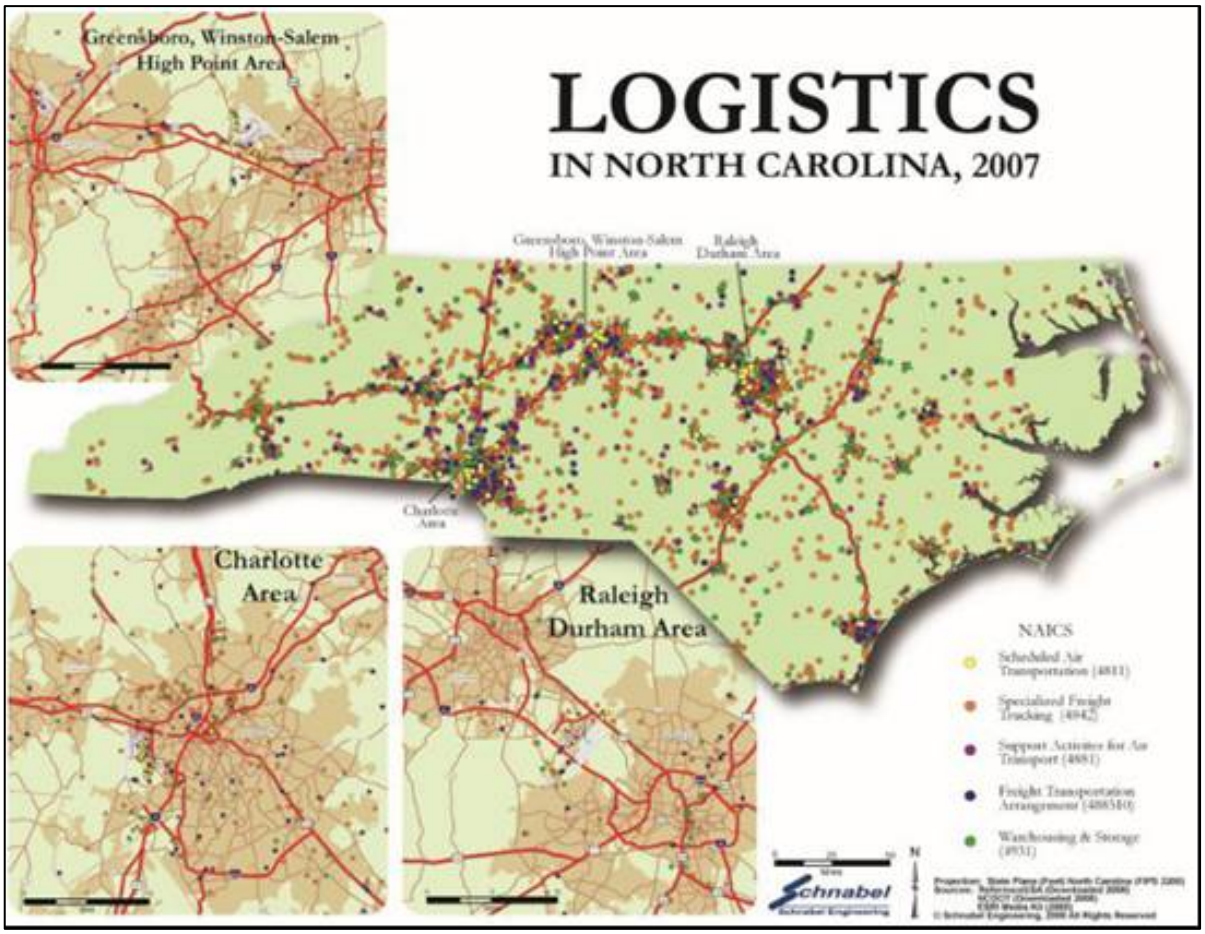

Figure 3-5: Logistics in North Carolina

Drawn from the Southeast Region study, a logistics village that could grow in support of this activity could be located in or near Laurinburg/ Maxton (or Monroe in the Charlotte Region is another possible location). It is naturally located at the junction of I-95 and the future I-74. Shown by the NC Department of Commerce as being a 2,000 acre developable site, it also has an underutilized airport with long runways that could be used for more air cargo activity.[74] The airport is proximate to future I-74 and 10 miles west of I-95. It is also proximate to CSX and an inactive rail spur leads to the site, including a wye ("Y")[75] that allows trains to arrive and depart either to the east or the west. To allow Maxton to be a major player in the military support activity, it would need a spur connection to future I-74, a rejuvenated rail connection, and power. It would also benefit from land use controls that ensure the airport could be used for touch and go activities in support of aircraft maintenance and perhaps training missions out into the future.

[74] In fact, Maxton was a candidate for the Global TransPark which is now in Kinston, NC.
[75] In railroad terminology, a wye is the equivalent of a three-legged intersection. It allows arriving trains on any one of the three legs to depart on either one of the two other legs. It can also be used to turn trains around.

A global economy becomes even clearer for international companies relying on global sourcing for efficiencies in delivering a product. Global sourcing incorporates the concepts of using products and labor from other countries to provide services or finished products at competitive costs. Many readers have already experienced this when getting computer technical support from low-cost labor in the Philippines and India. Right at home in NC is Spirit AeroSystems, manufacturing aircraft fuselage and wing components for final assembly in France. Thus, companies look across borders when breaking down components for products and services to see where cost efficiencies can be achieved through global sourcing. Global sourcing of some activities can then add transportation and distribution legs into the overall products and services, where those additional legs may not be there if local resources were used.

3.5 *Manufacturing*

Manufacturing has been a major strength in the state for decades, and it will continue to be a major strength in the future because of its location and labor force. It is well-distributed across the state as shown in Figure 3-6. The mix of products is shifting – toward high-valued merchandise (higher $$ values per ton or per pound) – and it seems to be spreading out statewide. An important point to keep in mind in this regard is that as the cheap labor sources in the world become exhausted (because standards of living rise) and the cost of transport rises (due to increasing costs of petroleum), manufacturing jobs will be returning to the US.[76] Therefore, North Carolina should not expect its manufacturing base to erode – but rather to remain strong and likely increase. In addition to the baseline manufacturing activity already present, there may be game-changing events akin to the siting of Spirit Aero at Global TransPark, like attracting a large manufacturing facility like an auto (vehicle) manufacturing plant. North Carolina has striven to attract such operations in the past – and it is likely that it will succeed in attracting one at some point in the future. Auto manufacturers seem to want to be the only one in a given state. The shift may also go in the direction of more vehicle parts manufacturing, biomedical manufacturing, and the production of agriculture-related machinery and other products.

The infrastructure investments needed to support this kind of activity include improved rail services and rights-of-way, improved highway access, improved airports (for both air cargo and business related personal trips), power delivery capacity and high-bandwidth internet connectivity.

As shown by the regional reports, many locales exist for expanded manufacturing activity in the state. Drawn from the Charlotte area study, the Project Legacy site in Union County is an example of a location that could grow.[77] Beneficial would be freeway quality connections from US 74 at the bottom of the map to the industrial locations throughout the site, a rail intermodal yard and switching yard proximate to and just north of the CSX main line, which passes through the site, power, IT, community college and university support for training – in the "higher

[76]For example, please see http://www.relooney.info/0_New_7481.pdf, http://www.usatoday.com/money/economy/2010-08-06-manufacturing04_CV_N.htm, http://globotrends.pbworks.com/w/page/14808372/international-strategy, http://www.thedailycrux.com/content/7134/Economy

[77] Please see http://www.unioncpp.com/legacy/index.html

education" parcel marked on the map, and high quality connections to air passenger and air cargo services, say at Charlotte-Douglas Airport.

Rank	County Name	Total Industry Employment	Manufacturing Sector	
			County Employment	County Employment Percentage
--	Total	3,764,812	447,092	100.00%
1	Guilford	259,773	31,467	7.04%
2	Mecklenburg	536,568	30,759	6.88%
3	Durham	179,205	29,741	6.65%

8 NC Mfg Work Force

Figure 3-6: Manufacturing Activity in North Carolina
Source: http://www.ies.ncsu.edu

Another example is Davidson County in the Triad region. The county has long been a leader in furniture manufacturing. Along with furniture manufacturing, Davidson County has also been home to manufacturers of textile products, chemical products, electronic connectors, batteries and plastics. The proposed 2,700 acre industrial park in Davidson County is designed to attract heavy industrial users. The site is located in the I-85/Business 85 and US 29 area. Infrastructure investments that would facilitate development of this site include enhanced freeway access, construction of rail spurs onto the site, enhanced rail rates and service, power, IT and water/sewer.

3.6 *Health and Wellness*

North Carolina has become the "half-back state".[78] People retire to Florida, find that the summers are too warm, and migrate back to North Carolina, where the summers are not so hot –

[78] Please see http://www.housingpredictor.com/northcarolina.html

and the winters are not so cold. During the real estate boom North Carolina benefitted from tens of thousands of new residents moving to the state to retire.

Economic trends suggest that North Carolina's place in the health and wellness marketplace is growing. Health care activity is distributed across the state, as can be seen from Figure 3-7. And with these well-established hospitals, rehabilitation facilities, medical schools, and medical research facilities, it makes sense to encourage its growth. But the logistics needs for this sector are more complicated than those for the sectors previously discussed. For local hospitals, there is the need for inbound delivery of supplies and disposal of hazardous wastes. For research facilities, it is inbound materials and outbound serums and other products that are tested worldwide. For related manufacturing firms, it is inbound material shipments and outbound products. In some cases, the shipments travel worldwide. For rehabilitation enterprises, including resorts, the inbound "shipments" are the people seeking rehabilitation and the supplies needed to help them heal. This includes medicines and supplies as well as the food they eat, which may actually be most of the shipments and the tonnage.

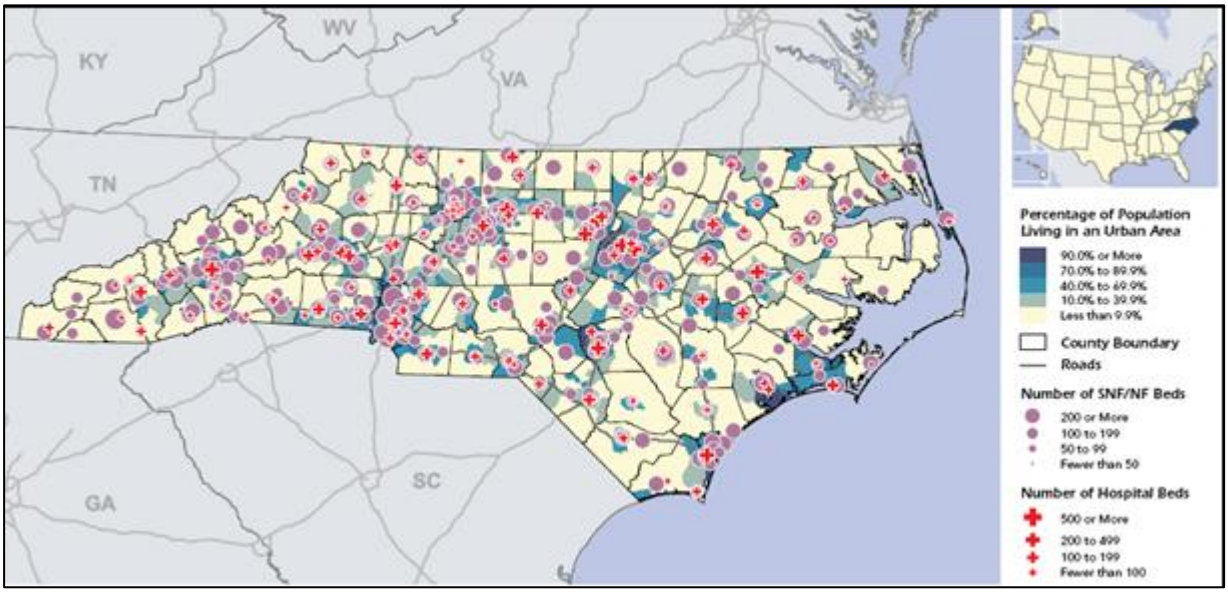

Figure 3-7: Health Care Activity across North Carolina
Source: http://www.ahrq.gov/prep/nursinghomes/atlas/atlas_nc.htm

This is a sector in which one must be mindful of the difference between high-valued and high-tonnage products. The biomedical market in particular is one in which products can have extremely high values but no significant weight; which "confuses" logisticians, because they think in terms of tonnage – and thousands of containers – not tiny packages worth lots of money that can be hauled by air freight. A couple shipments per week may be worth thousands of dollars each. It does not matter; the logistics needs still need to be met, and an "infrastructure" that can support those shipments is needed. It may not be much more than high quality air cargo facilities and the local highway-based pick-up and delivery network, as well as express surface transportation services, like FedEx Ground. From the perspective of North Carolina, this means

the important facilities are the airports and the freeways and streets that allow for expedient pick-up and delivery. The latter translates into capacity investments that keep traffic moving and eliminate congestion.

The entire state could benefit substantially from investment in infrastructure that supports activity in this sector. Further investments in the airports that already have air passenger and cargo services would make sense, as well as investments in the general aviation airports that can or could accommodate regional jets. The "cottage industry" portions of the sector could be distributed across the entire state. LabCorp, for example, with corporate headquarters in Burlington, NC, performs more than one million tests on approximately 400,000 samples each day at its labs worldwide. For the one in Burlington, planes arrive in the evening with samples to be tested and fly out early the next morning with returning samples and the lab results.

As pointed out during one of the Logistics Task Force meetings, the triangle region is *the world's* leading producer of vaccine serums.[79] Drawn from the triangle region study, Sanford is another site with respect to major research hospitals and the talent pool in the Triangle area. It is also emerging as a center of pharmaceutical manufacturing. It is located near major highways, has service from both NS and CSX, and many nearby community colleges and universities. To facilitate increased use of this site for economic development activities, such as outbound airlift capacity, the helpful infrastructure investments would be: the US 421 Bypass, which is already programmed in the state TIP, rail spurs to parcels needing service, good rail service and rates (served by CSX and NS), power, sewer, continued high-quality general aviation air service and highly skilled labor – educated and trained by the local community colleges and universities.

3.7 *Tourism*

Tourism is the last sector to be addressed in this Logistics study, but it is different from the other six economic sectors. It is perhaps most closely related to health and wellness. In North Carolina, it provides a higher percentage of the state's GDP than all but military-related business, and perhaps behind agriculture. It is a sector that relies heavily on the ambience of the state, from the seacoast to the mountains (see Figure 3-8). And, like agriculture, it depends on the "preservation" of the natural environment. It is a sector with interest and appeal statewide, although, obviously, the focus of the tourism is different among the regions.

Over 36 million tourists visited North Carolina in 2010. Visitors to North Carolina spent a record $17 billion in 2010, in spite of the recession. Part of this surprising statistic was that residents stayed in-state for tourist trips that may have previously gone to other locations. But out-of-state tourists continued to bolster the economy to the extent that it could. The 2010 figure is nine percent greater than tourist expenditures in 2009. North Carolina is the sixth most visited state in the nation. Again, in comparison with employment figures overall, there were approximately 2,000 tourism jobs created in 2010, while state tax revenue from visitor spending was 12 percent more in 2010 than in 2009.

[79] Hayes, C., presentation to the Governor's Logistics Task Force, May 23, 2011.

Figure 3-8: Tourism Activity in North Carolina
Source: http://www.visitnc.com/

Logistics comes into play as a major support function for venues and sites that attract tourists. More than 40,000 businesses in North Carolina directly provide products and services to travelers. Over 185,500 state residents work in the tourist industry. Out-of-state residents spend an average of $46 million per day, which results in approximately $4 million per day in state and local tax revenues, according to a survey by the U.S. Travel Association.

Another component of the travel and tourism industry in the state is the film industry. This industry is also a ubiquitous presence in the sense that it has grown to a state-wide industry. Somewhat surprisingly, over the past two decades, North Carolina has evolved as one of the top ten location destinations for film, television and commercial productions. The State Film Office markets the entire state as a location to retain an industry that spends over $100 million into the state's economy, and creates high-paying, highly technical jobs in this industry.

Although many parts of the state are magnets for tourism, obviously the Coastal and Mountain regions are more dependent on tourism as a critical infrastructure than the urban areas in the Piedmont. Highlights of tourist destinations include not only the beaches and the mountains, but also destinations such as Kitty Hawk, Tryon Palace, the USS North Carolina at Wilmington, Old Salem, the North Carolina Zoo, the many museums in Raleigh and Charlotte, the Charlotte Motor Speedway and associated NASCAR venues including the NASCAR Hall of Fame, and Concord Mills.

In the mountains and the coast, there is a wide distribution of tourist sites, with major enterprises such as the Biltmore Estate in Asheville, the Blue Ridge Parkway, the most visited National Park in the system being the Great Smokey Mountain National Park, and the Outer Banks. State highway improvements continue to be made through the development of bypasses around cities

and towns on the way to the coast and to the mountains, and the primary need for further operational improvements might be met with additional tourist information and the like provided to tourists in-route. For example, the US Highway 17 Association is very active in improving and increasing capacity on the 300-mile US 17 from the Virginia to the South Carolina line. There remain a significant number of miles on US 17 – approximately 40 percent – that are still two-lane highway. The Association is working in partnership with the NCDOT in developing an assessment of the impact that continuous four-lane, divided median cross sections would have on tourism in the state. This is especially relevant since 85% of overnight visitors arrive by automobile from the ten states closest to North Carolina east of the Mississippi River.

North Carolina is also an international tourist destination mostly through direct international flights or connections. Over a million international visitors travel to North Carolina yearly, and the international market has seen 6% growth over the last three years. While airport infrastructure and capacity play a role in supporting international visitors, the freeway network allows for easy access from the major commercial airports to most parts of the state. Ferries also carry visitors to the world famous barrier islands, a unique habitat for wildlife and scenic beauty.

In the western part of the state, another interesting synergy related to tourism exists in the area occupied by the Eastern Band of the Cherokee Indians. This enterprise is Harrah's Casino, which has grown into a major economic engine that would benefit from enhanced transportation infrastructure. Improved access to the western part of the state, by highway and air, would help ensure success. Obviously, the main inbound logistics needs are for supplies and food. But that can be partly coupled with inbound commercial air service if the runway at Andrews/Murphy is lengthened and the air terminal improved. Such an investment would create low-cost backhaul opportunities for firms located in the region.

Again, without intending to draw attention to any particular part of the state or location, it is interesting to consider the infrastructure investments that might assist the western part of North Carolina in becoming even more preeminent than it already is in terms of being a tourist attraction. Further commercial development in the Cherokee County and surrounding areas could become a more significant economic engine. Another transportation improvement in this region might be a 7000 ft runway at Andrews/Murphy airport, making it accessible to commercial jet aircraft.

In summary, across the state, there appear to be more than 30 large-scale sites where game-changing businesses could be located. Potential sites have been characterized in terms of the activity they could support, the geographic reach they could have, their preparedness for use, and the relative costs of getting them ready for use. It encourages the state to keep an inventory of these sites; their condition, and their suitability for use in various economic enterprises, not only tourism.

4 Regional Views

The state's seven regional commerce partnerships are likely to be the political engines that do the heavy lifting in transforming visions of economic growth into reality. This includes being the champions for infrastructure investments that facilitate that growth. This chapter summarizes the findings of the project teams that studied the infrastructure needs of these seven commerce regions. It presents the findings from each one and then discusses common themes. Over 30 potential sites were investigated and explored by the teams as seen in Figure 4-1.

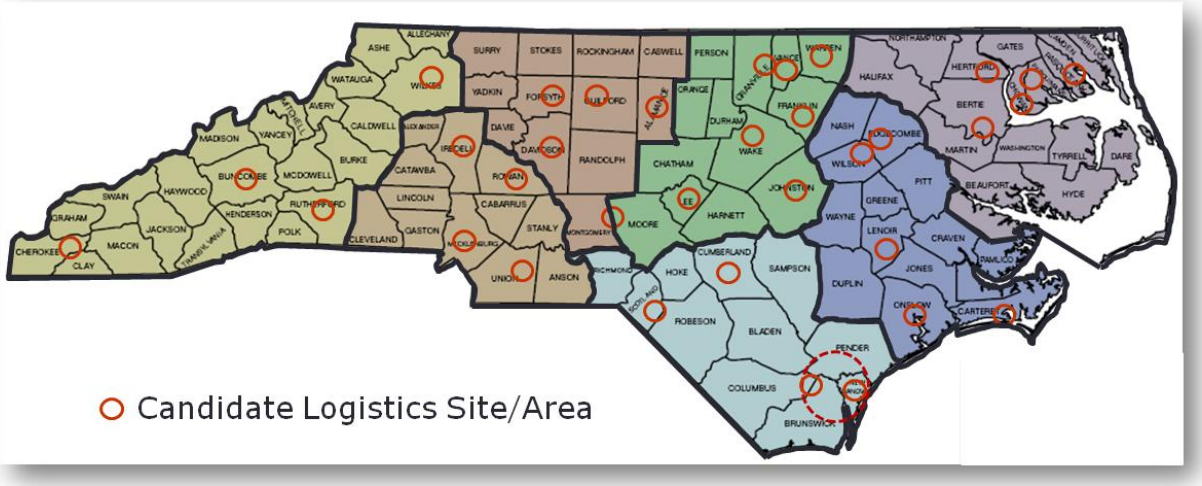

Figure 4-1: Potential Logistics Sites Investigated by the Study Teams

4.1 *North Carolina's Northeast*

North Carolina's Northeast is a region in the midst of what the Northeast Commission calls a "transformation." Described as the "poorest region" with demographics that are "challenging," the region's future economic success will depend on "cluster area development." Four areas of development exemplify the Northeast's vision.

- *Aviation.* With a US Coast Guard air base and three commercial airports, the Commission is looking to enhance training programs in conjunction with the city/state university at Elizabeth City [and the College of Albemarle]. There is land available but there needs to be a skilled work force to improve economic viability.
- *Automotive research*. With proximity to I-95 and its mid-Atlantic location, the region's plans are to be an automotive technology and research center of excellence.
- *Biomass fuels and processing center*. With adequate rural acreage, the region looks ahead to being a "cellulosic-based" research center; such research would develop a class of biofuels that would be less prone to increase the prices of staple foods, as we are seeing during the current ethanol boom.

- *Residential growth and increased tourism*. As undeveloped land becomes less available, the Northeast is viewing its geography and physical attractions as a key to future economic prosperity. Key is the proximity to the Hampton Roads/Tidewater area. However, the region must plan ahead to avoid the congestion with ill-planned development in order to preserve a highly attractive quality of life.

Transportation infrastructure needs are highlighted by connections to major highway networks and corridors into Southeast Virginia as well as the Outer Banks. Another asset, the existing short line railroad lines, could be improved and utilized to a greater extent to help attract companies/industries seeking deliveries via rail connection to the Virginia Ports in Hampton Roads.

The region is focusing on existing industrial clusters and the foundation companies in those clusters. The region hopes to expand industry activity in the future in the following areas: automotive, aviation, boatbuilding/marine trades, heritage tourism, inner coastal development, and life sciences and biotechnology.

In addition to these clusters, NCNE has a strong presence in Homeland Security due to the long established relationship with the United States Coast Guard. The Coast Guard location has a major economic impact as a result of enlisted, civilian and contract employees. The location is also a natural magnet for businesses involved in a variety of aviation activities ranging from aircraft maintenance to training programs and support activities like hospitality and retail.

"Green" Industries and Renewable Energy are also being recruited or developed in NCNE. The extensive waterfront in NCNE makes environmental issues a major concern in the region. Each of the sixteen counties has a portion of the county border defined by a large body of water or river. Given the sensitivity to the environment in the Northeast Region, the development and facilitation of "green" industries is a natural choice for the NCNE. Renewable Energy is an excellent example of focusing on complementary objectives represented by the Biotechnology emphasis and environmental responsibility.

Proximity of the Northeast Region to the Virginia Ports in Hampton Roads, Virginia also affords an opportunity to pursue transportation, warehousing and logistics as additional areas of growth. Import/export and retail goods distribution are specific sub-categories within the larger sector which are under consideration as potential commodities to move through the Virginia Ports with a cross-docking or distribution center operating in a NCNE location.

Five possible sites were examined for possible development: Ahoskie (including the Tri-County Airport); Edenton (including the Northeastern Regional Airport); Elizabeth City (including the Elizabeth City/Coast Guard Air Station Airport), Williamston (including the Martin County Airport), and an "Import/Export Village" concept that has recently emerged in discussions among the Northeast Commission, the Virginia Port Authority, and potential private investors in Virginia.

***Ahoskie* (*supported by Tri-County Airport*)**: Tri-County Airport is so-named because it lies in close proximity to the borders of three different counties – Hertford, Bertie and Northampton.

The airport is a general aviation field with a 4,000 foot runway. Another asset in the area is the North Carolina Virginia (NCVA) Railroad which provides short line rail service originating in Virginia and spanning across portions of the three counties to serve several industrial firms. The terminal point on the rail route is the Nucor Corporation (steel industry) location near Winton on the Chowan River on the eastern Hertford County border. The roadways in the immediate area are primarily two-lanes which provide adequate access for trucks in several directions across Hertford County. NC 11 and the shared route with US 13 provide a North-South route which connects from Suffolk, Virginia all the way to US 64 to the south in Martin County and other points beyond.

***Edenton* (*supported by Northeastern Regional Airport*)**: The Northeastern Regional Airport in Edenton has a 6,000 foot runway which is capable of handling many of the current air cargo planes in use. The area around the airport has a number of existing organizations including several marine/boatworks, MiTek and a US National Guard Armory. MiTek utilizes the barge site to receive steel rolls as their raw material for making roof trusses. The barge site is located less than one-half mile from the airport. The Chesapeake & Albemarle is a short line railroad which provides rail connections from the Virginia Ports in the Hampton Roads area to the Edenton area. There is also an inactive rail spur which is approximately three miles from the airport. The active rail line runs in close proximity to US 17 on the northern side of the city. Roadways are two-lanes and provide access to the airport in several directions. The surface roads, NC 32 and NC 37, also provide multiple ways to connect to US 17 or to US 64. For potential future development, there is 600 acres of land which wraps around the airport which could be acquired.

***Elizabeth City* (*supported by Elizabeth City/Coast Guard Air Station Airport*)**: The Elizabeth City/Coast Guard Air Station (EC/CGAS) Airport is a strategically important US Coast Guard facility for air rescue operations and homeland security on the east coast. The location is ideally situated to provide air rescue operations for all of North Carolina's waterways in the eastern part of the state including covering the waterfronts along the Outer Banks, the entire North Carolina coast and serving other nearby states when needed. Air access is clearly the first priority for the Coast Guard but suitable access is also available via ground transportation and via waterway. US 17 and 17 Bypass provide excellent highway access to the Elizabeth City area. Barge service is available to deliver bulk materials for certain industries and is situated at a separate location from the airport to the north of the city. The Chesapeake & Albemarle is a short line railroad which provides rail connections from the Virginia Ports in the Hampton Roads area to the Elizabeth City area. There is also an inactive rail spur which passes less than one-half mile from the airport. The active rail line lies in close proximity to US 17 Bypass which makes properties along that corridor attractive as separate sites away from the airport.

***Williamston* (*supported by Martin County Airport*)**: The Williamston site is located in Martin County in the Northeast Region of North Carolina. The main transportation assets include a major portion of US 64 and segments of US 17 and NC 11/US 13. CSX Railroad also provides rail service traveling East-West across the region from Plymouth in Washington County, across Martin County and continuing on to connect with Rocky Mount in Nash County. Martin County Airport is located about 15 miles west of Williamston and in close proximity to the town of Everetts to provide General Aviation service. The airport has a runway which is 5,000 feet in

length. There is an industrial park (Martin Business Park) in close proximity to the airport which also has a rail siding for CSX rail and easy access to US 64. This location provides excellent access to move items via US 64 to connect with I-95 which is approximately 40 miles to the west.

Import/Export "Megapark" Village: The Northeast Commission has discussed a number of "out-of–the-box" proposals as potential development opportunities to forge a stronger relationship with the Hampton Roads area and the Virginia Ports. Recent discussions have focused on two different sites along the Chesapeake & Albemarle (C&A) short line rail in the Northeast Region:

> Pasquotank County – this site is being marketed under the name "Tanglewood". The site contains a total of more than 5,000 acres but the discussion has centered on a 400 to 500 acre sub-parcel which is believed to have the best access to US 17 Bypass, the rail line and other infrastructure. This location is less than 50 miles from the Virginia Ports.
>
> Perquimans/Chowan County Border – this site also lies along the C&A rail line and also is located in close proximity to US 17. This location would be more centrally located within the Northeast Region and is about 60 to 65 miles from the Virginia Ports.

Further negotiations with Virginia representatives and identification of additional infrastructure needs will be critical for the potential development of this location.

4.2 *North Carolina's Eastern Region*

The Eastern Region has identified aerospace, biotech/pharmaceuticals/life science, food processing/agri-industry, marine trades/boat building, military/defense, and tourism and entertainment as target areas. The aerospace industry in the Eastern Region is anchored by the recently opened Spirit AeroSystems airframe facilities in Kinston.[80] Biotech is seeded by several plants along the western edge of the region which are in the immediate orbit of the Triangle.[81] Food processing is supported by the region's specialization in agriculture and the relatively easy access to markets via the I-95 corridor. Marine trades are supported by contact with the coast and historical specialization. Military support activities are linked to Camp Lejeune and other installations in or near the region. Tourism and recreation are anchored by popular seacoast resort areas and inland nature preserves. Interestingly, the region did not name logistics and distribution as a priority area.

Agricultural crops and meat production remain important to the Eastern portion of the state.[82] In Duplin County, for example, 90 percent of the tax base is directly related to agriculture. Tobacco, in particular, remains important but meat production, chickens, turkeys, and pork, are

[80] NC State University (2009) "Ready to Soar: Aviation and Aerospace in North Carolina."
[81] UNC Planning professor emeritus Harvey Goldstein has identified such "mid-tech" economic production as a likely growth sector for the state and has suggested that they will likely concentrate in the outer reaches of the state's two large metropolitan regions.
[82] Mike McLaughlin and Katherine Dunn (2006) "Agriculture: Still King of the Eastern North Carolina Economy?" *North Carolina Insight* 38-63, February.

also significant.[83] Meat production entails the import of feed from the Midwest, largely by rail. Much of the meat produced is shipped via I-95 to markets in the Boston-Washington region. A combination of access to that market, labor costs, and size of rural landholding has been cited as the key location factors for meat production. This agriculturally-linked economic activity is likely to continue operating in dispersed locations, capitalizing on soil quality and labor availability. Should the region need to export large quantities of meat to Asian markets via chartered freighters, the Global TransPark could support that trade and the strong likelihood of a return cargo might attract additional investment and employment to the TransPark. Also, in the future, a multi-modal rail link to the Northeast would be beneficial.

Hog production has been restricted for several years because of issues surrounding waste handling. It is unclear how soon those restrictions may be eased. While some parties suggest that the waste can be used in biofuel production, not all questions have been satisfactorily addressed. In the meantime, young hogs are sometimes transported to locations in nearby states for the final stages of their growth. Much of the hog production occurs in tightly vertically-integrated organizations of contract farming under the supervision of Smithfield Foods and Premium Standard Farms. There have been suggestions that pork has the potential to become a major export product (some is exported already). Personnel from trade associations suggest that ocean carriage would be the most likely mode of transport. Morehead City might prove to be a port of embarkation.

The military may be the region's primary growth driver. Eastern North Carolina is military-friendly, well-prepared to fill the needs of a military which is restructuring its logistics and support (including maintenance, repair, and overhaul activities), reducing its overall spending, and likely preparing for another round of base consolidations. The military sometimes needs access to a large amount of transport capacity on short notice. Global TransPark is designated as an Aerial Port of Embarkation (APOE) for moving troops and materials oversees. Because of this, it may take on a role as a central depot in addition to supplying the capacity to support massive movements of goods and personnel.

Advanced manufacturing in the region may concentrate along the I-95 Corridor as the Triangle Region pushes "mid-tech" activities outward and, possibly, along an envisioned technology corridor stretching between Rocky Mount and Greenville. Spirit AeroSystems promises to continue to grow and, due to the high salaries, have positive effects throughout the region. Most manufacturing in the region, however, will likely locate near I-95 to take advantage of the superior access but also because such locations provide a compromise between access to skilled professionals which are attracted to the well-developed labor market of the Triangle and the cultural, social, and educational amenities it has to offer and the low-cost labor and land markets of the East. The I-95 corridor may also emerge as a center for distribution serving the entire coastal plain to the east and the Triangle to the west.

The Eastern Region also receives an economic boost from amenity-driven tourism and retirement development. As the coast fills, the development has begun to move bayside and inland. The

[83] With the need for food expected to double by 2050, the demand for what the eastern region produces is likely to increase substantially.

influx is likely to continue as baby boom retirement gathers steam. The magnitude and nature of the future stream is uncertain, however. In many ways, the pre-boomers were pushed on a wave of prosperity throughout their careers by the approach of the boomers themselves. A smaller proportion of the larger boomer cohorts may have the savings which many recent in-migrants have had. Now that the real estate bubble has burst, in-migration will be slowed. It is too early to predict the magnitude of the decrease, however. Such migration may be largely limited to the young and old. Aside from Pitt County Memorial Hospital, much of the region lacks adequate sophisticated health care delivery.

One implication of retirement-fueled growth in the Eastern Region is the increasing need for distribution center space. A recent analysis performed by Cushman and Wakefield, a real estate consultancy, indicated that the Raleigh area is a likely growth market for distribution. To be sure, much of the draw is likely the continuing high rates of population growth in the Triangle but, because of land availability, price, and access to I-95, the western edge of the Eastern Region is a likely target for such investment. Distribution centers in that area can easily serve both the Triangle and the entire coastal "fan."

From all this development, encroachment may be the most significant challenge to the region's economy. Agriculture is a land-intensive activity which will be threatened if residential encroachment occurs. Land use encroachment would also threaten military operations. Much of the encroachment is caused by amenity-seeking residential development along the seaside and bayside which also benefits the region.

In Eastern North Carolina, US 70 is a vital transportation corridor between Raleigh and Morehead City. It is designated as a major arterial link and a Strategic Highway Corridor in the state's transportation system reflecting its status as a main street for commerce in the region. Along with its supporting arterial system of roadways, US 70 serves as an essential corridor for commerce, trade and tourism by transporting people, goods and services for the communities along and adjacent to its alignment. It supports at least three major economic sectors. Through its adjacent farm-to-market roads it supports the $70 billion dollar agricultural industry. The corridor is also the main thoroughfare for Eastern NC's second major economic engine—military activity—supplying access to three major military bases. US 70 is also a major travel route for the booming tourism trade that sustains our coastal region.

Improving the US 70 corridor to move traffic more efficiently and with greater safety is consistent with the most recent BRAC goals. It is also compatible with the Strategic Highway Corridor strategy to convert the 135-mile corridor into a freeway. At present only 48 miles of the 135 mile route have freeway status. A full-fledged freeway corridor would provide 1) enhanced support for Global Transpark, anchor site for the eastern North Carolina's emerging aerospace cluster and home of Spirit Aerosystems, 2) an efficient thoroughfare for the movement of troops, equipment and supplies, 3) a distribution system for effective movement of agricultural products from farm to market, 4) a safe and mobile roadway for visitors to our coast, and 5) expanded outreach for the Port of Morehead City.

In the regional investigation, five possible development sites were examined. Three are centered on operating airports; one is based on the Port of Morehead City; and the fifth is a large tract five miles east of Rocky Mount. The airports are the Global TransPark at Kinston Jetport, Jacksonville Airport, and the Rocky Mount Airport.

Global TransPark: With the opening of the Spirit AeroSystems manufacturing facility in Kinston on 1 July 2010, the Global TransPark moved into a new era. It is now a critical part of the state's aerospace industry. It has periodic air cargo flights that transfer airframe components to the Airbus final assembly plant in southern France. Complete assemblies travel by highway to Morehead City and then to Europe by ship. Rail will be an option in the near future as a spur is under construction. If the state exports meat and other products to Asian markets via chartered freighters, Global TransPark can be a natural take-off point. It is also designated as an Aerial Port of Embarkation (APOE) for troops and materials going overseas, which means it can be a critical part of the support infrastructure for military activity in the state. While it is some distance from I-95 and not presently well-connected in terms of interstate connectivity, it may prove to be a distribution center as well. It has a unique statutory authority to engage in land use planning with its constituent counties.[84] It may use this empowerment to the benefit of its constituent counties to create distribution centers closer to I-95.

Port of Morehead City: The Port of Morehead City is a natural port. It can maintain depths of 40+ feet without dredging and is only six miles from the open ocean. The port channel depth is 45 feet below mean low water inside the harbor (47 foot outside), and the width of the channel is between 400 and 820 feet, giving it the potential to handle very large container ships. The port has nine berths providing over 5,500 linear feet of ship dockage and 1,487 linear feet of barge dockage. The mean tide change is less than three feet with water speeds of 2-3 knots. There are no overhead navigation obstructions (such as bridges and high tension wires). The port has two turning basins of 1,350 foot and 2,200 foot diameters and depths of 45 and 35 feet, respectively. Presently, it ranks 64th in terms of total value handled among US ports. It has an inactive Foreign Trade Zone. On Radio Island, the port has significant amounts of open land that could be used for expansion. Presently, bulk and break bulk commodities are handled as shown in Chapter 2. Most imports are from Mexico, Venezuela, and Indonesia and most exports are to India, Brazil, and China. An average of approximately 120 ships called in each of the last several years. Barge movements were 450 in 2010. In the sense that much of the agricultural production in the state is close by, both crops and meat products, the port could be an export location for such produce. Cold storage facilities would be needed near the port – not necessarily on the port property – and arrangements would have to be made for refrigerated ships to call at the port. The latter would most likely involve some container-handling vessels – much of the agri-business commodities, even bulk and break-bulk, are now being handled by container – so the introduction of container handling equipment at the port – perhaps on Radio Island – would be beneficial. Support for off-shore wind-farm development is another new role that the port could play in the future. Improved highway and rail access and some on-site, landside access improvements – like refurbishment of the bascule bridge to Radio Island – would be needed to spur future growth. On the ocean side,

[84] It might be desirable to give other logistics villages elsewhere in the state this same kind of empowerment, or allow the state to engage in this type of partnering with the counties for logistics investment purposes.

continued maintenance dredging to depths adequate for the ships that call, the re-establishment of container handling capabilities and the development of Radio Island would be key. A particularly knotty problem is provision of competitive rail rates to the port. Presently, the port is served by only one carrier – NS – and consensus is that the rates are not particularly competitive. Since the North Carolina Railroad owns the line that serves the port, perhaps multi-carrier service can be established in the future.

Rocky Mount Area and Edgecombe County's Kingsboro-Rose Megasite: The Rocky Mount metropolitan area encompasses all of both Edgecombe and Nash counties. The area grew from cotton mill activity associated with proximity to the Tar River. As a connection point in the southeast, Rocky Mount benefited from passenger rail service, which survives to date. The area is in the midst of an economic restructuring, moving away from textiles manufacturing activity and farming. There are important warehousing and distribution activities in the Rocky Mount Area. One of the largest warehouses for QVC, several prepared and fresh food operations (Sara Lee, Cheesecake Factory, and MBN), logistics providers (Crown and McLane) and distributors (Eagle) are in the area. Support from economic development planners has been instrumental in attracting and retaining some of these industries. A foreign trade sub-zone was created for Cummins, and zone boundary re-adjustments have been provided for Crown Logistics and other manufacturers.

The Rocky Mount-Wilson Airport (RWI) supports the area through typical general aviation services, with a few local manufacturers (e.g., Cummins) sporadically bringing in parts needed for time-sensitive manufacturing activities. Water and sewer are available in the area. Land around the airport has been acquired by the county which can support "through the fence" operations (selling hangar space to private parties but with access to the airport). The short concession/lease periods for hangar space on airport land is often viewed as a barrier to generating more general aviation activity. The land can also be used in business/industrial recruitment for activities that could rely on excellent airport access.

The airport is being positioned as a business/corporate airport. Airport staff is collaborating with the Carolinas Gateway Partnership in funding and developing a new business plan that replaces an outdated master plan and solidifies the future strategy as a business airport.

CSX provides the main rail service in the area. The Nash County Railroad is a 15-mile short line railroad that connects to CSX. The railroad is six miles or so from the airport. The railroad service in the area has created opportunities for attracting industrial tenants. Three sites, the Kingsboro-Rose site (CSX), the Corbett Site (Nash County Railroad), and a transloading site (Nash County Railroad) are among the options currently available.

Of the sites available, the Kingsboro-Rose site is the largest with more than 1,300 acres. It is adjacent to the CSX line but no rail spur exists. Water, sewer, and natural gas are all available. Broadband support is good. Electric power is provided by Edgecombe-Martin County Electric Membership Corp. Although the site is currently zoned agricultural/residential (AR 30), all environmental and geotechnical studies to support an industrial site have been completed.

There are three major highways that intersect in Rocky Mount: US Route 64, I-95, and US 301. I-95 runs through a portion of West Rocky Mount, US 64 is a major east-west freeway through the city, and US 301 forms the major north-south thoroughfare through the city. Regionally, the area has interstate-quality roads to Norfolk. Connections south and southeast need improvement. Major projects included in the TIP that would help with site development are: 1) NC 33 from Tarboro to Greenville; 2) the Rocky Mount Northern Connector, with widening to multi-lanes and a new right of way; and 3) the I-95 Interchange with Sunset Avenue.

Jacksonville Area (supported by Albert J. Ellis Airport): Albert J. Ellis Airport (OAJ) is a county-owned public-use airport in Onslow County, located approximately ten miles northwest of Jacksonville and Camp Lejeune. The airport has a single 7,100 by 150 foot runway and a passenger terminal with three gates. Open since 1971, the airport is served by Delta Connection to Atlanta and US Airways Express to Charlotte. The airport is served by two cargo aircraft operators which provide services in cooperation with express service providers. The airport is also used by general aviation and the military. An industrial park is located six miles from the airport.

Jacksonville Airport plays an integral role in the regional community by supporting and promoting economic development, including tourism, by enhancing local quality of life by providing air access to desired destinations via the Atlanta and Charlotte hubs, and supporting national security by providing air transportation for local bases. According to recent data, the airport generates 345 jobs with an annual payroll of $4.4 million and a total economic impact of $44 million.

The airport's growth strategy is to take a leading role in economic development by providing facilities, such as hangars for business jets, somewhat ahead of demand. Existing cargo traffic is modest and adequately handled on the general aviation apron. Due to its small size, proximity to larger airports, and airline pricing policy, the airport loses a significant proportion of the passenger traffic in its market area. Airport management and their consultants expect the same situation to hold for future traffic growth, with air freight customers tending to truck to the larger airports in Wilmington and Raleigh-Durham. That baseline assessment is tempered, however, by the potential impacts of the FedEx regional hub in Greensboro and by decisions of the military.

If the growth in the military presence continues, Jacksonville airport's role in the region may change to be an increasingly important conduit for military personnel, their dependents, and military contractors. It may therefore be necessary to expand service once traffic reaches thresholds beyond that to the USAir and Delta hubs. In particular, service to Washington, DC, although National Airport is capacity constrained, could become a priority.

4.3 *North Carolina's Southeast*

North Carolina's southeast region enjoys a rich diversity of economic activity. It supports a strong agricultural, wood products and food processing base with such companies as Smithfield Foods, International Paper Company and Campbell Soup. It is also home to high tech companies like GE Nuclear Energy, Pharmaceutical Product Development Company (PPD) and Corning. While the increasing importance of the military is especially important in the Cumberland,

Sampson, Hoke and Robeson County areas, tourism is important in Pender, New Hanover and Brunswick Counties. November 2010 unemployment rates range from a low of 8.4% in Sampson County, significantly below average for North Carolina and the US, to a high of 15.7% in Scotland County, substantially above the unemployment for North Carolina and the US. In 2011, five (5) of the counties in NCSE are Tier 1 counties while three (3) are Tier 3 counties. However, one theme appears to be consistent throughout the region: the importance of logistics to economic development.

The region is strategically located mid-way between Maine and Miami. It is home to the Port of Wilmington providing convenient access for international trade. It is supported by a good and growing network of interstate and state highways providing good trade routes to the North, South and West. It is serviced by two well-maintained airports (Wilmington International and Fayetteville Regional). It is accessible to CSX, Norfolk Southern, and local short line railroads. It is populated with a workforce with a strong work ethic. Three state universities, two private colleges, and eight community colleges are readily available and willing to support workforce development. It is endowed with significant amounts of land ready for development that has, for the most part, infrastructure available to support immediate development (water, sewer, electricity, gas and communications). These assets will serve as the foundation for future economic development throughout the region - a future strong in supply chain logistics.

Agriculture and manufacturing have a long history in the region. The region currently employs some 40,000 people in manufacturing. Other industries employing a large number of workers are agri-business and the food processing industry. Additionally, a significant number of farmers work on fertile land that allows some regional counties to be ranked among the top farm producing counties in the nation.

With regard to the future, the region hopes to build upon this existing base by focusing on nine industrial clusters: building products, advanced textiles, distribution and logistics, building and marine trades, metalworking, food processing and the agri-industry, military contractors, biotechnology, and alternative energy. In addition, the region is considering the aerospace industry as another focus cluster.

While the region has a primary objective of focusing "on short, immediate and long-term economic development strategies aimed at sustainable job creation and industrial investment,"[85] it has several goals or objectives that support the creation of a "Logistics Village" in the region: international marketing, regional workforce analysis, engagement with the Base Closure and Realignment (BRAC) Commission[86] Regional Task Force, renewable energy, and the distribution and logistics. Attainment of each of these goals or objectives will require the region to have a strong foundation in logistics to support a vibrant economy and help the region increase its position in a global marketplace.

Four possible sites were examined for potential establishment of a "Logistics Village": Laurinburg-Maxton Airport (MEB); Fayetteville Regional Airport (FAY); International Logistics

[85] North Carolina's Southeast, Strategic Marketing Plan, 2010-2011 p. 10
[86] http://www.brac.gov

Park of North Carolina (ILP) and Wilmington International Airport (ILM). As a result of numerous interviews and research conducted to evaluate the four designated sites, the research team added a fifth possible site, a "Virtual Logistics Village" for the Greater Wilmington Area. Each site is unique and each offers different attributes that could support the establishment of a "Logistics Village."

Laurinburg-Maxton Area (supported by Laurinburg-Maxton Airport): The Laurinburg-Maxton Airport, a finalist site for consideration as North Carolina's Global TransPark, is located entirely in Scotland County but is immediately adjacent to Robeson County and is operated by the Laurinburg-Maxton Airport Commission that reports to the governing bodies of the cities of Laurinburg and Maxton. MEB offers significant opportunity for development as a result of the availability of developable land, adequate and improving roads, and ready access to most infrastructural needs. The site is also located very close to rapidly expanding Ft. Bragg and Camp McCall and this proximity offers many possibilities for future economic development in the area. With this said, the airport lacks a strategic plan and facilities need major costly improvements. While there are immediate plans and funds available to improve two of the three runways, the improvements do not fill all the needs and requirements to make MEB truly competitive. In addition, the area has access to CSX and short line railroads but to take full advantage of this resource costly rail connections are needed. Finally, while most infrastructure needs are available, they also need upgrades and retrofitting. In order to maximize the potential this area offers, the area needs a champion (a private company or companies, government or the military) that is in a position to provide the necessary resources for upgrades and improvement.

Fayetteville Area (supported by Fayetteville Regional Airport): The well maintained Fayetteville Regional Airport (FAY) is located in Cumberland County and is operated by an Airport Director for the City of Fayetteville. "Proximity" is the key word needed to understand the Fayetteville Regional Airport area and its potential as a "Logistics Village." The area is geographically well located, has access to CSX, Norfolk Southern and short line railroads. While the connections are not on the airport site, they are all located within the City of Fayetteville. The area is also in close proximity to major interstate highways, the Port of Wilmington, Research Triangle Park, recreational facilities and developable land including shovel ready sites. In addition, and perhaps most significantly, it is located near an expanding Ft. Bragg. This expansion of Ft. Bragg is a result of the Base Closure and Realignment Commission (BRAC). By 2011, Ft. Bragg will be home to the US Army Forces Command (FORSCOM) and the Army Reserve Command (USARC). These moves will have a major impact on economic development in the immediate Fayetteville area and the entire NCSE. Soldiers leaving the military at Ft. Bragg also provide the area with plentiful access to a skilled workforce with good work ethic. For the area to reach its full potential as a "Logistics Village," the airport's strategic plan needs to be integrated into the overall economic development efforts of Fayetteville and Cumberland County. FAY also needs better access to capital resources for infrastructure improvements, including cargo facilities, which will enhance economic development efforts. Similar to Laurinburg-Maxton Airport, FAY needs a champion to stimulate development, with the military being the most likely candidate for the foreseeable future.

International Logistics Park (ILP): The International Logistics Park of North Carolina (ILP) is built on the Columbus/Brunswick County line on US 74/76 just 15 miles from the Port of

Wilmington. A joint venture between Brunswick and Columbus Counties, this is an as of yet undeveloped 1,100 acre park that hopes to capitalize upon the "At Port" Logistics Model promoted by the Port of Wilmington. The potential for ILP is tremendous as the result of the vast amount of developable land that includes shovel ready sites. Close proximity to the Port of Wilmington and Wilmington International Airport is also an attribute. Utilities, gas, water electricity and sewer are readily available. Existing roads and planned road projects make ILP very accessible. An added tax advantage for ILP is Tier 1 status for all new projects. A major concern for this site is its risk exposure to the future viability of the Port of Wilmington. ILP also lacks a rail connection; however, located directly across the street is the site of another large industrial park, the Mid-Atlantic Logistics Center, that has CSX rail access. Marketing these two large sites together will enhance the areas potential as a "Logistics Village." Immediate construction of a lighted intersection at the entrance of these two sites will make the two sites more desirable. Finally, leveraging and promoting together all of the logistics assets of the Wilmington area, including these two industrial sites, creates a very creditable site for a "Logistics Village."

Wilmington International Airport (ILM): The Wilmington International Airport (ILM) is located in New Hanover County and serves southeast North Carolina. The airport, conveniently located off I-40 and I-140, is a modern, underutilized airport that is operated by the New Hanover County Airport Authority. It is a full-service airport that offers commercial, cargo and general aviation facilities. In addition, it provides a "state of the art" Federal Inspection Services (FIS) facility. Runways are adequate and expandable to meet demand. Shovel ready industrial sites that meet the Port of Wilmington's "At Port" Logistics Model criteria are available at the airport and larger tracks of developable land are located nearby in Pender, Brunswick and Columbus Counties. ILM has existing average to above average basic infrastructure (communications, water, sewer and power). The airport also has at-site rail service with an indirect link to the Port of Wilmington. In addition, the high quality of life in the area provides the ability to attract highly skilled workers. However, a weakness for ILM, like the nearby International Logistics Park, is its risk exposure to the future viability of the Port of Wilmington. Despite this possible weakness, leveraging and promoting together all of the logistics assets of the Wilmington area, including ILM, creates a very creditable site for a "Logistics Village."

Port of Wilmington and a "Virtual Logistics Village" for the Greater Wilmington Area: The final assessment is for a "Virtual Logistics Village" from the Greater Wilmington area that comprises all logistics assets of the region and is coordinated by a centralized facilitating body to work synergistically as a unified and coherent institution. The Wilmington metro area is composed of three counties: New Hanover, Brunswick and Pender. In addition, Columbus County is in close proximity to the Wilmington area and is an equal partner in the development of the International Logistics Park located on the Brunswick/Columbus County line. The area is home to the Port of Wilmington and Wilmington International Airport. Also, CSX rail access is available as are abundant trucking services. Developable land parcels of all sizes are found in the metro area and many are shovel ready. Most of the sites are located within the three major industrial parks: International Logistics Park, Mid-Atlantic Logistics Center, and the Pender Commerce Park. Metro Wilmington also has average to above average basic infrastructure (communications, water, sewer and power) to accommodate growth. Area road access is good and getting better with planned improvements. Finally, as a result of the area's quality of life,

skilled labor is available and, if specific skills are needed, area educational institutions stand ready to develop needed skills. As a direct result of all these factors, the Wilmington area is strategically positioned to capitalize upon the Port of Wilmington's "At Port" Logistics Model and thus become a "Virtual Logistics Village". An inactive Foreign Trade Zone (FTZ) is available at the Port and, as a result, sub-zone status is possible at other area sites. While all components of the "Virtual Logistics Village" are not located in one spot in the metro area, the major components of a village are found in close enough proximity to each other in the Wilmington area. Therefore, in order to create a "Virtual Logistics Village" some infrastructure needs must be addressed and area leaders need to work together and cooperatively leverage regional logistics assets to create synergy in facilitating regional economic development. In addition, leaders should explore the establishment of a "facilitation" group similar to the Aerotropolis Leadership Board in the Piedmont Triad Region. The creation of this "Virtual Logistics Village" will truly allow the Wilmington area to benefit from a global economy. However, there remains one major risk to the successful implementation of a "Virtual Logistics Village"; in order for it to flourish, the Port of Wilmington must remain viable now and far into the future.

In conclusion, as a result of the extensive research into the area conducted by Bryan School professionals and 14 separate interviews with 34 different people representing various organizations in NCSE Region, one fact became evident. In order for NCSE to truly benefit from global trade and be a true participant in the global economy, a viable Port of Wilmington is a necessity. On December 10, 2010, the NC Department of Environment and Natural Resources recently took a giant step forward in this direction when it announced that the Department will partner with the federal government to study the feasibility of improving the Port of Wilmington in order to accommodate larger ships and make the Port of Wilmington more accessible to those ships[87]. Additionally, the North Carolina Maritime Strategy study mentioned previously will also provide guidance for the future direction of maritime support in the state.

4.4 *Research Triangle Regional Partnership*

The Research Triangle Regional Partnership (RTRP), formed in 1994 after several years as the Raleigh-Durham Association, provides economic development leadership for the region through studies aimed at identifying strategies that offer a competitive advantage in attracting companies to the region. In fact, the region added over 110,000 jobs during the period from 2004-2009[88]. This was not a random occurrence, but the result of dedicated effort, and dollar investment, on the part of government and business leaders to join together in a cohesive and cooperative thrust in marketing and soliciting targeted businesses.

The businesses sought after were to be involved in 10 clusters, called "clusters of innovation," a term that came from another study in 2004[89] where specific industries were targeted to come to

[87] NC Department of Environment and Natural Resources, *Port of Wilmington Upgrades Could Allow for Larger Vessels, Increased Traffic.* Press Release, December 10, 2010.
[88] "State of the Research Triangle Region: An in-depth look at the region's economic health and competitive position." RTI International and Research Triangle Regional Partnership, May 21, 2009.
[89] "Staying on Top: Winning the Job Wars of the Future." Research Triangle Regional Partnership, March 2004.

this region of the state. The 10 original clusters have been changed slightly and added onto, resulting in the current listing of 12 targeted industries: pharmaceuticals, biological agents and infectious diseases, agricultural biotechnology, pervasive computing, advanced medical care, analytical instrumentation, nanoscale technologies, informatics, advanced gaming and e-learning, cleantech, defense technologies, and sustainability.

Each county within the region has both a vested interest and a commitment from businesses and communities to promote and seek companies that can fit into one of these categories. Obviously, some other manufacturing company or business desiring to set up operations in this region would be welcome. Still, the focus is on creating this niche business environment where innovation feeds into and off of other companies located in the area such that the entire region profits from this synergy with continued prosperity and job growth.

The region's 13 counties are home to the state capital and government services in Raleigh, the world-renowned Research Triangle Park (RTP), the metro areas of Raleigh, Cary, Durham, and Chapel Hill, numerous other towns, three (3) major research universities, eight (8) additional universities and colleges, an extensive community college (7) support network, major cultural and sports venues, excellent interstate and US route connectivity, a major commercial airport at Raleigh-Durham International (RDU) and three reliever business airports, numerous housing options, several top-ranked public and private golf courses, and recreational opportunities via lakes and state parks.

The breadth of facilities and opportunities makes the region very attractive for companies seeking a high quality of life for their employees. This is a vibrant region with an active business climate that both encourages and spawns innovation and job growth. In fact, RTRP received a national award for developing, promoting, and implementing the very successful "clusters of innovation" concept as a niche market opportunity. The success of RTP was a strong motivator in this decision, with other companies moving into this area for the skilled workforce, university expertise, and entrepreneurship opportunities available in the region. One success story is that the region is now home to the highest concentration of gaming companies in the world. Clearly the "clusters of innovation" concept is working and will continue being promoted (and adjusted based on business opportunities) by economic development staff and business leaders.

The region has several transportation projects in the current NCDOT TIP. The current projects having a significant impact on business and personal travel within and through the area include:

- Western Wake Freeway: under construction
- Triangle Parkway: under construction
- Southern an Eastern Wake Freeway: programmed in TIP
- Widen I-40 from I-440 to NC 42: programmed in TIP
- Widen I-40 from I-85 to NC 147: programmed in TIP
- Widen I-440 from Wade Avenue to Walnut Street: programmed in TIP
- Widen I-85 from Hillsborough to NC 147: programmed in TIP
- East End Connector From NC 147 to North of NC 98: programmed in TIP

These projects will reduce travel times for both commuters and business users, including truckers, desiring to move within and through the area with minimal congestion. Most goods are shipped by truck within this region, and 31% of workers commute to their jobs outside of the county they live in. Traffic volumes are very large in the central part of the region, and highway locations experiencing capacity constraints resulting in bottlenecks will likely be important issues now and into the future. Construction of additional travel lanes on existing freeways and complete new freeways will provide options for travelers and relieve congestion in the short term while improving freight shipments for on-time pickup and delivery.

The world-renowned Research Triangle Park, created in 1959, is now a tremendous success story for the region. Over 42,000 people work in the park at more than 170 companies nestled among 7,000-plus acres west of Raleigh Durham International Airport (RDU). An estimated 10,000 contract jobs attract another large population of commuters to the park each day. Within the park, 600 acres are available for new development. The park itself is an example of a successful logistics village. It is presented here because of its tremendous influence in strategies for future growth within the region.

Four sites were investigated as locations for future logistics villages in the region: Raleigh-Durham International Airport Area, Sanford-Lee County Executive Jetport Area, Johnston County, and Triangle North Properties.

Raleigh-Durham International Airport Area: Raleigh Durham International (RDU) provides significant support for business (and leisure) travel with easy access to Raleigh, Cary, Durham, Chapel Hill, Research Triangle Park and many other municipalities, businesses and residential areas within 45 minutes to an hour drive. Situated on 5,000 acres, the airport property is located between Raleigh (to the southeast) and Durham (to the northwest) and adjacent to Research Triangle Park (to the west). The airport is constrained on all sides by I-40 (south), I-540 (west), US 70 (north) and William B. Umstead State Park (east).

Freight shipping is a component of total operations at a commercial airport. During 2009, airplanes carried 92,459 tons of freight, with BAX Global, DHL Worldwide Express, Federal Express, and United Parcel Service being the main carriers and shippers. Thus, the airport could serve as a major freight shipper should a large distribution facility be located nearby or on airport property. The FedEx distribution center at Piedmont Triad International is an example of a great partnership between the airport and a major air freight operation.

Both RDU and RTP are located very close to Foreign Trade Zone #93 (FTZ). Companies desiring to utilize the economic duty tax advantages of this FTZ will have access to rail, air, and highway facilities for easy shipment of raw materials or goods.

Rail service to the airport property proper is not presently possible, nor is it envisioned in the future. However, rail lines do exist within close proximity to the site, across I-40 and NC 54, currently operated by Norfolk Southern (NS), and property for site development is available

adjacent to already-established industrial sites. Another rail line also operated by NS is across I-540 to the west.

One aspect that could be addressed is establishing convenient access to Research Triangle Park. Yet, RTP does not have a central core to connect to from RDU. Discussions are taking place on creating some kind of bus circulating loop within RTP. Should this be constructed, RDU envisions a dedicated bus connector road from the airport to a transfer station within the park. This would provide an option for business travelers within RTP to get to and from RDU without the need to park at the airport or rent a car or use a taxi from the airport.

Sanford-Lee County Executive Jetport Area: The Lee County Economic Development group is being very proactive in marketing the airport as a major reliever of RDU business aircraft. The group has developed a very attractive website for Sanford-Lee County airport, along with marketing a connection with a nearby industrial park, to the west of US 1, available for development. The airport is located to the east of US 1, with a CSX rail line located adjacent to the airport. This certainly provides ready marketing of potential industry/rail activity at the airport. However, access to the airport is also across this same rail line. Lee County is another area in NC where CSX and NS lines cross. The NS line runs to the south of the airport.

Johnston County: Johnston County has unique transportation opportunities compared to many other counties. Interstates 40 (I-40) and I-95 cross in the southwest part of the county providing an excellent opportunity for trucking East/West along I-40 and North/South along I-95. Both NS and CSX serve the county and in fact their lines cross in Selma. Any company relying on rail for either raw material imports or heavy product exports would certainly have some advantages locating close to this intersection point.

Johnston County airport is located southwest of Business US 70 and to the west of Smithfield. Rail access to the airport does not appear feasible. Connection with NS to the north is within 3.5 miles from the airport, but the rail connection would need grade separation crossings with Business US 70 and US 70 as the rail line is north of US 70.

To the east, the CSX rail line is also within 3.5 miles, but major crossings would need to be constructed for US 301 and NC 210. While this is feasible, access directly to the airport is extremely limited. The airport itself is surrounded by watershed issues (creeks and wetlands), limiting access to land immediately adjacent to the airport.

Triangle North Properties: The Triangle North properties spawned out of a study by the Kenan Institute[90] in 2003 that explored the feasibility of creating a "hub" or cluster of companies supporting the work and business activity in the Research Triangle Park. The study concluded that the concept was feasible and that one hub each in the northern and southern parts of the region could work. The final outcome was four sites identified in the northern counties of the region.

[90] "The Feasibility of Mini-Hub Development in the Research Triangle Regional Partnership Region," Michael Luger, Kenan Institute, The University of North Carolina at Chapel Hill, February 2003.

All of the sites are with a 50-mile radius from Research Triangle Park, which also places them within 60 minutes of travel time to RDU. The three most northern sites are located adjacent or very near to I-85, with the sites in Granville and Vance counties having frontage visibility from I-85. The Granville, Vance and Warren sites all have an interchange access point nearby with I-85. The Vance site is also located across I-85 from Vance-Granville Community College. Businesses located at any of these three sites will have proximity for their employees to receive specialized training developed at the community college for their needs.

Rail service is provided by CSX and is nearby for the Granville and Vance sites (2-3 miles away) and almost within the Warren site (½ mile away). Rail service to the Franklin site is 8 miles away through rural residential development and would be challenging to build. Rail access to the other three sites is through rural farm land or wooded terrain and would be easier to build, especially for the Warren site.

It should be mentioned here that the Warren site, at 1,000 acres, is being promoted for logistics, distribution, and manufacturing. Both the theme and size of the site make it stand out among the Triangle North properties for a large logistics village within this study.

The site in Franklin County is across the access road from the general aviation airport. This site could be very attractive to a company desiring to locate near a GA airport for use of a company business plane. The Granville and Vance sites are located further away (3 and 5 miles, respectively) from their nearest GA airport at Henderson-Oxford (HNZ), while the Warren site is located 16 miles away from the Henderson-Oxford airport.

All four of the sites are or have been certified ready for development by the NC Department of Commerce. Extensive information is available on the web for site maps, master plan concepts, terrain, flood levels, infrastructure, preliminary environmental assessment, etc. Commitment letters are in place for all utilities, including high speed fiber optic for telecommunications, a major need of innovative companies where information is readily shared and acquired over the internet.

The Warren site is especially attractive because of its large size, 1,000 acres, and its proximity to rail and a major interstate. I-85, just 3 miles away, enables rapid access to I-95, the east coast's major truck commerce freeway. Providing the rail connection onto the site could initiate business development for major logistics or distribution activities. Access to the site would involve construction of a rail crossing, which would need coordination with the high speed rail corridor from Raleigh to Richmond.

The Warren site is somewhat remote from major population centers and is on the fringe for convenient access to a commercial airport with RDU being about 60 minutes away. Should a distribution center be established at the site, import and export traffic would likely go through the Norfolk ports via I-85 to US 58 in Virginia. (This is likely for import/export shipments from the Granville and Vance sites as well.) Although not as direct, the Warren site could also support import/export movements through Morehead City if that port could accommodate containers on a bigger scale than currently available.

The Franklin site does not have any interstate or freeway access. A major infrastructure improvement for that site would be widening US 401 as a multilane highway toward Raleigh. This would provide improved travel time both into Raleigh and also to I-540 (the outer loop) providing quick access to I-40 for westbound movements. I-540 to US 64 bypass to I-440 and then I-40 eastbound is also possible, with shorter travel once I-540 is completed beyond US 64 bypass to I-40 eastbound. Widening of US 401 is programmed in the 2016-2020 STIP from north of SR 2044 (Ligon Mill road) to NC 39 in Louisburg, NC. Also programmed is a bypass for Rolesville.

It was announced on October 12, 2010 that the US Department of Commerce Economic Development Administration has awarded a $1.7M grant to build a 1.3 mile access road directly linking the Franklin business park and airport to US 401. The Kerr-Tar Regional Economic Development Corporation also leveraged $900K in NCDOT funds for the project.

The Franklin site does have a 33,900 SF shell building ready for occupancy, with 3,900 SF for office use and 30,000 SF for manufacturing/warehouse use.

The Granville and Vance sites do not have any major infrastructure needs at this time.

4.5 *Piedmont Triad Partnership*

The Piedmont Triad Region consists of twelve counties located in the mid part of the state. A regional focus on economic development has spurred efforts to coordinate opportunities for workforce development, higher education, infrastructure networks, and attract an array of businesses that contribute to the continued economic and job growth of the region.

The Piedmont Triad Partnership is a key player in the economic activity of the region. In conjunction with the US Department of Labor through a WIRED grant – Workforce Innovations in Regional Economic Development – the Partnership led a large scale effort focused on strengthening the Region's global competitiveness through the integration and collaboration of regional economic workforce development programs.

The three overarching goals of the region are:

- Be recognized as the Premier Logistics Center of the East Coast of the United States providing air, highway, and rail infrastructure within and easily accessible to companies operating in the region.
- Be a major player in aviation**,** composed of companies that engage in aircraft design and construction, aviation parts manufacturers, and aviation services providers continues to generate economic and job growth. The greatest level of activity in this cluster is currently taking place on and around the Piedmont Triad International Airport. However, aviation-related activity is rapidly spreading throughout the region, notably in Winston-Salem and Davidson County.

- Fulfill the potential of the Aerotropolis/NC Center for Global Logistics initiative which targets the melding of business, education, research, and planned economic development to provide a blueprint for a vibrant future for the Triad Region and the entire state. The elements of the initiative operate synchronously to provide the leverage and critical mass necessary to promote the development of economic development, job growth, and educational opportunity throughout the region and state.

Five "logistics villages" were reviewed for this region. While they each have their individual identity and mix of infrastructure resources, the synergistic opportunities that are afforded by capitalizing on their collective strength is highlighted.

Aerotropolis Village: The competitive environment of today requires businesses to develop global supply chains based on speed, flexibility, and connectivity. An essential element is the ability to move product quickly. To accommodate this need, more and more businesses are drawn to locations with easy access to air transportation. In essence, the airport drives the development of multi-modal transportation and logistics hubs, where business and technology parks, industrial parks, distribution centers, and information and communications technology (ICT) complexes radiate along connecting surface transportation corridors. As a result, economic growth, based on the influx of businesses that are transportation/logistics dependent, can be evident as far as a 60-minute drive time from the airport.

The Aerotropolis City in the Triad Region is centered on the Piedmont Triad Regional Airport. A 60-mile radius from the Piedmont Triad Regional Airport encompasses the majority of the region and in some cases spills over into surrounding regions.

To enhance the future of this site, the focus should be on providing uncongested service to and from PTI: NC 68 from High Point to PTI; NC 68/I-40; NC 68/US 311; Sandy Ridge Road; I-40/W-S Connector; North Greensboro portion of I-840; widening I-40 between US 311 and the junction with I-40 Business; I-85 over the Yadkin River; US 220 North/NC 68 North/I-73 connector from south of Greensboro to US 220 North; and the NC 68 interchange.

Winston-Salem/Smith Reynolds Airport: Smith Reynolds Airport has the potential to provide the Aerotropolis city additional airport assets focused on the ability to provide unscheduled, time-sensitive service to corporate and air ambulance and other medically-oriented services. It is located minutes from downtown Winston-Salem off NC 51 at 3801 North Liberty Street. The primary focus of the Airport is to provide an effective base of operations for corporate aircraft, air charter services, general aviation, and air cargo. Smith Reynolds Airport's facilities are ideally suited for aircraft maintenance, repair and overhaul (MRO) operations and a variety of aviation-related industrial and commercial development applications.

The recent addition of Dynamic Aviation, a leading provider of innovative aviation solutions to government and commercial organizations worldwide, and the commitment of NS Aviation to establish an aviation maintenance firm is expected to employ 300 people and provide service to up to 50 Boeing 737-type aircraft a year, illustrate the importance of Smith-Reynolds Airport to the growing aviation cluster in the Triad Region.

To continue development of this site, several enhancements would be helpful. First, the runway and associated technology coupled with the available hangers and maintenance and fueling services positions Smith-Reynolds airport as a location of choice for corporate jets. In addition, these same attributes will be an asset as efforts are made to attract additional freight and charter jet carriers. Second, the closing of the North Liberty Street exit off US 52 would cause access issues for the airport and companies with facilities on airport property. Third, the presence of a Norfolk Southern yard across the street from the airport is not considered to be part of the immediate strategy for the airport. To integrate freight movement between the airport and the rail facility would be difficult with the current road configuration. Last, complete bridge and road repair is needed for I-40 Business.

Alamance County Industrial Development Area and Burlington-Alamance Regional Airport: Alamance County promotes itself as being in the Carolina Corridor. I-40/85 runs through Alamance County and businesses located in the Burlington/Mebane area have easy access to Interstates 77 and 73/74 to the west and I-95 and the Ports at Wilmington and Morehead City. Being positioned midway between RDU with the UPS Hub and PTI with the FedEx Air Hub provides an additional resource to businesses choosing to locate here. Burlington and Mebane are served by both Amtrak and Norfolk Southern Railway.

Alamance County has a number of industrial parks with easy access to I-40/85. The abundance of spec buildings and build-ready sites complete with all utilities illustrates the level of growth that will emanate from the area. The industrial development sites have easy access to I-85 and I-40 between Greensboro and Raleigh in a location that is part of a development crescent from Charlotte to Wilmington including Burlington.

The intermodal classification yards in Charlotte and the proposed Rail Park in Mebane would provide connectivity between regions that would benefit both as well as the state as a whole. Rail connectivity also holds the possibility of improving access to the NC ports and increasing demand at the ports. There are also increased possibilities for the Burlington-Alamance Regional Airport to expand and serve as a significant contributor to the economic growth of the Triad Region.

Overall, the location affords companies a high degree of flexibility due to the array of transportation services available.

Infrastructure improvements that would be helpful include: widen US 70 in Guilford and Alamance counties to a 4-lane highway; reduce normal congestion and increase safety; reduce heavy congestion when I-40/85 traffic is detoured due to construction or accidents; widen NC 54 through Burlington beginning at NC 100/NC 49 to US 70; perform a two-stage relocation of NC 119 to a newly constructed 4-lane bypass from the I-40/85 bridge to Mrs. White Lane; include an elevated railroad crossing; and widen NC 62 from US 70 to the northern end of Ramada Road close to I-40/85.

Moore/Montgomery Area, The Heart of NC Mega Site: The Heart of North Carolina Mega Park is located off US 220 (Future I-73/74) between the Star (Spies Rd) and Biscoe (NC 24/27) Exits. I-73/74 will provide connections to Wilmington and also to I-40, I-85, and I-95. NC 24/27 presently provides an uncongested connection to Charlotte.

The existing mega-site which includes portions of Moore and Montgomery Counties consists of a total of 3,000 acres with the potential to expand to 4,000 acres. Currently 445 acres have been identified as heavy industrial, 1,600 acres have been identified as medium/light industrial and 368 acres have been identified as commercial/office/retail.

Rail service at the site is provided by the Aberdeen Carolina & Western Railway (ACWR), a shortline that operates from Charlotte on the east and to Aberdeen, with a line that runs northeast from Star to Gulf. ACWR interchanges in Charlotte with CSX and Norfolk Southern, in Norwood with the Winston Salem Southbound Railway, in Gulf with Norfolk Southern, and in Aberdeen with CSX and the Aberdeen & Rockfish Railroad. This network allows customers easy access to Class 1 rail links going to the Ports of Wilmington and Morehead City and to destinations throughout the US. The interchange with the Winston Salem Southbound Railway which is jointly owned by CSX and Norfolk Southern provides service to the Winston-Salem and Greensboro area of the Piedmont Triad.

Efforts are underway to secure Foreign Trade Zone status for all or part of the Mega Park.

Davidson County: Davidson County is midway along the eastern seaboard and less than an hour's drive from the Piedmont Triad International Airport (35 miles). It is approximately 120 miles from Raleigh and 70 miles from Charlotte. Thomasville-Lexington has been designated as a North Carolina micro area.

The future industrial park is located in the I-85/I-85 Business and US 29 area. The proposed 2,700 acre industrial park is designed to attract heavy industrial users. This provides an additional base for future economic and job growth. This location provides excellent access to I-40 for East/West freight flows and I-85 and US 29 for North/South freight flows. Access to intermodal resources in Charlotte is easily attainable. Future direct access to Norfolk Southern would further enhance freight flows for heavy industrial occupants of the industrial park.

4.6 *Charlotte Regional Partnership*

The greater Charlotte region (12 counties in North Carolina) is one of the nation's major transportation and distribution centers. Its geographic boundaries stretch from Statesville (north of Charlotte in Iredell County) through Mecklenburg County to the four counties in South Carolina that are part of the greater Charlotte region; then from Cleveland County west of Charlotte to Anson County in the eastern part of the region. The region is home to world headquarters of nine Fortune 500 companies, and since 1990, new and expanding businesses have invested more than $18 billion here, creating more than 170,000 new jobs. The Charlotte region consists of about 2.6 million people living in 16 counties in two different states, 12 counties in North Carolina and four in South Carolina. The regions employment base is

approximately 1.1 million jobs. The region is located within two hours' flight time, and one day's delivery by motor freight, to 60 percent of the nations' population and more than 60 percent of the nation's industrial base.

Two major Interstates cross in Charlotte, with I-77 providing a north-south access primarily to the North Central states, and I-85 providing an east-west route through North Carolina, but on a national scale is a north-south route from Atlanta to Richmond, connecting with other interstates at these two terminals. Rail service through the Charlotte region continues to be improved, with specific efforts to improve the operational capacity from Charlotte to Raleigh. An emerging multi-modal transportation network is another feature under development in the more densely urbanized part of the Region. One major component of the transportation network is container freight. It is projected that total container traffic in the U.S. will triple over the next 20 years. Simply put, from the basis of a supply of available space in the region, this growth is expected to track the national trend.

The Charlotte regions' economic growth over the past two decades has resulted in overall traffic demand beyond the capacity of our highway and rail infrastructure. Bottlenecks in the flow of goods by truck and rail affect scheduled deliveries both in the region and in locations in distant markets. Major highway routes including the Interstates are particularly congested during morning and afternoon peak hours, and Charlotte is usually evaluated by the annual Texas Transportation Institute Congestion Index as the first or second most congested municipality in the 500,000 to one million population range. This logistics study of the Charlotte region will help provide background data as the region develops an integrated freight logistics plan.

Two Class 1 railroads, Norfolk Southern and CSX, service the Charlotte region along with two short line railroads. Currently, Norfolk Southern has an existing intermodal yard located between North Tryon Street and North Brevard Street, just north of the downtown and near the AMTRAK station. This facility increased its volume of business between 1998 and 2007 by 74% to a total of 117,000 lifts. (A lift is the loading or unloading of a trailer from a railcar.) The facility has reached its peak capacity and is operating an inefficient satellite parking operation to store containers in several off-site parking lots. These off-site storage operations increase truck traffic and congestion in several areas in the Charlotte region, and adversely affect road safety.

Significant investments are already being made to help boost further growth. The CRISP project (Charlotte Railroad Improvement & Safety Program) will alleviate conflicts between the operations of Norfolk Southern and CSX and improve rail productivity and efficiency. The SEHSR (Southeast High Speed Rail) investments will add capacity in the north-south corridor. The Norfolk Southern intermodal yard is being moved to property at the airport. The airport is usually cited by companies seeking to re-locate in the Charlotte Region as one of the major positive factors in their decision process. Current major focus areas in industry and business development in the region include: advanced manufacturing, logistics and transportation, defense and aerospace, finance, health, energy infrastructure and distribution, motorsports, film-making, international business, health and wellness, and tourism.

From the perspective of current and projected future transportation and logistics investments, the region is a major economic engine for both North and South Carolina. Charlotte Douglas International Airport (CLT) is the major airport serving both states. Economic and political globalization has in part been responsible for stimulating the growth in intermodal airfreight in the Charlotte region. Air cargo volume is expected to rise to more than double the current volume in Charlotte and in North Carolina within the next 15 years. International shipments are expected to lead that growth. Therefore, major attention in this study focused on the current dynamics of a representative sample of potential "logistics sites" being developed in the region. Through the process of marketing and economic development activities in several counties, there is evidence that what we call "logistics villages" can be a part of an integrated logistics network in North Carolina and, for the Charlotte region, connectivity with several counties in South Carolina. This summary report will describe the current status of four logistical infrastructure projects being undertaken and already being recognized as part of this region's Logistical Villages.

Charlotte and Mecklenburg County: This logistics village is composed of a cluster of four areas that include the Charlotte Douglas International Airport area, the Arrowood-Westinghouse Industrial center, the Steel Creek industrial center, and a mixed-use community in the Dixie-Berryhill area.

Charlotte Douglas (CLT) is the largest airport in NC and has three major runways, two of which provide concurrent operations. As of September 2010, it had over 680 daily departures including non-stop service to 29 international destinations and non-stop service to 131 domestic destinations. Air cargo plays an important role in the airport operations and the logistics operations in Charlotte and in the state. A Foreign Trade Zone is located next to the airport for duty-free storage and operations. The reported tonnage includes three categories: traditional air freight including express cargo service, air mail, and international air freight. There are expected increases in international freight and this was an important consideration in future airport expansion and plans for the Charlotte area logistics system. Airport expansion includes a new rail/highway intermodal facility located between two parallel runways (with capability of air freight interaction as needed). In addition, space is available south of the airport property to double the capacity of the planned intermodal terminal.

Steele Creek is an available warehousing/ light industrial site located southwest of the airport. South of and contiguous to the Steele Creek industrial site is the Arrowood – Westinghouse Industrial Center. Another available site already developed is in the northwest "corner" of this major development area called the Airport industrial Center. This combined area has about 2,266 acres of land available. Access to Interstate 77, the Interstate Loop (I-485), and the airport is relatively easy from each of these areas.

The Dixie-Berryhill area encompasses approximately 7,600 acres. It is bounded by I-485 to the east; the Catawba River to the west; I-85 to the north; and Rock Island Road, and Shopton Road to the south. Five mixed-use/ transit-oriented communities are located along the eastern boundary of the development. These communities are not in the flight path but are very close to the western-most airport runway, are proposed primarily for employment/mixed-use

developments, with higher-density employment uses proposed along the major transportation corridors.

Charlotte-Douglas International Airport applied for and received a TIGER grant from the federal government to help fund creation of an intermodal facility on airport property. The facility will initially have a capacity for 200,000 lifts per year, with 250,000 lifts per year projected within five years of operation. The re-location of the Norfolk Southern facility to the airport and its added capacity are directly linked to the projected increase of cargo volume through the Charlotte-Douglas International Airport over the next 25 years.

From a highway perspective, the most crucial improvements to support logistics and distribution are as follows:

- Completion of Charlotte Outer Loop: The 6.5 mile section of the I-485 Interstate Loop northeast of the downtown area is important to provide better service for trucks and other through-traffic. The completion of the Loop will allow trucks to bypass the congested sections of I-85 and I-77 near Charlotte's uptown. This will ensure the goods flow through Charlotte area more efficiently. Currently, there are two project segments remaining for the completion of the Charlotte Outer Loop.
- Construction of the Monroe Bypass: The Monroe Connector/Bypass is a proposed toll road from US 74, near I-485 in southeastern Mecklenburg County, to US 74 in the area between the towns of Wingate and Marshville in Union County.
- Garden Parkway: The Garden Parkway will be a new highway on new alignment from I-85 west of Gastonia to I-485/NC 160 near the Charlotte Douglas International Airport. Garden Parkway is promoted to improve east-west travel around the south side of Gastonia, and will establish a direct access route between the rapidly growing area of southeast Gaston County, particularly the west side of Lake Wylie, and southwestern Mecklenburg County. It also promises to improve traffic flow on some sections of I-85 and US 29-74. It will also provide a quick access to the airport area from southern Gaston County, and will be a highway link from automotive manufacturing center in Greenville-Spartanburg area to the intermodal freight site at Charlotte-Douglas International Airport.
- I-77 widening: This enhancement involves widening I-77 from its interchange with I-85 to the Charlotte Outer Loop (I-485). This project involves widening the existing four-lane interstate facility to an 8-lane freeway, which will include a High Occupancy Toll (HOT) lane in each direction.
- NC 49 widening: This project involves widening NC 49 from Harrisburg east to the Yadkin River.
- US 74 (Independence Boulevard): This project involves constructing a highway that would connect Albemarle Road to the Charlotte Outer Loop.

In addition to the above highway projects, the construction of rail improvements as part of the Southeast High Speed Rail (SEHSR) project will improve both freight and passenger service between Charlotte and Greensboro (and beyond).

Monroe and Union County: The second example of a logistics village for the Charlotte Region is Legacy Park, a 5000-acre development just east of Monroe. This project plans include a CSX intermodal terminal on-site. This site is the vision of the Union County Partnership for Progress, with an objective of developing a premier business park in eastern Union County serving the Charlotte metro region. It would have regional connectivity to the Charlotte area 30 miles to the west.

Legacy Park has an objective of developing in parcels, including major rail-served tracts of between 150 and 250 acres and smaller tracts of approximately 50 acres each. Non-rail-served tracts of between 15 and 50 acres are also planned. Light industrial and flex space projects are being planned, as well as sections of the park devoted to high-tech operations. An intermodal facility of about 250 acres is planned adjacent to the existing east/west rail line. As currently envisioned, Phase 1 would encompass up to 1750 acres. A rail facility would be developed adjacent to the existing CSX rail line to serve as the park's freight transportation backbone and give businesses an attractive competitive advantage.

If CSX chooses to go forward in partnership with the Legacy Park project, its rail switching yard in Monroe would be re-located to Legacy Park [21]. CSX would likely build a new intermodal terminal at the park. This move would be consistent with CSX Transportation's announced "National Gateway" project. That project is intended to improve the flow of freight between Mid-Atlantic ports and the Mid-West. It includes a segment between Wilmington and Charlotte, named the Carolina Corridor. This project is significant to the area because it involves an initiative by CSX to expand intermodal terminal along these rail lines, create and support job growth, and decrease the amount of truck traffic on the highways.

However, if CSX elects not to place its intermodal terminal on site, the alternative for rail infrastructure improvement in the area could be investment in a stand-alone rail switching yard on-site. Management developing this logistics site indicates, however, that the success of their venture will depend very much on the completion of the Monroe Bypass

In conjunction with the Monroe Bypass, the completion of the I-485 loop will provide easy access to Legacy Park from northern Charlotte interstates, I-85 and I-77. The widening of I-485 on the south side of Charlotte could play an important role in the ability to easily transport goods through Monroe and Union County. (Note that Union County over the past decade has been one of the fastest-growing counties in the State.) Currently during peak travel times, I-485 in the southern part of Mecklenburg County becomes heavily congested between the I-77 interchange and Johnston Road. This has a significant potential impact on travel times to the proposed Monroe logistics village for commercial truck traffic connecting from I-85 in Gastonia and I-77 in South Carolina.

Salisbury and Rowan County: Salisbury is located about half-way between Charlotte and Greensboro along I-85. Its location provides a strategic position as the interface of two NC metropolitan areas, with the Piedmont Triad region connecting the Triangle with Charlotte. It has been suggested that a logistics operations base established in Salisbury would serve Charlotte and Greensboro well, and an integrated logistics network would result. In addition to the general

aviation service at Rowan County Airport, Salisbury is approximately 45 minutes driving time to both Charlotte Douglas and Piedmont Triad International Airports.

Available land for the development of a site in Salisbury is the Summit Corporate Center. This site consists of 612 acres located on Interstate 85 and Julian Road (Exit 74). It is bordered by Julian, Ritchie, Old Concord and Heilig Roads. Summit Corporate Center is designed for users needing space in the 10 to 34-acre range, with a few smaller parcels of two to nine acres. Important highway projects to facilitate this development would be the widening of I-85 in Mecklenburg and Cabarrus Counties and the widening of NC 49 from Harrisburg to the Yadkin River. I-85 in Rowan County has been widened over the past decade to a six to eight-lane facility with the exception of the five-mile stretch that connects to the four-lane I-85 in through Cabarrus County.

Statesville and Iredell County: This potential logistics site is composed of a 500-acre development at the Statesville Regional Airport (SVH). Statesville has a well-developed plan in the expansion of the airport to establish a logistics center based on air freight operations. It is located approximately 38 miles northeast of Charlotte and 39 miles southwest of Piedmont Triad International Airport.

The Statesville Regional Airport is a major regional transportation hub and home to corporate aviation facilities for two Fortune 500 companies as well as several NASCAR racing teams. It features full instrumentation landing, no landing fees, a recent $14 million expansion, and a 7,005 ft reinforced runway. Its air space is controlled from Atlanta (not Charlotte) for faster take-off and landing authorization---saving time and fuel.

This proposed logistics village has a development plan centered on the airport, where land is available. The plan includes the improvement of the airport with 500 plus acres land development. The current completed improvement of the airport included the completion of an extended north parallel taxiway and the construction of 72,000 square feet of new hangar space. In the meantime, there is plan for a new south parallel taxiway. These new taxiways will provide safe and convenient access to each end of the runway from anywhere on the airfield and increase the capacity of the airfield to accommodate more landings and takeoffs. Additional parking is also planned with construction of a new terminal as well as a new entrance road.

In summary, within the Charlotte region there are a large number of potentially available properties of 500 to 6,000 acres that are actively planned for development. Many are being developed with elements that are aimed at improving overall freight movements in the State and region. There are also a significant number of available, previously developed logistics sites, suitable for warehousing operations and/or light industry. The majority of these previously developed sites are surrounding Charlotte Douglas International Airport. These sites make the region attractive to industries in establishing operational facilities here.

With freight volumes on the rise, both existing and planned industrial and business developments must consider rail, air, and highway accessibility, and integrated, intermodal facilities. A logistics system to accommodate future freight volumes is an important element of future

development. An improved logistics system will enhance economic growth and help the State and region achieve a higher level of economic growth.

The Charlotte Region and each of the other six NC Department of Commerce economic development regions must be an integral part of the state logistics system. State and regional agencies and the private sector have indicated that a statewide approach, with regional "building blocks," would more adequately address the broad range of challenges shaping our freight and logistics systems in the future. Regional freight mobility plans should integrate the following components of any of the logistics villages: (1) urban street design that accommodates trucks; (2) "interstate standard" highways , toll roads, and other major arterial improvements to accommodate trucks; (3) transit systems designed and built on a regional basis; (4) high speed rail connecting major logistical regions or "villages"; and (5) air cargo terminals, taking into account existing warehousing/ industrial infrastructure already in place.

The logistics village concepts for the counties in the Charlotte region should also integrate with those of other regions in the two Carolinas and all other markets on the east coast. Within the greater Charlotte Region, for example, an Iredell County logistics village should link with Advantage West and the Piedmont Triad Partnership. A Rowan/Cabarrus village should also link with the Triad. Union County should link with Wilmington, as well as other east coast ports, particularly Charleston. The Charlotte/Mecklenburg village should not only link with the other villages in the greater Charlotte region, but also link with the automotive manufacturing industry in the Greenville-Spartanburg area. These links would offer this part of the State an integrated logistics network that can supply effective and efficient logistics operations and boost the State's economic growth.

4.7 *Advantage West*

Western North Carolina has distinctly different geography, economic development, and transportation infrastructure compared to the rest of the state. This is reflected in the recent study of the potential for creating one or more inland ports. The nationally recognized geography has beautiful mountains and valleys which attract tourists and recreation enthusiasts. However, the geography represents a challenge to building transportation infrastructure and concentrated industrial sites. As a result, economic development is more dispersed in Western North Carolina than elsewhere in the state. Thus, the traditional concept of a centralized concentration of manufacturing and transportation facilities does not seem to fit the region that well. Consequently, building on the prior inland port study[91] and the work of the Appalachian Regional Commission[92,93], the study team explored the concept of dispersed, virtual logistics villages about which economic development occurs over a 30 to 60 mile or more distance. At the centers of these virtual villages would be transportation facilities ready to carry the regional products to North Carolina, US, and global markets.

[91] Michael Smith, Ph.D. Western Carolina University. Western North Carolina Inland Port Feasibility Study. http://www.wcu.edu/WebFiles/PDFs/WNC__Inland_Port_Feasibility_Study.pdf
[92] Appalachian Regional Commission. Moving Appalachia Forward. Appalachian Regional Commission Strategic Plan 2011-2016. http://www.arc.gov/images/newsroom/publications/sp/ARCStrategicPlan2011-2016.pdf
[93] Cambridge Systematics. Economic Impact Study of Completing the Appalachian Development Highway System. http://www.arc.gov/assets/research_reports/EconomicImpactStudyofCompletingADHS.pdf

Virtual villages fit the western part of North Carolina very well. In fact the local business leaders have already been pursuing such ideas, perhaps without formally thinking about their efforts as forming a virtual village. The dispersed need for logistics has prompted innovative and efficient cooperation regarding product shipments. The Western North Carolina Transportation Alliance located in Asheville provides opportunities for transportation, logistics, and supply chain professionals in the manufacturing and distribution sectors to meet and discuss common needs. Such informal discussions have led to more efficient shipments where, for example, one company will pay for products shipped from Western North Carolina to Florida and a second company will use the shipper to bring materials from Florida to Western North Carolina. Empty backhaul trips are thereby avoided.

Four ideas for virtual logistics villages surfaced during the examination of the area, largely from interviews with the local business and governmental leaders including locations centered in: the Valley River valley in Andrews, Asheville, Rutherford County, and Wilkes County.

These four recommendations for logistics villages result from field trips, interviews, and database analysis for the Western Region of North Carolina.

Valley River Valley: This Village should be centered on the Valley River valley near Andrews with its current and recommended improvements to transportation infrastructure, its available sites and buildings, and its traditional economic connections to nearby counties including those in Georgia and Tennessee. The Valley River Valley is the most open and flat valley in Southwestern North Carolina and has land for development, existing industrial sites and buildings, an airport, water and power utilities, high-speed internet access, good roads, and a direct (although inactive) rail connection. The Valley attracts labor, materials, and products from North Carolina counties of and also draws from counties bordering North Carolina including Polk County, Tennessee and the Georgia counties of Fannin, Union, and Towns. The Village has regional destinations for its products (including car parts, tools, and textiles) in Asheville, Chattanooga, and Atlanta.

Also, since 1995 the Eastern Band of the Cherokee Indians (EBCI) has operated a casino in Cherokee. The enterprises of the Eastern Band of the Cherokee Indians focus heavily on tourism in a variety of forms. The casino with its gaming, 1100 room luxury hotel, conference center, entertainment area, and restaurants has been an economic engine for Western North Carolina. It attracts tourists, generates revenue, and creates jobs throughout the surrounding counties. According to a 2007 study[94] "…the estimated gross regional product attributable to the Cherokee enterprise for 2003 was $268,207,468 with a concomitant employment impact on the region of 4,288 jobs." Such impacts are likely to be compounded as the ECBI improves and expands the original casino to 1,600 rooms and plans a new casino in the Andrews-Murphy area.

[94] Ha and Ullmer, Gambling Industry: Laws, Regulations and Rules)

And the EBCI has other visions as well – of making the Cherokee area into an art mecca, like Santa Fe, NM, which, outside of New York City, is the second most significant area for art enterprise in the US.[95] Commercial activity is envisioned as related to the production of intermediate products that are used in creating commercial art. Also envisioned are tourist activities like fishing that capitalize on the abundant natural resources in the area.

Improved access by highway and air would help ensure success. Much of this would tie the region to the neighboring states like Georgia. The main inbound logistics needs are for truck-based deliveries of supplies and food. But also important is inbound commercial air service for the tourists themselves. One option would be to lengthen the runway at Andrews/Murphy and improve the terminal. A 7,000-foot runway would make it possible for commercial air service, charter flights and otherwise, to use the airport. Interesting, and coincidentally the US forestry service is also interested in lengthening the runway to 7,000 feet. They would like to use it as a base for fighting forest fires in the area. If such an investment would be made, there would be lower-hold air cargo carrying capacity for inbound supplies and outbound products. Such an investment might create low-cost backhaul opportunities for firms in the region.

Asheville Village: This Village with its hub in Asheville should be the focal point for much of the transportation activity and commerce in Western North Carolina. The traditional logistics center of this region is Asheville, which is North Carolina's fourth largest metropolitan area. Its transportation facilities include I-26, I-40, the Asheville Regional Airport, and the Norfolk Southern Railroad, which connects with the CSX Railroad a short distance to the east. This village would focus on four sectors: (1) advanced manufacturing, (2) technology, (3) professional/ technical business services, and (4) health care. In addition, tourism currently is and will remain a strong component of the economic vitality of the area through outdoor recreation opportunities, arts venues and local crafts.

Improvements to the highway system can be made. I-26 begins at the Port of Charleston in South Carolina and travels through Polk, Henderson, Buncombe, and Madison Counties before intersecting with I-81 in Johnson City, Tennessee. Through Buncombe County, however, I-26 narrows to one lane through downtown Asheville on I-240. This is an impediment to the movement of people and goods from and through the Advantage West region.

Related to the highway system is the concept of an inland port. The Appalachian Regional Commission report called for an intermodal inland port in Western North Carolina[96]. The closest Intermodal facility is in either Charlotte or Greensboro. The development of an inland Port in Western North Carolina would enhance the flow of products through and from the area and provide for job creation projects associated with warehouse, distribution, and advanced manufacturing companies that would benefit from the reduced transportation costs associated with the location of facilities near to an inland intermodal facility.

[95] http://www.examiner.com/getaways-in-san-francisco/santa-fe-an-art-mecca
[96] Appalachian Regional Commission. *Network Appalachia: Access to Global Opportunity*. http://www.arc.gov/program_areas/NetworkAppalachia.asp

While Norfolk Southern service is present to support an inland port, the Norfolk Southern service could be augmented by restored rail freight service along the Asheville, NC and Spartan burg, SC routes to enhance western North Carolina access to both the Crescent Corridor through central North Carolina and to the port of Charleston, SC.

Furthermore, regarding rail improvements, Asheville is the #1 destination not served by Amtrak. Investment in passenger rail service to Asheville would help alleviate congestion on the interstate road system and bring new business opportunities to the region through increased tourism and business travel.

Isothermal Belt Village: This Village should be centered on Rutherfordton and extend into nearby counties. It should underscore the growing importance of e-business and support activities in western North Carolina. Industrial sites are available to house the businesses and traditional infrastructure since air, rail and highway networks can support other transportation needs. The village recognizes the paradigm shift in that area from traditional manufacturing jobs to high tech employment. Rutherford County is developing extensive information technology (IT) facilities that represent contemporary broadband internet "logistics" and e-business. Furthermore, Rutherford County offers strong traditional transportation assets including a general aviation airport and primary highways (US 64, US 74, and US 221). The expanding information technologies in Rutherford County include the North Carolina State Data Center and Facebook Data Center. The information sector employment is 4.5% of the employment in Rutherford County (which is the highest county percentage in the state).

Wilkes County Village: This village would be in the northern tier of counties of western North Carolina. Its center would be Wilkes County with its current agriculture processing and manufacturing companies. The region has sites and industrial parks available for development. There are also regional rail and highway links to nearby interstate highway and rail corridors. The excellent general aviation airport in Wilkes County is already the home to several businesses including "through the fence" aircraft assembly, testing and delivery. While dispersed throughout the counties, this virtual logistics village would be centered on Wilkes County and could include the counties of Alleghany, Ashe, Avery, Caldwell, and Watauga. Transportation assets in the five county sub-region include Wilkes County Airport, Yadkin Valley Railroad (which serves Tyson Farms and which links with the Norfolk Southern Railroad in Winston-Salem), I-77 (about 20 miles east of Wilkesboro), US 21, US 221, US 321, and US 421. The manufacturing and agricultural products (including a significant number of the nation's Christmas trees) have ready access to North Carolina, Virginia, and Tennessee by way of US 421 to I-77, I-40 and I-81 in Virginia.

Capitalizing on investments in major highway corridors like US 221and I-74, the following highway, rail, and telecommunication improvements would be key to support the growth and development of these virtual village activities:

<u>Interstate and Highway Improvements:</u>

- Complete Corridor K of the Appalachian Development Highway System to provide four lane highway access to geographically insulated communities in the rural westernmost counties of the Advantage West region.
- Complete I-26 through Henderson and Buncombe Counties.
- Complete US 19 through Avery, Madison, Mitchell, Watauga, and Yancey Counties to provide four lane highway access from I-26 in Madison County.
- Complete US 221 widening from the South Carolina state line through Rutherford County and connecting to I-40 in McDowell County.
- Complete US 321 through Watauga and Caldwell Counties to provide four lane access from Boone to Charlotte.

Rail Improvements:

- Develop an inland multi-modal port near Asheville to enhance the flow of products through and from the area, to create jobs associated with warehouse and distribution companies, and attract advanced manufacturing companies.
- Provide passenger rail service to alleviate congestion on the interstate road system and bring new business and tourism.

Telecommunications:

- Deploy fiber and high speed broadband internet connectivity throughout the region to support the citizens, to provide improved healthcare through enhanced medical diagnostic and treatment, and to create jobs at data centers, advanced digital media design companies, and advanced manufacturing companies.

Transportation Alliances:

- Promote the concept of and/or participation in the Western North Carolina Transportation Alliance throughout the region and to support the dispersed logistics needs of the virtual villages for manufacturing, agriculture, and telecommunications.

Overall, Western North Carolina presents attractive development opportunities. They will be enhanced by improvements to virtual and traditional logistics infrastructure.

.

5 Crosscutting Statewide Analyses

This chapter examines the infrastructure needs across the state, from a crosscutting perspective. It presents assessments of the regions and sites focuses on highway infrastructure support as well as rail, air, and marine. It highlights power and gas supply, IT, water and sewer, training (through community colleges and universities), as well as the labor pool. This chapter emphasizes the first six of these, from highway infrastructure through information technology.

The information in some instances is organized by region, just for clarity in presenting the thoughts. There is no intention to give the reader the impression that the ideas presented are regional in focus – they are integrative – but presenting the information by region helps readers to find items of interest.

A series of investigations has questioned the transportation benefits of additional infrastructure and the spillover benefits on regional economic development appear to be even more tenuous. Transportation infrastructure appears not to have a substantial effect on convergence between economically advantaged and economically disadvantaged regions.[97] North Carolina, in any case, already rates very highly on freight accessibility measures and intermodal facilities may have only a minor effect on attracting additional industry.[98]

Transport infrastructure may act as a complement to other, more important underlying conditions. These include agglomeration and labor market economies, the availability of investment funds, and a suitable political environment.[99] Advanced manufacturing needs a skilled labor force which is not supported by small town labor markets. At the same time, county and municipal governments may not be attuned to the needs of manufacturers. This issue is explored in the next section.

5.1 *Highway Infrastructure*

This section presents an assessment of the highway needs across the state from the perspective of supporting transportation and distribution activities. Figure 5-1 shows the current status of planned improvements for the highway network. All of these improvements are also on the state's Strategic Highway Corridors system. For each item, there is an indication as to whether the needed investment is under construction, programmed in the state TIP, or a need. The information is organized by economic development region, for simplicity in helping readers find projects of interest.

[97] Vickerman R., Spiekermann K. and Wegener M. (1999) "Accessibility and economic development in Europe," *Regional Studies* 33: 1-15.
[98] Lim H, Thill J-C, (2008) "Intermodal freight transportation and regional accessibility in the United States" *Environment and Planning A* 40(8): 2006-2025.
[99] David Banister and Yossi Berechman (2001) "Transport investment and the promotion of economic growth," *Journal of Transport Geography* 9 (3): 209-218.

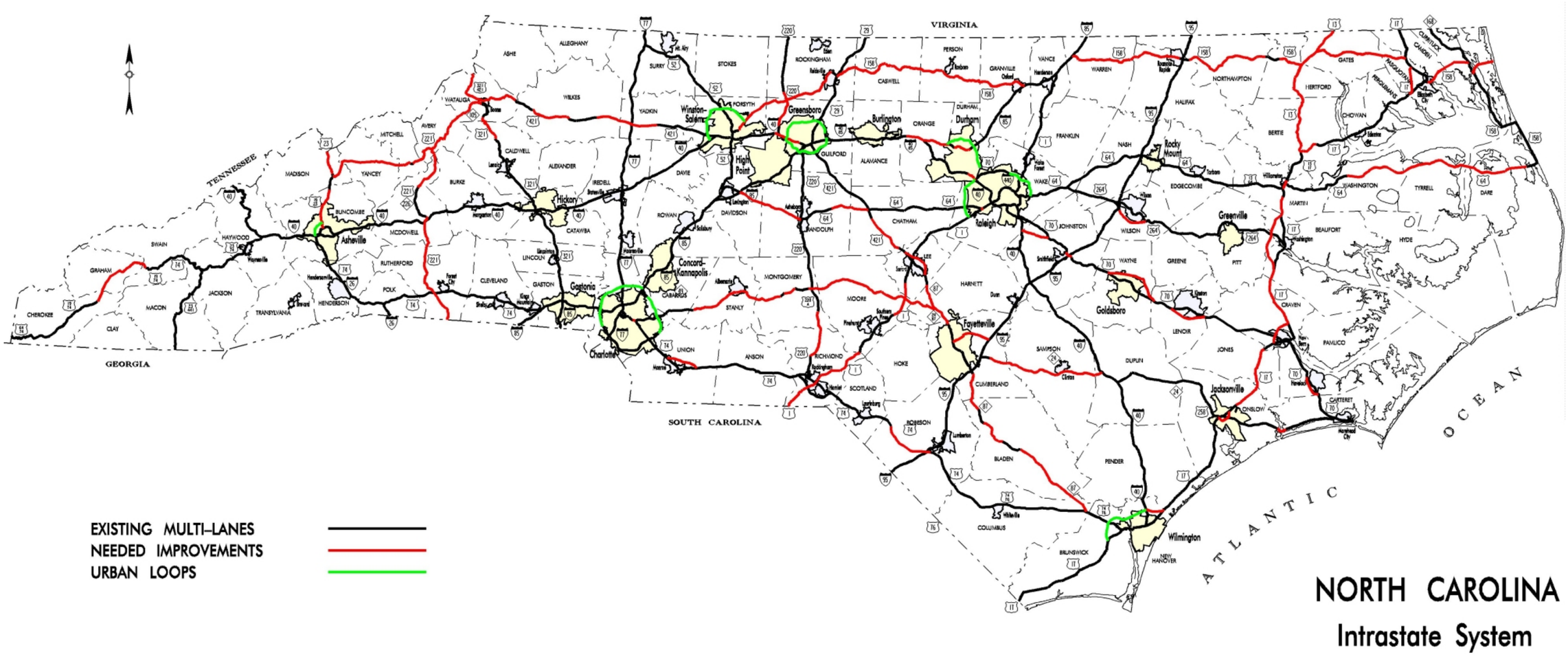

Figure 5-1: Highway Network Status

In the northeastern region, four highway infrastructure investments seem valuable from a logistics standpoint. They are in no particular order. All of them are currently programmed on the state TIP. The first is US 158 four lane widening from North Road Street in Elizabeth City to NC 168 in Currituck County. The second is US 13 four lane widening from Windsor to Virginia line with an Ahoskie Bypass. The third is US 17 four lane widening from South of Williamson to the Washington Bypass. The fourth is NC 33 from Tarboro to Greenville.

In the eastern region, 11 projects seem valuable. All of them are either programmed in the TIP or under construction. The ones under construction are identified. The first is the Rocky Mount Northern Connector. The second is the I-95 Interchange with Sunset Avenue. The third through fifth are the Goldsboro, Kinston, and Havelock Bypasses. The sixth is the Felix Harvey Parkway which is under construction. The seventh is the Global TransPark Freight Transportation System which is under construction. The eighth is US 17 four lane widening from Jacksonville to New Bern. The ninth is US 17 widening in Jacksonville from the Bypass to Drummer Kellum Road. The tenth is NC 24 Construct a trumpet interchange between Bell Fork Road and US 17 Bypass. The eleventh is US 70 widening from Radio Island to North of Beaufort.

In the southeastern region, eight projects seem relevant to logistics needs. They are all programmed in the TIP. The first is the US 17-74-76 Interchange upgrade. The second is the Wilmington Loop including the Skyway Bridge and Southeast Loop. The third is Independence Boulevard from Randall Parkway to MLK. The fourth is Kerr Avenue widening from Randall Parkway to MLK. The fourth is the US 17-74-76 Interchange upgrade. The fifth is the I-95 widening from I-95 Business to I-40 north of Benson. The sixth is the Fayetteville Loop from US 401 North to Bragg Boulevard to I-95 South. The seventh is NC 24 four lane widening from East of I-95 to I-40 in Warsaw. The eighth is US 401 four lane widening from North of Fayetteville to Fuquay Varina.

In the triangle, nine projects seem helpful in facilitating logistics. The first of these is under construction, the rest are programmed in the TIP. The first is the Triangle Expressway (I-540, toll). The second is the Southern and Eastern Wake Freeways (finishes the I-540 loop). The third is the widening of I-40 from I-440 to NC 42. The fourth is the widening of I-40 from I-85 to NC 147. The fifth is the widening of I-440 from Wade Avenue to Walnut Street. The sixth is the widening of I-85 from Hillsborough to NC 147. The seventh is the East End Connector from NC 147 to North of NC 98. The eighth is the US 421 Bypass of Sanford. The ninth is the widening of I-95 from I-95 Business to I-40 north of Benson.

In the Triad region, six projects seem relevant. All are programmed in the TIP. The first is the relocation of NC 119 from I-85 to North of SR 1918. The second is completion of the Greensboro Western and Eastern Loops. The third is the US 220-NC68 Connector. The fourth is the widening of NC 24-27 from US 220 to Carthage. The fifth is the Winston Salem Northern Beltway Western and Eastern Sections. The sixth is the Macy Grove Road Interchange with I-40 Business.

In the Charlotte region, 12 highway improvements seem particularly important from a logistics perspective. The first three are under construction or about to be. The others are programmed on

the TIP. The first is the Charlotte Outer Loop. The second is the Monroe Bypass. The third is the widening of US 601 widening from US 74 to the South Carolina Line. The fourth is the Garden Parkway programmed by Turnpike Authority. The fifth is the widening of I-85 in Mecklenburg, Cabarrus and Rowan Counties including Yadkin River Bridge. The sixth is the widening of NC 49 from Harrisburg to the Yadkin River. The seventh is US 74 (Independence Boulevard) from Albemarle Road to the Charlotte Outer Loop. The eighth is Derita Road from Poplar Tent Road to Concord Mills Boulevard. The ninth is Poplar Tent Road from Derita Road to the US 29-601 Bypass. The tenth is the widening of US 70 from Salisbury to Statesville. The eleventh is the I-40/77 Interchange modification. The twelfth is the widening of I-77 from the Brookshire Freeway in Charlotte to I-40 in Statesville.

In the western region, the Appalachian Regional Commission (ARC) has been deeply engaged in funding highway improvement projects and studying future ideas. Four projects seem important from a logistics perspective. All are programmed on the TIP. The first is the widening of I-26 from I-40 to Hendersonville. The second is the widening of I-26 from North of I-240 to US 25. The third is the Asheville Loop from I-40 to North of I-240. The fourth is the ARC's Corridor K from Andrews to NC 28 East of Almond, a four lane highway on new location with tunnels at Appalachian Trail.

In addition to highway improvements, many of the state's 12,712 bridges are below standard or have reached/exceeded their useful life. There are 780 bridge replacement projects scheduled in the current STIP. Many of these are located on Interstate, US, and NC routes—the primary routes uses for truck shipments.

5.2 *Rail Infrastructure*

From the perspective of railroad infrastructure, it is important to recognize that North Carolina is not that critical to either NS or CSX, the two Class 1 railroads that service the state. One estimate is that less than 2% of the revenues for these railroads is derived from shippers in North Carolina. The implication might be that the state needs a strategic plan that relies on partnerships with short lines or shared rights-of-way.

Figure 5-2 shows the railroad network in the state. The primary interest of CSX lies in its north-south main line stretching Weldon to Rowland, through Selma and Fayetteville where it intersects with NS. The primary interest of NS is its north-south main line from Lynchburg (VA) to Greenville (SC) through Charlotte where it intersects with CSX. There are other secondary lines in the state as well as locations served by both CSX and NS: Goldsboro, Colon, and Cary to Raleigh. Arguably, the entire length of the Aberdeen, Carolina, and Western Railway Company is also served by both Class 1 railroads since the ACWR interchanges with both CSX and NS. The same is true for the Carolina Coastal Railway (CLNA) between Raleigh and Wilson and the Aberdeen & Rockfish Railroad (AR).

A tiered network approach to railroad network planning seems needed. There also seems to be value in developing a sense of the types of railroads that would be best to operate what parts of the network – Class 1 railroads versus short lines – and where service by two Class 1 railroads is

needed. Figure 5-2 illustrates one realization of this tiered network idea, borrowing from the highway network ideas of interstates, state highways, and local “roads”.

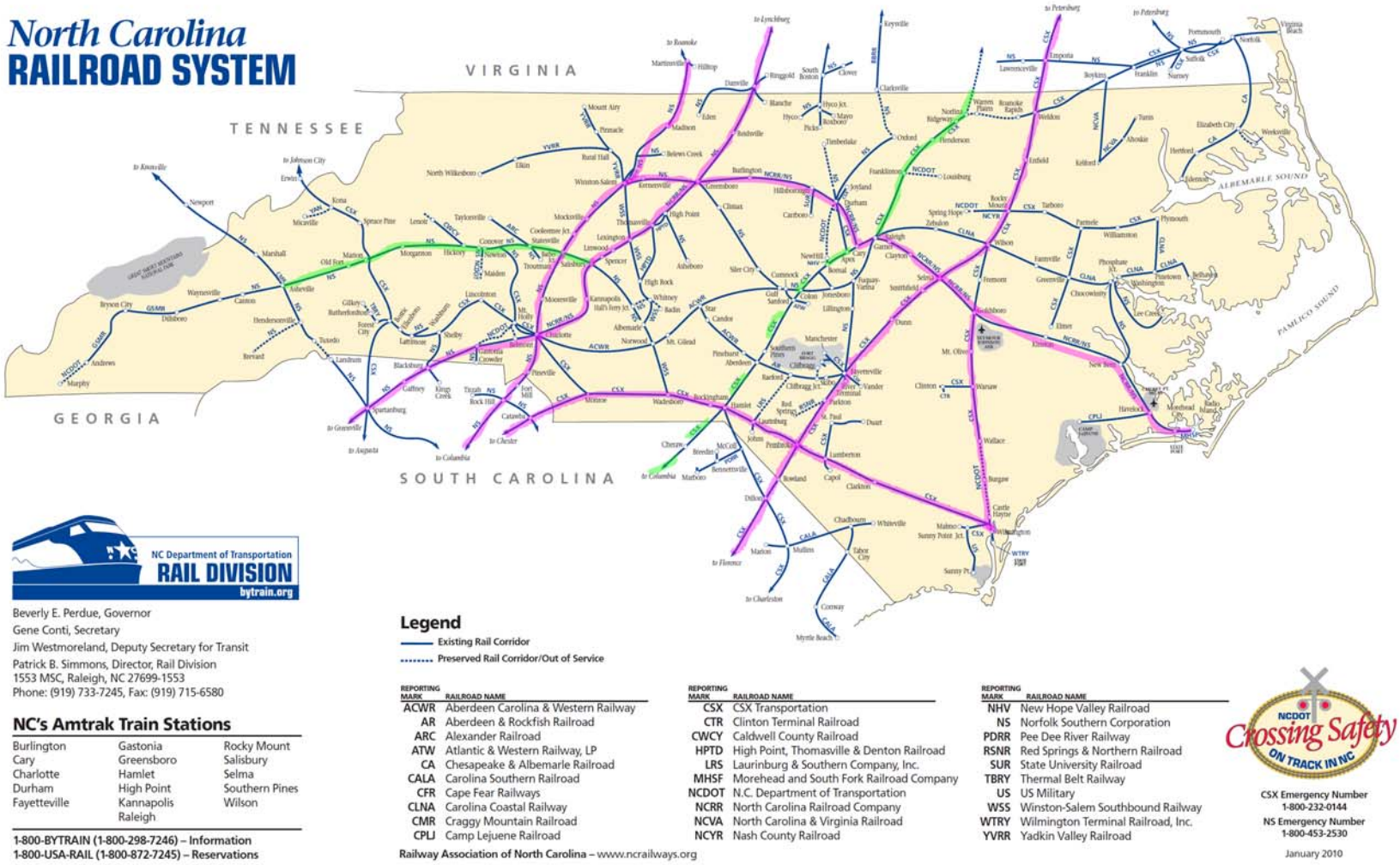

Figure 5-2: North Carolina Railroad Network – With Corridor Markings

It is clear that North Carolina has at least two "interstate" quality rail lines (high performance lines). One is the CSX north-south main line from Petersburg (VA), through Rocky Mount, Selma, and Fayetteville to Florence (SC). The other is the NS north-south main line from Lynchburg (VA), through Danville, Greensboro, and Charlotte to Greenville (SC).

The state might want to have or designate additional east-west high performance lines. Reaching the Midwest as well as the Mississippi River crossings in Memphis and St. Louis would be the objectives. One possible choice is the CSX east-west main line from Wilmington, through Monroe, Charlotte, and Marion to Johnson City (TN). It is die-straight in the east – in fact it has the longest stretch of tangent (straight) track in the US – but it is crooked and steep in the west, as well as slow, passing through the mountains. It is used there primarily to bring coal out of the Appalachians. The alignment could be transformed into an east-west main line, but it would most likely involve significant expense – and the cost would not stop at the North Carolina boundary - the mountains do not end at the border with Tennessee. There are equally slow-going mountainous sections of this alignment in other states. Another option involves a combination of the CSX east-west main line from Wilmington through Monroe, and not Charlotte, to Chester (SC) and then back into North Carolina via NS from Spartanburg (SC), through Asheville into Tennessee. But upgrading this line would also be pricy and would involve putting back in service the Saluda Grade. What might make the most sense would be to use the CSX main line from Wilmington through Monroe to Chester (SC) and not attempt to create an in-state route through the mountains of North Carolina. Two other options make sense, both on NS. The one is from Morehead City west through Raleigh to Greensboro, and then north to Danville en route to Lynchburg, VA. The second is similar: from Morehead City west through Raleigh and Greensboro to Winston-Salem, and then north to Roanoke.

Another valuable addition from a freight perspective would be the line from Goldsboro to Wilmington. Presently, the section from Wallace to Castle Hayne is out of service. Putting that segment back in service and possibly upgrading the rest of the line would be valuable.

There are other lines in the state that have a strong motivation from a passenger rail perspective, including high-speed rail, partly due to SEHSR. These may not be as valuable presently from a freight perspective, but they might become important if sites develop along them. It is certainly fine to include them in a list of lines that could become more valuable from a freight perspective. Included in this group are the lines from Raleigh to Petersburg (VA) and Raleigh to Columbia (SC) through Hamlet. In the future, the list might include: Greensboro to Winston-Salem; Salisbury to Asheville; and Raleigh to Wilmington through Goldsboro.

In a third tier are the rest of the rail lines shown in Figure 4-2. These would have a local focus, either for short hauls or pick-up and delivery to and from shippers and consignees. This third-tier network might best be operated by short lines whose cost structures make short-distance moves profitable. These short line operators might be local to the state or subsidiaries of national-level holding companies. These short-line companies also tend to have a greater interest in local business activity, they provide more frequent service, with shorter trains, and they are invested in the success of the state's economy.

A very challenging, but equally valuable idea is to treat the second and third tier lines as being public rights-of-way over which any rail carrier can operate. This idea is not new, it is at least 40 years old, suggested by Robert L. Banks and others in the 1970's. Except in limited instances where governments have argued successfully before the Surface Transportation Board (and before that the Interstate Commerce Commission) to provide trackage rights for multiple carriers over a particular rail line, this shared use idea has not seen great popularity. However, it may be in North Carolina's best interest to pursue it. This would be a way to get competitive rates for the ports of Wilmington and Morehead City as well as locations such as Global TransPark, which have found it challenging to get reasonable rate quotes from the Class 1 railroads.

The bottom line is to achieve two objectives: 1) have a high-quality railroad network that connects to all the major locations of industrial activity in the state and 2) obtain high quality service at reasonable rates from the railroads that operate over these lines, whether they are Class 1 railroads or short lines.

In terms of site-specific improvements that would seem to be helpful from a logistics perspective, several surfaced during the review conducted by this project. They include restoring the line from Wallace to Castle Hayne (which is planned), building a wye in Pembroke (which is being addressed); getting two-carrier service to both the ports of Wilmington and Morehead City (or make the ports equivalent in terms of the vessels and cargo they can handle, so steamship companies become indifferent between them); completing the wye on the branch that services MOTSU; providing more direct service to the Port of Wilmington, one that eliminates crisscrossing the City of Wilmington multiple times; simplifying the rail alignments through Charlotte, like eliminating the at-grade crossing between CSX and NS (CRISP); and eliminating single-track sections along the main lines – Greensboro to Raleigh, Charlotte to Greensboro, (maybe to triple track if high speed passenger services progress) and along the entire length of the CSX main line. Improvements at site specific locations would also be beneficial such as improving access to Morehead City (including Radio Island), building a larger local yard west of Morehead City to help service the port; and reorganizing the tracks in Goldsboro, as well as Raleigh, Greensboro, and Winston-Salem; and bypassing cities like New Bern.

An important "minor" detail is that the state needs to realize that rail service for some parts of the state will come from out of state. This is particularly true in the northeastern region, where the service will be based out of Norfolk. The Chesapeake & Albemarle, for example, interchanges with NS in Chesapeake, south of Norfolk.

Rail-related commentary about the large-scale sites explored in the regional assessments are described there and repeated here for clarity:

Northeastern Region

- Elizabeth City: rail service is from Virginia; interchange with NS in Chesapeake, south of Norfolk, local improvements in track condition would be needed.
- Williamston: rail service is CSX out of Rocky Mount, local improvements in track condition would be needed.

Eastern Region

- Kinston: the rail spur is being constructed; a reasonable rate is needed; perhaps short-line provided service would be more appropriate.
- Jacksonville: the site has no rail service presently; the only rail spur leads to Camp Lejeune; the right-of-way that used to exist from Wilmington north has been built over; there was also an alignment along NC 258 out of Wilson, by US 17, but there is no evidence that the right-of-way still exists in the aerial photos available on-line.
- Rocky Mount: it is 3.5 miles away from CSX in Rocky Mount; it would be served out of the yard in Rocky Mount; the Aberdeen railroad is also not far away, but a spur is not possible.
- Morehead City: The port is a major asset; maybe it should be upgraded to handle container vessels; this would create competitive rates between the railroads; it would be useful to get the railroad out of New Bern; running short trains would help mitigate the impact of significantly more traffic; more extensive use of a shortline operator might be beneficial; that would provide a better (lower) cost structure and make short trains and shorter lengths of haul feasible; dropping the railroad below grade in Morehead City would help a lot; it is an idea much like the Big Dig in Boston: freeze the sand and bore a tunnel; maybe use electric locomotives and eliminate the diesel fumes and noise; use the yard west of Morehead City as the servicing yard for the port; that yard could be the interchange point to NS, or the shortline could operate trains as far west as Goldsboro / Selma where it could interchange shipments with both NS and CSX.

Southeastern Region

- Brunswick/Columbus Logistics Site: it is adjacent to the CSX rail line; a spur would be needed into the site.
- Fayetteville: Both CSX and NS serve the town; so does the Aberdeen Railroad; there's a problem at Pembroke, a side of the wye is missing; NCDOT has plans to construct the missing leg.
- Maxton: CSX services the area from Charlotte; the CSX line is about two miles from the airport; there was/is a spur constructed to serve the former military base; it appears that RSNR operates the spur.
- Wilmington: the railroad is next to the airport; Wallace to Castle Hayne would be valuable and important to military; what railroad should own and/or operate it is an issue; it might be useful to build a wye connection north of Wilmington through the municipal facility; another possibility is to eliminate all the railroad travel through the city by constructing a new bridge; an improved Front Street next to the port could accommodate both trucks and rail trains; perhaps the rail could be adjacent to (west of) the street until just at the entrance to the port so that trucks coming off the ramp southbound onto Front Street do not get surprised by trains; use a short line operator to move short trains to the yard west of Wilmington; this would be a significant increase in the network operated by the short line, but it would yield operational benefits; it could be that NS should be given the operating rights (or trackage rights) on the line from Goldsboro to Wilmington via Castle Hayne; better access to MOTSU is needed, a leg of the wye is missing.

Research Triangle Region

- Raleigh: There is no rail access to RDU; but there is rail service in Morrisville (NS) which is close enough; there would be great access to rail in that commercial area.
- Sanford: there is a railroad line immediately adjacent to the airport; there is Amtrak service on the line; CSX, NS, and Atlantic and Western (part of the Genesee & Wyoming) all are nearby.
- Smithfield: There would be excellent rail service, both from NS and CSX, in Selma and Goldsboro.

Piedmont Triad Region

- Burlington: There is rail service on the north side of the airport, running E-W.
- Greensboro: NS is immediately adjacent to the site.
- Montgomery/Moore: The site is near the Montgomery Airport; the railroad is next to the airport (Aberdeen), about 2 miles from the site; it would be easy to construct a rail spur into the area; there are connections to CSX in Wadesboro and NS in Albermarle.
- Winston-Salem: NS is immediately adjacent to the site.

Charlotte Region

- Charlotte: There is rail service at the airport; there are plans to build a large intermodal facility between two of the runways.
- Monroe: There is great rail access from CSX; the tangent track is long enough for a major intermodal facility (more than 2 miles long).
- Project Legacy: CSX runs through or adjacent to the site.
- Salisbury: It is on the NCRR.
- Statesville: NS is nearby; a rail spur would be needed.

Western Region

- Andrews/Murphy: The railroad is immediately adjacent to the airport; the Great Smokey Mountain Railroad provides the tourist and freight service.
- Asheville: The railroad is close, but not adjacent, to the airport; rail service to other parcels would be simple if they are adjacent to the rail line; the Saluda grade is to the south (4.7%); but the grade problem could be ameliorated by careful realignment – options have been examined – the main "problem" is that the railroad was laid out a long time ago.
- Wilkesboro: Presently serviced by Yadkin Valley Railroad; only rail spurs might be needed.

5.3 *Maritime Support*

Maritime support is both related to ocean-going vessels and barges.[100,101,102,103,104] Ocean-going includes vessels that service the eastern seaboard and the Caribbean. Challenges associated with traffic along the intracoastal waterway were not explored. There are plans, encouraged by the I-95 coalition, to expand water-based freight service along the eastern seaboard, to relieve pressures on the highway and rail lines in the corridor. Some of those plans include handling container traffic.

The main questions relate to the Ports of Wilmington and Morehead City. Those questions will not be addressed in substantial detail here. A separate study, presently on-going and called the North Carolina Maritime Strategy, is examining port options aimed at providing North Carolina with guidance about what it might do.

In this project, four options surfaced, which are described here to document the ideas developed.

The first option is to "maintain status quo". Keep the ports in effective, functioning condition. Have them continue to serve existing and new clients. Have them seek partnerships with larger, nearby ports (Norfolk, Charleston) so that a full breadth of service can be provided to all customers.

The second option involves minor enhancements. Find niches, such as particular commodities (e.g., agriculture, farm machinery, as well as the niche markets now being served), strengthen the ties with the military; perhaps specialize in high-value, time sensitive products; expand RoRo services to the Caribbean and South and Central America; perhaps explore the use of catamarans for some of this service. Improve the landside access by making minor improvements, upgrade highway links, improve rail access – Wallace to Castle Hayne, for example. Make ocean-side enhancements in such facilities as turning basins and wharfs.

The third option is to make major enhancements – have NC become a major participant in maritime trade. Find niches (identify several commodities, get anchor tenants, develop a suite of services, partner strongly with the military; ideas: agriculture, container traffic, high-value sensitive products; Caribbean, South and Central America, coastal US; short of post-Panamax vessels, akin to the vessels now calling at the ports. Make on-site improvements (create identical intermodal capabilities at the two ports so that steamship lines can call at either port, become rail carrier indifferent). Improve the landside support (create inland ports in sensible locations like Charlotte and Greensboro as well as near I-95/US 70 (e.g., Selma/Smithfield, Goldsboro), near I-95/US 74 (e.g., Lumberton/Maxton) and further west (e.g., Asheville).[105] In this scenario, the state might also want to enhance the ocean-side access (dredging, cranes, turning basins), and improve the landside access (make major improvements, re-route / realign rail access, upgrade

[100] Mygatt, C., presentation to the Governor's Logistics Task Force, April 18, 2011
[101] Vaught, M., presentation to the Governor's Logistics Task Force, April 18, 2011
[102] Rich, S., presentation to the Governor's Logistics Task Force, April 18, 2011
[103] Nowicki, S., and D. Helgason, presentation to the Governor's Logistics Task Force, April 18, 2011
[104] Durham, J., presentation to the Governor's Logistics Task Force, April 18, 2011
[105] The latter three ideas would create jobs in areas that need jobs – and avoid already congested urban areas.

highways and highway access, create two freeway-quality connections from the ports to their respective inland ports).

The last option is to have NC become a major participant in the deep water port business. Engage in head-to-head competition with Norfolk, Port Elizabeth, Charleston, Savannah, and other similar ports on the east coast.[106] Lock-in globally-operative anchor tenants, create strategic alliances with the military; ideas: agriculture, container traffic, high-value sensitive products; Caribbean, South and Central America, coastal US; post-Panamax vessels, Suez Canal vessels. Make on-site improvements (create identical intermodal capabilities at the two ports so that steamship lines can call at either port, get to 50'+ depth at one or both ports, on-dock rail, become rail carrier indifferent, create high-capacity intermodal capability at one or both of the ports). Increase load/unload capacity (find one or more additional sites – add 600-2400 more acres of land on water – create acreage equivalent to other east coast ports). Improve landside support (create two inland ports; one in Charlotte for Wilmington and another in Greensboro for Morehead City – target is Heartland, or perhaps use Lumberton and Goldsboro instead – create jobs in areas that need them – stay out of congested urban areas). Improve landside access (dramatic improvements, get rail onto new alignments, get double stack clearances to both ports, create high-capacity connection(s) to the Heartland –around the mountains to the north via NS, around the mountains to the south via CSX, or through the mountains with tunnels; create freeway-quality connections from the inland ports to the ports). Make ocean-side enhancements (dredging, cranes, turning basins, etc.).

5.4 *International Commerce Support*

As is obvious, some of the transportation and logistics activities in the state will be domestic in nature; other activities will relate to international commerce. The latter is the focus here. For international commerce, partnerships are needed with the US Government, for example US Customs. The criticality of this collaboration cannot be emphasized enough. Even though this study is about connecting North Carolina to the world, it is not as though any location in the state can be an international portal – an international gateway. This is the motivation for creating "inland ports" or "foreign trade zones". They represent locations – portals – through which goods can enter and leave the country or never enter the country, from a commerce perspective, in the case of "foreign trade zones".

Conceptually, there are six ways in which "goods" can enter and leave any given locale – by highway, rail, water, air, pipeline, or the internet. There are probably other options (conveyor belt) but they are rare. The last has only emerged in the last couple of decades. In the case of North Carolina, only three of these are relevant since the state has no boundaries with foreign countries except implicitly by water. So the focus of this discussion about international gateways needs to focus on air and water. The internet can be set aside.

From a water perspective, North Carolina has two international ports – Morehead City and Wilmington. Either can provide full-fledged support for international commerce. They have different capabilities presently in terms of handling commodities – but from a customs and immigration standpoint, they are effectively identical. Perhaps the ties with US Customs, etc.

[106] Edwards, G., presentation to the Governor's Logistics Task Force, October 18, 2010

could be strengthened or improved – those issues were not explored in the study – but the assumption of the team is that these two ports are like any others (e.g., Norfolk, Charleston, Savannah) from an international trade perspective.

Air is a different matter. As people know, from a personal travel perspective, not all airports are international. RDU, for example, is an international airport, but it has one international gate, and the customs and immigration personnel are limited in number. At times, there is only one flight a day involving the arrival of people from abroad onto US soil.

The same is true for air cargo. Not all airports can be direct portals for international trade. Provisions have to be made to ensure that the airport, and the airport tenants (e.g., FedEx) are really prepared for and allowed to engage in international commerce.

Hence, from the perspective of North Carolina, there is value in considering what locations should be equipped to deal with international air shipments – how many of them there should be and where they should be located. A couple of those locations seem clear – RDU for the triangle region, Charlotte-Douglas Airport for the Charlotte region, Wilmington airport for the southeastern region, the Aerotropolis associated with PTI in the Triad, and Global TransPark for the eastern region. But for the northeastern region and the western region, the answers are not quite as clear. It is possible for the northeastern region that the international air gateway should be Norfolk, but the state might want to have a second one that is in-state. Elizabeth City might be a logical choice because the US Coast Guard is already deeply involved in activities at that location. Getting additional US government support for customs, etc., for goods movements, might not be that difficult. In the western region, Asheville seems to be the logical choice.

If these locations were designated, they would effectively become "inland ports". That is, they would be empowered to engage in international commerce, which is something that inland ports do. That does not necessarily mean that they would become major intermodal distribution centers – as is the case in Front Royal, VA – that is a different thought – but from the perspective of being gateways to the world – they would fit that description.

5.5 *Information Technology*

One major insight from this statewide study is that top-quality internet support is crucial to the future of the state's economy and to its logistics support. It might be advantageous for North Carolina to become the best wired state in the nation. Not that it will have more miles of internet cable or fiber optics than any other state in the nation but rather that ubiquitous high-bandwidth service, perhaps wireless, is available everywhere in the state. As the logistics task force has heard several times, improving the state's information technology (IT) infrastructure is a major objective.[107] The status of the IT network in North Carolina is reflected in Figure 5-3.

High bandwidth IT infrastructure makes the virtual villages feasible. It attracts businesses because their day-to-day operations can be effective and efficient. It makes information sharing straightforward, like the Western North Carolina Transportation Alliance where empty backhaul information is being shared to help reduce transportation costs in the aggregate.

[107] Freddoso, J., presentations to the Governor's Logistics Task Force, October 18, 2010 and May 23, 2011

Although there are still areas in the state which are dark or served only by low-bandwidth connections, it does not appear that those locations are coincident with the places where business would be likely to locate. However, high-bandwidth internet service is a critical part of any modern company's success and ensuring that that service is provided – either to the large-scale sites – or to any other locales where industries might operate – is nonetheless extremely important.

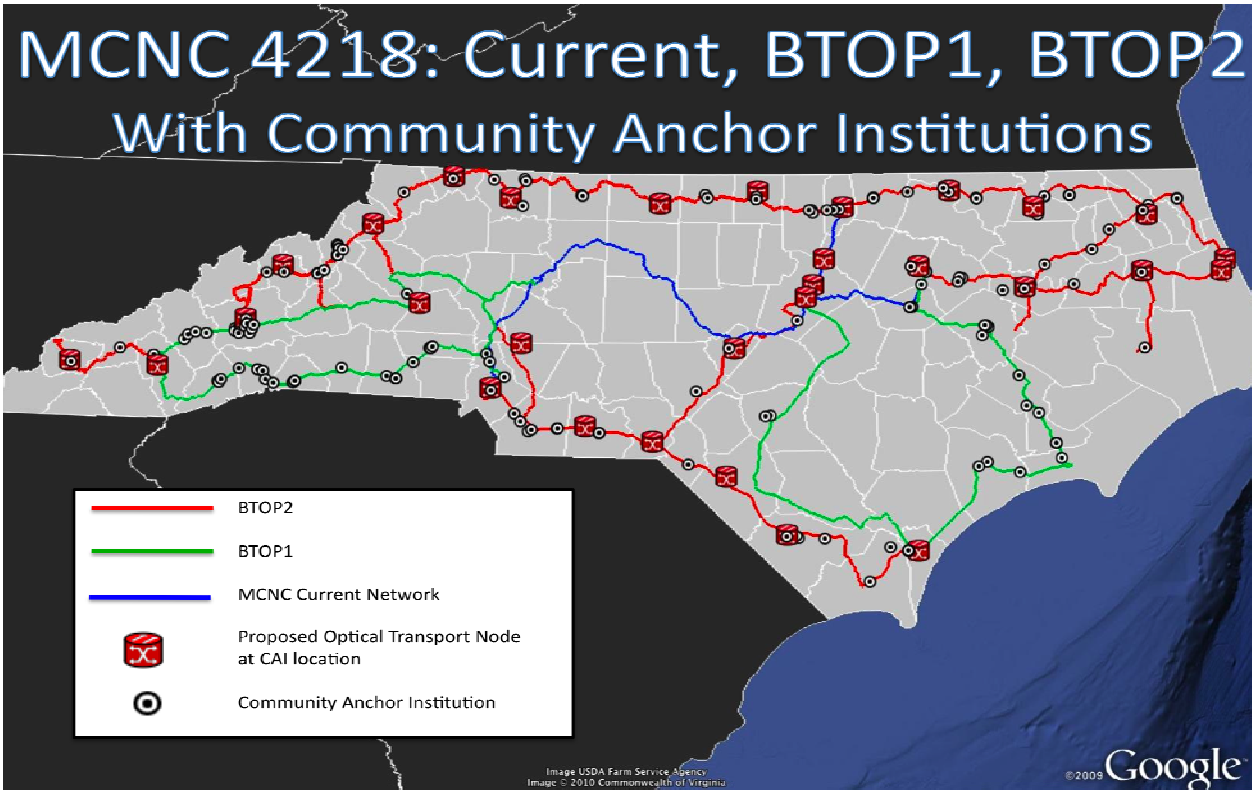

Figure 5-3: The Expanding Information Technology Network in North Carolina
Source: Freddoso, J., presentation to the Governor's Logistics Task Force, May 23, 2011

5.6 *Other Infrastructure*

It is apparent that other infrastructure investments would also be helpful, but it seems that these investments are either site specific or ubiquitous. And it does not seem that these investments fall within the direct purview of NCDOT. Rather, they represent investments that the State of North Carolina should consider making to attract business and ensure their success, partnering with other service providers such as the major utilities. A brief summary of these investment "needs" is as follows.

There are site-specific instances where investments in expanding the power grid and natural gas pipeline networks would be useful. Not all of the 30+ sites are already served by high-tension lines or major gas lines. The trunk lines seem to be close by, but tie-lines to the site would be needed in some instances. These investments are really under the control of public utilities – they construct the lines and charge for the service. As is already the case, North Carolina needs to continue partnering with these service providers to ensure that business needs are met. In some instances, these utilities are based in neighboring states, as is the case in the northeast.

Community college and university support is also important. In fact, partnerships with the community colleges seem key because those are the institutions – at least it seems – that engage with the companies to meet the training needs identified – that is, those that are not met by the companies themselves. Hence it seems important that the state ensure that the community college system is an integral partner in the economic development process as well – constructing infrastructure alone is not sufficient.

Another infrastructure need is for water and sewer. It is simply not reasonable to assume that major business (or major business growth) can be accommodated by wells and septic systems. This means, akin to the way in which housing tract developers operate, that the state must partner with local governments to get the water and sewer (and other public utility networks) installed, so that the land is ready for occupancy – as is the case when builders prepare a tract of land for houses. This may be a significant challenge. And it may be an important "plan ahead" part of the "game plan". It may be that the state should partner with the local municipalities in land use planning – master planning – to ensure that transportation rights-of-way are set aside for future business growth – in areas that are acceptable from the perspective of the local governments and citizens – and that the utility investments are made in anticipation of future development – or that the plans for creating those investments are prepared ahead of time so that when businesses express interest in setting up operations the lead time to install those utilities is minimized.

Finally, as is apparent from the site selection criteria that businesses seem to use, there are other infrastructures that are also important to have in place. One is cultural amenities. Another is good primary and secondary school systems. A third is the inter-institutional "infrastructure" between and among government agencies that makes it possible to get things done in an expedient, logical, and efficient manner. Companies want to find places where the governmental bodies seem united and coordinated.

6 Findings and Conclusions

This report has presented ideas about how North Carolina can tie its transportation infrastructure investments to economic development – and the creation of jobs. It has tied together regional interests – in economic development and infrastructure investment – to form a unified whole that speaks to ways in which transportation investments can help expand the state's economy. The report has been written to convince businesses that North Carolina is prepared to accommodate their activities should they should locate here, and help make the state's vision become a reality.

The report describes infrastructure investments needed to help these visions become reality. It presents ideas that are consistent with the long lead times it takes for governmental agencies to get facilities built. It considers the challenges of acquiring the rights-of-way, conducting Environmental Impact Studies, assembling the funds needed, and then engaging in construction.

The report encourages North Carolina to walk a fine edge – and be prepared to accommodate the needs of new and growing businesses while not moving along too far. It emphasizes the importance of taking incremental steps – of getting prepared – of advancing its supply-push initiatives to sensible milestones – while not putting the government at risk by expending scarce public funds on development options that may not materialize. Businesses should be engaged in the decision-making process to ensure demand exists for infrastructure improvements. It is important to do this because North Carolina, like many other states, has found that businesses, like people buying houses, would like to find sites in "move-in" condition – places where they can begin construction right away or even start operations – where everything is in place. Deals seem to be lost – companies go elsewhere – because the "to do" list is too long, the hurdles to be overcome are too significant, or the wait time is too long.

The report emphasizes the importance of both *transportation and land use*. In fact, the land use part is critical and cannot be over-emphasized. The regional studies identify some 30+ logistics villages – some physical and some virtual – that would help the state better organize its transport-related activities. Those villages are characterized in terms of the activity they could support, the geographic reach they would be likely to have, their preparedness for use, and the relative costs of getting them ready for use. The report encourages North Carolina to keep an eye on statewide land use trends; to keep an inventory of the sites that are available; to keep track of their condition; and their suitability for various economic enterprises; and to do the studies – generic environmental impact studies and otherwise – necessary to move the villages to the most advanced frontier they need over time. For the physical sites that are part of these villages, it involves marking future rights-of way, zoning or other land use controls; taking ownership of the rights-of-way (highway, rail, power, water and sewer, etc.) needed for site access – or placing easements or rights of first refusal to ensure the rights-of-way will be available; and, along with the Department of Commerce, perhaps placing options on the land (and perhaps permits as well) – through promoting the idea that these sites are or will be "ready" for occupancy at definitive points in the future.

The visions are focused around two views of the infrastructure improvements. The first is *generic*, relating to transportation and distribution infrastructure improvements that will help business statewide regardless of the economic sector to which they align and regardless of whether they are large or small – improvements to the highway, rail, air, and maritime facilities that make it easier, quicker, more reliable and safer to get North Carolina goods to market, worldwide. This includes existing infrastructure needs for relieving traffic congestion and increasing capacity to keep people and freight moving with minimal delays.

The second view focuses on specific economic sectors – with job creation in mind. It emphasizes sectors that resonate with the regions and the state – sectors that can exploit North Carolina's comparative strengths – strengths that exist because of its location, natural resources, human resources, or other assets. A number of sectors are logical to emphasize; among them: agriculture, military support, aerospace, transportation and distribution, manufacturing, health and wellness (biomedical, pharmaceutical, and rehabilitation), and tourism. These seven business sectors are graphically presented in Figure 6-1.

These sectors depict a subset of important themes that resonated across many regions of the state and are clearly important sectors for the state in helping identify infrastructure needs that can make a difference in the future economic success of the state.

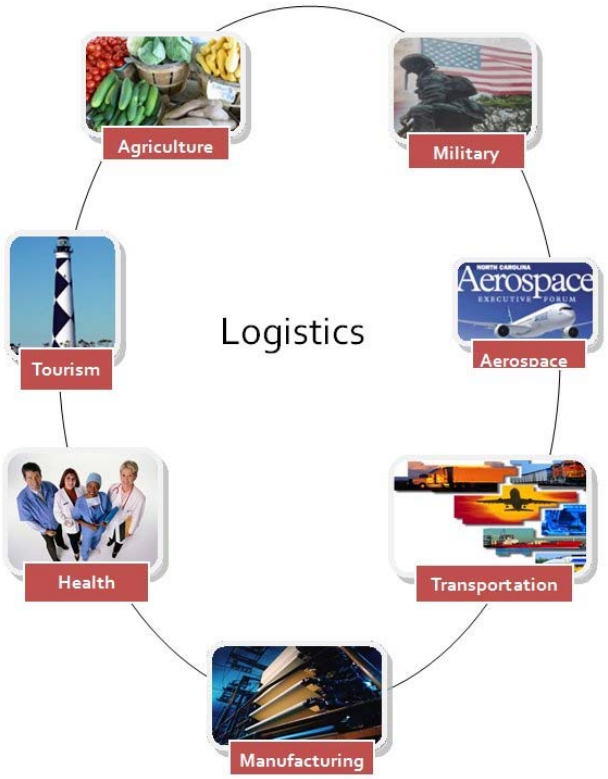

Figure 6-1: **Relationship of Business Sectors to Logistics**

While not explicitly shown, the excellent university and community college systems in NC certainly support all economic sectors by providing degrees, trades, and information exchange important for business to remain strong throughout the state. High quality education and information exchange is vital for continued business prosperity.

In focusing on these sectors, the report takes into account the world economy and the role that North Carolina is poised to play – especially its niche markets. The ideas are consistent with the growth in the Chinese and Indian markets, the expansion of the Panama Canal, the trend toward use of ever larger container ships, the competition for import and export trade among the east (and west coast) ports, the growing economies of Brazil, Argentina and other countries in Central and South America, etc. It recognizes trends like: the most significant categories of North Carolina exports by dollar value are industrial machinery, pharmaceutical products, electrical machinery, aircraft parts, and

optical and surgical equipment. On the rise are pharmaceutical products and aircraft parts. Machinery is on the decline. It also recognizes the contrast between the ranking of economic sectors in terms of gross state product – where agriculture, military support, and tourism are major enterprises. A few comments follow on each of the sectors.

Agriculture – The state is blessed with soil and climate that naturally supports agricultural production throughout the entire state. As the largest industry, agricultural land needs to be preserved and infrastructure must be maintained, and in some cases enhanced, that supports the movement of goods throughout the state and to the ports for export to foreign countries. People need to eat, and North Carolina is well-positioned to help feed populations both within the state, the region, and abroad—South America, Europe and Asia. Agricultural land also supports the military by providing low population densities in areas where the military needs to conduct air and ground training exercises. If population densities were to significantly increase around our growing military bases, the military could decide to leave for another state. Because agricultural activities occur across the entire state, it could be helpful to create a study team to look at what products are being produced, marketed, shipped, and exported and if any infrastructure or other organizational needs exist that could improve efficiencies in moving these products. Agricultural products are often time sensitive, load sensitive, and transport cost sensitive.

Military Support – the state is currently a benefactor of the BRAC activities, with significant expansion at most bases in North Carolina. Military personnel represent about 9% of the state workforce and generate $19.7 Billion in output. With this growth comes the need to ensure our highway and rail infrastructure can support military activities, especially maritime activities at Sunny Point (MOTSU), and residential and retail growth near the bases. The state should identify ways that can sustain military operations through land conservation to support military exercises in low population density areas.

Aerospace – the state is aggressively positioning itself as a strong supporter of companies engaged in manufacturing within the aviation industry. Honda Jet, Spirit AeroSystems, MX Aircraft, and GE Engines are but a few examples. There is an emerging commercial market in unmanned aircraft systems (e.g., UAS Dynamics) that the state could take advantage of, both for manufacturing and research. Activity here is primarily related to highway and rail infrastructure needs to support parts shipping, with air cargo playing a minor role in overall operations.

Transportation and Distribution – the existing movement of freight within and through the state predominately follows the Piedmont Crescent from Wilmington to Charlotte. There is a need to improve highway and rail access to the Port of Morehead City via US 70 and to the Port of Wilmington via US 74 (future I-74) from Charlotte. I-40 from Winston-Salem to Asheville and on to Knoxville, TN is also an important trucking corridor. I-26, I-77, and I-95 are also important North/South trucking corridors. Major logistics distribution centers and supporting activity naturally cluster in larger population centers where the demand for products and services is higher. Large tracts of land in and near our major cities should receive close scrutiny for possible zoning or other restrictions that can ensure the land is available when the demand is generated to use that space. Further, congestion and bottlenecks along these major freight corridors (both highway and rail) can be reduced through capacity improvements like additional travel lanes for freeways and parallel tracks for railroads.

Manufacturing – while this industry is in decline overall in the state, it still remains a major industry. In addition, the state's climate and skilled labor pool are attractive to newer industries, like aerospace, and other high-value merchandise. There also appears to be a shift into more vehicle parts manufacturing, biomedical manufacturing, and the production of agriculture-related machinery and other products. Also, post production of raw agricultural products (including beef, pork and poultry) are likely to increase as the world's population continues growing and demanding food products.

Health and Wellness – this is a sector where growth is happening now. The state has well-established hospitals, rehabilitation facilities, medical and veterinary schools, and medical research facilities. A complimentary sector is high-valued pharmaceuticals, shipped by air to any place in the world. The triangle region is the world's leading producer of vaccine serums. Air cargo support and congestion-free trucking for timely pick-up and delivery are vital for these companies to remain in the state.

Tourism – each region has unique tourist attractions that support this large economic engine for the state. The needs of travelers primarily include highway and air access, plus some passenger rail services. International travelers are increasingly coming to North Carolina for the natural beauty found from the outer banks to the mountains. The film industry places North Carolina in the top 10 destinations for film, television, and commercial productions. And Harrah's Casino, managed by the Eastern Band of the Cherokee Indians, is a major economic engine that could trigger further growth and expansion of tourism in that region. It is important now and into the future to look for any needs in highway, air, rail, and ferry services that would improve travel conditions for this vital industry.

The main findings from the individual regional studies along with an assessment of statewide logistics issues are that:

- The state has to partner with the private sector in this initiative. Its *supply-push* investments need to be linked to *demand-pull* initiatives undertaken by the business sector.[108]
- The state needs to partner with organizations like the regional partnerships and the Eastern Band of the Cherokee Indians to work locally with business to transform commerce ideas into reality.
- These organizations also need to partner with one another – and with their neighboring states where appropriate – assisted by state-level leadership – to achieve the greatest common good.
- Economic sectors around which the infrastructure investments can be focused include: agriculture, military support, aerospace, transportation and logistics, manufacturing, health and wellness (biomedical, pharmaceutical, and rehabilitation), and tourism.
- The inter-dependencies among these sectors need to be recognized and supported. A good example is the tight connection between agricultural activity and military support.

[108] This includes the military activities in the state and other Federal initiatives.

- Land conservation and zoning measures should complement business activity, such as preserving agriculture land near military bases and over fly zones and restricted zoning for both land use compatibility and height issues surrounding airports.
- High quality higher education and information outreach is critical for continued business prosperity and growth in many areas, e.g., biotechnology, gaming, and healthcare.
- International portals can help tie the state to the world. This includes ocean-side ports as well as inland ports – locations where goods can pass through US Customs. Via these portals, North Carolina can engage more directly in international commerce.[109]
- A portal in every economic development region is a somewhat bold move; but it would tie every local North Carolina doorstep more closely to the world economy. It would be the 21st century equivalent of building the farm-to-market roads. To make this happen, partnering with US Customs, the US Department of Agriculture, and possibly other federal agencies would be critically important. Some portals might be large; some small; and they could have varied scopes and purposes that reflect regional identities. Connectivity is the key.
- Such portals already exist in some of the regions, like Wilmington (port and ILM), Morehead City (port), RTP (and RDU), Charlotte (and CLT), and Greensboro (and PTI). Other places that could be considered include GTP, Asheville (and AVL), the I-95/US-70 vicinity (e.g., Selma/Smithfield), and the I-95/US-74 vicinity (e.g., Lumberton/Maxton). This list is not exhaustive. The regional reports describe more than 30 sites. Two regions lack portals: North Carolina's Northeast and Advantage West.
- Increased support for domestic transportation and distribution is also important. The state is in a natural location to play a prominent role in logistics along the eastern seaboard. Determining future demands for highway, rail, and water commerce—intrastate and interstate—will identify gaps in existing infrastructure where investments now will facilitate goods movements later.
- Both *transportation and land use* need to be planned. After careful environmental analysis, rights-of-way need to be set-aside for future network growth. And those choices then need to have staying power, so the facilities can eventually be built. The state also needs to engage in strategic land use partnerships with the counties and local governments.
- The state needs to make investments that help businesses grow, without over investing. It needs to invest where its dollars can make the biggest difference; and where private sector dollars are relatively scarce and need to be attracted to help the local economy grow faster. For example, investments in the Andrews/Murphy area, made in partnership with the Eastern Band of the Cherokee Indians, have the potential to be a game-changer for that part of the state.
- The state needs to take incremental steps by advancing supply-push initiatives to sensible milestones – while not expending scarce public funds to create underutilized facilities. At the same time, businesses must be engaged to use new infrastructure in support of their needs (demand-pull).

[109] Related to this is the activation/re-activation of foreign trade zones like the one at Morehead City. These could be linked to the portals, like linking Morehead City to Global TransPark.

- North Carolina should become the "best wired" state in the nation. This would attract businesses that are IT-intensive (and typically high-valued products and jobs). The service should be ubiquitous, wired and wireless. Businesses could manage their day-to-day activities anytime, anywhere, seamlessly.
- The state should arrange for more and better competitive rail service. It should make more extensive use of the North Carolina Railroad (NCRR). NCRR could help build statewide rail service that provides greater accessibility, higher capacity, better competitive rates, shorter lengths of haul, and more frequent service. The state should grow the network of short lines, play a greater role in rail network planning and service provision, freight and passenger, and work with the Class 1 railroads to find win-win solutions.[110] Rail improvements would support both intrastate and interstate commerce and passenger travel, and these demands should be known prior to new investments.
- The state should invest in its ports. The reason is more related to exports than imports. North Carolina can capitalize on its agricultural and other natural assets and help the US with its balance of trade challenges.

In summary, North Carolina is in prime position to take advantage of its east coast location and current political climate to create a vision for the future where logistics is and must be an integral part of future economic prosperity.

[110] See, for example, the letter of April 12, 2011 from Secretary Conti to Chairman Elliot of the Surface Transportation Board related to Ex Parte 705.

Appendix A

Table A-1: North Carolina Runways

	City	County	Facility Name	Location ID	Runway ID	Runway Length	Runway Width
1	AHOSKIE	HERTFORD	TRI-COUNTY	ASJ	'01/19	4502	75
2	ALBEMARLE	STANLY	STANLY COUNTY	VUJ	'04R/22L	5500	100
					'04L/22R	3500	75
3	ANDREWS	CHEROKEE	WESTERN CAROLINA RGNL	RHP	'08/26	5500	100
4	ASHEBORO	RANDOLPH	ASHEBORO RGNL	HBI	'03/21	5501	100
5	ASHEVILLE	BUNCOMBE	ASHEVILLE RGNL	AVL	'16/34	8001	150
6	BEAUFORT	CARTERET	MICHAEL J. SMITH FIELD	MRH	'08/26	4249	100
					'03/21	4191	150
					'14/32	4001	100
7	BURLINGTON	ALAMANCE	BURLINGTON-ALAMANCE RGNL	BUY	'06/24	4999	99
8	CHAPEL HILL	ORANGE	HORACE WILLIAMS	IGX	'09/27	4005	75
9	CHARLOTTE	MECKLENBURG	CHARLOTTE/DOUGLAS INTL	CLT	'18C/36C	10000	150
					'18R/36L	9000	150
					'18L/36R	8676	150
					'05/23	7502	150
10	CLINTON	SAMPSON	CLINTON-SAMPSON COUNTY	CTZ	'06/24	5000	75
11	CONCORD	CABARRUS	CONCORD RGNL	JQF	'02/20	7400	100
12	CURRITUCK	CURRITUCK	CURRITUCK COUNTY RGNL	ONX	'05/23	5500	150
13	EDENTON	CHOWAN	NORTHEASTERN RGNL	EDE	'01/19	6000	100
14	ELIZABETH CITY	PASQUOTANK	ELIZABETH CITY CG AIR STATION/RGNL	ECG	'10/28	7219	150
					'01/19	4518	150
15	ELIZABETHTOWN	BLADEN	CURTIS L BROWN JR FIELD	EYF	'15/33	4998	75
16	ELKIN	SURRY	ELKIN MUNI	ZEF		.	
17	ENGELHARD	HYDE	HYDE COUNTY	7W6	'11/29	4700	100
18	ERWIN	HARNETT	HARNETT RGNL JETPORT	HRJ	'05/23	5000	75
19	FAYETTEVILLE	CUMBERLAND	FAYETTEVILLE RGNL/GRANNIS FIELD	FAY	'04/22	7709	150
					'10/28	4801	150
20	FRANKLIN	MACON	MACON COUNTY	1A5	'07/25	4400	75
21	GASTONIA	GASTON	GASTONIA MUNI	AKH	'03/21	3770	100
22	GOLDSBORO	WAYNE	GOLDSBORO-WAYNE MUNI	GWW	'05/23	5499	99
23	GREENSBORO	GUILFORD	PIEDMONT TRIAD INTL	GSO	'05R/23L	10001	150
					'05L/23R	9000	150
					'14/32	6380	150
24	GREENVILLE	PITT	PITT-GREENVILLE	PGV	'02/20	6505	150
					'08/26	4997	150
					'15/33	2687	150
25	HATTERAS	DARE	BILLY MITCHELL	HSE	'07/25	3000	75
26	HICKORY	CATAWBA	HICKORY RGNL	HKY	'06/24	6400	150
					'01/19	4400	150
27	JACKSONVILLE	ONSLOW	ALBERT J ELLIS	OAJ	'05/23	7100	150
28	JEFFERSON	ASHE	ASHE COUNTY	GEV	'10/28	4293	75
29	KENANSVILLE	DUPLIN	DUPLIN CO	DPL	'05/23	6002	75
30	KILL DEVIL HILLS	DARE	FIRST FLIGHT	FFA		.	
31	KINSTON	LENOIR	KINSTON RGNL JETPORT AT STALLINGS FLD	ISO	'05/23	11500	150
32	LEXINGTON	DAVIDSON	DAVIDSON COUNTY	EXX	'06/24	5004	99
33	LINCOLNTON	LINCOLN	LINCOLNTON-LINCOLN COUNTY RGNL	IPJ	'05/23	5500	100
34	LOUISBURG	FRANKLIN	TRIANGLE NORTH EXECUTIVE	LHZ	'05/23	5498	100
35	LUMBERTON	ROBESON	LUMBERTON MUNI	LBT	'05/23	5502	150
					'13/31	5003	150
36	MANTEO	DARE	DARE COUNTY RGNL	MQI	'05/23	4305	100
					'17/35	3301	73
37	MAXTON	SCOTLAND	LAURINBURG-MAXTON	MEB	'05/23	6503	150
					'13/31	3753	150
38	MONROE	UNION	CHARLOTTE-MONROE EXECUTIVE	EQY	'05/23	5500	100
39	MORGANTON	CALDWELL	FOOTHILLS REGIONAL	MRN	'03/21	5500	75
40	MOUNT AIRY	SURRY	MOUNT AIRY/SURRY COUNTY	MWK	'18/36	4301	75
41	MOUNT OLIVE	WAYNE	MOUNT OLIVE MUNI	W40	'05/23	5255	75
42	NEW BERN	CRAVEN	COASTAL CAROLINA REGIONAL	EWN	'04/22	6004	150
					'14/32	4000	150
43	NORTH WILKESBORO	WILKES	WILKES COUNTY	UKF	'01/19	6200	100
44	OAK ISLAND	BRUNSWICK	CAPE FEAR RGNL JETPORT/HOWIE FRANKLIN FLD	SUT	'05/23	5505	100
45	OCEAN ISLE BEACH	BRUNSWICK	ODELL WILLIAMSON MUNI	60J	'06/24	4000	75
46	OCRACOKE	HYDE	OCRACOKE ISLAND	W95	'06/24	2999	60
					'H1	100	100
47	OXFORD	GRANVILLE	HENDERSON-OXFORD	HNZ	'06/24	5002	97
48	PINEHURST/SOUTHER	MOORE	MOORE COUNTY	SOP	'05/23	5503	150
49	PLYMOUTH	WASHINGTON	PLYMOUTH MUNI	PMZ	'03/21	5500	75
50	RALEIGH/DURHAM	WAKE	RALEIGH-DURHAM INTL	RDU	'05L/23R	10000	150
					'05R/23L	7500	150
					'14/32	3570	100
51	REIDSVILLE	ROCKINGHAM	ROCKINGHAM COUNTY NC SHILOH	SIF	'13/31	5199	100
52	ROANOKE RAPIDS	HALIFAX	HALIFAX COUNTY	RZZ	'05/23	4006	75
					'16/34	2100	150
53	ROANOKE RAPIDS				'02/20	5500	100
54	ROCKINGHAM	RICHMOND	RICHMOND COUNTY	RCZ	'14/32	5000	100
					'04/22	3009	500
55	ROCKY MOUNT	NASH	ROCKY MOUNT-WILSON RGNL	RWI	'04/22	7100	150
56	ROXBORO	PERSON	PERSON COUNTY	TDF	'06/24	6005	100
57	RUTHERFORDTON	RUTHERFORD	RUTHERFORD CO - MARCHMAN FIELD	FQD	'01/19	5000	100
58	SALISBURY	ROWAN	ROWAN COUNTY	RUQ	'02/20	5501	100
59	SANFORD	LEE	RALEIGH EXEC JETPORT AT SANFORD-LEE COUNTY	TTA		.	
60	SHELBY	CLEVELAND	SHELBY-CLEVELAND COUNTY RGNL	EHO	'05/23	5002	100
61	SILER CITY	CHATHAM	SILER CITY MUNI	5W8	'04/22	5000	75
62	SMITHFIELD	JOHNSTON	JOHNSTON COUNTY	JNX	'03/21	5500	100
63	SPRUCE PINE	AVERY	AVERY COUNTY/MORRISON FIELD/	7A8	'17/35	3000	60
64	STAR	MONTGOMERY	MONTGOMERY COUNTY	43A	'03/21	4001	75
65	STATESVILLE	IREDELL	STATESVILLE RGNL	SVH	'10/28	7006	100
66	SYLVA	JACKSON	JACKSON COUNTY	24A	'15/33	3003	50
67	TARBORO	EDGECOMBE	TARBORO-EDGECOMBE	ETC	'09/27	4000	60
68	WADESBORO	ANSON	ANSON COUNTY - JEFF CLOUD FIELD	AFP	'16/34	5498	100
69	WALLACE	PENDER	HENDERSON FIELD	ACZ	'09/27	3998	75
70	WASHINGTON	BEAUFORT	WARREN FIELD	OCW	'05/23	5000	100
					'17/35	5000	150
					'11/29	4000	150
71	WHITEVILLE	COLUMBUS	COLUMBUS COUNTY MUNI	CPC	'06/24	5500	75
72	WILLIAMSTON	MARTIN	MARTIN COUNTY	MCZ	'03/21	5000	75
73	WILMINGTON	NEW HANOVER	WILMINGTON INTL	ILM	'06/24	8016	150
					'17/35	7004	150
74	WILSON	WILSON	WILSON INDUSTRIAL AIR CENTER	W03	'03/21	4500	150
					'09/27	4500	150
					'15/33	4499	150
75	WINSTON SALEM	FORSYTH	SMITH REYNOLDS	INT	'15/33	6655	150
					'04/22	3938	150

Table A-2: Aircraft Operations at North Carolina Airports

Obs	City	County	Facility Name	Location ID	Owner	Distance From CBD	Direction From CBD	Airport Land Area	Single Engine GA	Multi-Engine GA	Jet Engine GA	Military Operational	Operations Commercial	Operations Air Taxi	Operations G A Local	Operations GA Itin	Operations Military	Total Operations	Proportion GA Itinerant
1	AHOSKIE	HERTFORD	TRI-COUNTY	ASJ	TRI-COUNTY AIRPORT AUTH.	9	W	250	8	0	1	.	.	200	6,000	6,800	100	13,100	53.1%
2	ALBEMARLE	STANLY	STANLY COUNTY	VUJ	STANLY COUNTY	4	NE	800	16	2	0	.	.	-	11,506	1,974	6,350	19,830	14.6%
3	ANDREWS	CHEROKEE	WESTERN CAROLINA RGNL	RHP	CHEROKEE COUNTY	2	W	206	47	20	0	.	.	1,000	14,000	5,000	500	20,500	26.3%
4	ASHEBORO	RANDOLPH	ASHEBORO RGNL	HBI	CITY OF ASHEBORO	6	SW	454	35	9	1	.	.	-	8,000	7,000	500	15,500	46.7%
5	ASHEVILLE	BUNCOMBE	ASHEVILLE RGNL	AVL	CITY OF ASHEVILLE	9	S	900	80	28	10	.	588	18,032	16,776	28,275	4,117	67,788	62.8%
6	BEAUFORT	CARTERET	MICHAEL J. SMITH FIELD	MRH	BEAUFORT-MOREHEAD ARPT AUTH	1	N	412	52	9	1	.	.	3,728	33,549	3,728	2,795	43,800	10.0%
7	BURLINGTON	ALAMANCE	BURLINGTON-ALAMANCE RGNL	BUY	BURLINGTON-ALAMANCE AIRPORT AUTHORI	3	SW	500	99	18	5	.	.	1,000	26,000	23,000	450	50,450	46.9%
8	CHAPEL HILL	ORANGE	HORACE WILLIAMS	IGX	UNIVERSITY OF N CAROLINA	1	N	420	20	7	.	.	.	100	4,000	1,500	100	5,700	27.3%
9	CHARLOTTE	MECKLENBURG	CHARLOTTE/DOUGLAS INTL	CLT	CITY OF CHARLOTTE	4	W	5000	12	9	55	10	320,462	179,048	.	24,170	1,804	525,484	100.0%
10	CLINTON	SAMPSON	CLINTON-SAMPSON COUNTY	CTZ	SAMPSON COUNTY/CITY OF CLINTON	2	SW	114	24	1	2	.	.	100	4,000	500	600	5,200	11.1%
11	CONCORD	CABARRUS	CONCORD RGNL	JQF	CITY OF CONCORD	7	W	750	110	35	28	.	259	9,919	13,723	44,282	359	68,542	76.3%
12	CURRITUCK	CURRITUCK	CURRITUCK COUNTY RGNL	ONX	COUNTY OF CURRITUCK	4	S	250	23	4	0	.	.	500	3,500	14,000	7,000	25,000	80.0%
13	EDENTON	CHOWAN	NORTHEASTERN RGNL	EDE	TOWN OF EDENTON	3	SE	734	30	3	0	.	.	500	6,000	7,000	300	13,800	53.8%
14	ELIZABETH CITY	PASQUOTANK	ELIZABETH CITY CG AIR STATION/RGNL	ECG	USCG SUPPORT CENTER	3	SE	850	24	4	0	13	.	620	6,500	9,000	44,000	60,120	58.1%
15	ELIZABETHTOWN	BLADEN	CURTIS L BROWN JR FIELD	EYF	TOWN OF ELIZABETHTOWN	2	SE	212	10	2	0	.	.	.	5,000	9,000	500	14,500	64.3%
16	ELKIN	SURRY	ELKIN MUNI	ZEF	TOWN OF ELKIN	3	NE	91	15	2	0	.	.	.	7,000	6,000	350	13,350	46.2%
17	ENGELHARD	HYDE	HYDE COUNTY	7W6	HYDE COUNTY	7	N	387	0	0	0	.	.	50	1,000	2,500	500	4,050	71.4%
18	ERWIN	HARNETT	HARNETT RGNL JETPORT	HRJ	HARNETT COUNTY	4	NW	152	32	5	2	.	.	300	30,000	14,000	7,000	51,300	31.8%
19	FAYETTEVILLE	CUMBERLAND	FAYETTEVILLE RGNL/GRANNIS FIELD	FAY	CITY OF FAYETTEVILLE	3	S	1308	39	10	6	.	8,871	9,412	1,415	13,269	5,855	38,822	90.4%
20	FRANKLIN	MACON	MACON COUNTY	1A5	MACON COUNTY AIRPORT AUTHORITY	3	NW	90	24	5	0	.	.	500	4,000	4,000	500	9,000	50.0%
21	GASTONIA	GASTON	GASTONIA MUNI	AKH	CITY OF GASTONIA	4	S	280	28	4	2	.	.	1,000	40,000	9,000	40	50,040	18.4%
22	GOLDSBORO	WAYNE	GOLDSBORO-WAYNE MUNI	GWW	CITY OF GOLDSBORO & WAYNE CO	3	N	249	34	4	2	.	.	2,000	6,500	6,700	1,000	16,200	50.8%
23	GREENSBORO	GUILFORD	PIEDMONT TRIAD INTL	GSO	PIEDMONT TRIAD ARPT AUTH.	7	W	2800	56	28	12	.	14,065	36,220	4,528	27,967	1,501	84,281	86.1%
24	GREENVILLE	PITT	PITT-GREENVILLE	PGV	PITT CO & GREENVILLE CITY	2	N	872	46	6	6	.	2,719	12,500	16,500	16,000	500	48,219	49.2%
25	HATTERAS	DARE	BILLY MITCHELL	HSE	NATIONAL PARK SERVICE	4	E	100	0	0	0	.	.	100	4,000	5,000	100	9,200	55.6%
26	HICKORY	CATAWBA	HICKORY RGNL	HKY	CITY OF HICKORY	3	W	739	45	18	7	.	-	.	12,280	27,766	458	40,504	69.3%
27	JACKSONVILLE	ONSLOW	ALBERT J ELLIS	OAJ	ONSLOW COUNTY	10	NW	675	17	4	.	.	7,920	2,200	11,000	8,800	6,900	36,820	44.4%
28	JEFFERSON	ASHE	ASHE COUNTY	GEV	ASHE COUNTY	3	E	106	22	0	0	.	.	.	3,900	6,000	500	10,400	60.6%
29	KENANSVILLE	DUPLIN	DUPLIN CO	DPL	DUPLIN COUNTY	2	NW	250	12	2	3	.	.	-	5,500	9,000	3,000	17,500	62.1%
30	KILL DEVIL HILLS	DARE	FIRST FLIGHT	FFA	NATIONAL PARK SERVICE	1	W	40	0	0	0	.	.	1,000	23,000	14,000	120	38,120	37.8%
31	KINSTON	LENOIR	KINSTON RGNL JETPORT AT STALLINGS FLD	ISO	NORTH CAROLINA	3	NW	1255	28	6	10	.	257	1,192	4,812	9,658	13,433	29,352	66.7%
32	LEXINGTON	DAVIDSON	DAVIDSON COUNTY	EXX	DAVIDSON COUNTY ARPT AUTH	3	SW	75	44	11	2	.	.	500	5,000	3,000	500	9,000	37.5%
33	LINCOLNTON	LINCOLN	LINCOLNTON-LINCOLN COUNTY RGNL	IPJ	CITY OF LINCOLNTON & LINCOLN	5	E	453	65	7	0	.	.	-	15,300	17,900	900	34,100	53.9%
34	LOUISBURG	FRANKLIN	TRIANGLE NORTH EXECUTIVE	LHZ	FRANKLIN COUNTY	5	SW	388	58	9	1	.	.	-	42,300	18,000	2,500	62,800	29.9%
35	LUMBERTON	ROBESON	LUMBERTON MUNI	LBT	CITY OF LUMBERTON	3	W	485	36	3	0	.	.	1,000	10,000	12,000	2,000	25,000	54.5%
36	MANTEO	DARE	DARE COUNTY RGNL	MQI	DARE COUNTY	1	NW	340	41	5	0	.	.	6,000	6,000	9,000	500	21,500	60.0%
37	MAXTON	SCOTLAND	LAURINBURG-MAXTON	MEB	TOWN OF LAURINBURG & MAXTON	3	N	4290	13	0	0	.	.	5,000	8,000	10,000	20,000	43,000	55.6%
38	MONROE	UNION	CHARLOTTE-MONROE EXECUTIVE	EQY	CITY OF MONROE	5	NW	206	71	10	3	.	.	4,100	30,500	20,500	1,000	56,100	40.2%
39	MORGANTON	CALDWELL	FOOTHILLS REGIONAL	MRN	FOOTHILLS REGIONAL AIRPORT AUTHORIT	6	NE	1170	56	5	1	.	.	1,000	9,000	6,500	500	17,000	41.9%
40	MOUNT AIRY	SURRY	MOUNT AIRY/SURRY COUNTY	MWK	CITY OF MOUNT AIRY & SURRY COUNTY	3	SE	147	33	3	3	.	.	1,000	9,000	7,000	200	17,200	43.8%
41	MOUNT OLIVE	WAYNE	MOUNT OLIVE MUNI	W40	TOWN OF MT OLIVE AND WAYNE COUNTY	3	NE	108	10	1	0	.	.	.	10,000	4,500	50	14,550	31.0%
42	NEW BERN	CRAVEN	COASTAL CAROLINA REGIONAL	EWN	CRAVEN COUNTY	3	SE	785	75	2	2	.	4,000	4,642	12,078	817	21,536	43,073	6.3%
43	NORTH WILKESBORO	WILKES	WILKES COUNTY	UKF	WILKES COUNTY	4	NE	259	21	3	6	.	.	2,000	4,000	2,000	100	8,100	33.3%
44	OAK ISLAND	BRUNSWICK	CAPE FEAR RGNL JETPORT/HOWIE FRANKLIN FLD	SUT	BRUNSWICK CO ARPT COMMISSION	1	NE	185	47	2	0	.	.	-	30,000	44,000	3,000	77,000	59.5%
45	OCEAN ISLE BEACH	BRUNSWICK	ODELL WILLIAMSON MUNI	60J	TOWN OF OCEAN ISLE BEACH	1	N	30	10	0	0	.	.	.	10,000	8,000	.	18,000	44.4%
46	OCRACOKE	HYDE	OCRACOKE ISLAND	W95	NATIONAL PARK SERVICE	1	E	50	0	0	0	.	.	100	3,000	3,000	10	6,110	50.0%
47	OXFORD	GRANVILLE	HENDERSON-OXFORD	HNZ	OXFORD-HENDERSON ARPT AUTH	4	NE	220	38	7	0	.	.	120	10,800	13,200	1,200	25,320	55.0%
48	PINEHURST/SOUTHER	MOORE	MOORE COUNTY	SOP	COUNTY OF MOORE	3	N	500	60	7	2	.	.	854	2,300	5,300	100	8,554	69.7%
49	PLYMOUTH	WASHINGTON	PLYMOUTH MUNI	PMZ	WASHINGTON COUNTY	2	S	390	10	2	0	.	.	275	6,000	3,000	2,000	11,275	33.3%
50	RALEIGH/DURHAM	WAKE	RALEIGH-DURHAM INTL	RDU	RALEIGH-DURHAM ARPT AUTH	9	NW	5000	104	37	40	17	45,793	44,290	18	26,120	2,646	118,867	99.9%
51	REIDSVILLE	ROCKINGHAM	ROCKINGHAM COUNTY NC SHILOH	SIF	ROCKINGHAM COUNTY	8	NW	220	45	6	0	.	.	-	15,000	9,000	100	24,100	37.5%
52	ROANOKE RAPIDS	HALIFAX	HALIFAX COUNTY	RZZ	CITY OF ROANOKE RAPIDS	3	SW	281	23	1	0	.	.	2,300	13,000	15,000	1,200	31,500	53.6%
53	ROANOKE RAPIDS	HALIFAX	HALIFAX-NORTHAMPTON RGNL	IXA	HALIFAX-NORTHAMPTON RGNL ARPT AUTH	8	S	797	17	1	.	.	.	.	1,200	1,400	300	2,900	53.8%
54	ROCKINGHAM	RICHMOND	RICHMOND COUNTY	RCZ	RICHMOND COUNTY	3	S	340	10	1	0	.	.	-	5,000	5,000	60	10,060	50.0%
55	ROCKY MOUNT	NASH	ROCKY MOUNT-WILSON RGNL	RWI	ROCKY MOUNT-WILSON ARPT AUTH	7	SW	364	10	4	1	.	112	1,276	8,521	19,302	621	29,832	69.4%
56	ROXBORO	PERSON	PERSON COUNTY	TDF	PERSON COUNTY	6	S	218	28	6	0	.	.	550	15,000	18,000	1,200	34,750	54.5%
57	RUTHERFORDTON	RUTHERFORD	RUTHERFORD CO - MARCHMAN FIELD	FQD	RUTHERFORD COUNTY ARPT AUTH	3	N	140	45	7	3	.	.	-	25,000	8,000	500	33,500	24.2%
58	SALISBURY	ROWAN	ROWAN COUNTY	RUQ	ROWAN COUNTY	3	SW	400	66	10	4	10	.	1,000	16,000	22,100	3,900	43,000	58.0%
59	SANFORD	LEE	RALEIGH EXEC JETPORT AT SANFORD-LEE COUNTY	TTA	SANFORD-LEE COUNTY RGNL ARPT AUTH	7	NE	700	94	12	4	.	.	2,000	48,000	12,000	1,000	63,000	20.0%
60	SHELBY	CLEVELAND	SHELBY-CLEVELAND COUNTY RGNL	EHO	CITY OF SHELBY	3	SW	225	27	4	0	.	.	-	10,000	8,000	200	18,200	44.4%
61	SILER CITY	CHATHAM	SILER CITY MUNI	5W8	TOWN OF SILER CITY	3	SW	92	19	5	0	.	.	.	4,000	16,500	1,000	21,500	80.5%
62	SMITHFIELD	JOHNSTON	JOHNSTON COUNTY	JNX	JOHNSTON CO ARPT AUTH	3	NW	463	82	9	3	.	.	-	40,350	32,000	1,000	73,350	44.2%
63	SPRUCE PINE	AVERY	AVERY COUNTY/MORRISON FIELD/	7A8	AVERY COUNTY ARPT AUTHORITY	4	NE	32	23	2	0	.	.	.	2,000	3,000	1,000	6,000	60.0%
64	STAR	MONTGOMERY	MONTGOMERY COUNTY	43A	MONTGOMERY COUNTY	0	NE	65	11	5	0	.	.	.	1,300	1,500	2,000	4,800	53.6%
65	STATESVILLE	IREDELL	STATESVILLE RGNL	SVH	CITY OF STATESVILLE	3	SW	382	28	13	26	.	.	1,000	19,000	16,000	200	36,200	45.7%
66	SYLVA	JACKSON	JACKSON COUNTY	24A	JACKSON CO ARPT AUTHORITY	3	SE	147	13	0	0	.	.	150	1,600	2,500	400	4,650	61.0%
67	TARBORO	EDGECOMBE	TARBORO-EDGECOMBE	ETC	TARBORO-EDGECOMBE ARPT AUTH	2	N	86	4	1	0	.	.	800	2,000	2,000	500	5,300	50.0%
68	WADESBORO	ANSON	ANSON COUNTY - JEFF CLOUD FIELD	AFP	ANSON COUNTY	3	N	286	20	2	0	.	.	-	2,500	4,000	200	6,700	61.5%
69	WALLACE	PENDER	HENDERSON FIELD	ACZ	TOWN OF WALLACE	1	SW	145	20	1	0	.	.	200	4,500	10,000	1,200	15,900	69.0%
70	WASHINGTON	BEAUFORT	WARREN FIELD	OCW	CITY OF WASHINGTON	0	NE	479	26	4	0	.	.	2,100	17,000	8,000	1,000	28,100	32.0%
71	WHITEVILLE	COLUMBUS	COLUMBUS COUNTY MUNI	CPC	COLUMBUS COUNTY	3	S	214	18	2	0	.	.	2,100	3,600	6,500	500	12,700	64.4%
72	WILLIAMSTON	MARTIN	MARTIN COUNTY	MCZ	COUNTY OF MARTIN	6	W	110	5	0	0	.	.	-	2,000	2,000	500	4,500	50.0%
73	WILMINGTON	NEW HANOVER	WILMINGTON INTL	ILM	NEW HANOVER COUNTY	3	NE	1800	82	41	10	.	6,317	17,016	5,155	27,351	5,561	61,400	84.1%
74	WILSON	WILSON	WILSON INDUSTRIAL AIR CENTER	W03	CITY OF WILSON	3	N	775	30	5	2	.	.	700	5,000	6,000	700	12,400	54.5%
75	WINSTON SALEM	FORSYTH	SMITH REYNOLDS	INT	FORSYTH COUNTY	3	NE	702	67	14	17	.	165	2,238	10,634	2,670	99	15,806	20.1%

Table A-3: North Carolina Air Passenger and Air Cargo Trends

Passengers handled by North Carolina Airports

	City Name	Code	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
1	Charlotte, NC	CLT	15,253,842	16,506,432	17,768,482	16,472,592	19,606,073	20,025,380	20,922,204	21,585,873	21,383,201	19,721,819	21,692,479	21,294,054	21,978,769	23,345,532	24,310,443	28,720,367	30,072,881	33,615,542	35,016,664	34,944,896
2	Raleigh/Durham, NC	RDU	9,491,208	9,304,722	9,512,452	9,072,349	8,002,563	5,906,306	5,979,724	6,314,564	6,888,208	8,343,121	9,813,998	9,137,566	7,976,300	7,911,379	8,707,213	9,512,997	9,564,266	10,120,396	9,693,156	8,974,715
3	Greensboro/High Point, NC	GSO	2,036,930	1,863,887	1,837,343	2,108,171	4,454,879	3,722,491	2,544,895	2,109,597	2,474,904	2,530,425	2,430,528	2,238,879	2,162,038	2,580,386	2,617,325	2,628,961	2,180,036	2,186,515	2,116,027	1,725,466
4	Wilmington, NC	ILM	264,186	240,226	246,710	276,792	346,895	345,605	362,576	385,147	387,444	367,000	410,206	378,120	388,911	415,599	534,217	679,623	622,743	782,011	797,643	797,194
5	Asheville, NC	AVL	276,916	325,828	315,917	357,133	505,627	444,266	391,190	416,988	418,424	355,466	432,768	416,080	404,028	445,714	482,186	630,244	577,834	582,128	564,837	586,126
6	Fayetteville, NC	FAY	273,234	294,842	268,988	296,728	338,815	310,930	320,294	301,149	273,060	245,696	236,924	137,016	155,672	242,591	248,781	306,505	311,182	353,189	403,440	463,951
7	Jacksonville/Camp Lejeune, NC	OAJ	107,850	134,871	107,586	97,950	126,027	66,780	44,743	51,726	51,237	39,915			19,744	88,077	93,026	191,361	180,122	243,403	262,387	251,238
8	New Bern/Morehead/Beaufort, NC	EWN	3,486	12,257											37,176	134,177	110,376	190,078	171,505	209,953	224,234	227,588
9	Greenville, NC	PGV	4,762	21,947								131	395	240	19,215	68,681	58,276	97,612	88,843	94,061	104,191	117,570
10	Cabarrus, NC	JQF																	253	4,177	11,413	14,509
11	Cherry Point, NC	NKT		1,624	1,100	334	347	1,785	6,993	867	146	486	721	803	1,604	3,107	9,194	10,743	5,346	5,800	8,353	10,586
12	Kinston, NC	ISO	35,820	40,949	14,559	130			262				272	4	142	3,315	6,018	48,605	46,098	29,993	17,583	10,544
13	Fayetteville, NC	POB	150	280	665	104	1,441	1,302	3,680	876	27,308	1,252	4,287	105	686	3,820	6,970	4,488	5,587	3,605	5,518	7,556
14	Winston-Salem, NC	INT				64		30			184	21	219	0	2,170	2,486	6,358	2,243	1,580	2,146	3,583	5,150
15	Hickory, NC	HKY								51			0	0	0	532	106	22,795	464	94		156
16	So.Pines/Pinhrst/Aberdeen, NC	SOP																7	5,469	8,539		68
17	Wadesboro, NC	AFP																				14
18	Morganton, NC	MRN																		2		
19	Rocky Mount, NC	RWI													72	1,168	73	0	152	565		
20	Roxboro, NC	TDF																				
21	Elizabeth City, NC	ECG																	150			
22	Edenton, NC	EDE																			8	
23	Statesville, NC	SVH																				
24	Albemarle, NC	VUJ																			12	
	TOTAL		27,748,384	28,747,865	30,073,802	28,682,347	33,382,667	30,824,875	30,576,561	31,166,838	31,904,116	31,605,332	35,022,797	33,602,867	33,146,527	35,246,564	37,190,562	43,046,629	43,834,511	48,242,119	49,229,049	48,137,327

Cargo handled by North Carolina Airports

	City Name	Code	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
1	Charlotte, NC	CLT	187,993,309	216,046,385	243,101,642	205,264,484	210,078,096	208,474,857	214,566,208	213,578,034	192,812,755	225,519,323	242,362,815	155,237,243	179,994,546	359,316,315	360,970,326	382,957,315	343,032,181	296,907,611	265,962,909	239,364,781
2	Raleigh/Durham, NC	RDU	81,466,620	79,140,333	88,091,992	84,617,033	81,922,327	57,537,181	51,693,791	51,833,413	49,091,633	49,030,343	53,795,233	38,968,421	78,050,518	223,030,236	233,928,394	224,111,345	228,894,032	225,426,539	210,028,354	183,788,408
3	Greensboro/High Point, NC	GSO	36,620,416	36,500,539	34,635,080	65,505,764	55,307,556	44,908,654	36,391,317	41,542,484	32,242,687	31,877,006	24,815,762	15,168,500	57,036,146	183,485,848	188,770,406	184,078,941	182,327,907	172,183,294	176,291,319	171,132,983
4	New Bern/Morehead/Beaufort, NC	EWN												2,994	875,598	3,588,217	3,836,257	3,875,235	4,167,018	4,124,550	4,117,404	4,257,430
5	Wilmington, NC	ILM	1,078,382	1,109,220	1,083,598	1,007,167	1,081,386	1,106,965	1,150,423	1,131,210	955,720	890,531	840,967	791,534	1,442,425	3,631,130	3,809,016	3,842,508	3,625,743	3,666,814	3,445,179	3,236,559
6	Cherry Point, NC	NKT		1,101,130					70,180			216,420			786,356		861,274	1,001,105	58,482	555,648	574,416	139,061
7	Asheville, NC	AVL	1,354,262	1,574,690	1,656,280	1,786,165	1,830,339	1,480,975	1,485,126	1,221,229	1,012,587	871,557	2,069,661	1,755,455	2,558,674	2,376,848	1,885,140	619,793	459,667	737,874	149,459	138,660
8	Rocky Mount, NC	RWI										1,023	1,142	48,341	3,932	13,530	2,155,593	180,897	1,047,923	1,849,613	158,715	134,949
9	Hickory, NC	HKY									46,967		27,862	7,783	2,782	2,532	28,614	20,760	49,695		40,630	81,039
10	Fayetteville, NC	FAY	1,476,756	1,583,545	2,108,222	2,545,298	2,344,636	2,298,327	1,940,150	1,834,896	1,371,496	773,705	623,499	286,153	93,111	306,892	117,590	150,400	98,499	109,371	216,304	46,609
11	Greenville, NC	PGV								301			462	13,897	19,505	84,837	68,664	115,840	63,918	75,701	40,649	34,349
12	Fayetteville, NC	POB						148,703	164,878		2,573	152,554	24,000	64,310	307,743	579,767	479,879	343,960	201,540	2,221,122	252,406	25,927
13	Kinston, NC	ISO	190,163	161,536	69,763							31,173			55,938	5,425	9,234	42,529	12,321	1	25,567	20,118
14	Jacksonville/Camp Lejeune, NC	OAJ	175,248	268,100	288,353	315,003	256,376	77,761	26,698	26,284	31,720	17,715			6,190	24,452	16,381	41,159	26,106	16,321	15,130	19,231
15	Morganton, NC	MRN														1,152	6,017	40,259	15,631	0	9,338	18,201
16	Roxboro, NC	TDF														19,676	158,324	54,314	45,440	11,093	16,037	9,480
17	Cabarrus, NC	JQF																7,000				
18	Winston-Salem, NC	INT				575							10,500			1,972	3,011	2,302				
19	So.Pines/Pinhrst/Aberdeen, NC	SOP													793,830	452	339		1	10		
20	Wadesboro, NC	AFP																				
21	Elizabeth City, NC	ECG																				
22	Edenton, NC	EDE																				
23	Statesville, NC	SVH															4,574	2,715	7,589			
24	Albemarle, NC	VUJ																				
	TOTAL		310,355,156	337,485,478	371,034,930	361,041,489	352,820,716	316,033,423	307,488,771	311,167,851	277,568,138	309,381,350	324,571,903	212,344,631	322,027,294	776,469,281	797,109,033	801,488,377	764,133,693	707,885,562	661,343,816	602,447,785


blank
page