2040 Plan

North Carolina Statewide Transportation Plan

Draft Report

CHALLENGES AND OPPORTUNITIES

June 2011

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State of North Carolina Department of Transportation

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Executive Summary

ES.1 Purpose of Report

This Challenges and Opportunities report is the first in a series of reports that documents the preparation of the North Carolina Department of Transportation's (NCDOT) update of its Statewide Transportation Plan (STP), the 2040 Plan. The purpose of this report is to create a context for the preparation of a 30-year plan for the delivery of transportation infrastructure and services in the state. The report defines baseline conditions in terms of both transportation systems and the social and economic forecasts that must drive transportation program delivery. It identifies a series of transportation challenges that the plan must address and the opportunities available for addressing those challenges.

This report also describes the overall context within which the study is being conducted. The key element of this framework is NCDOT's Transportation Reform process, which has sought to make its decision-making aspects more transparent and has also resulted in a clearly defined set of program delivery goals that will drive the updating of the 2040 Plan.

Two aspects of Transportation Reform will be instrumental to preparation of the 2040 Plan: NCDOT's embrace of a "Policy to Projects" planning and decision-making process, and the goals driving delivery of transportation systems and services in North Carolina.

The "Policy to Projects" consists of these continuously updated elements:

1. *North Carolina Statewide Long-Range Transportation Plan (STP)*. This plan is the long-range guide for transportation policy and programmatic delivery.
2. *Program and Resource Plan*. This is the NCDOT 10-year plan which establishes mid-term spending priorities to achieve long-range goals from the STP.
3. *Statewide Transportation Improvement Program (STIP)*. STIP lists the projects that will receive federal aid and are included in the Work Program and the Program & Resource Plan.
4. *Work Program*. A direct derivative of the Program and Resource Plan, the 5-Year Work Program identifies specific projects that will be undertaken by NCDOT over the following five years.

NCDOT's overall program delivery goals: making the state's network safer and more efficient in the movement of people and goods; making the infrastructure last longer; making NCDOT an organization that functions well and is a great place to work, form the foundation for the day-to-day operation of the Department. The first three are the reasons why NCDOT exists. The other two are supplemental goals that enable NCDOT to meet the primary goals. To place the 2040 Plan in the same goal-oriented environment, the plan should meet consistent study objectives shown below, that are consistent with the NCDOT's goals.

2040 Plan Study Objectives

Modal Effectiveness Goals

1. *Update estimates of modal needs* to reflect defensible performance standards.
2. *Expand the Strategic Highway Corridors concept to encompass a multimodal system*, based on criteria that can be traced to a confirmed set of performance goals, to provide a basis for defensible recommendations for investment strategies.
3. *Confirm that the NCMIN still reflects the state's overall development and sustainability goals*.

Financial Feasibility Goals

4. *Clearly define the gap between transportation needs and anticipated revenues.*
5. *Establish a set of long-term revenue strategies* that recognize the likely non-sustainability of the current transportation revenue structure.
6. *Establish a strong rationale for long-term transportation investment strategies* that reflect the state's goals for jobs, economic opportunities, and environmental and financial sustainability.

Program Delivery and Vision Goals

7. *Provide cost-effective, wide-ranging opportunities for public input* that recognize the interests of the general public, interested party stakeholders, and the Department's transportation partners (builders and providers of transportation systems).
8. *Establish a clear understanding of the long-term challenges and opportunities* facing the Department that will affect its ability to address the state's mobility, transportation choices, economic development, and reliability demands.
9. *Identify improvements to the Department's program delivery processes* to fully leverage relationships with its public and private partners.

ES.2 North Carolina Department of Transportation Transformation Process

The NCDOT's organizational environment, within which the 2040 Plan is being prepared, has evolved significantly since completion of the last major update of the STP in 2004. Driven by the Transportation Reform process, NCDOT is an organization driven by transparent decision-making based on clearly defined goals, performance measures, and project selection criteria. Investments and service delivery efforts are designed to optimize a strategic, multimodal network, are built on the concept of broad sustainability (of infrastructure, environment, and finances), and always with an eye to investing to maximize economic opportunities for state residents.

The four key elements of Transportation Reform described below will be reflected in the 2040 Plan.

- Pursuing the mission and five Departmental goals.
- Refining the North Carolina Multimodal Investment Network (NCMIN). The NCMIN stratifies modal systems (highways, passenger and freight rail, public transportation, aviation, ferries, and bicycle/pedestrian) into three tiers of decreasing statewide and increasing local importance: statewide, regional, and subregional.
- Applying multimodal levels of service to tie investment in respective modal tiers of the NCMIN to expected outcomes or performance. The NCDOT level of service grades are tied to the Department's main three investment categories: infrastructure health, mobility, and safety.
- Reporting of system performance using an Organizational Performance Dashboard. The dashboard reports performance of nearly three dozen elements of NCDOT's modal systems (such as pavement conditions, incident response, or passenger train on-time arrival) and tracks performance against defined standards.

ES.3 North Carolina Transportation System

In addition to operating the nation's largest state-maintained highway system, NCDOT also participates in the delivery of rail, aviation, ferries, public transportation, bicycle and pedestrian transportation services in partnership with public and private governments and providers.

Highways

The NCDOT is responsible for more than 79,000 miles of state operated roadways in North Carolina, 75 percent of the 105,000 miles of the state's public roadways. Notably, North Carolina is one of only nine states where counties own and maintain no roadways. The state is also one of 24 with no toll road mileage, although six projects totaling nearly 104 miles are currently under development; the 16-mile Triangle Expressway in Wake County is under construction and will open in late 2012.

The statewide tier of highways of the NCMIN, a key subset of the NCDOT-maintained highway system, has been labeled Strategic Highway Corridors. Their identification was a collaborative effort by NCDOT, the North Carolina Department of Commerce, and the North Carolina Department of Environment and Natural Resources. Consisting of 55 principal highways with an overall length of 6,510 miles, strategic corridors account for 7 percent of the state-maintained highway system yet they carry 45 percent of all state system traffic.

In addition to designation of the Strategic Highway Corridors and the NCMIN, two other recent steps taken by the state and NCDOT regarding highways are notable in the context of the 2040 Plan. First is the use of tolling as a funding source for new highway construction. With creation of the NC Turnpike Authority in 2004, this "user pays" concept of project financing allows payment of construction bonds with tolls collected from drivers of the toll roads, freeing gas tax revenue for other needed projects.

The other initiative reflects NCDOT's ongoing efforts to deploy a "sustainability blueprint" that recognizes NCDOT's role in ensuring the health and well-being of the state's residents and how transportation infrastructure investment can impact adjacent land use, community form, and multimodal opportunities. In adopting measures such as the Complete Streets Policy in 2009, the NC Board of Transportation recognized that "transportation, quality of life, and economic development are all undeniably connected through well-planned, well-designed, and context-sensitive transportation solutions."

Passenger Rail

Six intercity passenger trains operated by Amtrak currently serve cities in North Carolina. The NCDOT's Rail Division operates the trains operating between Raleigh and Charlotte. Ridership has climbed steadily in recent years, with a 39 percent increase from 2007 to just over 803,000 riders using North Carolina stations in 2010, an average of more than 2,600 passengers per day. As part of NCDOT's Southeast High-Speed Rail program, the Rail Division is currently upgrading the corridor between Raleigh and Charlotte to increase train speeds, reduce travel time, increase train frequency, and improve safety and reliability.

At a regional level, passenger rail is found in Charlotte, where the first light rail line opened in 2007. The 9.5-mile-long LYNX light rail service was developed by the city in cooperation with NCDOT and the Federal Transit Administration. There are also existing public agency plans to develop light rail or commuter rail service in the Raleigh-Durham, Charlotte, and Greensboro-Winston-Salem areas.

Freight Rail

Freight rail service is provided in 86 of the state's 100 counties, with most of the 3,345-mile rail system owned, operated, and maintained by the private sector. Seventy-two percent of the system is owned and operated by two Class 1 railroad companies: the Norfolk Southern Corporation and CSX Transportation. The remainder is operated by short line or switching/terminating railroads. North Carolina owns the North Carolina Railroad Company, leasing its 317-mile corridor between Charlotte and Morehead City to Norfolk Southern. The NCDOT's role in the freight transportation network is

limited. It administers the Rail Industrial Access Program, constructing or refurbishing tracks required by a new or expanded industry to encourage economic development, the Short Line Infrastructure Assistance Program that provides funding for tracking upgrades and maintenance in rural areas, and a program focusing on improving grade crossing safety.

Ferries

The NCDOT operates and maintains the ferry system in North Carolina. Seven routes served by 21 ferries carried more than 2.5 million passengers and 1.1 million vehicles annually across five bodies of water. The NCDOT ferry system is the second largest in the U.S. and provides an essential service for the residents and tourists of the coastal region and for transporting of goods to water-locked communities.

Ports

The North Carolina State Ports Authority, under the jurisdiction of the North Carolina Department of Commerce, owns and operates North Carolina's Ports of Wilmington and Morehead City, plus inland terminals in Charlotte and in the Piedmont Triad at Greensboro. The Ports Authority receives no funding from NCDOT, but it coordinates with NCDOT on transportation access needs to its port facilities. Total shipments of processed tonnage in and out of both seaports have increased in the past decade.

Aviation

North Carolina has 72 publicly owned and nearly 300 privately owned airports. Of the 72 publicly owned airports, 11 have scheduled service and the remaining 61 are for general aviation. The scheduled service airports serve more than 47 million passengers annually. Although air freight makes up less than 2 percent of the weight of cargo shipments in the state, it makes up approximately 10 percent of the value of North Carolina cargo shipments. More than 98 percent of all air cargo originations and destinations in North Carolina are handled by the three airports: Raleigh/Durham, Charlotte, and Piedmont Triad. The NCDOT Aviation Division is responsible for state system aviation planning and development. It provides grants for construction of new airports and associated facilities and for improvements to the existing aviation network.

Public Transportation

Public transportation systems in North Carolina provide mobility options for residents who cannot or choose not to drive. They are operated directly by local and regional transit agencies in all 100 North Carolina counties. The NCDOT Public Transportation Division's role in the process is to promote the development of public transportation in the state through the administration of federal and state grant programs, provision of safety and training programs, and offering of planning and technical assistance. In 2010, nearly 68 million one-way transit trips were provided by these systems, with most by urban systems.

Bicyclists and Pedestrians

Bicyclists and pedestrians use both state and municipal streets and highways. Bicycle and pedestrian improvements are programmed through four funding mechanisms within the STIP: the Bicycle and Pedestrian program, the Congestion Mitigation program, the Enhancement program, and the Urban and Rural highway programs. The NCDOT's Division of Bicycle and Pedestrian Transportation works closely with other units of NCDOT and other state agencies as well as regional and municipal agencies throughout the state to encourage comprehensive bicycle and pedestrian plans or planning, research, and design support.

ES.4 Economic Forecasts

To provide the type of multimodal transportation network that ensures continued economic prosperity and quality of life for North Carolina's residents and businesses, NCDOT and other transportation providers should anticipate economic trends in the state's population and employment characteristics, particularly as they relate to demand for transportation services. Several expected trends are likely to have a significant impact on efforts to provide needed transportation services and infrastructure over the next three decades. Key changes and transportation implications between 2010 and 2040 include the following:

- The number of North Carolinians is expected to increase by 42 percent, increasing to 13.5 million.
- Population in the state's six major metropolitan areas (Charlotte, Raleigh-Durham, Greensboro-Winston-Salem, Asheville, Fayetteville, and Wilmington) will continue to grow more rapidly than the state as a whole, from 69 percent to 74 percent of total state population. The Raleigh-Durham region will grow 84 percent, becoming the state's most populous with 3.2 million residents.
- While they will not be growing as rapidly as the major metropolitan areas, population in many smaller cities and exurban areas (areas located just beyond the suburban boundaries of major cities) will also grow. Population outside the six major metropolitan areas will increase by 600,000, to 3.6 million.
- North Carolinians will continue to age, with the average age increasing over the next three decades. Retirees will continue to move to North Carolina, particularly to the southeast coast and the mountains. Those over 65 years of age will increase from 13 to 18 percent of the state's population, doubling to 2.4 million.
- The employment base will continue its radical shift from the manufacturing base of the 1990s, as North Carolina's economy becomes increasingly service-oriented. While total non-farm employment will increase from pre-recession 2007 levels of 4.1 million to 5.7 million in 2040, the shift will continue, as manufacturing jobs drop 32 percent to 368,000 and non-military service jobs increase 50 percent to 5.0 million.

Such trends create serious challenges to NCDOT and its transportation partners.

ES.5 Transportation Challenges

As a blueprint for transportation-related decisions in North Carolina for the next 30 years, the 2040 Plan should anticipate changing conditions that might define different needs, expectations, and responses. The report identifies five sets of key transportation challenges to enhanced economic opportunity and environmental sustainability.

Growing and Changing Personal Mobility Needs

Four challenges related to the provision of growing and changing personal mobility needs are identified:

- By 2040, an estimated 13.5 million people will reside in North Carolina, a 42 percent increase from 2010. This increase will create the need for more housing, employment, and services, leading to substantial impacts on travel patterns and demand and increased strain on the state's transportation infrastructure health. The challenge presented by these demands is cited bluntly in the *North Carolina State Energy Plan*: "the design of most of North Carolina's towns and cities fails to encourage transportation efficiency via shorter shopping trips, increased pedestrian friendly developments, and augmented mass transit use." Public attitudes which result in reliance on motor vehicles can be expected to continue to lead to substantial impacts on travel patterns and demand.

- The continued concentration of population in the state's six major metropolitan areas leads to the threat of increased traffic congestion, runaway land consumption, and inadequate transportation infrastructure. Although the Department's *2010 Annual Performance Report* stated that 88 percent of Strategic Highway Corridor miles have little or no reoccurring congestion, the Texas Transportation Institute reports that congestion has gotten worse in recent years: trips take longer; congestion affects more of the day; congestion affects weekend travel and rural areas; personal trips and freight shipments must plan around congestion more often; and trip travel times are unreliable. Public surveys of North Carolinians indicate that reducing congestion through improving infrastructure health is one of the top factors NCDOT should consider when prioritizing projects.

- According to the recently released U.S. 2010 Census data, North Carolina is becoming more ethnically diverse, with increases in Latino, Asian-American, and African-American populations growing more rapidly than the white population, a trend expected to continue. More diversity creates challenges for transportation systems delivery, particularly regarding access to economic opportunities. Lower auto ownership rates and more rural residency create a challenge of getting workers to critical activities such as jobs, medical services, and educational facilities.

- The aging of North Carolina's population, growing from 13 to 18 percent of the state's population by 2040, will challenge efforts to provide mobility for this age sector and to ensure safety of motorists. Many of these seniors will continue to drive, but increasingly, they will look to public transportation services to meet their mobility needs.

Preservation of Transportation Infrastructure Health

The NCDOT and its public and private transportation partners have invested heavily in North Carolina's transportation infrastructure. As is implied by the mobility and logistics challenges described above, preserving these systems in sound physical condition is vital to providing economic opportunity and public safety. Unfortunately, the infrastructure health is in jeopardy. The Department's most recent *2010 Annual Performance Report* described the following key performance measures of the state's transportation network:

- While 84 percent of interstate route pavement miles are in good condition, only 63 percent of primary and 67 percent of secondary route pavement miles are in good condition.
- 63 percent of bridges are in good condition.

The NCDOT's *2010 Report on the Condition of the State Highway System* has confirmed that the infrastructure health of the state's highway features requires serious attention. As reported, if funding remains stagnate, the percent of pavement miles in good condition in North Carolina is projected to drop from 68 percent to 50 percent by 2017. Similarly, bridge performance would drop from 61 percent in good condition to 54 percent.

Preservation of infrastructure health will require more resources than today. The NCDOT has estimated that from 2011 to 2015, it will invest 34 percent of its funds on maintenance, preservation, rehabilitation, reconstruction, and replacement projects aimed at improving infrastructure health. This will not suffice, and the challenge ahead will be to augment the existing revenues sources that pay for preservation of infrastructure health with new technologies, advanced materials, and modern equipment that improve efficiency and cost-effectiveness.

Growing and Changing Freight Movement and Logistics Needs

As reflected in the recently completed North Carolina Statewide Logistics Plan, North Carolina and NCDOT need to anticipate and prepare ongoing response to freight movement and logistics needs of commerce in the state. This includes both added capacity needed to handle expected increase in freight volume, whether through expanded infrastructure or operational efficiencies, and changing logistics patterns as the state's economy evolves.

As was made clear in the Statewide Logistics Plan, an evolving North Carolina economy will have markedly different freight movement needs than the economy of today. It seems unlikely that homogeneous investment strategies (such as providing four-lane highways within a few miles of every residence) can be defended when financial resources are scarce. A more focused strategy will be needed. In addition, there may be times when the definition of "mobility needs" will need to be expanded, to reflect not only the traditional view of facilitating the auto-oriented work trip, but also to reflect the logistics needs of commerce in both urban and rural areas, without which, jobs may be lost and economies impacted.

Realizing that economic opportunity for the state's workers may rely on the ability of commerce to access resources and world markets, a great challenge facing NCDOT will be in responding to changing logistics needs, designing systems to reflect those needs, and implementing decision-making processes that recognize the tradeoffs that may occur in addressing freight logistics and personal mobility needs.

Financial Sustainability

Adequate financing is fundamental to the delivery of transportation services and infrastructure, including new projects and initiatives, expansion needs, preservation, and maintenance of transportation systems. Going forward from its current annual operating budget of nearly $4 billion (FY 2010), NCDOT faces two major funding challenges:

- Addressing the funding gap
- Identifying long-term sustainable funding sources

The NCDOT's recent statewide transportation plans have identified large and growing needs and funding gaps. These needs are opposed by recent data showing that current revenue streams are unlikely to be sustainable in the long term. The bottom line is that North Carolinians will demand and deserve a transportation system that cannot realistically be provided given the current level of investment by the federal and state governments. The public and budget decision-makers need to understand the ramifications of demanding a system that cannot be sustained.

In light of the anticipated funding shortfall and increased travel demand resulting in increased modal needs, it is necessary to leverage current resources and identify new sustainable strategies for funding. Sustainable financing of transportation in North Carolina will need to have a two-fold dimension: (1) it will need to go beyond the existing revenue sources, and (2) it will need to increasingly rely on lowering costs and increasing efficiencies to achieve the desirable outcomes.

Environmental Sustainability

A growing population and the needed infrastructure response will continue to threaten environmental quality in North Carolina. The challenge for NCDOT is to anticipate and prepare a response to the environmental challenges facing the state's transportation sector and to pursue environmental sustainability in four areas described below:

- Transportation accounts for a staggering 27 percent of all energy consumed in North Carolina, and as the population and economic activity continue to grow, so will fuel consumption, reflecting rapid growth in vehicle miles traveled (VMT), along with the increase in movement of freight by trucking and rail. About 80 percent of North Carolina's existing 4.4 million commuters currently drive to work alone compared to the national figure of 75 percent. Public attitudes resulting in continuous preference for driving to and from work alone will need to be addressed. Moving forward, a challenge North Carolina and NCDOT will face is the need to increase energy efficiency in the transportation sector.

- While an expected shift from oil to alternative sources of energy might reduce the environmental impacts of automobiles, NCDOT will be challenged to provide infrastructure and services that can slow the growth of VMT and associated carbon dioxide emissions while also supporting economic opportunities that will lead to a high quality of life for North Carolina residents.
- Climate change may be one of the most significant issues facing transportation today. The impacts of transportation on natural resources extend beyond greenhouse gas emissions. Air quality, water quality and scarcity, loss of biodiversity, and conservation and protection of natural resources are all important quality of life indicators that affect the state's economic competiveness. A challenge faced by NCDOT and its transportation partners is that efforts to satisfy mobility, logistics, and access needs will be increasingly difficult to provide as urban areas expand and easy locations to add capacity to the system are exhausted.
- The NCDOT adopted its Environmental Stewardship Policy in 2002. The policy stresses the importance of balancing daily operations and environmental responsibility and strongly encourages employees to incorporate the principles of safety, environmental stewardship, and customer focus into their daily activities. The Department is also developing a Sustainability Blueprint that would deploy sustainability practices and a prioritized list of recommendations, including performance metrics and corresponding tracking systems. The challenge that NCDOT must address is to provide the kind of sustainable transportation solutions that result in minimal disturbance to the natural resources, are economically viable, and, at the same time, improve mobility of North Carolina residents and place NCDOT at the forefront of environmental stewardship efforts nationwide.

ES.6 Transportation Opportunities

The transportation challenges posed by overarching social, economic, and environmental trends and issues are daunting. Focused, strategic deployment of financial and human resources will be needed if the challenges are to be satisfactorily addressed. In some cases, current spending and resource allocation plans may need to be adjusted, and looming over any policy or programmatic response is the huge transportation funding gap. There may be external opportunities available to NCDOT that might be leveraged to meet those challenges more effectively. If successful, the State's transportation investments can contribute more effectively to the broad goals of providing ever-greater economic opportunities, ensuring that the environment is better tomorrow than it is today, and being good stewards of public funds. Six broad opportunities to address transportation challenges and the looming funding gap have been identified. These opportunities are described below.

Emphasis on Personal Mobility

As North Carolina continues its rapid population growth and demographic change, its population will face growing mobility challenges. Population growth alone is bound to create significant capacity constraints leading to congestion and loss of mobility. In its delivery of transportation services, NCDOT and its partners have opportunities to offer a positive response to personal mobility challenges facing the state in several ways:

- *By countering capacity constraints and congestion with multimodal solutions and seamless intermodal connectivity.* NCDOT, through its direct ownership and control of so many miles of roadways and its financial support of other modes, can focus on offering and encouraging connections between all surface transportation modes.
- *By improving accessibility and intermodal connections.* Through the use of sustainable design approaches, the NCDOT Complete Streets Policy is a bold step toward supporting an interdependent, multimodal transportation network that safely accommodates access and travel for all users. The Department has enormous opportunity to encourage excellent transportation connections that link workers with jobs, raw materials with manufacturers, and recreational users with parks and natural resource areas.
- *By using technology to enhance mobility options.* Technology will positively affect the future delivery of transportation services by offering innovative ways to efficiently meet traveler needs and expectations. By optimizing the transportation network through the use of technology, NCDOT can mitigate congestion, increase safety, increase dependability, and enhance mobility for all users, all in a cost-effective manner that can enhance its environmental stewardship efforts.
- *By enhancing education about transportation issues.* Through its existing communication and outreach efforts, NCDOT has the ability to increase awareness of North Carolinians about transportation and mobility issues, including the costs and investments related to each mode, the trade-offs involved with each mode and access and intermodal connection options. This would lead to a more informed public that chooses mobility options that consider the investment required and consequences associated with each option.

Strategic Investment Responsive to Expanded Focus on Logistics

In the past several years, North Carolina has given an institutional emphasis to the logistics needs of the state's businesses, particularly as logistics challenges impact the ability of commerce to attract new or expanded businesses due to deficiencies in the state's transportation infrastructure. Since completion in 2008 of the first Statewide Logistics Plan, North Carolina's Logistics Task Force, with support of NCDOT and the North Carolina Department of Commerce, has worked to make recommendations to ensure that people and goods are able to move efficiently across North Carolina.

The Logistics Task Force is reviewing transportation systems in the state with an eye toward giving North Carolina a competitive advantage in economic development by maximizing existing transportation systems and defining priorities for future transportation investments. This is being done on a regional basis and offers opportunity for the state to be more strategic in making infrastructure investment decisions that will support urban and rural economic development.

The opportunity presented to NCDOT by the focus on logistics in collaboration with the Logistics Task Force and Department of Commerce is to put scarce financial resources where they might leverage the greatest economic development/opportunity benefit, by identifying short-term and long-term infrastructure investment strategies that are consistent with evolving commercial opportunities.

More specifically, NCMIN, with its identification of statewide, regional, and subregional modal tiers of infrastructure, could allow for linking proposed improvements in its various tiers and modes to the benefits captured by addressing identified logistics needs. For the 2040 Plan, insight gained from Logistics Task Force deliberations will be considered in defining modal needs, examining long-term financing options, and defining policy changes needed to maximize return on investment that is focused on creating improved economic opportunities for the state's residents.

Expanded, More Flexible Funding Initiatives

The NCDOT faces the expanding challenge of accessing a sustainable funding stream needed to maintain and expand transportation infrastructure responsive to growth and changing needs of commerce, reflecting the expected long-term decline of gas tax revenue as vehicles become more efficient at a rate higher than the increase in travel. North Carolina has the opportunity to build on notable policy successes such as legislation creating the short-term Mobility Fund and the North Carolina Turnpike Authority.

These recent funding successes plus the opportunities offered by enhanced partnerships may offer similar opportunities for expanded, more flexible funding initiatives to address the long-term funding gap such as:

- Extending the Mobility Fund with expansion to include strategic investment in the NCMIN to implement the Statewide Logistics Plan
- Expanding application of user-based fees such as tolling on a programmatic basis such as the use of tolls to accelerate completion of the urban loop system or to fund long-term needs of the Interstate Highway system.
- Encouraging equity participation by NCDOT's private partners such as transportation providers and strategic economic sectors such as agriculture or the military.

- **Laser-Like Identification of Needs for Financial Sustainability**
- The NCDOT is developing tools that provide a unique opportunity to ensure that stated needs are in fact critical to creating economic opportunity, sustaining the state's environment and its quality of life, and preserving public safety. With its Organizational Performance Dashboard, NCDOT is able to track the performance of its systems, such as bridge health, congestion levels, or transit on-time performance and to compare that performance to desired standards. This creates the database from which future needs can be determined. And in continuing to refine its desired level of service for each mode and tier of the NCMIN, NCDOT is increasingly able to assess the implications on the health of its infrastructure of varying funding levels.
- An opportunity in preparing the 2040 Plan is to apply the levels of service developed for the Priorities to Projects Program and Resource Plan to the 2040 Plan's horizon year. This will provide consistency between short-range needs of the 10-year Program and Resource Plan and the long-range needs defined by the 2040 Plan. It should also allow further consideration of the tradeoffs of alternative resource allocation strategies.

Enhanced Partnerships

Through its various modal programs, NCDOT has a history of leveraging partnerships to provide for the state's transportation infrastructure and services. Not so ingrained in NCDOT's history is partnering with private sector transportation providers, primarily freight movers, and even less evident has been the partnering between NCDOT and the non-transportation sectors of the state's economy.

The work of the Logistics Task Force clearly shows that a great benefit to major sectors of the state's economy (such as tourism, agriculture, manufacturing, and military) might be realized if either direct or indirect financial support is provided for infrastructure investment. This would be especially the case when such needed investment exceeds the ability of NCDOT to meet these and other needs within its more traditional funding structure.

NCDOT can also foster working collaborations or partnerships with local governments and locally-based organizations to promote an equitable, balanced and reasonable transportation planning process. Local resources can serve the function of extension agents for NCDOT transportation agencies and help identify and address pressing needs at the local level. Creating long-term partnerships between local entities and NCDOT divisions can be an effective way to create and implement solutions to transportation at local and regional levels.

The enhanced partnering offers opportunities for the delivery of transportation infrastructure and services by the identification of mutually beneficial system improvements that offer the most cost rewards.

Environmental Sustainability

Recognizing that sustainable transportation solutions contribute to healthy, economically viable, and sustainable communities, NCDOT has declared that its environmental mission is to connect people and places in North Carolina safely and efficiently, with accountability and *environmental sensitivity*. Building on the principles in its Sustainability Blueprint, NCDOT has multiple opportunities to offer positive responses to environmental and energy challenges facing the state:

- *Integrating land use and transportation decisions to allow more efficient trip making and energy savings.* Over the past few decades, the land use response to population growth has been sprawling development patterns that have led to longer and longer average trip lengths, fueling ever-increasing congestion. In response to a 42 percent increase in population by 2040, employing the same patterns will create more congestion. However, steps can be taken to reduce the distances that must be traveled for each of those valued trips. The new development or redevelopment that will accommodate growth can be seen as an opportunity to better integrate land use and transportation investment decisions, allowing shorter, less intrusive opportunities to make the same trips. Better integration of land use and transportation causes less strain on the environment, curbs sprawl and reduces land consumption, mitigates traffic congestion, increases quality of life, and results in higher productivity and economic benefits.

- *Becoming a leader in the use of green technology in building and operating the state's transportation network.* As it preserves and improves the state's transportation systems, NCDOT has opportunity to employ new technologies aimed at increasing energy efficiency and reducing emissions. The NCDOT could become the leader in showcasing and encouraging new technologies. The NCDOT can also use green technology in design and construction of its facilities, including materials used for roadway construction, but also its capital facilities, including its buildings, operating equipment, and traffic lights. And as a major funder of transportation investment by others, NCDOT has opportunity to encourage such activities by its partners.
- *Realizing economic benefits of sustainable transportation solutions.* The NCDOT should expect to reap the benefits of its environmental stewardship efforts. These include key economic benefits such as new business attraction to areas with sustainable transportation networks; increased business activity and its concentration; reduced transportation costs; and facilitated economic growth, including higher value land use. Sustainable transportation affords job creation possibilities in services, technology, construction, design, manufacturing, and maintenance.

Summary of Challenges and Opportunities

As this report documents, NCDOT and its transportation partners face substantial hurdles in addressing the broad transportation needs of the state over the next 30 years. These challenges include assurance of the safety of its systems, preservation of the health of an aging infrastructure, and provision of economic opportunity brought in part by personal mobility and efficient movement of the freight and goods of commerce. As if bridging a multi-billion dollar funding gap were not enough, broad shifting influences will need to be addressed: a growing population, an evolving economy, sensitive environmental conditions, and uncertain financial resources.

These daunting challenges, however, are not without corresponding opportunities. And they are not abstractions. Many of the opportunities that might be leveraged to meet the transportation needs are available today. For this 2040 Plan, they will become a starting point for considering goals and objectives, long-term investment and revenue enhancement strategies, and policy and process change.

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Appendix

Demographic and Economic Projections: North Carolina in 2040

Acronyms and Abbreviations

Department	North Carolina Department of Transportation
FY	Fiscal Year
LOS	Level of service
NC	North Carolina
NCDOT	North Carolina Department of Transportation
NCMIN	North Carolina Multimodal Investment Network
NCSPA	North Carolina State Ports Authority
PTD	Public Transportation Division
SHC	Strategic Highway Corridor
STP	Statewide Transportation Plan
VMT	Vehicle miles traveled

Chapter 1
Purpose of Report

This Challenges and Opportunities report is the first in a series of reports that documents the preparation of the North Carolina Department of Transportation's (NCDOT) update of its Statewide Transportation Plan (STP), henceforth called the 2040 Plan. The purpose of this report is to create a context for the preparation of a 30-year plan for the delivery of transportation infrastructure and services in the state. This report defines baseline conditions in terms of both transportation systems and the social and economic forecasts that must drive transportation program delivery. Key to this baseline is the early identification of a series of transportation challenges that the 2040 Plan must address and the opportunities available to NCDOT for addressing those challenges. With general acceptance of the challenges and opportunities, a platform will be created to define long-term transportation infrastructure and service-delivery needs and strategies, policies, and procedures to address those needs.

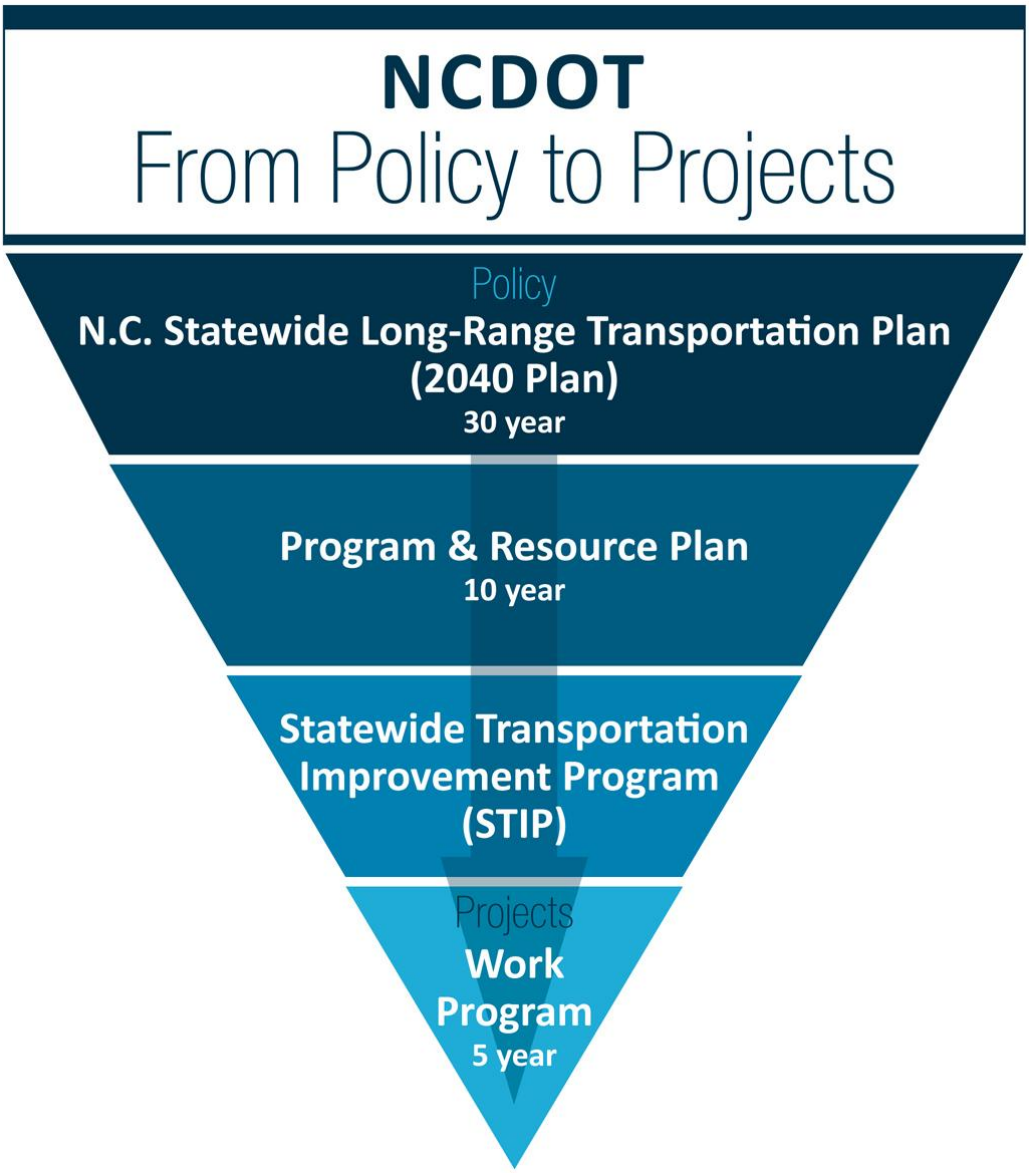
As the initial document of the 2040 Plan study, this report also describes the overall context within which the study is being conducted. The sections below summarize the planning framework within which the study is being conducted. The key element of this framework is the Transportation Reform process that has occurred within NCDOT in the past several years, a process that is designed to make the Department's decision-making aspects more transparent. The Transformation Reform process has also resulted in a clearly defined set of program delivery goals that will drive the updating of the 2040 Plan.

1.1 Planning Framework

Since 1995, NCDOT has regularly updated its STP to be responsive to growth in population and employment, changes in demographics, evolving transportation infrastructure and service needs, and to satisfy federal regulations. In 2001, NCDOT identified a 25-year infrastructure estimate of both transportation needs and available revenue that was the basis for a multi-year public policy conversation with North Carolina residents and stakeholders to establish transportation priorities. This effort culminated in the recommendation for and adoption of a new, long-term investment policy highlighted in the STP in September 2004 and established the concept of a Multimodal Investment Network (described in Chapter 2). In 2006, NCDOT prepared a mid-cycle update of the STP, refining key elements of the 2004 STP. The mid-cycle update was not adopted by the NC Board of Transportation due to data concerns. Subsequently, the Department launched a Transportation Reform process that restructured transportation decision-making and improved performance and accountability for program delivery. NCDOT is now updating its STP to a planning horizon of 2040 (2040 Plan) within the framework established by the Transportation Reform process.

Two elements of Transportation Reform will be instrumental in preparing the 2040 Plan. First is NCDOT's embrace of a "Policy to Projects" planning and decision-making process that begins with overarching, comprehensive state plans and ends with the adoption by the NC Board of Transportation of the 5-Year Work Program. This process (shown in Figure 1-1) includes the following steps:

1. *North Carolina Statewide Long-Range Transportation Plan*. This plan is a long-range guide for transportation policy and programmatic delivery (this 2040 Plan), a 30-plus year look forward that sets out key objectives and strategies, revenue options, and investment strategies.
2. *Program and Resource Plan*. This 10-year plan addresses needs and fiscal constraints and establishes mid-term spending priorities to achieve long-range goals from the STP.
3. *Statewide Transportation Improvement Program (STIP)*. STIP lists the projects that will receive federal aid and are included in the Work Program and the Program & Resource Plan.
4. *Work Program*. A direct derivative of the Program and Resource Plan, the 5-Year Work Program identifies specific projects that will be undertaken by NCDOT over the following five years.



Source: NCDOT, Policy to Projects Program and Resource Plan (draft)

Figure 1-1. North Carolina Department of Transportation Policy to Projects Process

The second element of the Transportation Reform process instrumental to the preparation of the 2040 Plan is the goals driving delivery of transportation systems and services in North Carolina. As adopted by the Board of Transportation, the goals now core to NCDOT's mission are shown on Figure 1-2.

The first three goals (safety, mobility, and infrastructure health) are perceived by the Department as the fundamental reasons for its existence.[1] The other two goals (to make NCDOT a place that works well and to make NCDOT a great place to work) are supplemental goals that help the Department to meet the three primary goals (these two goals are more internal, or organizational, than the delivery-based goals.

Figure 1-2. North Carolina Department of Transportation Mission and Goals

1.2 Study Goals

The NCDOT overall program delivery goals shown on Figure 1-2 form the foundation of its day-to-day operations. The goals define personnel performance objectives, infrastructure quality assessment, and the prioritization of project programming. To place this 2040 Plan in the same goal-oriented

[1] NCDOT, *Policy to Projects*

environment, the plan should be based on satisfactorily meeting a set of consistent study goals. Shown below are the 2040 Plan study goals established to guide development of the 2040 Plan; they are listed here to provide a context for the preparation of the 2040 Plan.

Modal Effectiveness Goals

1. Update estimates of modal needs to reflect defensible performance standards.
2. Expand the Strategic Highway Corridors (SHC) concept to encompass a multimodal system, based on criteria that can be traced to a confirmed set of performance goals, to provide a basis for defensible recommendations for investment strategies.
3. Confirm that the North Carolina Multimodal Investment Network (NCMIN) still reflects the state's overall development and sustainability goals.

Financial Feasibility Goals

4. Clearly define the gap between transportation needs and anticipated revenues.
5. Establish long-term revenue strategies that recognize the likely non-sustainability of the current transportation revenue structure.
6. Establish a strong rationale for long-term transportation investment strategies that reflect the state's goals for jobs, economic opportunities, and environmental and financial sustainability.

Program Delivery and Vision Goals

7. Provide cost-effective, wide-ranging opportunities for public input that recognize the interests of the general public, interested party stakeholders, and the Department's transportation partners (builders and providers of transportation systems).
8. Establish a clear understanding of the long-term challenges and opportunities facing the Department that will affect its ability to address the state's mobility, transportation choices, economic development, and reliability demands.
9. Identify improvements to the Department's program delivery processes to fully leverage relationships with its public and private partners.

1.3 Report Organization

This Challenges and Opportunities report is organized as follows:

1. Purpose of Report
2. North Carolina Transportation Reform Process (Policy to Projects)
3. North Carolina Transportation System: A Snapshot
4. Economic Forecasts
5. Key Transportation Trends and Challenges
6. Transportation Opportunities

Chapter 2
North Carolina Transformation Reform Process (Policy to Projects)

The 2040 Plan is being prepared in an organizational environment that has evolved significantly since 2004. Driven by the Transportation Reform process, NCDOT is moving toward becoming an organization driven by transparent decision-making based on clearly defined goals, performance measures, and project selection criteria. The NCDOT's investments and service delivery efforts are designed to (1) optimize a strategic, multimodal network; (2) be built on the concept of broad sustainability (of infrastructure, environment, and finances); and (3) always seek to invest to maximize economic opportunities for state residents.

Four key elements of Transportation Reform will be carried through the 2040 Plan. The first is the mission and the five Department goals. The other three elements are listed below and described in the following sections:

- The North Carolina Multimodal Investment Network (NCMIN) as the basis for project programming
- Application of multimodal levels of service (LOS) to quantify investment alternatives
- Reporting of system performance using an Organizational Performance Dashboard

2.1 North Carolina Multimodal Investment Network

The 2004 STP established the NCMIN and the 2006 mid-cycle update further defined that concept. The NCMIN stratifies each modal system (highways, passenger and freight rail, ferries, aviation, public transportation, and bicycle/pedestrian) into three tiers: statewide, regional, and subregional. Modal elements placed in the statewide tier are those considered to be critical to achieving the state's development goals and are given highest funding priority. Modal elements on the regional tiers do not have the same importance as those on the statewide tier, but their preservation and improvement are considered to be crucial to regional development goals. Elements on the subregional tiers are generally of local importance, and the Department looks to local partnerships to fund projects on this tier. Descriptions of the modal tiers are shown in Table 2-1.

As per the study goals, the NCMIN will be a focus of the 2040 Plan, expanding the SHC into other modes and confirming that it still reflects the state's overall development and sustainability goals.

Table 2-1. North Carolina Multimodal Investment Network Definitions

Mode	Statewide Tier	Regional Tier	Subregional Tier
Highways	Strategic Highway Corridors	All primary routes (U.S. and North Carolina) not on the Statewide Tier	All secondary routes (SR) not on the Statewide Tier
Passenger Rail	All intercity (including out-of-state) passenger rail service and associated station facilities	Commuter rail service and associated station facilities serving commuters between two or more counties	Commuter and light rail service and associated station facilities serving commuters within a county
Freight Rail	Rail lines of strategic importance	All remaining rail lines	Not applicable
Ferries	Ferry routes connecting Statewide Tier Highways	Ferry routes connecting Regional Tier Highways	Ferry routes connecting Subregional Tier Highways
Aviation	Commercial service airports with 100,000/+ annual enplanements	Commercial service airports with < 100,000 annual enplanements *or* general aviation airports with 25/+ based aircraft	General aviation airports with < 25 based aircraft
Public Transportation	Bus service and associated station facilities serving out-of-state travel	Bus/vanpool service and associated facilities serving commuters between two or more counties	Bus/vanpool service and associated facilities serving commuters within a county
Bicycle and Pedestrian	North Carolina bicycling highways (on-road)	Multi-county regional routes (on-road) *or* off-road multiple jurisdiction facilities 20/+ miles long	Off-road facilities <20 miles long *or* local on-road bicycle networks *or* all sidewalks

Source: NCDOT NCMIN: http://www.ncdot.org/download/performance/NCMIN_Definitions.pdf

2.2 Level of Service and Investment Categories

As part of the initial Policy to Projects strategic prioritization, NCDOT developed the LOS concept as a way to tie investment in respective modal tiers of the NCMIN to expected outcomes or performance. Modeled after the traditional LOS used to define the quality of highway operations, the investment LOS can be defined as the quality of service provided to the user, using LOS "grades". For NCDOT, the assigned grades would range from A to F (A indicating the highest performance and F indicating the lowest). The Transportation Reform's LOS grades are tied to the Department's main three goals, or Investment Categories: Infrastructure Health, Mobility, and Safety.

The LOS criteria, when applied based on this approach, allow NCDOT to determine which projects, if implemented, would provide the greatest benefit. When a limited pool of funding for future projects is available, it is imperative to prioritize them based on their net positive estimated effects; for example, a

positive effect resulting in a much better LOS grade (e.g., an improvement from D to B) would make the considered project a better candidate for funding and implementation when compared to projects that would result in negligible positive effects.

2.3 Organizational Performance Dashboard

During the early stages of the Transportation Reform process and the makeover of NCDOT to a results-based performance organization, the Department had sought a practical tool that would measure its performance based on expected results. The NCDOT's ongoing efforts to meet its defined five goals would have to be measured based on a quantifiable standard to be meaningful to the public and evaluated and adjusted as necessary in-house by NCDOT.

It was during this stage when the concept of an Organizational Performance Dashboard surfaced. The NCDOT has identified specific performance measures (currently 30) to gauge the success in meeting its goals. One view of the dashboard is shown in Figure 2-1. The performance measure targets aim to be challenging yet realistic and achievable. The 30 measures are shown in Table 2-2. In fiscal year (FY) 2009-2010, NCDOT met or exceeded 16 performance measures, did not meet nine, and had no results for the other five.

Figure 2-1. North Carolina Department of Transportation Organizational Performance Dashboard

Because the transportation network and its needs are constantly evolving, the performance target goals are flexible. The performance measures are set independently based on performance trends, previous year results, national standards and recommendations, and legislative requirements with input from subject experts. They are reviewed annually and modified as needed. The NCDOT is also in the process of establishing long-term target goals that would gauge its progress in the 10-year time period, based on available resources. Once adopted, these 10-year targets will be aligned with the existing annual targets and will serve as a guideline for improving performance each year.

Table 2-2. North Carolina Department of Transportation Performance Scorecard Measures

Goal	Performance Measure
Safety Make our transportation network safer.	Rate of fatalities per 100 million vehicle miles
	Rate of crashes per 100 million vehicle miles
	Rate of injuries per 100 million vehicle miles
	% of statewide safety belt usage
Mobility Make our transportation network move people and goods more efficiently.	% of strategic highway corridor miles that have little or no recurring congestion
	Average time to clear major incidents
	% of scheduled ferry runs completed
	% of passenger trains that departed on schedule*
	% reduction in expected growth of commuter-generated vehicle miles traveled (VMT)
Infrastructure Health Make our infrastructure last longer.	% of interstate route pavement miles in good condition
	% of primary route pavement miles in good condition
	% of secondary route pavement miles in good condition
	% of bridges in good condition
	Weighted score of all highway features, excluding pavement and bridges, in good/excellent condition*
Make our organization a place that works well.	% of projects "advertised for bid" and awarded to the contractor for construction on schedule
	% of projects that completed right-of-way plans on schedule
	% of highway construction projects completed on schedule
	% of highway construction projects completed within budget
	Average environmental compliance score for construction and maintenance projects statewide
	% of the overall budget for administrative costs
	% of federal receipts to eligible authority to bill
	% of planned expenses compared to actual receipts
	% of total dollars paid to minority- and women-owned businesses
	% of customers satisfied with Department-wide services*
Make our organization a great place to work.	Employee engagement index
	% of top talent retained*
	% of all employees that met or exceeded performance expectations
	Depth of leadership pipeline*
	Employee safety index

Source: NCDOT, *A Vision Set in Motion, 2010*. 2010-2011 Executive Performance Measures.

Notes: Text in red denotes performance measures below target in FY 2010.

* Still in development.

Chapter 3
North Carolina Transportation System: A Snapshot

This chapter describes the existing transportation network, including both highway and non-highway modes, in North Carolina. The NCDOT is involved in all transportation modes in the state including highways, passenger railroads, freight railroads, ferries, ports, aviation, public transportation, and bicyclists and pedestrians. The NCDOT also houses the state's Division of Motor Vehicles, as well as the Turnpike Authority, which oversees state toll roads and manages the Governor's Highway Safety Program. The sections below describe each operating mode.

3.1 Highways

The NCDOT Division of Highways assumes full responsibility and liability for design, construction, funding, maintenance, and preventive care for 79,186 miles of state-operated roadways (Table 3-1). The NCDOT highway program is delivered primarily by the Division of Highways, the Division of Technical Services, and the Governor's Highway Safety Program. The Division of Highways comprises central and field-based functions (including Preconstruction, Safety and Mobility, Field Support, Asset Management, and Operations), all of which support the delivery of transportation projects statewide.

Table 3-1. North Carolina Department of Transportation State Mileage by Facility Type, FY 2009

Facility Type	Mileage
NCDOT Maintained	79,186
Primary	14,919
Interstate	1,131
Interstate Business	70
United States (U.S. routes)	5,602
North Carolina (NC routes)	8,116
Secondary	64,267
Other	25,999
Municipal System (local routes)	21,782
State Park	748
Federal	3,470
Total Public Roads in North Carolina	105,185

Source: NCDOT *Maintained Mileage by System Report*, 2009

Route Ownership

North Carolina has 105,185 miles of public roadways. Of this total, NCDOT maintains 79,186 miles, making it the largest state-maintained roadway network in the country. Most of the remaining public roads are maintained by towns and municipalities (21,782 miles). Table 3-1 shows a breakdown by mileage and ownership. Notably, North Carolina is one of only nine states where counties maintain no ownership of any roadways. North Carolina is also one of 24 states with no toll road mileage, although six projects totaling nearly 104 miles are currently under development. One of these, the 16-mile Triangle Expressway in Wake County, is under construction and will fully open to traffic in late 2012. The NCDOT maintains 16,953 (94.1 percent) of the state's 18,007 bridges. The remaining bridges are owned by local entities or the federal government.

Route Designation

The majority of state-maintained roadways, 64,267 miles (81.2 percent), are classified by the Department as secondary roads. US and NC numbered routes account for 14,919 (18.8 percent) of all NCDOT owned and maintained roads.

Strategic Highway Corridors

The SHC initiative represents the first major implementation step to be advanced under the update of North Carolina's 2004 STP. The development of the SHC concept was a collaborative effort by the NCDOT, the Department of Commerce, and the Department of Environment and Natural Resources. These three agencies saw the need for and importance of this initiative to enhance the overall quality of life and business climate in North Carolina. This concerted effort led to the formation of three main themes:

- *Mobility and Connectivity*: Enhancing the ability to travel to destinations in a safe and efficient manner.
- *Environmental Stewardship*: Striving to preserve and enhance natural and cultural resources by maximizing the use of the existing transportation infrastructure with the support of compatible land uses.
- *Economic Prosperity*: Moving people and goods efficiently, making for a more competitive business climate while providing a good quality of life for employees.

The SHC initiative identifies and focuses attention on the state's critical highway facilities. The identified SHCs in North Carolina consist primarily of existing highways vital to moving people and goods to destinations within and just outside of North Carolina. The SHC network is also classified as the top Statewide Tier by NCMIN's definitions for the highway mode. The NCDOT identified 55 principal SHCs in the state, with an overall length of 6,510 miles. These corridors account for approximately seven percent of the state-maintained highway systems, yet they carry 45 percent of the state system traffic.

Other Recent Highway Initiatives

In addition to designation of the SHCs and the NCMIN, NCDOT has taken other steps in recent years to improve the way it is pursuing its stated mission. Two of these initiatives in particular are impacting the way NCDOT delivers its highway program. First is the use of tolling as a funding source for new highway construction. With the creation of the North Carolina Turnpike Authority in 2004, the General Assembly authorized the construction of toll roads as a way to fund needed highway projects that could not be financed with traditional funding sources. The state's first modern toll road is now under construction in Wake County, and several other toll road or bridge projects are in various development stages. This "user pays" concept of project financing allows payment of construction bonds with tolls collected from drivers of the toll roads, thus freeing gas tax revenue for other needed projects.

The other initiative is reflective of NCDOT's ongoing efforts to deploy a "sustainability blueprint" that recognizes NCDOT's role in ensuring the health and well-being of the state's residents and how transportation infrastructure investment can affect adjacent land use, community form, and multimodal opportunities such as public transportation, bicycling, and walking. In adopting its Complete Streets Policy in 2009, the NC Board of Transportation recognized that "transportation, quality of life, and economic development are all undeniably connected through well-planned, well-designed, and context-sensitive transportation solutions." The policy goes on to confirm that NCDOT, "in its role as stewards over the transportation infrastructure, is committed to:

- Providing an efficient multimodal transportation network in North Carolina such that the access, mobility, and safety needs of motorists, transit users, bicyclists, and pedestrians of all ages and abilities are safely accommodated;
- Caring for the built and natural environments by promoting sustainable development practices that minimize impacts on natural resources, historic places, businesses, residents, scenic and other community values, while also recognizing that transportation improvements have significant potential to contribute to local, regional, and statewide quality of life and economic development objectives;
- Working in partnership with local government agencies, interest groups, and the public to plan, fund, design, construct, and manage complete street networks that sustain mobility while accommodating walking, biking, and transit opportunities safely."

Responsive to the policy, NCDOT planners and designers are working to incorporate multimodal alternatives into appropriate transportation projects within the growth areas of towns and cities.

3.2 Passenger Railroads

Passenger rail service offers convenient travel between major cities and other towns in North Carolina. The NCDOT Rail Division's role is unique in comparison to its nationwide peers because it operates its independently funded passenger rail service. This service includes the following routes:

- The Piedmont (daily Raleigh-Charlotte), which mostly uses the North Carolina Railroad shared tracks and is co-branded with Amtrak.
- The Carolinian (daily New York-Richmond-Raleigh-Charlotte), which, although continuing outside of North Carolina, is paid for with state funding and passenger fares.

Other passenger rail service in North Carolina consists of a number of Amtrak long-distance trains:

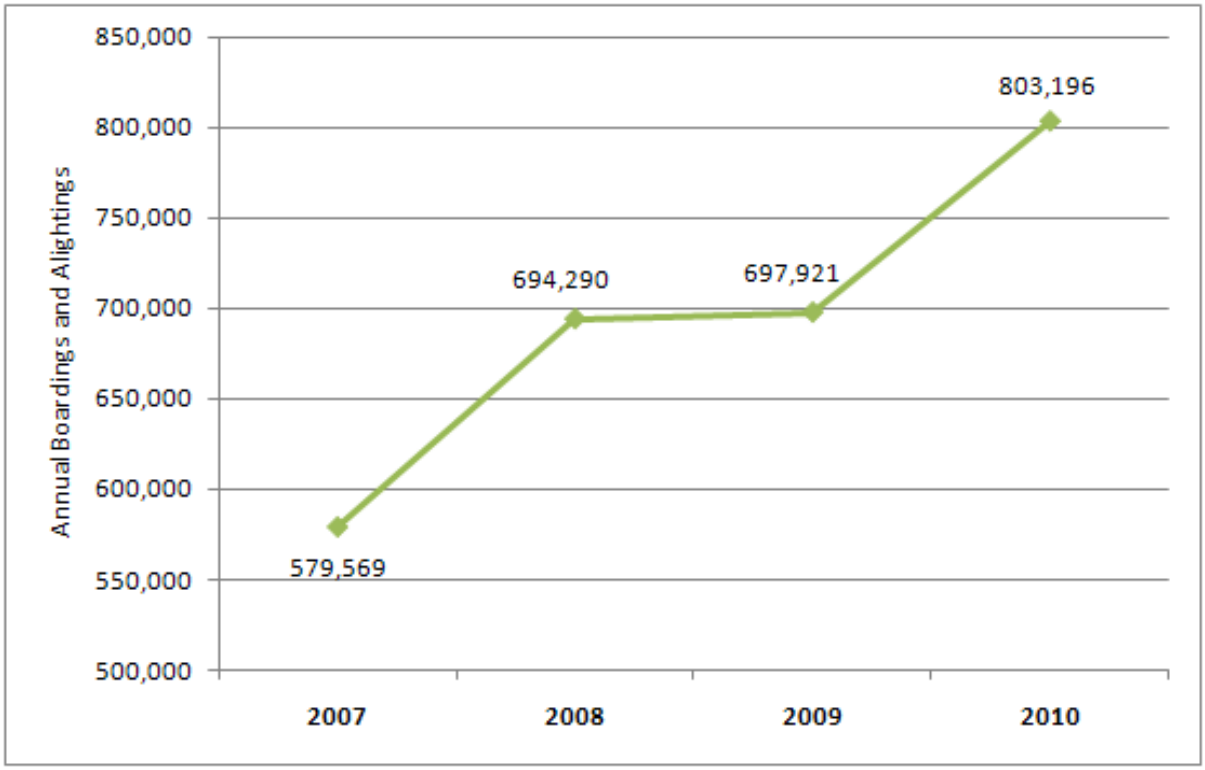
- The Crescent (daily New York-Charlotte-Atlanta-New Orleans)
- The Palmetto (daily New York-Savannah via Fayetteville)
- The Silver Meteor (daily New York-Miami via Fayetteville)
- The Silver Star (daily New York-Tampa-Miami via Raleigh)

Intercity rail travel has gained popularity and importance in North Carolina in recent years. Federal initiatives such as High-Speed Rail have helped bring attention to passenger rail in the United States. Infrastructure improvements to the state's primary corridor between Raleigh and Charlotte resulted in improved speeds and frequencies of service and have allowed passenger rail to compete with the private automobile travel time for trips to/from Charlotte and Raleigh. The third Raleigh-to-Charlotte round trip (a second Piedmont train) began service in June 2010 and has been well received by the travelling public, with a significant resulting ridership boost.

As shown on Figure 3-1, Amtrak's ridership in North Carolina has climbed steadily in recent years. Amtrak's most recent FY 2010 statistics show that the total number of passengers boarding or alighting in North Carolina in FY 2010 was 803,196, or 2,200 per day; this represents a 38.6 percent increase from FY 2007.[2]

Regional and local passenger rail is available only in Charlotte, where the state's first light rail line opened in 2007. The 9.5-mile-long LYNX light rail service was developed by the city in cooperation with NCDOT and the Federal Transit Administration. LYNX has greatly exceeded initial ridership projections, reporting nearly 3.6 million passenger trips in FY 2009. Existing public agency plans call for developing light rail or commuter rail service in the Raleigh-Durham, Charlotte, and Greensboro-Winston-Salem areas.[3]

[2] *Amtrak Fact Sheet, Fiscal Year 2007–2010, State of North Carolina:* http://www.amtrak.com/pdf/factsheets/NORTHCAROLINA07.pdf
[3] NCDOT *2009 Rail Plan*



Sources: Amtrak Fact Sheets, Fiscal Years 2007, 2008, 2009, and 2010, State of North Carolina

Figure 3-1. Annual Number of Boardings/Alightings at North Carolina's Amtrak Stations, FY 2007-2010

3.3 Freight Railroads

North Carolina's freight transportation network provides access to strategic locations in the state and facilitates the movement of goods for a variety of the state's industries. The NCDOT's role in the state's freight transportation network is limited; it administers the Rail Industrial Access Program that provides funding for constructing or refurbishing tracks required by a new or expanded industry to encourage economic development, and it administers the Short Line Infrastructure Assistance Program, which provides funding for tracking upgrades and maintenance in rural areas.

The majority of the state's freight rail system serving 86 of the state's 100 counties is owned, operated, and maintained by the private sector. The State of North Carolina owns the North Carolina Railroad Company, leasing its 317-mile corridor to the Norfolk Southern Corporation.[4]

Table 3-2 shows the miles of freight railroads operated in North Carolina, with 2,422 miles of Class I railroads comprising 72.4 percent of all railroads in the state. A total of 22 active freight railroad companies operate in the state: two active Class I railroads, 12 active short line railroads, and eight active short line railroads that specialize in switching and terminal services.

[4] NCDOT *Rail Plan, 2009*

Table 3-2. Freight Railroads in North Carolina, by Type and Miles, FY 2008

Type	Miles
Class I Railroads	
CSX Transportation	1,121
Norfolk Southern Corporation*	1,301
Subtotal Class I Railroads	2,422
Local Railroads	687
Switching and Terminal Railroads	236
Total Miles of Railroads in North Carolina	3,345

Source: U.S. Department of Transportation, 2008 National Transportation Atlas Database

* Includes operating rights on 317 miles of the North Carolina Railroad.

3.4 Ferries

North Carolina's ferry system is operated and maintained by NCDOT. The system is comprised of 21 ferries that provide service for more than 2.5 million passengers and 1.1 million vehicles across five bodies of water. The NCDOT ferry system is the second largest in the U.S. and provides an essential service for residents and tourists of the coastal region and for transporting goods to water-locked communities. Seven ferry routes are located along the coast:

- Southport ferry provides access across the Cape Fear River to Wilmington and serves mainly tourists.
- Minnesott Beach and Bayview ferries provide access to the military installation at Cherry Point for military personnel and other area businesses.
- Knotts Island ferry provides access to Elizabeth City and southeastern Virginia.
- Ocracoke Island ferries (three) serve mainly tourists and the workforce needed to support them.

The fleet is based in Morehead City, with maintenance and repairs completed by ferry personnel at the shipyard in Manns Harbor.

3.5 Ports

The North Carolina State Ports Authority (NCSPA), under the jurisdiction of the North Carolina Department of Commerce, owns and operates the North Carolina Ports of Wilmington and Morehead City, plus inland terminals in Charlotte and in the Piedmont Triad at Greensboro. The NCSPA receives no appropriated operating funds or dedicated capital funding from NCDOT, but it coordinates with NCDOT on transportation access needs to its port facilities.

The port facilities serve as competitive alternatives to ports in neighboring states for access to global markets. According to the NCSPA, the strategic location advantages of the ports in North Carolina include the following attributes:

- Within 700 miles of more than 150 million American and Canadian consumers and 70 percent of the U.S. industrial base
- Within 190 miles of more than 4.5 million tons of import/export, container, and break bulk cargo annually
- Closest to the center of the Southeastern U.S. market, one of the nation's fastest growing markets
- One of the nation's top manufacturing and distribution states
- Middle of North and South Atlantic shipping lanes
- Service on all major international trade lanes[5]

Freight movement data from both seaports show an overall increase in processed tonnage at the facilities. As shown on Figure 3-2, shipments at the Port of Morehead have fluctuated in recent years with more variances and an overall slight downtrend in tonnage, while the Port of Wilmington has experienced a steady increase in processed tonnage in the last decade, with shipments at the facility increasing by 55 percent from 2001 to 2010.

3.6 Aviation

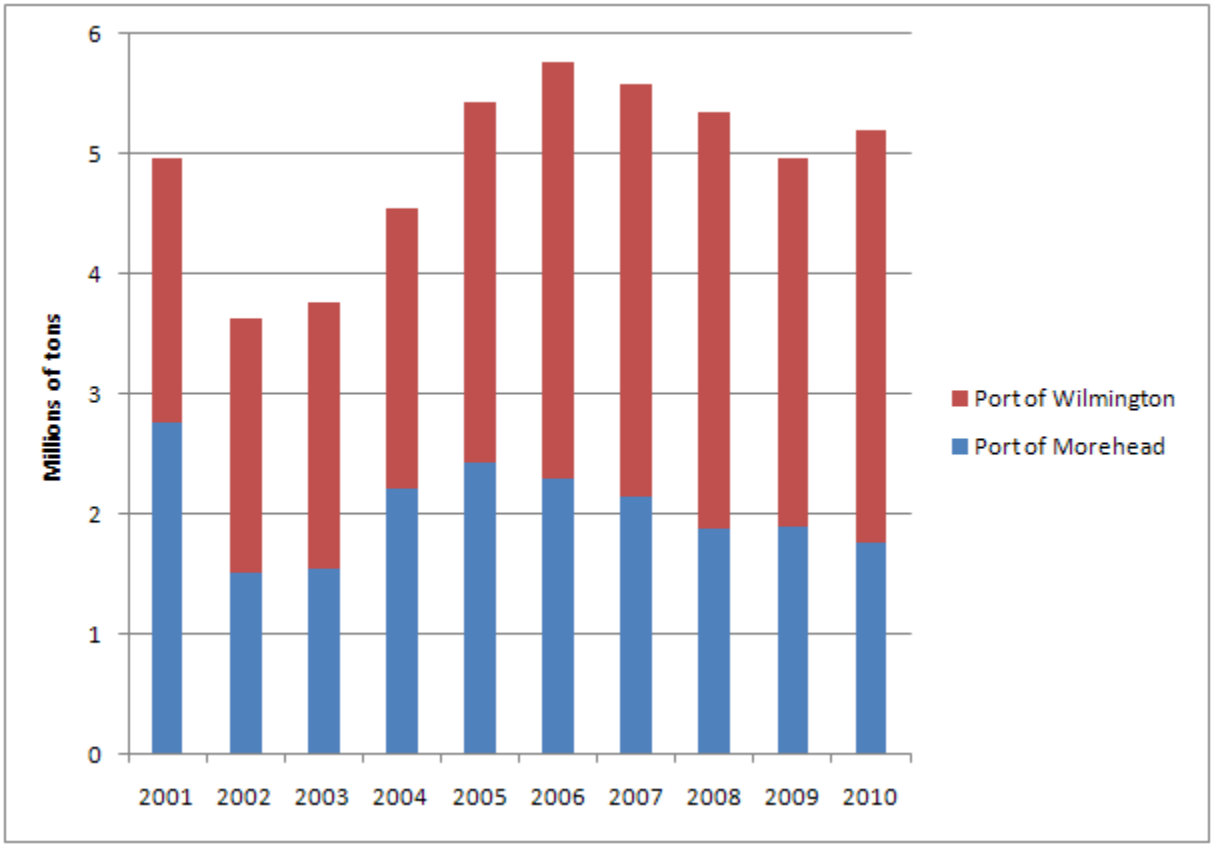
The NCDOT Division of Aviation is responsible for state system aviation planning and development and for the appropriation of funding for the construction of new airports and associated facilities and improvements to the existing aviation network. North Carolina participates in the Federal Aviation Administration Block Grant Program, meaning that the state has assumed responsibility for the administration and distribution of block grants to general aviation airports. The NCDOT Division of Aviation administers the State Aid to Airports Program.

North Carolina has 72 publicly owned and nearly 300 privately owned airports. Of the 72 publicly owned airports, 11 have scheduled service (with four offering international flights to Europe, Canada, and Mexico), and the remaining 61 are general aviation. The scheduled service airports in North Carolina serve more than 47 million passengers annually. More than 7,000 registered aircraft are based in North Carolina, and the state is also home to more than 15,000 licensed pilots.[6]

Although air freight makes up less than two percent of the weight of cargo shipments in the state, it makes up approximately ten percent of the value of North Carolina cargo shipments. According to the Statewide Logistics Plan, more than 98 percent of all air cargo originations and destinations in North

[5] North Carolina Ports: http://www.ncports.com
[6] NCDOT*, A Vision Set In Motion: 2010 Annual Performance Report*

Carolina are handled by what could be perceived as three Tier 1 freight airports: Raleigh-Durham, Charlotte, and Piedmont Triad.[7]



Source: North Carolina Ports, Ports Statistics, http://www.ncports.com/_Port_Statistics.htm

Figure 3-2. Shipment Trends at North Carolina Port Authority Ports, FY 2001-2010

3.7 Public Transportation

Public transportation systems in North Carolina provide mobility options for residents who cannot or choose not to drive. The state is served by a variety of local, regional, and intercity public transportation services that connect people to places of interest. Public transportation systems are operated directly by local and regional transit agencies in all 100 North Carolina counties. The role of the NCDOT Public Transportation Division (PTD) in the process is to promote the development of public transportation in the state through:

- Administering more than $100 million in state and federal funds awarded annually to transit systems
- Providing safety and training opportunities through workshops and funding grants

[7] NC Office of State Budget and Management, *Statewide Logistics Plan for North Carolina, 2008*

- Offering planning and technical assistance

The NCDOT PTD classifies the existing 99 public transportation service agencies responsible for delivery of transit services to the state's residents into three broad categories:

- *Urban and small urban public transportation systems*. There are 19 urban systems for the general public in cities with populations in excess of 50,000 and three small urban systems, all providing local fixed-route bus and van service.
- *Regional public transportation systems*. These multi-county systems for the general public operate regional bus and shuttle service, paratransit services, ridematching, and vanpools in Durham, Orange, and Wake counties (Triangle Transit), and Guilford, Forsyth, Davidson, Alamance, Randolph, and Rockingham counties (Piedmont Authority for Regional Transportation).
- *Community public transportation systems*. These systems provide transportation for the general public and human service agency clients. There are 68 single-county systems and seven multi-county systems in North Carolina. Basic service is mainly provided by subscription routes (prearranged rides), deviated fixed-route service, or dial-a-ride.[8]

In terms of ridership estimates (Table 3-3), NCDOT PTD data show 67.6 million one-way transit trips in North Carolina in FY 2010, with the bulk of them (60.5 million) recorded on the urban side of transit (including urban paratransit services), and the remaining 7.1 million transit trips recorded by the rural general public transportation systems statewide.[9] Public transportation in the state also includes out-of-state and in-state private bus service providers, including Greyhound and Carolina Trailways, which offer services to many points in the state as well as connections to neighboring states and beyond.

Table 3-3. Public Transportation Ridership in North Carolina, FY 2010

Transit Category	One-Way Transit Trips
Urban Transportation	60,552,516
Community Transportation	7,069,822
Total Transit Trips	**67,622,338**

Source: NCDOT PTD, FY 2010 Operating Statistics Summary

3.8 Bicyclists and Pedestrians

Bicyclists and pedestrians use both state and municipal transportation infrastructure facilities. Bicyclists typically use travel lanes, road and street shoulders, and dedicated on-road bike lanes, shared-use paths and off-road trails. Pedestrians use sidewalks and shoulders, as well as shared-use paths and walking trails. The role of the NCDOT Division of Bicycle and Pedestrian Transportation is to improve the safety, access, and mobility of bicyclists and pedestrians throughout the state.

[8] NCDOT PTD: *North Carolina Public Transportation System, 2009*
[9] NCDOT PTD, FY 2009 Operating Statistics Summary: http://www.ncdot.gov/nctransit/download/FY2009.pdf

Bicycle and pedestrian improvements are programmed through four funding mechanisms within the STIP: the Bicycle and Pedestrian program, the Congestion Mitigation program, the Enhancement program, and the Urban and Rural highway programs. Division of Bicycle and Pedestrian Transportation works toward its annual matching grant program (the Bicycle and Pedestrian Planning Grant Initiative) to encourage municipalities to develop comprehensive bicycle and pedestrian plans. It works closely with other units of NCDOT and other state agencies as well as regional and municipal agencies throughout the state to encourage comprehensive bicycle and pedestrian plans or planning, research, and design support. These efforts resulted in the 2009 adoption by the NC Board of Transportation of the Complete Streets policy, which requires consideration of pedestrian and bicycle modes during planning and design of new highway facilities and highway facility improvements and is intended to encourage non-motorized transportation.

Bicycles

Bicycles are allowed on all federal, state, and secondary roads, except on freeways with limited access. As a result, bicyclists are permitted on more than 78,000 miles of state-maintained roadways. The Division of Bicycle and Pedestrian Transportation has successfully completed a broad range of projects, including the design and construction of multi-use paths and rail trails; the provision of on-road improvements such as bike lanes and bicycle safe bridges; and the mapping and signing of more than 5,000 miles of local, regional, and cross-state bicycle route systems.

The NCDOT has worked with local officials and bicyclists across the state to develop and market the following facilities:

- *Bicycle Highways*: The NCDOT has designated a system of cross-state marked bicycling facilities that includes nine routes covering 3,000 miles.
- *Multi-County/Countywide Routes*: The NCDOT has developed the mapped and signed systems of bicycle routes (20 maps in total).
- *Urban Bicycle Maps/Trail and Bike Lane Systems*: The NCDOT has developed the mapped and signed systems of existing urban bicycle routes for many municipalities in the state, including Raleigh, Mecklenburg/Union counties, Greensboro, Durham, Asheville, Wilmington, Winston-Salem, and many others.

Pedestrians

The NCDOT perceives pedestrian movement as an important part of the overall transportation network. The Department acknowledged the importance of meeting transportation needs for pedestrian activity when the original Bicycle Program expanded to become the Office of Bicycle and Pedestrian Transportation in 1992. In 1993, the NC Board of Transportation allocated the first funds specifically for pedestrian projects. Since then, NCDOT has initiated policies, programs, and guidance that aim to improve the pedestrian environment and make walking a viable transportation mode. These policies include Pedestrian Policy Guidelines and the recently adopted Complete Streets Policy.

Chapter 4
Economic Forecasts

Travel demand in North Carolina is strongly related to economic trends that affect how the state's residents travel and goods are moved. The state's demographics, employment opportunities, and industry mix have changed dramatically in recent decades and are expected to continue to change in ways that affect the delivery and expectations of the multimodal transportation network. Shifts in travel demand and priorities between 2010 and 2040 will largely be a function of demographic and economic indicators. To provide the type of multimodal transportation network that ensures continued economic prosperity and quality of life for North Carolina's residents and businesses, NCDOT and other transportation providers must anticipate the estimated economic trends, particularly as they relate to demand for transportation services. This chapter provides a forecast of demographic and employment estimates for North Carolina. An expanded presentation of expected demographics and economic changes in North Carolina is in the appendix to this report.

4.1 Demographic Forecasts

In recent decades, North Carolina has been one of the nation's fastest growing states. From 2000 to 2010, North Carolina's 19 percent growth rate was surpassed by only five states, and its absolute increase of nearly 1.5 million people was topped by only four. In the 2010-2040 time frame, North Carolina will continue to be one of the fastest growing states, with the Charlotte and Raleigh-Durham metropolitan areas continuing to be among the country's fastest-growing areas, and most of North Carolina's other metropolitan areas also growing rapidly. North Carolina's population will increasingly urbanize and concentrate, with a large percentage of residents living in just a few major metropolitan areas. North Carolinians will also be older due to an aging population.

As shown in Table 4-1, North Carolina is expected to add another 4 million residents by 2040, growing to 13.5 million. In terms of relative population numbers, the Raleigh-Durham metropolitan area is expected to surpass the Charlotte area to become the state's most populous region, with nearly 3.2 million residents by 2040. Charlotte and the Greensboro-Winston-Salem metropolitan area will both have populations in excess of 2 million. Three other identified metropolitan areas (Wilmington, Asheville, and Fayetteville) are projected to have approximately 1.6 million residents combined by 2040. While they will not be growing as rapidly as the major metropolitan areas, population in many smaller cities and exurban areas (areas located just beyond the suburban boundaries of major cities) will also grow. Population outside the six major metropolitan areas will increase by 600,000, to 3.6 million.

In terms of the population growth rate, Raleigh-Durham will outpace all other metropolitan areas in the state, with an estimated 84 percent growth between 2010 and 2040, followed by Wilmington's 58 percent, and Charlotte's 47 percent. It is expected that the pace of growth across North Carolina will be slower after 2020, from 14 percent in the 2010-2020 decade to 11 percent in the 2030-2040 decade.

North Carolina's population will continue to urbanize and become more concentrated. The three most populous metropolitan areas (Raleigh-Durham, Charlotte, and Greensboro-Winston-Salem) are expected to account for nearly 62 percent of the state's population in 2040, up from 57 percent today, and the top six metropolitan areas will account for nearly 74 percent of the population in 2010, up from 69 percent today.

Table 4-1. Estimated North Carolina Population, by Major Metropolitan Area, 2000-2040

Region	2000 Census	2010 Census	2020	2030	2040
Charlotte	1,636,956	2,066,758	2,385,303	2,704,043	3,029,612
Greensboro-Winston-Salem	1,414,670	1,589,200	1,791,438	1,979,842	2,162,757
Raleigh-Durham	1,311,887	1,749,525	2,234,127	2,687,607	3,190,429
Asheville	369,172	424,858	468,848	512,028	549,891
Fayetteville	336,608	366,383	412,445	436,009	460,020
Wilmington	274,550	362,315	427,845	494,730	570,482
Rest of State	2,702,970	2,976,444	3,154,177	3,378,398	3,575,244
North Carolina	8,046,813	9,535,483	10,874,183	12,192,657	13,538,435

Source: U.S. Census Bureau, North Carolina State Data Center, Global Insight

Not only is North Carolina growing, its population is also aging. Table 4-2 summarizes the state's changing age breakdown. The number of seniors (defined as 65 years and older) is projected to increase rapidly in the 2010-2040 time period, with an estimated 4.1 million residents 65 years and older by 2040, up from 1.9 million in 2010. This amounts to a 108 percent increase by 2040. The 85 and older bracket is expected to show a 165 percent increase.

Table 4-2. Estimated North Carolina Age Group Population, in Thousands, 2000-2040

Age Group	2000 Census	2010 Census	2020	2030	2040	% Change, 2010-2040
0-24	2,769	3,221	3,578	3,974	4,404	42%
25-64	4,310	5,080	5,640	6,075	6,699	37%
65 and up	969	1,218	1,657	2,144	2,435	108%
75 and up	435	546	675	942	1,268	141%
85 and up	106	156	188	240	398	165%
Total	8,047	9,519	10,874	12,193	13,538	48%

Source: North Carolina State Data Center, Global Insight

Table 4-3 shows that retirees will continue to flock to the coastal areas and the mountains in western North Carolina due to the quality of life offered in those regions. Asheville and Wilmington are expected

to continue to include the largest percentage of residents 65 years and older in the six largest metropolitan areas in the state, with one in four expected to be 65 years or older by 2040.

Table 4-3. Estimated Percentage of Seniors (>65 years old) as Total of North Carolina Population, by Major Metropolitan Area, 2000-2040

Region	2000	2010	2020	2030	2040
Charlotte	11%	11%	13%	16%	15%
Greensboro-Winston-Salem	13%	14%	16%	18%	20%
Raleigh-Durham	9%	9%	12%	15%	12%
Asheville	18%	19%	21%	23%	26%
Fayetteville	8%	9 %	11%	14%	16%
Wilmington	14%	18%	22%	24%	25%
Rest of State	14%	15 %	18%	19%	22%
North Carolina	12%	13%	15%	18%	18%

Source: North Carolina Data Center, Global Insight

4.2 Employment Estimates

Total nonfarm employment in the state grew by nearly 33 percent between 1990 and 2007, but as shown in Table 4-4, fell 6 percent between 2007 and 2010, as North Carolina and the nation endured a deep economic recession. Employment sectors that have gained market share include health care, education, professional and business services, and leisure and hospitality, reflecting a shift to a service-based economy accompanied by declining manufacturing employment. Outside of textile/apparel manufacturing, in which outsourcing to foreign countries has been prevalent; the employment declines in North Carolina manufacturing are largely due to automation and technological innovation. Two decades ago, North Carolina was the nation's most manufacturing-intensive state as measured by manufacturing's share of total employment, with more than 26 percent of all payroll workers in the state employed by manufacturing companies. By 2010, that ratio dropped to 11 percent, largely due to the sharp decline of employment in the textile/apparel industry that experienced a decrease from 9 percent of total employment in the state in 1990 to just above one percent in 2010.

Table 4-4. Estimated Employment in North Carolina, by Sector, in Thousands, 2007-2040

Sector	2007	2010	2020	2030	2040	% Chg, 2007-2040
Goods-Producing Industries	800	610	724	712	738	-8%
Manufacturing	538	432	461	401	368	-32%
Construction	255	172	258	306	365	43%
Service-Providing Industries	3,345	3,292	3,887	4,446	4,999	50%
Military	116*	146	158	171.9	185	27%^
Total Nonfarm	4,145	3,903	4,611	5,158	5,737	38%

Source: Global Insight
*2000 data
^ 2010-2040 percent change

The trend toward an increasingly service-oriented economy is expected to continue in North Carolina through 2040. Overall, employment opportunities in the state are projected to increase by more than 38 percent. As indicated, the fastest employment growth is expected to take place in service-providing industries (all industries other than construction, manufacturing, mining, fishing, or forestry), projected to experience a 50 percent increase in employment opportunities, and account for 87 percent of all nonfarm jobs in the state by 2040. The decline in manufacturing employment is expected to continue, with an estimated 32 percent decrease. The military is an integral part of eastern North Carolina, with nine bases generating military and civilian jobs and requiring all types of infrastructure, including adequate transportation access and connectivity. While the growth of military employment is not expected to exceed the overall estimated employment growth rate, at a 27 percent employment increase, the military is expected to add 40,000 jobs on top of the 30,000 jobs projected to have been added between 2000 and 2010.

The trend of declining employment in the manufacturing sector is evident in employment projections for the three largest metropolitan areas in the state as well, as shown in Table 4-5. The Piedmont Triad is expected to continue to provide the most manufacturing jobs among the state's metropolitan areas, but it will also experience the steepest decline in the number of those jobs, with an expected 33 percent decrease. Charlotte and Raleigh-Durham will not be far behind, with 30 and 23 percent declines, respectively. Table 4-5 also shows the expected strength of Charlotte and Raleigh-Durham in professional and business services, with 438,000 estimated jobs added in those employment sectors by those two metropolitan areas by 2040. More details on employment estimates by specific industry are in the appendix to this report.

Table 4-5. Estimated Employment in Largest Metropolitan Areas in North Carolina Selected Sectors, Thousands, 2007-2040

Region and Sector	2007	2010	2020	2030	2040	% Chg, 2007-2040
Charlotte						
Manufacturing	82	66	71	62	57	-30%
Professional/Business Services	133	129	208	280	367	176%
Transport, Warehousing	36	31	40	46	46	28%
Total Nonfarm	860	806	1,006	1,183	1,381	61%
Manufacturing (%)	10%	8%	7%	5%	4%	
Greensboro-Winston-Salem						
Manufacturing	103	81	86	75	69	-33%
Professional/Business Services	82	75	110	136	163	99%
Transport, Warehousing	27	23	28	30	28	5%
Total Nonfarm	652	602	694	755	815	25%
Manufacturing (%)	16%	13%	12%	10%	9%	
Raleigh-Durham						
Manufacturing	75	62	68	61	58	-23%
Professional/Business Services	126	118	188	247	317	153%
Transport, Warehousing	15	13	17	18	18	16%
Total Nonfarm	803	782	981	1,157	1,354	69%
Manufacturing (%)	9%	8%	7%	5%	4%	

Source: Global Insight

4.3 Transportation Implications

This section highlights several expected economic trends that could have a significant impact on efforts to provide needed transportation services and infrastructure over the next three decades. Key findings and transportation implications include:

- The number of North Carolinians is expected to increase by 42 percent by 2040. Clearly, the demand for both services and infrastructure capacity in most areas of the state has not been reached.
- Population in the state's major metropolitan areas (Charlotte, Raleigh-Durham, Greensboro-Winston-Salem, will continue to grow even more rapidly than the state as a whole. The congestion problems of those major areas, a problem today causing significant delay and loss of productivity,

will continue to worsen without significant changes in either land use patterns or transportation capacity, or both.

- While metropolitan populations will continue to grow rapidly, population in many smaller cities and rural areas will also grow, though at substantially lower rates. As a result, the need for infrastructure investment in these areas will also continue.
- North Carolinians continue to age, with the average age increasing over the next three decades. Retirees will continue to move to the state, particularly to the southeast coast and the mountains. This graying population is unlikely to be as dependent on the automobile for mobility and will likely be increasingly reliant on public transportation.
- The employment base will continue its radical shift from the manufacturing base of the 1990s as the state's economy becomes increasingly service-oriented. The ongoing shift from a manufacturing to a service-based economy will increase the need to efficiently and quickly move smaller and higher-value goods to markets.

Such trends create serious challenges to NCDOT and its transportation partners. The implications of demographic and employment forecasts on the state's transportation network is explored in more detail in Chapters 5 and 6.

Chapter 5
Key Transportation Trends and Challenges

The 2040 Plan is a blueprint for broadly defined transportation-related decisions in North Carolina for the next 30 years. The Plan must reflect current conditions and expectations, but it must also anticipate changing conditions that might define different needs, expectations, and responses. This chapter identifies the key challenges facing NCDOT as it serves to lead the state's efforts to enhance economic opportunity and environmental sustainability, the core goals underpinning this study. North Carolina is facing the following transportation challenges:

- Growing and changing personal mobility needs
- Preservation of transportation infrastructure health
- Growing and changing freight movement and logistics needs
- Financial sustainability
- Environmental sustainability

5.1 Growing and Changing Personal Mobility Needs

Future demand for transportation is largely determined by changes in the state's demographics and economy. Based on the 2010 Census, population in North Carolina has grown to 9.5 million, an 18.5 percent increase from 8.0 million in 2000. The demographics of North Carolina are expected to change substantially over the next 30 years. By 2040, the state's population will be significantly larger, older, and more ethnically diverse than today.

North Carolina must anticipate and prepare a response to the following demographics-related challenges facing its transportation sector; these challenges are described in more detail in the following sections:

- Population growth
- Population and economic opportunities concentration
- Population diversity
- Aging population

Population Growth

North Carolina will continue to attract newcomers. By 2040, an estimated 13.5 million people will call North Carolina home, a 42 percent increase from 2010.[10]

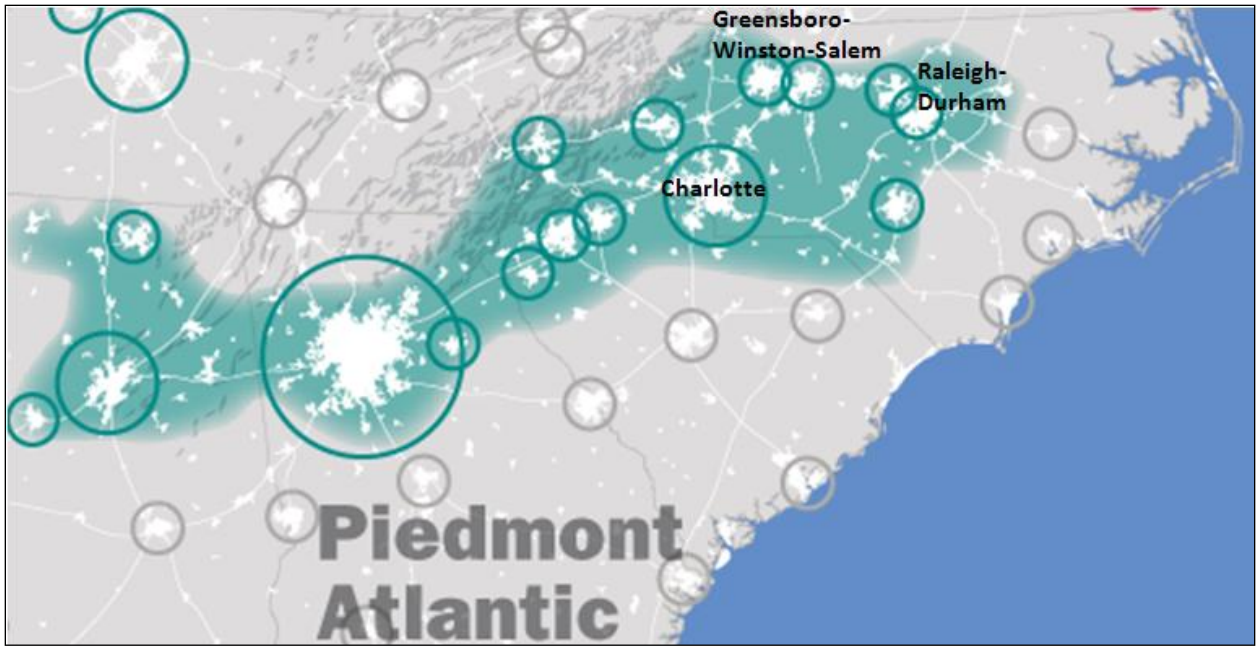
Challenge: The sizable population increase will create the need for more housing, employment, and services, leading to substantial impacts on travel patterns and demand and placing increased strain on the state's transportation infrastructure health. The challenge presented by these demands is cited bluntly in the North Carolina State Energy Plan: "The design of most of North Carolina's towns and cities fails to encourage transportation efficiency via shorter shopping trips, increased pedestrian friendly developments, and augmented mass transit use."[11] Public attitudes which result in reliance on motor vehicles can be expected to continue to lead to substantial impacts on travel patterns and demand.

Population and Economic Opportunities Concentration

The country's population will continue to urbanize and concentrate in clusters and corridors in and around urban areas and major transportation corridors. Between 2005 and 2050, more than half of the nation's population growth, and perhaps as much as two-thirds of its economic growth, will occur in several "megaregions."[12] One of those megaregions, the rapidly growing Piedmont Atlantic, shown in Figure 5-1, stretches from Birmingham, Alabama, to Raleigh-Durham. The section of Piedmont Atlantic in North Carolina largely follows the two main transportation corridors in the state: Interstates 85 and 40. Overall, the high-growth metro areas of Charlotte, Raleigh-Durham, Wilmington, and Greensboro-Winston-Salem will grow at a much faster rate, both in terms of population and offered economic opportunities, when compared to the rest of the state.

The continued concentration of population in the state's six major metropolitan areas leads to the threat of increased traffic congestion. Public surveys of North Carolinians indicate that reducing congestion through improving infrastructure health is one of the top factors NCDOT should consider when prioritizing projects. Although the Department's *2010 Annual Performance Report* stated that 88 percent of Strategic Highway Corridor miles have little or no reoccurring congestion, the Texas Transportation Institute reports that congestion has gotten worse in recent years: trips take longer; congestion affects more of the day; congestion affects weekend travel and rural areas; personal trips and freight shipments must plan around congestion more often; and trip travel times are unreliable. The report pointed out that in the two largest metropolitan areas in North Carolina, Charlotte and Raleigh-Durham, congestion causes an average commuter to spend an extra 26 hours of travel time and use additional 22 gallons of fuel on an annual basis, which amounts to an average congestion cost of $636 per commuter. Smaller urban areas of Greensboro and Winston-Salem have experienced congestion cost as well: with 16 hours of travel time delay per commuter and 14 gallons of wasted fuel, the average congestion cost per commuter in those areas in 2010 was estimated at $379.[13]

[10] Global Insight database. US Census 2010.
[11] North Carolina State Energy Office, *North Carolina State Energy Plan*, revised edition January, 2005: http://www.energync.net/epc/docs/Energy%20Plan%202005.pdf
[12] Center for Quality Growth & Regional Development, *MegaRegions and Transportation*
[13] Texas Transportation Institute, *Urban Mobility Report 2010*



Source: America 2050: http://www.america2050.org/megaregions.html

Figure 5-1. Piedmont Atlantic Megaregion

Challenge: The low cost of living and high quality of life, including the high level of personal mobility and ease of moving around, have made the region attractive for newcomers. However, the region has also started facing serious challenges associated with its growing population. These challenges include increased traffic congestion, runaway land consumption, and inadequate transportation infrastructure.[14] Population concentrations in the metropolitan areas will further increase congestion, commuting time, and commuting patterns. Part of the problem stems from the types of land use patterns that are prevalent in North Carolina: the majority of the newer development is low-density, zoned for single use, and designed with automobile needs in mind with little regard for other transportation modes.

Population Diversity

The recently released U.S. Census 2010 North Carolina data show that the state is becoming more ethnically diverse, with increases in Latino, Asian-American, and African-American populations growing more rapidly than the white population. This trend can be expected to continue.

Challenge: More diversity creates challenges for transportation systems delivery. Access to economic opportunities is one important issue. Immigrant households typically have fewer vehicles per household than the nationwide average, and many immigrants' points of first entry are in suburban areas in North

[14] America 2050: http://www.america2050.org/piedmont_atlantic.html

Carolina, with low-density, single-family housing dominating the land use development patterns, and with inadequate public transportation and bicycle and pedestrian facilities.[15]

Aging Population

The Global Insights database estimates that by 2040 more than 30 percent of North Carolina's population will be 65 years or older, compared to 13 percent today. The gap between the number of working-age people and dependents (children and seniors) will widen as baby boomers age. However, many baby boomers are expected to choose a "soft retirement" and continue to work part-time beyond retirement age. They will mostly continue to drive to meet their daily mobility needs, both for commuting and other trips. [16]

Traffic safety will become another issue with the expected increase in the number of older drivers on North Carolina's roads. Drivers 65 years and older were involved in more than 28,000 vehicle crashes in North Carolina in 2008, and that number will likely increase based on the expected aging population growth.[17] However, important subsets of the aging population will be less likely to have car access: immigrants, low-income residents, and ethnic minorities. Their personal mobility will depend on the availability of other modes, particularly public transportation and pedestrian connections. Older adults, along with other low- or fixed-income persons, are most susceptible to rising transportation costs, which might force them to use alternatives such as public transportation, although they could be faced with higher passenger fares if transit agencies raise their fares due to increased fuel costs.[18]

Challenge: Dependence on private automobiles by an aging population will pose multiple challenges. As the number of older Americans who continue to drive increases, the infrastructure health of the roadway network in North Carolina will continue to be challenged by the growing travel demand. Travel forecasting based on mean indicators can mask the needs of a changing population, including the needs of an aging population. Their patterns of travel could change substantially from the forecasts, with travel demand increasing for different types of trips, in different locations, and at different times.

5.2 Preservation of Transportation Infrastructure Health

With 105,000 miles of public roads, 3,300 railroad miles, 2 major seaports, 11 scheduled and 61 general aviation airports, 99 public transportation entities, bicyclists allowed on more than 78,000 miles of NCDOT-owned roads, and pedestrian facilities alongside many roads in the state, NCDOT and its public and private transportation partners have invested heavily in North Carolina's transportation infrastructure. As is implied by the mobility and logistics challenges described above, preserving the health of these systems is crucial to providing economic opportunity and ensuring public safety.

[15] National Household Travel Survey 2006: http://nhts.ornl.gov/briefs/Immigrant%20Travel.pdf
[16] Pew Research Center, February 2008, US Population Projections: 2005-2050.
[17] NCDOT, Division of Motor Vehicles, *North Carolina 2008 Traffic Crash Facts*: http://www.ncdot.org/dmv/other_services/recordsstatistics/download/2008_Crashfacts.pdf
[18] Brookings Institution, 2003, *The Mobility Needs of Older Americans: Implications for Transportation Reauthorization*. National Household Travel Survey, March 2009, *Older Americans: Safety Implications.*

The "health" aspect of the state's transportation infrastructure must be "preserved" to last longer. As with all tangible assets, transportation system components need continuous monitoring, maintenance, and rehabilitation. Unfortunately, the infrastructure health is in jeopardy. The Department's most recent *2010 Annual Performance Report* described the following key performance measures of the state's transportation network:

- While 84 percent of interstate route pavement miles are in good condition, only 63 percent of primary and 67 percent of secondary route pavement miles are in good condition.
- 63 percent of bridges are in good condition.

The NCDOT's *2010 Report on the Condition of the State Highway System* has confirmed that the infrastructure health of the state's highway features requires serious attention. As reported, if funding remains stagnate, the percent of pavement miles in good condition in North Carolina is projected to drop from 68 percent to 50 percent by 2017. Similarly, bridge performance would drop from 61 percent in good condition to 54 percent.

Challenge: Preservation of infrastructure health will require more resources than today. The NCDOT has estimated that from 2011 to 2015, it will invest 34 percent of its funds on maintenance, preservation, rehabilitation, reconstruction, and replacement projects aimed at improving infrastructure health.[19] This will not suffice, and the challenge ahead will be to augment the existing revenue sources that pay for preservation of infrastructure health with new technologies, advanced materials, and modern equipment that improve efficiency and cost effectiveness. Already, the Department has reported that its increased investment in infrastructure health has largely paid off; since 2008, interstate conditions have improved by 3.6 percent.

5.3 Growing and Changing Freight Movement and Logistics Needs

Due to its strategic location, North Carolina plays a crucial role in the nation's freight transportation network. North Carolina's two major ports are important international gateways for bulk exports and commodities imports; Interstates 95, 85, and 40 serve as the primary trucking cargo arteries; two active Class I railroads offer freight rail capacity; and the three international airports serve as major freight hubs. Beginning with the preparation of the Statewide Logistics Plan and creation of the Governor's Logistics Task Force, logistics and the need to accommodate transportation needs of businesses have gained considerable attention. Unlike personal mobility, logistics is primarily concerned with freight flows and the infrastructure needed to support those flows. Logistics has become a critical management area for many businesses, and to remain competitive in a global economy, North Carolina must recognize that virtually all employment and population growth rely on efficient movement and adequate support activities that facilitate the movement of goods.

[19] NCDOT, *A Vision Set in Motion, 2010 Annual Performance Report*

North Carolina must anticipate and prepare an ongoing response to the following freight movement and logistics challenges facing its transportation sector; these challenges are described in more detail in the following sections:

- Increasing volumes and values of freight patterns and trading patterns
- Changing freight movement requirements

Increasing Volumes and Values of Freight Patterns and Trading Patterns

The importance of efficient movement and adequate support that facilitates the movement of goods to pertinent markets will intensify in North Carolina due to increased demand for those services. Recent freight and trading patterns in the state exemplify the overall trend of increases in both volume and value of goods shipped to, from, and via North Carolina's multimodal transportation network.

Freight patterns in North Carolina will continue to be dominated by trucks, both in terms of volume and value:

- By volume, trucks have dominated the percentage of the tonnage of shipments to, from, and within North Carolina, followed by rail and water (projections for FY 2010: 84.8 percent, 13.8 percent, and 0.9 percent, respectively). [20] Trucks are anticipated to continue to move the largest percentage of the tonnage of shipments within North Carolina, an estimated 92 percent in 2035, followed by rail at 5 percent.[21]
- By value, trucks have dominated the value of shipments to, from, and within North Carolina, followed by air and rail (projections for FY 2010: 87.7 percent, 8.8 percent, and 3.2 percent, respectively); trucks are anticipated to continue to move the largest percentage of the value of shipments within North Carolina, an estimated 94 percent in 2035.

Trading patterns in North Carolina will continue to be dominated by trucks, both in terms of volume and value, with South Carolina and Virginia constituting the two top trading partners (total 40 percent of all trading movement according to the Statewide Logistics Plan), followed by Kentucky and Georgia. Projections indicate that both trading volume and value will grow significantly, particularly foreign trade.

Challenge: Increased demand for freight movement and the resulting increase in shipments by both volume and value will continue to strain the infrastructure health of the transportation network in North Carolina. Truck traffic will continue to dominate the state's freight movement patterns, followed by an increased reliance on rail. Much of this growth will occur in urban areas and along the state's interstates. Incidentally, as reported by the Federal Highway Administration in *Freight Story 2008*, "freight movement often creates local problems without local benefits."

Changing Freight Movement Requirements

[20] NC Office of Budget and Management, Statewide Logistics Plan for North Carolina, 2008
[21] U.S. Department of Transportation, Federal Highway Administration, *Freight Shipments To, From, and Within North Carolina*: http://www.ops.fhwa.dot.gov/freight/freight_analysis/faf/state_info/faf2/nc.htm

As noted in the *Statewide Logistics Plan for North Carolina,* an evolving state economy will have markedly different freight movement needs than those of today. The core network of strategic highways, rail lines, and airports is likely to remain the same, but regional specialization initiatives, a changing mix of manufacturing types, and an increased military presence may dictate a surgical public sector response if economic opportunities are to be maximized. It seems unlikely that homogeneous investment strategies (such as providing four-lane highways within a few miles of every residence) can be defended when financial resources are scarce. A more focused strategy will be needed. In addition, there may be times when the definition of "mobility needs" must be expanded, to reflect not only the traditional view of facilitating the auto-oriented work trip, but also to reflect the logistics needs of commerce in both urban and rural areas, without which jobs may be lost and economies impacted.

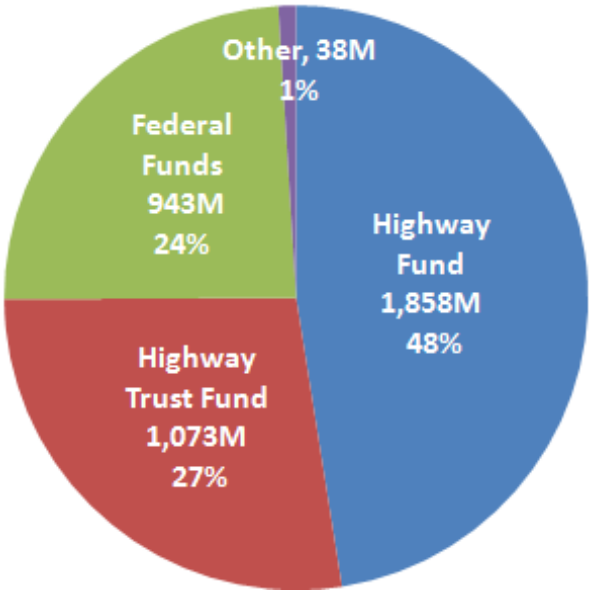
Challenge: As North Carolina transitions from a traditional textiles/furniture manufacturing base to a new economy of high-value goods and services, it will be necessary for commerce, economic development agencies, and transportation providers to work more closely to understand the logistics needs of commerce in urban and rural areas and to unite those needs with the infrastructure investment of the state and of private providers. Realizing that economic opportunity for the state's workers may rely on the ability of commerce to access resources and world markets, a great challenge facing NCDOT will be in recognizing changing logistics needs, designing systems to reflect those needs, and implementing decision-making processes that recognize the tradeoffs that may occur in addressing freight logistics and personal mobility needs.

5.4 Financial Sustainability

Adequate financing is fundamental to the delivery of transportation services and infrastructure including new projects and initiatives, expansion needs, and preservation and maintenance of transportation systems. NCDOT recognized the need for a comprehensive funding approach for all aspects of its operations. The Department's Policies to Projects Work Program clearly indicated the projected use of anticipated resources, based on a data-based prioritization process, and ensuring limited funding is properly invested to achieve optimal results.

NCDOT has an annual operating budget of nearly $4 billion (FY 2010). This revenue comes from three primary funding sources: the Highway Fund (including sources such as state gas tax, Division of Motor Vehicles registration and title fees, and federal aid appropriations) at 48 percent of the total; the Highway Trust Fund at 27 percent, and federal funds at 24 percent (Figure 5-2). In terms of allocation of those funding sources for specific uses, 38 percent is allocated for Transportation Improvement Plan construction, 25 percent for highway maintenance, 11 percent for state agency transfers, 8 percent for administration, and the remaining balance for other expenses.[22]

[22] NCDOT: *Finance and Budget*: http://www.ncdot.org/about/finance/



Source: NCDOT

Figure 5-2. North Carolina Department of Transportation Funding by Source, FY 2010

NCDOT must focus on anticipating and preparing a response to the following transportation financing challenges facing its transportation sector; these challenges are described in more detail in the following sections:

- Revenue gap
- Need to identify long-term sustainable funding sources

Revenue Gap

North Carolina is expected to grow in population, employment opportunities, VMT, and freight movement, all of which will result in an increase in travel demand. The growth in future transportation needs will increase the need to preserve the existing transportation infrastructure and to expand capacity. NCDOT will increasingly face challenges similar to what other state departments of transportation, the federal government, and local governments are facing: declining revenues that are not keeping pace with identified and projected transportation needs. The current model and level of transportation investment in North Carolina are not sustainable given the anticipated travel demand. While the transportation system owned and maintained by NCDOT continues to grow, the traditional highway maintenance funds have increased, but not enough to keep pace with inflation and system growth. The public and budget decision-makers need to understand the ramifications of demanding a system that cannot be sustained.

In the *2006 Mid-Cycle Update North Carolina Statewide Multimodal Transportation Plan*, the multimodal transportation investment needs total $124 billion (in 2005 dollars), while NCDOT estimates that a total of $59 billion (in 2005 dollars) will be available for transportation investment over the next 25 years. Comparing the needs against the available federal and state funding revenues identifies a funding gap of

$65 billion. Recent data show that state gas tax receipts have decreased dramatically in North Carolina. State revenues per lane miles in the state are well below national the average. In 2008, NCDOT received $20 in revenue per lane mile, compared to $64 nationwide.[23] Finally, the purchasing power of NCDOT construction dollars has shrunk in recent years; one dollar buys around 38 percent less today than it did just eight years ago, in 2003.[24]

At the federal level, the federal gas tax is the main funding sources of the Highway Trust Fund. However, that fund is becoming insolvent and will not be able to keep up with transportation needs, especially given the expected shifts to alternative fuels and the interest in more sustainable transportation options. The existing state Highway Trust Fund largely focuses on urban loops. The urban loops are located in Asheville, Charlotte, Durham, Fayetteville, Gastonia, Greensboro, Greenville, Raleigh, Wilmington, and Winston-Salem, totaling 353 miles, only 140 of which are open to traffic today. The estimated cost to complete the program is currently about $8 Billion; at the existing funding rate, it will take more than 50 years to complete the remaining 213 miles.

Challenge: North Carolinians deserve, and will demand, a transportation system that cannot realistically be provided given the current level of investment by the federal and state governments. Ironically, it is NCDOT that will need to look for other types of funding, including user fees, to replace the decreasing gas tax revenue. Compounding this issue is the fact that transportation funding revenues are generally sensitive to changes in inflation, fuel prices, and economic and budgetary conditions. They are also sensitive to future legislative actions at the state and federal levels, resulting in uncertainty when predicting the funding stream.

Need to Identify Sustainable Funding Sources

Based on the anticipated funding shortfall and increased travel demand resulting from increased modal needs, it is necessary to leverage current resources and identify new sustainable strategies for funding. Transportation financing is bound to continue to experience negative effects of the revenue shortfall. The NCDOT's role is to mitigate those effects through new funding sources and innovative financing strategies. The NCDOT has worked diligently not only to increase maintenance funds, but also to find non-traditional funding sources to decrease the revenue gap. These sources include the Mobility Fund, the American Recovery and Reinvestment Act, the Secondary Road Improvement Program, and the Interstate Maintenance Preservation Program.

Challenge: Identifying future funding sources can be difficult in lean economic times. During such downturns, the public may resist attempts at levying new user fees that are not defensible and necessary. Sustainable transportation financing in North Carolina must be twofold: (1) it must go beyond existing revenue sources, and (2) it must increasingly rely on lowering costs and increasing efficiencies.

[23] Federal Highway Administration, *Highway Statistics 2008*
[24] NCDOT, A Vision Set In Motion: 2010 Annual Performance Report

5.5 Environmental Sustainability

The growing population and the needed infrastructure response will continue to cause a strain on the state's environmental quality. There is a growing awareness of the role that carbon dioxide and other greenhouse gases play in global climate change. At the local level is increasing concern over air and water quality and the general quality of life. Public expectation for preservation of environment places challenges on NCDOT program delivery.

North Carolina must anticipate and prepare a response to the following environmental challenges facing its transportation sector; these challenges are described in more detail in the following sections:

- Growth in transportation sector-related energy consumption
- Growing concern about climate change
- Clean air and water in an increasingly challenging environment for building
- Environmental stewardship

Growth in Transportation Sector-Related Energy Consumption

Growth in energy consumption for the transportation sector has been outpacing overall energy consumption in North Carolina. Transportation, the movement of people (personal mobility) and goods and services (freight logistics) accounts for a staggering 27 percent of all energy consumed in North Carolina.[25] One of the primary reasons for the increasing use of transportation energy (or fuel) has been the rapid growth in VMT, or the total number of miles driven in the state each year, along with the increase in movement of freight by trucking and rail. Each licensed resident of North Carolina drove an estimated 11,000 miles in 2008, with all residents traveling 101.7 million VMT in 2008, representing an 8.5 percent increase from 2003.[26] Freight-wise, trucks have dominated, and are anticipated to continue to move, the largest percentage of the tonnage of shipments to, from, and within North Carolina, followed by rail. This movement adds to the VMT on North Carolina roads.

Commuting patterns show an auto-dominated landscape. North Carolina commuters overwhelmingly opt to drive alone. Public attitudes resulting in continuous preference for driving to and from work alone will need to be addressed. About 80 percent of the state's existing 4.4 million commuters currently drive to work alone compared to the national figure of 75 percent. About 11.5 percent of North Carolinians carpool, 1.1 percent use public transportation, 1.7 percent walk, 4.3 percent work from home, and 1.3 percent motorcycle or bicycle. Overall, North Carolina commutes are more auto-centric and rely less on public transportation and walking when compared to the national average.

[25] North Carolina State Energy Office, *North Carolina State Energy Plan*, revised edition January 2005: http://www.energync.net/epc/docs/Energy%20Plan%202005.pdf
[26] U.S. Department of Transportation, State Transportation Statistics, 2009: http://www.bts.gov/publications/state_transportation_statistics/state_transportation_statistics_2009/pdf/entire.pdf

Challenge: Although VMT in North Carolina have leveled off in recent years, it has been largely a function of the economic downturn rather than a transportation policy shift aimed at reducing the growth in energy consumption by the transportation sector. North Carolina must focus on increasing energy efficiency in the transportation sector to have any success in reducing total energy use in the state. Although growth in energy consumption for the transportation sector has been outpacing overall energy consumption in the state, investment in technologies that would reduce mobile point pollution (such as electric vehicles or incentives for drivers opting for cleaner vehicles) have not kept pace.

Growing Concern about Climate Change

Climate change may be one of the most significant issues facing transportation today. There is growing concern about the implications of global climate change and awareness of the role that carbon dioxide plays. The transportation sector is responsible for about half of all greenhouse gas emissions in the state.

Challenge: While an expected shift from oil to alternative sources of energy might reduce the environmental impacts of automobiles, other aspects of the environment must also be considered, particularly the transportation sector's impacts on the quality of life as it relates to mitigating its noise, visual, and land disturbance effects. In the future it will become crucial to identify the range of responses to climate change to provide a context for adaptation strategy and the best strategies to adapt existing infrastructure to climate change.

Clean Air and Water in an Increasingly Challenging Environment for Building

The impacts of transportation on the natural resources extend beyond greenhouse gas emissions. Air quality, water quality and scarcity, loss of biodiversity, and conservation and protection of natural resources are all important quality of life indicators that affect the state's economic competiveness. While water quality and wetland impacts continue to be regulated by strict federal, state, and local regulations, those regulations relevant to transportation facilities primarily include erosion control during construction and the detention and treatment of storm water runoff.

Challenge: The challenge faced by NCDOT and its transportation partners in providing the systems required to satisfy mobility, logistics, and access needs will be increasingly difficult to provide as urban areas expand and "easy" locations to add capacity to the system are exhausted.

Environmental Awareness

Environmental sustainability is likely to become a core focus for state transportation agencies in the future. If the state is to continue to provide economic opportunities and attract businesses that offer employment opportunities, NCDOT programs must rest lightly on the natural and built environment. Existing day-to-day practices (such as utilization of recycled materials in highway projects) are excellent examples of the Department's commitment to the environmental sustainability and showcase that NCDOT has begun to embrace environmental stewardship priorities in construction and maintenance activities.

The NC Board of Transportation adopted the NCDOT Environmental Stewardship Policy in 2002. The policy expresses the Department's commitment to "planning, designing, constructing, maintaining, and managing an interconnected transportation system while striving to preserve and enhance our natural and cultural resources."[27] This policy stresses the importance of balancing daily operations and environmental responsibility and strongly encourages employees to incorporate the principles of safety, environmental stewardship, and customer focus into their daily activities.

Context-sensitive solutions are a comprehensive approach to transportation decision-making. This approach embraces the philosophy that transportation programs and projects should address transportation needs, be an asset to the community, and be compatible with the human and natural environment. The NCDOT views context-sensitive solutions as a critical element in institutionalizing its stewardship policy. The Department's Complete Streets Policy, at its core, encourages environmentally friendly, non-vehicular travel. The NCDOT is also developing a Sustainability Blueprint that would include an inventory of existing sustainability practices and a prioritized list of recommendations, including performance metrics and a corresponding tracking system. [28]

Challenge: Providing adequate transportation infrastructure and services needed for a growing population will become more difficult in the future when easy solutions are gone. The challenge is to provide the kind of sustainable transportation solutions that result in minimal disturbance to the natural resources, are economically viable, and, at the same time, improve the mobility of North Carolina residents and place NCDOT at the forefront of environmental stewardship efforts nationwide.

[27] NCDOT Environmental Stewardship Policy:
http://www.ncdot.org/programs/environment/download/environmental_policy.pdf
[28] NCDOT *Blueprint for Sustainability*:
http://www.ncdot.org/download/about/board/eppc/documents/2009/2009_10_Blueprint_Sustain.pdf

Chapter 6
Transportation Opportunities

The transportation challenges posed by overarching social, economic, and environmental trends and issues described in Chapter 5 are daunting. Focused, strategic deployment of financial and human resources will be needed if these challenges are to be satisfactorily addressed. In some cases, current spending and resource allocation plans may need to be adjusted. And looming over any policy or programmatic response is the huge transportation funding gap that reflects these challenges. As documented in the NCDOT *2006 Statewide Transportation Plan Mid-Cycle Update*, the identified need was defined to be $124 billion through 2030. This was a significant increase over 2025 needs defined by the 2004 STP, reflecting continued rapid population growth, ever-higher per capita VMT, and rapid increases in construction costs. The resultant reported funding gap of $65 billion will force NCDOT to continue to make tough decisions in the allocation of its finances.

There may be external opportunities available to NCDOT that might be leveraged to meet those challenges more effectively. If successful, the State's transportation investments can contribute more effectively to the broad goals of providing ever-greater economic opportunities, ensuring that the environment is better tomorrow than it is today, and being good stewards of public funds. This chapter describes the following broad opportunities to address transportation challenges; it also discusses the looming funding gap:

- Emphasis on personal mobility
- Strategic investment responsive to expanded focus on logistics
- Expanded, more flexible funding initiatives
- Laser-like identification of needs for financial sustainability
- Enhanced partnerships
- Environmental sustainability

6.1 Emphasis on Personal Mobility

As North Carolina continues its rapid population growth, its population will become older, more ethnically diverse, and increasingly likely to work at least part-time past the typical retirement age. Population growth alone is bound to create significant capacity constraints leading to congestion and loss of mobility. Social tendencies will also play a major role in travel demand patterns. These tendencies include the values of younger generations and immigrants, an increase in the number of seniors driving, shifts in mobility preferences, and an increased demand for freight services.

In its provision of transportation services, North Carolina has dealt successfully with its population boom. The state has an opportunity to offer a positive response to personal mobility challenges in several ways:

- By countering capacity constraints and congestion with multimodal solutions and seamless intermodal connectivity
- By improving accessibility and intermodal connections
- By using technology to enhance mobility options
- By enhancing education about transportation issues

Opportunity: Counter capacity constraints and congestion with multimodal solutions and seamless intermodal connectivity.
Growing population will have an immense impact on travel demand and travel patterns. A primary emphasis of high level personal mobility is improving connections and access to different modes for all users. NCDOT, through its direct ownership and control of the majority of roads in the state and responsibilities extending to all other transportation modes, can encourage multimodal connections between automobile, transit, rail, airline, bicycle and pedestrian modes and facilities. The Department could also include multiple performance measurements for non-highway modes to properly track its future progress towards meeting that goal.

Opportunity: Improve accessibility and intermodal connections.
Through the use of sustainable design approaches, the NCDOT Complete Streets Policy is a bold step toward supporting an interdependent, multimodal transportation network that safely accommodates access and travel for all users. The goal of the policy is to ensure that the state's infrastructure accommodates a wide variety of transportation modes that can be used to move both people and freight.[29] The Department should focus on providing excellent transportation connections that link workers with jobs, raw materials with manufacturers, and recreational users with parks and natural resource areas.

Opportunity: Use technology to enhance mobility options.
Technology will positively affect the future delivery of transportation services by offering innovative ways to efficiently meet traveler needs and expectations. The expanded application of real-time information, intelligent transportation systems, and other improvements will not only allow NCDOT to offer a more refined and efficient transportation system, it will also help reduce the Department's operating costs. End-users will also do their part. Today's smart phones with their real-time traffic and transit information or today's GPS systems might be anachronisms in just a few years. In 30 years, virtual travel might become a reality. Advancements in materials science, communication tools and techniques, and freight tracking and movement offer unique opportunities to do more with less. By optimizing the

[29] NCDOT, *A Vision Set in Motion, 2010 Annual Performance Report*

transportation network through the use of technology, NCDOT can mitigate congestion, increase safety, increase dependability, and enhance mobility for all users.

Opportunity: Enhance education about transportation issues.
The task of educating the public about transportation issues is an on-going endeavor. General information concerning transportation projects, new or proposed thoroughfares or service changes must be given to the North Carolinians by NCDOT on a routine basis to avoid confusion and keep the public informed. Despite the on-going efforts to educate the public, transportation issues are often not fully understood by the general public. Through its existing communication and outreach efforts, NCDOT has the ability to increase awareness of North Carolinians about transportation and mobility issues, including the costs and investments related to each mode, the trade-offs involved with each mode and access and intermodal connection options. This would lead to a more informed public that chooses mobility options that consider the investment required and consequences associated with each option.

6.2 Strategic Investment Responsive to Expanded Focus on Logistics

In the past several years, North Carolina has placed an institutional emphasis on the logistics needs of the state's businesses. This emphasis takes on particular importance because logistics challenges affect the ability of commerce to attract new or expanded businesses due to deficiencies in the state's transportation infrastructure. In response to House Bill 1005, Session Law 2007-551, investigators from North Carolina State University prepared the Statewide Logistics Plan for North Carolina in 2008. Since completion of that plan, North Carolina's Logistics Task Force, with the support of NCDOT and the North Carolina Department of Commerce, has worked to make recommendations to ensure that people and goods are able to move efficiently across North Carolina. The mission and goals of the Logistics Task Force are shown on Figure 6-1.

The Logistics Task Force is reviewing all elements of the state's multimodal transportation system involved in the movement of goods and resources, including roads and highways, airports, ports, railroads, and transit. The review focuses on giving North Carolina a competitive advantage in economic development by maximizing existing transportation systems and defining priorities for future transportation investments. The task force is also reviewing specific logistics needs of the state's seven economic development districts. The review will help to identify specific transportation infrastructure needs that will enhance the competitiveness and economic opportunities that those regions can offer to current and potential employers and workers. The resulting investment decisions will support urban and rural economic development statewide.

Mission

The mission of the task force is to create jobs and recruit industry by developing an efficient and cost-effective vision plan for the movement of people, goods, and information throughout the state of North Carolina.

Goals

- Assess the existing resources and project future needs of the state's multimodal transportation systems (aviation, highway, rail and transit), as well as water, sewer, and broadband capabilities.
- Investigate reductions or the transfer of functions from existing governance structures to aid efficiency and avoid duplication.
- Identify the regional programs and infrastructure that support industries vital to the state's long-term economic viability.
- Explore public-private partnerships in transportation and economic development that support the overall plan.
- Recommend short-, medium-, and long-range plans to the Governor and General Assembly, which will integrate their operation seamlessly and manage state funds more strategically.

Figure 6-1. Mission and Goals of the Governor's Logistics Task Force

Traditionally, NCDOT has considered economic development in setting programming priorities. These considerations have tended to be either (1) immediate responses to site-specific economic development needs, or (2) homogeneous programs; for example, to develop a statewide system of four-lane highways to encourage rural development, or funding of general aviation airports. The opportunity presented to NCDOT by the focus on logistics in collaboration with the Logistics Task Force and Department of Commerce is to use scarce financial resources where they might leverage the greatest economic development/opportunity benefit. Benefits could be derived by identifying short-term and long-term infrastructure investment strategies that are consistent with evolving commercial opportunities.

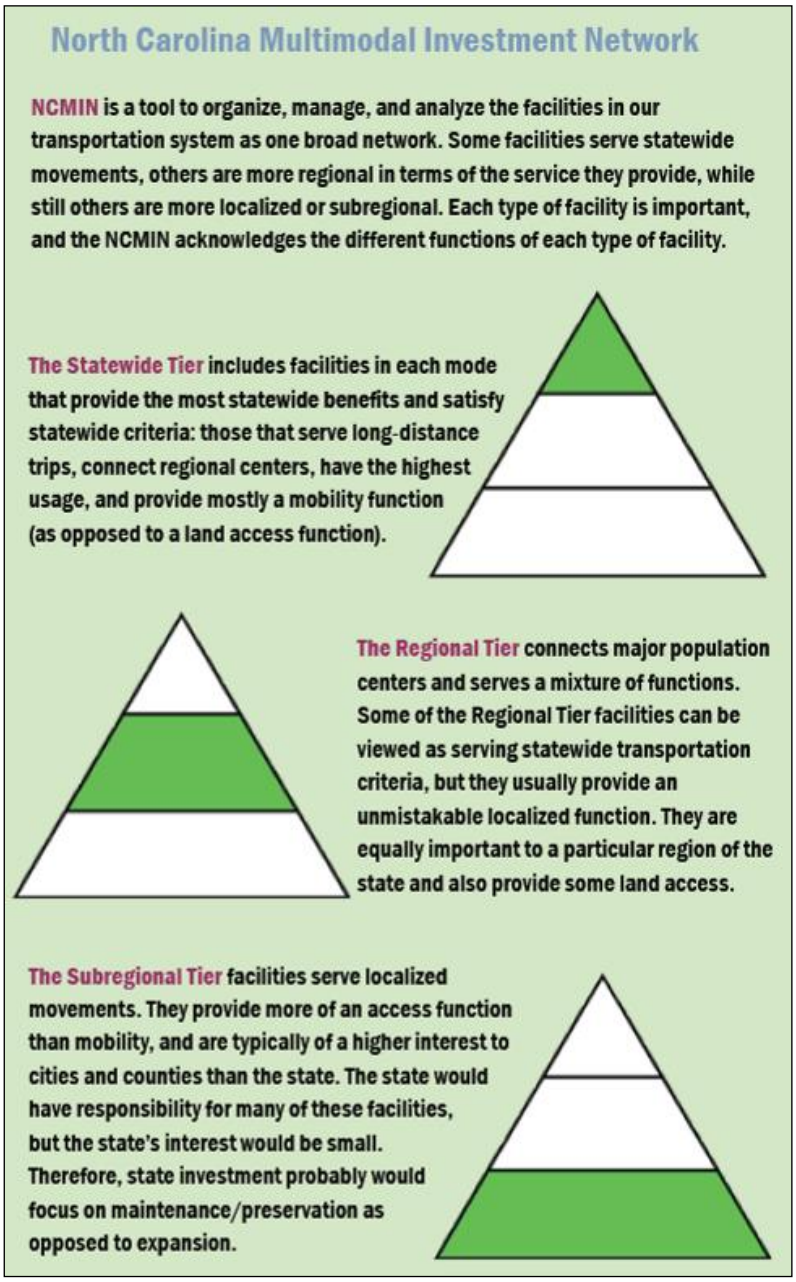
The NCMIN, described in Chapter 2 and shown in Figure 6-2, could allow proposed improvements in various tiers and modes to consider the benefits that will be captured by addressing identified logistics needs. For the 2040 Plan, insight gained from the Logistics Task Force deliberations can be considered in defining modal needs, examining long-term financing options, and defining policy changes needed to maximize return on investment that is focused on creating improved economic opportunities for state residents.

6.3 Expanded, More Flexible Funding Initiatives

NCDOT faces challenges in accessing a sustainable funding stream that is necessary to maintain and expand a transportation infrastructure that is responsive to growth and the changing needs of commerce. This largely reflects the expected long-term decline of gas-tax revenue as vehicles become more efficient at a rate higher than the increase in travel. There is a growing awareness among state and federal transportation agencies such as NCDOT that increasing funding gaps, changing economic

development needs, meeting environmental sustainability goals, and rapidly increasing demand from the public and from commerce for infrastructure enhancement and preservation will require greater flexibility to address varying needs.

North Carolina has been successful in gaining flexibility in the application of state funds. Example are the legislation that created the short-term Mobility Fund for projects of statewide or regional significance and the creation of the North Carolina Turnpike Authority to accelerate implementation of a small set of vital regional highway projects. Similar focused funding programs have been established for public transportation, rail passenger and freight, and aviation programs. But as its backlog of needs increases, there may be an opportunity to allocate scarce funding if greater funding flexibility or expanded sources could be obtained. This approach would include leveraging of both new public funds and working with the private sector to target specific improvements to their mutual benefit.



Source: NDCOT 2006 Mid-Cycle Update

Figure 6-2. North Carolina Multimodal Investment Network

These recent funding successes, coupled with the opportunities offered by enhanced partnerships, may offer similar opportunities for expanded, more flexible funding initiatives to address the long-term funding gap. In considering financing options as part of preparation of the 2040 Plan, options that might be considered could include:

- Extending the Mobility Fund with expansion to include strategic investment in the NCMIN to implement the Statewide Logistics Plan.
- Expanded application of user-based fees such as tolling on a programmatic basis; for example, tolls might be broadly applied to accelerate completion of the urban loop system or to fund long-term needs of the Interstate highway system.
- Encouraging equity participation by NCDOT's private partners (such as transportation providers) and strategic economic sectors (such as agriculture or the military).
- A shift from a fuel consumption revenue base to a use basis (such as VMT).

6.4 Laser-Like Identification of Needs for Financial Sustainability

The NCDOT has been actively transforming the way it does business, converting to a goals-driven organization that clearly tracks and reports its successes and failures and that makes programming decisions in a more transparent, collaborative way. In the face of the state's demonstrated long-term transportation funding gap, the challenge of stewardship of financial resources will only become more crucial. Part of this stewardship should demonstrate that stated needs and the associated financial requirements are real and that any request for additional public financial support is justified.

The NCDOT is developing tools that provide a unique opportunity to ensure that stated needs are vital to creating economic opportunity, sustaining the state's environment and its quality of life, and preserving public safety. With its Performance Monitoring Dashboard, NCDOT is moving toward being able to track its system performance (in areas such as bridge health, congestion levels, or transit on-time records) and to compare that performance to desired standards. Information from the Performance Monitoring Dashboard will form the foundation of the database from which future needs can be determined. While continuing to refine its desired LOS for each NCMIN mode and tier, the Department is increasingly able to assess the implications of varying funding levels on health of its infrastructure.

An opportunity proposed for further consideration in preparing the 2040 Plan is to apply the LOS developed for the Priorities to Projects Program and Resource Plan to the 2040 Plan's horizon year. This will provide consistency between short-range needs of the 10-year Program and Resource Plan and the long-range needs defined by the 2040 Plan. It should also allow further consideration of the tradeoffs of alternative resource allocation strategies (e.g., the benefits of increased funding or the shift of available funds among program categories).

6.5 Enhanced Partnerships

Through its various modal programs, NCDOT has a history of leveraging partnerships to provide for the state's transportation infrastructure and services. The Department has a long history of working with local and regional governments, public transportation agencies, and airport authorities to identify mutual needs and to apply resources to address those needs. An example of such a partnership is the joint funding by NCDOT and the City of Charlotte/Charlotte Area Transit System to fund the construction

of the state's first urban light rail transit line. Such partnering has been extended to provide public transportation service in all of the state's 100 counties.

Not so ingrained in NCDOT's history is partnering with private sector transportation providers, primarily freight movers. The trucking industry uses state roads and highways but has not traditionally been a partner in building and maintaining the highway system other than paying user fees and taxes. Conversely, freight railroads have long been the province of the Class 1 and local railroad companies, with small investment by the state in branch line preservation and industrial access programs. While the North Carolina Railroad owns the right-of-way across the Piedmont Crescent and extending to the port at Morehead City, the track is maintained and all freight service is provided by the leasing railroad, Norfolk Southern Corporation. In recent years, the public-private partnership between NCDOT and freight railroads has increased as NCDOT has pursued a broad program of improved rail safety and a more focused program of expanded passenger rail service between Charlotte and Raleigh. To the benefit of both parties, grade crossings have been closed to improve public and rail carrier safety, and additional track capacity has been provided to reduce unpredictable delays and improve transit speeds. By securing $540 million in federal high-speed rail funding in 2010, infrastructure improvements in the Piedmont Crescent have accelerated.

Not so evident has been the partnering between NCDOT and the non-transportation sectors of the state's economy. The work of the Logistics Task Force clearly shows that a great benefit to major sectors of the state's economy (such as tourism, agriculture, manufacturing, and military) might be realized if either direct or indirect financial support is provided for infrastructure investment. This would be especially the case when such needed investment exceeds the ability of NCDOT to meet these and other needs within its more traditional funding structure.

The opportunities that enhanced partnering offers in the delivery of transportation infrastructure and services come in the identification of mutually beneficial system improvements that offer the most cost rewards. The NCDOT has sought to improve its partnering through its Transportation Reform process (described in Chapter 2). Partnerships with local governments and locally-based organizations can promote an equitable, balanced and reasonable transportation planning process. Local resources can serve the function of extension agents for NCDOT transportation agencies and help identify and address pressing needs at the local level. Creating long-term partnerships between local entities and NCDOT divisions can be an effective way to create and implement solutions to transportation at local and regional levels.

Through the prioritization process that was the basis for development of the 10-year Policies to Projects Program and Resource Plan, NCDOT has sought to more directly engage its local/regional government partners in developing its 5-year Work Program and Statewide Transportation Improvement Program. The decision-making processes evolving from the Transportation Reform have the potential to inform development of the 2040 Plan as well as to gain consensus on the investment strategies and supporting policies that can advance the transportation system.

Similarly, recent efforts such as the preparation of the Statewide Logistics Plan by a task force comprised of public and private transportation providers and users has raised the awareness of opportunity provided by broad public-private partnering to identify mutual needs. Investment programs such as High-Speed Rail, with its clear benefits to both public rail passenger service and private freight rail, demonstrate the potential for continued and expanded partnerships.

6.6 Environmental Sustainability

Recognizing that sustainable transportation solutions contribute to healthy, economically viable, and sustainable communities, NCDOT has declared that its Environmental Mission is to connect people and places in North Carolina safely and efficiently, with accountability and environmental sensitivity.[30]

Building on the principles in its Sustainability Blueprint, NCDOT has multiple opportunities to offer positive responses to environmental and energy challenges facing the state. These opportunities include:

- Better integration of land use and transportation decisions to allow more efficient trip-making and energy savings
- Becoming a leader in the use of green technology in building and operating the state's transportation network
- Realizing economic benefits of sustainable transportation solutions

Opportunity: Better integration of land use and transportation decisions to allow more efficient trip-making and energy savings.

North Carolina is, and likely will continue to be, an auto-oriented economy. This is not necessarily detrimental, because every trip made can be considered a measure of economic activity. Over the past few decades, the land use response to population growth has been sprawling development patterns that have led to longer and longer average trip lengths, fueling ever-increasing congestion. In response to a 42 percent increase in population by 2040, employing the same patterns will create more congestion. Conversely, steps can be taken to reduce the distances that must be traveled for each of those valued trips. The new development or redevelopment that will accommodate growth can be seen as an opportunity to better integrate land use and transportation investment decisions, allowing shorter, less intrusive opportunities to make the same trips.

Better integration of land use and transportation causes less strain on the environment, curbs sprawl and reduces land consumption, mitigates traffic congestion, increases quality of life, and results in higher productivity and the economic benefits described below. The NCDOT can focus on integration of land use and transportation as an effective way to foster environmental stewardship. In the future, NCDOT might give priority to highway and transit system expansion and operational projects that promote integrated land use and transportation planning. There are some excellent examples of

[30] NCDOT Environmental Excellence: http://www.ncdot.org/programs/environment/

integrating land use and transportation planning in the state already. Charlotte has taken a proactive approach to land use and transportation planning within the framework of managing growth. Charlotte's progress towards meeting its goal of becoming the premier city in the country for integrating land use and transportation is measured through five key strategic initiatives. Much of Charlotte's future moderate to higher intensity development is targeted within defined "Growth Corridors" and in "Activity Centers" that support high density mixed use development and rapid transit. Lower to medium density residential and services supporting neighborhoods is targeted for the areas between the Growth Corridors, referred to as "Wedges." This conscious strategy of integrating land use and transportation, supported by area plans and other policy documents, will help maximize existing infrastructure and services in the rapidly growing Charlotte area.

Opportunity: Becoming a leader in the use of green technology in building and operating the state's transportation network.

Because it preserves and improves the state's transportation systems, NCDOT has the opportunity to employ new technologies to increase energy and reduce emissions. And as a major funder of transportation investment by others, NCDOT has an opportunity to encourage such activities by its partners. NCDOT should become the leader in showcasing and encouraging new technologies. Advanced passenger and commercial vehicles might use alternative and cleaner fuels (such as hybrid, electric, and fuel cell). Passenger rail might rely more on low-emission rail vehicles and alternative fuels. Freight trucking might improve diesel engine mileage or rely more on hybrid technology. Airplane engines and ferry turbines could be improved in terms of efficiency and energy consumption. The NCDOT can also use green technology in the design and construction of its facilities. Green materials could be used not only for roadway construction, but also for capital facilities such as buildings, operating equipment, and traffic lights.

Opportunity: Realizing economic benefits of its sustainable transportation solutions.

The NCDOT should expect to reap the benefits of its environmental stewardship efforts. These include key economic benefits such as new business attraction to areas with sustainable transportation networks; increased business activity and its concentration; reduced transportation costs; and facilitated economic growth, including higher value land use. Sustainable transportation affords job creation possibilities in services, technology, construction, design, manufacturing, maintenance, education, and research.

6.7 Summary of Challenges and Opportunities

As this report seeks to demonstrate, NCDOT and its transportation partners face substantial challenges in addressing the broad transportation needs of the state over the next 30 years. These challenges include assurance of the safety of its systems, preservation of the health of an aging infrastructure, and provision of economic opportunity brought in part by personal mobility and efficient movement of the freight and goods of commerce. As if bridging a multi-billion dollar funding gap were not enough, there are broad shifting influences that will need to be addressed: growing population, an evolving economy, sensitive environmental conditions, and uncertain financial resources.

These daunting challenges are not, however, without corresponding opportunities. And they are not abstractions. Many of these opportunities that might be leveraged to meet the transportation needs are available today. For this 2040 Plan, they will become a starting point for considering goals and objectives, long-term investment and revenue enhancement strategies, and policy and process change.

Appendix

Demographic and Economic Projections: North Carolina in 2040

A.1 Population Projections

In recent decades, North Carolina has been one of the nation's fastest growing states. From 2000 to 2010, the state's 18.5 percent growth rate was surpassed by only five states, and its absolute population increase of nearly 1.5 million was topped by only four states. North Carolina is now the 10th most populous state. Within the state, the Charlotte and Raleigh-Durham metropolitan areas continue to be among the fastest-growing in the country.

The North Carolina Office of State Budget and Management (OSBM) and the economic consulting firm Global Insight (the data service OSBM subscribes to) provide population projections at the county and state levels. The projections imply that statewide population growth will slow, but that even with the slow-down, growth will continue to be strong, particularly in metropolitan areas.

Table A-1 summarizes the demographic projections for six major metropolitan areas in North Carolina, plus the state as a whole. The following regional definitions are employed: A metropolitan statistical area (MSA) is according to the post-2002 definitions. A combined statistical area (CSA) is generally made up of more than one MSA.

Table A-1. Metropolitan Area Definitions

Charlotte CSA	Greensboro/ Winston-Salem CSA	Raleigh/ Durham CSA	Asheville MSA	Fayetteville MSA	Wilmington MSA
Anson	Alamance	Chatham	Buncombe	Cumberland	Brunswick
Cabarrus	Davidson	Durham	Haywood	Hoke	New Hanover
Cleveland	Davie	Franklin	Henderson		Pender
Gaston	Forsyth	Harnett	Madison		
Iredell	Guilford	Johnston			
Lincoln	Randolph	Orange			
Mecklenburg	Rockingham	Person			
Rowan	Stokes	Wake			
Stanly	Surry				
Union	Yadkin				

North Carolina has 14 MSAs, of which 9 are represented in the above regions. For example, the Greensboro/Winston-Salem CSA is made up of three MSAs, and two counties are designated as "micropolitan areas." The five MSAs not represented in Table A-1 are included in the Rest of State category below, which for purposes of this document are referred to loosely as the state's "non-metropolitan areas."

Actual and projected decadal totals for these metropolitan areas, using newly released data from the 2010 Census, are shown in Table A-2. The projections incorporate data from both the North Carolina State Center and Global Insight.

The trend toward slower growth is shown in Figure A-1.

Table A-2. Projected Population by Metropolitan Area, 2000-2040

Region	2000 Census	2010 Census	2020	2030	2040
Charlotte	1,636,956	2,066,758	2,385,303	2,704,043	3,029,612
Greensboro Winston-Salem	1,414,670	1,589,200	1,791,438	1,979,842	2,162,757
Raleigh-Durham	1,311,887	1,749,525	2,234,127	2,687,607	3,190,429
Asheville	369,172	424,858	468,848	512,028	549,891
Fayetteville	336,608	366,383	412,445	436,009	460,020
Wilmington	274,550	362,315	427,845	494,730	570,482
Rest of State	2,702,970	2,976,444	3,154,177	3,378,398	3,575,244
North Carolina	8,046,813	9,535,483	10,874,183	12,192,657	13,538,435

Source: North Carolina State Data Center, Global Insight

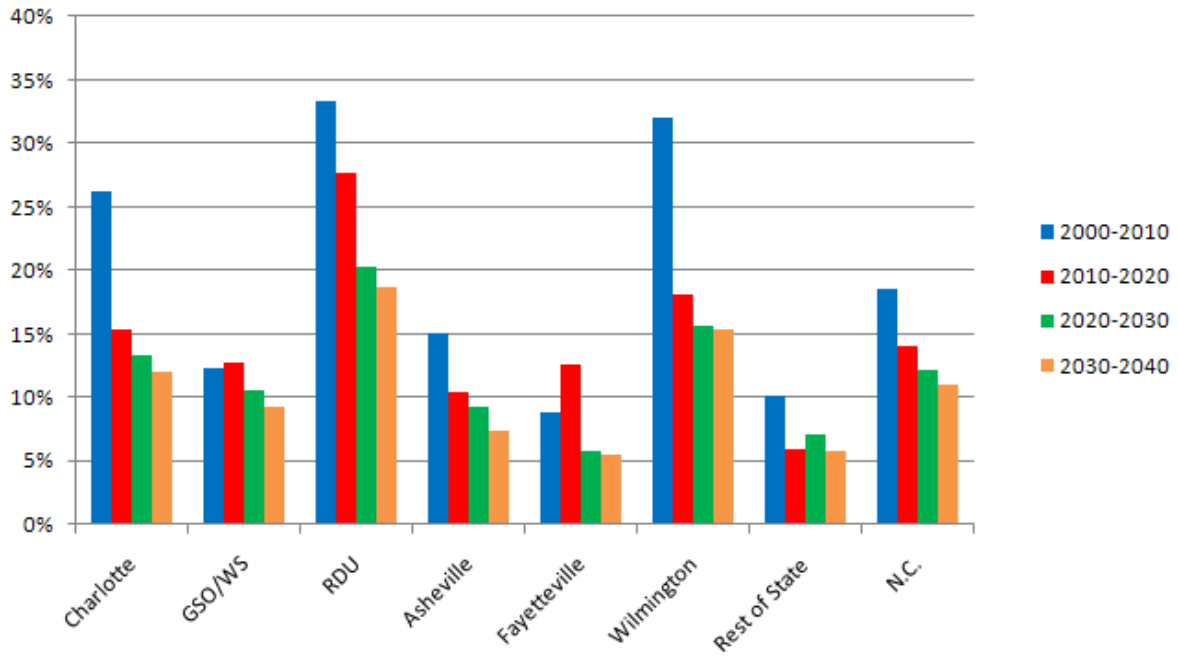


Figure A-1. 10-Year Rates of Growth, by Metro and North Carolina

As Figure A-1 shows, slowing population growth is expected not just statewide, but in the high-growth metropolitan areas of Charlotte, Raleigh-Durham, and Wilmington. Among metropolitan areas, the only projected increases in population growth rates are during the 2010-2020 decade in the relatively slow-growing Greensboro/Winston-Salem and Fayetteville areas. For completeness, these growth rates are shown in Table A-3.

Table A-3. Population Growth, by Metropolitan Area, 2000-2040

Region	2000-2010	2010-2020	2020-2030	2030-2040	2010-2040
Charlotte	26.3%	15.4%	13.4%	12.0%	46.6%
Greensboro Winston-Salem	12.3%	12.7%	10.5%	9.2%	36.1%
Raleigh-Durham	33.4%	27.7%	20.3%	18.7%	82.4%
Asheville	15.1%	10.4%	9.2%	7.4%	29.4%
Fayetteville	8.8%	12.6%	5.7%	5.5%	25.6%
Wilmington	32.0%	18.1%	15.6%	15.3%	57.5%
Rest of State	10.1%	6.0%	7.1%	5.8%	20.1%
North Carolina	18.5%	14.0%	12.1%	11.0%	42.0%

Source: North Carolina Data Center, Global Insight

Projected growth from 2030 to 2040 will slow the most in the high-growth Wilmington and Charlotte metropolitan areas and in Asheville. In each area, the growth in that decade is expected to be less than half of what it was from 2000 to 2010. The smallest decline in growth rates will be in the Greensboro/Winston-Salem metropolitan area; its projected 2030 to 2040 growth is roughly three-quarters of its value from 2000 to 2010.

Even with the drop-off in growth, Wilmington and Charlotte are projected to be the second- and third-fastest growing metropolitan areas in the 30 years from 2010 to 2040, lagging behind only Raleigh-Durham. The projected average annual population growth in those three metropolitan areas exceeds the state's projected growth of 42 percent. Growth over those 30 years in the Greensboro/Winston-Salem, Asheville, and Fayetteville metropolitan areas (and in the "non-metropolitan areas")is projected to be slower than the state average.

Table A-4 shows increasing concentrations of the North Carolina population. The percentage of people living in the six metropolitan areas is projected to rise gradually, to nearly 74 percent in 2040 (an increase of 4.8 percentage points since 2010). That growth, however, is explained entirely by growth in the Charlotte and Raleigh-Durham metropolitan areas. Population in the other four metropolitan areas is projected to decline as a percentage of state population. It is thus reasonable to expect that the political influence of the two large cities will increase, and with it their ability to attract transportation funds.

Table A-4. Share of State Population, 2000-2040

Region	2000 Census	2010 Census	2020	2030	2040	Change 2010-40
Charlotte and Raleigh-Durham	36.6%	40.0%	42.5%	44.2%	45.9%	+5.9 ppts
Other Four Metros	29.8%	28.8%	28.5%	28.1%	27.6%	–1.1 ppts
All Six Metros	66.4%	68.8%	71.0%	72.3%	73.6%	+4.8 ppts

Source: North Carolina Data Center, Global Insight

A.2 Economic Projections

The recession of 2008-09, along with its slow recovery, is the single biggest macroeconomic issue at the time of this writing. However wrenching this cyclical event has been, it did not erase the ongoing structural (i.e., long-term trend) changes in the North Carolina economy. Like most states, North Carolina is seeing an unprecedented transformation from Old Economy to New Economy, from a manufacturing-based, industrial economy to a knowledge-based, post-industrial economy. This structural change can be usefully measured by the declining share of manufacturing employment.

On the eve of the recession, in 2007, the national manufacturing share of total non-farm employment was 10 percent, down from about 16 percent in 1990. Since the recession began, the percentage has fallen further, to just under 9 percent in 2010, as manufacturing lost a larger percentage of its jobs than the economy as a whole.

Nowhere in the country has this transformation been more pronounced than in North Carolina. Two decades ago, North Carolina was the most manufacturing-intensive state as measured by manufacturing's share of total employment. In 1990, more than 26 percent of all payroll workers in the state were employed by manufacturing companies. In 2007, just 13 percent of all workers in the state were in manufacturing, and North Carolina was only the 10th-most manufacturing-intensive state. As of 2010, the state's ranking had fallen a bit further, with only 11.5 percent of its workers employed in manufacturing.

Much of this decline has been due to the collapse of employment in the textile/apparel industry. The primary cause of the collapse in apparel manufacturing has been offshore outsourcing; whereas, the story is more mixed in textile manufacturing. Textile manufacturing automated aggressively but was then drawn offshore when its customers, the apparel manufacturers, left for cheaper labor. The employment bottom line, however, is nearly the same for the two industries. In 1990, the textile/apparel industry employed 286,000 people in North Carolina and accounted for 9.3 percent of all employment in the state. In 2007, it employed 69,600 people and accounted for only 1.6 percent of the state workforce. By late 2010, North Carolina textile/apparel manufacturing employment was down to 47,900, or 1.3 percent of all workers.

Outside of textiles and apparel, other North Carolina manufacturing industries have mostly tracked national trends. Relative to the manufacturing sector as a whole, employment in furniture manufacturing, another of North Carolina's signature industries, has fallen only slightly since 1990 (primarily because the state specializes in the manufacture of wood furniture, which has been hit harder by imports than upholstered furniture). In absolute terms, employment is up significantly compared to 1990 in such manufacturing industries as transportation equipment, fabricated metal products, plastics, electronic instruments, and medical equipment and supplies. Pharmaceutical manufacturing employs more than twice as many people now as in 1990.

Total employment in North Carolina grew by nearly 33 percent between 1990 and 2007, only to fall 6 percent between 2007 and 2010 (the corresponding figures on the national level were 26 percent and -6 percent). The sectors in the state that have gained employment market share include health care, education, professional and business services, and leisure and hospitality. Most of these expanding sectors grew faster in North Carolina than they did nationally, in part because the state's manufacturing decline left a bigger void to be filled.

Outside of textile/apparel manufacturing, the employment declines in North Carolina manufacturing are largely due to automation and technological innovation. Consequently, most of the manufacturing output remains onshore. This has implications for logistics planning because materials still need to be shipped to and from plants in the state. For comprehensive transportation planning, however, employment is a useful indicator; it is a good gauge of economic trends, especially in the service sector.

The economic consulting service Global Insight generates forecasts for a number of useful economic indicators. Table A-5 shows employment forecasts for broad industry sectors in North Carolina.

Table 4-5. Projected Employment, by Sector, in Thousands

Sector	2007	2010	2020	2030	2040	% Chg, 2007-2040
Goods-Producing Industries	799.96	610.34	724.05	712.13	737.97	-7.7%
Manufacturing	538.39	432.33	461.00	401.38	368.49	-31.6%
Construction	254.57	171.90	258.03	306.10	364.75	43.3%
Service-Providing Industries	3,344.75	3,292.35	3,886.60	4,445.77	4,999.20	49.5%
Total Nonfarm	4,144.71	3,902.69	4,610.65	5,157.90	5,737.17	38.4%

Source: Global Insight

One of the goals of transportation planning is to ensure sufficient capacity. For this reason, the rates of change in the tables in this section are generally calculated using 2007 (rather than 2010) as the starting year. Without this adjustment, many of the calculations would be driven by the persistent effects of the 2008-2009 recession. In 2010, the economy still exhibited an underutilization of existing capacity. For example, the data in Table A-5 show that construction employment will more than double from 2010 to 2040, due to excess capacity in that industry in the wake of the housing bust. The 2007-2040 calculation yields a more representative and useful rate.

Overall, employment in North Carolina is expected to rise 38 percent between 2007 and 2040. The vast majority of jobs will be in service-providing industries, which include everything that isn't construction, manufacturing, mining, fishing, or forestry. Service-providing industries are projected to grow faster than the economy. The decline in manufacturing employment will continue, dropping another 15 percent from 2010 to 2040 (but 32 percent from 2007). That is a slower decline than in the 20 years ending in 2010, in which manufacturing employment fell 47 percent.

Tables A-6 and A-7 break the manufacturing projections into specific industries, defined by three-digit North American Industry Classification System (NAICS) codes. Table A-6 shows employment projections and illustrates the overall employment declines in manufacturing. Table A-7 shows indexes of industrial production (or output) and paints a picture nearly diametrically opposed to that of the employment data.

Table A-6. Projected Employment, by Manufacturing Industry, in Thousands

Manufacturing Industry	NAICS	2007	2010	2020	2030	2040	% Chg, 2007-2040
Food Manufacturing	311	53.41	51.48	56.98	55.44	54.09	1.3%
Beverages and Tobacco Products	312	14.14	13.09	12.48	9.55	6.98	-50.6%
Textile Mills	313	42.64	26.70	12.37	7.69	7.75	-81.8%
Textile Product Mills	314	9.01	6.48	6.05	5.20	3.39	-62.4%
Apparel	315	16.64	11.20	7.14	4.94	4.59	-72.4%
Wood Products	321	24.86	13.69	21.50	20.05	19.52	-21.5%
Paper and Paper Products	322	18.62	16.67	18.51	17.51	17.02	-8.6%
Printing and Related Activities	323	15.30	12.11	10.36	9.68	9.70	-36.6%
Chemicals	325	43.76	41.46	43.53	38.93	34.40	-21.4%
Plastics and Rubber Products	326	33.60	28.90	27.76	22.13	17.97	-46.5%
Nonmetallic Mineral Products	327	17.41	13.88	15.34	13.08	12.35	-29.1%
Fabricated Metal Products	332	40.49	32.93	40.14	35.97	34.12	-15.7%
Machinery	333	33.25	25.83	29.52	24.30	21.12	-36.5%
Computer and Electronic Products	334	41.14	34.30	41.86	33.80	34.40	-16.4%
Electrical Equipment, Appliances	335	24.97	20.66	19.59	16.78	15.82	-36.7%
Transportation Equipment	336	34.79	26.11	29.41	24.20	21.14	-39.2%
Furniture	337	49.40	33.55	42.37	37.90	31.75	-35.7%
Total Manufacturing	31-33	538.39	432.33	461.00	401.38	368.49	-31.6%

Source: Global Insight

Table A-7. Projected Industrial Production Indexes, by Industry, 2007 = 100

Manufacturing Industry	NAICS	2007	2010	2020	2030	2040	% Chg, 2007-2040
Food Manufacturing	311	100.00	102.11	120.78	140.95	163.92	63.9%
Beverages and Tobacco Products	312	100.00	87.16	84.86	80.85	79.02	-21.0%
Textile Mills	313	100.00	70.21	43.39	30.47	24.75	-75.3%
Textile Product Mills	314	100.00	74.52	70.51	64.50	66.01	-34.0%
Apparel	315	100.00	60.11	29.74	18.30	12.20	-87.8%
Wood Products	321	100.00	57.43	82.46	84.64	88.74	-11.3%
Paper and Paper Products	322	100.00	91.29	113.85	132.52	156.11	56.1%
Printing and Related Activities	323	100.00	77.44	72.78	78.34	94.13	-5.9%
Chemicals	325	100.00	98.16	144.64	199.95	261.55	161.5%
Plastics and Rubber Products	326	100.00	85.55	106.77	122.16	140.17	40.2%
Nonmetallic Mineral Products	327	100.00	80.75	111.22	118.92	134.13	34.1%
Fabricated Metal Products	332	100.00	87.33	107.52	118.35	134.00	34.0%
Machinery	333	100.00	77.66	107.40	121.64	148.14	48.1%
Computer and Electronic Products	334	100.00	110.05	421.38	940.91	1,413.15	1,312.9%
Electrical Equipment, Appliances	335	100.00	87.88	113.15	128.30	157.32	57.3%
Transportation Equipment	336	100.00	79.98	117.90	155.31	196.97	97.1%
Furniture	337	100.00	73.24	97.86	99.85	103.27	3.3%
Total Manufacturing	31-33	100.00	88.87	122.47	152.50	182.54	82.5%

Source: Global Insight

The industrial-production data shown in Table A-7 take the form of an index that measures the dollar value of factory production (after correcting for inflation). The value of the index is 100 for the base year 2007; hence, index values in ensuing years can be translated easily into percentage changes from the base year. For example, the all-industry value for North Carolina in 2020 is projected to be 122.47 (from the bottom of Table A-7), which implies a 22.5 percent increase in the value of overall industrial production in North Carolina between 2007 and 2020.

Table A-6 shows that only one of the 17 manufacturing industries, food manufacturing, is projected to increase employment between 2007 and 2040. In contrast, Table A-7 reveals that the value of overall manufacturing output is projected to increase 82.5 percent between 2007 and 2040, and 11 of

17 industries show increases in output over the course of those 33 years. The biggest gainers will be computers and electronics, chemicals, and transportation equipment. Four of the industries with declining production through 2040 are familiar to North Carolinians: tobacco, textiles, and apparel. The other two decliners are wood products and printing.

Table A-7 has implications for moving materials; hence, it is significant primarily for the logistics component of transportation planning.

Projections for industrial production are available only at the state level. At the metropolitan level, the Global Insight projections address employment only. Table A-8 shows employment projections by metropolitan area.

The Greensboro/Winston-Salem and Raleigh-Durham metropolitan areas shown in Table A-8 are not precisely the same as the CSAs used in Section A1. For example, the Greensboro/Winston-Salem metropolitan area is constructed as the sum of the Burlington, Greensboro/High Point, and Winston-Salem MSAs, which omit two small peripheral counties.

Despite of employment declines, Table A-8 reveals that the Greensboro/Winston-Salem metropolitan area is likely to remain the top manufacturing area in the state, both in terms of number of workers and the share of jobs in manufacturing industries. Table A-8 also shows the strength of Charlotte and Raleigh-Durham in professional and business services.

Figure A-2 shows the projected employment shares of these three industries in 2040. One of the implications is that for all its promise for North Carolina, developing the transport-logistics industry is unlikely to create a large number of jobs. (The distinction between industry and occupational data matters greatly in this case, however, because transport-logistics workers are employed by other industries such as manufacturing).

Figure A-2 also shows both the importance of service-sector jobs and the gulf between the top three and second three metropolitan areas in their reliance on such occupations. It is worth noting, however, that both Asheville and Wilmington have large and well-established tourism industries, and Fayetteville has a strong military presence and culture due to its proximity to military bases.

Table A-8. Projected Employment, by Metropolitan Area, Selected Industries, Thousands

Region and Sector	2007	2010	2020	2030	2040	% Chg, 2007-2040
Charlotte						
Manufacturing	81.72	66.44	70.69	62.03	57.16	-30.1%
Professional/Business Services	133.36	128.72	207.95	279.69	367.40	175.5%
Transport, Warehousing	35.87	31.34	40.42	45.83	45.79	27.6%
Total Nonfarm	859.93	805.59	1,005.85	1,182.75	1,381.25	60.6%
Manufacturing (%)	9.5%	8.2%	7.0%	5.2%	4.1%	
Greensboro/Winston-Salem						
Manufacturing	103.10	80.81	85.97	74.99	68.88	-33.2%
Professional/Business Services	82.06	75.40	110.33	135.88	163.33	99.0%
Transport, Warehousing	26.83	23.13	28.34	30.13	28.12	4.8%
Total Nonfarm	652.48	602.23	694.40	755.35	814.62	24.8%
Manufacturing (%)	15.8%	13.4%	12.4%	9.9%	8.5%	
Raleigh-Durham						
Manufacturing	75.45	61.81	68.42	61.09	57.97	-23.2%
Professional/Business Services	125.54	118.20	187.88	246.84	317.06	152.6%
Transport, Warehousing	15.30	13.48	16.84	18.49	17.80	16.4%
Total Nonfarm	802.98	781.74	981.08	1,156.86	1,354.00	68.6%
Manufacturing (%)	9.4%	7.9%	7.0%	5.3%	4.3%	
Asheville						
Manufacturing	20.95	17.72	18.97	16.82	15.88	-24.2%
Professional/Business Services	16.85	13.22	19.27	24.04	29.29	73.8%
Transport, Warehousing	4.64	4.20	4.95	5.21	4.81	3.7%
Total Nonfarm	176.67	165.34	188.40	205.13	222.00	25.7%
Manufacturing (%)	11.9%	10.7%	10.1%	8.2%	7.2%	
Fayetteville						
Manufacturing	9.72	9.91	10.68	9.50	8.95	-8.0%
Professional/Business Services	12.79	13.47	19.72	24.51	29.66	132.0%
Transport, Warehousing	4.54	3.88	4.61	4.92	4.63	1.9%
Total Nonfarm	127.71	129.68	143.09	154.89	165.37	29.5%
Manufacturing (%)	7.6%	7.6%	7.5%	6.1%	5.4%	
Wilmington						
Manufacturing	9.07	7.99	8.77	7.87	7.41	-18.3%
Professional/Business Services	15.85	13.59	21.23	28.44	37.01	133.5%
Transport, Warehousing	4.17	3.73	4.80	5.44	5.42	30.0%
Total Nonfarm	146.95	136.47	166.88	195.32	225.79	53.6%
Manufacturing (%)	6.2%	5.9%	5.3%	4.0%	3.3%	

Source: Global Insight

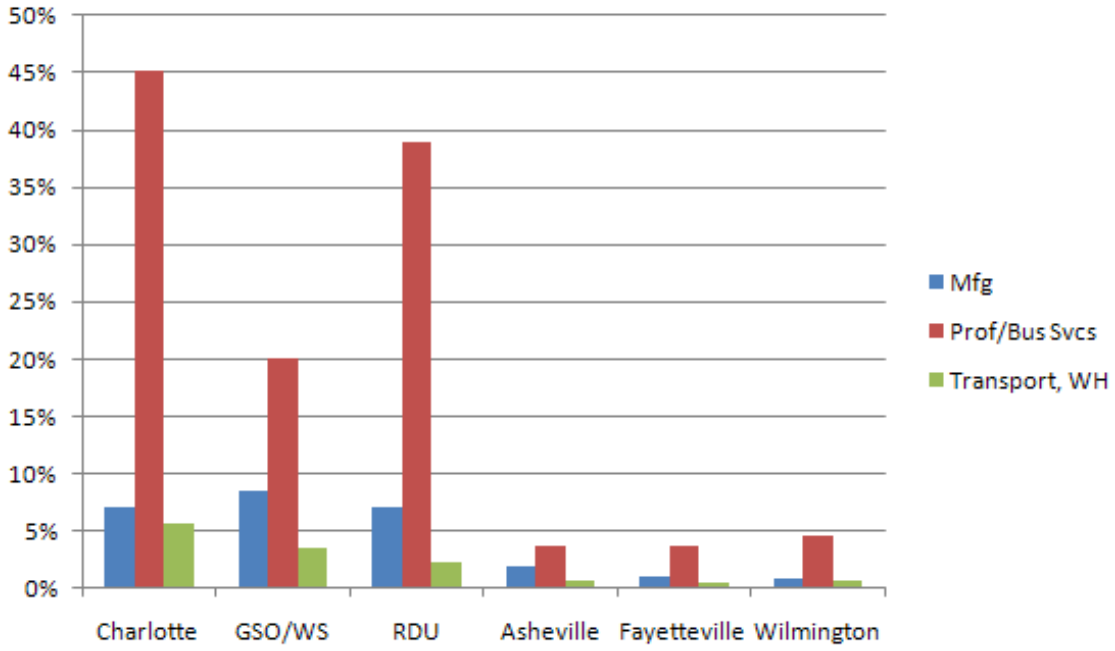


Figure A-2. Percentage of Total Employment by Metropolitan Area, Selected Industries, 2040

There are indications of substantial growth in output in some industries between now and 2040; however, good projections of how that growth will be distributed within the state are not available. As a result, inferences can be drawn from current patterns. Table A-7 identified the largest growth for the following industries: computers/electronics products, chemicals, transportation equipment, food manufacturing, electrical equipment and appliances, paper products, machinery, and plastics/rubber. The four industries projected to suffer the biggest reductions in output are beverages/tobacco, textile mills, textile product mills, and apparel. Table A-9 lists the largest manufacturing industries (measured by percentage of total current employment) in each of the six metropolitan areas. The high projected-growth industries are in green text, while the high projected-loss industries are in red text.

Because the Asheville, Fayetteville, and Wilmington MSAs are so much smaller than the others, in those areas only industries with more than a 10 percent share of total manufacturing employment are included in Table A-9. Raleigh-Durham's top three manufacturing industries are all projected to grow significantly between 2010 and 2040. In fact, Raleigh-Durham is highly invested in the two highest-projected-growth industries: computers and chemicals. Greensboro/Winston-Salem's top four feature two industries projected to show declining output through 2040.

Table A-9. Top Manufacturing Industries in 2007, by Metropolitan Area

Region	Top Industries (% of Total Manufacturing Employment)	
Charlotte	Fabricated Metal Products	11.4%
	Machinery Manufacturing	10.0%
	Food Manufacturing	9.6%
	Plastics and Rubber Products	7.6%
	Textile Mills	7.4%
	Transportation Equipment	7.3%
Greensboro/ Winston-Salem	Furniture and Related Products	12.7%
	Textile Mills	11.8%
	Beverage and Tobacco Products	7.0%
	Chemical Manufacturing	7.0%
Raleigh-Durham	Computer and Electronic Products	33.5%
	Chemical Manufacturing	17.8%
	Food Manufacturing	7.0%
Asheville	Electrical Equipment and Appliances	13.2%
	Machinery Manufacturing	12.8%
	Plastics and Rubber Products	11.1%
	Paper Manufacturing	10.4%
Fayetteville	Food Manufacturing	16.2%
	Transportation Equipment	12.4%
Wilmington	Transportation Equipment	23.5%
	Nonmetallic Mineral Products	15.8%
	Chemical Manufacturing	14.7%
	Fabricated Metal Products	12.7%

Source: North Carolina Employment Security Commission

Table A-10 calculates each metropolitan area's share of manufacturing employment in the high-projected-growth and high-projected-loss industries.

Table A-10. Manufacturing Jobs in Big-Growth and Big-Loss Industries in 2007

Region	(1) Employment in High-Projected-Growth Industries*	(2) Employment in High-Projected-Loss Industries**	Ratio: (1)/(2)
Charlotte	33,791	10,732	3.1
Greensboro/ Winston-Salem	33,707	24,627	1.4
Raleigh-Durham	54,040	2,415	22.4
Asheville	11,946	1,763	6.8
Fayetteville	3,475	47	73.9
Wilmington	4,515	281	16.1

Source: North Carolina Employment Security Commission

* NAICS 311, 325, 326, 333, 334, 335, 336
** NAICS 312, 313, 314, 315

Of the three larger metropolitan areas, the two most striking results are Greensboro/Winston-Salem's large proportion of employees in industries projected to lose output through 2040, and Raleigh-Durham's large proportion of employees in industries projected to increase output significantly. The ratios are less informative for the smaller metropolitan areas because of their small size.

As suggested, the story of North Carolina's structural changes is not solely about the decline in manufacturing as an employer of North Carolinians. It is also a story about the expansion of the service sector. Table A-11 traces the projected employment growth of service-providing industries.

Table A-11. Projected Employment, by Service-Providing Industry, Statewide, in Thousands

Service Industry	NAICS	2007	2010	2020	2030	2040	% Chg, 2007-2040
Utilities	22	12.52	12.76	10.52	7.34	6.37	-49.2%
Wholesale Trade	42	182.29	163.13	193.69	207.88	199.50	9.4%
Retail Trade	44-45	465.86	436.73	461.12	477.16	497.44	6.8%
Transportation, Warehousing	48-49	117.33	99.88	127.25	141.49	134.86	14.9%
Information	51	72.68	70.18	85.44	95.49	114.71	57.8%
Finance and Insurance	52	157.34	148.99	152.95	168.77	194.06	23.3%
Real Estate and Leasing	53	54.12	49.82	55.28	55.14	54.55	0.8%
Professional, Technical, Scientific	54	183.46	172.40	229.25	346.41	473.79	158.3%
Management of Companies	55	72.59	72.38	67.81	61.50	55.99	-22.9%
Administration, Waste Management, etc.	56	243.65	230.88	433.67	532.82	653.36	168.2%
Educational Services	61	75.06	82.63	79.14	84.21	89.87	19.7%
Health Care and Social Assistance	62	447.58	466.23	622.18	766.45	904.93	102.2%
Arts, Entertainment, Recreation	71	57.28	53.01	53.47	65.64	72.81	27.1%
Hospitality and Food Services	72	342.64	339.13	351.66	384.72	427.03	24.6%
Government	92	687.75	733.69	804.42	879.81	941.77	36.9%
Total Nonfarm		4,144.71	3,902.69	4,610.65	5,157.90	5,737.17	38.4%

Source: Global Insight

The striking thing about the information shown in Table A-11 is its sharp contrast with the data on manufacturing industries. Only two of these broad industrial sectors (utilities and management of companies) are projected to see employment losses through 2040. And a few are expected to grow much faster than the overall economy: administration/support and waste management/remediation services; professional, technical, and scientific services; health care and social assistance; and information. NAICS sectors 54, 55 and 56 are shown in the Professional and Business Services category analyzed at the metropolitan level in Table A-8.

Table A-12 shows additional statewide indicators, with projections to 2040.

Both Gross State Product and retail sales are expected to more than double between 2007 and 2040 (after correcting for inflation), but real per capital income, while growing dramatically, will not quite

keep up. The data on the Consumer Price Index imply an average annual rate of inflation of just 1.9 percent.

Table A-12. Miscellaneous North Carolina Indicators

Sector	2007	2010	2020	2030	2040	% Chg, 2007-2040
Real Gross State Product (millions of 2005 dollars)	378,926	374,561	515,422	687,916	901,526	137.9%
Real Per Capita Personal Income (thousands of 2005 dollars)	32.87	31.86	38.54	47.17	55.79	69.7%
Real Retail Sales (millions of 2005 dollars)	108,537	103,263	136,368	181,818	240,665	121.7%
Housing Starts (thousands)	86.35	34.48	80.71	76.43	73.20	-15.2%
Elderly Population (percent of people 65+)	12.4%	12.9%	15.5%	17.4%	18.0%	45.3%
Consumer Price Index (1982-84 = 100)	199.67	210.79	256.60	309.59	373.30	87.0%

Source: Global Insight

The projected number of housing starts in 2020 is close to the observed figure for 2000, but then it tails off and ends up 15 percent lower in 2040 than in 2007. This figure masks some compositional detail, as multi-family and single-family housing starts are projected to move in opposite directions. Between 2007 and 2040, multi-family starts are projected to rise 39 percent, while single-family starts are projected to fall 24 percent. The housing boom of the 2000 to 2010 decade was focused almost exclusively on single-family homes, and it appears that the overbuilding of such homes will have long-lasting implications.

The projected decline in housing starts may also have something to do with the aging of the North Carolina population. People aged 65 and over do not build as many houses as their younger neighbors, and the share of that population segment will rise nearly 6 percent by 2040 according to projections.

Table A-13 shows some of the same indicators for the top six metropolitan areas in North Carolina. The definitions for the Greensboro/Winston-Salem and Raleigh-Durham metropolitan areas are the same as those shown in Table A-8. Table A-13 shows that Charlotte and Raleigh-Durham are projected to exhibit the strongest growth in the state in terms of real gross metropolitan product and real retail sales. Greensboro/Winston-Salem is once again more like the next largest metropolitan areas than it is like Charlotte and Raleigh-Durham. In fact, among the six metropolitan areas, Greensboro/Winston-Salem is projected to have the slowest growth in real gross metropolitan product and the second-slowest growth in real retail sales; and both figures are below the state average shown in Table A-12.

The figures on metropolitan-level housing starts are unsurprising, given the statewide data shown in Table A-13, except perhaps for the modest 10 percent growth in Raleigh-Durham. Neither Charlotte nor Greensboro will see big declines, but the three smaller metropolitan areas will.

Table A-13. Miscellaneous Metropolitan-Area Indicators

Sector	2007	2010	2020	2030	2040	% Chg, 2007-2040
Charlotte						
Real Gross Metro Product	112,477.7	109,185.6	156,473.4	219,669.5	304,901.4	171.1%
Real Retail Sales	21,996.7	21,213.1	29,280.0	40,678.6	56,408.5	156.4%
Housing Starts	21,406.7	5,849.8	20,455.9	19,433.1	18,829.3	-12.0%
Greensboro/Winston-Salem						
Real Gross Metro Product	56,353.9	54,984.4	73,866.3	95,442.5	119,924.9	112.8%
Real Retail Sales	16,382.1	15,330.9	19,373.3	24,810.9	31,549.3	92.6%
Housing Starts	9,997.2	4,008.5	9,664.6	9,019.8	8,511.0	-14.9%
Raleigh-Durham						
Real Gross Metro Product	80,967.71	82,600.13	118,460.34	164,095.07	223,443.58	176.0%
Real Retail Sales	19,150.07	18,519.97	25,933.14	36,242.92	50,132.53	161.8%
Housing Starts	19,379.26	7,699.96	21,702.04	21,417.60	21,390.07	10.4%
Asheville						
Real Gross Metro Product	12,545.97	12,297.12	16,083.97	20,411.93	25,282.09	101.5%
Real Retail Sales	5,660.08	5,149.81	6,676.23	8,745.25	11,352.45	100.6%
Housing Starts	3,681.20	1,801.44	2,739.42	2,628.80	2,475.78	-32.7%
Fayetteville						
Real Gross Metro Product	13,507.59	15,394.57	19,755.71	24,965.40	30,698.91	127.3%
Real Retail Sales	3,806.15	4,013.71	5,119.02	6,710.16	8,686.43	128.2%
Housing Starts	2,809.36	3,045.65	2,583.02	2,279.13	1,956.23	-30.4%
Wilmington						
Real Gross Metro Product	12,380.32	12,334.65	17,108.51	23,256.71	31,058.70	150.9%
Real Retail Sales	4,889.25	4,484.20	6,308.10	8,912.16	12,481.17	155.3%
Housing Starts	5,995.54	1,909.97	5,679.88	4,972.26	4,305.38	-28.2%

Source: Global Insight

A.3 Special Topics

Elderly North Carolinians

The North Carolina population, like that of the United States as a whole, is aging. Table A-14 summarizes the changing age breakdown in North Carolina, using Census data for 2000 and Global Insight projections thereafter.

Table A-14. Projected Population, by Age Group, 2000-2040 (Thousands)

Age Group	2000 Census	2010	2020	2030	2040	Change, 2010-2040
0-24	2,768.2	3,220.7	3,577.7	3,973.8	4,404.2	42.1%
25-64	4,309.5	5,080.1	5,639.6	6,075.3	6,698.8	37.0%
65 and up	969.1	1,218.2	1,656.9	2,143.6	2,435.4	107.8%
75 and up	435.3	546.0	675.3	942.4	1,267.9	141.3%
85 and up	105.5	155.9	188.2	240.0	398.2	165.4%
Total	8,046.8	9,519.0	10,874.2	12,192.7	13,538.4	47.8%
Median Age	35.3	37.2	38.0	38.6		

Source: North Carolina State Data Center, Global Insight

The age breakdown of the 2010 Census is not yet available; therefore, the 2010 figures in Table A-14 are estimates rather than Census values. As a result, the projected 2010-2040 growth of the total North Carolina population does not match that of Table A-3.

As Table A-15 shows, the two broad age groups below the age of 65 are both projected to grow, but at a rate somewhat slower than the population as a whole. This can be seen further in the following table of percentage shares:

Table A-15. Projected Population Shares, by Age Group, 2000-2040

Age Group	2000 Census	2010	2020	2030	2040	Ratio, 2040 vs. 2010
0-24	34.4%	33.8%	32.9%	32.6%	32.5%	0.96
25-64	53.6%	53.4%	51.9%	49.8%	49.5%	0.93
65 and up	12.0%	12.8%	15.2%	17.6%	18.0%	1.41
75 and up	5.4%	5.7%	6.2%	7.7%	9.4%	1.63
85 and up	1.3%	1.6%	1.7%	2.0%	2.9%	1.80
Total	100.0%	100.0%	100.0%	100.0%	100.0%	1.00

Source: North Carolina State Data Center, Global Insight

Between 2010 and 2040, the share of both the 0-24 and 25-64 age groups falls slightly, while that of the over-65 groups increase significantly. (Their share increases are larger than the young age groups' decreases because people 65 or older are still a relatively small minority of the overall population.) The population share of those aged 85 and up is projected nearly to double by 2040.

Figures A-3 and A-4 show the declining shares of the 0-24 and 25-64 age groups and the rising share of the 65-and-up group.

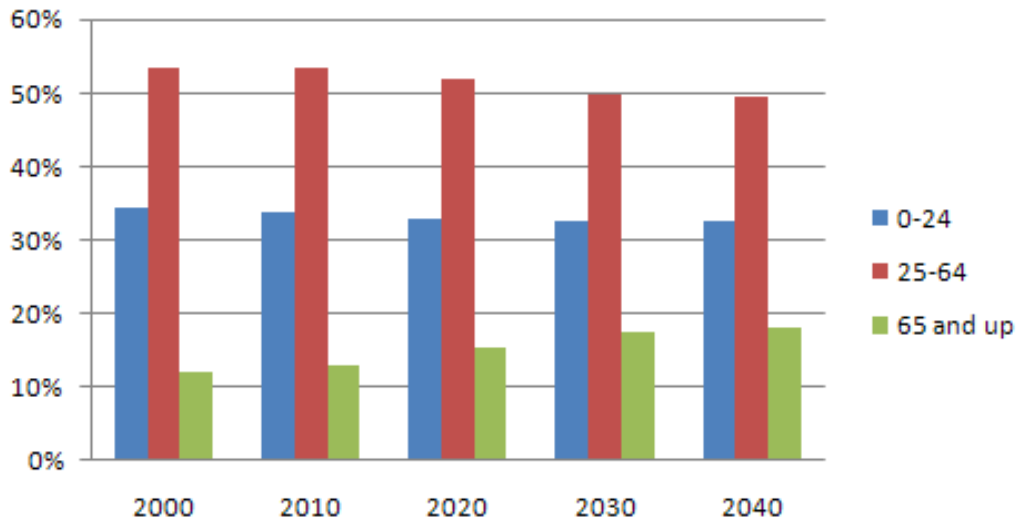


Figure A-3. North Carolina Population, by Age Group

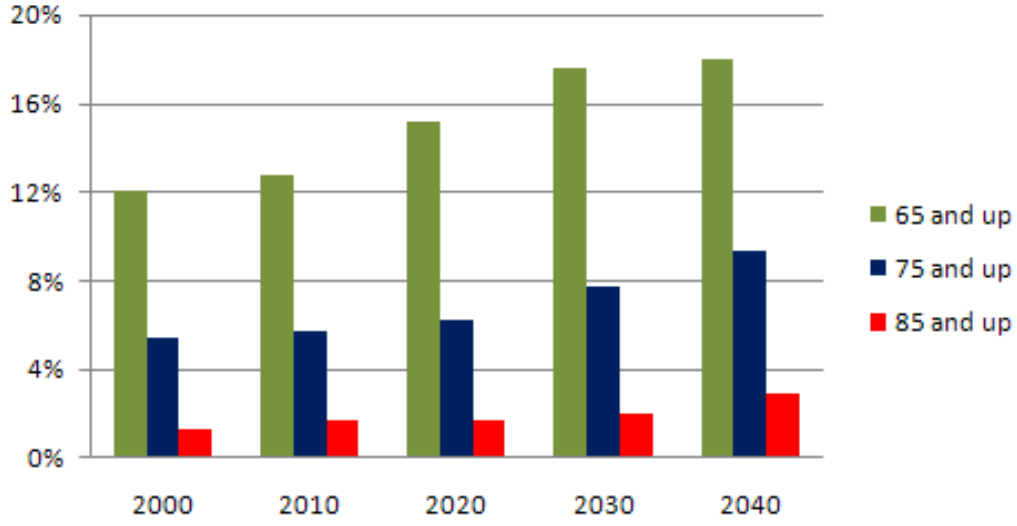


Figure A-4. North Carolina Population, by Age Group, 65 and Up

The increasing population share of the over-65 age group levels off slightly between 2030 and 2040, an indication of the passing of the Baby Boom. In 2040, the oldest living baby boomers will be in their mid-

90s. Table A-15 and Figure A-5 summarize the percentage of 65-and-over population in the six metropolitan areas.

Table A-16. Population Shares of the 65+ Age Group, by Metropolitan Area

Region	2000	2010	2020	2030	2040
Charlotte	10.7%	10.8%	13.4%	16.4%	14.8%
Greensboro/Winston-Salem	12.8%	13.6%	15.8%	17.9%	20.4%
Raleigh-Durham	8.9%	9.2%	11.8%	14.7%	12.2%
Asheville	17.5%	18.7%	21.1%	23.1%	26.2%
Fayetteville	7.7%	9.0%	11.1%	13.9%	16.3%
Wilmington	14.1%	17.7%	21.6%	23.9%	24.9%
Rest of State	13.6%	15.0%	17.5%	19.3%	22.3%
North Carolina	12.0%	12.8%	15.2%	17.6%	18.0%

Source: North Carolina Data Center, Global Insight

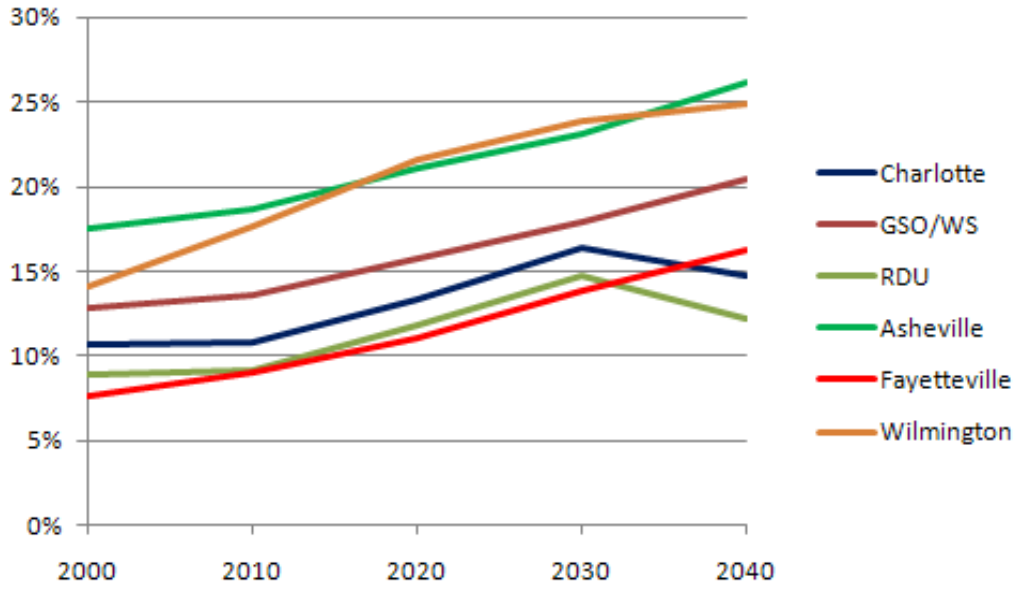


Figure A-5. Share of Population 65+, by Metropolitan Area

The curves in Figure A-5 all slope upward, at least through 2030, reflecting North Carolina's aging population. The curves of Asheville and Wilmington are above the other metropolitan areas, due to their status as destinations for retirees. In contrast, Fayetteville, the home of Fort Bragg and a large military population, is the lowest of the curves (at least at first). Charlotte and Raleigh-Durham are generally low as well, reflecting their young workforce. While their curves turn down from 2030 to 2040 as the baby boomers pass away, Fayetteville's is projected to continue to rise.

After Asheville and Wilmington, the largest numbers in Table A-16 correspond to Rest of State. The growth of the elderly population is particularly pronounced in rural areas.

The federal government's *Profile of Older Americans 2010* (Department of Health and Human Services, Administration on Aging) defines "older Americans" as those aged 65 and up, and it provides a few highlights about the elderly nationwide:

- Men who reach the age of 65 have a life expectancy of 17.1 years, while 65-year-old women have a 19.8-year life expectancy.
- Among people aged 65 or older, women outnumber men by 57.5 percent to 42.5 percent.
- Older men are much more likely to be married than older women: 72 percent of men are married, as compared to 42 percent of women.
- Roughly one in five older Americans is a minority; 8.3 percent are African-Americans.
- The percentage of the elderly who are minorities is projected to rise from 16.3 percent in 2000 to 20.1 percent in 2010, and to 23.6 percent in 2020.
- In 2008, 8.9 percent of all older Americans were below the poverty level, as compared to 13.2 percent of the population as a whole.
- For about a third of all Social Security beneficiaries in 2008, Social Security accounted for 90 percent or more of their income.

A 2004 study by the Surface Transportation Policy Project (*Aging Americans: Stranded without Options*) found that:

- More than one in five Americans aged 65 and older does not drive.
- On any given day, more than half of elderly non-drivers stay home because they lack transportation; the most heavily affected are rural and older minority populations.
- Older non-drivers have a reduced ability to participate in their communities.
- Where public transportation is available, older Americans make regular use of it.
- "Livable communities" have lower rates of staying home and higher rates of public transportation use and walking among non-drivers aged 65 and up.
- For older persons with health problems who cannot get rides from friends and relatives, paratransit and specialized transportation are the only options.

To serve this segment of the population, the Surface Transportation Policy Project study recommends increasing spending on public transportation, incorporating older Americans' needs in transportation and land-use planning, improving coordination between human-service providers and transportation departments and authorities, and improving sidewalks and roads to allow more older Americans to use them.

A 2003 Brookings Institution report (*The Mobility Needs of Older Americans*, Brookings Institution Series Report: Center on Urban and Metropolitan Policy) provides similar information about the elderly and transportation. The report also seeks to refute various myths, including the belief that as people age, they first lose the ability to drive. According to the report, "driving is often the easiest physical task for older people. Long before they lose the ability to drive, older people may be unable to board or ride public transit, or to walk to the bus stop or train station. Even though many may still be able to use special transit services, the overwhelming majority of older people, regardless of their stage of disability, are able to ride in a car and choose to do first."

In 2010, the American Public Transportation Association released *Funding the Transportation Needs of an Aging Population*, which naturally focused on public transportation. In addition to recommending that routes and schedules be redesigned and that buses and other vehicles be made more accessible and user-friendly, the report focuses on the need for specialized transportation services including:

- Paratransit
- Dial-A-Ride services
- Taxi subsidies
- Shuttle services coordinated by neighborhood and community organizations
- Volunteer drivers
- Accessible taxi cabs
- Caregiver transportation
- Medical transportation

Rural North Carolinians

Unlike its elderly population, North Carolina's rural population is not growing in relative terms. The Rest of State category in previous tables is the slowest-growing segment of the state. Its share of state population is projected to fall from about one-third in 2000 to barely more than one-fourth in 2040. Rest of State is not entirely rural because it includes five small metropolitan areas, but it is a reasonable proxy for purposes of this document.

Table A-17 summarizes the urban/rural divide in various years:

Table A-17. Rural versus Urban in North Carolina

Indicator	Rural	Urban	Data Year
Per capita income	$30,431	$37,277	2008
Federal funds per person	$8,863	$9,098	2009
Poverty rate	19.1%	15.0%	2009
Unemployment rate	7.1%	5.8%	2008
Percent with BA/BS degrees	14.5%	26.3%	2000

Source: U.S. Department of Agriculture Economic Research Service

Not only are rural areas losing population (and hence influence in the North Carolina General Assembly), but rural citizens also earn less on average than their metropolitan counterparts, receive less aid on average from the federal government, are more likely to be in poverty, are more likely to be unemployed, and are less likely to have a college degree.

As noted, there is one element of growth in rural areas, namely elderly populations. In 2040, 22 percent of the population in the Rest of State category will be elderly, up from less than 14 percent in 2000. That percentage is not as high as in the Asheville and Wilmington metropolitan areas, where a quarter of the population is projected to be aged 65 or older by 2040. Those areas, however, are well-known destinations for retirees, and they have resources available for their elderly citizens, while most of the communities in Rest of State do not. Therefore, to a large extent, addressing transportation issues for the elderly will be of benefit in addressing rural transportation issues.

The North Carolina Division of Aging and Adult Services' *North Carolina Aging Services Plan 2007-2011* looks at the rural/elderly linkage from a different vantage point, finding that in 2005, 40 percent of the state's 65-and-over population lived in rural areas. That was nearly double the national rate of 21 percent. Of that 40 percent, only a small fraction of North Carolina's rural elderly (1 percent) live on farms.

The report identifies transportation problems for the elderly and highlights problems in rural areas, noting the challenges of fixing problems with rural transportation and the difficulty of obtaining necessary medical and dental care for the elderly in rural areas. Because of non-dense rural populations, solutions must deviate significantly from traditional modes of public transportation and include vanpools, shuttle services, non-emergency medical transportation, and park-and-ride lots.

Military Population

The military is an integral part of eastern North Carolina, with nine bases in that region. Those bases generate jobs, both military and civilian, and require infrastructure, including transportation. Table A-18 summarizes projections of military employment in North Carolina (almost all of which is in the eastern part of the state, east of the I-95 corridor).

Table A-18. Military Employment in North Carolina, in Thousands

Sector	2000	2010	2020	2030	2040	Change, 2010-2040
Military	115.8	145.8	157.8	171.9	185.4	27.1%
Total Nonfarm	3,915.2	3,902.7	4,610.7	5,157.9	5,737.2	47.0%
Military Share	3.0%	3.7%	3.4%	3.3%	3.2%	

Source: Global Insight

The data shown in Table A-18 include only workers directly employed by the military; it does not include those employed by associated civilian businesses (i.e., generated by spillover or multiplier effects).

As shown in Table A-18, the military is projected to account for a generally steady share of jobs in North Carolina over the next 30 years. The high-water mark of 3.7 percent in 2010 is a function of the recession-related decline in total employment and the military's relative immunity to recessions. From 2010 on, military employment is expected to grow, but not as fast as total employment.

One region of North Carolina has experienced a surge in recent years. The Military Growth Task Force of North Carolina's Eastern Region was established to analyze and plan for an increase in military personnel in eastern North Carolina starting in 2006 and ending in 2011. The Military Growth Task Force was a creation of the economic development agency in North Carolina's Eastern Region (which includes 13 counties) in collaboration with the U.S. Marine Corps.

The increase totaled 11,477 military personnel at Camp Lejeune, Cherry Point Air Station, and New River Air Station (such bases as Fort Bragg and Seymour Johnson Air Force Base are in a different economic development region and hence are not part of this process). To that number, Military Growth Task Force determined that 13,499 dependents would also arrive, plus 15,110 people to provide the additional services that the influx would require. The total population increase was expected to be 40,086, or about 9 percent of the region's population in 2006.

The Military Growth Task Force generated a comprehensive report that specified the improvements and enhancements that the region's systems would need in order to absorb the new residents and allow them to work and live productively. The areas analyzed included housing, infrastructure, education, workforce development, public safety, medical care, and transportation.

For transportation, the report recommended widening and improving certain key highways, particularly U.S. routes 17 and 70 and NC route 24. The goals were to increase capacity, enhance access, and improve traffic safety. While the transportation recommendations were fairly narrow, focusing as they did exclusively on roads, the process could serve as a partial model for addressing future surges in military personnel in the eastern half of the state.