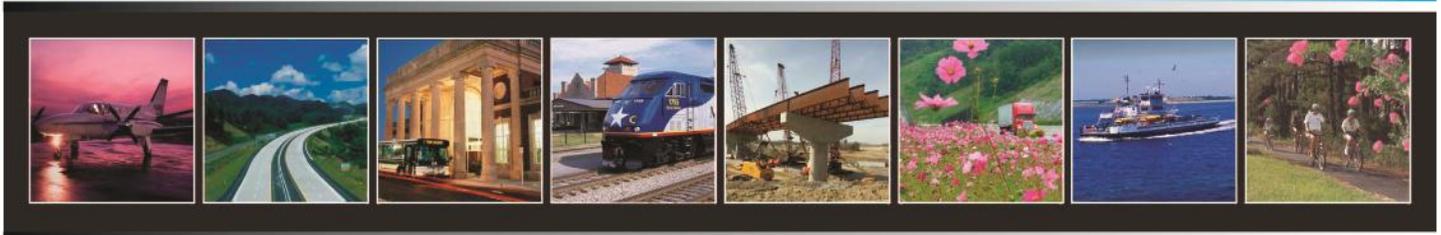


**NCDOT**  
From Policy to Projects  
**2040 Plan**

**NORTH CAROLINA**  
**STATEWIDE**  
**TRANSPORTATION**  
**PLAN**



**SYSTEM INVENTORY AND MODAL NEEDS**

**AUGUST 2012**

Prepared for:



Prepared by:

**ATKINS**



# Executive Summary

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## ES.1 Introduction

### ES.1.1 Purpose of the Report

This report is one in a series 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 purposes of this report are to:

- Provide a profile of existing modal conditions and performance as a frame of reference for the preparation of a 30-year plan for the delivery of transportation infrastructure and services in the state.
- Present an estimate of the future modal needs, for both capital and operating costs, to the year 2040 to serve as a foundation for subsequently examining priorities for investing in transportation infrastructure and operational services.

To accomplish these two purposes, this report describes the existing conditions, features, and assets for each modal component of the transportation system. It also provides a preliminary summary of the general performance and current deficiencies of each modal component, based on available metrics from prior study, reporting, and investment programming cycles undertaken by NCDOT. For each mode, the report documents estimates of the modal needs, quantifying the costs of providing a desired level of service, or performance, of each mode in addressing the mobility and transportation needs of the residents, businesses, visitors, and government agencies using those facilities.

### ES.1.2 Background

The initial report of the 2040 Plan study, Challenges and Opportunities, described the overall context within which the study is being conducted, including baseline conditions in terms of both transportation systems and the social and economic forecasts that must drive transportation program delivery. The Challenges and Opportunities report discussed a set of transportation challenges that the 2040 Plan must address and the opportunities available to NCDOT for addressing those challenges, as well as the planning framework.

The goals for the current 2040 Plan development were documented in the Challenges and Opportunities report and address these major plan components:

- Modal Effectiveness
- Financial Feasibility
- Program Delivery and Vision

The discussion of the modes in this report is intended to provide a summary profile of the extent of current facilities, a profile of existing modal condition and performance, and the estimated costs of

modal needs to maintain existing transportation facilities and services, and to expand those facilities and services to address future mobility and transport needs.

### **ES.1.3 Report Organization**

This report describes the approach to existing modal conditions, performance assessment, and estimate of modal needs; it then provides mode-by-mode documentation of these elements and summarizes the transportation system modal needs. The modes covered are highways, aviation, public transportation, rail (both passenger and freight), ferries, bicycle/pedestrian, and ports.

## **ES.2 Existing Modal System Condition and Performance**

The modal needs assessment process begins with providing an overview of the existing modal conditions. Next is a discussion of the performance framework concept and how it relates to modal conditions and the determination of needs. The report then describes the approach to developing modal needs to the year 2040 and closes with a discussion of other key considerations, including freight and logistics, in the estimation of long-term modal needs.

### **ES.2.1 Approach**

The 2040 Plan is being prepared in an organizational environment that has evolved significantly since 2004. Initiated 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. NCDOT's investments and service delivery efforts are designed to:

- Optimize a strategic, multimodal network
- Be built on the concept of broad sustainability (of infrastructure, environment, and finances)
- 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 Department mission and the five goals
  - Definition of the North Carolina Multimodal Investment Network (NCMIN)
  - Application of multimodal levels of service (LOS) to quantify investment alternatives
  - Reporting of system performance using an Organizational Performance Dashboard

These components have permeated the NCDOT project and program development process and drive the performance-based approach to prioritizing transportation infrastructure investments across the various modes. This has been reflected in the Prioritization 1.0 and Prioritization 2.0 process. The 2040 Plan is the first STP to begin to capture that performance-based approach in terms building off the Prioritization process and its LOS framework for assessing existing performance and for quantifying the cost of performance at the various levels of service.

The first steps in the 2040 Plan process in terms of infrastructure needs planning were to provide an overview of the status and condition of existing infrastructure assets and services and to assess the existing performance under current funding levels.

## **ES.2.2 Performance Framework and Assessment**

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 (Statewide, Regional and Subregional) to expected outcomes or performance. Modeled after the traditional LOS used to define the quality of highway traffic 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 for transportation system investments are tied to the Department’s three Investment Goals: 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.

The Prioritization 2.0 process, which identifies 10-year transportation system priorities for the Statewide Transportation Improvement Program (STIP) that can be funded with available funding streams, is proceeding during the timeframe in which 2040 modal needs have been formulated. It was recognized that there is an opportunity to further coordinate the refinement of the LOS/project prioritization approach with the introduction of an LOS and performance-oriented approach into the analysis of 2040 needs and transportation infrastructure investment scenarios.

As part of this overview of existing modal conditions, an effort was made to characterize existing modal performance considering the available data sources within NCDOT. Sources considered were the annual Transportation System Performance Report, the biannual Maintenance Condition Assessment Report for the highway mode, and the Prioritization 1.0 and 2.0 processes, which introduced the LOS concept to the project prioritization process leading to the STIP and 10-year Program and Resource Plan. Because these various scales for performance metrics were developed at different times for differing purposes, they are not part of a unified system, though each cycle of the biannual prioritization process and STP updates affords opportunities to refine and better integrate these elements.

From these sources, this report documents information to provide a characterization of modal performance, relying primarily on the modal performance assessments developed in the current Prioritization 2.0 process. The report also provides an estimate of the current deficiencies for each mode. Current deficiencies are those needs that would be implemented today if funding were available.

The Prioritization LOS framework that captures the performance metrics for each investment category provides metric criteria for the LOS steps and quantifies the investment level needed to attain and maintain a given LOS grade.

## ES.3 Modal Needs

### ES.3.1 Approach

To assist NCDOT decision-making, all modal needs are categorized by NCMIN tier, investment goal, and 5-year funding phases (plus a backlog for current deficiencies). In addition, for the highway and public transportation modes, various subcategories are also tabulated to be consistent with modal need estimation calculations.

Not all modes have investment needs for every investment goal category or every tier category. Also, for highways and public transportation, specific subcategories of investments reflect the way that the modal needs estimates were developed.

### ES.3.2 Framework for Estimating Modal Needs

These estimation categories are summarized below.

#### North Carolina Multimodal Investment Network

The NCMIN is a framework to organize, manage, and analyze facilities across all transportation modes as part of a unified system. It consists of three tiers (Statewide, Regional, Subregional) into which all transportation facilities that are managed and administered by NCDOT, or which are funded in part through NCDOT, are assigned. The existing NCMIN definitions can be found on NCDOT's website at <http://www.ncdot.gov/performance/reform/NCMINmaps/>. The existing tiers get updated with new assignments (e.g., new routes can be added to the highway Statewide tier). The NCMIN tiers updates can be found on NCDOT's GIS website at: <http://www.ncdot.gov/it/gis/DataDistribution/DOTData>.

#### Investment Goal

NCDOT's transportation system investments are tied to the Department's three goals of Infrastructure Health, Mobility, and Safety. Modal needs were tabulated to reflect which investment goal was being addressed by project or program. These three investment goals are described further below, along with representative project types.

- Infrastructure Health: Projects where the *primary* purpose is to improve the condition of the existing infrastructure.
- Mobility: Projects where the *primary* purpose is to improve mobility or improve access. This includes the majority of projects that add capacity or improve travel time, even if the safety or condition of the facility is also improved.
- Safety: Projects where the *primary* purpose is to improve safety. A safety project may also improve the condition of the facility or mobility along the corridor.

#### Current Deficiencies and Accruing Needs

Another key aspect of the needs assessment process is identifying the difference between current deficiencies (that is, existing needs often referred to as backlog) and accruing (future) needs. Current

deficiencies, or backlog needs, refers to modal needs that are current, that is, those needs that have not been implemented but rather have been deferred. Accruing needs refers to modal needs that become necessary at a future date, due to capacity and services needs arising from growth in demand over time, or maintenance or repairs that become due in the future. These current deficiency estimates are a key part of total modal needs; the subsequent Phases 1 through 6 cover the 2011-2040 planning horizon. Generally, current deficiencies represent backlog, plus Phases 1 through 6 represent accruing needs; that is, the total of all these phases comprises total modal needs.

### **5-Year Funding Phases**

The 2040 Plan identifies multimodal transportation needs over a 30-year planning horizon (2011 to 2040). To assist the decision-making process, needs were subdivided into the following six distinct funding phases:

- Phase 1: 2011 to 2015
- Phase 2: 2016 to 2020
- Phase 3: 2021 to 2025
- Phase 4: 2026 to 2030
- Phase 5: 2031 to 2035
- Phase 6: 2036 to 2040

### **ES.3.3 Modal Needs Estimation Methodology**

For each of the individual modes and modal subcategories as appropriate, a specific modal needs estimation process was developed in collaboration with each of the NCDOT modal business units as indicated by the subcategories involved. This process was formulated after researching and reviewing the documentation available from the 2004 STP process and the 2006 Mid-Cycle Update process.

This process was also accomplished with elaborate coordination with estimation partners, including the Strategic Planning Office of Transportation (SPOT), the 17 Metropolitan Planning Organizations (MPO), and Rural Planning Organizations (RPOs) across the state. This interaction involved frequent communications in the form of numerous online/telephone conversations and webinars, teleconferences, and in-person coordination meetings over several months. These communications involved briefings, data development training, data review discussions, and refinement of provided data.

Based on review of prior plans, available reported data, conversations with business units' representatives, and prior experience, the following suite of modal need estimation methodologies were identified:

- Programmatic estimate based on historic investment levels in various programs
- Project-based capital and operating costs
- 2006 Mid-Cycle STP update information
- Recent modal system plans (Rail only)
- Asset-based inventory analysis (Highway - Bridges and Pavement)
- Mode specific asset-based inventory analysis (Ferries)
- GIS-based analysis of the roadway characteristics inventory

Each methodology or combinations were considered as needed for each modal investment category. Based on coordination, an estimation strategy was developed with each modal unit. A collaborative approach involving varying participation by the modal units and the consultant team was defined for each mode and mode subcategory of investment. The estimation approaches used for each mode/modal subcategory are summarized in **Table ES-1**.

## **ES.4 Summary of System Conditions and Modal Needs**

This report provides detailed discussion of the transportation system existing conditions, existing performance, and system needs mode by mode.

### **ES.4.1 Inventory Summary**

The NCDOT administers and partners in a substantial and well-developed network of multimodal transportation facilities. This system in which NCDOT partners with other agencies and jurisdictions Statewide comprises nearly 80,000 miles of state-operated roadways, 72 publicly operated airports, a ferry system with seven key service routes, two important coastal seaports and complementary inland ports, a widely dispersed system of pedestrian and bicycle facilities, a system of publicly and privately operated railroads supporting significant freight and passenger movements, and a widely dispersed set of municipal, county, and regional transit services addressing the mobility needs of both the general public and special transportation markets.

Collectively, these transportation facility and service assets provide a broad array of essential and strategic transport capacity that critically underpins the diverse movement of people and freight into, out of, through, and within the state. The following points summarize recent work relating to each mode:

- **Highways:** Progress has been made in remediating structurally deficient bridges. Improved maintenance regimes have made pavement maintenance dollars go further, but there are still significant backlogs in other highway maintenance work, as well as in capacity enhancements and roadway modernization.
- **Aviation:** The general structure of the NCDOT program of grants supporting the state's public aviation facilities is intact, but the need for state and federal funding to support specific airport projects is exceeded by local facility needs. A strategic investment to support regional economic develop potentials is another emerging need category.
- **Public Transportation:** Public transit services are a partnership arrangement with NCDOT funding and channeling federal grants to county and local services outside the major metropolitan areas and providing some financial support to metropolitan and regional transit services. Local transit revenue shortages are affecting the ability to match non-local funds, ironically at the time of rising needs for transit given the adverse economic climate. Long-term identified needs are significant.

**Table ES-1. Summary of Modal Needs Estimation Methods**

Mode / Mode Element	Estimation Method
Highways - Pavement	10-year estimate developed with pavement management system software and pavement inventory database
Highways - Bridges	Estimate developed with bridge management system software and bridge database
Highways – Maintenance	Developed from maintenance needs estimate for biannual maintenance condition assessment report
Highways – Expansion, Metropolitan	MPOs provided listing of highway needs per most recent LRTPs for metro areas. Coordinated with listing of costs to complete for Loops and intrastate road improvements
Highways – Expansion, Non-Metropolitan	Developed from analysis of roadway characteristics database in GIS format, applying traffic growth rates and segment capacities developed by the SPOT, and applying cost improvement matrix. Coordinated with listing of costs to complete for loops and intrastate road improvements
Highways – Modernization	Developed from analysis of roadway characteristics database in GIS format, screened against minimum tolerable standards and applying cost improvement matrix
Highways – Safety	Developed through estimates formulated for Prioritization 2.0, extended to 30-year period
Highways - ITS	Developed from updated ITS program requirements, including both capital and operating costs
Public Transportation	Developed from review and analysis of historic department funding role and review of programmatic needs; coordinated with Prioritization 2.0 estimates
Bicycle/ Pedestrian	Developed from review of nearly 100 planning reports and review of programmatic needs; coordinated with Prioritization 2.0 estimates
Rail	Developed from listing of freight and passenger projects identified in new Rail System Plan, with costing of capital land operating requirements
Ferries	Developed from listing of infrastructure assets and operating costs estimated for each facility/service
Ports	Developed from 10-year capital needs estimate and historical operating budget, allocated to goals, and extrapolated to 30 years; excludes any major new strategic investments to ports
Aviation	Developed from current listing of project needs and state funding participation

- Railroads: NCDOT envisions continued strategic investments in private Class 1 railroads to enhance publicly sponsored rail operations and to address targeted safety priorities. Continued public investment in the state’s passenger railroad services are sought, as well as long-term investment in high-speed rail through the state.
- Ferries: Ferries have seen the introduction of several replacement vessels, but there remains considerable need to address other infrastructure and added capacity for peak demand periods.
- Bicycle and Pedestrian: A complete analysis of these modal needs reveals a substantial overall need, with a significant accumulated backlog of needs.

- Ports: Ports are newly being considered under the umbrella of the Department, having previously been administered by the North Carolina State Ports Authority. Ports have ongoing modal needs not unlike other modes. Should the North Carolina Maritime Strategy report identify worthwhile investment needs in the existing ports or new facilities, those new strategies would need to be reflected in the ports modal needs.

## **ES.4.2 Existing System Performance**

Beginning in 2008, NCDOT has annually evaluated its organizational effectiveness based on numerical performance measures aligned with its mission, goals, and values. The three transportation network performance goals are to improve infrastructure health, mobility, and safety. Over the past 3 years of the annual evaluation process, NCDOT has refined and updated its performance measures and performance targets.

## **ES.4.3 Existing Performance**

In 2008, the NCDOT business units, in conjunction with the SPOT, developed LOS performance categories and associated financial needs for modal infrastructure as part of the biannual Prioritization process for the STIP. This assessment scored the ability of specified investment categories of the modes to address infrastructure, mobility, and safety goals at the Statewide, Regional, and Subregional tiers. In 2011, the ratings of existing performance for the modal investment categories were updated as part of the Prioritization 2.0 process, which is part of the biannual STIP update. In this process, modal units working with SPOT refined performance metrics, ascribed 10-year investment values associated with the various LOS steps, and determined their existing performance levels against this framework. Similar to the 2008 assessment, most investment categories were evaluated to be performing at LOS D, with several at LOS C, a few at LOS B, and two at LOS A. A composite weighted performance rating across all modes and investment categories yielded a result in the upper range of LOS D.

This assessment of performance indicates that for many individual investment line items and for the system collectively, the level of funding applied currently to transportation system investments in facilities and services yields an LOS D performance overall, and improved performance in individual categories or overall would require increased investment. Summary of Modal Needs

The overall transportation system modal needs estimates were developed based on estimates of the individual needs of each mode. All estimates are reported in constant 2011 dollars.

As shown in **Table ES-2** and **Figures ES-1** and **ES-2**, the 30-year transportation modal needs total \$159.53 billion. At \$114.59 billion, the accruing needs represent 72 percent of all identified needs, with current deficiencies accounting for \$44.95 billion, or 28 percent of the total identified need.

Table ES-2. Modal Needs by 5-Year Increments (\$ in Millions)

Mode	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
Aviation	682	261	300	345	396	456	524	2,964
Rail	242	782	2,558	362	5,350	711	938	10,943
Bicycle/ Pedestrian	1,051	7	20	33	46	59	68	1,284
Public Transportation	13,875	1,296	3,250	2,490	1,029	1,234	1,234	24,408
Ferry	404	248	260	232	208	225	193	1,770
Ports	66	238	250	256	263	269	276	1,618
Highways	28,626	9,172	9,687	14,383	10,144	22,107	22,425	116,544
<b>Grand Total</b>	<b>44,946</b>	<b>12,004</b>	<b>16,325</b>	<b>18,101</b>	<b>17,436</b>	<b>25,061</b>	<b>25,658</b>	<b>159,532</b>

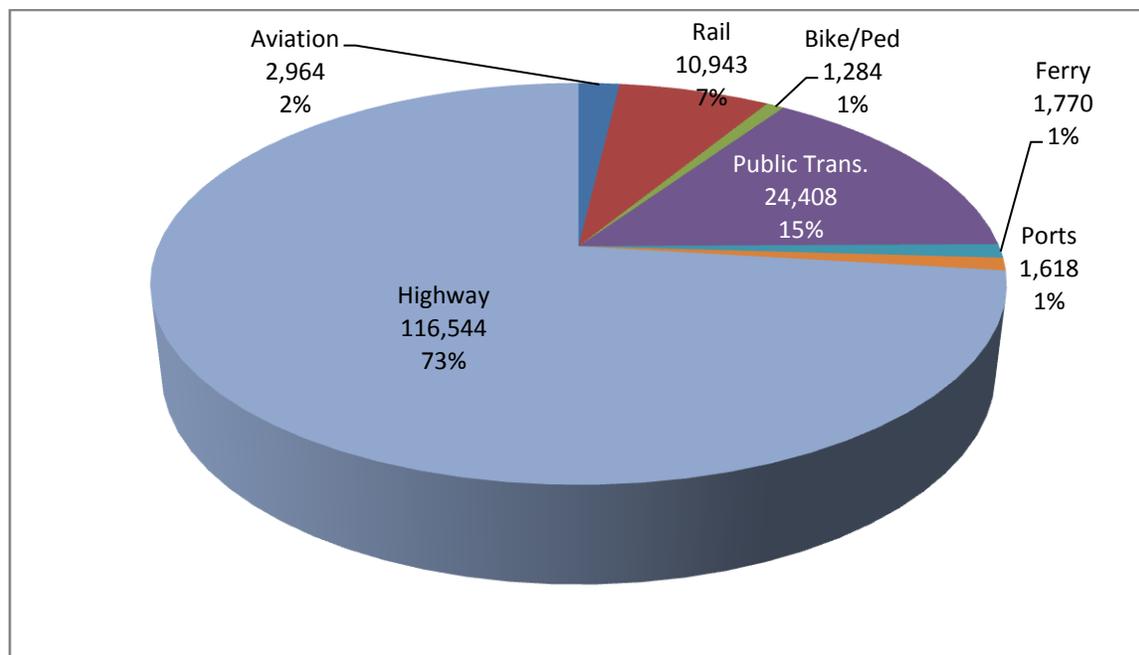


Figure ES-1. Total Transportation Needs (\$ in Millions)

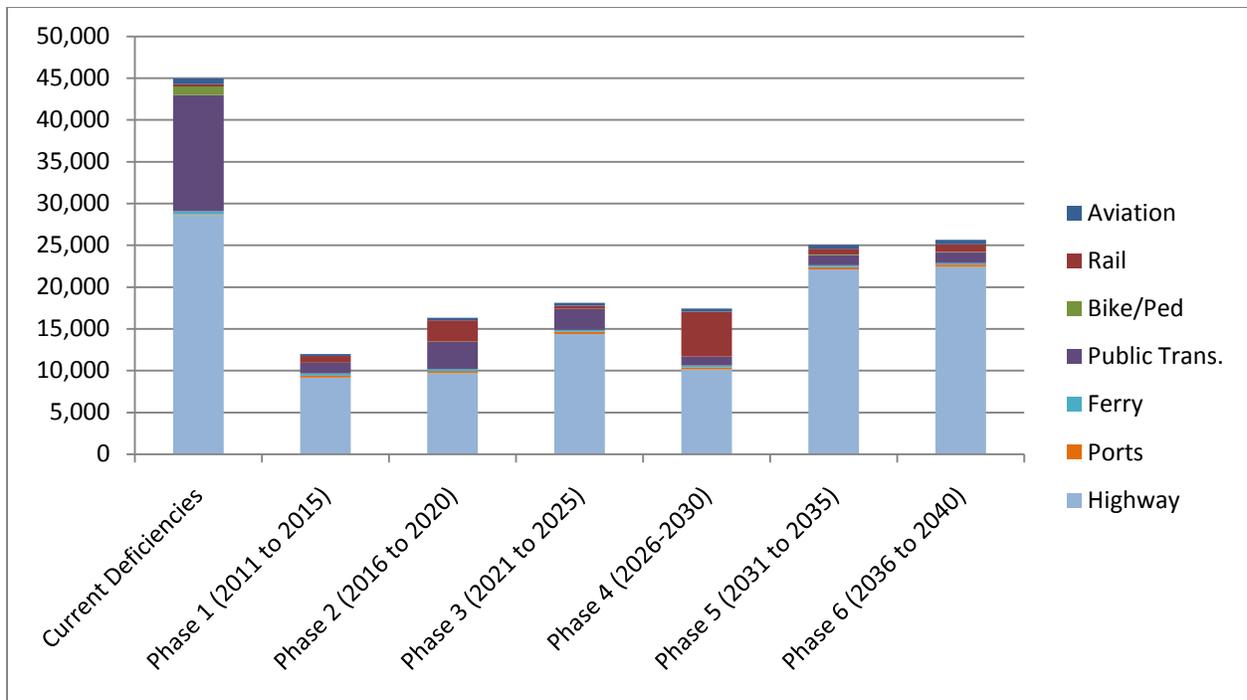


Figure ES-2. Total Transportation Needs by 5-Year Increments (\$ in Millions)

#### ES.4.4 Needs by Investment Goal

By investment goal, as shown in **Table ES-3** and **Figure ES-3**, 53 percent (\$84.57 billion) of identified transportation needs are mobility needs, 45 percent (\$71.08 billion) are infrastructure health needs, and the remaining 2 percent (\$3.88 billion) are safety needs. Identified needs by investment goal vary widely by mode depending on the particular needs and role in each investment goal.

Table ES-3. Total Transportation Needs by Investment Goal (\$ in Millions)

Total Needs By Mode	Health	Safety	Mobility	Total
Aviation	1,338	174	1,452	2,964
Rail	36	231	10,676	10,943
Bicycle/Pedestrian	-	643	642	1,285
Public Transportation	9,058	274	15,076	24,408
Ferry	1,508	-	262	1,770
Ports	1,434	62	123	1,619
Highway	57,701	2,499	56,343	116,543
<b>Total</b>	<b>71,075</b>	<b>3,883</b>	<b>84,574</b>	<b>159,532</b>

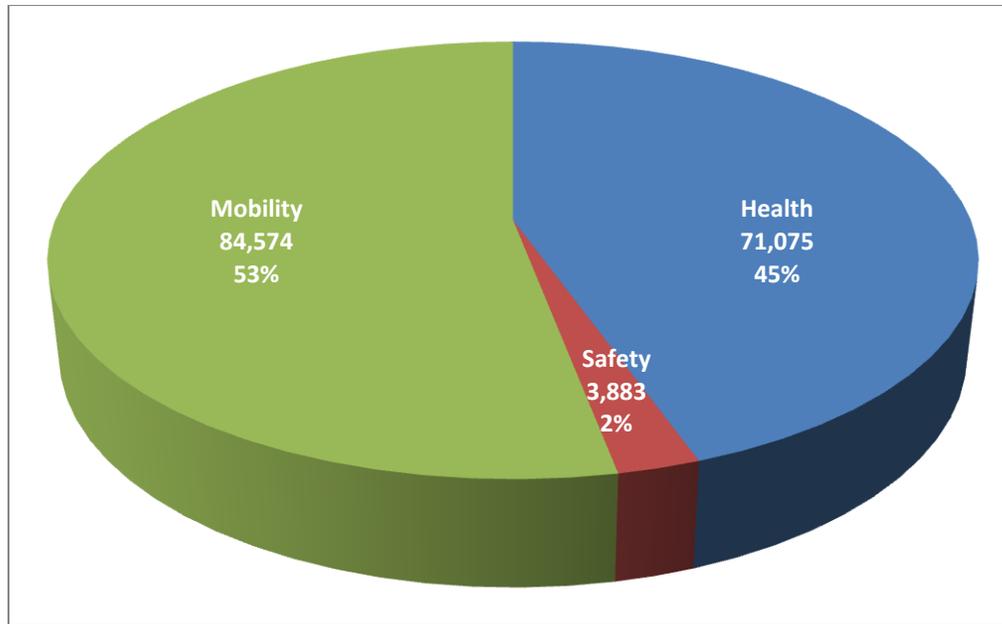


Figure ES-3. Total Transportation Needs by Investment Goal (\$ in Millions)

#### ES.4.5 Needs by NCMIN Tier

Based on NCMIN Tier, as shown in **Table ES-4** and **Figure ES-4**, 37 percent (\$59.47 billion) of identified transportation needs are Statewide tier needs, 23 percent (\$36.37 billion) are Regional tier needs, and 40 percent (\$63.69 billion) are Subregional tier needs. Identified needs by tier vary widely by mode depending on the particular needs and role in each of the NCMIN tiers.

Table ES-4. Total Transportation Needs by North Carolina Multimodal Investment Network Tier (\$ in Millions)

Mode	Statewide	Regional	Subregional	Total
Aviation	76	2,339	549	2,964
Rail	7,919	1,896	1,128	10,943
Bicycle/Pedestrian	26	103	1,156	1,285
Public Transportation	254	13,055	11,099	24,408
Ferry	1,192	578	-	1,770
Ports	1,619	-	-	1,619
Highways	48,385	18,401	49,757	116,543
<b>Total</b>	<b>59,471</b>	<b>36,372</b>	<b>63,689</b>	<b>159,532</b>

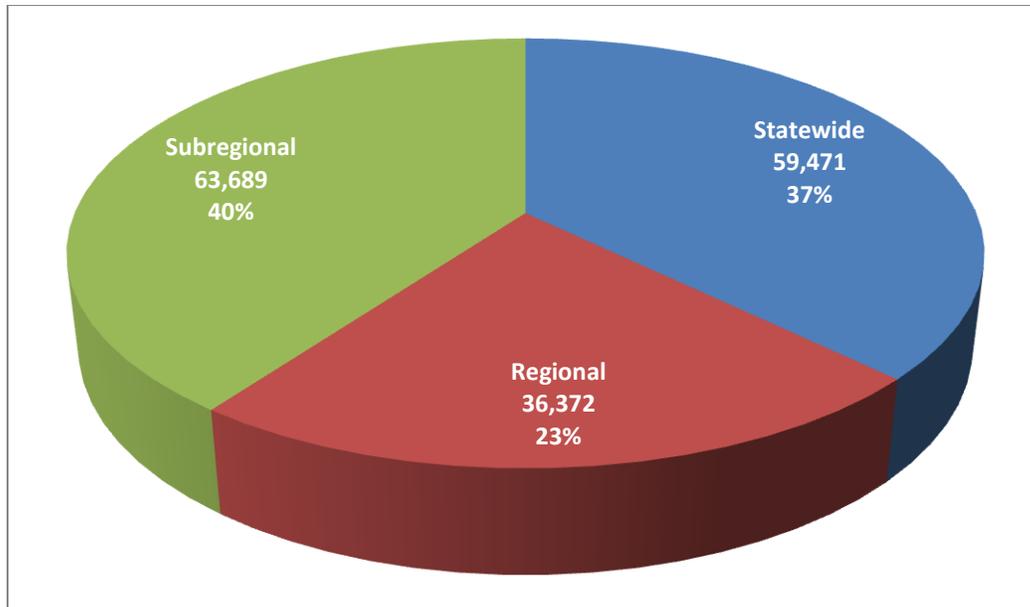


Figure ES-4. Total Transportation Needs by North Carolina Multimodal Investment Network Tier (\$ in Millions)

#### ES.4.6 Level of Service Targets

For the 2040 Plan and its longer timeframe, consistency with the Prioritization 2.0 process and clearer links to system quality levels needed for more cost-effective investment provides a logical basis for reporting a set of multimodal system quality targets lower than LOS A. Unlike the modal needs estimates in this report, the 2040 Plan analysis applies a “Target Level of Service” identified by NCDOT modal business units as the basis for defining 10-year needs and funding gaps.

Table ES-5 presents a tabulation of needs by Level of Service ranging from A to D, and Target LOS. When LOS A is compared to Target LOS, the estimated decrease in estimated 30-year modal needs is from \$160 billion to \$123 billion, or a difference of \$37 billion. The 30-year needs at LOS B are estimated at \$130 billion, followed by LOS C at 94 billion, and LOS D at \$66 billion.

Table ES-5. Total Transportation Needs by Level of Service (\$ in Millions)

Mode / Sub-Mode	Investment Goal	NCMIN Tier	LOS A Total	LOS B Total	LOS C Total	LOS D Total	Target LOS Total
Aviation Total			2,964	2,775	2,080	1,461	2,218
Rail - Passenger Total			9,599	8,042	2,225	1,123	2,733
Rail Total			10,943	9,117	3,031	1,660	3,539
Bike/Ped Total			1,285	1,029	773	341	773
Public Transportation Total			24,408	20,384	17,338	14,736	20,384
Ferry Total			1,770	1,593	1,416	708	1,593
Ports Total			1,619	1,295	971	648	1,295
Highways - Bridges Total			10,144	8,115	6,086	4,058	7,921
Highways - Pavement Total			25,534	21,385	14,471	10,214	19,309
Highways - Roadway Maintenance Total			17,440	13,952	10,464	6,976	11,395
Highways - Safety Total			2,499	1,999	941	1,000	1,999
Highways - Modernization Total			4,028	3,222	2,417	1,611	2,244
Highways - Expansion - Non-Metro Total			10,412	8,330	6,247	4,165	8,582
Highways - Expansion - Metro Total			45,311	36,249	27,187	18,124	40,564
Highways Total			116,543	94,192	68,519	46,617	93,030
<b>Grand Total</b>			<b>159,532</b>	<b>130,386</b>	<b>94,128</b>	<b>66,172</b>	<b>122,833</b>



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# Acronyms and Abbreviations

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ARRA	American Recovery and Reinvestment Act of 2009
BR	Bridge Route
CATS	Charlotte Area Transit System
DOT	Department of Transportation
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
FY	Fiscal Year
GIS	Geographic Information System
IDAS	ITS Deployment Analysis Software
ITS	Intelligent Transportation Systems
LOS	Level of service
L RTP	Long-Range Transportation Plan
MPO	Metropolitan Planning Organization
MVM	Million vehicle miles travelled
NCDOT	North Carolina Department of Transportation
NCMIN	North Carolina Multimodal Investment Network
NCRR	North Carolina Railroad
NCSPA	North Carolina State Ports Authority
PART	Piedmont Authority for Regional Transportation
PTD	Public Transportation Division
RGP	Rural General Public
RIAP	Rail Industrial Access Program
RPO	Rural Planning Organization
SAFETEA-LU	Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users
SDP	Strategic Deployment Plan
SHC	Strategic Highway Corridors
SPOT	Strategic Planning Office of Transportation
SR	Secondary Route
STIP	Statewide Transportation Improvement Program
STP	Statewide Transportation Plan
TDM	Transportation demand management
TIP	Transportation Improvement Plan
TMC	Traffic Management Center
TRIP	The Road Information Program
VMT	Vehicle Miles Travelled



# Chapter 1

## Introduction

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### 1.1 Purpose of Report

This report is one in a series 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 purposes of this report are to:

- Provide a profile of existing modal conditions and performance as a frame of reference for the preparation of a 30-year plan for the delivery of transportation infrastructure and services in the state.
- Present an estimate of the future modal needs, for both capital and operating costs, to the year 2040 to serve as a foundation for subsequently examining priorities for investing in transportation infrastructure and operational services.

To accomplish these two purposes, this report describes for each transportation mode the existing conditions, features, and assets for each modal component of the transportation system. It also provides a preliminary summary of the general performance and current deficiencies of each modal component, based on available metrics from prior study, reporting, and investment programming cycles undertaken by NCDOT. For each mode, the report documents estimates of the modal needs, quantifying the costs of providing a desired level of service, or performance, of each mode in addressing the mobility and transport needs of residents, businesses, and government agencies using those facilities.

### 1.2 Background

The initial report of the 2040 Plan study, *Challenges and Opportunities*, described the overall context within which the study is being conducted, including baseline conditions in terms of both transportation systems and the social and economic forecasts that must drive transportation program delivery. The *Challenges and Opportunities* report discussed a set of transportation challenges that the 2040 Plan must address, and the opportunities available to NCDOT for addressing those challenges. The report also described the planning framework within which the study is being conducted; therefore, that information is not repeated here.

The federal government requires that each state develop, maintain, and update an STP. These requirements are outlined in 23 Code of Federal Regulations Parts 450.212 and 450.214. Within NCDOT, the Transportation Planning Branch is responsible for preparing the STP. The development of each STP is framed with a set of goals to guide the plan development. The goals for the current 2040 Plan development were documented in the *Challenges and Opportunities* report and address these major plan components:

- Modal Effectiveness
- Financial Feasibility
- Program Delivery and Vision

The previous STP documents have included summary discussions of significant existing modal resources and conditions as a frame of reference for the subsequent analysis of long-term improvement and services needs, as well as requirements to preserve a state of good repair for the infrastructure components. The discussion of the modes in this report is intended to provide a summary profile of the extent of current facilities, a profile of existing modal condition and performance, and the estimated costs of modal needs to maintain existing transportation facilities and services, and to expand those facilities and services to address future mobility and transport needs.

During this discussion, it is helpful to understand several terms that are used to characterize how the transportation system is performing and how the costs of preserving and expanding the network into the future are described. These definitions are provided below.

- *Level of service (LOS)* refers to the how well a modal investment category performs in meeting public needs. The level of performance of a given modal investment category is assessed against one or more measures which are graded against a defined scale of metrics tied to LOS A, B, C, D, and F, similar to a school report card.
- *Modal needs* refer to the long-range capital and operating costs for infrastructure and services for each transportation mode. The needs are estimates of the long-range (for the 30-year period ending at 2040) capital and operating costs of infrastructure, services provided, and maintenance/repair for each transportation mode. In this report, modal needs are estimated in terms of meeting LOS A, a optimal quality level of performance in which all existing infrastructure is at a very good level of condition, all operational types of services are sufficiently funded to yield a high level of convenience, and in which mobility and transport needs that evolve over time with growth are fully accommodated in a timely fashion.
- *Current deficiencies* are those needs that are considered to be current, that is, costs of capital project or operational deficiencies that should have already been implemented to achieve or maintain the target LOS. Current deficiencies are also referred to as “backlog” needs.
- *Accruing needs* refers to modal needs that become necessary at a future date, due to capacity and service needs arising from growth in demand over time, or maintenance or repairs that become due in the future.

### **1.3 Report Organization**

This report documents existing modal conditions and systems components. The report next provides a summary of existing transportation system *conditions and an* assessment of future needs for each mode of transportation, followed by a section summarizing the collective transportation system.

# Chapter 2

## Transportation System Conditions and Needs

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### 2.1 Overview

The modal needs assessment process begins with this report, which provides an overview of the existing modal conditions but forms the frame of reference for development of long-term modal needs within a performance-based framework. The report discusses the performance framework concept and how it relates to modal conditions and the determination of needs. This chapter discusses the approach to developing modal needs to the year 2040 and closes with a discussion of other key considerations, including freight and logistics, in the estimation of long-term modal needs.

### 2.2 Existing Modal System Condition and Performance

#### 2.2.1 Approach

The 2040 Plan is being prepared in an organizational environment that has evolved significantly since 2004. Initiated 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. NCDOT's investments and service delivery efforts are designed to:

- Optimize a strategic, multimodal network
- Be built on the concept of broad sustainability (of infrastructure, environment, and finances)
- 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 Department mission and goals
  - Definition of the North Carolina Multimodal Investment Network (NCMIN)
  - Application of multimodal LOS to quantify investment alternatives
  - Reporting of system performance using an Organizational Performance Dashboard

These components have permeated the NCDOT project and program development process and drive the performance-based approach to prioritizing transportation infrastructure investments across the various modes. This has been reflected in the initial Prioritization 1.0 process and the ongoing Prioritization 2.0 process. The 2040 Plan is the first STP to begin to capture that performance-based approach in terms building off the Prioritization process and its LOS framework for assessing existing performance and for quantifying the cost of performance at the various levels of service.

The first steps in the 2040 Plan process in terms of infrastructure needs planning was to provide an overview of the status and condition of existing infrastructure assets and services and to determine the existing performance under current funding levels.

## 2.2.2 Performance Framework and Assessment

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 traffic 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 for transportation system investments 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.

The Prioritization 2.0 process, which identifies 10-year transportation system priorities for the Statewide Transportation Improvement Program (STIP) that can be funded with available funding streams, is proceeding during the timeframe in which 2040 modal needs were formulated. It was recognized that there is an opportunity to further coordinate the refinement of the LOS/project prioritization approach with the introduction of an LOS and performance-oriented approach into the analysis of 2040 needs and transportation infrastructure investment scenarios.

As part of this overview of existing modal conditions, an effort was made to characterize existing modal performance considering the available prior data sources within NCDOT. Sources considered were the annual Transportation System Performance Report, the annual Maintenance Condition Assessment Report for the highway mode, and the Prioritization 1.0 and 2.0 processes, which introduced the LOS concept to the project prioritization process leading to the 5-year work program, the STIP, and the 10-year Program and Resource Plan. Because these various scales for performance metrics were developed at different times for differing purposes, they are not part of a unified system, though each cycle of the biannual prioritization process and STP updates affords opportunities to refine and better integrate these elements.

From these sources, this report documents information to provide a characterization of modal performance, relying primarily on the modal performance assessments developed in the current Prioritization 2.0 process. The report also provides an estimate of the current deficiencies for each mode. Current deficiencies are those needs that would be implemented today if funding were available.

**Table 2-1** shows the current system performance by various modal investment categories evaluated as part of the Prioritization 2.0 process. It is noted that various capital and operations costs (such as roadside maintenance, Intelligent Transportation Systems, Statewide tier Aviation) are not included in the analysis. Also the Ports mode was not assessed as its transition into NCDOT management is currently underway. **Table 2-2** shows a sample of Prioritization LOS framework for the Aviation system that captures the performance metrics for each investment category, provides metric criteria for the

LOS steps, and quantifies the investment level needed to attain and maintain a given LOS rating. This same process has been developed for all modes except the ports.

**Table 2-1. Current Transportation System Performance Based on Prioritization 2.0 Assessments**

Mode	Goal	Tier	Improvement Type	CURRENT YEAR LOS (A - F)
<b>Aviation</b>	Safety	Regional & Subregional	All	<b>D</b>
	Mobility	Regional & Subregional	All	<b>D</b>
	Health	Regional & Subregional	All	<b>D</b>
<b>Bike &amp; Ped</b>	Mobility	All tiers	All	<b>D</b>
	Safety	All tiers	All	<b>D</b>
<b>Ferry</b>	Mobility	All tiers	All	<b>C</b>
	Health	All tiers	All	<b>C</b>
<b>Public Transportation</b>	Safety	All tiers	All	<b>C</b>
	Mobility	All tiers	All	<b>D</b>
	Health	All tiers	All	<b>C</b>
<b>Rail</b>	Mobility	Statewide	All	<b>D</b>
<b>Highway</b>	Safety	All Tiers	All	<b>C</b>
	Mobility	Statewide	All	<b>B</b>
		Regional	All	<b>A</b>
		Subregional	All	<b>A</b>
	Health	Statewide	Interstate Pavement	<b>B</b>
			Pavement (Contract Resurfacing)	<b>D</b>
			Modernization	<b>C</b>
		Regional	Pavement (Contract Resurfacing)	<b>D</b>
			Modernization	<b>D</b>
		Subregional	Pavement (Contract Resurfacing)	<b>D</b>
			Modernization	<b>F</b>
All tiers	Bridge	<b>C</b>		

This assessment of performance indicates that the level of funding currently applied to transportation system investments yields existing performance at LOS C overall, and that improved performance in individual categories or overall would require increased investment.

Table 2-2. North Carolina Department of Transportation Level of Service Framework for Modal Performance (Aviation Mode Example)

Mode	Goal	Tier	Submode	Measure	LOS A (min. value)	LOS B (min. value)	LOS C (min. value)	LOS D (min. value)	LOS F (min. value)	\$ Needed to Achieve LOS A	\$ Needed to Achieve LOS B	\$ Needed to Achieve LOS C	\$ Needed to Achieve LOS D	\$ Needed to Achieve LOS F	MEET ALL TARGETS	CURRENT YEAR (A-F)	TARGET (A-F) for Year 2022	EXAMPLE PROJECTS
Aviation	Safety	Regional & Subregional		Number of unfunded Aviation Safety Related Category Projects	10	50	100	200	>200	\$165,000,000	\$146,000,000	\$118,000,000	\$60,000,000	\$0	\$146,000,000	D	B	Runway Approach Obstruction Removal, Runway Safety Area Improvements, Land for Runway Protection Zones
	Mobility	Regional & Subregional		Number of unfunded Aviation Mobility Related Category Projects	50	100	300	600	>600	\$548,000,000	\$496,000,000	\$286,000,000	\$100,000,000	\$0	\$286,000,000	D	C	Runway Extension, Pavement Strengthening and Widening, New Taxiway, Aircraft Parking Apron Expansion
	Health	Regional & Subregional		% of primary airside pavement with a Pavement Condition Index (PCI) number > or equal to 76	100%	85%	75%	60%	50%	\$309,000,000	\$305,000,000	\$282,000,000	\$270,000,000	\$0	\$305,000,000	D	B	Runway, Taxiway and Aircraft Apron Pavement Resurfacing or Rehabilitation

Source: NCDOT, SPOT Draft Level of Service – P 2.0

## 2.3 Modal Needs

### 2.3.1 Approach

To assist NCDOT decision-making, all modal needs are categorized by NCMIN tier, investment goal, and 5-year funding phases (plus a separate phase for current deficiencies). In addition, for the highway and public transportation modes, various subcategories are also tabulated because the modal need estimations were necessarily calculated in this manner. This section discusses those estimation categories. **Table 2-3** summarizes the tabulation structure used for the Mode/Goal/Tier structure of the modal needs estimates.

Not all modes have investment needs for every investment goal category or every tier category. Thus, **Table 2-2** does not display a full matrix of those investment components. Also, for highways and public transportation, specific subcategories of investments reflect the way that the modal needs estimates were developed. For public transportation, needs were further subdivided between urban (Metropolitan Planning Organization [MPO] areas) and Rural Planning Organizations (non-metropolitan, non-MPO areas). For highways, several subcategory stratifications were used to capture the manner in which the highway modal needs were developed, to include bridges, pavement, safety, maintenance, modernization and expansion, both metropolitan areas (MPOs) and non-metropolitan rural areas (outside RPOs), and Intelligent Transportation Systems (ITS).

### 2.3.2 Framework for Estimating Modal Needs

To facilitate the eventual assessment of investment priorities as part of the 2040 Plan process, the modal needs are tabulated against several specific breakdowns; these include the NCMIN tiers, the NCDOT investment goal categories, current deficiencies and accruing needs, and 5-year phases of need, as described below.

#### North Carolina Multimodal Investment Network

The NCMIN is a framework to organize, manage, and analyze facilities across all transportation modes as part of a unified system. It consists of three tiers (Statewide, Regional, and Subregional) into which all transportation facilities that are managed and administered by NCDOT or which are funded in part through NCDOT are assigned. The NCMIN was developed during the 2004 STP and was continued through the 2006 Mid-Cycle Update. Some transportation facilities serve significant Statewide movements, while others serve Regional or more localized (Subregional) movements. Each facility type is important, and the NCMIN represents a way to acknowledge the different functions of each tier of facility. The North Carolina State Ports Authority (NCSPA) is currently coming under the umbrella of NCDOT administratively. While its two seaports, Wilmington and Morehead City, and two inland port/terminal facilities are not formally incorporated under the NCMIN, for the purposes of the 2040 Plan they are considered to be Statewide tier facilities under the Ports mode. It is recommended that the NCMIN be amended to include ports.

The existing NCMIN definitions can be found on NCDOT's website at <http://www.ncdot.gov/performance/reform/NCMINmaps/>. The existing tiers get updated with new

assignments (e.g., new routes can be added to the highway Statewide tier). The NCMIN tiers updates can be found on NCDOT's GIS website at:

<http://www.ncdot.gov/it/gis/DataDistribution/DOTData/default.html>

**Table 2-3. Modal Needs Tabulation Format**

Mode / Sub-Mode	Investment Goal	NCMIN Tier
Aviation	Mobility	Statewide
		Regional
		Subregional
	Mobility Subtotal	
	Safety	Statewide
		Regional
		Subregional
	Safety Subtotal	
	Health	Statewide
		Regional
Subregional		
Health Subtotal		
<b>Aviation Total</b>		
Rail – Passenger	Mobility	Statewide
		Regional
		Subregional
	Mobility Subtotal	
	Safety	Statewide
	Safety Subtotal	
	Health	Statewide
Health Subtotal		
<b>Rail - Passenger Total</b>		
Rail – Freight	Mobility	Statewide
		Regional
	Mobility Subtotal	
<b>Rail - Freight Total</b>		
<b>Rail Total</b>		
Mode / Sub-Mode	Investment Goal	NCMIN Tier
Bike/Ped	Mobility	Statewide
		Regional
		Subregional
Mobility Subtotal		
<b>Bike/Ped Total</b>		
Public Trans. – Urban	Mobility	Statewide
		Regional
		Subregional
	Mobility Subtotal	
	Safety	Statewide
		Regional
Safety Subtotal		
Health	Statewide	

**Table 2-3. Modal Needs Tabulation Format**

<b>Mode / Sub-Mode</b>	<b>Investment Goal</b>	<b>NCMIN Tier</b>	
		Regional	
		Subregional	
	Health Subtotal		
Public Trans. – Rural	Mobility	Statewide	
		Regional	
		Subregional	
		Mobility Subtotal	
	Safety	Statewide	
		Regional	
		Subregional	
		Safety Subtotal	
	Health	Statewide	
		Regional	
Subregional			
	Health Subtotal		
<b>Public Transportation Total</b>			
<b>Mode / Sub-Mode</b>	<b>Investment Goal</b>	<b>NCMIN Tier</b>	
Ferry	Mobility	Statewide	
		Regional	
		Mobility Subtotal	
	Health	Statewide	
Regional			
	Health Subtotal		
<b>Ferry Total</b>			
Ports	Mobility	Statewide	
		Mobility Subtotal	
	Safety	Statewide	
		Safety Subtotal	
	Health	Statewide	
	Health Subtotal		
<b>Ports Total</b>			
Highways – Bridges	Health	Statewide	
		Regional	
		Subregional	
<b>Highways - Bridges Total</b>			
Highways – Pavement	Health	Statewide	
		Regional	
		Subregional	
<b>Highways - Pavement Total</b>			
Highways - Roadway Maintenance	Health	Statewide	
		Regional	
		Subregional	
<b>Highways - Roadway Maintenance Total</b>			
Highways – Safety	Safety	Statewide	
		Regional	
		Subregional	
<b>Highways - Safety Total</b>			
Highways – Modernization	Health	Statewide	
		Regional	
		Subregional	

**Table 2-3. Modal Needs Tabulation Format**

Mode / Sub-Mode	Investment Goal	NCMIN Tier
<b>Highways - Modernization Total</b>	<b>Health</b>	
Highways - Expansion - Non-Metro	Mobility	Statewide
		Regional
		Subregional
<b>Highways - Expansion - Non-Metro Total</b>	<b>Mobility</b>	
Highways - Expansion – Metro	Mobility	Statewide
		Regional
		Subregional
<b>Highways - Expansion - Metro Total</b>	<b>Mobility</b>	
Highways – ITS	Mobility	Statewide
		Regional
	Mobility Subtotal	
	Health	Statewide
		Regional
Health Subtotal		
<b>Highways - ITS Total</b>		
<b>Highways Total</b>		
<b>Grand Total</b>		

The Statewide tier includes facilities in each mode that provide the most Statewide benefits and satisfy Statewide criteria; they are those that serve long-distance trips, connect regional centers, have the highest usage, and provide mostly a mobility function (as opposed to a land access function). Example facilities are I-40, I-95, US 501, Raleigh-Durham International Airport, NC and Amtrak passenger trains, State Bicycle Route 7, and Hatteras-Ocracoke Ferry.

The Regional tier connects major population centers and serves a mixture of functions. Some Regional tier facilities can be viewed as serving Statewide transportation criteria, but they usually provide an unmistakable localized function. They are equally important to a particular region of the state and provide some land access. Example facilities are US 301, US 21, US 15, NC 801, Bayview-Aurora Ferry, and Currituck County Regional Airport.

The Subregional tier facilities serve localized movements. They provide more of an access function than mobility and are typically of a higher interest to cities and counties than the state. The state has responsibility for many of these facilities. In most cases at this tier, state investment probably would focus on maintenance/preservation as opposed to expansion. Example facilities are Charlotte Lynx Blue Line, Asheville Transit bus service, and Ocracoke Island Airport.

The NCMIN also allows NCDOT to identify which transportation resources are most critical for the efficient movement of passengers and freight across all modes. Logically, the NCDOT has primary interest in those facilities that move freight and passengers on a Statewide or regional basis; that is, longer trips between major metropolitan areas or regions, through-state traffic, or trips serving intermodal terminals.

Each facility is classified into one of three tiers; each tier has distinct features that define how facilities function, the type of travel they serve, and other measures such as connectivity and usage. The NCMIN

is a planning tool. It does not represent a recommended State-owned transportation system, nor is it intended to identify limits on future State investments. For the highway mode, the roadway characteristics database now includes a coding field designating the assigned tier for each roadway segment in the database. **Table 2-4** summarizes the NCMIN tier structure definitions by mode.

### **Investment Goal Categories**

NCDOT's transportation system investments are tied to the Department's main three goals relating to infrastructure management, development, services, and funding, or Investment Categories: Infrastructure Health, Mobility, and Safety. Modal needs were tabulated to reflect which investment goal was being addressed by project or program. These three investment goals are described below, along with representative project types.

#### ***Infrastructure Health***

Infrastructure health includes projects where the *primary* purpose is to improve the condition of the infrastructure. Projects that improve the health of the infrastructure and safety of the facility are typically classified as infrastructure health, unless the primary purpose is to improve safety. Examples include:

- Reconstruction, rehabilitation, resurfacing, repair, replacement, or preservation projects
- Rest area projects
- Replacing an aging ferry vessel (as opposed to a new ferry for new service)
- Replacing an aging bus (as opposed to a new bus for new service)
- Repaving an airport runway

#### ***Mobility***

Mobility includes projects where the *primary* purpose is to improve mobility or improve access; this includes the majority of projects that add capacity or improve travel time, even if the facility safety or condition is also improved. Examples include:

- Widening projects (including those that incorporate a bridge replacement project)
- New location projects (unless a project is to relocate a facility to improve safety)
- Convert grade-separation to interchange projects
- Signal system coordination projects
- Variable message signs and traffic cameras
- New multi-use trail projects
- New buses for a new bus route
- New passenger/commuter/light rail service
- Adding double track to a rail line
- New ferry vessel for expanded ferry service
- Runway extension to accommodate larger planes

#### ***Safety***

Safety includes projects where the *primary* purpose is to improve safety. A safety project may also improve the condition of the facility or mobility along the corridor. Examples include:

- Guardrail projects
- Rail crossing and safety projects
- Upgrade roadway projects to improve safety, where no additional capacity or lanes are included
- Traffic signals
- Rumble strips
- Runway lighting
- Pedestrian crossings or safe-route-to-school projects

**Table 2-4. North Carolina Multimodal Investment Network Tier Structure**

Mode	Statewide Tier	Regional Tier	Subregional Tier
Highways <sup>1</sup>	The Strategic Highway Corridors (SHC) as approved by the Board of Transportation on the SHC Vision Plan. <sup>2</sup>	All primary routes (US and NC) not on the Statewide Tier.	All secondary routes (SR) not on the Statewide Tier. <sup>3</sup>
Aviation	Commercial service airports with at least 100,000 annual enplanements.	Commercial service airports (Part 139 Certificated) with fewer than 100,000 annual enplanements <i>or</i> General aviation airports with at least 25 based aircraft.	General Aviation airports with fewer than 25 based aircraft.
Public Transportation	Bus service and associated station facilities that serve out-of-state travel.	Bus and vanpool service and associated station facilities and passenger amenities that serve commuters <i>between</i> two or more counties.	Bus and vanpool service and associated station facilities and passenger amenities that serve commuters <i>within</i> a county.
Rail (Passenger and Commuter)	All intercity (including out-of-state) passenger rail service and station facilities associated with intercity services.	Commuter rail service and associated station facilities that serve commuters <i>between</i> two or more counties.	Commuter and light rail service and associated station facilities that serve commuters <i>within</i> a county.
Rail (Freight)	Rail lines of strategic importance as determined by the Rail Division.	All remaining rail lines not included on the Statewide Tier.	N/A
Ferry	Ferry routes connecting Statewide Tier Highway Facilities.	Ferry routes connecting Regional Tier Highway facilities.	Ferry routes connecting Subregional Tier Highway facilities.
Bicycle and Pedestrian	NC bicycling highways (on-road)	NCDOT-designated multi-county regional routes (on-road) <i>or</i> Off-road facilities spanning multiple jurisdictions with a length of at least 20 miles.	Off-road facilities with a length shorter than 20 miles <i>or</i> Town, city, or county on-road bicycle networks <i>or</i> All sidewalks.

1. The Board of Transportation formally designated the SHC as the highway element of the Statewide tier on March 1, 2007.

2. An existing segment of an SHC, which is proposed to be bypassed (the bypass has been approved by the Board of Transportation on the SHC Vision Plan), is considered to function as part of the Corridor until the bypass is open to traffic.

3. It is proposed that all secondary routes on the Statewide tier will be evaluated for primary route designation.

### **Current Deficiencies and Accruing Needs**

Another key aspect of the needs assessment process is identifying between current deficiencies (that is, existing needs often referred to as backlog) and accruing (future) needs. Current deficiencies refer to modal needs that are current, that is, those needs that have been deferred due to lack of funds. These needs are current deficiencies that would have already been implemented had necessary funds been available. Accruing needs refers to modal needs that become necessary at a future date, due to capacity and services needs arising from growth in demand over time, or maintenance or repairs that become due in the future. The 2040 Plan provides detailed backlog information for all modes, which is an enhancement over prior plans where data did not support this breakdown for the non-highway modes.

Some of the estimations were the result of models with the ability to identify current deficiencies; others involve qualitative judgment of the timing of needs; and, for a few, an approximate estimation of current deficiencies was made given the nature of the available information. The backlog portions of the highway and bridge analyses were obtained in different ways. HERS-ST (version 4.0) does not directly report backlog needs (miles improved and improvement costs) in its output. Determining roadway backlog needs required manual calculations.

These current deficiency estimates are a key part of total modal needs and were reported as Phase 0, along with the subsequent Phases 1 through 6 covering the 2011-2040 planning horizon for the plan.

Generally, Phase 0 defines current deficiencies (backlog) and Phases 1 through 6 represents accruing needs; that is, the total of all seven of these phases comprises total modal needs.

### **5-Year Funding Phases**

The 2040 Plan identifies multimodal transportation needs over a 30-year planning horizon (2011 to 2040). To assist the decision-making process, needs were subdivided into the following seven distinct funding phases:

- Current Deficiencies
- Phase 1: 2011 to 2015
- Phase 2: 2016 to 2020
- Phase 3: 2021 to 2025
- Phase 4: 2026 to 2030
- Phase 5: 2031 to 2035
- Phase 6: 2036 to 2040

The existing backlog is captured in current deficiencies. For each of the various modal needs estimation methodologies, particular to each mode and/or mode subcategory, participants in the estimation process were directed to distribute needs over these seven timeline phases. Some of the estimations were the result of models with the ability to assign needs by phase; other needs were manually assigned to various time periods; and for a few, a distribution of needs over time was synthesized using available information. Segmenting needs into these seven funding phases provides information of when certain

needs will arise and allows NCDOT an opportunity to prepare to address these needs, rather than reacting once the needs occur.

### 2.3.3 Modal Needs Estimation Methodology

For each of the individual modes and modal subcategories as appropriate, a specific modal needs estimation process was developed with elaborate coordination with estimation partners. This process was formulated after researching and reviewing the documentation available from the 2004 STP process and the 2006 Mid-Cycle Update process. Specifically, the consultant team coordinated with the NCDOT Business Unit offices, Strategic Planning Office of Transportation (SPOT), and the MPOs and RPOs across the state. This interaction involved frequent communications in the form of numerous online/telephone conversations and webinars, teleconferences, and in-person coordination meetings over several months. These communications involved briefings, data development training, data review discussions, and refinement of provided data.

Based on a review of prior plans, available reported data, conversations with individual modal unit representatives, and prior experience, the following suite of modal need estimation methodologies was identified:

- Programmatic estimate based on historic investment levels in various programs
- Project-based capital and operating costs
- 2006 Mid-Cycle Update information
- Recent modal system plans (Rail only)
- Asset-based analysis using system inventories (Highway - Bridges and Pavement)
- Mode-specific asset-based inventory analysis (Ferries)
- GIS-based analysis of the roadway characteristics inventory

Each methodology was considered as needed for each modal investment category. Based on coordination, an estimation strategy was developed with each modal unit and a collaborative approach involving varying participation by the modal units. The estimation approaches used for each mode/modal subcategory are summarized in **Table 2-5**.

**Table 2-5. Summary of Modal Needs Estimation Methods**

Mode / Mode Element	Estimation Method
Highways - Pavement	10-year estimate developed with pavement management system software and pavement inventory database
Highways - Bridges	Estimate developed with bridge management system software and bridge database
Highways – Maintenance	Developed from maintenance needs estimate for biannual maintenance condition assessment report
Highways – Expansion, Metropolitan	MPOs provided listing of highway needs per most recent LRTPs for metro areas. Coordinated with listing of costs to complete for Loops and intrastate road improvements
Highways – Expansion, Non-Metropolitan	Developed from analysis of roadway characteristics database in GIS format, applying traffic growth rates and segment capacities developed by the SPOT, and applying cost improvement matrix. Coordinated with listing of costs to complete for loops and intrastate road improvements
Highways – Modernization	Developed from analysis of roadway characteristics database in GIS format, screened against minimum tolerable standards and applying cost improvement matrix
Highways – Safety	Developed through estimates formulated for Prioritization 2.0, extended to 30-year period
Highways - ITS	Developed from updated ITS program requirements, including both capital and operating costs
Public Transportation	Developed from review and analysis of historic department funding role and review of programmatic needs; coordinated with Prioritization 2.0 estimates
Bicycle/ Pedestrian	Developed from review of nearly 100 planning reports and review of programmatic needs; coordinated with Prioritization 2.0 estimates
Rail	Developed from listing of freight and passenger projects identified in new Rail System Plan, with costing of capital and operating requirements
Ferries	Developed from listing of infrastructure assets and operating costs estimated for each facility/service
Ports	Developed from 10-year capital needs estimate and historical operating budget, allocated to goals, and extrapolated to 30 years; excludes any major new strategic investments to ports
Aviation	Developed from current listing of project needs and state funding participation

The sections below summarize the modal needs estimation process for each of the modes/mode subcategories of investments. Where NCDOT has a responsibility for, or a role in, funding the operation of infrastructure assets or in providing a service to the public, the modal needs estimates include those costs. The modes where this applies are Public Transportation, Rail-Passenger, and Ferries. In addition, there are operational costs in the Highway and other modes, such as maintenance, ITS facility operations, and other system elements, and those costs are likewise reflected in estimates. To summarize, modal needs estimates include both capital investments in existing and new facilities, as well as appropriate operating costs.

## Highways

The NCDOT highway system represents the largest modal component of the Statewide transportation network. Significant system inventory data files cover roadway, pavement, and bridges, which are a significant asset in developing modal needs estimates. The development of modal needs for highways was accomplished by developing needs for several specific sub-mode categories including:

- Pavement
- Bridges
- Maintenance
- Expansion
- Modernization
- Safety
- ITS

Modal needs estimation approaches for each of these sub-mode categories are discussed below.

### ***Pavement***

The Pavement Management office oversees the maintenance, repair, remediation, and replacement activities of NCDOT across the three tiers of the highway system. Pavement Management led the modal need estimation for this mode, supported by several coordination meetings with the consultant. The office used its pavement database and system analysis software to develop 10-year system maintenance needs estimate as part of its Prioritization 2.0 needs analysis and LOS framework data development. Pavement Management used its database and analysis software package to analyze its pavement database and condition status, to identify optimal intervention remediation and eventual pavement replacements. With interaction from SPOT and the consultant, these results were reviewed and escalated to the 30-year timeframe for the 2040 Plan. Part of the discussion related to the analysis within the initial 10 years for current deficiencies and the connection of this value to the 10-year Prioritization LOS framework table. Based on this discussion, the 10-year needs analysis was extended to the 30-year timeframe in a spreadsheet format to document the analysis. Current deficiencies were assessed in terms of performance against the Prioritization 2.0 LOS scale that had been developed. This overall process yielded total modal need costs by goal, tier, and phase.

### ***Bridges and Structures***

The Structure Management office oversees the maintenance, repair, remediation, and replacement activities of NCDOT structures across the three tiers of the highway system. Structure Management led the modal need estimation for this element of the highway mode, supported by several coordination meetings with the consultant. The office used its newly acquired bridge database and system analysis software to develop a 10-year system needs cost estimate as part of its Prioritization 2.0 needs analysis and LOS framework data development. To measure a performance threshold index in the optimization process that examines the most cost-effective regime of remediation, the software was set up to develop a Minimum Index column derived from data in the Bridge Management System database, which stores the lowest value of the Deck, Superstructure, and Substructure condition grades to use as a constraint or objective in the needs analysis. Considering that the Bridge Health Index calculation is

based on all three of these condition grades being equal to or greater than a score of 6 for a bridge to be ranked “Good,” then a Minimum Index threshold of 6 can be set and used to track the % Good result in optimization process. It is noted that the old Bridge Health Index calculation was used in this analysis. The proposed “new” health calculation includes a ranking for Posted Bridges but has not yet been implemented in the Bridge Management System database.

The Structure Management used its database and analysis software package to analyze its bridge database and condition status to identify optimal intervention remediation in two analyses:

- A 1-year analysis by system tier that yielded an analysis output that was equivalent to current deficiencies and immediate action remediation needs. Current deficiencies were assessed in terms of performance against the Prioritization 2.0 LOS scale that had been developed.
- A second long-term (30-year) set of analyses by tier, with compliance to performance targets set at 90 percent for the Statewide tier, 80 percent for the Regional tier, and 75 percent for the Subregional tier. Because of analysis anomalies with the Subregional tier, a 10-year analysis was conducted in the end, and this value tripled to yield a 30-year estimate. Current deficiencies were assessed in term of performance against the Prioritization 2.0 LOS scale that had been developed.

This overall process yielded total modal need costs by goal, tier, and phase. The current deficiencies and accruing bridge needs were all tabulated under the infrastructure health investment goal.

### ***Maintenance***

The current Highway Maintenance program encompasses a wide range of infrastructure system maintenance spread across roadways, bridges, and pavement. The maintenance efforts focused on bridges, and pavements are complementary to the larger scale and impact project efforts led by the Structure and Pavement Management offices. The programs oriented to the general Roadway right-of-way environments are geared to the maintenance of roadway corridors and the minor appurtenances and facilities. A sampling of these activities includes budget allowances for weigh stations, historical markers, state park roads, new disaster events, and debt service on prior events; routine roadway maintenance to include snow removal, rest areas, electricity for all highway infrastructure, mowing, guardrail repair, unpaved road maintenance, maintenance of culverts, drainage ways; and specific preventive maintenance pavement and minor repairs to bridges, railings, approach slabs, and other features. The State Road Management office develops annual estimates of full system needs as part of its annual report on system maintenance needs in contrast to available funding. This annual estimate was developed by the State Road Management office and provided to the consultant. The consultant adjusted it to the 30-year time from of the 2040 Plan, in constant dollars. This overall process yielded total maintenance need costs by tier, and phase, including current deficiencies. These maintenance needs were tabulated under the Infrastructure Health investment goal.

### ***Expansion***

The expansion component of highway needs refers to the projects and improvements that would be necessary to provide for adequate traffic capacity across the state’s roadway system and involves the cost to remediate roadway segments with insufficient capacity. For this plan cycle, three methods were

used. In what are referred to as the non-metropolitan areas of the state, specifically referring to the areas outside of the 17 MPOs, an analysis of the NCDOT Geographic Information System (GIS) database for roadway inventory characteristics was used. Within the MPO areas, the study team partnered with each MPO to capture the highway capacity improvement needs contained in the “needs” component of their most recently adopted Long-Range Transportation Plans (LRTP). Finally, the urban loop and intrastate four-lane road networks were included in the tabulation of highway expansion needs, based on the “cost to complete” tabulation that is prepared annually. Each of these needs sources are described further below.

The estimation of highway expansion needs outside the MPO areas involved GIS analysis using the NCDOT GIS database for roadway inventory characteristics. A detailed analysis was undertaken to estimate traffic growth trends by functional classification of roadways. The resulting factors were then applied to existing traffic volumes by segment, using a supporting data file containing segment traffic volume and capacity developed by SPOT for the Prioritization 2.0 process. The number of lanes was developed from pavement width data in the data files. A volume-to-capacity ratio of 0.8 or greater was used as the threshold for triggering a capacity deficiency. The particular timing of the need was identified through the analysis for assignment to the appropriate phase. A costing factor was applied based on the type of roadway, number of new lanes needed, and functional classification. The summation of individual segment costs yielded the total non-metropolitan highway expansion cost estimate.

Within the MPOs, the LRTP process was used for several reasons. The GIS-based network analysis was deemed to be less applicable to the urban environment where an analysis algorithm trying to capture conventional roadway widening might not be as accurate. Many urban capacity projects can involve lane additions on side streets to increase main street green signal time, turning lanes can be improved, or interchanges can be reconfigured to re-optimize their efficiency. In addition, the capacity and expansion needs within the MPOs are generally developed with detailed travel demand models that better represent future traffic conditions and roadway capacity needs. Finally, the costing of these urban projects generally recognizes unusual features involved such as right-of-way costs, construction phasing issues, major utilities, and bridge components. For many of the large projects within MPOs, their solution concept and costs are the result of a location-specific study. MPOs were instructed to report only those project needs that fell under the NCDOT highway network.

To capture the metropolitan highway expansion needs, a data form with instructions was created, and several webinars were conducted to provide training and answer questions about the form and process. This activity was supported by a data reporting process to track receipt of the requested information. Once data were received, the consultant reviewed the information and coordinated follow-up with each MPO office.

The data form, shown in **Table 2-6**, was set up as a spreadsheet that captured the following data field types:

- Project description

- NCDOT Division
- NCMIN tier
- Inclusion in MPO cost-feasible adopted plan
- Investment goal category
- Project cost
- Estimated state/federal share of cost
- Needs status (backlog or accruing)
- Timing of project implementation by time phase
- Basis for project need (such as LRTP or corridor study)
- Comments

The form also documented the year of LRTP adoption and the base year of cost estimates. With this information, the costs could be adjusted to the 2011 base year for the 2040 Plan. While the form solicited all project needs across the modes, only the highway element was consistently fully reported. The partial information obtained for bicycle/pedestrian, transit, and ITS projects was used in some instances to cross-check mode-specific needs estimates discussed elsewhere in this section. Once the received data were screened, refined, and finalized, the metropolitan highway expansion needs were rolled up into a summary tabulation for transfer to the master modal needs spreadsheet. This process yielded a reasonable estimate of metropolitan urban highway improvement needs.

To the total of the metropolitan and non-metropolitan highway expansion needs, the “cost to complete” tabulation for the urban loop and intrastate four-lane road networks was added. Data files were reviewed to identify and remove overlap between estimation sources, such as between the non-metropolitan GIS analysis and the intrastate road network. Combined with the metropolitan expansion needs, the total highway expansion cost needs were tabulated and were applied to the mobility component of overall transportation system needs.



Thus, the principal focus on identifying modernization needs then falls to geometric elements of roadway cross section, principally shoulder widths and lane widths. Under the current applicable standards, these criteria are a function of roadway classification, the design and posted speeds, and the prevailing current traffic volume. This framework makes the analysis somewhat detailed, and it can be further complicated by exceptions, policy choices, and conditions within and along the roadway. The sources for conducting the modernization needs analysis are the roadway characteristics inventory database and the companion pavement inventory database. Several years ago NCDOT translated these databases into a GIS format, which begins to greatly facilitate analysis, although the database covers nearly 80,000 miles of roadways and involves more than 300,000 discrete roadway segments. The needs analysis entails analysis computations involving a number of data fields for each roadway segment in the system. Given the massive size of the database, and the manner in which all the data variables have been populated into the database over time, there are issues such as missing, incomplete, incorrect, or conflicting data. Any one of these situations occurring for a given roadway segment can limit the ability to include that segment in the analysis. Invariably, the set of segments with sufficiently valid and useful data represents some fraction of the overall segment population, and depending on the analysis methods, can lead to the need to prorate results. Once the segments with needs were identified, the appropriate unit costs were applied for segment length and these segment costs were summed to arrive at the total modernization needs.

For the modernization component of highway needs, a parallel effort occurred between the consultant team and SPOT, which was focused on the needs for the Prioritization 2.0 process over the next 10 years, in particular population of the LOS table for modernization investment needs at varying LOS steps. However, modernization needs are completely a current deficiency because new roads would be built to prevailing standards. Thus, the modernization requirements for both the 2040 Plan and the Prioritization 2.0 process should be consistent. The estimation process began with separate, initial efforts by the consultant and SPOT. After several initial passes and refinements through the available databases, addressing various anomalies and results, the estimation effort was coordinated through a series of communications, teleconferences, and meetings. Results and issues were shared, and refined analysis approaches pursued. Based on the evolution of the analysis process, it was decided to focus on the results developed by SPOT, given its intimate familiarity with the data sources and ready access internally for consultations with NCDOT staff.

After further review and refinement, the roadway modernization metric was defined to be: “% of miles that meet NCDOT’s Paved Shoulder Policy where Paved Shoulders are required,” per the NCDOT Roadway Design Manual and revisions. With this metric applied, the associated cost dropped relative to prior estimates by both the consultant and SPOT and significantly on the Subregional tier. The current deficiency highway modernization needs were all tabulated under the Infrastructure Health investment goal.

### **Safety**

The current Highway Safety program is targeted to Spot Safety location improvements based on a technical analysis of remediation effectiveness based on expected improvements, as well as other

supporting initiatives including Hazard Elimination and High Risk Rural Road safety programs. Its funds are disbursed across all three highway tiers, based on the intrinsic benefits of specific safety projects. The Traffic Safety Unit developed a long-term estimate for its current programs as part of its efforts to develop similar needs estimates for the Prioritization 2.0 needs process. The tabulations it provided were an integrated short-term and long-term statement of program needs integrated with the Prioritization 2.0 LOS performance framework. This estimate was developed by the Traffic Safety Unit, supported by coordination meetings and communications with the consultant. This overall process yielded total modal need costs by goal, tier, geography (urban/rural), and phase, including current deficiencies. The current deficiency and accruing safety needs were all tabulated under the Safety investment goal.

### ***Intelligent Transportation Systems (ITS)***

The ITS component deals with the deployment of advanced traffic control and highway system monitoring and management. The ITS Section developed a long-term estimate for its current programs as part of its efforts to develop similar needs estimates for the Prioritization 2.0 process. These estimates were derived from programmed and planned projects across the regional ITS plans developed across the state. This office developed a similar type of estimate in the 2006 Mid-Cycle Update process, and that estimation process was largely replicated in this cycle and included representation of capital, operational, and capital refurbishment project costs over the 30-year term of the STP. These needs were tabulated by the ITS Section in a detailed spreadsheet format. In developing its estimate of modal needs and current deficiencies, the office looked at its future operational and capital project needs by location, by tier, by investment goal, and by backlog/accruing and future phases over the planning term. The current deficiency and accruing ITS needs were all tabulated under the Health and Mobility investment goals, depending on the nature of the investment projects.

### **Aviation**

The Aviation mode generally is a participant in a grant funding program that involves all three tiers of North Carolina airports, with the vast majority of that effort focused on the Regional and Subregional tier airports. The Statewide tier (commercial) airports are direct grant recipients from the Federal Aviation Administration (FAA). The Division of Aviation office led the modal need estimation for this mode. In developing its estimate of modal needs and current deficiencies, the office looked at the backlog of unfunded projects, its historical level of funding across state and federal sources by investment category, and the history of grant applications, by tier, by investment goal, and by backlog/accruing and future phases over the planning term. The office used a modal needs estimation template provided by the consultant to capture its estimates.

### **Public Transportation**

The Public Transportation mode generally is a participant in a grant funding program that involves all three tiers of transit services and support facilities in the state, with the bulk of that effort focused on the urban area operations. The Division of Public Transportation led the modal need estimation for this mode and was supported by several coordination meetings with the consultant using a multi-sheet spreadsheet file to document the analysis. The Division of Public Transportation maintains a robust

informational database on all transit services and systems it provides funding to, in part due to the National Transit Database reporting required by the Federal Transit Administration (FTA). The informational database contains data on funding, assets, ridership, and performance over the years and was used to establish trend lines for the various investments by investment goal, tier, geography (urban/rural), and capital versus operating cost categories.

The estimation of current deficiencies and future needs for bus-based transit services was coordinated with the office's estimation work as part of the ongoing Prioritization 2.0 process coordinated with SPOT of LOS performance and associated investments. The needs estimation was also coordinated with prior projections on the capital side for the STIP. Year-by-year estimates were escalated according to recent year growth trends for each investment line item. Once the first 10-year totals were developed, these values were assessed in terms of performance against the Prioritization 2.0 LOS scale that had been developed. The 10-year investment levels were then replicated forward to the second and third decades of the planning horizon, with step-wise upgrades in LOS to LOS A by 2040. The share factors for each of the investment line items over the first 10 years were used to prorate 30-year investments to the individual investment line items and phases.

An inventory of planned light rail transit services across the state was tabulated for both capital and operating costs and formatted by goal, tier, and phase, and included with the bus-based needs estimates. The light rail transit services were included here because the FTA would be the coordinating agency; commuter rail projects were assigned to the Rail Division because the Federal Railroad Administration (FRA) would be the coordinating federal agency with which the Rail Division routinely works. This overall process yielded total modal need costs by goal, tier, geography (urban/rural), and phase.

## **Rail**

The Rail mode oversees a variety of programs, including its involvement with rail passenger operations in the state, certain freight railroad and short line railroad projects, and road-rail crossing and other safety projects. Because of the nature of its programs, and based on current and prospective projects, the Rail Division developed its modal needs on a needs spreadsheet developed by the consultant and provided to the division. This spreadsheet captured the goal, tier, phase, and other key information for each entry, whether project-based or program-based. Depending on the investment type, the line entries in the spreadsheet reflected both capital and operating costs as appropriate, for both existing services and facilities and those that are contemplated for the future. These included expansion of in-state rail passenger services as well as planned high-speed rail services through the state. Planned commuter rail services were assigned to this mode and included in the project list because the FRA would be the coordinating federal agency with which the Rail Division routinely works. Planned light rail transit services were included with the Public Transportation Division because the FTA would be the coordinating agency. . In developing its estimate of modal needs and current deficiencies, the Rail Division looked at its backlog of unfunded projects, and future operational and capital project needs by location, by tier, by investment goal, and by backlog/accruing and future phases over the planning term.

## **Ferries**

The Ferries mode is fully responsible for the infrastructure and operations associated with the ferry services on the state's Atlantic Seaboard. These costs are partially offset by tolls charged on certain ferry routes and by FTA grant funds for certain capital projects. Ferry facilities are categorized into the Statewide and Regional tiers of the NCMIN. Because of its relatively small range of facilities and assets, the Ferry Division developed its modal needs based on an ad hoc asset management approach, tabulating its maintenance, operations, and replacement needs by facilities and its expansion plans in terms of additional vessels and associated operating costs. These were tabulated by the Ferry Division on a needs spreadsheet developed by the consultant and provided to the division. In developing its estimate of modal needs and current deficiencies, the Ferry Division looked at its backlog of unfunded projects, and future operational and capital project needs by location, by tier, by investment goal, and by backlog/accruing and future phases over the planning term.

## **Bicycle/Pedestrian**

The Bicycle/Pedestrian mode generally is a participant in a grant funding program that involves all three tiers of bicycle/pedestrian facilities in the state, with the vast majority of that effort focused on the Subregional tier. The Division of Bicycle and Pedestrian Transportation led the modal need estimation for this mode, with initial input from the consultant. The estimate considered several information sources including project cost estimates for the Prioritization 2.0 process as well as Prioritization 1.0 and the prior STPs. Because the office has funded more than 90 local bicycle/pedestrian plans in the last several years, the cost of those plan recommendations were reviewed on a per capita basis as another metric. Consideration was also given to the number and dollar volume of grant requests and grant awards over the years. The estimate also considered growth in state population in its estimation process. The estimate of current deficiencies was coordinated with the estimate of LOS performance and associated investments as part of the ongoing Prioritization 2.0 process coordinated with SPOT. These analyses yielded final estimates of modal needs by tier, by investment goal, and by backlog/accruing and future phases over the planning term.

## **Ports**

The Ports mode, operated by the North Carolina State Ports authority (NCSPA), is fully responsible for the infrastructure and operations associated with the ports services it provides at the Port of Wilmington and the Port of Morehead City, as well as the two inland ports/terminals that it oversees. These costs are essentially offset by tariffs and fees that it charges its tenants and users and by federal agency grant funds for certain capital projects. While not yet formally incorporated with the NCMIN tier structure, the consultant has assigned these facilities to the Statewide tier level due to their significance in Statewide freight and cargo activity. Because of its relatively small range of facilities and assets, the Ports modal needs were developed by the consultant in coordination with the NCSPA. The consultant reviewed current and projected operational budgets and capital improvement plans, along with available information on historical and projected ports activity. This approach captured both the capital and operational costs of the ports. Working with the NCSPA, the consultant formulated the modal needs

in terms of backlog and future operational and capital project needs, by investment goal, and by backlog/accruing and future phases over the planning term.

## **2.4 Freight and Logistics Considerations**

Since the issuance of NCDOT's last STP, "Charting a New Direction for NCDOT" in 2004, a number of national and North Carolina initiatives have highlighted the importance of freight and logistics in relation to long-term economic health and growth in the state. In North Carolina, freight and logistics have emerged as a state priority that can help underpin economic development and economic competitiveness. In North Carolina, this topic then relates to the movement of raw goods and materials as well as finished goods and products, between their origins and ultimate destinations including in-state distribution to businesses and consumers and out-of-state markets. As a result, freight and logistics touch all key aspects of the state's multifaceted economic development targets including agriculture, bio/medical, tourism, education, military, and manufacturing. This section examines how and to what extent freight and logistical considerations are addressed in the 2040 Plan.

### **2.4.1 National Trends for Incorporating Freight and Logistics in Transportation Plans**

State Departments of Transportation (DOT) have a historic linkage to freight and freight movements. This linkage dates to the early days of DOTs, when their primary focus tended to be on creating "farm to market" roads to meet basic societal needs - bringing food from the point of production (the farm) to where people live (cities and towns). Accordingly, including freight considerations in the transportation process is less of a new trend than a revisiting of a historical relationship.

Compared to the historic role of freight in DOT activities and planning, recent efforts to incorporate freight considerations into the transportation planning process tend to be reflective of shifts toward the use of global rather than national or regional supply chains. In a global supply chain environment (where markets are operating freely), it is natural and predictable that labor-intensive industries would tend to locate in areas where labor costs are low (subject to the impact of transportation costs), while industries that tend to be capital-intensive (or for which transportation costs are a major component of final product cost) are less affected. These predictable trends have proven true in the United States and North Carolina and have had significant impacts on many domestic industries such as textiles, furniture, and other industries with similar economics. However, while such industry and employment impacts are predictable, it does not change the difficulty associated with adjusting to the job losses and industry displacements associated with these market-driven adjustments or the desire for governments to attempt to avoid or mitigate these impacts. Such mitigation efforts can and do include using transportation system projects to encourage the location of new businesses or improve the competitive standing of existing businesses.

Because of the factors noted above, the Federal Highway Administration (FHWA) and state DOTs are increasingly devoting resources to understanding and determining how to best incorporate freight considerations into transportation planning and/or project selection. Specifically, the FHWA, through

the efforts of its Offices of Planning and Freight Management and Operations, has sponsored the development of, and/or compiled a considerable library of, resources directed to this topic. Specific tools include freight data sources, demand modeling tools, guides, and technical resources directed to practitioners so that they can incorporate freight into state planning activities. Additionally, a number of state DOTs have actively been developing state-specific models for including freight in both project planning and prioritization efforts. Of particular note, the Florida Strategic Intermodal System prioritization model represents one of the more mature and comprehensive efforts to systemically incorporate freight into the project planning and prioritization process.<sup>1</sup> Other notable state DOT efforts to include freight in transportation planning include Indiana, Minnesota, Ohio, and Washington.<sup>2</sup>

### **2.4.2 “Charting a New Direction for NCDOT”**

The 2004 STP included a number of direct and indirect references to the importance of “freight” and “logistics” in establishing transportation planning priorities. Starting with its initial discussion of domestic and international trade factors, the report identified a linkage between North Carolina’s future economic prosperity on the ability of its transportation system to support freight and logistics demands. The report further discusses the importance of the freight rail infrastructure needs and the economic impact of the industries primarily served by rail as a means of further underscoring this freight/economic growth linkage. Finally, the report encouraged the enhanced adoption and use of NCDOT’s SHC concept, which specifically identifies Statewide economic prosperity as a major focus for SHC-designated assets; this effectively acknowledges the linkage between freight movements and economic growth.

This report clearly acknowledges the linkage of economic growth to the state’s transportation infrastructure. However, while the freight/economics/transportation linkage was generally understood, the report did not define how freight/logistics considerations should be weighted within NCDOT’s project prioritization and selection process.

### **2.4.3 Post-2004 Freight-Related Studies and Initiatives**

Since the 2004 STP, a number of studies and initiatives have been completed (or are currently underway) that have significant freight dimensions of relevance to NCDOT’s 2040 Plan. These reports and initiatives include the following:

- 2008 Statewide Logistics Plan
- Seven Portals Study
- North Carolina Maritime Strategy
- North Carolina International Terminal Study
- Prioritization 2.0 Process

The elements of these reports or initiatives most relevant to the 2040 Plan are summarized below.

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<sup>1</sup> <http://www.dot.state.fl.us/planning/sis/>

<sup>2</sup> [http://www.fhwa.dot.gov/planning/freight\\_planning/forecasting.cfm](http://www.fhwa.dot.gov/planning/freight_planning/forecasting.cfm)

## 2008 Statewide Logistics Plan

The 2008 Statewide Logistics Plan was created at the request of the North Carolina State Legislature and directed by the North Carolina Office of State Budget and Management. As the title suggests, the intention of this report was to provide a blueprint for advancing freight and logistics movements both within and traveling through North Carolina (and by association, driving economic growth and job creation). This wide-ranging report provided some level of examination of nearly every area covered separately in the other reports identified above. Specifically, the 2008 Statewide Logistics Plan examined the following:

- The role and economic importance of the various ports in the State's port system
- The potential impacts and challenges associated with the possible creation of a new international terminal in the Southport area
- The importance and impact of North Carolina's military bases, as well as the expansion of the State's bases associated with the Base Realignment and Closure initiative
- The relationship between the North Carolina transportation system, NCDOT projects, and the North Carolina Department of Commerce's efforts to attract and retain businesses

Key among the 2008 Statewide Logistics Plan's recommendations were the following:

- Explore the possibility of creating a permanent Freight Logistics Authority.<sup>3</sup>
- Prepare a Comprehensive Goods Movement Plan<sup>4</sup>

### ***Explore the Possibility of Creating a Freight Logistics Authority***

On December 8, 2009, Governor Perdue signed Executive Order 32, establishing the Governor's Logistics Task Force. This task force is led by North Carolina Lieutenant Governor Dalton and consists of a mix of 30 elected and appointed officials, as well as prominent private sector shipping and logistics executives.

The Governor's Logistics Task Force currently is organized into four subcommittees, with responsibilities assigned as indicated:<sup>5</sup>

- Best Practices Subcommittee
  - Study what other states and/or countries have done successfully in regard to logistics.
  - Determine which of those best practices North Carolina might want to use.
- Commerce Subcommittee
  - Examine the state's largest exporters, determine where their products are going, and by what method of transportation those products leave the state.
  - Identify the state's top five export destinations as well as ways the state can help move freight faster and more efficiently.
  - Identify emerging industries that may become leading exporters.
- Governance Subcommittee
  - Examine how North Carolina governs logistics.
  - Look at what other states do to support their logistics chain and connect their states nationally and globally.

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<sup>3</sup> [http://www.ncdot.org/download/business/committees/logistics/StatewideLogisticsPlan\\_080513.pdf](http://www.ncdot.org/download/business/committees/logistics/StatewideLogisticsPlan_080513.pdf), page 138.

<sup>4</sup> [http://www.ncdot.org/download/business/committees/logistics/StatewideLogisticsPlan\\_080513.pdf](http://www.ncdot.org/download/business/committees/logistics/StatewideLogisticsPlan_080513.pdf), page 149.

<sup>5</sup> <http://www.ncdot.org/business/committees/statewidelogistics/>

- Determine whether a new, more streamlined state organizational structure would better support the movement of people and freight.
- Regional Hub Design Subcommittee
  - Explore the feasibility of regional transportation hubs to ensure that the entire state of North Carolina is able to move goods efficiently.
  - Work closely with the Seven Portals Study research team.

The current Logistics Task Force may provide guidance for creation of a permanent logistics entity at pointing the future as part of its recommendations to the North Carolina Governor. While creating a permanent logistics authority could be the recommendation of the Task Force, other options that achieve the same goal could be explored as well.

### ***Prepare a Comprehensive Goods Movement Plan***

Since its creation, the Logistics Task Force has conducted a series of outreach meetings and other activities across the state. Ultimately, these efforts are aimed at helping the task force better understand the private sector freight and logistics industries and gaining an understanding of how government can best assist economic growth. Simultaneously, the Logistics Task Force has sponsored research aimed at improving its understanding of the North Carolina economy as it relates to the freight and logistics subject areas, as well exploring some of the concepts covered in the 2008 Statewide Logistics Plan such as regional freight hubs.<sup>6</sup> Specific projects sponsored by the Logistics Task Force and targeted toward addressing these research needs include the Seven Portals Study and the North Carolina Maritime Study<sup>7</sup>, both of which are underway but incomplete. These studies are described below.

### ***Seven Portals Study***

This study examines both the number and feasibility of developing business hubs in the seven commerce economic development regions across North Carolina. The text below is from an earlier draft of the “West Region” section of the Seven Portals Study; it describes the purpose of the study and defines a key study term, “logistics village”.<sup>8</sup>

“This report presents an assessment of economic development strategies for the Western Region of North Carolina. Within the context of the Seven Portals Study which emphasizes the logistics village strategy for economic development, this report will identify illustrative examples of logistics villages for the Western Region of North Carolina. In this report, the term logistics village could describe a relatively small geographic location that has a concentration of infrastructure for manufacturing and transportation assets to distribute products. For example, a logistics village could be a group of manufacturing facilities surrounding a regional airport that is proximate to Interstate highways and rail lines. Or, a more virtual logistics village, following a hub and

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6 [http://www.ncdot.org/download/business/committees/logistics/StatewideLogisticsPlan\\_080513.pdf](http://www.ncdot.org/download/business/committees/logistics/StatewideLogisticsPlan_080513.pdf), page 150

7 <http://www.ncmaritimestudy.com/>

8 “Seven Portals Study, An Investigation of Economic Development through Logistics Villages, West Region Report,” April 25, 2011

[http://www.fbrmpo.org/yahoo\\_site\\_admin/assets/docs/2011\\_LogisticsVillages\\_Draft\\_West\\_Region\\_Report.163132359.pdf](http://www.fbrmpo.org/yahoo_site_admin/assets/docs/2011_LogisticsVillages_Draft_West_Region_Report.163132359.pdf)

spoke layout, could be a dispersed group of manufacturing facilities in a region that ship their products to a regional distribution hub.”

Based on the draft report, the Seven Portals Study identifies logical areas/sub-regions within each economic development region that is based on geographical, population, education, and logistical attributes. Where appropriate sub-regions exist, the report suggests a potential economic focus for that area, based on the relative competitive advantages/disadvantages associated with the respective geographic groupings. Finally, the report identifies what multimodal transportation asset priorities and projects best support the economic vision for that area.

The Seven Portals Study is targeted toward supporting the 2008 Statewide Logistics Plan’s recommendation to prepare a comprehensive goods movement plan. Specifically, the Seven Portals Study addresses several of the short (less than 5 years), medium (5 to 15 years), and long-term (more than 15 to 25 years) initiatives identified in the 2008 Plan as “clear first steps towards further coalescing freight logistics interests, generating discussion on important goods movement and economic development issues, and raising important implementation matters – including funding, roles, timing, etc. – towards their accomplishment.”<sup>9</sup>

### **North Carolina Maritime Strategy**

Like the Seven Portals Study, the North Carolina Maritime Strategy is sponsored by the Logistics Task Force. The objective of this study is stated as taking “a fresh look at North Carolina’s maritime assets and the needs for improvement to ensure that our State remains competitive in the future.”<sup>10</sup> The oversight committee for this project is called the Maritime Study Executive Team. Several members of the team are shared with the Logistics Task Force, including the Lieutenant Governor, the Governor’s Policy Advisor, the Secretary of Commerce, the Secretary of Environment and Natural Resources, and the Secretary of Transportation.

This project is scheduled to be completed in early 2012, but no study products are currently available. However, as with the Seven Portals Study, the final results of this study are expected to provide the Logistics Task Force (as well as the North Carolina State Ports Authority, the North Carolina Legislature, and the Governor’s Office) with valuable insights and inputs into how the state can best leverage its maritime assets and transportation investments to achieve economic growth.

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<sup>9</sup> [http://www.ncdot.org/download/business/committees/logistics/StatewideLogisticsPlan\\_080513.pdf](http://www.ncdot.org/download/business/committees/logistics/StatewideLogisticsPlan_080513.pdf), pages 149-150.

<sup>10</sup> <http://www.ncmaritimestudy.com/>

## North Carolina International Terminal Study

In April 2006 the NCSA purchased 600 acres of land in the area of Southport with the intention of developing a new deep water port.<sup>11</sup> This facility would be significantly closer to the Atlantic Ocean than the existing port in Wilmington, with a much deeper natural channel. Both issues (ocean distance and channel depth) are considered competitive concerns for North Carolina ports in general, and the Port of Wilmington in particular, as the Panama Canal post-widening era ushers in a new, larger class of ocean vessels.

Between 2006 and now, a series of studies and reports has been produced (mostly sponsored by the NCSA) examining the need, economic benefits, and impacts of a new international port facility. While these studies were generally supportive of creating a new port facility, significant resistance by local residents, environmental groups, and others has raised a number of concerns ranging from environmental impact to security, facility, and study costs. As a result, in June 2010 the North Carolina General Assembly voted to withhold state funding for a feasibility study to be conducted by the U.S. Army Corps of Engineers, effectively halting this project for now.<sup>12</sup> It is unclear as to what extent the international port project may be reconsidered at some future point, but until/unless the NCSA-owned property is permanently repurposed, this concept is likely to remain a consideration for future North Carolina transportation planning efforts.

## Prioritization 2.0 Process

The SPOT, which is within NCDOT, was created in July 2008.<sup>13</sup> The SPOT is tasked with managing strategic planning and prioritization. Currently, Prioritization 2.0 process is ongoing and nearing completion. This prioritization process serves as an input into the Statewide STIP and the 10-year Transportation Work Program.

Prioritization 2.0 is a combination of quantitative and qualitative data and includes a weighted ranking system that is based on goal, tier, and MPO/(RPO) rankings.<sup>14</sup> Quantitative data used include volume-to-capacity ratios, crash rates, and pavement condition ratings. Qualitative input is based on the top 25 priorities of the respective MPOs, RPOs, and Divisions. Multimodal characteristics are based on whether a project benefits more than one transportation mode.<sup>15</sup> Non-highway projects (Ferry, Bicycle/Pedestrian, Rail, Aviation, and Public Transportation) also are prioritized by goal and system classification. The first prioritization process (Prioritization 1.0) was partly qualitative and partly quantitative, but Prioritization 2.0 uses a more data-driven approach.<sup>16</sup>

The results of prioritization process are shared with the public and a series of meetings are held to determine funding allocations to each category. As an additional input to this process, NCDOT scores each project in terms of its current LOS grade. With an understanding that investment needs far exceed

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<sup>11</sup> "NCSA Plans NC International Port," NCSA News Release, January 3, 2006.

<sup>12</sup> : <http://www.newsobserver.com/2010/07/22/592205/deepwater-port-plans-put-on-ice.html>

<sup>13</sup> SPOT presentation to North Carolina Area Metropolitan Planning Organization Annual Meeting, November 14, 2008.

<sup>14</sup> "Strategic Prioritization Process," presentation August 5, 2009.

<sup>15</sup> "North Carolina Department of Transportation's Strategic Prioritization Process," June 2, 2010.

<sup>16</sup> Ibid.

anticipated funding availability, a screening effort occurs, resulting in a prioritization schedule for funding transportation projects. This prioritization schedule is then examined within the context of federal and state laws as well as considered what projects are ready to proceed in terms of establishing the draft STIP.<sup>17</sup> It is this process where consideration of freight and logistics factors in project scoring can begin to be more directly incorporated.

#### **2.4.4 Summary**

The 2040 Plan takes a fresh look at modal needs for the next 30 years. In developing the final plan document, the investment decision-making process will broadly demarcate emphasis areas in terms of transportation investments and policies across the modes, tiers, and goals. This plan is a blueprint reflecting current appraisals of future conditions and needs and the most appropriate investment strategies. Once the plan is completed, the direction it sets is incrementally captured for several activities including the biannual Prioritization 2.0 process because it defines project scoring metrics, criteria, and weights, and other significant policies, laws, funding instruments, and actions that may address specific plan components and strategies. Therefore, an important consideration of freight and logistics integration into eventual project selection and prioritization is the extent to which various projects support at least in part freight and logistics projects of merit.

Based on the demonstrated importance of freight and logistics to the state, the 2040 Plan process has been sensitive to the matter of reflecting important freight and logistics needs into modal needs. This is not a precise process at this stage because many different types of projects may have direct or indirect value to enhancing freight and logistics effectiveness and efficiency. Such projects could be an Interstate widening in a corridor heavily used by trucks, an interchange improvement near a distribution center, or improvements in rail access to a seaport or military base.

The freight and logistics benefits of these projects at this time may not be fully recognized or reflected in project scoring or even nomination by local transportation officials. The NCDOT is in the process of developing a Statewide travel demand model that can be invaluable for better identifying and tracking key highway logistics corridors, their needs, and the benefits to goods movement; unfortunately, that tool is just being developed and is not available. The Maritime Strategy process will not reach definitive findings and recommendations until well into 2012; therefore, the modal needs for ports at this time do not reflect any possible “game changing” investments that may emerge from that study.

Nevertheless, the 2040 Plan process has endeavored to be informed as to the studies and ongoing initiatives relating to freight and logistics and will look to consider that these components are reflected in transportation investment strategies. It is considered that the highway, rail, and ports modes most directly relate to the bulk of freight and logistics concerns, with aviation playing a supporting role. In developing modal needs, the study process can report that consideration of freight and logistics has been considered in the following ways:

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<sup>17</sup> Ibid.

- **Highways–Mobility (Expansion–Capacity)**  
The estimation process has captured expansion needs in non-metropolitan areas by performing a traffic growth-based analysis of roadway widening needs and in metropolitan areas by capturing the defined highway capacity needs of each MPO. In addition, the cost-to-complete for the urban loops and the intrastate system is included. Each of these elements will address freight and logistics concerns. A review of the Seven Portals Study reveals that all suggested highway network improvements that were identified are under construction or included in the current STIP.
  
- **Rail–Mobility**  
Conversations with the Rail Division in the development of the rail modal needs include a variety of projects that address small-scale but strategic rail connectivity to nearby destinations, consider continued improvement of port rail access, and improve the capacity of certain passenger rail corridors with a benefit to freight rail operations.
  
- **Ports**  
From a landside access perspective, NCDOT has continued to pursue highway improvement projects on the corridors that connect the two seaports westward to the I-95 corridor and the interior population centers of the state. Likewise, the Rail Division continues to address improved rail access to the ports, working with the rail companies to do so. While the ports modal needs do not reflect a possible “game changer” investment strategy in port facilities and capacity, the baseline modal needs do capture the continued preservation of existing facilities and small-capacity projects as shipping activity continues to track upward.

These factors collectively reflect a reasonable capture of modal needs that support the diverse freight and logistics needs of business and commerce within, into, out of, and through North Carolina. With increased awareness of its importance to the state’s economy, and the availability of additional tools and data, it is expected that a more focused advancement and integration of freight and logistics into the transportation investment process can be accomplished in the future.

## Chapter 3 Highways

### 3.1 Existing Conditions

#### 3.1.1 Inventory Summary

##### Existing Facilities

Highway infrastructure in North Carolina includes state, municipal, and federally owned roadways. According to the 2010 Maintenance Condition Assessment Report, the NCDOT owns and maintains 80,000 miles of roadways, which represents approximately three-fourths of the total roadway inventory in the state. The state-owned roadway inventory includes 160,806 paved lane miles, approximately 4,500 centerline miles of unpaved roads, and 18,205 structures.

The 2004 STP established the North Carolina Multimodal Investment Network (NCMIN). The NCMIN stratifies each modal system into three tiers: Statewide, Regional, and Subregional. The defined Statewide, Regional, and Subregional tiers for the highway system are shown in **Table 3-1** (the NCMIN definitions for all modes were shown in **Table 2.3**).

**Table 3-1. Highway Tier Definitions in North Carolina Multimodal Investment Network**

Statewide Tier	Regional Tier	Subregional Tier
Strategic Highway Corridors as approved by the Board of Transportation	All primary routes (US and NC) not on the Statewide tier	All secondary routes not on the Statewide tier

Source: NCDOT NCMIN: [http://www.ncdot.org/download/performance/NCMIN\\_Definitions.pdf](http://www.ncdot.org/download/performance/NCMIN_Definitions.pdf)

Beginning with the 2004 STP effort, all transportation facilities in the state were classified into one of three NCMIN tiers. Statewide tier facilities serve long-distance trips, connect regional centers, have the highest usage, and provide a mobility function. Regional tier facilities connect major population centers and have a mix of functions. Subregional tier facilities service localized movements and provide access functions beyond mobility. For the highway mode, the Statewide tier includes facilities that have been designated as Strategic Highway Corridors. Currently, 55 corridors have this designation, with a total length of approximately 5,500 miles. Regional tier facilities include all primary routes (designated US or NC) that are not on the Statewide tier. Subregional tier facilities include all secondary routes that are not on the Statewide tier.

##### Existing Programs

###### *Mobility*

Highway mobility projects have a primary purpose of increasing capacity, reducing congestion, or improving access; examples of these projects are widening, new alignment, and grade separation. Highway capacity expansion projects are primarily funded through the Interstate, Urban, and Rural highway programs.

In addition to traditional highway projects, the NCDOT uses Intelligent Transportation Systems (ITS) deployments to improve mobility throughout the state. ITS solutions currently deployed throughout the state include a variety of advanced transportation management systems, advanced traveler information systems technologies, and commercial vehicle operations. The existing technologies deployed in North Carolina are summarized below.

#### **Advanced Transportation Management Systems**

- Metropolitan signal systems
- Reversible lane systems
- Traffic Management Centers (TMC)
- Fiber-optic and twisted-pair copper communications link monitoring devices with TMCs
- Microwave sensors and probes that provide real-time traffic volume and speed data to TMCs
- Closed-circuit television cameras that provide live video of traffic conditions to TMCs to identify and monitor accidents and congestion
- Queue detection systems
- Truck escape ramp detection systems
- Overheight vehicle warning systems
- Signal ahead warning systems

#### **Advanced Traveler Information Systems**

- Traveler Information Management System (TIMS)
- Interactive online map that shows real-time congestion on major NCDOT roadways
- 511 dial-in traveler information line and twitter feed that provide highway, public transportation, and weather information Statewide and a quick link to 511 systems in neighboring states
- Dynamic message signs and highway advisory radio on major routes to inform travelers of incidents, work zones, unexpected travel conditions and congestion, emergency information, and special event traffic information

#### **Commercial Vehicle Operations**

- Weigh In Motion
- Virtual weigh station
- Commercial Vehicle Information Systems and Networks

#### **Safety**

NCDOT has a variety of existing safety programs; some fund physical improvements to roadways, some are education-based, and others are policy-based. A summary of existing safety programs is provided below.

The Governor's Highway Safety Program is a collection of education initiatives intended to improve highway safety throughout the state. This program funds initiatives including "Click It or Ticket," "Booze

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It & Lose It,” “No Need 2 Speed,” and other targeted programs for motorcycles, commercial vehicles, child passengers, teen drivers, and Hispanic drivers.

The NCDOT Work Zone Safety Program funds education initiatives to promote conscientious driving in roadway work zones. The current work zone safety initiative, “Drive Smart. Do Your Part,” encourages motorists to reduce speeds and eliminate distractions while driving through work zones. The program also funds statewide campaigns for National Work Zone Awareness Week and North Carolina’s Work Zone Safety Awareness Month, which includes targeted awareness campaigns and targeted enforcement.

NCDOT currently has three safety programs that fund infrastructure improvements: the Highway Safety Improvement Program, the Spot Safety Program, and the Hazard Elimination Program. Per the 2010 Highway Safety Program overview, the Highway Safety Improvement Program employs a systematic process to identify and assess potential hazards throughout the state. Once locations are identified, regional traffic engineering staff performs field investigations and benefit cost analyses to develop recommendations for safety improvements. The Spot Safety Program funds small safety improvement projects. The maximum Spot Safety Program funding per project is \$250,000, and approximately \$9 million is spent annually through this program. The Hazard Elimination Program is used for larger safety improvement projects. Projects are prioritized based on benefit cost analysis, where benefit is quantified using crash reduction estimates. The program is funded with 90 percent federal funding and 10 percent state funding. The total cost for projects funded through this program is between \$400,000 and \$1 million.

In addition to education and engineering based safety programs, NCDOT also uses traffic ordinances to promote safety on its roadways. These ordinances include maintenance and revision of speed zones, no parking zones, turning prohibitions, truck route changes, and route designations. Proposed ordinance changes are developed and evaluated based on traffic engineering studies.

### ***Infrastructure Health***

NCDOT’s roadway maintenance activities are divided into two categories: performance-based activities and recurring programs. Performance-based activities are those that align with the Department’s highway performance measures and are surveyed every two years as part of the Maintenance Condition Assessment Report. This survey assesses the condition of highway features at a random sampling of sites throughout the state and uses the condition ratings to develop a Statewide snapshot of current system performance. According to the 2010 Maintenance Condition Assessment Report, approximately \$271 million is spent annually on performance-based roadway maintenance activities. Recurring programs include maintenance activities that are necessary, but not tied to performance measures. Some examples of these recurring program activities are weigh station maintenance, snow and ice control, and roadway hazard removal. Approximately \$98 million is spent annually on recurring roadway maintenance programs.

Bridge and structure maintenance activities are divided into five categories:

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- Performance-based activities
  - Large pipe and culvert maintenance
  - Bridge preservation
  - Bridge rehabilitation
  - Recurring programs

Like performance-based roadway maintenance activities, performance-based bridge and structure maintenance is also tied to the performance measures and condition ratings as part of the biannual Maintenance Condition Assessment Report. Based on the 2010 report, approximately \$44.6 million is required annually for performance-based bridge and structure maintenance activities to maintain bridge features at an acceptable level. Large pipe and culvert maintenance is accounted for separately in the bridge and structure budget; approximately \$6.2 million is spent annually on large pipe and culvert maintenance according to the 2010 report. Bridge preservation and bridge rehabilitation are also separate programs.

Bridge preservation includes activities that are low-cost and are intended to extend bridge life, such as painting structural steel, cleaning bearings, repairing and replacing expansion joints, applying treatments to slow corrosion, waterproofing decks, and resurfacing decks. Bridge rehabilitation activities are those that restore bridge components to like-new condition. According to the 2010 Maintenance Condition Assessment Report, approximately the estimated annual cost of bridge preservation is \$26.2 million and the estimated annual cost of bridge rehabilitation is \$134 million. Recurring bridge and structure maintenance programs include drawbridge maintenance, small bridge replacements, large culvert installation, and scour/slope protection. According to the 2010 report, the estimated annual cost of recurring bridge and structure maintenance programs is \$20.9 million.

Pavement maintenance activities are divided into three categories:

- Pavement preservation
- Contract resurfacing
- Pavement rehabilitation

Pavement preservation activities are performed while pavement is in overall fair or good condition and are intended to extend pavement life. Preservation treatments include crack sealing, chip seal application and thin hot mix asphalt overlays. Based on the *2010 Maintenance Condition Assessment Report*, the estimated cost of pavement preservation on non-interstate highways in the state is \$150 million, and the estimated cost of concrete and asphalt pavement preservation on Interstate highways is \$57 million. Contract resurfacing includes asphalt resurfacing activities. The 2010 report states that the estimated annual cost of these activities is approximately \$206 million. Pavement rehabilitation is performed when pavement has deteriorated to the point at which it cannot be restored to good condition using preservation techniques or resurfacing. The 2010 report states that the estimated annual cost of these activities is approximately \$263 million.

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### 3.1.2 Changes since Prior Plan

#### Programs

Generally, the Department has maintained the same capacity expansion and safety improvement and maintenance programs since the 2006 plan, with a few revisions to maintenance programs. Pavement preservation and preventive maintenance programs have been expanded to include new treatments to preserve pavements in fair to good condition. In addition, a separate program specifically for Interstate maintenance and preservation was initiated and is expected to be expanded in the future.

The methods by which ITS projects are developed and deployed are currently changing. In the fall of 2010, NCDOT and its transportation partners developed project evaluation measures specific to ITS. These measures analyze the potential impacts and benefits to deploying ITS projects, thus aiding in the prioritization of ITS projects in North Carolina. NCDOT is also moving forward to work with planners statewide to encourage them to use ITS Deployment Analysis Software (IDAS) as a planning tool for analyzing project alternatives. This software will allow planners to see the benefits that could be reaped from implementing various ITS initiatives. The following project evaluation measures will be used to evaluate potential ITS deployments:

- Benefit/cost ratio
- System preservation
- Emission reductions
- Travel time reliability
- Volume/capacity ratio

This shift in the project development process, including the use of IDAS, will be incorporated into updates of the nine regional Strategic Deployment Plans and implemented within each region as each plan update is completed. Of the nine regional plans, the Triangle Regional Strategic Deployment Plan was the first to be updated. This plan update was completed in 2010, and the new project development process has been implemented in this region. Other regional plan updates have not yet been initiated; however, the Fayetteville Regional Strategic Deployment Plan has been selected to be the second plan update.

#### Inventory

Most highway system assets and usage indicators have increased slightly since they were tabulated in 2005 as part of another analysis of modal needs, with the exception of bridge deck area, which has increased by more than ten percent. **Table 3-2** summarizes changes in highway system inventory and usage indicators between 2005 and 2009.

**Table 3-2. Comparison of Highway System Inventory and Usage Indicators from 2005 to 2009**

Asset/Indicator	2005	2009	% Change
Vehicle miles of travel (VMT)	100,861,000	102,590,000	+ 1.71
Centerline miles	79,009	79,185	+ 0.22
Paved lane miles	160,609	160,806	+ 0.12
Number of structures	17,848	18,205	+ 2.00
Bridge deck area (square feet)	79,750,000	88,124,000	+ 10.5

Source: *Maintenance Condition Assessment Report*, NCDOT, 2010

### 3.1.3 Trends and Forces

The state of today's modal resources in North Carolina is the function of the costs of building and maintaining resources, the way in which the modal system is used, and the availability of funds from all sources to underwrite the system development and maintenance. These factors are in turn influenced by a variety of trends and forces arising at and interacting across regional, state, national, and global levels. For example, the national economic downturn and the concurrent rise in fuel prices have affected employment levels, real estate markets, and consumption. This situation has led to declines in freight movement and traffic volumes but an increase in transit ridership. Looking beyond the current malaise, forecasters anticipate shifts in global trade lanes with more containerized waterborne cargo reaching the Eastern Seaboard of the United States, with possible effects on related landside truck and rail movement patterns. These are but two examples of the interplays between the economy, consumer demand, government funding, and other influential dynamics.

A sampling of such trends and forces that have had an influence in recent years, or which are anticipated to drive modal needs and the ability to solve those needs, is presented below.

- With 80,000 miles of state-maintained roadways, North Carolina has the second largest roadway system in the nation; this amounts to 76 percent of all roadways in the state, the fourth highest share of responsibility in the nation. The majority of this state-maintained mileage is in the Subregional tier.
- Because of the system size, and because no extraordinary funding stream is in place to support the large amount of Subregional tier mileage, per-mile capital spending on state-maintained roads is the fourth lowest in the nation.
- Highway improvements are falling behind due to the declining buying power of historic revenue sources and due to the level of these funding sources falling behind accumulating and growing system needs.
- A high percentage of rural roadways in North Carolina lacks paved shoulders, undermining LOS ranking and safety.
- There are current uncertainties over funding programs and their funding levels in the coming years under the federal transportation reauthorization bill that Congress has begun to formulate.
- Tools and techniques have evolved that allow for more cost-efficient maintenance of pavement and bridge assets.

- The growing extent of accumulated highway restoration deficiencies is exacerbating decisions about whether to repair built facilities or add capacity to relieve congestion.
- Vehicle travel increased by 60 percent from 1990 to 2008, the eighth highest increase in the country.
- From 1990 to 2008, the state's gross domestic product increased 73 percent, much higher than the national average of 52 percent.
- According to The Road Information Program (TRIP), one in seven bridges is structurally deficient, with the percentage by county varying from 2.3 percent to 33.6 percent.
- Nationally, bridge needs have grown \$10 billion per year from 2007 to 2010, with federal funding basically level, covering about 7.5 percent of the needs, according to TRIP.
- The average age of state bridges is 35.7 years, while the typical service life is 50 years. TRIP, quoting a report from the American Association of State Highway and Transportation Officials, states that by 2030 about two-thirds of North Carolina bridges will reach the end of their service life.
- Over the 2000-2009 period, the number of lane miles in the state increased 4.2 percent, while VMT over the period increased 14.9 percent. Lane miles did not keep pace with traffic growth; however, an increase in lane miles increases future pavement maintenance and restoration costs over time.
- According to NCDOT estimates, with only level funding, the percentage of pavement on state highways that would be considered in good condition would drop from 68 percent to 50 percent from 2011 to 2017; the same analysis for bridges showed a drop from 61 percent to 54 percent in the same time.
- To maintain overall roadway conditions (bridges, pavement, and roadside) at current levels from 2011 to 2017, an additional \$1 billion over the \$6.5 billion with level funding would be needed, according to NCDOT forecasts in the *2010 Annual Maintenance Report*. An additional \$4.6 billion over current funding would be needed to elevate roadway system condition and performance to target levels.
- North Carolina's Statewide cost of traffic congestion in lost time and wasted fuel is about \$1.2 billion annually. While not all of this cost can be reasonably avoided, there is obviously significant short- and long-term benefit to strategic capacity projects.
- According to the Reason Foundation, unless additional highway capacity is added by 2030, traffic delays in the Charlotte and Raleigh-Durham regions will more than double.
- Critical existing and projected transportation system needs continue to outstrip available historical, conventional funding sources. Planning for solutions to future transportation needs will be challenged by the large shortfalls in funding, with larger gaps looming in the future.
- ITS will play an increasingly vital role in the efficient management of built highway capacity, from arterial street networks to major urban freeways; this comes in the form of signal system timing, recurring congestion management, incident management, traveler (incidents, weather alerts, road condition, construction) information, emergency vehicle response, hurricane evacuation, and construction work zones, among others.
- Rapid advances in ITS technologies will likely create new opportunities to better manage the transportation system.

- ITS technologies may play a role in innovative highway capacity development in the form of toll roads, managed lanes, and other strategies.
- ITS applications can also contribute to improved transit services and operations, commercial vehicle compliance enforcement, and security requirements.

## 3.2 Performance

### 3.2.1 Performance Standards

In 2009, the NCDOT begin using a new strategic prioritization process to identify projects for inclusion in the 2011 STIP. As part of this process, existing and target performance for all modes is developed by investment goal (mobility, safety, infrastructure health) and tier (Statewide, Regional, Subregional) based on performance measures developed by the modal units in conjunction with the Strategic Prioritization Office of Transportation. A second round of strategic prioritization, referred to as Prioritization 2.0, was initiated in 2011 to identify projects for inclusion in the next STIP. This process refined performance measures and standards used for each mode.

There are six highway mode performance measures evaluated as part of the Prioritization 2.0 process, one related to mobility, one related to safety, and four related to different aspects of infrastructure health. The six measures are summarized in **Table 3-3**.

**Table 3-3. Prioritization 2.0 Performance Measures and Standards – Highway Mode**

Goal	Submode	Measure	LOS A	LOS B	LOS C	LOS D
Mobility	n/a	% of miles with TTI <sup>1</sup> <1.05	80%	60%	40%	20%
Safety	n/a	Fatal Crash Rate	0.0 0.3	0.31-0.90	0.91-1.48	1.49 - 2.0
Health	Interstate Pavement	% of road miles with PCR <sup>2</sup> ≥80	85%	80%	75%	60%
	Pavement (Contract Resurfacing)	% of road miles with PCR <sup>2</sup> ≥80	85%	80%	75%	60%
	Bridges	% of bridges with BHI <sup>3</sup> ≥6.0	90%	80%	70%	60%
	Roadway Modernization	% of miles that meet NCDOT's Paved Shoulder Policy where Paved Shoulders are required	80%	60%	40%	20%

Notes:

1. Travel Time Index (TTI) is the ratio of travel time in peak hours to travel time in off-peak hours. A delay in peak hour travel time results in TTI>1.00. An index of 1.05 means that travel time in the peak hour is 5% longer than in the off-peak.

2. Pavement Condition Rating (PCR) is a measure of pavement distress. Data are obtained from the Statewide Pavement Condition Survey.

3. Bridge Health Index (BHI) is a measure of bridge condition rated on a scale of 1 to 9. Data are obtained from the Statewide Bridge Condition Survey.

## 3.2.2 Existing Performance

### Mobility

Current mobility performance based on Prioritization 2.0 data is shown in **Table 3-4**. The measured performance for both measures exceeds the target performance.

**Table 3-4. Existing Performance: Mobility**

Performance Measure	Tier	Existing Performance
% of miles with TTI <1.05	Statewide	LOS B [ $\geq 60\%$ ]
	Regional	LOS A [ $\geq 80\%$ ]
	Subregional	LOS A [ $\geq 80\%$ ]

### Safety

Current safety metric performance based on Prioritization 2.0 is shown in **Table 3-5**.

**Table 3-5. Existing Performance: Safety**

Performance Measure	Tier	Existing Performance
Fatal Crash Rates	All Tiers	LOS C [1.28]

### Infrastructure Health

Current infrastructure health performance based on Prioritization 2.0 data is shown in **Table 3-6**.

**Table 3-6. Existing Performance: Infrastructure Health**

Performance Measure	Tier	Existing Performance
Interstate Pavement: % of road miles with PCR $\geq 80$	Statewide	LOS B [ $\geq 80\%$ ]
Pavement (Contract Resurfacing): % of road miles with PCR $\geq 80$	Statewide	LOS D [ $\geq 60\%$ ]
	Regional	LOS D [ $\geq 60\%$ ]
	Subregional	LOS D [ $\geq 60\%$ ]
Bridges: % of bridges with BHI $\geq 6.0$	Statewide	LOS B [ $\geq 80\%$ ]
	Regional	LOS C [ $\geq 70\%$ ]
	Subregional	LOS D [ $\geq 60\%$ ]
Roadway Modernization: % of miles that meet NCDOT's Paved Shoulder Policy where Paved Shoulders are required	Statewide	LOS C [ $\geq 40\%$ ]
	Regional	LOS D [ $\geq 20\%$ ]
	Subregional	LOS F [ $< 20\%$ ]

## 3.3 Current Deficiencies

### 3.3.1 Basis for Deficiencies

In 2008, the SPOT developed LOS performance categories and associated financial needs for the highway system as part of the biannual Prioritization process for the STIP. The SPOT performance analysis estimates the highway system to address mobility, safety, and infrastructure health goals at the Statewide, Regional, and Subregional tiers. The SPOT performance analysis was recently updated with Prioritization 2.0 figures and performance targets. Current performance for various highway subcategories ranges from LOS A to LOS D. Current highway mode deficiencies of \$28.63 billion were identified.

### 3.3.2 Changes since Prior Plan

The 2006 STP Mid-Cycle Update identified 25-year highway system needs to the year 2030. In the analysis, needs were calculated by the improvement types of preservation, modernization, and expansion at the Statewide, Regional, and Subregional tiers. Approximately \$30 billion of the identified needs were identified as current deficiencies. A comparison of current deficiencies identified by the 2006 plan through 2030 versus the current deficiencies identified in this plan is shown in **Table 3-7**. The 2006 plan values are not adjusted for a different cost basis or for a 25-year versus 30-year horizon for the 2040 plan.

**Table 3-7. Comparison of Current Deficiencies from 2005 to 2009 (\$ in Billions)**

Tier	2005*	2011
Statewide	11.0	18.1
Regional	4.0	4.4
Subregional	15.0	6.2
<b>Total</b>	<b>30.0</b>	<b>28.6</b>

\* NCDOT 2006 STP Mid-Cycle Update Technical Report

## 3.4 Summary of Modal Needs

As shown in **Figure 3-1** and **Figure 3-2**, total highway needs of \$116.54 billion were identified, which includes needs for roadway, bridges and structures, and ITS. The roadway needs estimate is composed of highway mobility projects including widening and new location, highway safety projects, and infrastructure health projects for pavement and roadside features. The bridges and structures estimate includes costs for repair, rehabilitation, and replacement; it does not include an estimate of needs for new bridges, because this need is captured within the highway mobility needs estimate. The ITS estimate includes costs for both new and existing deployments.

The roadway needs estimate was developed with assistance from several NCDOT Business Units and all seventeen MPOs in the state. The highway mobility estimate was completed in two parts. Each MPO provided an estimate for highway needs within its jurisdiction based on local plans. For areas not in an MPO, an estimate for highway widening was developed based on a volume-to-capacity analysis using a GIS database developed by the NCDOT GIS Unit and SPOT. In addition, the highway mobility estimate includes the policy-driven estimate for completion of urban loops and the intrastate system. The highway safety needs estimate was developed by the NCDOT Traffic Safety Unit and includes funding needs for the Spot Safety, Hazard Elimination, and High Risk Rural Road safety programs. The infrastructure health needs estimates were developed by the NCDOT Pavement Management and State Road Maintenance Units.

The bridge needs estimate was developed by the NCDOT Bridge Management Unit using the new NCDOT Bridge Management System inventory database and software model. The estimate includes infrastructure health needs for existing bridges, including costs for preservation, rehabilitation, and replacement.

The highway ITS needs estimate was developed by the NCDOT ITS Section. The estimate includes needs for freeway management, weigh stations, and metropolitan signal systems.

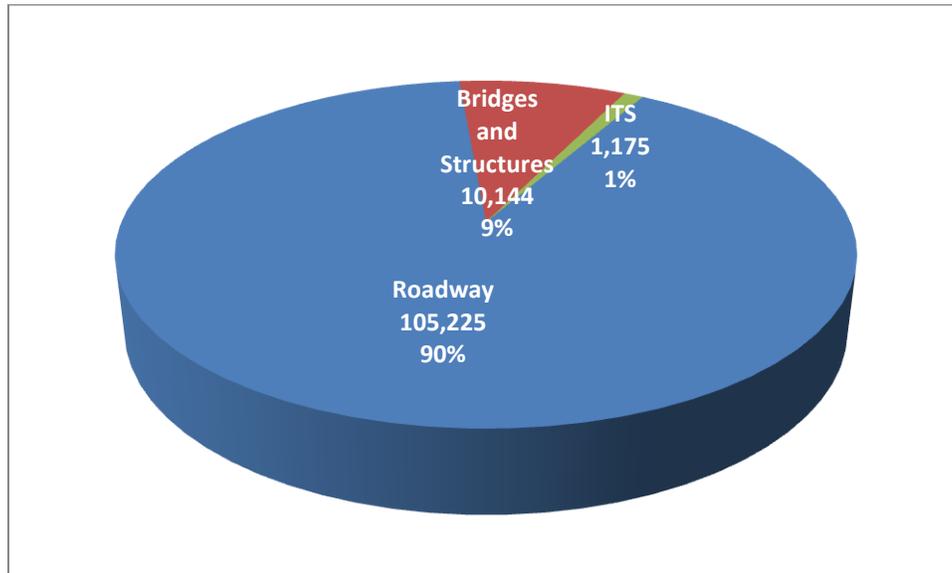


Figure 3-1. Highway Needs Subcategories (\$ in Millions)

Of the \$116.54 billion of identified needs, roadway needs represent 90 percent (\$105.23 billion), while bridges and structures needs represent 9 percent (\$10.14 billion), and ITS needs represent 1 percent (\$1.18 billion), as shown in **Figure 3-1**.

Approximately \$28.63 billion in current deficiencies were identified, which represents 25 percent of the total estimated need. **Table 3-8** and **Figure 3-2** summarize highway needs by category and 5-year increment across the planning period.

Table 3-8. Highway Needs by Category in 5-Year Increments (\$ in Millions)

Need Category	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
Roadway	28,459	7,345	7,771	12,484	8,244	20,288	20,635	105,225
Bridges and Structures	167	1,663	1,663	1,663	1,663	1,663	1,663	10,144
ITS	0	165	254	236	238	156	127	1,175
<b>Total</b>	<b>28,626</b>	<b>9,172</b>	<b>9,687</b>	<b>14,383</b>	<b>10,144</b>	<b>22,107</b>	<b>22,425</b>	<b>116,544</b>

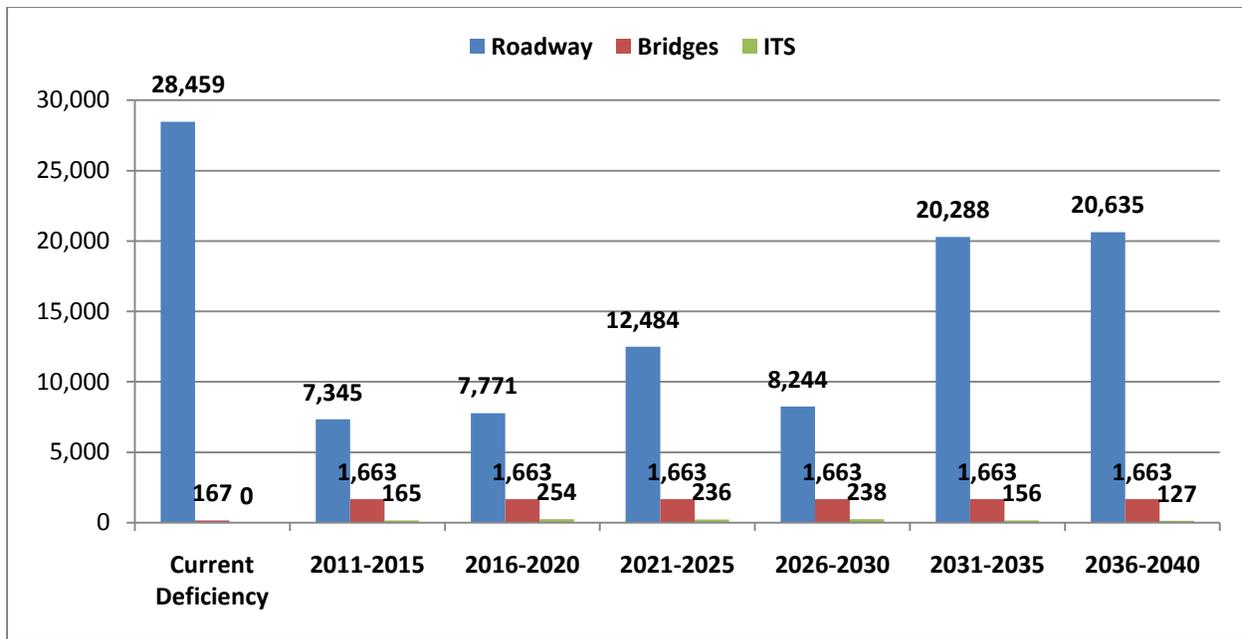


Figure 3-2. Highway Needs by Highway Mode Subcategory (\$ in Millions)

### 3.4.1 Needs by Investment Goal

Highway investment goal were identified in all three categories of mobility, safety, and infrastructure health. As shown in **Table 3-9**, **Figure 3-3**, and **Figure 3-4**, infrastructure health needs represent 50 percent (\$57.70 billion), mobility needs represent 48 percent (\$56.34 billion), and safety needs represent 2 percent (\$2.50 billion) of total highway needs.

Table 3-9. Highway Needs by Investment Goal in 5-Year Increments (\$ in Millions)

Investment Goal	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
Mobility	22,519	1,008	925	5,420	970	12,710	12,791	56,343
Safety	950	258	258	258	258	258	258	2,500
Health	5,157	7,905	8,504	8,705	8,916	9,139	9,375	57,701
<b>Total</b>	<b>28,626</b>	<b>9,172</b>	<b>9,687</b>	<b>14,383</b>	<b>10,144</b>	<b>22,107</b>	<b>22,425</b>	<b>116,544</b>

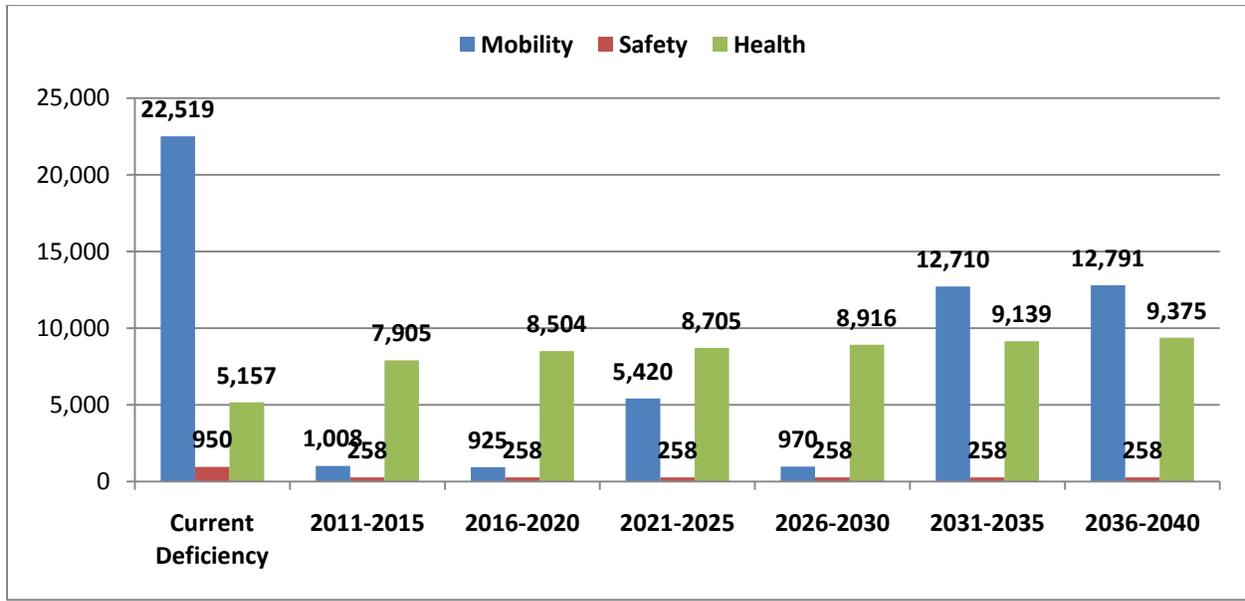


Figure 3-3 Highway Needs by Investment Goal in 5-Year Increments (\$ in Millions)

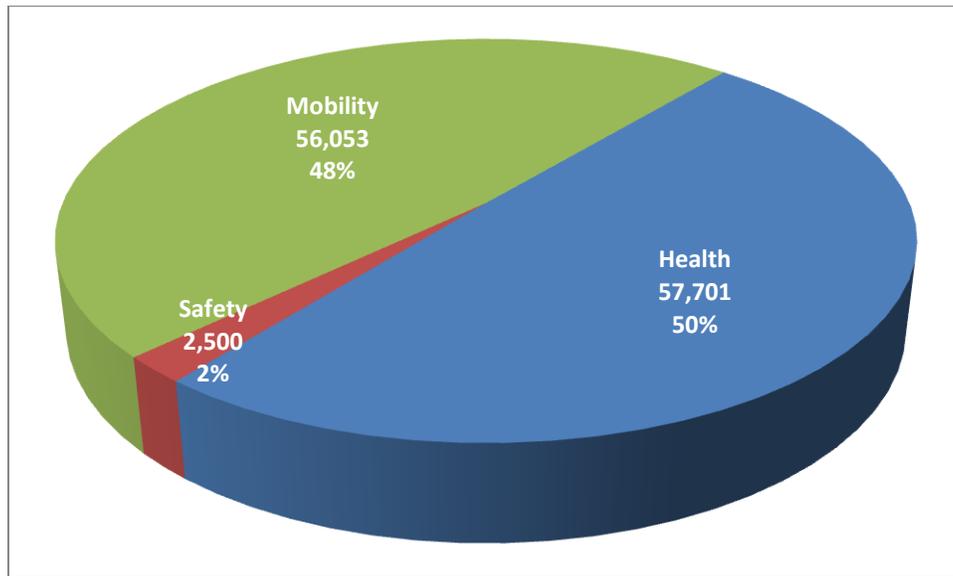


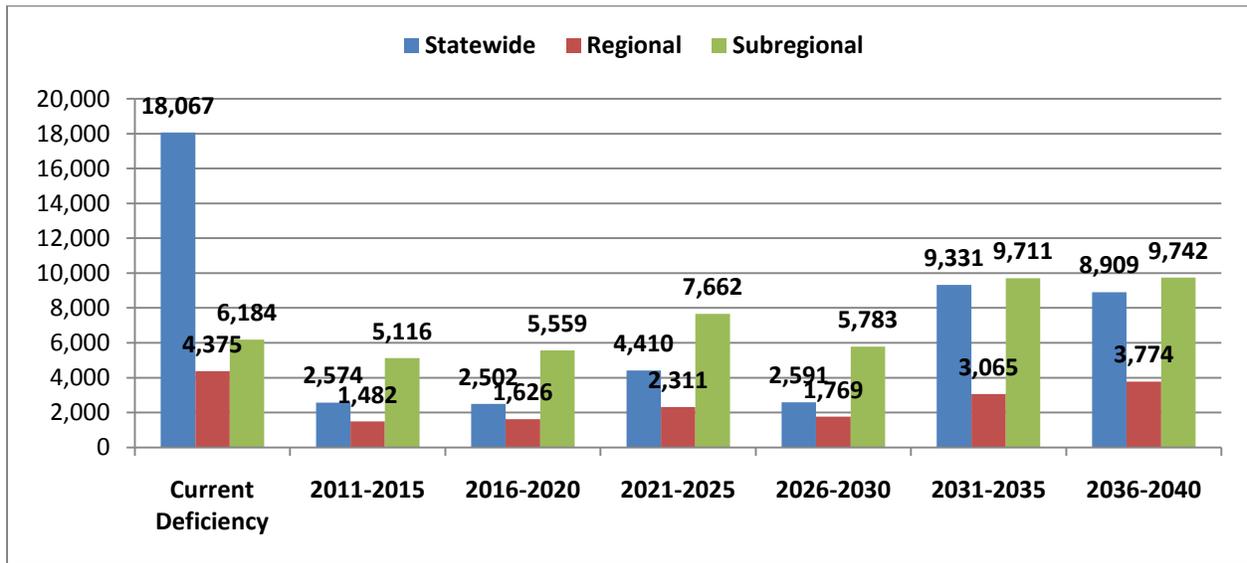
Figure 3-4. Highway Needs by Investment Goal (\$ in Millions)

### 3.4.2 Needs by North Carolina Multimodal Investment Network Tier

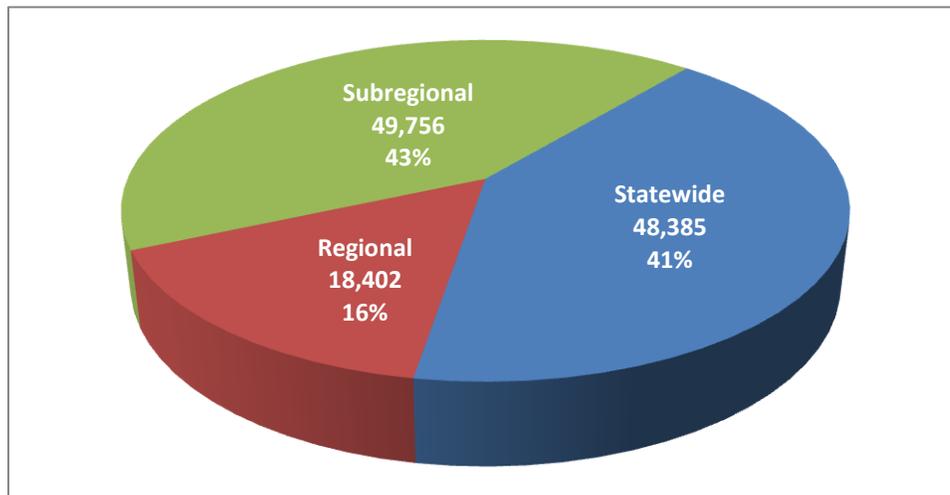
Highway improvement needs were identified for all three NCMIN tiers. As shown in **Table 3-10**, **Figure 3-5**, and **Figure 3-6**, Statewide tier needs represent 42 percent (\$48.30 billion), Regional tier needs represent 16 percent (\$18.30 billion), and Subregional tier needs represent 43 percent (\$49.66 billion) of total highway needs.

**Table 3-10. Highway Needs by North Carolina Multimodal Investment Network Tier in 5-Year Increments**  
(\$ in Millions)

NCMIN Tier	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
Statewide	18,067	2,574	2,502	4,410	2,591	9,331	8,909	48,385
Regional	4,375	1,482	1,626	2,311	1,769	3,065	3,774	18,402
Subregional	6,184	5,116	5,559	7,662	5,783	9,711	9,742	49,756
<b>Total</b>	<b>28,626</b>	<b>9,172</b>	<b>9,687</b>	<b>14,383</b>	<b>10,144</b>	<b>22,107</b>	<b>22,425</b>	<b>116,544</b>



**Figure 3-5 Highway Needs by North Carolina Multimodal Investment Network Tier in 5-Year Increments (\$ in Millions)**



**Figure 3-6. Highway Needs by North Carolina Multimodal Investment Network Tier (\$ in Millions)**

Needs by improvement type vary significantly by tier. The majority of identified Statewide tier needs are mobility needs, while the majority of identified Regional and Subregional tier needs are for infrastructure health. **Table 3-11** summarizes highway needs by both NCMIN tier and improvement type.

**Table 3-11. Highway Needs by Investment Goal (\$ in Millions)**

Investment Goal	NCMIN Tier			
	Statewide	Regional	Subregional	Total
Health	14,340	9,271	34,090	57,701
Safety	833	833	833	2,500
Mobility	33,212	8,298	14,833	56,343
<b>Total</b>	<b>48,385</b>	<b>18,402</b>	<b>49,756</b>	<b>116,544</b>



# Chapter 4 Aviation

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## 4.1 Existing Conditions

### 4.1.1 Inventory Summary

North Carolina has 72 publicly owned airports, of which nine are primary commercial service airports and the remaining 63 are general aviation airports. More than 7,000 aircraft and 15,000 licensed pilots are based in the state. The NCDOT Division of Aviation is responsible for aviation functions including state system planning, airport and aviation system development, and construction and improvement of publicly owned general aviation airports throughout the state.

The defined Statewide, Regional, and Subregional tiers for the aviation system are shown in **Table 4-1**. For aviation, NCDOT provides minimal funding for the Statewide tier commercial service airports as they are direct recipients of federal aviation funds. Thus, funding flowing through the Division of Aviation is primarily focused on the Regional and Subregional tiers. As a result, the aviation modal needs estimates do not reflect the capital requirements for commercial airports on the Statewide tier.

**Table 4-1. Aviation Tier Definitions in the North Carolina Multimodal Investment Network**

Statewide Tier	Regional Tier	Subregional Tier
Commercial service airports with at least 100,000 annual enplanements	<ul style="list-style-type: none"><li>Commercial service airports with fewer than 100,000 annual enplanements</li><li>General aviation with at least 25 based aircraft</li></ul>	General aviation airports with fewer than 25 based aircraft

Source: NCDOT NCMIN: [http://www.ncdot.org/download/performance/NCMIN\\_Definitions.pdf](http://www.ncdot.org/download/performance/NCMIN_Definitions.pdf)

NCDOT provides funding to general aviation airports through the FAA Block Grant Program, State Aid to Airports Program, and programs for airport pavement management and maintenance, safety data collection, and safety education. In FY 2009, approximately \$19 million was allocated to airports through the State Aid to Airports Program, while approximately \$29 million was allocated through the FAA Block Grant Program. The average annual expenditure for the pavement maintenance program for the period from 2007 to 2010 was approximately \$300,000.

In 2004, the Division of Aviation adopted the North Carolina General Aviation Development Plan, which organized the state's general aviation airports into three groups and provided minimum and recommended planning and design standards for each group. The airports were grouped based on multiple demographics including economic development parameters provided by the North Carolina Department of Commerce for the communities surrounding each airport. The plan focuses on four core development areas: safety, infrastructure preservation, expansion, and promotion of economic growth, and is intended to guide airports' development of short- and long-range plans. The plan was updated in 2006.

The NCDOT provides funding for commercial service airports, ranging from \$300,000 to \$500,000. **Table 4-2** summarizes passenger and cargo statistics for calendar year 2010 at North Carolina's nine commercial service airports.

**Table 4-2. Statistics for North Carolina Commercial Service Airports (FY 2010)**

Airport Code	City	Airport Name	Based Aircraft	Enplanements	NCMIN Tier
CLT	Charlotte	Charlotte/Douglas International	82	18,629,181	Statewide
RDU	Raleigh	Raleigh-Durham International	156	4,465,736	Statewide
GSO	Greensboro	Piedmont Triad International	96	855,073	Statewide
ILM	Wilmington	Wilmington International	137	408,055	Statewide
AVL	Asheville	Asheville Regional	174	371,226	Statewide
FAY	Fayetteville	Fayetteville Regional/Grannis Field	55	258,986	Statewide
OAJ	Jacksonville	Albert J. Ellis	18	154,307	Statewide
EWN	New Bern	Coastal Carolina Regional	80	126,800	Statewide
PGV	Greenville	Pitt-Greenville	61	61,899	Regional

Source: FAA Passenger Boarding (Enplanement) and All-Cargo Data for U.S. Airports:  
[http://www.faa.gov/airports/planning\\_capacity/passenger\\_allcargo\\_stats/passenger/](http://www.faa.gov/airports/planning_capacity/passenger_allcargo_stats/passenger/)

#### 4.1.2 Changes since Prior Plan

An economic impact study for North Carolina aviation conducted in 2006 estimated an economic impact of this mode of at least \$11.9 billion annually across the state. General aviation alone accounted for more than \$1.8 billion Statewide and continues to experience increasing general aviation and corporate travel. Commercial airports are playing an increasingly significant role in regional and national aviation service coverage. The Rural Airport Development Program developed in 2006 assists airports in economically challenged areas of the state as another funding source to support capital improvement projects that enhance attractiveness for business aviation and industry recruitment.

### **4.1.3 Trends and Forces**

A sampling of trends and forces that have had an influence in recent years, or which are anticipated to drive aviation modal needs and the ability to solve those needs, are as follows:

- The institution of significant aviation security measures involving both infrastructure (perimeter controls, facilities expansion, or modification, equipment, and systems) and services (patrols, monitoring, passenger security, and freight inspection) has affected airport budgets. Further requirements could exacerbate the situation.
- The ability to generate revenue streams and garner local general revenue aid to match grants and to cover direct costs is a continuing challenge.
- North Carolina's general aviation airports have experienced significant growth in general aviation and corporate travel and play a growing role in supporting regional economic development, trends that are expected to continue.
- Infrastructure project costs have increased noticeably in recent years, stressing the need for enhanced system preservation planning.
- The FAA/Airport Improvement Program reauthorization has languished through 18 interim extensions, though it is expected that eventually a multi-year reauthorization will be accomplished. The uncertainty of a long-term funding plan continues to inhibit growth and planning.
- Infrastructure needs at all classes of the state's airports are expected to mount in the coming years, to preserve built infrastructure and facilities and to accommodate growth and expansion both airside and landside. While the Department has a minimal role at the large commercial airports, the growth in the state's population should drive airport improvements in all three tiers.
- As passenger growth continues to be critical in stimulating economic growth, there may be the need for the state to play a more vital role in commercial airports.

## **4.2 Performance**

### **4.2.1 Performance Standards**

Beginning in 2008, NCDOT has annually evaluated its organizational effectiveness based on numerical performance measures aligned with its mission, goals, and values. Each performance measure is associated with one of five institutional goals, of which three are related to the transportation network and two are internal administrative goals. The three transportation network performance goals are to improve safety, mobility, and infrastructure health. These performance goals are tracked internally and used by the division to prioritize funding through its annual TIP prioritization process.

## 4.2.2 Existing Performance

In 2008, the Aviation Division, in conjunction with the SPOT, as part of the biannual Prioritization process for the STIP, developed LOS performance categories and the associated financial needs for aviation infrastructure. This assessment scored the ability of the aviation system to address safety, mobility, and health goals at the Regional and Subregional tiers. Existing performance was scored at an LOS C for all six investment types of safety, mobility, and health, at both the Regional and Subregional tiers. In 2011, the SPOT updated its LOS performance categories; the existing performance for aviation was scored at an LOS D for all investment types.

## 4.3 Current Deficiencies

### 4.3.1 Basis for Deficiencies

The Aviation Division and SPOT performance analysis was recently updated with the 10-year Prioritization 2.0 figures, used to derive current aviation deficiencies for the 2040 Plan. The total estimated cost of identified aviation improvements in the 10-year Prioritization 2.0 is \$737 million. Notably, the estimates exclude aviation needs on the Statewide tier because NCDOT provides very limited funding for commercial service airports. Because the 2040 Plan analysis uses estimates provided by the NCDOT Aviation Division for this analysis, the resulting 30-year LOS framework for aviation needs is consistent with the 10-year Prioritization 2.0 estimates.

### 4.3.2 Changes since Prior Plan

In 2006, an NCDOT update to the needs identified in the 2004 STP identified 25-year aviation needs to the year 2030. In the analysis, needs were calculated by the improvement types of preservation, modernization, and expansion at the Regional and Subregional tiers. However, none of these identified needs were identified as current deficiencies, but rather were treated as accruing needs.

The 2040 Plan identifies 30-year aviation needs in five-year increments to the year 2040. The current deficiencies (sometimes referred to as backlog) are identified separately from accruing needs and are included in total aviation modal needs.

## 4.4 Summary of Modal Needs

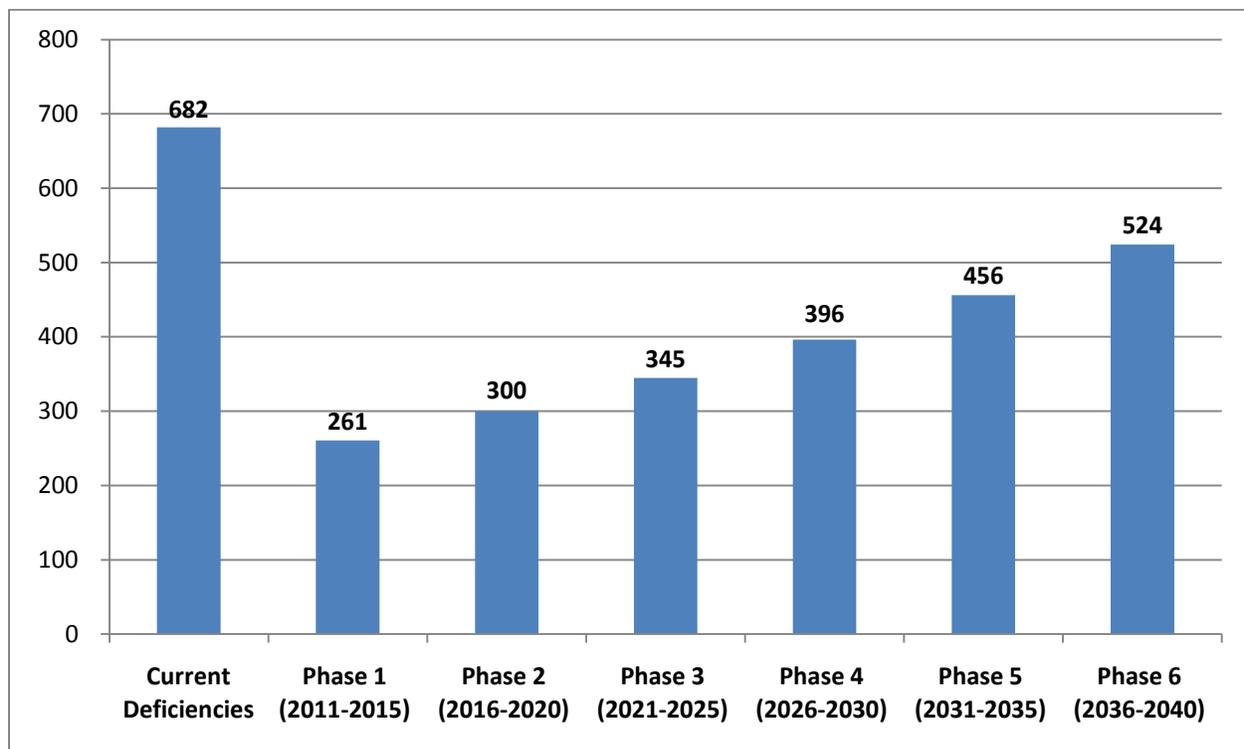
The accruing aviation modal needs estimates were developed by the NCDOT Aviation Division. As shown in **Table 4-3** and **Figure 4-1**, the 30-year aviation needs total \$2.96 billion. At \$682 million, current deficiencies represent 23 percent of all identified aviation needs.

As shown in **Table 4-3**, nearly 84 percent, or \$572 million of the estimated current deficiencies is allocated to the Regional tier, with the remaining 16 percent allocated to the Subregional tier. Because NCDOT has a limited role in providing funding for commercial airports, the estimated \$45 million in funding for Statewide tier airports (all for accruing needs) for the entire duration of the 2040 Plan represents only a small fraction (less than 2 percent) of the identified aviation needs. As shown in

**Figure 4-1**, the accruing aviation needs gradually increase during the 2040 Plan, with Phase 6 alone accounting for 23 percent of the total \$2.28 billion in identified accruing needs.

**Table 4-3. Aviation Needs by 5-Year Increments (\$ in Millions)**

Investment Goal	NCMIN Tier	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
Mobility	Statewide	0	0	0	0	0	0	0	0
Mobility	Regional	459	98	112	129	148	171	196	1,313
Mobility	Subregional	79	7	8	9	10	12	14	139
Safety	Statewide	0	0	0	0	0	0	0	0
Safety	Regional	86	6	7	9	10	11	13	143
Safety	Subregional	19	1	2	2	2	2	3	31
Health	Statewide	0	9	10	11	13	15	17	76
Health	Regional	27	98	112	129	149	171	197	883
Health	Subregional	12	42	48	55	64	73	84	379
<b>Total</b>		<b>682</b>	<b>261</b>	<b>300</b>	<b>345</b>	<b>396</b>	<b>456</b>	<b>524</b>	<b>2,964</b>



**Figure 4-1. Aviation Needs by 5-Year Increments (\$ in Millions)**

#### 4.4.1 Needs by Investment Goal

Based on investment goal, as shown in **Table 4-4** and **Figures 4-2** and **4-3**, 49 percent (\$1.45 billion) of identified aviation needs are mobility needs (e.g., new airport construction, runway lengthening, and pavement strengthening), followed by infrastructure health (e.g., facility, runway, and taxiway maintenance and airport obstruction removal) at 45 percent (\$1.34 billion), and safety (e.g., approach

lighting systems) at six percent (\$174 million). Mobility needs represent nearly 79 percent of the identified current deficiencies, followed by safety at 15 percent, and infrastructure health at six percent.

The accruing mobility, safety, and infrastructure health improvements are projected to increase gradually during the 2040 Plan, with each phase accounting for more of the identified need by investment goal.

The Seven Portals Study Final Report, prepared for the Governor’s Logistics Task Force and released in December 2011, cited the importance of improving Statewide aviation mobility in North Carolina. The study noted a modest indication of the need for additional capacity, with several airports possibly benefitting local economies if their runways are lengthened. The Governor’s Logistics Task Force Subcommittee Reports released in 2011 pay equal attention to mobility and infrastructure health aviation needs. In terms of mobility, “strong” aviation infrastructure is cited as the vital link that provides for the state’s tourism industry, with the need to strengthen the connection to the western part of the state, particularly west of Asheville and service to the Andrews/Murphy area. The subcommittee also points to the growth in aviation freight transport and the growing importance of the FedEx hub at the Piedmont Triad International Airport outside of Greensboro and the North Carolina Global TransPark facility near Kinston. Because of the strong growth in demand at these existing airports, the subcommittee recommends continued infrastructure health investments in the sustainment and development of those facilities.

**Table 4-4. Aviation Needs by Investment Goal (\$ in Millions)**

Investment Goal	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
Mobility	538	104	120	138	159	183	210	<b>1,452</b>
Safety	105	8	9	10	12	14	16	<b>174</b>
Health	39	148	171	196	226	259	298	<b>1,338</b>
<b>Total</b>	<b>682</b>	<b>261</b>	<b>300</b>	<b>345</b>	<b>396</b>	<b>456</b>	<b>524</b>	<b>2,964</b>

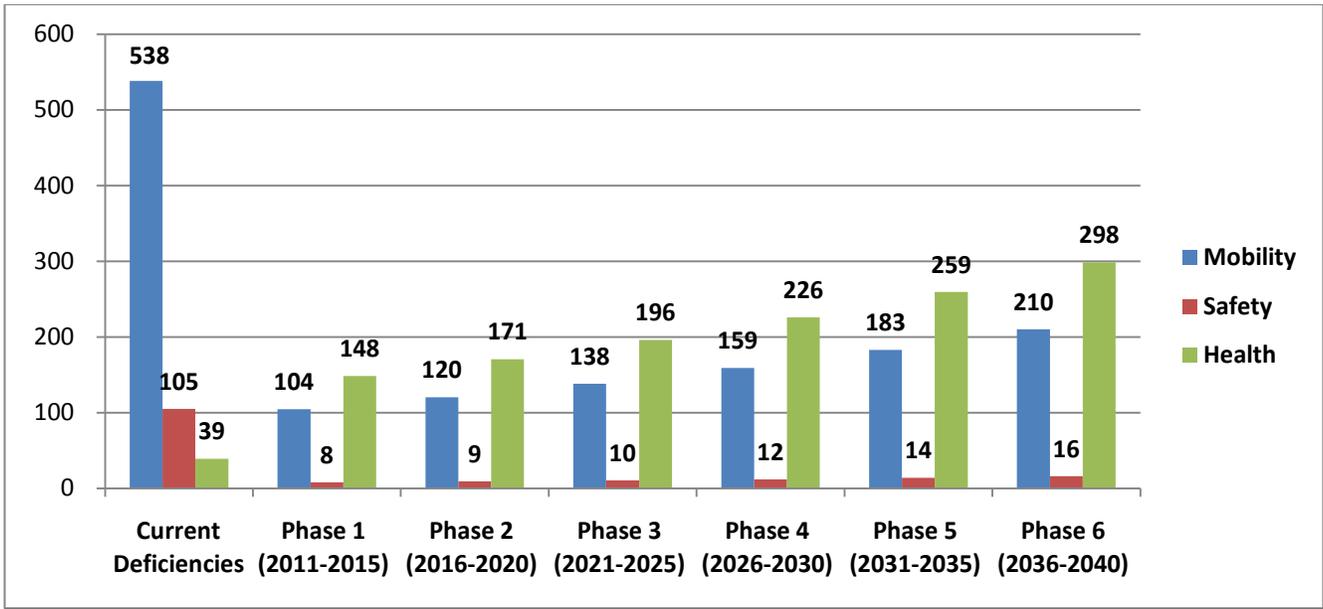


Figure 4-2. Aviation Needs by Investment Goal in 5-Year Increments (\$ in Millions)

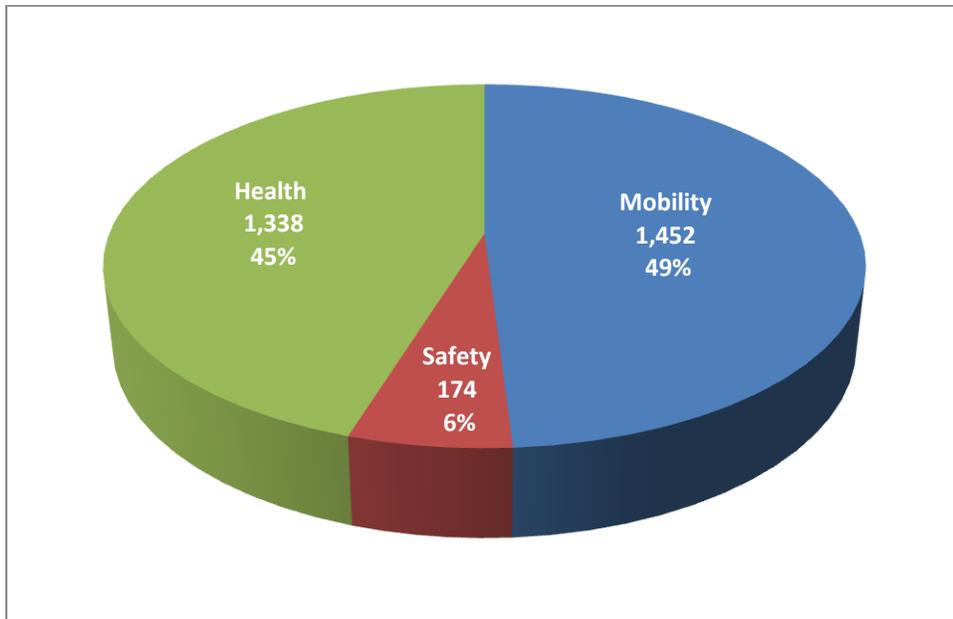


Figure 4-3. Aviation Needs by Investment Goal (\$ in Millions)

#### 4.4.2 Needs by North Carolina Multimodal Investment Network Tier

In terms of the NCMIN breakdown, 79 percent (\$2.34 billion) of the identified aviation needs are on the Regional NCMIN tier, followed by 18 percent (\$549 million) on the Subregional tier, and three percent (\$76 million) on the Statewide tier, as shown in **Table 4-5** and **Figures 4-4** and **4-5**. The Regional tier includes small commercial service airports and general aviation with at least 25 based aircraft (e.g., Pitt-Greenville Airport in Greenville, Concord Regional Airport, Kinston Regional Jetport at Stallings Field, or

Smith Reynolds Airport in Winston-Salem). The Subregional tier includes general aviation airports with fewer than 25 based aircraft (e.g., Siler City Municipal Airport or Halifax-Northampton Regional Airport in Roanoke Rapids). The Statewide tier includes commercial service airports with at least 100,000 annual enplanements; however, NCDOT has a limited role in providing funding support for those airports.

The identified current deficiencies are concentrated on the Regional tier, with 84 percent (\$573 million) of the total \$682 million allocated to that tier, and the remaining 16 percent (\$109 million) allocated to the Subregional tier. The identified accruing aviation needs by NCMIN tier are projected to gradually increase with each phase of the 2040 Plan, with Phase 6 alone accounting for 23 percent of all accruing needs by NCMIN tier.

While the Department currently has a minimal role at the large commercial airports, the growth in the state’s population should drive airport improvements at all tiers: Statewide, Regional, and Subregional. The Governor’s Logistics Task Force has found that healthy airports are crucial to efforts to achieve regional economic opportunity, as key economic sectors increasingly rely on the logistics benefits of good air service. The Task Force recommends continued infrastructure health investments in the sustainment and development of aviation facilities. Continuation of the current level of service D will undoubtedly lead to reduced safety, congestion in the major airports, and increasing cost to preserve even current maintenance levels.

**Table 4-5. Aviation Needs by North Carolina Multimodal Investment Network Tier (\$ in Millions)**

NCMIN Tier	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
Statewide	0	9	10	11	13	15	17	76
Regional	573	202	232	267	307	353	406	2,339
Subregional	109	50	58	66	76	88	101	549
<b>Total</b>	<b>682</b>	<b>261</b>	<b>300</b>	<b>345</b>	<b>396</b>	<b>456</b>	<b>524</b>	<b>2,964</b>

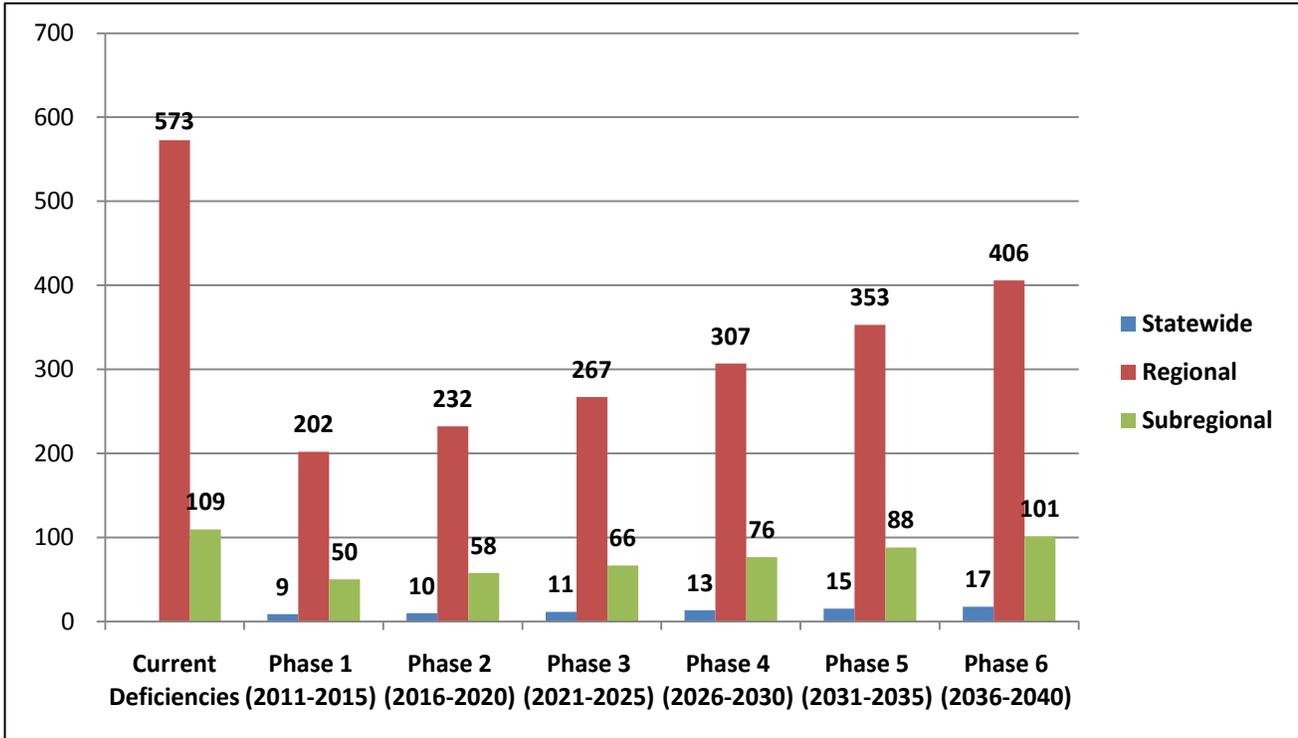


Figure 4-4. Aviation Needs by North Carolina Multimodal Investment Network Tier by 5-Year Increments

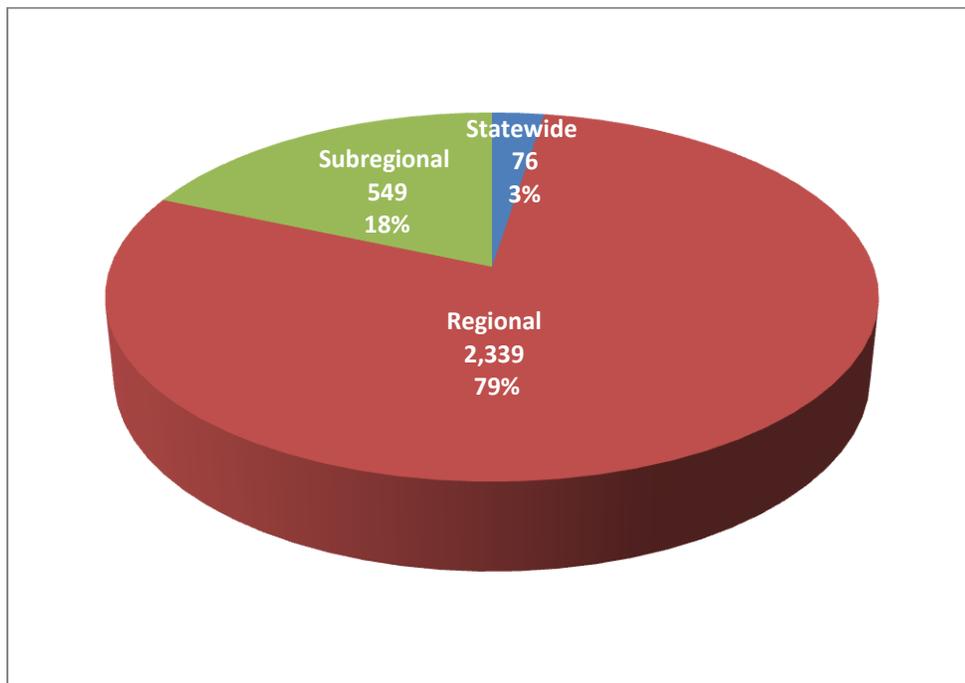


Figure 4-5. Aviation Needs by North Carolina Multimodal Investment Network Tier (\$ in Millions)



# Chapter 5

## Public Transportation

### 5.1 Existing Conditions

#### 5.1.1 Inventory Summary

While public transportation provides an important alternative for individuals who cannot or choose not to drive or do not have access to an automobile, a high level of public transportation service can provide a competitive and even attractive alternative to driving and parking. Public transportation can also be an important plank in an integrated land use and transportation strategy. In FY 2010, 99 public transportation systems provided nearly 68 million trips in every county in the state. The NCDOT Public Transportation Division (PTD), created in 1974 by the North Carolina General Assembly to foster the development of intercity, urban, and community public transportation in the state, assists the state’s public transit systems in providing mobility options through technical assistance and funding. The buses, trains, or vans are operated directly by local transit systems. The role of the PTD is to:

- Administer federal and state transportation grant programs
- Provide safety and training opportunities for transit professionals
- Offer planning and technical assistance

The 2004 STP established the NCMIN that stratifies each modal system into three tiers: Statewide, Regional, and Subregional. The defined Statewide, Regional, and Subregional tiers for public transportation are shown in **Table 5-1**. These tiers largely follow the service areas covered by public transportation. Interstate passenger travel is given the highest priority as the Statewide tier, followed by regional multi-county bus and vanpool service as the Regional tier, and bus and vanpool service within one county as the Subregional tier.

**Table 5-1. Public Transportation Tier Definitions in the North Carolina Multimodal Investment Network**

Mode	Statewide Tier	Regional Tier	Subregional Tier
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

Source: NCDOT NCMIN: [http://www.ncdot.org/download/performance/NCMIN\\_Definitions.pdf](http://www.ncdot.org/download/performance/NCMIN_Definitions.pdf)

Note: Although the existing NCMIN classifies light rail as part of passenger rail transportation facilities, this analysis includes light rail services as part of public transportation modal needs. It is recommended that the existing NCMIN tier is modified and light rail services moved from passenger rail tier definitions to public transportation. Intercity and commuter passenger rail facilities are included under the passenger rail transportation facilities.

North Carolina’s transit systems are classified as Community, Regional Community, Urban, and Regional Urban Transportation Systems.

## **Community Transportation**

Community transportation, while historically centered on assisting clients of human service agencies, serves the general public as well through their Rural General Public (RGP) services. Most human service-focused community transportation system services use advance registration where human service agencies prepay and reserve seats for a guaranteed number of passengers. RGP community transportation systems, on the other hand, operate on first-come, first-served basis, with passengers paying their fares directly. North Carolina has 68 rural single-county transit systems. In FY 2010, more than seven million one-way trips were provided by community transportation providers in the state, with a nearly equal split between human service-focused and RGP community transportation ridership. Nearly 3.7 million trips, or 52 percent of the total community transportation trips, were human service-focused (with 47 percent of them classified as contracted Medicaid trips, and 53 percent non-Medicaid contracted trips), and nearly 3.4 million trips, or 48 percent of the total, counted as RGP trips.

## **Regional Community Transportation**

Regional community transportation systems are comprised of coordinated/consolidated service in two or more contiguous counties. Statewide, rural transportation services are provided by regional transit entities in nearly one-fourth of all counties. The PTD has encouraged establishing regional transit system agencies to serve demand for regional transit trips. Regional community transportation services in North Carolina are provided by the following eight regional agencies:

- Choanoke Public Transportation Authority (Bertie, Halifax, Hertford, and Northampton counties)
- Craven Area Rural Transit System (Craven, Pamlico, and Jones counties)
- Greenway Public Transportation (Alexander, Burke, Caldwell, and Catawba counties)
- Inter-County Public Transportation Authority (Camden, Chowan, Currituck, Pasquotank, and Perquimans counties)
- Kerr Area Rural Transportation System (Franklin, Granville, Vance, and Warren counties)
- Regional Coordinated Area Transportation System (Montgomery and Randolph counties)
- Tar River Transit (Edgecombe and Nash counties)
- Yadkin Valley Public Transportation (Davie, Stokes, Surry, and Yadkin counties)

## **Urban Public Transportation**

Urban public transportation systems in North Carolina provide fixed-route and dial-a-ride services for the general public in large and medium size cities. Fixed-route service typically operates on a set schedule determined by the system's management, with input from community leaders and citizens. Dial-a-ride service requires that prospective riders request service in advance by calling to schedule a specific pickup location, boarding time, and destination within the system's service area. The PTD assists North Carolina's 19 urbanized areas and three small urban areas (that provide fixed-route services locally in small towns) with the planning, funding, and operating of public transportation services. The Charlotte Area Transit System (CATS) is the largest of the 19 urban transit systems operating in the state.

In some areas of the state, a single transportation system provides both urban and rural transportation within the county. Consolidated urban-community transportation exists in five areas:

- AppalCART (Boone and Watauga counties)
- G.A.T.E.W.A.Y. Transit (Goldsboro and Wayne counties)
- Greenway Public Transportation (Hickory, Newton, Conover, Alexander, Burke, Caldwell, and Catawba counties)
- Tar River Transit (Rocky Mount, Edgecombe, and Nash counties)
- Wave Transit (Wilmington and New Hanover counties)

Because Greenway Public Transportation serves four counties and Tar River Transit serves two counties, they are considered both regional community systems and consolidated urban-community transportation systems.

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 Blue Line light rail service was developed by the city in cooperation with NCDOT and the FTA. Operated by CATS, the Blue Line has greatly exceeded initial ridership projections, averaging 15,000 daily weekday rides. Existing public agency plans call for extending light rail service in the Charlotte area.

### Regional Public Transportation

Regional public transportation systems provide transportation for the general public in multiple counties. Two urban regional transportation authorities are currently in North Carolina:

- Triangle Transit, based in Research Triangle Park, operates a fixed-route bus service that connects Raleigh, Durham, Chapel Hill, and the surrounding area.
- Piedmont Authority for Regional Transportation (PART), based in Greensboro, operates fixed-route bus service connecting Greensboro, Winston-Salem, High Point, the surrounding area, and medical transportation to University of North Carolina hospitals and Duke University Medical Center.

### Other Public Transportation Services

#### Vanpool and Carpool Programs

Three urban transit systems coordinate vanpool service in the state: Triangle Transit, CATS, and PART. In addition, 2Plus (a nationwide 501(c)(3) charitable non-profit corporation) works directly with NCDOT, transit operators, and corporations to coordinate vanpool service in the state’s rural areas. As shown in **Table 5-2**, 629,453 vanpool trips with a total of nearly 39 million service miles were coordinated by the four agencies statewide in FY 2009-2010. CATS and Triangle Transit coordinated more than 75 percent of all vanpool trips.

**Table 5-2. North Carolina Vanpool Operating Statistics Summary, FY 2009-2010**

System Name	Vanpool Number	Total Number of Trips	Total Miles	Average Round Trip (In Miles)
CATS	71	271,661	13,159,538	89
Triangle Transit	72	202,608	12,375,213	70
Piedmont Authority	45	110,628	9,071,496	82
2Plus	14	44,556	4,127,760	130
<b>Total</b>	<b>202</b>	<b>629,453</b>	<b>38,734,007</b>	<b>93</b>

## Intercity Buses

Intercity bus service is one of a few remaining examples of privately owned and operated public transportation in North Carolina. Intercity buses serve many cities and towns throughout the state. Most routes are concentrated in the densely populated corridor from Charlotte to Greensboro and Raleigh, with slightly less-intensive service along major highway routes in eastern North Carolina. Intercity buses provide connections to cities and towns in neighboring states and throughout the United States and Canada. Greyhound Lines Inc. and Carolina Trailways are the two largest intercity bus systems currently operating in North Carolina. The Department provides operating assistance of two cents per passenger mile for routes in North Carolina that otherwise would be abandoned by the carriers. As shown in **Table 5-3**, between 2006 (when the last statewide transportation plan mid-cycle update was conducted) and 2010, NCDOT provided nearly \$6 million in intercity bus funding, with about half of that funding, or \$3 million, allocated to Greyhound Lines Inc. The carrier received \$2.1 million in NCDOT funding in FY 2008-2009.

**Table 5-3. North Carolina Intercity Bus Funding Summary, FY 2006-2010**

FY	Funded Amount (\$)
2005-2006	-
2006-2007	966,599
2007-2008	738,833
2008-2009	3,107,129
2009-2010	1,099,961
<b>Total 2006-2010</b>	<b>5,912,522</b>

Amtrak and state-owned intercity passenger trains and state-operated passenger ferries also complement public transportation in many areas; these systems are discussed in Section 6.1. New NCDOT programs such as the Access to Transit program, administered in conjunction with the Pedestrian and Bicycle Division, and the Complete Streets Policy are statewide policy-level changes that may drive an increase in spending on transit projects and improve access to transit for other modes.

### 5.1.2 Existing Funding and Programs

Federal, state, and local governments are partners in funding public transportation activities in North Carolina, with each contributing a portion of the costs. The federal-state-local partnership, along with fare box revenue, represents a funding patchwork for public transportation. The PTD annually administers more than \$100 million in state and federal funds that are awarded to transportation systems in urban and rural areas throughout the state through a variety of grant programs (**Table 5-4**). Most of the state and federal funding programs have restrictions on how funds from the programs may be used. Some programs may fund capital improvements, while others may fund operating expenses or specific types of services. Many of the funding programs require a local match of some percentage of the grant.

The main public transportation programs available in North Carolina are shown in **Table 5-4**.

**Table 5-4. Federal and State Funding Programs for Public Transportation in North Carolina**

Program		State or Federal	Summary	Operating (Op), Capital (Cap), Administrative (Admin) Funds	NCDOT Share	Local Match Requirement
<b>Rural Programs</b>						
<b>Community Transportation Program</b>	Non-urbanized Area Formula Program	Federal FTA Section 5311	General program that funds capital, operating, and administrative expenses.	Op Cap Admin	5% admin 10% capital	15% admin 10% capital 50% operating
	Rural Capital Program	State and federal three consolidated programs	Funds capital costs for vehicles, equipment, and technology.	Cap	90% combination of federal and state	10%
	Human Service Transportation Management Program	State	Funds administrative costs of human service transportation.	Admin	85%	15%
<b>Rural Operating Assistance Program</b>	Elderly and Disabled Transportation Assistance Program	State	Funds operating costs for transportation needs of the elderly and disabled.	Op	100%	None
	Rural General Public Program	State	Funds operating costs for transportation needs of the rural general public.	Op	90%	10%
	Employment Transportation Assistance Program	State	Funds operating costs for employment- related transportation need for low-income individuals.	Op	100%	None
<b>Rural Transit Assistance Program</b>		Federal FTA Section 5311(b)(3)	Funds training, technical assistance, research, and related activities.	Admin	None	None
<b>Intercity Bus Program</b>		Federal FTA Section 5311(f)	Funds intercity bus service in underserved areas of North Carolina that connect two or more urban areas not in proximity.	Op Cap Admin	None	50% Op

**Table 5-4. Federal and State Funding Programs for Public Transportation in North Carolina**

Program	State or Federal	Summary	Operating (Op), Capital (Cap), Administrative (Admin) Funds	NCDOT Share	Local Match Requirement
<b>Urban Programs</b>					
<b>Federal Capital Investment Program</b>	Capital Investment Program—Bus and Bus-Related Facilities	Federal FTA Section 5309	Capital investment.	Cap	10% 10%
	Capital Investment Program—New Starts	Federal FTA Section 5309	New or extended fixed guideway systems (rail, light rail, streetcar, bus rapid transit) or corridor-based bus projects.	Cap	Typically 10% Typically 10%
<b>Metropolitan Planning</b>		Federal FTA Section 5303		Op Cap Admin	10% Cap, 25% Op 10% Cap, 25% Op
<b>Urban Formula Funding</b>		Federal FTA Section 5307	Operating costs of urban systems. Also capital costs in small urban areas.	Op Cap Admin	10% Cap, 25% Op 10% Cap, 25% Op
<b>State Maintenance Assistance Program</b>		State	Operating costs of urban systems.	Op	50% 50%
<b>Urban/Regional Technology Program</b>		State	Funds advanced technology needs.	Op Cap Admin	Up to 90% 10% or less
<b>Urban or Rural Programs</b>					
<b>Public Transportation Grant Program—Apprentice and Intern Programs</b>		State	Funds (a) work position for recent graduates and graduate students and (b) transportation demand management (TDM) programs.	Admin	90% 10%
<b>Congestion Mitigation and Air Quality</b>		Federal taxes	Purpose: service or system expansion, provision of new transit service, and financial incentives to use existing transit services. Distributed to MPOs.	Op Cap Admin	None Non-federal share; typically 20% first year, followed by gradual increase in years 2 and 3
<b>American Recovery Reinvestment Act (ARRA)</b>		Federal taxes	Strives to reduce transportation-related emissions by providing state departments of transportation and local governments options to fund different emission reduction strategies.	Op Cap Admin	None Non-federal share; typically 50% for capital; no local match for operating

**Table 5-4. Federal and State Funding Programs for Public Transportation in North Carolina**

Program	State or Federal	Summary	Operating (Op), Capital (Cap), Administrative (Admin) Funds	NCDOT Share	Local Match Requirement
<b>Competitive Grant Programs</b>					
<b>Elderly and Disabled Individuals Transportation Program</b>	Federal FTA Section 5310	Funds capital costs for meeting mobility needs of the elderly and disabled. Funds used primarily for vehicle purchases, but also for the acquisition of transportation service under contract, lease, or other arrangement. State program administration expenses also eligible.	Cap	None	20% Cap
<b>Jobs Access Reverse Commute Program</b>	Federal FTA Section 5316	Funds employment-related transportation needs for welfare recipients and low-income persons.	Op Cap	None	50% Op
<b>New Freedom Program</b>	Federal FTA Section 5317	Funds transportation services for the disabled beyond what is required by the Americans with Disabilities Act.	Op Cap Admin	None	50% Op

### 5.1.3 Trends and Forces

A sampling of trends and forces that have had an influence in recent years, or that are anticipated to drive modal needs and the ability to solve those needs, are as follows:

- While the national economic downturn has affected employment levels, the decline in household income and increasing fuel prices and other household costs have led to a general increase in transit ridership.
- The local government general revenue support and/or local dedicated tax streams supporting urban transit are declining due to real estate and economic downturns, exacerbating the ability of transit agencies to fund current service and match capital grants.
- Mounting congestion in the state's urban areas due to accelerated urban growth will make the availability of mobility choices more critical. The growth in total population and in the elderly segment will accentuate the need for public transit services. In recent years three community transportation transit agencies in North Carolina added urban transportation, fixed-route services to its offerings – this trend, along with more focus on regionalism, is expected to continue in the future as more areas in the state urbanize and population increase results in increased transit demand.
- An aging population and changing patterns of employment and income exemplify the need to connect workers to jobs.
- The current trend of increasing fuel cost is aggravating transit agency budgets.
- Historic land development patterns have not been transit-supportive, but the positive effect of the Charlotte LYNX south line on redevelopment, despite the economic downturn, is encouraging evidence of the impact that quality transit can have on smart growth initiatives.
- The FTA has been placing increased emphasis on its State of Good Repair program.
- Federal security requirements for transit facilities may become more stringent, affecting agency operational budgets.
- The present federal transportation funding reauthorization intended to succeed the present SAFETEA-LU legislation which has been extended several times past its original horizon date is still in process, and the levels and categories of program funding may be different than those in place today.
- Urban transit has a key role to play in how North Carolina's urban areas grow in the next 30 years, desirably in a greener, more sustainable pattern that creates less greenhouse gas and is more efficient.

### 5.1.4 Changes since Prior Plan

#### **New Funding Sources and Mechanisms**

The funding programs described above, while not exhaustive, demonstrate the variety of funding mechanisms used for public transportation in North Carolina. Other federal funding opportunities that have recently been made available include programs such as the State of Good Repair, Transit Investments for Greenhouse Gas and Energy Reduction, and Clean Fuels Grant. The Surface Transportation Program, while typically used for highway funding, can in fact be used to fund transit

projects as well. Local funding for public transportation, largely dependent on the combination of political priorities and the available municipal revenues (General Fund contributions), can also take other, more innovative forms, including sales tax and vehicle registration tax.

### Local Sales Tax

The Mecklenburg County sales tax, which funds CATS, was adopted through popular vote in 1998 and renewed in a 2008 vote. Until 2009, Mecklenburg County was the only county in North Carolina with the power to levy a local sales tax to fund public transportation. The General Assembly House Bill 148, passed in August 2009, extended similar authority to all counties. The 0.25 percent sales tax requires approval by the County Commissioners, and then by voters in a referendum. The goal of the funds raised with the sales tax is not to replace the existing transit funding, but rather to augment it with additional revenue stream aimed at funding specific projects such as the initial LYNX light rail line in Charlotte.

### Vehicle Registration Tax

House Bill 148 also allowed all counties in the state to levy an annual vehicle registration tax in any full-dollar amount up to \$7 per registered vehicle. The difference between the vehicle registration tax and the local sales tax is that while both require approval by Counties' Commissioners, the vehicle registration tax does not require a referendum, and the funding does not have to supplement existing funds.

### Funding Levels

Funding for public transportation in North Carolina has increased steadily since the 2006 NCDOT update to the needs identified in the 2004 STP. As shown in **Table 5-5**, NCDOT has provided \$53.5 million in funding and matching grants in FY 2010, representing a 15 percent of the total transit funding in the state. Because PTD also administers federal funds awarded to public transportation in the state, more than \$106 million in state and federal funds in total were administered by PTD in FY 2010.

**Table 5-5. North Carolina Public Transportation Funding by Source, FY 2009-2010**

Funding Source	FY 2008-2009 (\$)	FY 2009-2010 (\$)
Federal revenue	41,175,500	52,680,854
State revenue	52,711,221	53,470,512
Local revenue	239,897,960	221,412,445
Other revenue	11,207,258	18,661,881
<b>Total funding</b>	<b>344,991,939</b>	<b>346,225,692</b>

### Recent Trends in Public Transportation

Transit ridership in North Carolina has been growing since the late 1990s, reversing a slight downward trend during the mid to late 1990s. Several factors have contributed to the increased transit ridership. Four new urban transit systems in cities that were either without public transportation or provided only community transportation (Cary, Concord, Goldsboro, and Jacksonville) and the creation of a regional public transportation system in the Piedmont Triad in 2003 significantly expanded service in a number of

cities. The state's first light rail line in Charlotte and fare-free service initiated in Chapel Hill are service enhancements that have contributed to increased ridership. Population growth, urbanization, and concentration, and the aging population are some of the demographic characteristics that have contributed to the increase in passengers statewide. Societal factors such as increased fuel costs and the economic downturn have also influenced transit ridership.

In terms of service, capital, administrative and institutional transit improvements, and TDM efforts, notable changes since a NCDOT update to the needs identified in the 2004 STP include the following:

- Service Improvements
  - New fixed-route services include the Rider Transit System in Concord/Kannapolis (2005), C-Tran in Cary (2006), and Higher Education Area Transit in Greensboro (2006).
  - The first light rail system in the state was the highly successful CATS LYNX Blue Line light rail service that started operating in Charlotte in November 2007.
  - The Gates County Inter-Regional Transportation System increased its ridership with the addition of night routes in 2006.
  - Targeted fare-free service
    - AppalCART, which operates fixed-route service in Boone and dial-a-ride service in Watauga County, continues to increase its ridership because it is fare-free and focuses on serving the Appalachian State University community.
    - Jacksonville and Asheville offer fare-free service, which is used to market their services by exposing the general public to their offerings.
  - Reduced headways/increased service frequency in Greenville and Goldsboro (2006-2007).
- Capital Improvements
  - LYNX Blue Line light rail system in Charlotte (2007)
  - Chapel Hill Operations Center dedicated (2008)
  - Inter-county Public Transportation Authority Maintenance facility dedicated in Elizabeth City (2008)
  - New administrative facilities opened to serve rural transit systems in Madison, Avery, and Clay counties; Durham Area Transit Authority dedicated new transfer facility (2009)
- Administrative and Institutional Improvements
  - Funding arrangements and initiatives: in FY 2008, seven transit systems participated in and ordered buses from the first NCDOT statewide bus bid.
  - Community Transportation Service Plans, evaluating the public transit agencies and enabling access to targeted competitive funding sources, were on track for six initial transit systems in 2009.
  - Spotlight on transit: CATS hosted the American Public Transportation Annual Meeting in 2008.
  - Increased focus on safety: 22 safety reviews were initiated in 2008.
  - Regionalization and consolidation of the community transportation systems: NCDOT has encouraged the formation of regional transit systems to increase mobility options available to a region's residents. Examples include Greenway Public Transportation, which started operation in 2009, and Intercity Bus Statewide Network Plan, also developed in 2009.

- University-specific marketing initiatives: Higher Education Area Transit in 2007, AppalCART in Boone, Greenville Area Transit, Chapel Hill Transit, North Carolina State University’s Wolfline Campus Bus Service. TDM efforts on campuses: U-Pass at North Carolina State University and Commuter Alternatives Program at University of North Carolina-Chapel Hill.
- Planning studies: Hybrid Electric Alternative Fuel System study complete (2008).
- Transportation Demand Management
  - TDM programs, initiated in North Carolina in 2004, strive to reduce single-occupant VMT to reduce harmful emissions by encouraging use of public transit, carpooling, walking, cycling, and telecommuting.
  - The four major emphasis areas for work accomplished with the funds are getting employers designated as Best Workplaces for Commuters, conducting commuter challenge campaigns aimed at employees, promoting the online rideshare matching program ShareTheRideNC, and promoting vanpool programs in urban areas.
  - Three TDM programs are in Triad, Asheville, and Charlotte in addition to a regional TDM program in the Triangle that encompasses seven programs.
  - Three regional vanpools programs are run by PART, Triangle Transit, and CATS, and one rural vanpool program is operated by 2Plus, Inc. The transit systems purchase vans with Section 5307 funds and include the vehicle “replacement cost” in the calculation of rider fares. In other words, once a van is purchased, there is no need to find funding to replace it because the replacement funding will be accumulated through fare box revenues. The fares also support the operating cost of the vanpools, which all operate on a cost recovery basis.
  - NCDOT funds 50 percent of the administrative costs of TDM programs across the state. The state match provided in the FY 2006-2010 period is shown in **Table 5-6**. Total expenditures for TDM programs statewide were nearly \$10 million between 2006 and 2010, and NCDOT funded almost half of that need, or \$5 million.

**Table 5-6. North Carolina Transportation Demand Management  
Funding Summary, FY 2006-2010**

FY	Requested Funding (\$)
2005-2006	983,484
2006-2007	847,172
2007-2008	1,022,108
2008-2009	1,078,677
2009-2010	1,065,896
<b>Total 2006-2010</b>	<b>4,997,337</b>

Although the Organizational Performance Dashboard reports performance of more than 30 elements of NCDOT’s modal systems (such as pavement conditions, incident response, or passenger train on-time arrival) and tracks performance against defined standards, VMT reduction through TDM programs is the sole public transportation-focused performance measure tracked by NCDOT. By 2009, in part due to the ongoing TDM efforts in North Carolina, the goal of the Ambient Air Quality Improvement Act of 1999

(reducing VMT by 25 percent statewide) was met. Although VMT reduction is used as a proxy measure for TDM effectiveness, other factors have contributed to VMT reduction in recent years, most notably the economic downturn.

### **Operating Statistics Summary**

While the cost of providing service by North Carolina's transit agencies and the corresponding needed subsidy have increased in recent years, public transportation ridership has also increased. This period of expansion in service and ridership has coincided with the continuing growth of state operating funding for both rural and urban area systems. The majority of rural systems report that their service expansion would not have been possible without the additional operating assistance. Many urban areas have increased their overall level of service by providing expanded weekend and evening service. Cities that have implemented significant service expansions include Chapel Hill, Charlotte, Durham, Greensboro, and Wilmington.

In 2006, when the NCDOT update to the needs identified in the 2004 STP was completed, the number of public transportation agencies in North Carolina was 106. Those transit agencies provided transit services for 53.1 million passengers, VMT totaled more than 79.1 million, vehicle hours totaled more than 4.7 million, and expenses totaled \$222.5 million. In FY 2010, 99 state transit agencies provided service for 67.6 million passenger trips, VMT totaled more than 91.3 million, vehicle hours totaled 6.5 million, and expenses totaled \$329.6 million. While overall transit ridership in North Carolina increased by 27.4 percent between FY 2005-2010, nearly all of that growth was in urban public transportation systems; in FY 2010, 24 urban public transportation systems provided 60.5 million trips, 14.4 million more than 23 urban systems in FY 2005. In comparison, community transportation systems added just 36,000 additional transit trips between 2006 and 2010, representing a less than one percent increase.

## **5.2 Performance**

### **5.2.1 Performance Standards**

Beginning in 2008, NCDOT has annually evaluated its organizational effectiveness based on numerical performance measures aligned with its mission, goals, and values. The three transportation network performance goals are to improve safety, mobility, and infrastructure health. Over the past three years of the annual evaluation process, the Department has refined and updated its performance measures and performance targets. The current measure associated with public transportation performance included in the 2010 Annual Performance Report is described below.

### **5.2.2 Existing Performance**

Overall, NCDOT has defined only one performance metric for public transportation on the list of executive performance measures. The performance metric, the percentage reduction in expected growth of commuter-generated VMT, is tied to the Department's goal of improving mobility. For FY 2010, the performance target for this measure was 25 percent or greater. Current public

transportation metric performance based on the 2010 Annual Performance Report is shown in **Table 5-7**. The measured performance for reduction in commuter generated traffic is better than the target performance.

**Table 5-7. Existing Public Transportation Performance Measures in North Carolina, FY 2010**

Performance Measure	2010 Target	Statewide Average Score
% reduction in expected growth of commuter-generated VMT	25% or greater	25.3% (target met)

In 2008, the PTD, in conjunction with the SPOT, developed LOS performance categories and associated financial needs for public transportation infrastructure as part of the biannual Prioritization process for the STIP. This assessment scored the ability of public transportation to address mobility and health goals at the Statewide, Regional, and Subregional tiers. Existing performance was scored at mostly LOS C for the mobility and health investment goals at the Statewide, Regional, and Subregional tiers (only the Subregional tier for health was rated at LOS B). In 2011, SPOT's ranking of existing performance for public transportation was similar, with assigned scores mostly at LOS C. Only the Regional and Subregional tiers for rural health were rated at LOS B; mobility at the Statewide and Subregional tier was ranked at LOS D.

## 5.3 Current Deficiencies

### 5.3.1 Basis for Deficiencies

The PTD and SPOT performance analysis showed that for public transportation to address mobility and health goals at the Statewide, Regional, and Subregional tiers, there were needs totaling \$2.98 billion to achieve an LOS A performance level. For the 10-year period of 2009-2018, the existing performance level was scored at mostly LOS C, which related to a funding level of \$751 million. Because the 2040 Plan analysis largely uses estimates provided by the PTD for this analysis, the resulting 30-year LOS framework for transit needs is consistent with the 10-year level Prioritization 2.0 estimates. At \$13.88 billion, current public transportation deficiencies account for 57 percent of the identified need.

### 5.3.2 Changes since Prior Plan

In 2006, the NCDOT update to the needs estimated for the 2004 STP identified 25-year public transportation system needs to the year 2030. In the analysis, needs were calculated for both capital and operating cost components, by the improvement types of preservation, modernization, and expansion, at the Statewide, Regional, and Subregional tiers. The 25-year transit needs total \$17.8 billion, with 75 percent (\$13.3 billion) identified as maintenance and preservation needs, and the remaining 25 percent (\$4.5 billion) as expansion needs. Based on NCMIN tiers, 72 percent (\$12.8 billion) was on the Subregional tier, 28 percent (\$5 billion) was on the Regional tier, and no identified transit needs were on the Statewide tier.

None of the identified public transportation needs in the 2006 needs update were identified as current deficiencies, and was thus considered to be accruing needs. The 2040 Plan identifies 30-year public

transportation needs in five-year increments to the year 2040. The current deficiencies (sometimes referred to as backlog) are identified separately from accruing needs, and are included in total transit modal needs.

## 5.4 Summary of Modal Needs

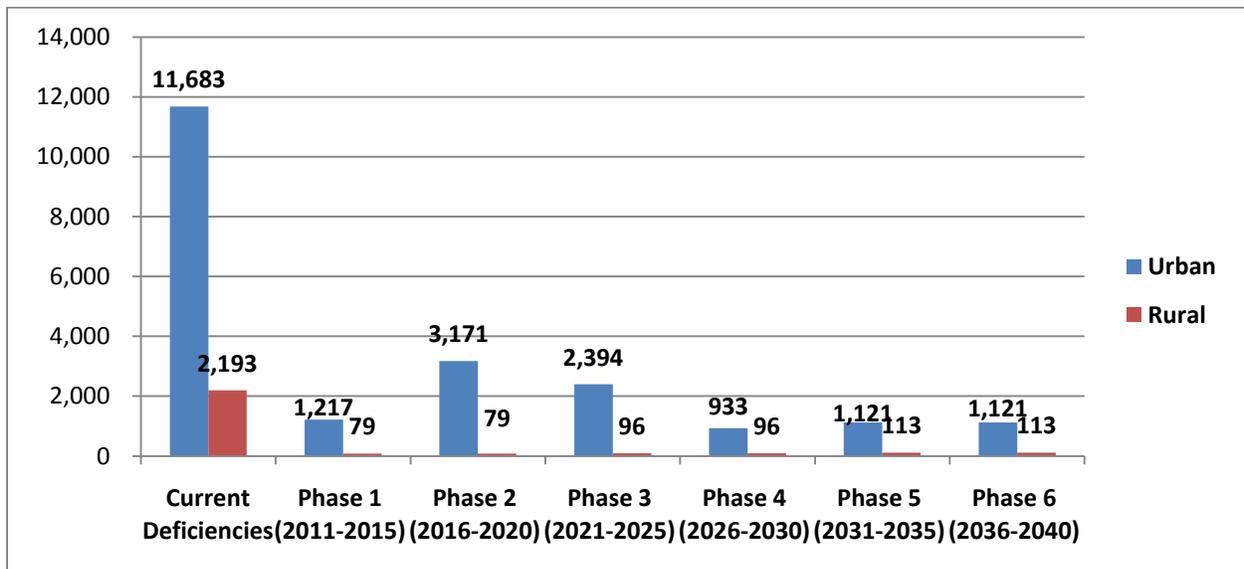
The backlog and accruing public transportation modal needs estimates were developed by the NCDOT Rail Division, with light rail and streetcar estimates provided by the MPOs and local transit agencies. As shown in **Tables 5-8** and **5-9** and **Figures 5-1** through **5-6**, the 30-year public transportation needs total \$24.41 billion. At \$13.88 billion, current deficiencies represent 57 percent of all identified transit needs. All identified current deficiencies are represented by urban bus transit and demand-responsive services; light rail, streetcars, and ITS needs are added to the list of services when determining accruing needs.

**Table 5-8. Public Transportation Needs by 5-Year Increments (\$ in Millions)**

Need Category	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
Urban								
Capital	8,405	926	2,807	1,933	407	499	499	<b>15,477</b>
Operating	3,278	292	364	461	525	622	622	<b>6,163</b>
<b>Total Urban</b>	<b>11,683</b>	<b>1,217</b>	<b>3,171</b>	<b>2,394</b>	<b>933</b>	<b>1,121</b>	<b>1,121</b>	<b>21,640</b>
Rural								
Capital	695	15	15	21	21	26	26	<b>820</b>
Operating	1,498	64	64	75	75	86	86	<b>1,948</b>
<b>Total Rural</b>	<b>2,193</b>	<b>79</b>	<b>79</b>	<b>96</b>	<b>96</b>	<b>113</b>	<b>113</b>	<b>2,768</b>
<b>Total Public Transportation</b>	<b>13,875</b>	<b>1,296</b>	<b>3,250</b>	<b>2,490</b>	<b>1,029</b>	<b>1,234</b>	<b>1,234</b>	<b>24,407</b>

**Table 5-9. Public Transportation Needs by Service Type by 5-Year Increments (\$ in Millions)**

Public Transit Service Type	Need Category	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
<b>Bus and Paratransit</b>									
Urban	Capital	8,405	381	381	407	407	499	499	<b>10,980</b>
Urban	Operating	3,278	209	209	260	260	356	356	<b>4,928</b>
<i>Urban</i>	<i>Subtotal</i>	<i>11,683</i>	<i>590</i>	<i>590</i>	<i>667</i>	<i>667</i>	<i>855</i>	<i>855</i>	<b>15,908</b>
Rural	Capital	695	15	15	21	21	26	26	<b>820</b>
Rural	Operating	1,498	64	64	75	75	86	86	<b>1,948</b>
<i>Rural</i>	<i>Subtotal</i>	<i>2,193</i>	<i>79</i>	<i>79</i>	<i>96</i>	<i>96</i>	<i>113</i>	<i>113</i>	<b>2,768</b>
<b>Total Bus &amp; Paratransit</b>		<b>13,875</b>	<b>669</b>	<b>669</b>	<b>763</b>	<b>763</b>	<b>968</b>	<b>968</b>	<b>18,675</b>
<b>ITS</b>									
Urban	Capital	-	50	40	9	-	-	-	<b>99</b>
<b>Light Rail and Streetcar</b>									
Urban	Capital	-	495	2,386	1,516	-	-	-	<b>4,397</b>
Urban	Operating	-	82	154	202	266	266	266	<b>1,236</b>
<b>Total Light Rail &amp; Streetcar</b>		<b>-</b>	<b>577</b>	<b>2,541</b>	<b>1,718</b>	<b>266</b>	<b>266</b>	<b>266</b>	<b>5,633</b>
<b>Total Urban Capital</b>		<b>8,405</b>	<b>926</b>	<b>2,807</b>	<b>1,933</b>	<b>407</b>	<b>499</b>	<b>499</b>	<b>15,477</b>
<b>Total Urban Operating</b>		<b>3,278</b>	<b>292</b>	<b>364</b>	<b>461</b>	<b>525</b>	<b>622</b>	<b>622</b>	<b>6,163</b>
<b>Total Urban</b>		<b>11,683</b>	<b>1,217</b>	<b>3,171</b>	<b>2,394</b>	<b>933</b>	<b>1,121</b>	<b>1,121</b>	<b>21,640</b>
<b>Total Rural Capital</b>		<b>695</b>	<b>15</b>	<b>15</b>	<b>21</b>	<b>21</b>	<b>26</b>	<b>26</b>	<b>820</b>
<b>Total Rural Operating</b>		<b>1,498</b>	<b>64</b>	<b>64</b>	<b>75</b>	<b>75</b>	<b>86</b>	<b>86</b>	<b>1,948</b>
<b>Total Rural</b>		<b>2,193</b>	<b>79</b>	<b>79</b>	<b>96</b>	<b>96</b>	<b>113</b>	<b>113</b>	<b>2,768</b>
<b>Total Capital</b>		<b>9,100</b>	<b>941</b>	<b>2,823</b>	<b>1,954</b>	<b>428</b>	<b>525</b>	<b>525</b>	<b>16,297</b>
<b>Total Operating</b>		<b>4,775</b>	<b>355</b>	<b>427</b>	<b>536</b>	<b>600</b>	<b>708</b>	<b>708</b>	<b>8,111</b>
<b>Total Public Transportation</b>		<b>13,875</b>	<b>1,296</b>	<b>3,250</b>	<b>2,490</b>	<b>1,029</b>	<b>1,234</b>	<b>1,234</b>	<b>24,407</b>



**Figure 5-1. Public Transportation Needs by 5-Year Increments (\$ in Millions)**

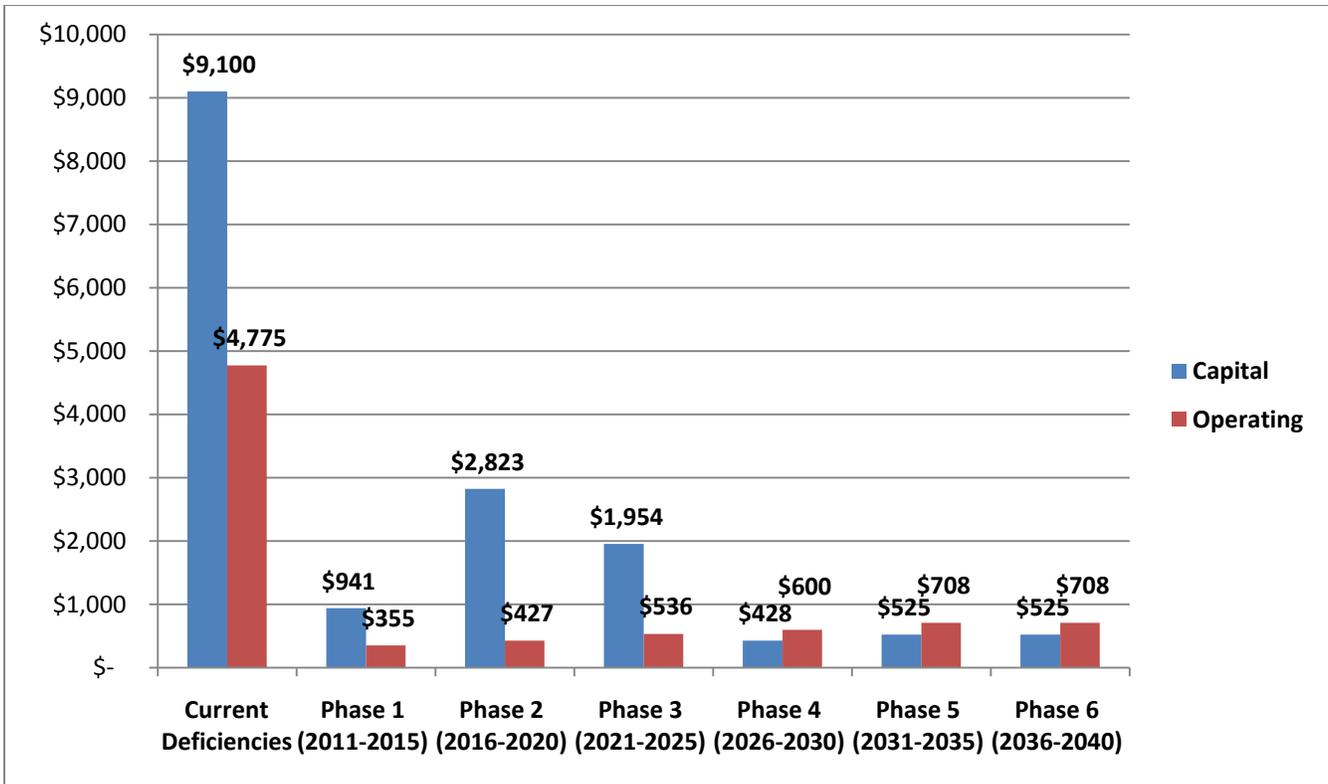


Figure 5-2. Public Transportation Needs by 5-Year Increments: Capital and Operating (\$ in Millions)

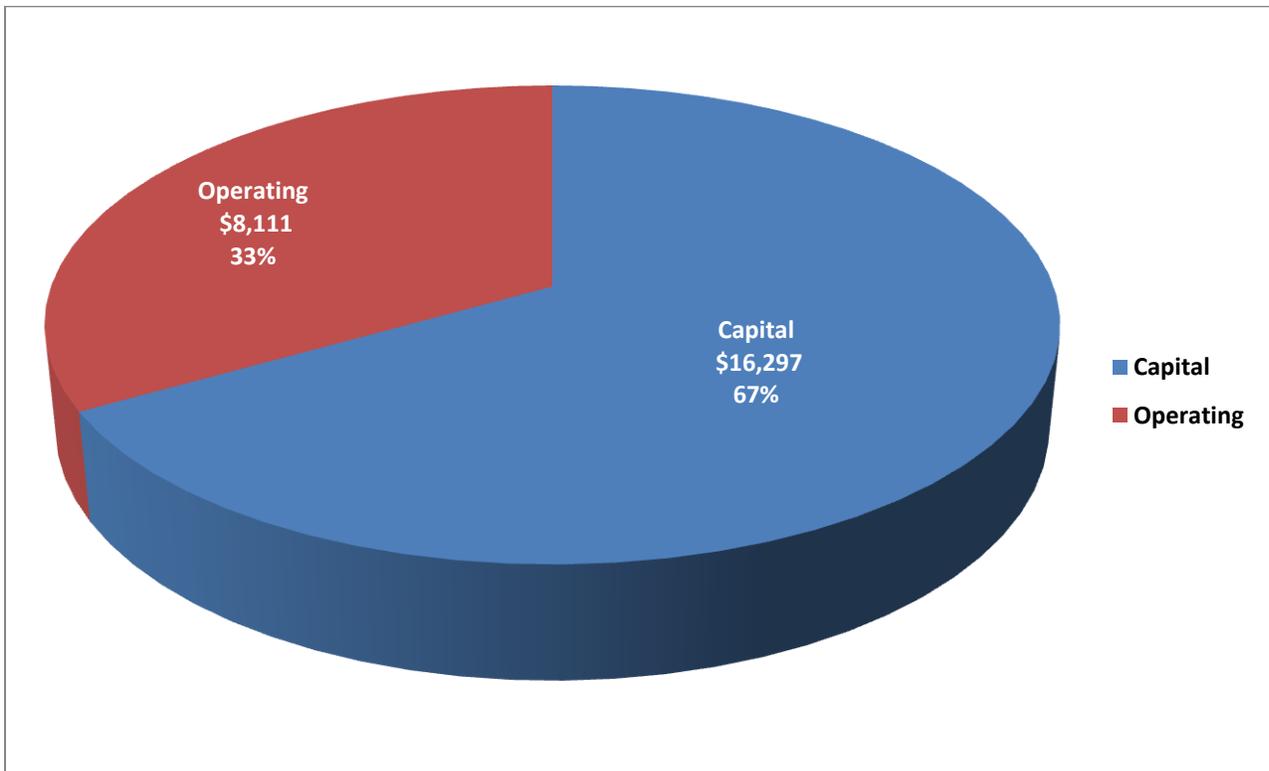


Figure 5-3. Public Transportation Needs: Capital and Operating (\$ in Millions)

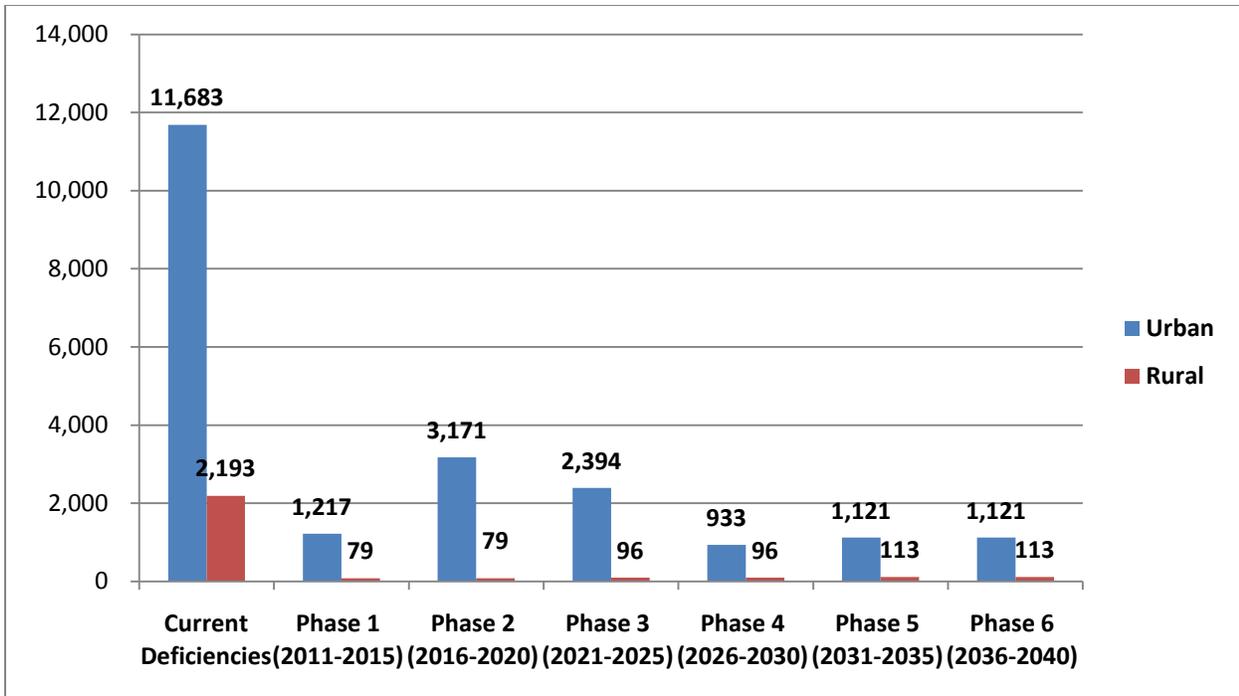


Figure 5-4. Public Transportation Needs by 5-Year Increments: Urban and Rural (\$ in Millions)

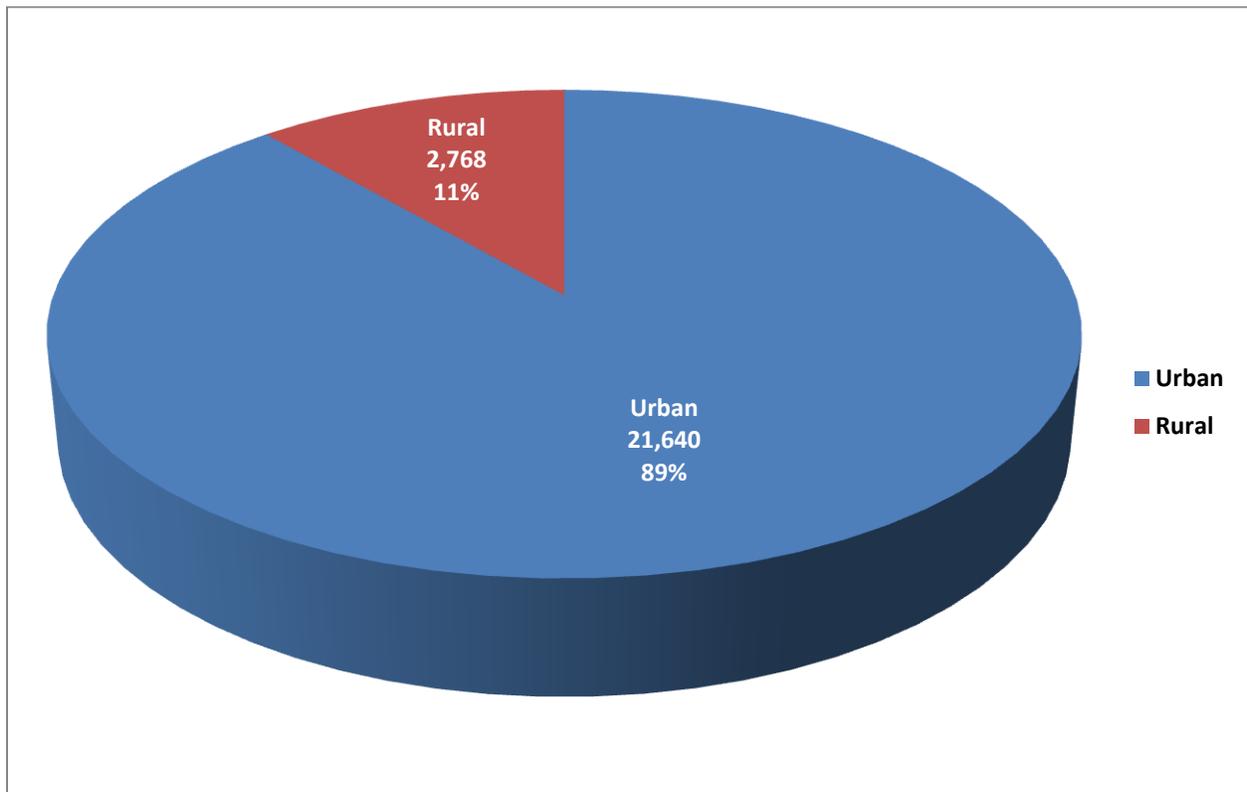
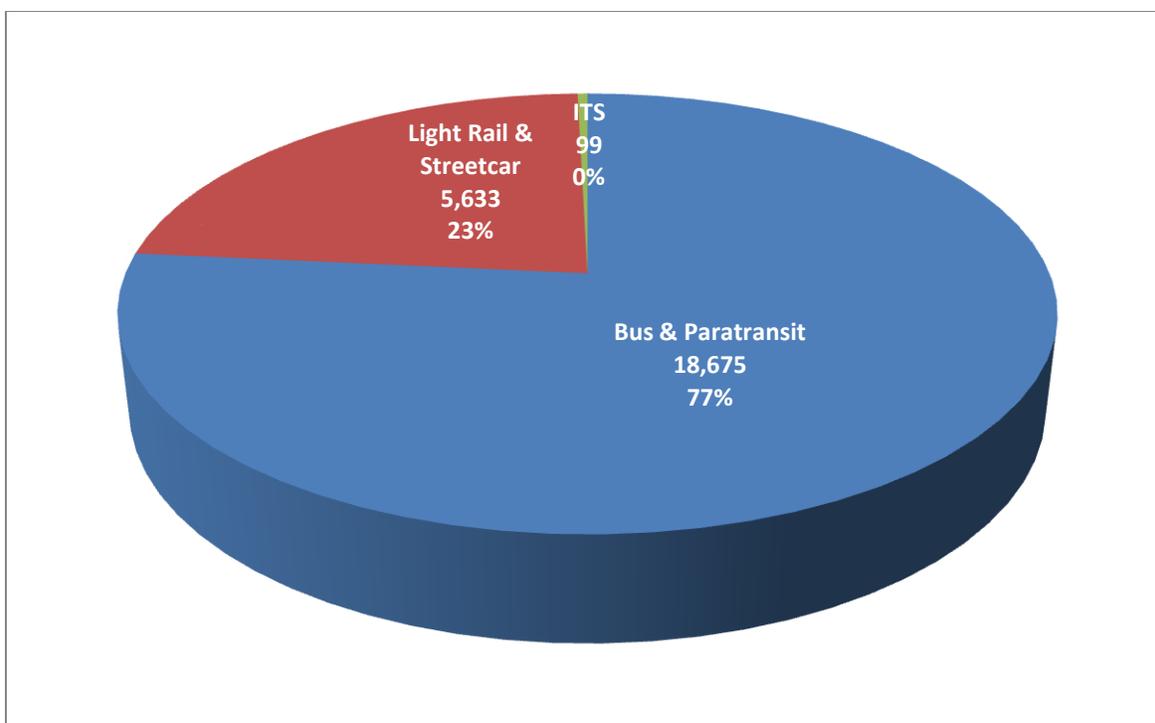


Figure 5-5. Public Transportation Needs: Urban and Rural (\$ in Millions)



**Figure 5-6. Public Transportation Needs by Service Type (\$ in Millions)**

Nearly 72 percent, or \$8.41 billion, of all identified urban public transportation current deficiencies are in the capital needs category (i.e., vehicle fleet replacement, bus stop amenities, and vehicle fleet maintenance facilities), while more than 68 percent are in the operating category (i.e., funding for demand-responsive services). When backlog is excluded from calculations, more than half of all identified future transit needs are scheduled for Phase 2 and Phase 3 of the 2040 Plan. These two 5-year increments account for 54 percent, or \$5.74 billion, of all identified accruing public transportation needs that total \$10.53 billion.

Overall, 67 percent, or \$16.30 billion, of all public transportation needs are capital improvements, while 33 percent, or \$8.11 billion, is allocated to operating costs. The majority of public transportation needs by service technology type (bus and paratransit vans, ITS, and light rail transit or streetcar) are urban transit needs, and they are heavily slanted toward Phase 2 and Phase 3 of the 2040 Plan. Urban service needs represent 89 percent of the need by service type, and rural service accounts for 11 percent.

As shown in **Table 5-9** and **Figure 5-6**, when identified by technology type, the majority of public transportation needs, 77 percent, or \$18.68 billion, are for urban and rural bus and paratransit services, followed by light rail and streetcar enhancements at 23 percent, or \$5.63 billion, and ITS needs at one percent, or \$99 million, of the total. These estimates are based on data provided by the PTD for urban and rural bus and demand-responsive services and ITS, and by MPOs and local agencies for light rail and streetcar services.

### 5.4.1 Needs by Investment Goal

Based on investment goal, as shown in **Table 5-10** and **Figures 5-7** and **5-8**, 62 percent (\$15.08 billion) is mobility needs, 37 percent (\$9.06 billion) is infrastructure health needs, and the remaining 1 percent (\$273 million) is safety needs. Current deficiencies account for the majority of identified needs for all three investment categories. When current deficiencies are excluded from calculations, more than half of all identified future mobility needs are scheduled for Phase 2 and Phase 3 of the 2040 Plan. Safety and health are distributed fairly evenly across all six phases of the STP.

In recent years, the federal government has increased its focus on has provided funding for mass transit security through grant programs that protect critical surface transportation infrastructure – this trend is expected to continue. Although the projected public transportation safety needs might seem insignificant in comparison to the projected mobility and health needs, safety and security is one of the core goals of the NCDOT, PTD. The Safety and Training Program is one example of prioritizing transit security by the Department; the program ensures the well-being of transit passengers, employees and the public, and the protection of property. It emphasizes transit security efforts by providing or sponsoring training that covers a broad range of topics, recognizing systems that meet certain security standards and developing guidelines and best practices. Public transportation also benefits from security enhancements resulting from mobility and health investments (e.g., new buses and vans with surveillance cameras provide better security for transit riders; modern bus shelters with better lighting enhance security; the FTA’s focus on its State of Good Repair program strengthens the security).

**Table 5-10. Public Transportation Needs by Investment Goal (\$ in Millions)**

Service Type	Investment Goal	NCMIN Tier	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
Urban	Mobility	Statewide	107	17	11	8	8	10	10	170
Urban	Mobility	Regional	5,760	270	272	1,812	286	354	354	9,108
Urban	Mobility	Subregional	1,009	579	2,464	55	55	69	69	4,300
<i>Subtotal Urban Mobility</i>			<i>6,876</i>	<i>866</i>	<i>2,747</i>	<i>1,874</i>	<i>349</i>	<i>433</i>	<i>433</i>	<i>13,578</i>
Urban	Safety	Statewide	4	-	-	-	-	-	-	5
Urban	Safety	Regional	92	4	4	4	4	5	5	120
Urban	Safety	Subregional	85	4	4	4	4	5	5	111
<i>Subtotal Urban Safety</i>			<i>180</i>	<i>8</i>	<i>8</i>	<i>9</i>	<i>9</i>	<i>11</i>	<i>11</i>	<i>235</i>
Urban	Health	Statewide	54	3	3	4	4	5	5	79
Urban	Health	Regional	2,147	120	120	158	222	268	268	3,302
Urban	Health	Subregional	2,425	220	292	350	350	404	404	4,446
<i>Subtotal Urban Health</i>			<i>4,627</i>	<i>343</i>	<i>416</i>	<i>511</i>	<i>575</i>	<i>677</i>	<i>677</i>	<i>7,827</i>
<b>Urban Total</b>			<b>11,683</b>	<b>1,217</b>	<b>3,171</b>	<b>2,394</b>	<b>933</b>	<b>1,121</b>	<b>1,121</b>	<b>21,640</b>
Rural	Mobility	Statewide	-	-	-	-	-	-	-	-
Rural	Mobility	Regional	227	9	9	11	11	13	13	293
Rural	Mobility	Subregional	940	37	37	44	44	51	51	1,205
<i>Subtotal Rural Mobility</i>			<i>1,166</i>	<i>46</i>	<i>46</i>	<i>55</i>	<i>55</i>	<i>64</i>	<i>64</i>	<i>1,498</i>
Rural	Safety	Statewide	-	-	-	-	-	-	-	-
Rural	Safety	Regional	6	-	-	-	-	-	-	7
Rural	Safety	Subregional	26	1	1	1	1	1	1	31
<i>Subtotal Rural Safety</i>			<i>32</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>38</i>
Rural	Health	Statewide	-	-	-	-	-	-	-	-
Rural	Health	Regional	182	6	6	7	7	9	9	225
Rural	Health	Subregional	812	26	26	33	33	39	39	1,006
<i>Subtotal Rural Health</i>			<i>994</i>	<i>32</i>	<i>32</i>	<i>40</i>	<i>40</i>	<i>47</i>	<i>47</i>	<i>1,231</i>
<b>Rural Total</b>			<b>2,193</b>	<b>79</b>	<b>79</b>	<b>96</b>	<b>96</b>	<b>113</b>	<b>113</b>	<b>2,768</b>
<b>Total Mobility</b>			<b>8,042</b>	<b>912</b>	<b>2,794</b>	<b>1,930</b>	<b>404</b>	<b>497</b>	<b>497</b>	<b>15,076</b>
<b>Total Safety</b>			<b>212</b>	<b>9</b>	<b>9</b>	<b>10</b>	<b>10</b>	<b>12</b>	<b>12</b>	<b>273</b>
<b>Total Health</b>			<b>5,621</b>	<b>375</b>	<b>447</b>	<b>551</b>	<b>615</b>	<b>724</b>	<b>724</b>	<b>9,058</b>
<b>Public Transportation Total</b>			<b>13,875</b>	<b>1,296</b>	<b>3,250</b>	<b>2,490</b>	<b>1,029</b>	<b>1,234</b>	<b>1,234</b>	<b>24,407</b>

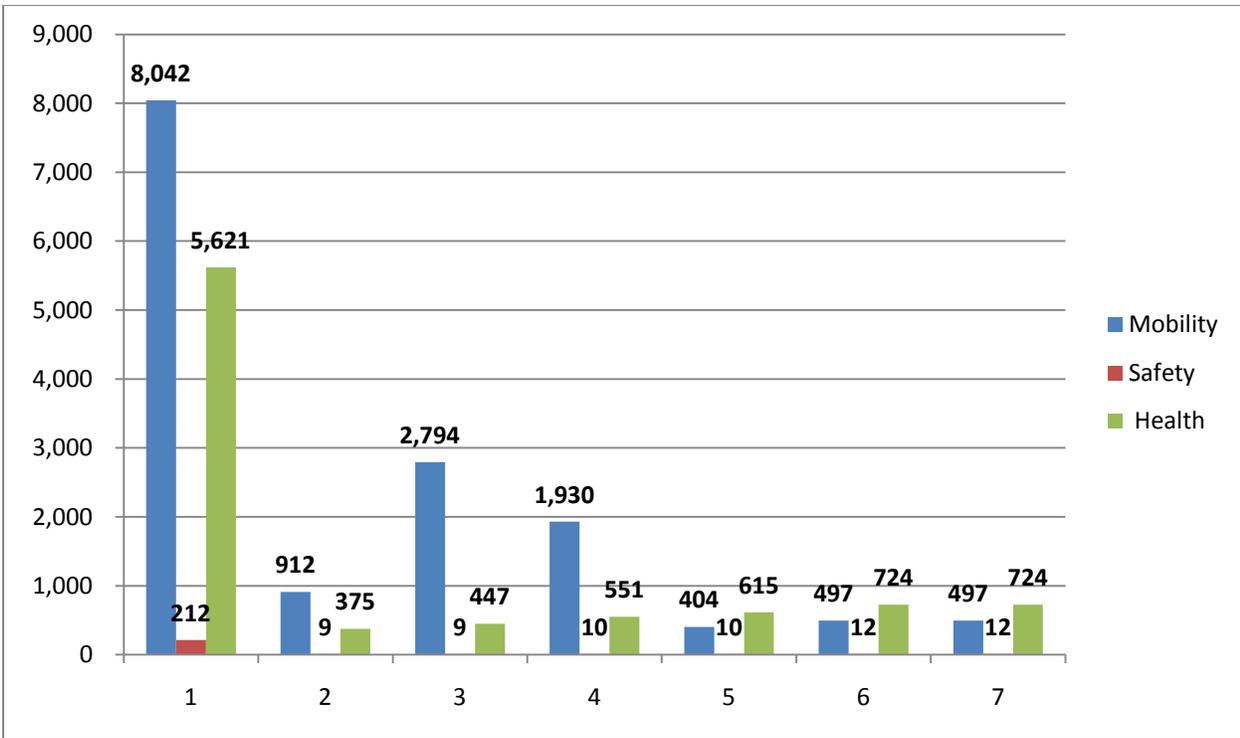


Figure 5-7. Public Transportation Needs by Investment Goal by 5-Year Increments (\$ in Millions)

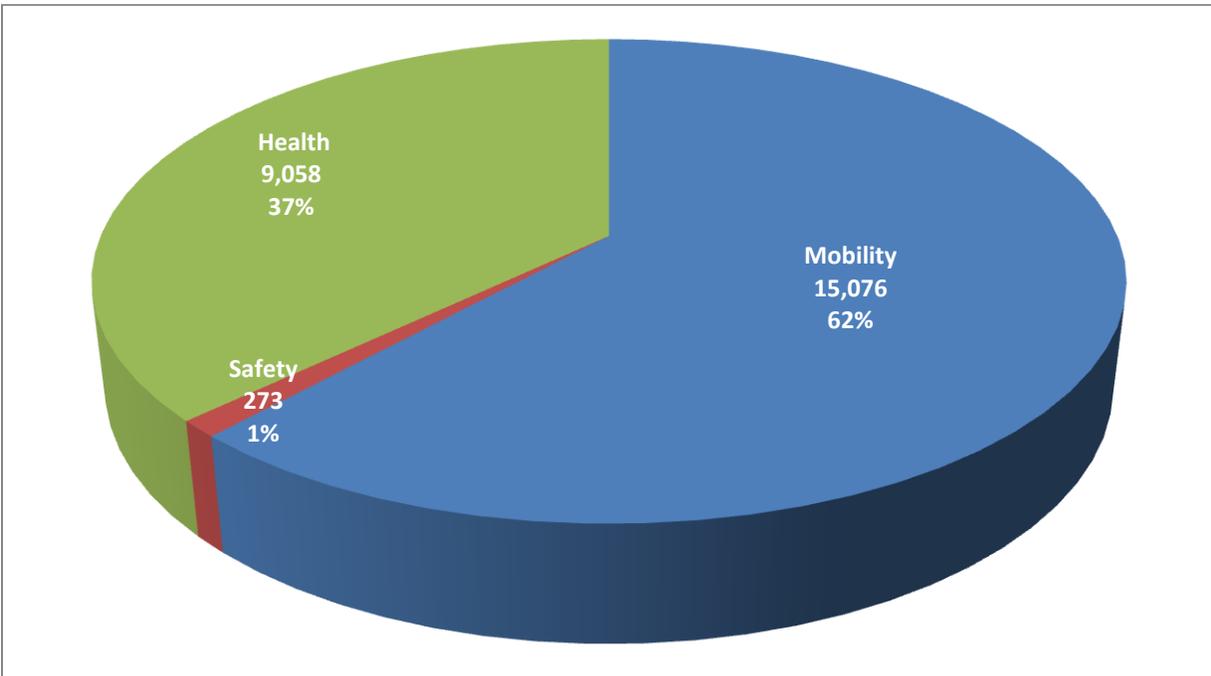


Figure 5-8. Public Transportation Needs by Investment Goal (\$ in Millions)

## 5.4.2 Needs by North Carolina Multimodal Investment Network Tier

As shown in **Table 5-11** and **Figures 5-9** and **5-10**, due to the local and regional nature of transit services operated by agencies in North Carolina, virtually all of the state’s public transportation services belong to the Regional or Statewide NCMIN tiers; the resulting need estimates reflect this, with 99 percent of all identified need allocated to those two tiers. All long-distance public transportation bus services (such as Greyhound or Carolina Trailways) belong to the Statewide tier, but account for a fraction of the total identified transit need; this also explains why no rural transit needs are identified for the Statewide tier. The existing Statewide, Regional, and Subregional tiers for public transportation are shown in **Table 5-7**. The 2040 Plan, unlike the 2004 STP and the needs estimates update in 2006, modifies the NCMIN definitions to include light rail and streetcar services as part of public transportation in the analysis. The proposed commuter rail services are included in the passenger rail analysis (**Chapter 6**).

In terms of the specific estimates breakdown by NCMIN tier, 54 percent (\$13.06 billion) of identified public transportation needs are on the Regional tier. The Subregional tier accounts for 45 percent (\$11.10 billion) of the identified need, and the remaining 1 percent (\$253 million) is allocated to the Statewide tier.

The estimates demonstrate that improvements to public transportation services on the Regional tier are projected to be largely concentrated during Phase 3 of the 2040 Plan, when many of the proposed light rail enhancements will be implemented, while Subregional enhancements will be most pronounced during Phase 2.

**Table 5-11. Public Transportation Needs by North Carolina Multimodal Investment Network Tier (\$ in Millions)**

Service Type	NCMIN Tier	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
Urban	Statewide	164,216	19,960	14,642	11,561	11,561	15,531	15,531	253,001
Urban	Regional	7,998,826	394,473	396,371	1,974,077	512,645	626,800	626,800	12,529,992
Urban	Subregional	3,519,458	802,983	2,760,054	408,533	408,533	478,559	478,559	8,856,679
<i>Subtotal Urban</i>		<i>11,682,500</i>	<i>1,217,416</i>	<i>3,171,067</i>	<i>2,394,170</i>	<i>932,739</i>	<i>1,120,890</i>	<i>1,120,890</i>	<i>21,639,672</i>
Rural	Statewide	-	-	-	-	-	-	-	-
Rural	Regional	415,273	15,126	15,126	18,392	18,392	21,534	21,534	525,375
Rural	Subregional	1,777,227	63,661	63,661	77,665	77,665	91,122	91,122	2,242,125
<i>Subtotal Rural</i>		<i>2,192,500</i>	<i>78,787</i>	<i>78,787</i>	<i>96,057</i>	<i>96,057</i>	<i>112,656</i>	<i>112,656</i>	<i>2,767,500</i>
<b>Total Statewide</b>		<b>164,216</b>	<b>19,960</b>	<b>14,642</b>	<b>11,561</b>	<b>11,561</b>	<b>15,531</b>	<b>15,531</b>	<b>253,001</b>
<b>Total Regional</b>		<b>8,414,099</b>	<b>409,599</b>	<b>411,497</b>	<b>1,992,468</b>	<b>531,037</b>	<b>648,334</b>	<b>648,334</b>	<b>13,055,367</b>
<b>Total Subregional</b>		<b>5,296,685</b>	<b>866,645</b>	<b>2,823,715</b>	<b>486,198</b>	<b>486,198</b>	<b>569,682</b>	<b>569,682</b>	<b>11,098,804</b>
<b>Public Transportation Total</b>		<b>13,875,000</b>	<b>1,296,203</b>	<b>3,249,853</b>	<b>2,490,227</b>	<b>1,028,795</b>	<b>1,233,547</b>	<b>1,233,547</b>	<b>24,407,172</b>

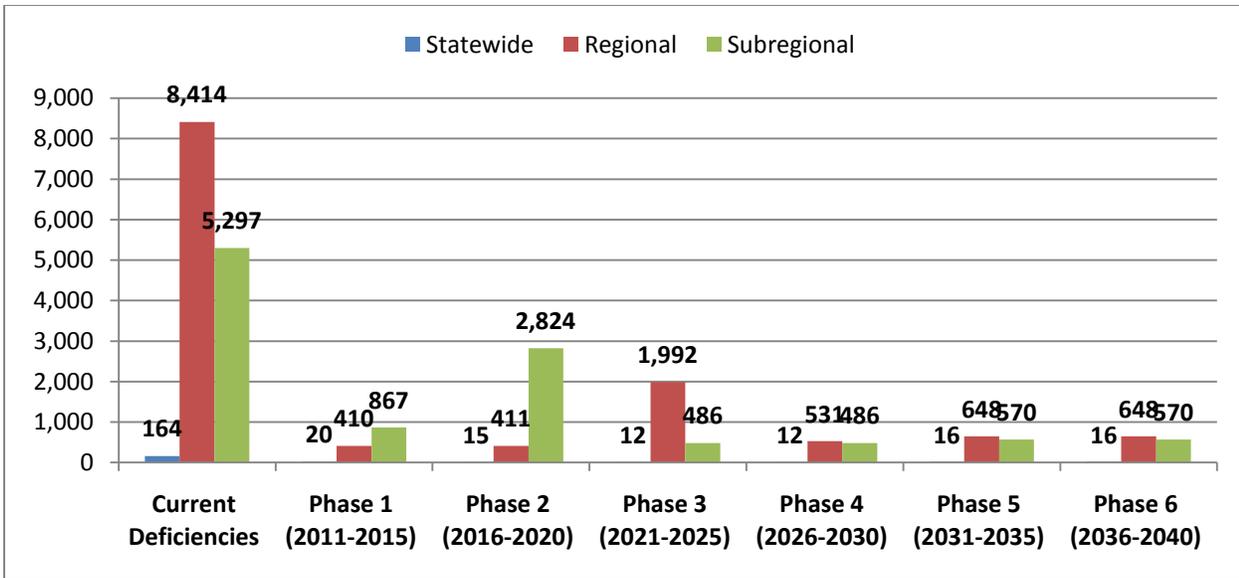


Figure 5-9. Public Transportation Needs by North Carolina Multimodal Investment Network Tier by 5-Year Increments (\$ in Millions)

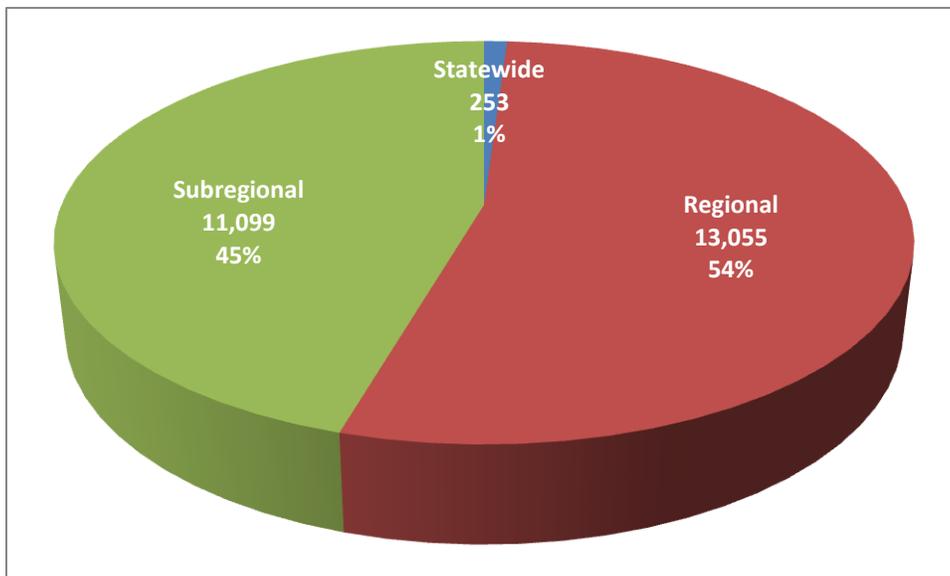


Figure 5-10. Public Transportation Needs by North Carolina Multimodal Investment Network Tier (\$ in Millions)



# Chapter 6

## Rail (Passenger)

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### Rail

Transportation by rail includes differing types of services, the majority of which use the freight railroad's tracks. The North Carolina railroad system is over 3,300 miles long and reaches into 86 of North Carolina's 100 counties with 22 active freight railroad companies. Two Class I railroads own or control over 2400 miles of track and 20 shortline railroads control the remainder. Services provided on freight tracks include intercity passenger service, heavy rail commuter and freight. Intercity passenger rail services are provided through Amtrak and serve 16 stations in NC with connections within the state and cities from Boston, MA to Miami, FL and New Orleans, LA. Heavy rail commuter service provides regional and local movement of commuters. Light rail service uses dedicated tracks not served by freight railroads and provides high frequency local transportation service. Freight rail includes the standard commodity services provided by a railroad. **Chapter 6** and **Chapter 7** describe modal needs estimates for intercity passenger rail (including a separate discussion of commuter rail), followed by freight rail, and finally the summary of modal needs for all types of rail services in North Carolina.

## 6.1 Intercity Passenger Rail

### 6.1.1 Existing Conditions

NCDOT has long recognized passenger rail as a vital part of a multimodal transportation system in North Carolina. The state's rail policy has emphasized enhancing and growing passenger rail services, preserving existing rail lines for future use, improving infrastructure to support and enhance passenger and freight service, and extending passenger rail service in the state.<sup>18</sup> Passenger rail service offers convenient travel between major cities and other towns in North Carolina.

The NCDOT Rail Division's initiated/supported intercity passenger rail services include the following routes:

- The *Piedmont* (twice daily Raleigh-Charlotte with 7 intermediate stops), which uses the North Carolina Railroad Company (NCR) shared tracks with Norfolk Southern Railway Company (NS) and is co-branded with Amtrak because NCDOT owns and maintains the equipment.
- The *Carolinian* (daily New York-Richmond-Raleigh-Charlotte with 12 in-state and 12 out-of-state stops), uses the NCR/NS and CSX freight tracks. Amtrak operates and provide the equipment.

Other intercity passenger rail service in North Carolina consists of the Amtrak long-distance routes of over 700 miles in length:

- The *Crescent* (daily New York-Greensboro-Charlotte-Atlanta-New Orleans with 5 in-state and 28 out-of-state stops)

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<sup>18</sup> *Southeastern North Carolina Passenger Rail Study*

- The *Palmetto* (daily New York-Savannah via Fayetteville with 4 in-state and 24 out-of-state stops)
- The *Silver Meteor* (daily New York-Miami via Rocky Mount and Fayetteville with 2 in-state and 41 out-of-state stops)
- The *Silver Star* (daily New York-Tampa-Miami via Rocky Mount and Raleigh with 4 in-state and 46 out-of-state stops)

Intercity rail travel has gained popularity and importance in North Carolina in recent years, as more service is being offered and greater numbers are riding the trains. Amtrak's ridership in North Carolina has climbed steadily in recent years. In FY 2006, when a NCDOT update to the needs identified in the 2006 STP was conducted, the six intercity train services carried 520,698 passengers.<sup>19</sup> Amtrak's most recent FY 2011 statistics show the number of passengers boarding or alighting in North Carolina increased to 900,390, or 2,467 per day; this represents a 73 percent increase from FY 2006.<sup>20</sup> Raleigh and Charlotte were the state's busiest passenger rail stations; together, they accounted for 374,000 boardings and alightings in FY 2011, representing nearly 42 percent of all passengers in North Carolina.<sup>21</sup> Between 2009 and 2010, state-funded Piedmont service had a 46 percent increase in ridership, the largest increase in the nation. This was mainly due to the addition of a mid-day frequency made possible by the 2010 ARRA grants.

Recent infrastructure improvements to the passenger rail 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. Travel time on the Piedmont route between Charlotte and Raleigh has been reduced by 35 minutes from 2001 to 2010. In June 2010, new midday service from Charlotte to Raleigh was initiated to meet the surging demand for passenger rail service between the state's two largest cities. The state supported Carolinian service from Charlotte to DC and New York City sold out 34 percent of the trains for 2010. Significant increases in ridership for this route will require additional frequencies provided by the completion of the SESHR corridor program of projects.

### Passenger Rail Station Improvements

The state of North Carolina, in partnership with Amtrak and local governments, has taken the initiative to rebuild many of its historic train stations. The Rail Division works with cities on plans and funding, assists with project management, and uses historical information about each structure to restore the stations to as close to their original appearance as possible. Many of the revitalized stations are multimodal transfer centers, tying multiple transportation services together by offering transfers from/to passenger rail to intercity bus service, and local and regional transit services. Stations include adequate access for vehicular traffic, bicyclists and pedestrians, and sufficient parking. Multimodal train

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<sup>19</sup> 2006 STP Mid-Cycle Update Technical Report

<sup>20</sup> *Amtrak Fact Sheet, Fiscal Years 2007-10, State of North Carolina:*  
<http://www.amtrak.com/pdf/factsheets/NORTHCAROLINA11.pdf>

<sup>21</sup> Ibid.

stations that were rehabilitated in recent years are Durham (2009) and Cary (2011). In the last decade, 13 passenger rail stations were rehabilitated or enhanced.

The defined Statewide, Regional, and Subregional tiers for passenger rail are shown in **Table 6-1**. These tiers largely follow the service areas covered by passenger rail routes; intercity passenger travel is given the highest priority as the Statewide tier, followed by commuter rail service serving at least two counties as the Regional tier, and commuter rail or light rail service serving one county as the Subregional tier.

**Table 6-1. Passenger Rail Tier Definitions in the North Carolina Multimodal Investment Network**

Mode	Statewide Tier	Regional Tier	Subregional Tier
Passenger Rail (Intercity and Commuter)	All intercity (including out-of-state) passenger rail service and station facilities associated with intercity services	Commuter rail service and associated station facilities that serve commuters between two or more counties	Commuter and light rail service and associated station facilities that serve commuters within a county*

Source: NCDOT NCMIN: [http://www.ncdot.org/download/performance/NCMIN\\_Definitions.pdf](http://www.ncdot.org/download/performance/NCMIN_Definitions.pdf)

\*Note: Although the existing NCMIN classifies light rail as part of passenger rail transportation facilities, this analysis considers it part of public transportation modal needs. It is recommended that the existing NCMIN tier is modified and light rail services moved from passenger rail tier definitions to public transportation.

### 6.1.2 Existing Funding Mechanisms

The FRA, Amtrak, NCR, and NCDOT are partners in funding passenger rail activities in North Carolina including operating cost and capital investments. Amtrak supplements the fare box revenues for all the long distance trains, listed above, and associated stations to cover operating cost. NCDOT supplements ticket sales for the Piedmont and Carolinian services as required for routes under 700 miles. Capital investments in stations and maintenance facilities have been provided by FHWA enhancement funding, local governments, FRA and NCDOT contributions and grants. Equipment has been funded by NCDOT and FRA. Track and structures improvements have been funded through FRA grants, and NCDOT and NCR contributions. The NCDOT Rail Division has invested more than \$300 million of state and federal funds in capital improvement for intercity passenger rail in the past 16 years. NCDOT's fare box recovery was 78 percent in FY 2010.<sup>22</sup>

### 6.1.3 Changes since Prior Plan

Since the 2004 statewide plan effort, the following new federal and state programs, legislation, and funding sources that are relevant to passenger rail have been established:

#### Federal Level

- 2005 passage of Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) authorized federal funding from 2005 to 2009 for surface transportation programs, including railway-highway crossings, statewide planning, local planning, enhancement programs and intermodal projects.

<sup>22</sup> Ibid.

- The Passenger Rail Investment and Improvement Act of 2008 recognized the federal role in improvements to intercity passenger rail services.
- The FRA Office of Railroad Development has added responsibility for funds and grant programs under the Passenger Rail Investment and Improvement Act since 2008.
- The FHWA has served as the lead agency on many state rail projects because of more robust resources, and is involved in safety improvements for railway grade crossings through Section 130 of its Highway Safety Program.
- The Rail Safety Improvement Act of 2008 updated safety regulations (that take effect in late 2015) that authorize the installation of new train control systems on all freight mainlines handling intercity passenger traffic.
- The American Recovery and Reinvestment Act of 2009 (ARRA) included \$8 billion for High-Speed Intercity Passenger Rail (HSIPR) program. The NCDOT Rail Division was awarded over \$570 million of ARRA funds for projects along the *Carolinian* and Southeast High-Speed Rail corridors.

### State Level

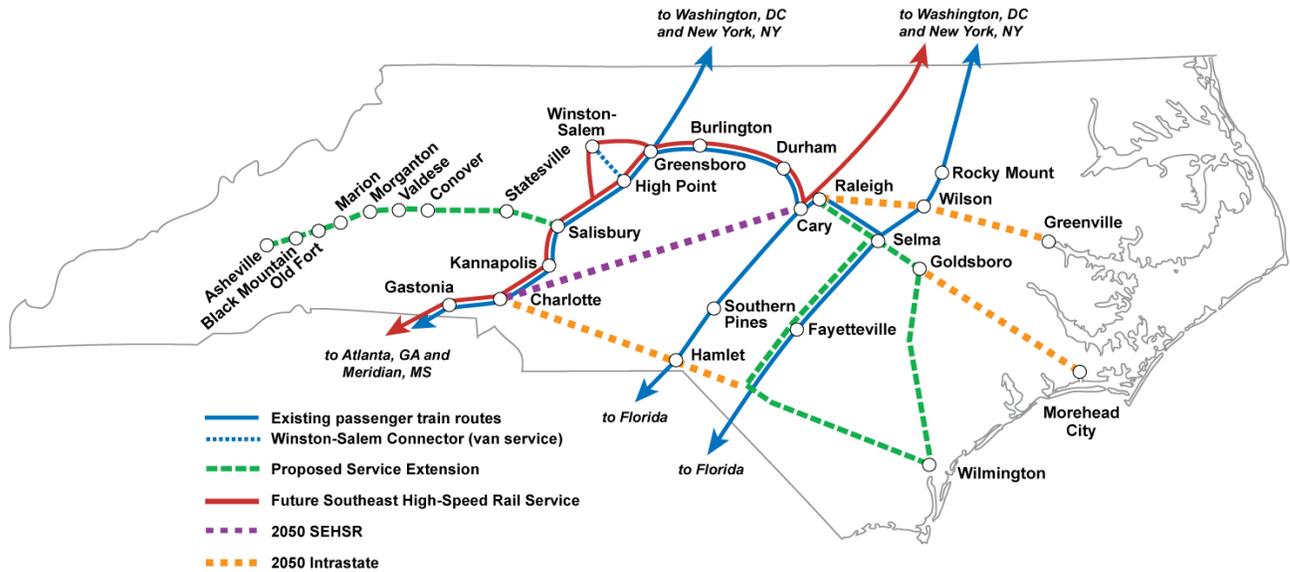
- The House Select Committee on a Comprehensive Rail Service Plan for North Carolina was established in 2008. Rail needs identified include rail and highway congestion, increased passenger ridership, and the need to provide more intercity and urban transit choices.
- The 21st Century Transportation Committee was established by the 2007 General Assembly to study transportation infrastructure across North Carolina. In 2009, in its final report, the Committee recommended expanding and upgrading passenger and commuter service.
- The General Assembly instructed the Office of State Budget and Management in 2007 to develop a Statewide Logistics Plan that addresses the state's long-term economic, mobility, and infrastructure needs. Short- and mid-term passenger rail-specific recommendations included coordinating schedules to optimize freight and passenger services (5- to 15-year recommendation horizon).
- NCDOT Safety Initiatives increase safety on the state's passenger and freight rail systems; these initiatives include:
  - The Crossing Hazard Elimination Program was established to reduce the number of accidents at highway-railroad crossings (in 2008, there were 69 collisions in North Carolina, resulting in 8 deaths and 27 injuries). Improvements to crossing signals and signs, crossing project prioritization system, and crossing consolidation resulted in a 20 percent reduction in the average number of crossing collisions statewide between 2008 and 2010.
  - The U.S. Department of Transportation designated the Washington, D.C.-Raleigh-Charlotte Southeast Rail Corridor as a future high-speed rail corridor, for which North Carolina has received federal funding to improve railroad-crossing safety. The Sealed Corridor Program evaluates and closes or grade separates crossings where appropriate and improves signals on the remaining crossings. The entire corridor has 172 public and 46 private railroad crossings and

is divided into three phases for construction. The Sealed Corridor Program is a nationally recognized best practice for crossing protection.

- The Private Crossing Safety Initiative, a new high-speed rail corridor program, uses federal funds to evaluate and improve private rail crossings between Charlotte and Raleigh. It has identified potential crossings that could be closed and those where protective signals could be used.
- The Safety Oversight Program was used to enforce FRA standards for rail operations in North Carolina to ensure safe and efficient travel for passengers and freight.

**Figure 6-1** shows the relation of existing passenger rail corridors to future corridors, as NCDOT has plans for a number of expansions to its passenger services. Service development in these corridors has resulted in various near-term projects in these corridors; these projects include:

- Implementation of the Southeast High-Speed Rail Corridor (extending from Washington, D.C., through Raleigh to Charlotte, and further to Atlanta), which was identified as the most economically viable high-speed rail corridor and selected for possible ARRA funding. The state was awarded over \$570 million for projects: \$545 million for improvements to the Charlotte and Raleigh route, \$22 million in PRIIA funding to improve tracks in Charlotte and \$4 million for environmental studies of the corridor north from Raleigh to Virginia.
- A 2005 feasibility study by the North Carolina Railroad Company recommended implementing passenger rail service from Raleigh to Wilmington via Fayetteville and Goldsboro and investigating the possibility of Selma-Raleigh commuter rail service. The study has found that building a commuter rail system between Goldsboro and Greensboro could attract annual ridership of nearly 3 million people by 2022. NCDOT is moving this project forward with environmental studies and planning in Goldsboro.
- A 2001 feasibility study recommended service to Asheville through Statesville and Morganton. NCDOT is working on rail safety improvements and six station renovations have been completed through state and local partnerships.



Source: NCDOT

Figure 6-1. Existing and Proposed Intercity Rail Corridors

### 6.1.4 Trends and Forces

A sampling of trends and forces that have had an influence in recent years, or which are anticipated to drive modal needs and the ability to solve those needs, are as follows:

- Along with the issue of the shape and form of the federal transportation reauthorization, there are uncertainties in the outlook for FRA rail programs and the High-Speed Rail initiative of the Obama administration in future years.
- Federal security requirements for transit facilities may become more stringent, thus affecting agency operational budgets.
- For the intercity passenger rail service, mounting congestion in the state’s urban areas due to accelerated urban growth will make the availability of mobility choices more critical, and those choices will have statewide implications as well. The growth in total population and in the elderly segment will accentuate the need for non-auto transportation choices for intercity movements.
- For other modes, increasing costs of operations and capital projects will stress historic funding avenues.
- Recent grant awards and railroad agreements provide the foundation for further improvements to the state’s successful intercity passenger rail system.
- As fuel prices increase, the role of intercity passenger rail service is expected to assume a more prominent profile.
- As the intercity passenger rail system expands, multimodal connectivity at rail stations will become more critical to the system’s success and will afford door-to-door mobility choices.

- Coordinated efforts with freight railroads will continue to be paramount to balancing intercity passenger and freight rail needs in dual-use corridors.

## 6.2 Performance

Beginning in 2008, NCDOT has annually evaluated its organizational effectiveness based on numerical performance measures aligned with its mission, goals, and values as part of the biannual Prioritization process for the STIP. Each performance measure is associated with one of five institutional goals, of which three are related to the transportation network and two are internal administrative goals. The three transportation network performance goals are to improve safety, mobility, and infrastructure health. The framework for this performance-driven analysis assumes that the LOS A for the intercity passenger rail mode equals modal needs, and the difference between LOS A and existing performance equals current deficiencies.

### 6.2.1 Performance Standards

Currently, on the NCDOT list of executive performance measures, only one performance metric relates to passenger rail mobility; this metric relates to timekeeping and customer satisfaction. In FY 2010, NCDOT tracked intercity passenger rail mobility by the number of passenger trains that departed on schedule. For 2010, the performance target for this measure was 75 percent or greater. The statewide result of 22 percent did not meet the target. NCDOT changed its passenger rail metric for FY 2011. The new passenger rail executive mobility measure tracks the “Rail Intercity Passenger Mobility Index (Availability of Service and Quality of Service offered/provided,” with a performance target of 87 percent or greater. For the current Prioritization cycle, the adopted rail (passenger and freight) measure is the parameter: “Projects which advance Interstate/Intrastate Rail Connections.” Existing rail performance was scored at an LOS D for the mobility investment goals at the Statewide tier. As shown in **Table 6-2**, in FY 2008 through 2009, NCDOT used another measure to track passenger rail mobility, “percentage increase in the number of intercity of rail passengers.” The annual ridership increase of 3 percent or more was met during both years.

**Table 6-2. Intercity Passenger Rail Performance Measures in North Carolina, FY 2008-2011**

FY	Performance Measure	Target	Statewide Average Score
2008	% increase in the number of intercity rail passengers	3% or greater	6% (target met)
2009	% increase in the number of intercity rail passengers	3% or greater	21% (target met)
2010	% of passenger trains that departed on schedule	75% or greater	22% (target unmet)
2011	Rail Intercity Passenger Mobility Index	87% or greater	89% (target met)

### 6.2.2 Current Performance

In 2008, the NCDOT Rail Division in conjunction with the SPOT developed LOS performance categories and associated financial needs for passenger rail infrastructure. This assessment scored the ability of

passenger rail to address mobility health goals at the Statewide tier level (example projects would include double-tracking rail line or new passenger stations). Existing rail performance was scored at LOS D for the mobility investment goals at the Statewide tier. In 2011, the SPOT updated its LOS performance for passenger rail; the existing performance was again scored at an LOS D.

The low current level of service for intercity passenger rail reflects the scarcity of service outside the Charlotte-to-Raleigh Piedmont Crescent. Growth of ridership in that corridor as highway congestion grows and train frequency is improved suggests the presence of under-served (Raleigh-to-Washington, DC Southeast High Speed Rail) and untapped (western NC or SE NC) markets.

## **6.3 Current Deficiencies**

### **6.3.1 Basis for Deficiencies**

The Rail Division and SPOT performance analysis was recently updated with Prioritization 2.0 figures, used to derive current intercity passenger rail deficiencies for the 2040 Plan. Because the 2040 Plan analysis uses estimates provided by the NCDOT Rail Division, the resulting 30-year LOS framework for passenger rail needs is consistent with the 10-year Prioritization 2.0 estimates. At \$242 million, current passenger rail deficiencies account for 3 percent of the identified need.

The SPOT numbers are similar to the rail needs estimates in NCDOT's Rail Plan 2009. According to the report, the passenger rail portion would account for \$4.8 billion, or 81 percent of all defined rail modal needs totaling \$5.9 billion, including:

- \$3.95 billion for the Southeast High-Speed Rail Corridor
- \$195 million for intercity passenger rail service in western North Carolina
- \$324 million for intercity passenger rail service in southeastern North Carolina

### **6.3.2 Changes since Prior Plan**

The 2006 STP Mid-Cycle Update Technical Report identified 25-year passenger system needs to the year 2030. In the analysis, needs were calculated for both capital and operating cost components, by the improvement types of preservation, modernization, and expansion, at the Statewide, Regional, and Subregional tiers. The 25-year passenger rail needs total \$4.06 billion, including \$3.28 billion (81 percent) for intercity passenger rail and \$778 million (19 percent) for projected commuter rail needs. Existing corridor needs represented 81 percent of the projected future needs, with 100 percent allocated to the Statewide tier. However, none of the identified needs were identified as current deficiencies, and thus would be accruing needs. The 2040 Plan identifies 30-year passenger rail needs in 5-year increments to the year 2040. Current deficiencies are identified separately from accruing needs and are included in total passenger rail modal needs. The sections below provide separate estimates for intercity passenger rail and commuter rail services.

### 6.3.3 Summary of Intercity Passenger Rail Modal Needs

The accruing intercity passenger rail needs estimates were developed by the NCDOT Rail Division, with commuter rail estimates provided by the MPOs. As shown in **Tables 6-3** and **6-4** and **Figures 6-3** through **6-5**, the 30-year intercity passenger rail needs total \$7.06 billion. At \$224 million, current deficiencies (sometimes referred to as backlog) represent 3 percent of all identified intercity passenger rail needs.

Existing corridor needs represent current deficiencies in intercity passenger rail. Specifically, the NCDOT Rail Division estimates that current deficiencies for the Carolinian, Piedmont, and High Speed Rail service maintenance and operating costs amount to \$242 million. At \$6.82 billion, new corridor needs represent 97 percent of all future intercity passenger rail needs.

The largest single recognized future passenger rail expenditure is the Charlotte to Washington, D.C., High Speed Rail, with an estimated \$3.95 billion in capital costs estimated to complete right-of-way acquisition, construction, track work, safety projects, and the purchase of rolling stock. Other large identified future projects are the Southeast High Speed Rail corridor, returning passenger rail service to southeast and western North Carolina, and various station improvements. The bulk of future passenger rail needs is projected for Phase 4 of the 2040 Plan (2026-2030), with the Charlotte to Washington, D.C., High Speed Rail and return of service to southeastern and western North Carolina planned to be implemented within that 5-year span. Capital improvements account for 94 percent, or \$6.66 billion, of future intercity passenger rail needs, while operating improvements account for 6 percent, or \$402 million.

**Table 6-3. Intercity Passenger Rail Needs by 5-Year Increments (\$ in Millions)**

Need Category	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
<b>Existing Corridors</b>								
Capital	-	-	-	-	-	-	-	-
Operating	242	-	-	-	-	-	-	242
<b>Subtotal Existing</b>	<b>242</b>	-	-	-	-	-	-	<b>242</b>
<b>New Corridors</b>								
Capital	-	1	1,024	46	5,014	46	526	6,657
Operating	-	-	-	-	19	68	73	160
<b>Subtotal New</b>	-	1	1,024	46	5,033	114	599	6,817
Total Capital	-	1	1,024	46	5,014	46	526	6,657
Total Operating	242	-	-	-	19	68	73	402
<b>Total Rail Passenger</b>	<b>242</b>	<b>1</b>	<b>1,024</b>	<b>46</b>	<b>5,033</b>	<b>114</b>	<b>599</b>	<b>7,059</b>

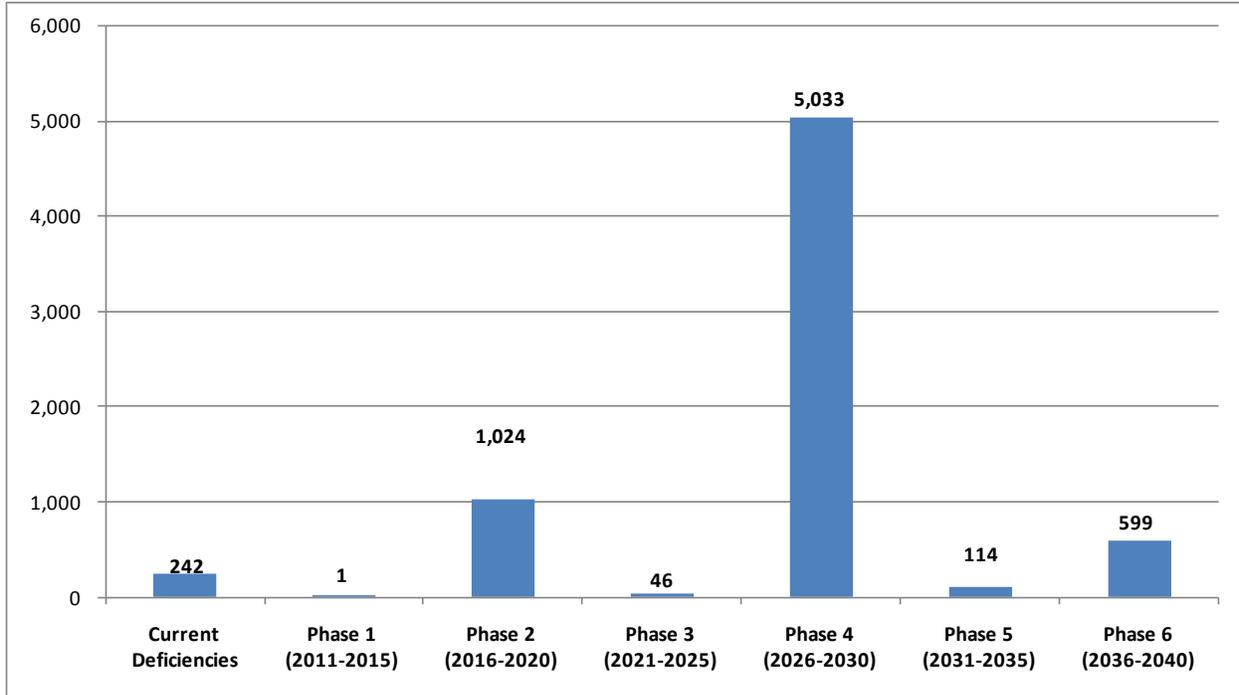


Figure 6-2. Intercity Passenger Rail Needs by 5-Year Increments (\$ in Millions)

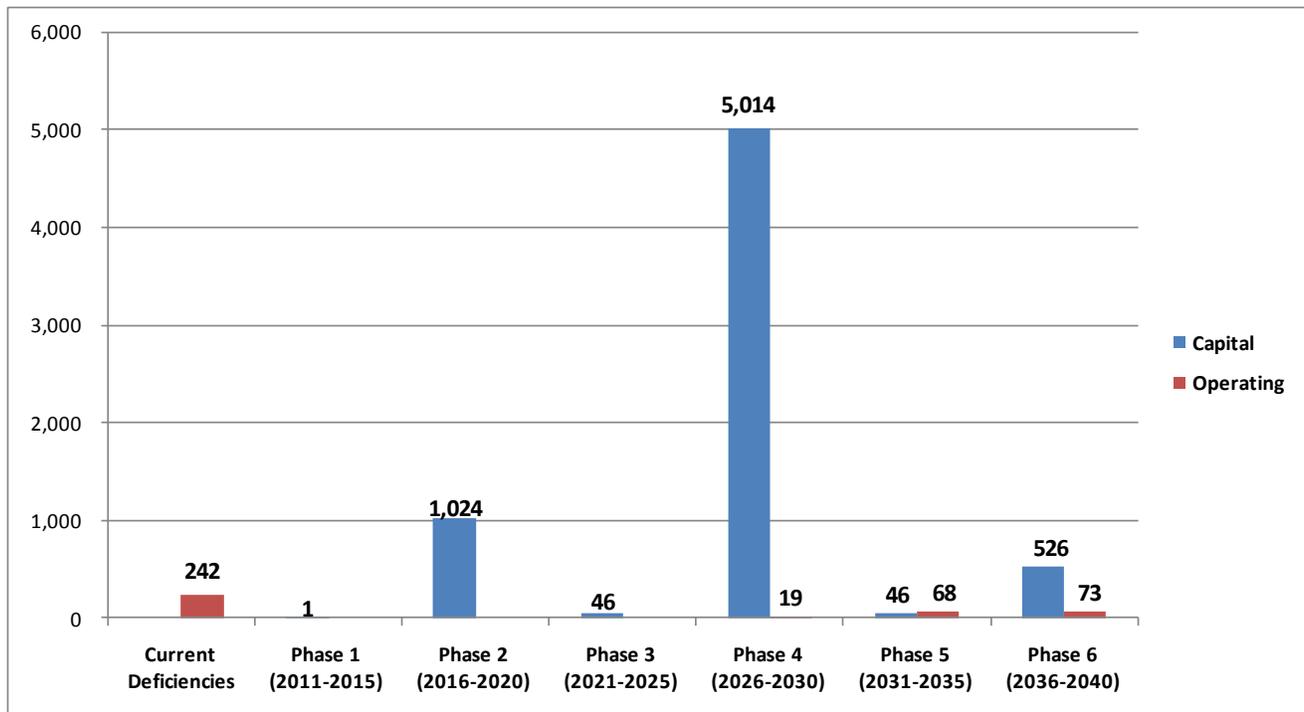


Figure 6-3. Intercity Passenger Rail Needs by 5-Year Increments: Capital and Operating (\$ in Millions)

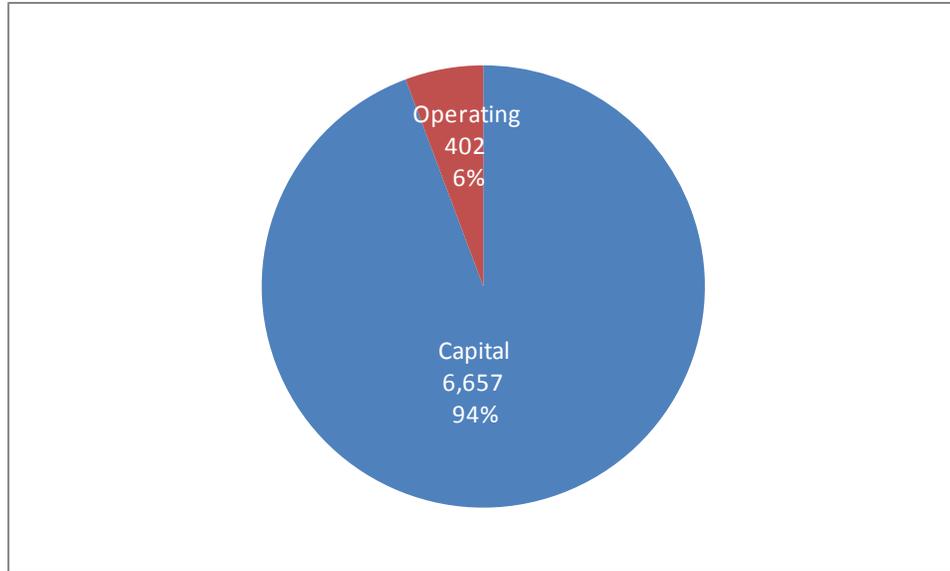


Figure 6-4. Intercity Passenger Rail Needs: Capital and Operating (\$ in Millions)

### 6.3.4 Needs by Investment Goal

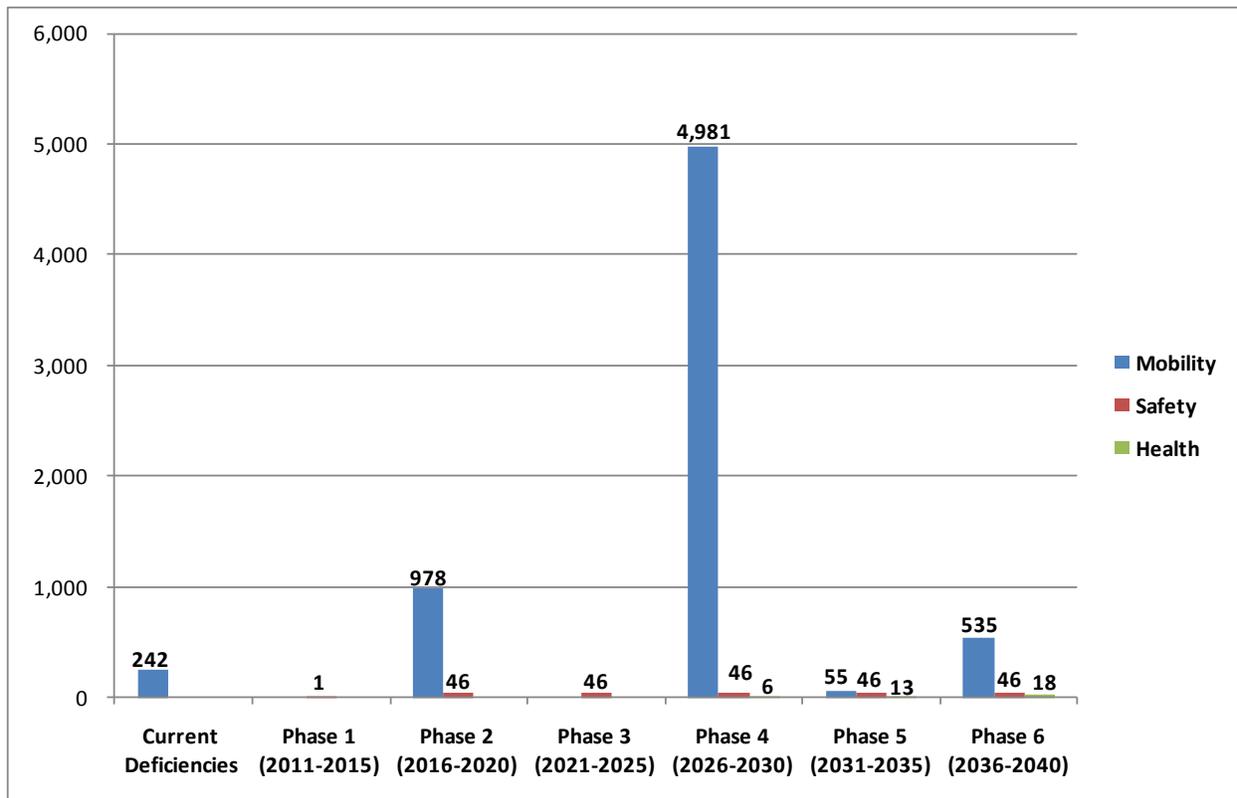
Based on investment goal, as shown in **Table 6-4** and **Figures 6-6** and **6-7**, 96 percent (\$6.79 billion) is for mobility needs, 3 percent (\$231 million) is for safety needs, and 1 percent (\$36 million) is for infrastructure health needs. More than 73 percent of the identified mobility needs are programmed for Phase 4 of the 2040 Plan, and 14 percent for Phase 2. Those needs include accruing estimates associated with Charlotte to Washington, D.C., and Southeast High Speed Rail initiatives, enhancing existing rail services, and returning passenger rail service to southeastern and western North Carolina. Safety projects include grade separations and positive train control. Infrastructure health includes maintenance of the future corridors returned to service in southeastern and western North Carolina.

The Seven Portals Study Draft Final Report, prepared for the Governor’s Logistics Task Force and released in August, 2011, noted the importance the new passenger routes would have on logistics in the state. The report noted that as sites develop around the Southeast High Speed Rail Corridor and corridors are returned to passenger service in southeastern and western North Carolina, the affected areas will become more important from the logistics perspective; the passenger rail lines can become economic engines spurring growth and creating jobs. Improved passenger rail services should also benefit freight rail, if only due to increased demand for freight and increased value of those rail corridors. The report mentions that passenger rail lines included in this group are those from Raleigh to Richmond (Virginia) and Raleigh to Columbia (South Carolina) through Hamlet.

In the future, the list might also include Greensboro to Winston-Salem, Salisbury to Asheville, and Raleigh to Wilmington through Goldsboro. The Governor’s Logistics Task Force Subcommittee Reports from August 2011 expressed similar confidence that passenger rail connections between population centers and points throughout the state, especially those with vibrant tourism industries, are necessary for the continued development of that economic sector.

**Table 6-4. Intercity Passenger Rail Needs by Investment Goal (\$ in Millions)**

Investment Goal	NCMIN Tier	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
Mobility	Statewide	242	-	978	-	4,981	55	535	6,792
Mobility	Regional	-	-	-	-	-	-	-	-
Mobility	Subregional	-	-	-	-	-	-	-	-
<b>Subtotal Mobility</b>		<b>242</b>	<b>-</b>	<b>978</b>	<b>-</b>	<b>4,981</b>	<b>55</b>	<b>535</b>	<b>6,792</b>
Safety	Statewide	-	-	46	46	46	46	46	231
Safety	Regional	-	-	-	-	-	-	-	-
Safety	Subregional	-	-	-	-	-	-	-	-
<b>Subtotal Safety</b>		<b>-</b>	<b>1</b>	<b>46</b>	<b>46</b>	<b>46</b>	<b>46</b>	<b>46</b>	<b>231</b>
Health	Statewide	-	-	-	-	6	13	18	36
Health	Regional	-	-	-	-	-	-	-	-
Health	Subregional	-	-	-	-	-	-	-	-
<b>Subtotal Health</b>		<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>6</b>	<b>13</b>	<b>18</b>	<b>36</b>
<b>Total</b>		<b>242</b>	<b>1</b>	<b>1,024</b>	<b>46</b>	<b>5,033</b>	<b>114</b>	<b>599</b>	<b>7,059</b>



**Figure 6-5. Intercity Passenger Rail Needs by Investment Goal in 5-Year Increments (\$ in Millions)**

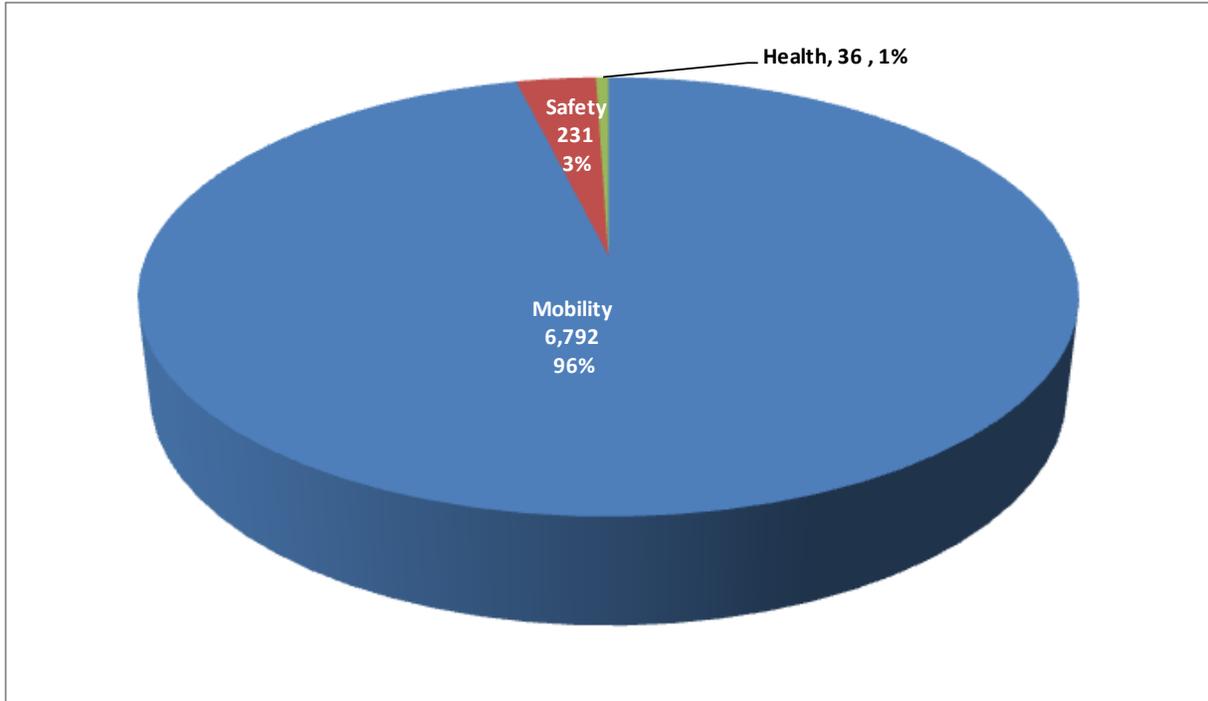


Figure 6-6. Intercity Passenger Rail Needs by Investment Goal (\$ in Millions)

### 6.3.5 Needs by North Carolina Multimodal Investment Network Tier

In terms of the NCMIN breakdown all identified intercity passenger rail needs are on the Statewide NCMIN tier, as shown in **Table 6-5** and **Figure 6-8**. All intercity passenger rail services in the state (such as Amtrak or Southeast High Speed Rail) are classified as belonging to the Statewide tier. The estimates show that the improvements are projected to be largely concentrated during Phase 4 of the 2040 Plan.

Table 6-5. Intercity Passenger Rail Needs by North Carolina Multimodal Investment Network Tier (\$ in Millions)

NCMIN Tier	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
Statewide	242	1	1,024	46	5,033	114	599	7,059
<b>Total</b>	<b>242</b>	<b>1</b>	<b>1,024</b>	<b>46</b>	<b>5,033</b>	<b>114</b>	<b>599</b>	<b>7,059</b>

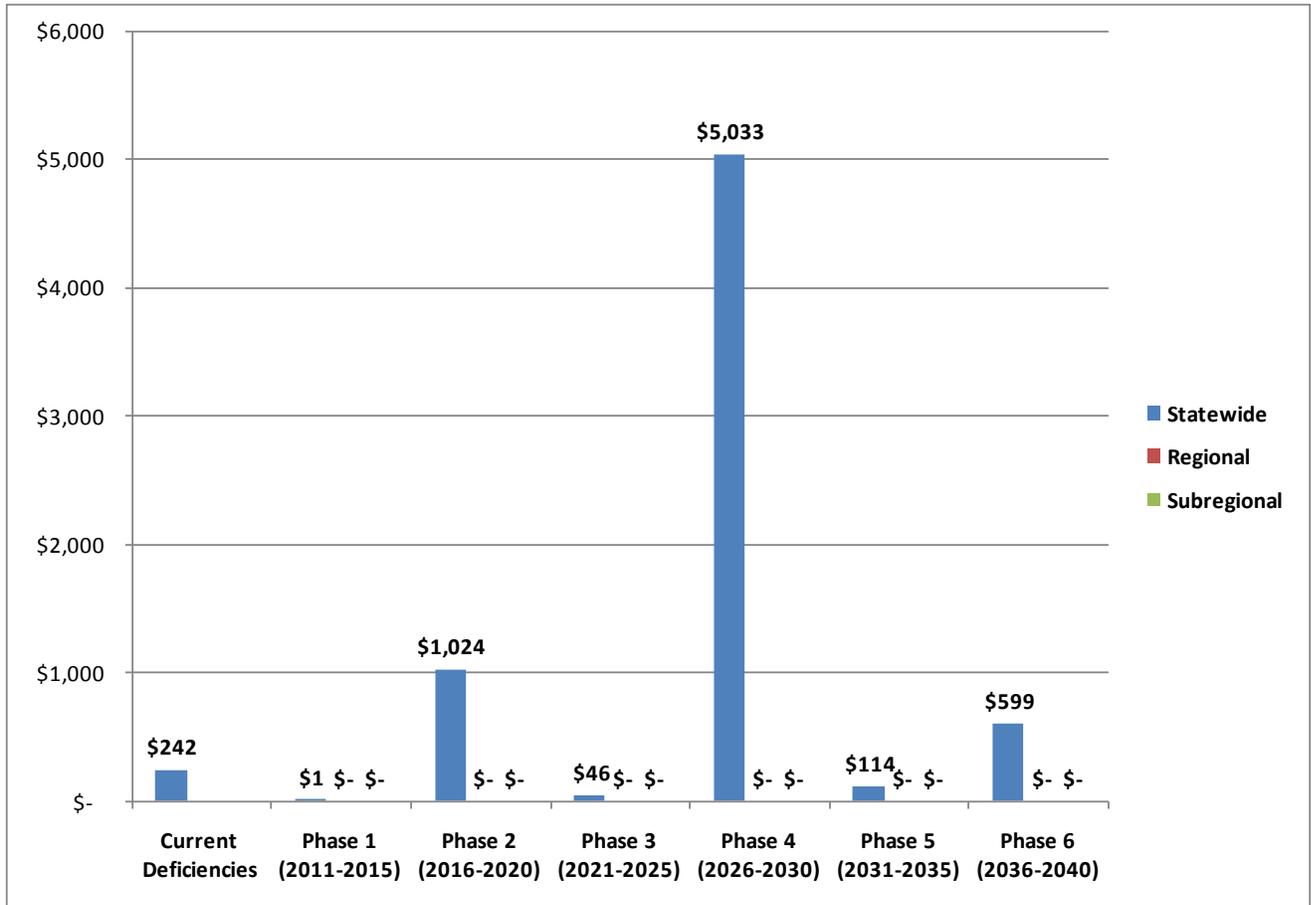


Figure 6-7. Intercity Passenger Rail Needs by North Carolina Multimodal Investment Network Tier by 5-Year Increments (\$ in Millions)

## 6.4 Summary of Commuter Rail Modal Needs

### 6.4.1 Existing Conditions

At present, there are no existing commuter rail commuter rail facilities in North Carolina. Existing public agency plans call for developing commuter rail service in the Raleigh-Durham and Charlotte areas.<sup>23</sup> Local rail service in the form of light rail is available only in Charlotte, where the state’s first light rail line opened in 2007. Light rail service is discussed in more detail in Chapter 5.

### 6.4.2 Summary of Commuter Rail Modal Needs

The accruing commuter rail estimates were provided by the MPOs. As shown in **Table 6-6** and **Figures 6-9** through **6-11**, the 30-year commuter rail needs total \$2.54 billion. All identified commuter rail needs are accruing needs.

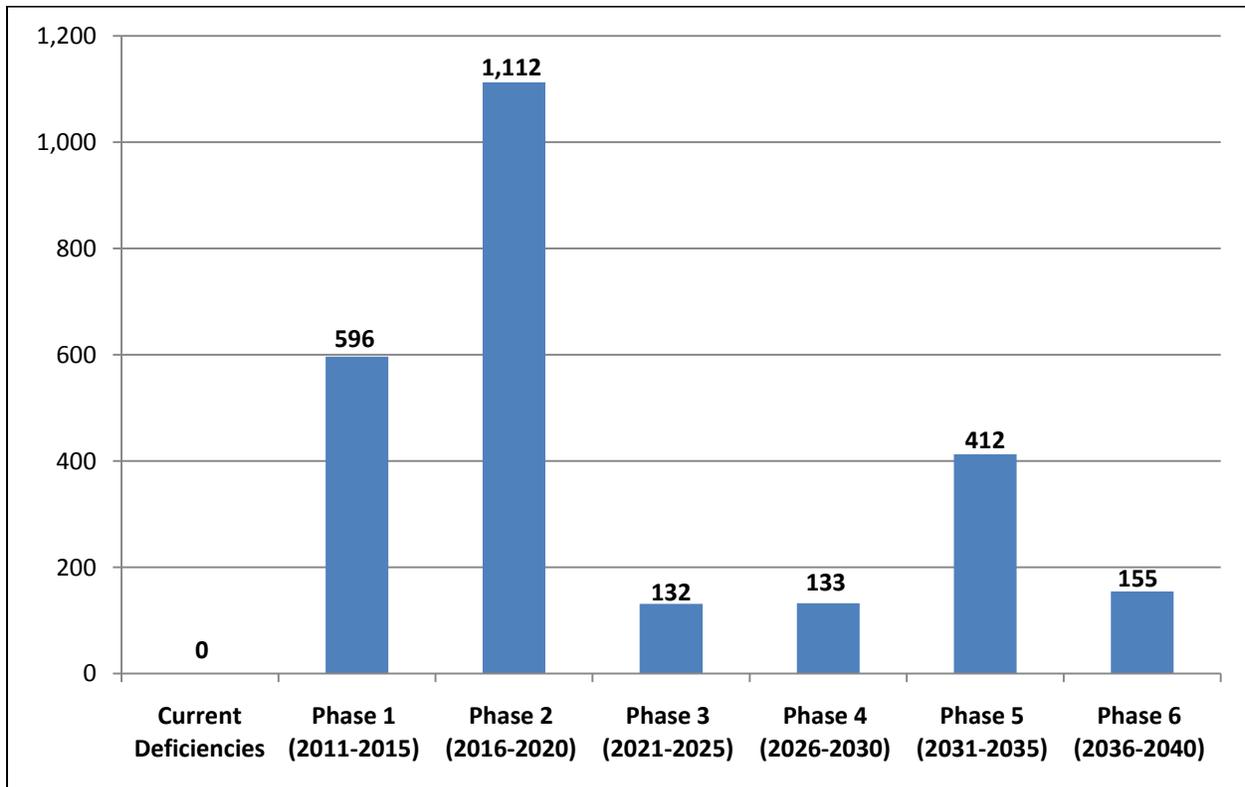
The planned commuter rail services belong to the Regional or Subregional tier, depending on whether they serve one or more counties. The largest commuter rail expenditure is projected for the Triangle

<sup>23</sup> NCDOT Rail Plan 2009

region, at \$1.19 billion, followed by \$826 million in the Winston-Salem area, and \$525 million for the Red commuter rail line in the Charlotte area. Capital improvements account for 73 percent, or \$1.85 billion, of future commuter rail needs, while operating improvements account for 27 percent, or \$690 million.

**Table 6-6. Commuter Rail Needs by 5-Year Increments (\$ in Millions)**

Need Category	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
New Corridors								
Capital	-	550	1,025	-	-	275	-	1,850
Operating	-	46	87	132	133	137	155	690
<b>Total Commuter Rail</b>	-	<b>596</b>	<b>1,112</b>	<b>132</b>	<b>133</b>	<b>412</b>	<b>155</b>	<b>2,540</b>



**Figure 6-8. Commuter Rail Needs by 5-Year Increments (\$ in Millions)**

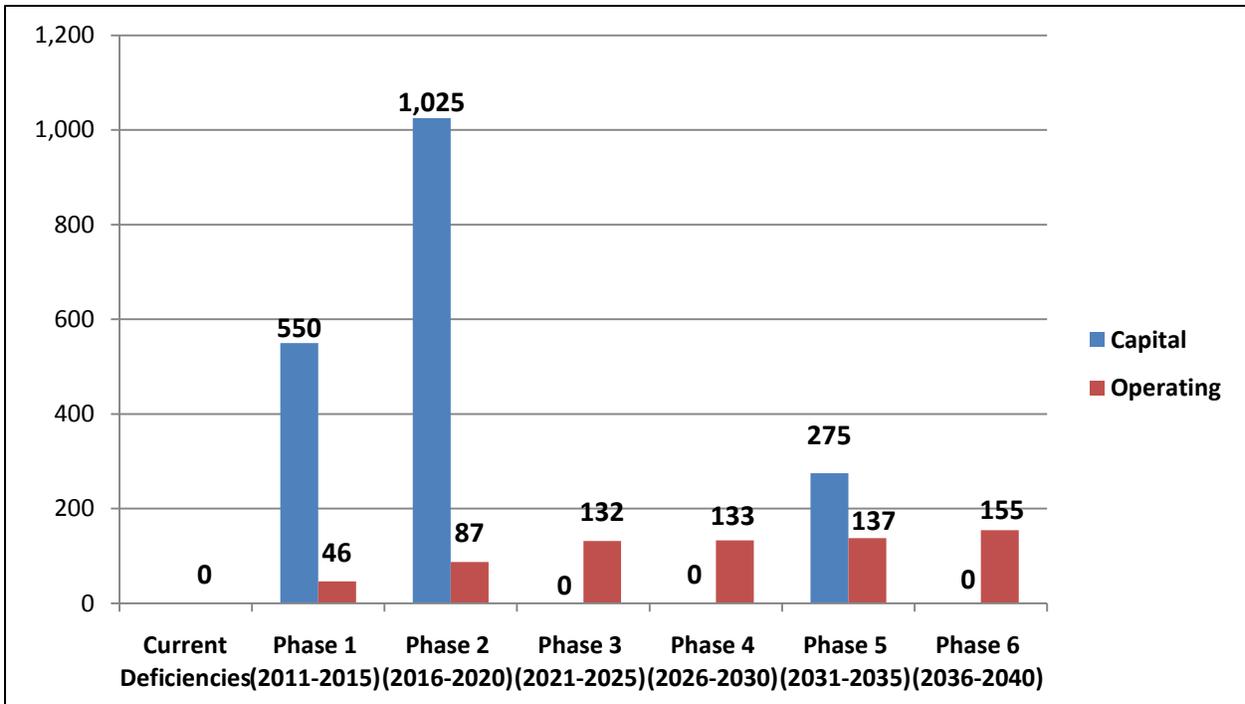


Figure 6-9. Commuter Rail Needs by 5-Year Increments: Capital and Operating (\$ in Millions)

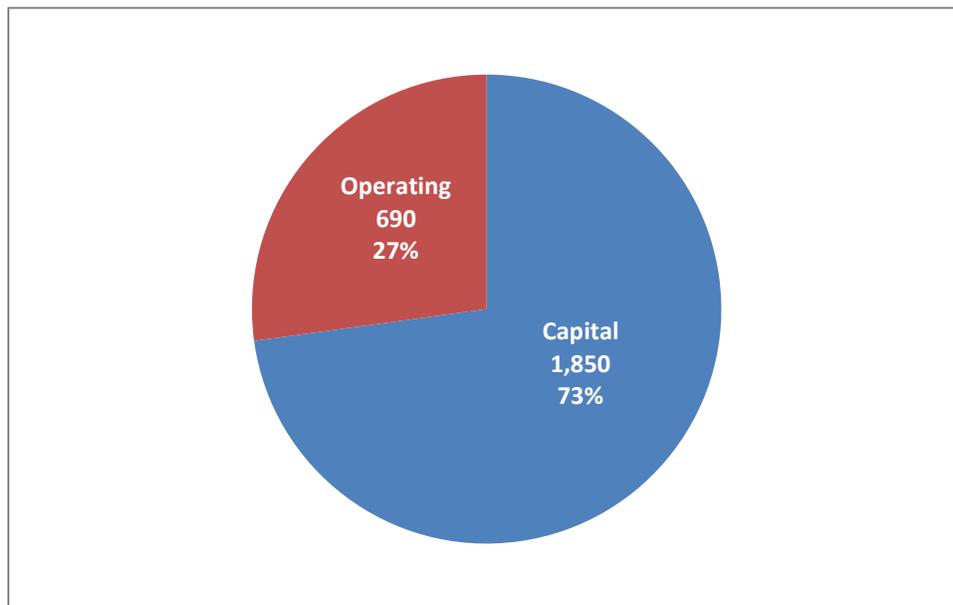


Figure 6-10. Commuter Rail Needs: Capital and Operating (\$ in Millions)

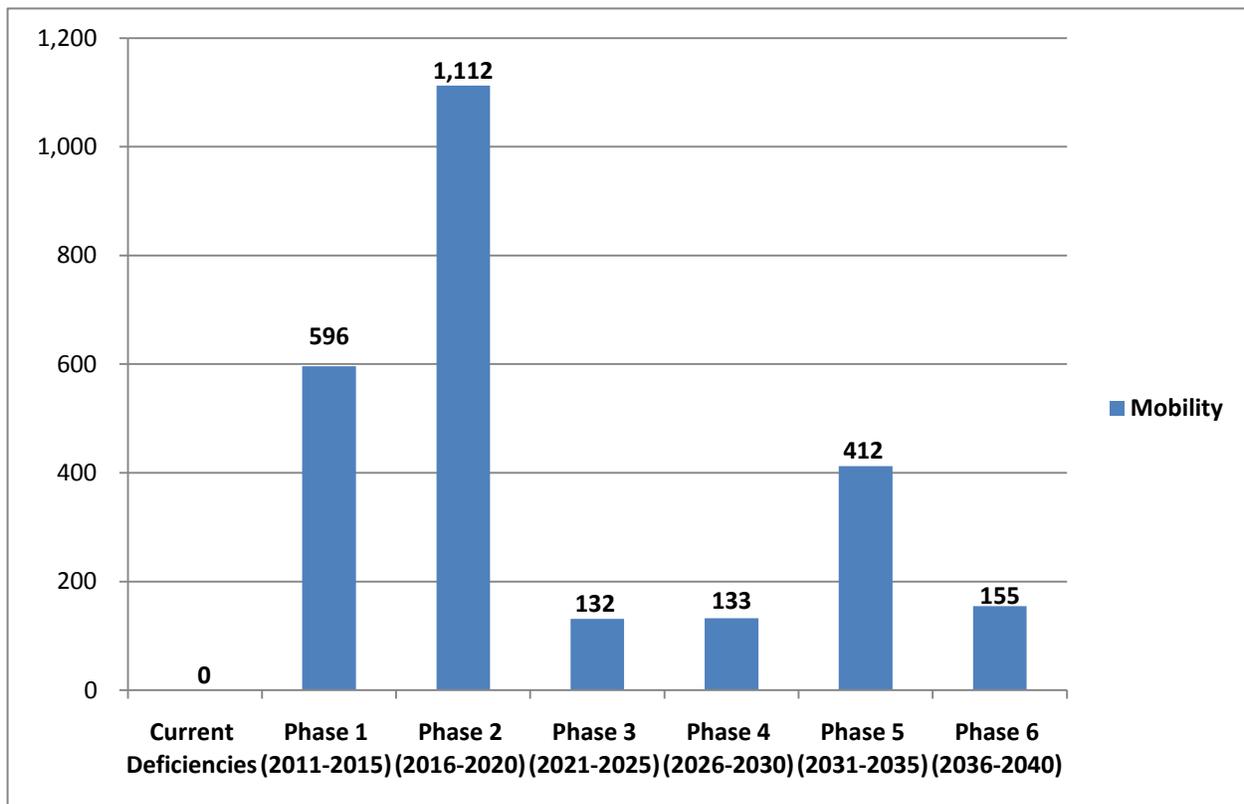
### 6.4.3 Needs by Investment Goal

Based on investment goal, as shown in **Table 6-7** and **Figure 6-12**, all identified commuter rail needs are mobility needs. Nearly 44 percent of the identified mobility needs are programmed for Phase 2 of the 2040 Plan, and 22 percent for Phase 1.

**Table 6-7. Commuter Rail Needs by Investment Goal (\$ in Millions)**

Investment Goal	NCMIN Tier	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
Mobility	Statewide	-	-	-	-	-	-	-	-
Mobility	Regional	-	1,066	86	86	86	86	1,412	0
Mobility	Subregional	596	46	45	46	326	68	1,128	596
<b>Subtotal Mobility</b>		<b>242</b>	<b>596</b>	<b>1,112</b>	<b>132</b>	<b>133</b>	<b>412</b>	<b>155</b>	<b>2,540</b>
<b>Total</b>		<b>242</b>	<b>596</b>	<b>1,112</b>	<b>132</b>	<b>133</b>	<b>412</b>	<b>155</b>	<b>2,540</b>

Note: Commuter rail has no identified safety or health investment goal needs



**Figure 6-11. Commuter Rail Needs by Investment Goal in 5-Year Increments (\$ in Millions)**

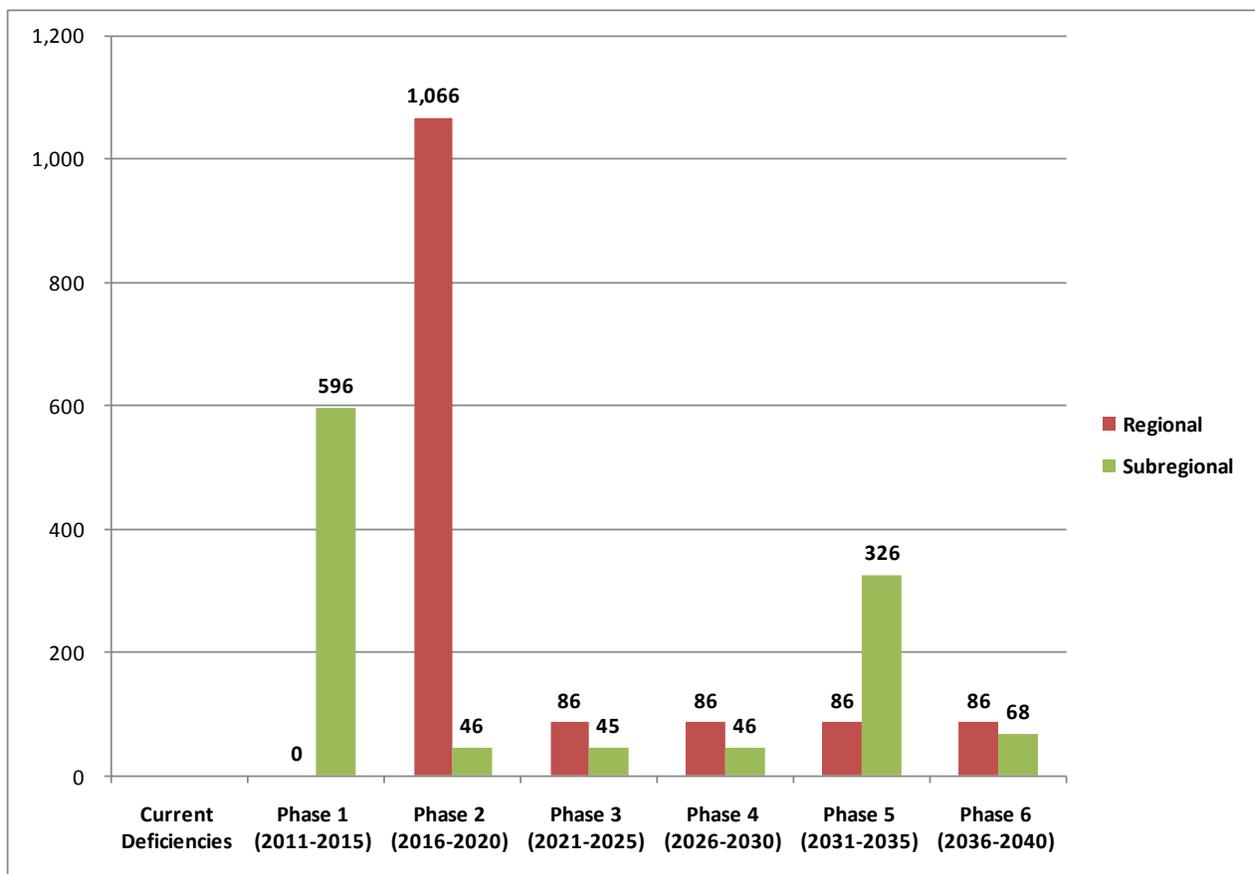
### 6.4.4 Needs by North Carolina Multimodal Investment Network Tier

In terms of the NCMIN breakdown, 56 percent (\$1.41 billion) of commuter rail needs are on the Regional NCMIN tier, and 44 percent (\$1.13 billion) are on the Subregional tier, as shown in **Table 6-8**

and **Figures 6-13 and 6-14**. There are no identified commuter rail needs on the Statewide tier. The estimates show that commuter rail improvements are projected to be largely concentrated during Phase 2 of the 2040 Plan.

**Table 6-8. Commuter Rail Needs by North Carolina Multimodal Investment Network Tier (\$ in Millions)**

NCMIN Tier	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
Statewide	-	-	-	-	-	-	-	-
Regional	-	-	1,066	86	86	86	86	1,412
Subregional	-	596	46	45	46	326	68	1,128
<b>Total</b>	-	<b>596</b>	<b>1,112</b>	<b>132</b>	<b>133</b>	<b>412</b>	<b>155</b>	<b>2,540</b>



**Figure 6-12. Commuter Rail Needs by North Carolina Multimodal Investment Network Tier by 5-Year Increments (\$ in Millions)**

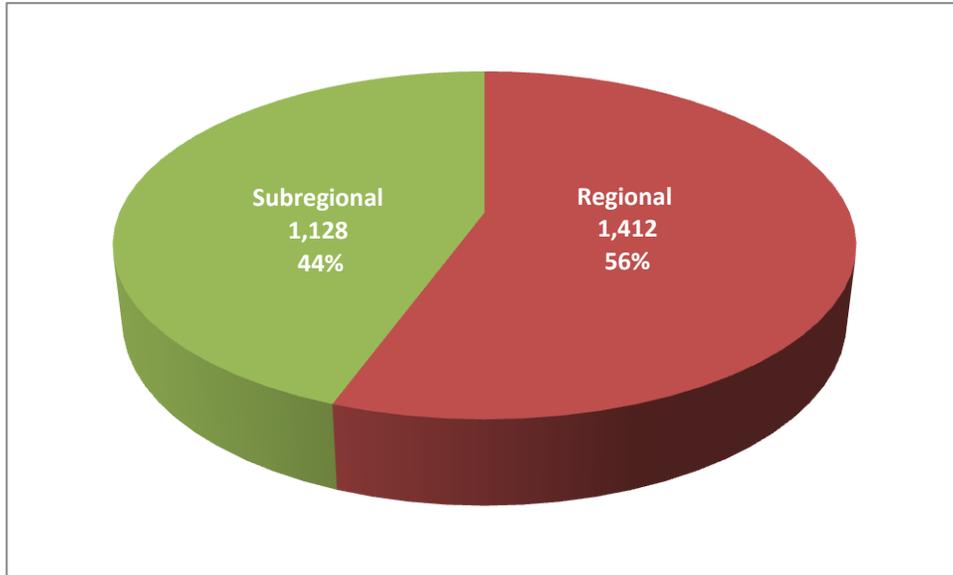


Figure 6-13. Commuter Rail Needs by North Carolina Multimodal Investment Network Tier (\$ in Millions)



# Chapter 7

## Rail (Freight)

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### 7.1 Existing Conditions

#### 7.1.1 Inventory Summary

North Carolina's freight rail network serves 86 of the state's 100 counties. The network provides access to the state's strategic locations, such as ports, power plants, mines, and military installations, and facilitates the movement of goods for a variety of industries, including agriculture, forestry, plastic, furniture, coal, food products, and chemicals.

The majority of the state's freight rail system is owned, operated, and maintained by the private sector. With 3,345 miles of rail lines throughout North Carolina, all but 491 miles are owned by the state's freight railroads. The state of North Carolina owns the North Carolina Railroad Company (NCRR), and Norfolk Southern Railroad Company (NS) has trackage rights over its 317-mile corridor from Charlotte to Morehead City.<sup>24</sup> **Table 7-1** and **Figure 7-1** show the miles and locations 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.

**Table 7-1. Freight Railroads in North Carolina, by Type and Miles, FY 2011**

Type	Miles
Class I Railroads	
CSX Transportation	1,121
Norfolk Southern Railroad Company*	1,301
<i>Subtotal Class I Railroads</i>	<i>2,422</i>
Class III Railroads	
Shortline/local railroads	687
Switching and terminal railroads	236
<i>Subtotal Class III Railroads</i>	<i>923</i>
<b>Total miles of railroads in North Carolina</b>	<b>3,345</b>

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

\* Includes operating rights on 317 miles of the NCRR

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<sup>24</sup> NCDOT Rail Plan 2009



Beverly E. Perdue, Governor  
Gene Conti, Secretary  
Paul Morris, Deputy Secretary for Transit  
  
Patrick B. Simmons, Director, Rail Division  
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# North Carolina's RAILROAD SYSTEM



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NS Emergency Number  
1-800-453-2530



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bytrain.org  
Stations

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Cary	Kannapolis
Charlotte	Raleigh
Durham	Rocky Mount
Fayetteville	Salisbury
Gastonia	Selma
Greensboro	Southern Pines
Hamlet	Wilson

REPORTING MARK	RAILROAD NAME	REPORTING MARK	RAILROAD NAME	REPORTING MARK	RAILROAD NAME	REPORTING MARK	RAILROAD NAME
ACWR	Aberdeen Carolina & Western Railway	CMR	Craggy Mountain Railroad	NCDOT	N.C. Department of Transportation	SLR	State University Railroad
AR	Aberdeen & Rockfish Railroad	CPLJ	Camp Lejeune Railroad	NCRR	North Carolina Railroad Company	TBRV	Thermal Belt Railway
ARC	Alexander Railroad	CSX	CSX Transportation	NCVA	North Carolina & Virginia Railroad	US	US Military
ATW	Atlantic & Western Railway, LP	CTR	Clinton Terminal Railroad	NHV	New Hope Valley Railroad	WSS	Winston-Salem Southbound Railway
CA	Chesapeake & Albemarle Railroad	CWCY	Caldwell County Railroad	NS	Norfolk Southern Corporation	WTRY	Wilmington Terminal Railroad, Inc.
CALA	Carolina Southern Railroad	GSMR	Great Smoky Mountains Railroad	PDRR	Pee Dee River Railway	YAN	Toe River Railroad
CFR	Cape Fear Railways	HPTD	High Point, Thomasville & Denton Railroad	PNRW	Piedmont & Northern Railway	YVRR	Yadkin Valley Railroad
CLNA	Carolina Coastal Railway	LRS	Laurinburg & Southern Company, Inc.	RSNR	Red Springs & Northern Railroad		

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1-800-USA-RAIL (1-800-872-7245) – Reservations

Figure 7-1. North Carolina Freight Railroads Network, 2011

# North Carolina RAILROAD SYSTEM

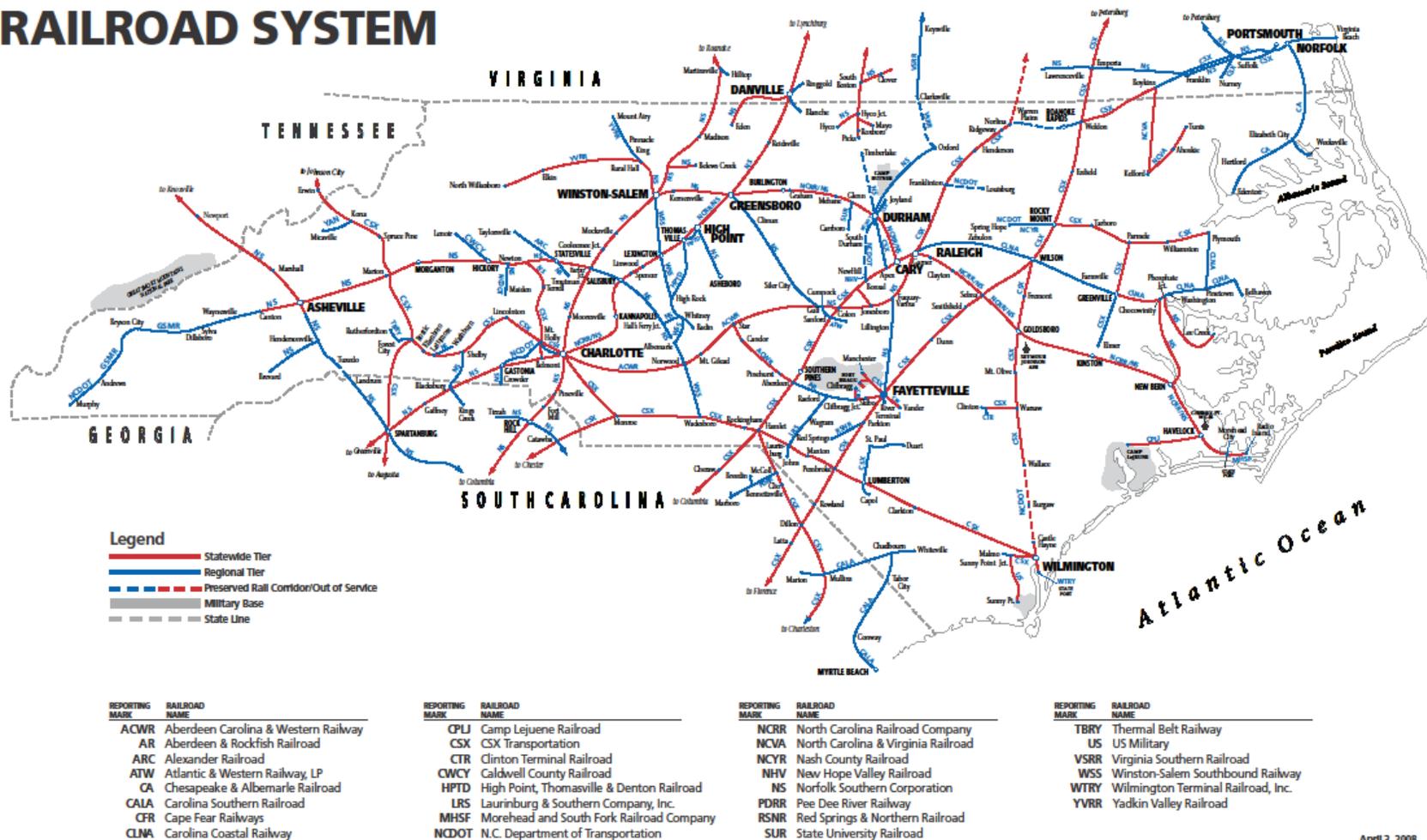


Figure 7-2. North Carolina Freight Railroads Multimodal Investment Network

April 3, 2008

Twenty-two active freight railroad companies operate in the state:

- Two active Class I railroads (CSX Transportation and Norfolk Southern Railroad Company): According to size classifications established by the Surface Transportation Board, a Class I railroad had annual carrier operating revenues of \$379 million in 2009.<sup>25</sup>
- Twenty active Class III railroads: 12 short line railroads, and 8 other short line railroads that specialize in switching and terminal services. According to the Surface Transportation Board, a Class III railroad is a railway company with annual operating revenue of less than \$20.5 million.

The following list shows how North Carolina’s rail system compares to other states per 2008 data:<sup>26</sup>

- 13th in total number of railroad companies (23)
- 17th in total rail miles (3,250)<sup>27</sup>
- 32nd in originated rail tons (12,086,168)
- 13th in terminated rail tons (58,440,018)
- 32nd in originated rail carloads (211,572)
- 14th in terminated rail carloads (665,580)
- 32nd in rail tons carried (103,254,917)
- 34th in rail carloads (1,467,318)
- 29th in freight rail employment (2,425)
- 30th in freight rail wages (\$163. 2 million)

The defined Statewide and Regional tiers for freight rail are shown in **Table 7-2** and **Figure 7-2**. The NCMIN did not define Subregional tier for freight rail because rail is not used for short distance transportation, with trips typically exceeding 300 miles. The Statewide tier is defined as rail lines of strategic importance as defined by NCDOT, and the Regional tier is comprised of all remaining rail lines in the state.

**Table 7-2. Freight Rail Tier Definitions in the North Carolina Multimodal Investment Network**

Mode	Statewide Tier	Regional Tier	Subregional Tier
Rail (Freight)	Rail lines of strategic importance as determined by the Rail Division	All remaining rail lines not included on the Statewide tier	N/A

Source: NCDOT NCMIN: [http://www.ncdot.org/download/performance/NCMIN\\_Definitions.pdf](http://www.ncdot.org/download/performance/NCMIN_Definitions.pdf)

<sup>25</sup> Association of American Railroads, *Class I Railroad Statistics*. Notably, Amtrak is classified as a Class I railroad carrier under this definition.

<sup>26</sup> Association of American Railroads

<sup>27</sup> Miles operated excluding trackage rights

## Existing Freight Rail Corridors

The most densely used freight rail corridors in North Carolina in recent years include:

- The CSX corridor in western North Carolina serves through freight traffic and connects South Carolina to Tennessee. Coal from mines in Virginia, West Virginia, and Kentucky dominates the corridor's volume.
- The CSX corridor in eastern North Carolina, parallels I-95 and connects North Carolina to states from Boston, MA to Miami, FL. This corridor is the CSX north/south mainline and is the backbone of the CSX's National Gateway intermodal corridor. It also carries Amtrak rail passenger traffic.
- The CSX corridor from the Port of Wilmington to Charlotte is part of CSX's National Gateway intermodal corridor. The National Gateway ends in Charlotte but the corridor extends to Atlanta and points south.
- The NCRP corridor runs 317 miles from the port of Morehead City to Charlotte. The line parallels I-40 and I-85. NS has an exclusive trackage rights on the NCRP. Between Charlotte and Greensboro is the NS mainline, which is part of its Crescent Corridor. The corridor is a heavily traveled intermodal corridor with connection to New Jersey and New Orleans. Amtrak's Crescent also uses this corridor from NY to New Orleans, LA.

Intermodal freight facilities support and facilitate the movement of freight in the state. These facilities include state ports (Port of Wilmington and Port of Morehead City, owned and operated by the North Carolina Ports Authority).

## Freight Rail Volume and Direction

The total volume of freight handled by railroads in North Carolina, both inbound and outbound traffic, has decreased since the 2004 STP. In 2004, more than 177 million tons originated in, terminated in, or passed through North Carolina, representing an increase of approximately 1.5 percent since 2000. By 2008, the number of tons that originated in, terminated in, or passed through the state has decreased to more than 103 million.

In terms of shipment origin, in 2004, more than 15 million tons of products originated in North Carolina, while more than 61 million tons terminated in North Carolina. By 2008, more than 12 million tons of products originated in North Carolina, while more than 58 million tons terminated in North Carolina.

Inbound traffic accounted for 61 percent of the total volume, and through traffic accounted for 26 percent in FY 2008. In 2008, similarly to 2004, coal, grain field crops, and chemicals dominated the out-of-state inflow by volume, while crushed stone, gravel, or sand, and chemicals and lumber dominate the out-of-state outflow. Coal has remained by far North Carolina's highest volume rail commodity, averaging 50 percent of tons in FY 2005, and 53 percent in 2008, all shipped into the state. Farm

products, also primarily a terminating commodity, ranked second in rail volume, with 11 percent of tonnage in FY 2004 and FY 2008.

### 7.1.2 Existing Funding Mechanisms

Although NCDOT has only a small amount of funding available for freight rail projects, it plays an important role in protecting and improving freight service through its passenger rail program expansion plans, work on rail line relocation projects, corridor preservation and safety initiatives. The federal funds available for rail come through the Federal Railroad Administration section of USDOT except for FHWA Section 130 Railway-Highway Crossings funds. State funding is provided on a non-recurring basis for Rail Industrial Access Program and the Shortline Infrastructure Assistance Program. NCDOT administers the following freight rail grant programs:

- The Rail Industrial Access Program provides state grants for new or expanded industries to construct or refurbish tracks, which connect their plant to the railroad. This grant program supports and encourages local or regional economic development. NCDOT began the Rail Industrial Access Program to help ensure that companies have the railroad tracks needed to transport freight and materials. Eligible applicants include local governments, community development agencies, railroad companies, and private industries. Funding for the projects is contingent upon application approval prior to the industry making its decision to locate or expand their facilities in the state and the availability of private or local matching funds. Historically \$1 million has been available for awards each year.
- The Short Line Infrastructure Assistance Program provides grant funding to smaller volume railroads in the state. Grants can be used for track upgrades and maintenance. This program also provides funding to assist in obtaining federal rail freight assistance grants or loans. NCDOT provides a 50 percent match of the total project cost for eligible recipients. State funding authorized for the program has ranged from \$0 to \$2.5million annually and is appropriated in the State Budget each year. Shortline Infrastructure Assistance Program funding has decreased from \$1.5 million in FY 2006 to \$0.4 million in FY 2011.
- The Corridor Preservation Program is used to monitor short line and Class I rail corridors that have limited traffic to ensure that strategic rail corridors are preserved for future use, be it public use or corridors that have a potential to be returned to service. The Rail Corridor Preservation Act, passed by the General Assembly in 1988, gave NCDOT the authority to purchase railroads and preserve rail corridors for “future rail use and interim compatible uses” (NCDOT Rail Division: <http://www.bytrain.org/corridor/>). NCDOT holds title to more than 100 miles of rail that are preserved for future use. Since the 1920s, many miles of valuable rail corridors have been abandoned in North Carolina, and this “repurchasing” program has the ability to return them to productive freight uses. The Piedmont and Northern Railway between Mount Holly, Gastonia and Belmont was purchased and has been rehabilitated by NCDOT and returned to service in 2012 through a lease with Patriot Rail.

- The NCDOT, in partnership with NCR, NS, and CSXT, has been actively upgrading existing rail corridors to improve safety, efficiency, and capacity for freight and passenger train services. The first phase of improvements was implemented along the NCR corridor. The NCDOT provided the preliminary engineering and design plans and is paid for all of the rail improvements with state and federal transportation funds. Norfolk Southern provided the final plans and completed the actual construction. . Complex organizational coordination has been required among the four involved entities: NCDOT (design and fund), NCR (owner of right-of-way), NS (operator), and Amtrak (intercity passenger operator). The current Piedmont Improvement Program is being funded through the American Recovery and Revitalization Act (ARRA) and the High-Speed Intercity Passenger Rail (HSIPR) program. These passenger improvements also provide benefits to freight movements.
- Safety includes two components: track and equipment inspections and the crossing safety program. In partnership with the FRA, NCDOT is responsible for inspecting nearly 3,400 miles of track and signal systems and all rolling stock. NCDOT also invests significant funding to increase rail safety and reduce the number of accidents and fatalities at the 3,703 open public at-grade crossings across the state. In 2008, 64.6 percent (or 1,988) of those crossings had gates and flashing-light signals. The Rail Division works with FHWA to signalize or consolidate and close crossings where possible. The average cost of installing mechanical warning devices on at-grade railroad-highway crossings is between \$170,000 and \$200,000. Based on available funding, as many crossings as possible are selected for improvement each year. Annual funding has averaged \$10 million in recent years, with some funding increases provided through the federal Transportation Equity Act. **Table 7-3** shows the statewide railroad grade crossing statistics between 2005 and 2010. Since the 2004 STP, rail safety overall has trended slightly down, collisions have been reduced by nearly 26 percent, fatalities have been reduced from six to one, and injuries have slightly increased by 6 percent. State VMT has increased by nearly 7 percent during the same period.<sup>28</sup>

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<sup>28</sup> Highway Statistics (VM-2) and NCDOT TPB

**Table 7-3. North Carolina Freight Rail Railroad Grade-Crossing Statistics, FY 2005-2010**

Fiscal Year	Collisions	Fatalities	Injuries	Trespasser Incidents	Trespasser Fatalities	Trespasser Injuries
2010	49	1	35	33	18	15
2009	55	8	28	29	15	14
2008	69	8	27	36	17	19
2007	68	5	20	37	21	16
2006	75	8	23	35	21	14
2005	66	6	33	30	18	12

Source: FRA, Office of Safety Analysis

### 7.1.3 Changes since Prior Plan

Since the 2004 statewide plan effort, the following new federal and state programs, legislation, and funding sources relevant to freight rail have been established.

#### Federal Level

- SAFETEA-LU has allocated a significant portion of funding for freight rail transportation from 2005 to 2009.
- FHWA has served as the lead agency on many state rail system projects because they have more robust staff resources than the FRA. FHWA is involved in safety improvements as related to railway grade crossings through Section 130 of its Highway Safety Program.
- The Rail Safety Improvement Act of 2008 updated safety regulations and authorized the installation of new train control systems on all routes that handle certain classes of hazardous materials. The new regulations take effect at the end of 2015.

#### State Level

- The House Select Committee on a Comprehensive Rail Service Plan for North Carolina was established in 2008 to study development of a comprehensive rail plan. Relevant freight rail needs identified by the committee include rail capacity to promote economic development, better service for the military and ports, accommodating heavier rail cars (286,000 pounds), and addressing rail and highway congestion.
- The 21st Century Transportation Committee was established by the 2007 General Assembly to study transportation infrastructure across North Carolina. In its 2009 final report, the Committee recommended:
  - Accelerated use of rail for freight transport
  - Investment in rail connections to intermodal facilities and inland ports
  - Restoration of abandoned rail lines
  - Expansion and upgrading of passenger, freight, commuter, and short line service

- The General Assembly instructed the Office of State Budget and Management in 2007 to develop a Statewide Logistics Plan that addresses the state’s long-term economic, mobility, and infrastructure needs. Short- and mid-term freight rail-specific recommendations in the plan include:
  - Encourage the Crescent Rail Corridor (0 to 5 years)
  - Retain existing rail corridors; halt track removal (0 to 5 years)
  - Support short line infrastructure improvements (0 to 5 years)
  - Coordinate schedules to optimize freight and passenger services (5 to 15 years)
  - Create a Charlotte to Wilmington multimodal corridor (5 to 15 years)
  - Expand high-use corridor capacity (5 to 15 years)
- NCDOT has pursued multiple initiatives to increase safety on the state’s freight rail systems. These new programs include Crossing Hazard Elimination Program, Sealed Corridor Program, Private Crossing Safety Initiative, and Safety Oversight Program. These programs are described in more detail in Chapter 6.

Improvements to the designated Southeast High-Speed Rail Corridor in North Carolina will benefit freight transportation, double (or triple) tracking will increase the existing capacity and freight movement efficiency in the affected areas, and the Sealed Corridor Program will improve trackside safety. Major strategic freight rail transportation initiatives will benefit freight rail; these include the NS Crescent Corridor, the CSXT National Gateway, the doubling of the CSXT intermodal yard in Charlotte and the relocation of the NS intermodal yard in Charlotte, a \$100 million joint venture among NS, the state, the City of Charlotte, the federal government, and the Charlotte Douglas International Airport. These initiatives will improve efficiency and cost-effectiveness of the freight rail network.

#### **7.1.4 Trends and Forces**

A sampling of trends and forces that have had an influence in recent years, or which are anticipated to drive modal needs and the ability to solve those needs, are as follows:

- The Statewide Logistics Plan acknowledged the role that railroads can play in supporting freight movements within, to and from, and through North Carolina, and how this can shift some traffic off the highways via truck.
- FRA Positive Train Control implementation will be an important safety initiative over the near term; however, many deployment issues are still being refined.
- Coordinated efforts with the freight railroads will continue to be paramount to balancing freight and passenger rail needs in dual-use corridors. Development of mutually beneficial projects addressing safety, capacity, and speed will continue to be critical.

- Railroad companies have successfully maintained and expanded their networks through sizable reinvestment of capital but have been open to public partnerships to advance common interests.
- Railroads are reporting increased intermodal traffic (hauling containers and truck trailers on rail cars), and while freight movement by truck is forecast to continue increasing in volume, the rail intermodal service is an important component in optimizing the impacts of surface freight shipments on system capacity.
- While NCDOT has had a minor role historically in funding freight railroad improvements, the Department has increased its focus on corridors with shared freight and passenger rail usage and statewide freight logistics.

## **7.2 Performance**

### **7.2.1 Performance Standards**

Beginning in 2008, NCDOT has annually evaluated its organizational effectiveness based on numerical performance measures aligned with its mission, goals, and values. Each performance measure is associated with one of five institutional goals, of which three are related to the transportation network and two are internal administrative goals. The three transportation network performance goals are to improve safety, mobility, and infrastructure health. Over the past 3 years of the annual evaluation process, the Department has refined and updated its performance measures and performance targets.

To date, no performance metric specifically for freight rail has been tracked by NCDOT. On its list of executive performance measures, the Department tracks passenger rail mobility by the number of passenger trains that departed on schedule and measures the rail service customer satisfaction index.

### **7.2.2 Existing Performance**

In 2008, the NCDOT Rail Division, in conjunction with the SPOT, developed LOS performance categories and associated financial needs for freight rail infrastructure as part of the biannual Prioritization process for the STIP. This assessment scored the ability of rail (including both passenger and freight) to address mobility health goals at the Statewide tier level (example projects would include double-tracking rail line or new stations). For the current Prioritization cycle, the adopted rail (passenger and freight) measure is the parameter: “Projects which advance Interstate/Intrastate Rail Connections.” Existing rail performance was scored at LOS D for the mobility investment goals at the Statewide tier in 2008 and again in 2011 level (example projects would include double-tracking rail line).

## **7.3 Current Deficiencies**

### **7.3.1 Basis for Deficiencies**

In 2008, the Rail Division, in conjunction with SPOT, developed LOS performance categories and associated financial needs for freight rail infrastructure. The Rail Division and SPOT performance analysis was recently updated with Prioritization 2.0 figures, used to derive current freight rail deficiencies for

the 2040 Plan. Because the 2040 Plan analysis uses estimates provided by private railroads and the NCDOT Rail Division for this analysis, the resulting 30-year LOS framework for freight rail needs is consistent with the 10-year Prioritization 2.0 estimates.

The SPOT numbers are similar to the rail needs estimates in the NCDOT Rail Plan 2009. The freight rail portion accounts for \$1.13 billion, or around 19 percent, of the \$5.9 billion in defined rail modal needs, and include:

- \$488 million in rail safety projects
- \$439 million for CSXT, NS, and NCRP improvement needs
- \$205 million for shortline railroad-related projects

### 7.3.2 Changes since Prior Plan

In 2006, a NCDOT Mid-Cycle Update to the needs estimates in the 2004 STP identified 25-year passenger system needs to the year 2030. In the analysis, needs were calculated for both capital and operating cost components, by the improvement types of preservation, modernization, and expansion, at the Statewide and Regional tiers. The 25-year freight rail needs total \$799 million. Improvements to track operated by Class I railroads represented two-thirds of the future needs, and 56 percent were located on the Statewide tier. Short line rail improvements represented 24 percent of the future needs, and 100 percent were on the Regional tier. However, none of the identified needs were identified as current deficiencies, and thus would be accruing needs. Although the needs update in 2006 identified freight rail needs at the Subregional tier, the NCMIN classification has since been revised, and the Subregional tier is no longer applicable to freight rail (the revised classification was shown in **Table 7-2**).

The 2040 Plan identifies 30-year freight rail needs in 5-year increments to the year 2040. The current deficiencies are identified separately from accruing needs and are included in total freight rail modal needs.

## 7.4 Summary of Modal Needs

The accruing freight rail modal needs estimates were developed by the NCDOT Rail Division with input from railroad companies. As shown in **Tables 7-4** and **7-5** and **Figure 7-2**, the 30-year freight rail needs total \$1.34 billion. All identified freight rail needs are accruing needs. At \$1.03 billion, existing corridor needs represent 76 percent of freight rail needs, with the remaining \$317 million, or 23 percent of the total need, allocated to new corridors.

The identified freight rail needs are entirely on the capital costs side, with no identified operating cost needs as the information is unavailable from the private companies. Freight rail needs are largely concentrated during Phase 2 of the 2040 Plan, with freight rail access improvements to North Carolina ports weighing in on the total projected need within that 5-year span. As shown in **Figure 7-2**, estimated freight rail needs will be spread evenly across the other five phases of the 2040 Plan, at \$184 million in estimated need per phase.

The largest single identified future freight rail expenditure is for improvements to short line railroads across the state, with an estimated \$387 million in capital costs in the 2011-2040 time period, or 29 percent of the total need, as shown in **Table 7-5** and **Figure 7-3**. Shortline railroads typically started with infrastructure that had not been maintained well and have current profits that only support minimal improvements. Other large identified future projects include the CSXT A-line and North Carolina intermodal improvements, and port access improvements. Notably, the NCDOT Rail Division estimates call for \$150 million to promote economic development in areas of the state that are underserved by freight rail access but have a potential to grow the economy and improve the economic fabric of the community with improved access. NCDOT is also projecting to allocate \$5 million to each of the six phases of the 2040 Plan to return corridors to service.

**Table 7-4. Freight Rail Needs by 5-Year Increments (\$ in Millions)**

Need Category	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
Existing Corridors								
Capital	-	154	154	179	179	179	179	1,027
Operating	-	-	-	-	-	-	-	-
<b>Subtotal Existing</b>	-	<b>154</b>	<b>154</b>	<b>179</b>	<b>179</b>	<b>179</b>	<b>179</b>	<b>1,027</b>
New Corridors								
Capital	-	30	267	5	5	5	5	317
Operating	-	-	-	-	-	-	-	-
<b>Subtotal New</b>	-	<b>30</b>	<b>267</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>317</b>
Total Capital	-	184	421	184	184	184	184	1,344
Total Operating	-	-	-	-	-	-	-	-
<b>Total Rail Freight</b>	-	<b>184</b>	<b>421</b>	<b>184</b>	<b>184</b>	<b>184</b>	<b>184</b>	<b>1,344</b>

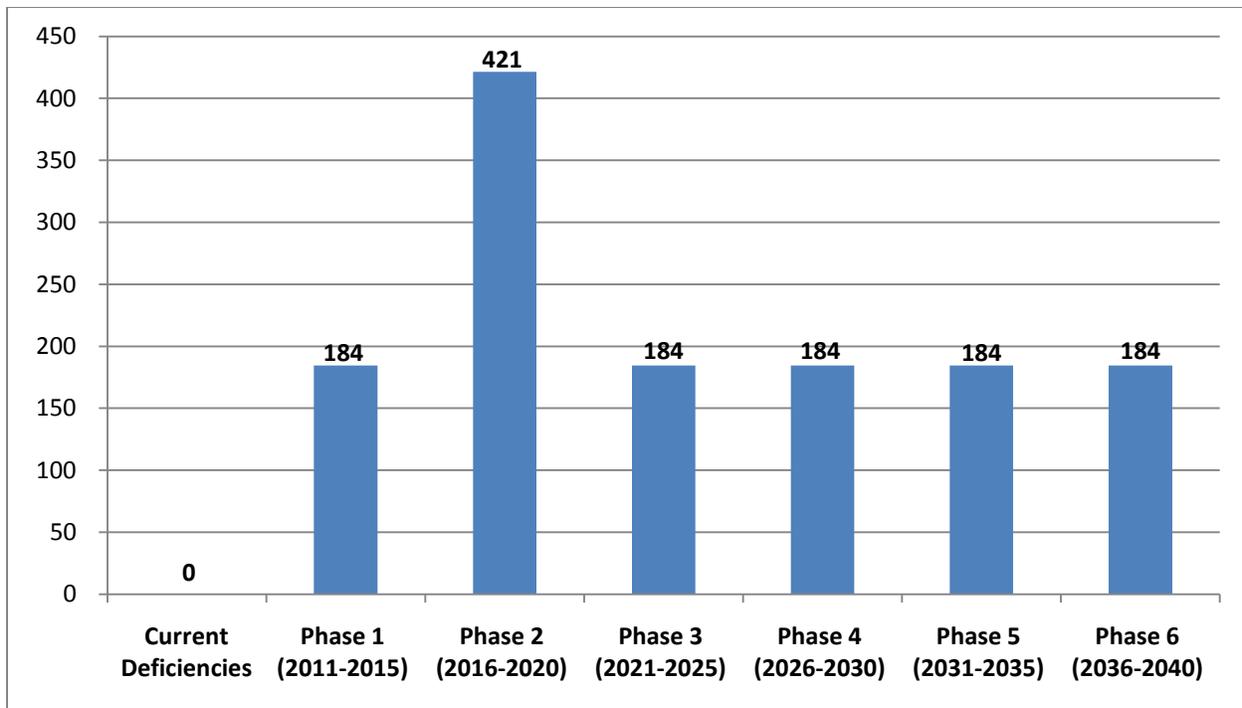


Figure 7-3. Freight Rail Needs by 5-Year Increments (\$ in Millions)

Table 7-5. Freight Rail Needs by 5-Year Increments: by Program (\$ in Millions)

Program	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
Short line railroads		64	64	64	64	64	64	387
CSXT A-line		41	41	41	41	41	41	247
NS Intermodal		38	38	38	38	38	38	226
Port Access Improvements-Class I			177					177
Economic Development Program		25	25	25	25	25	25	150
Rail Industrial Access Program		11	11	11	11	11	11	68
Port Access Improvements-NCDOT			60					60
Return Corridors to Service		5	5	5	5	5	5	30
<b>Total</b>	-	<b>184</b>	<b>421</b>	<b>184</b>	<b>184</b>	<b>184</b>	<b>184</b>	<b>1,344</b>

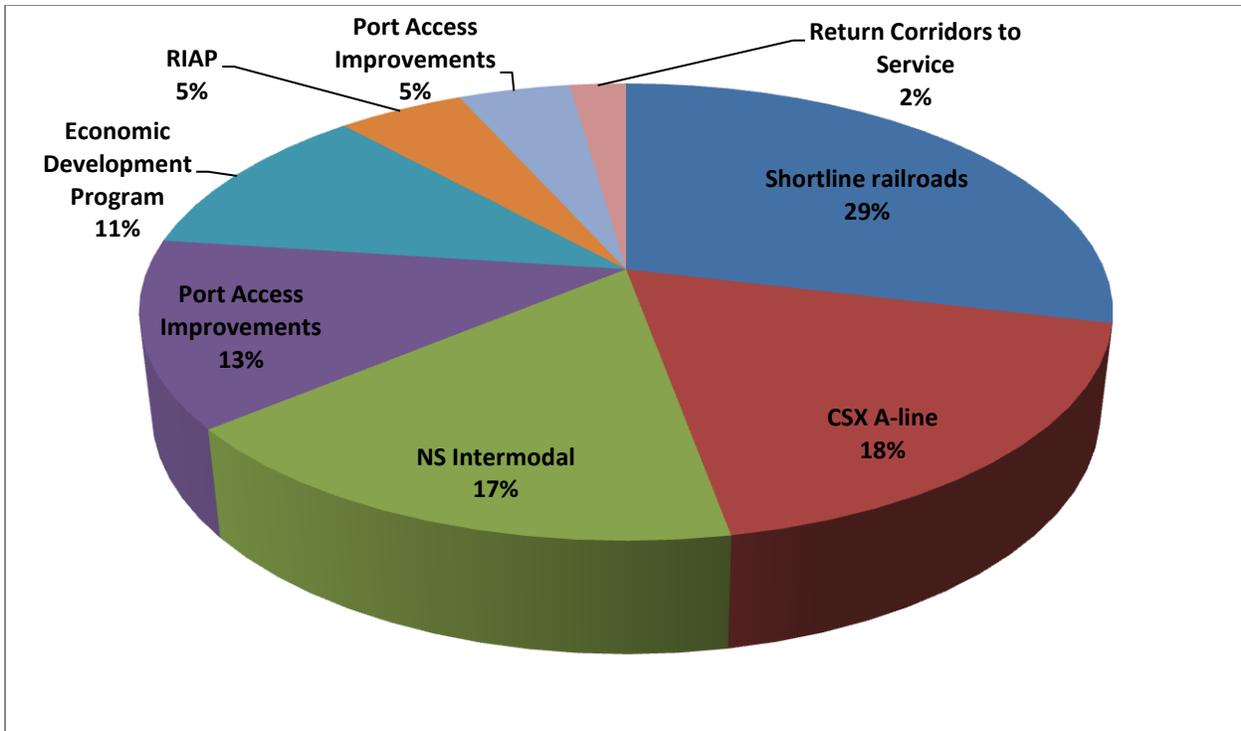


Figure 7-4. Freight Rail Needs by Program (\$ in Millions)

### 7.4.1 Needs by Investment Goal

By investment goal, as shown in **Table 7-6**, 100 percent (\$1.34 billion) of identified freight rail needs are mobility needs.

**Table 7-6. Freight Rail Needs by Investment Goal (\$ in Millions)**

Investment Goal	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
Mobility	-	184	421	184	184	184	184	1,344

The Seven Portals Study Draft Final Report, prepared for the Governor’s Logistics Task Force and released in August 2011, recommended that the state arrange for more and better competitive rail service to increase statewide freight mobility. The study argues that the state needs a strategic plan that relies on partnerships with short lines for shared right-of-way. To that end, North Carolina should grow its support of short lines, play a greater role in rail network planning and service provision on shared right-of-way, and work with the Class I railroads. The state should also make better use of the NCR. The NCR could help build statewide rail service that provides greater accessibility, higher capacity, better competitive rates, shorter haul lengths, and more frequent service.

The Seven Portals Study suggests that the statewide freight rail investment strategy should concentrate on meeting two objectives:

- Have a high-quality railroad network that connects to all the major locations of industrial activity in the state.
- Obtain high quality service at reasonable rates from the railroads that operate those lines, whether they are Class I railroads or short lines.

#### 7.4.2 Needs by North Carolina Multimodal Investment Network Tier

In the NCMIN breakdown, 64 percent, or \$860 million, of identified freight rail needs are on the Statewide NCMIN tier, as shown in **Table 7-7** and **Figures 7-7** and **7-8**. These are classified as freight lines of strategic importance as determined by the Rail Division. All other freight lines are considered to be on the regional tier, and account for 36 percent, or \$484 million, of the total need. The Statewide tier needs are projected to be most prominent during Phase 2 of the 2040 Plan, while the identified needs on the regional tier are spread fairly evenly throughout the 30-year span of the STP.

The NCDOT Rail Division currently determines which rail lines are of strategic importance to be included on the Statewide freight rail tier. The Seven Portals Study Draft Final Report recommended a tiered network approach to railroad network planning in North Carolina. The report notes that the state has at least two “Interstate” quality (high performance) rail lines:

- CSXT north-south main line from Petersburg (Virginia) through Rocky Mount, Selma, and Fayetteville to Florence (South Carolina).
- NS north-south main line from Lynchburg (Virginia) through Danville, Greensboro, and Charlotte to Greenville (South Carolina).

The study suggests that the state might want to designate additional east-west high-performance lines. The Seven Portals Study identifies site-specific improvements important from the logistics perspective; these needs include the line from Goldsboro to Wilmington, getting two-carrier service to both the Port of Wilmington and Morehead City to complete the branch that services the Military Ocean Terminal Sunny Point facility, providing more direct service to the Port of Wilmington, simplifying the rail alignments through Charlotte, and restoring the second track on sections with single track between Raleigh and Charlotte and along the entire length of the CSXT main line.

**Table 7-7. Freight Rail Needs by North Carolina Multimodal Investment Network Tier (\$ in Millions)**

NCMIN Tier	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
Statewide	-	104	341	104	104	104	104	<b>860</b>
Regional	-	81	81	81	81	81	81	<b>484</b>
<b>Total</b>	-	<b>184</b>	<b>421</b>	<b>184</b>	<b>184</b>	<b>184</b>	<b>184</b>	<b>1,344</b>

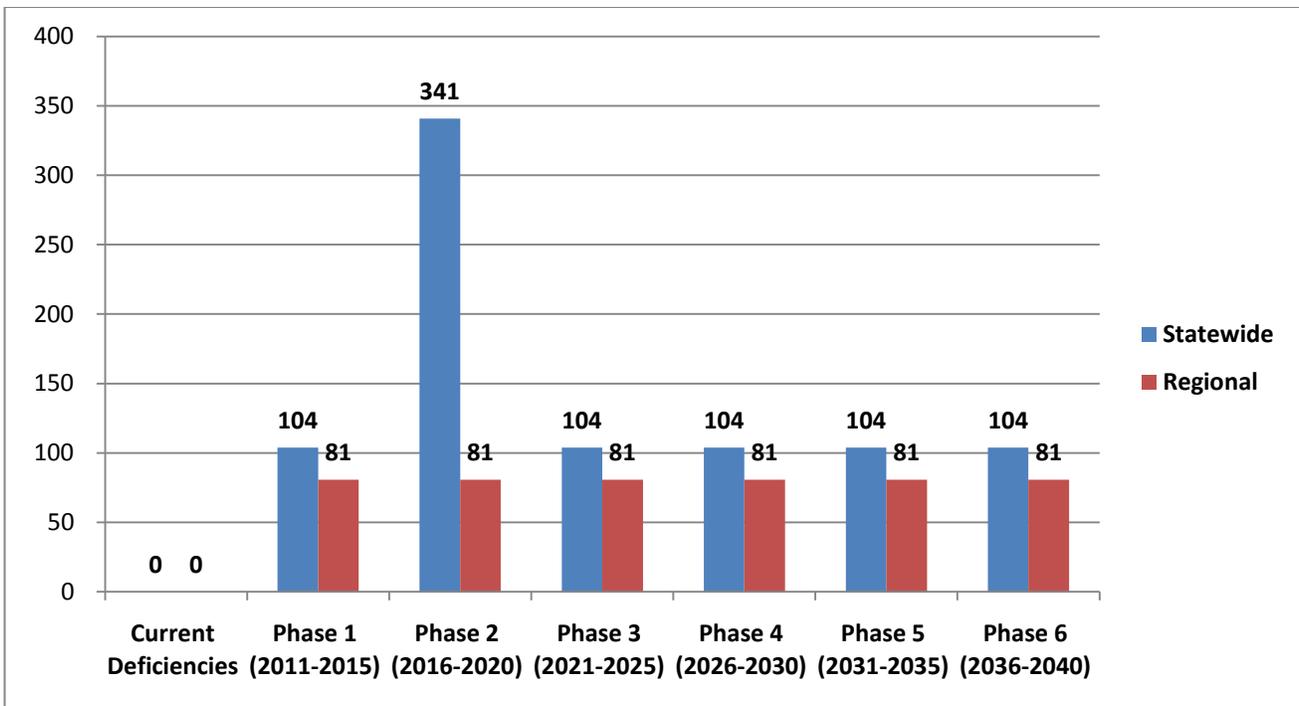


Figure 7-5. Freight Rail Needs by North Carolina Multimodal Investment Network Tier by 5-Year Increments (\$ in Millions)

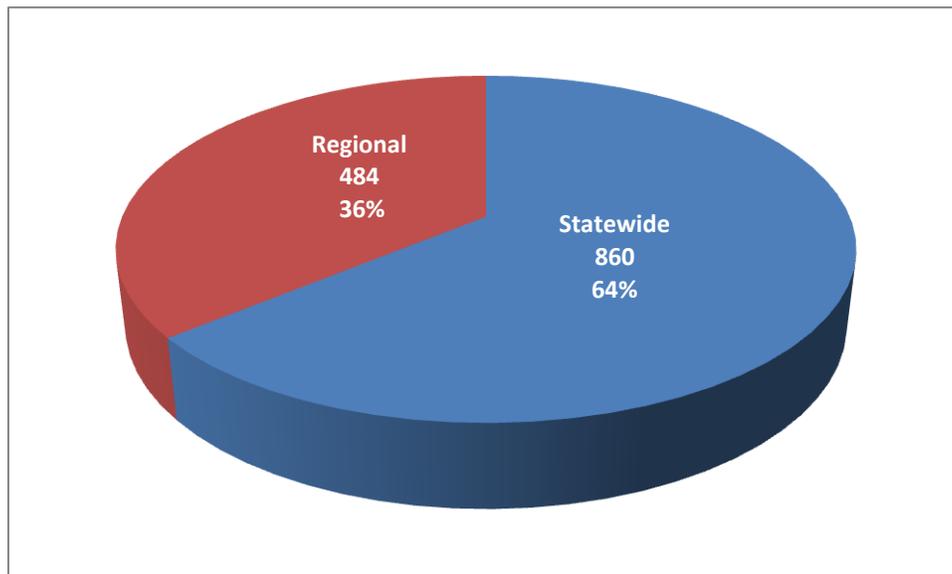


Figure 7-6. Freight Rail Needs by North Carolina Multimodal Investment Network Tier (\$ in Millions)

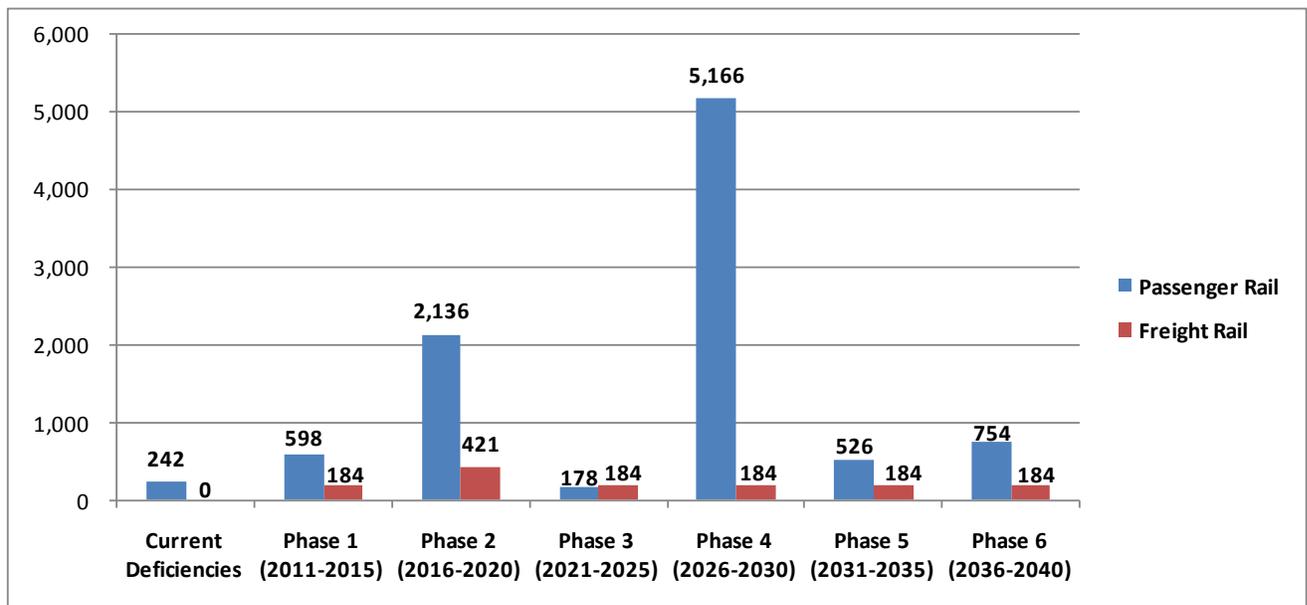
## 7.5 Summary of Passenger and Freight Rail Modal Needs

The combined passenger and freight modal needs estimates are shown in **Table 7-8** and **Figures 7-5** and **7-6**. The 30-year passenger (including intercity rail and commuter rail) and freight rail needs total \$10.94 billion, with \$9.60 billion, or 88 percent, allocated to passenger rail needs and \$1.34 billion, or 12

percent, allocated to freight rail needs. Passenger rail needs are projected to be largely concentrated during Phase 4 of the 2040 Plan, while freight rail needs will be most pronounced during Phase 2 of the STP.

**Table 7-8. Passenger and Freight Rail Needs by 5-Year Increments (\$ in Millions)**

Type	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
Intercity Passenger Rail	242	1	1,024	46	5,033	114	599	7,059
Commuter Rail	-	596	1,112	132	133	412	155	2,540
Subtotal Passenger Rail	242	597	2,136	178	5,166	526	754	9,599
Freight	-	184	421	184	184	184	184	1,344
<b>Total</b>	<b>242</b>	<b>782</b>	<b>2,558</b>	<b>362</b>	<b>5,350</b>	<b>711</b>	<b>938</b>	<b>10,943</b>



**Figure 7-7. Passenger and Freight Rail Needs by 5-Year Increments (\$ in Millions)**

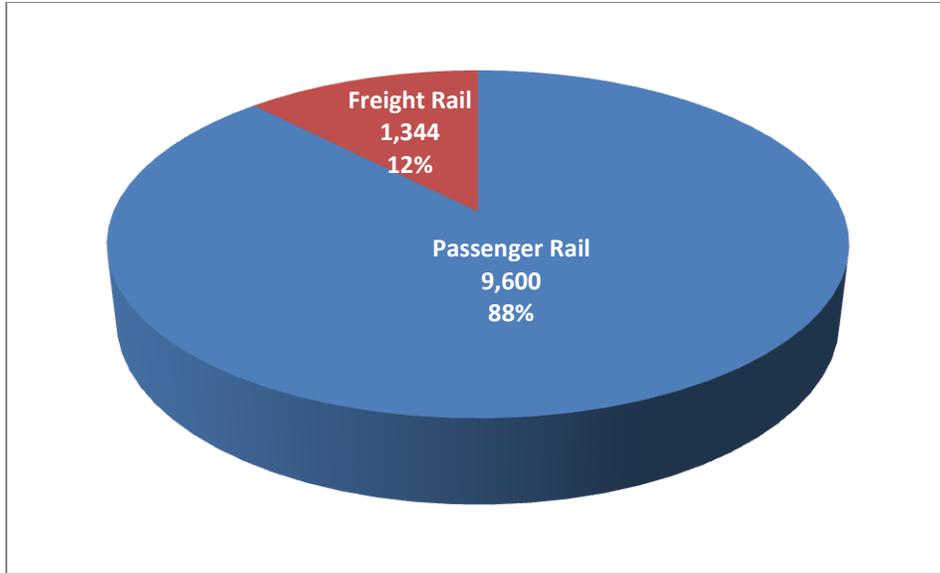


Figure 7-8. Passenger and Freight Rail Needs (\$ in Millions)

# Chapter 8

## Ferries

### 8.1 Existing Conditions

#### 8.1.1 Inventory Summary

The NCDOT Ferry Division currently operates seven routes along North Carolina’s coastline. The Ferry Division’s existing mission is to provide safe, cost effective and dependable service for the traveling public. The routes and corresponding schedules are summarized in **Table 8-1**. These routes serve work and school commuting, recreational travel, and freight delivery to island communities. Ferries also provide emergency services including hurricane evacuation. The Division owns and maintains 21 ferry vessels and 13 ferry terminals in support of its routes, along with a dredge, crane barge, tug, and seven other support vessels and a shipyard.

**Table 8-1. Existing Ferry Routes**

Water Body	Terminal 1	Terminal 2	Distance (miles)	Sailing Time	One-Way Trips Per Day	
					Summer	Off-Peak
Pamlico Sound	Swan Quarter	Ocracoke South	30.0	2.50 hrs	8	4
Pamlico Sound	Cedar Island	Ocracoke South	26.0	2.25 hrs	12	8
Currituck Sound	Currituck	Knotts Island	5.0	45 min	12	12
Pamlico River	Bayview	Aurora	3.5	30 min	22	22
Cape Fear River	Southport	Fort Fisher	4.0	35 min	32	32
Hatteras Inlet	Hatteras	Ocracoke North	4.5	40 min	64	40
Neuse River	Cherry Branch	Minnesott Beach	2.0	20 min	65	65

The Statewide, Regional, and Subregional NCMIN tiers for the ferry system are shown in **Table 8-2**.

**Table 8-2. Ferry Tier Definitions in the North Carolina Multimodal Investment Network**

Statewide Tier	Regional Tier	Subregional Tier
Ferry routes connecting Statewide tier highway facilities	Ferry routes connecting Regional tier highway facilities	Ferry routes connecting Subregional tier highway facilities (no such routes at present)

Source: NCDOT NCMIN: [http://www.ncdot.org/download/performance/NCMIN\\_Definitions.pdf](http://www.ncdot.org/download/performance/NCMIN_Definitions.pdf)

All 21 of the existing ferry vessels are assigned to regular service routes, leaving no standby vessels for substitution when a vessel is taken out of service for inspection, maintenance, or incident. Of the

21 vessels, 10 have exceeded their intended service life of 20 years. An additional five are between 15 and 19 years old. Three are between 10 and 14 years old, and three are less than 10 years old. Ridership varies significantly by route due to differences in the size and nature of the communities served. Some routes serve primarily work and school commuters, while others have more demand from tourism. On these routes, ridership varies seasonally, and additional ferry runs are scheduled during the summer months to accommodate the increase in demand, as shown in **Table 8-3**.

**Table 8-3. Annual Ferry Ridership by Route, 2010**

Water Body	Terminal 1	Terminal 2	Ridership	
			Vehicles	Passengers
Pamlico Sound	Swan Quarter	Ocracoke South	27,123	61,939
Pamlico Sound	Cedar Island	Ocracoke South	65,116	157,004
Currituck Sound	Currituck	Knotts Island	24,247	78,936
Pamlico River	Bayview	Aurora	67,686	99,996
Cape Fear River	Southport	Fort Fisher	173,620	471,858
Hatteras Inlet	Hatteras	Ocracoke North	328,907	857,850
Neuse River	Cherry Branch	Minnesott Beach	247,400	427,592
<b>Summary</b>			<b>934,099</b>	<b>2,155,175</b>

Three of the seven routes currently charge a toll, and four are fare-free. **Table 8-4** summarizes existing toll rates. Annual passes are also available for commuters and frequent ferry users. In 2010, the Institute for Transportation Research and Education performed a study of the North Carolina ferry system that investigated potential increases to current toll rates and adding tolls to routes that are now fare-free. Currently, approximately six percent of total ferry system operations costs are returned through tolls.

**Table 8-4. Current One-Way Ferry Toll Rates (\$)**

	Swan Quarter–Ocracoke South Cedar Island– Ocracoke South	Southport–Fort Fisher
Pedestrian	1	1
Cyclist	3	2
Motorcyclist	10	3
Passenger vehicle	15	5
Vehicle/combination up to 40 feet	30	10
Vehicle/combination up to 65 feet	45	15

### 8.1.2 Changes since Prior Plan

One ferry vessel was replaced with a new vessel in 2006, and no other vessels were replaced or added. Accordingly, the number of vessels exceeding their service life of 20 years increased from eight to ten. Two new vessels are scheduled to enter into service in 2011, replacing the two oldest vessels in the fleet. The existing vessels will be retained as reserves. In 2008, the existing crane barge used for channel

maintenance was replaced with a new vessel built entirely in-house at the state-owned shipyard. A comparison of service frequency from the 2005 schedule to the current schedule is shown in **Table 8-5**.

**Table 8-5. Comparison of Service Frequency, 2005 to 2011**

Water Body	Terminal 1	Terminal 2	Peak Season One-Way Trips Per Day		
			2005	2009	2011
Pamlico Sound	Swan Quarter	Ocracoke South	6	4	8
Pamlico Sound	Cedar Island	Ocracoke South	18	8	12
Currituck Sound	Currituck	Knotts Island	6	6	12
Pamlico River	Bayview	Aurora	22	16	22
Cape Fear River	Southport	Fort Fisher	32	28	32
Hatteras Inlet	Hatteras	Ocracoke North	63	63	64
Neuse River	Cherry Branch	Minnesott Beach	74	50	65
<b>Summary</b>			<b>221</b>	<b>175</b>	<b>215</b>

Despite the reduction in service and accompanying drop in ridership in 2009, current overall ridership levels are approximately equal to 2005 levels cited in the previous plan. A comparison of passenger ridership from 2005 to 2010 is shown in **Table 8-6**. There were no fare changes over the 6-year period.

**Table 8-6. Comparison of Ridership, 2005 to 2010**

Water Body	Terminal 1	Terminal 2	Passenger Ridership		
			2005	2010	% change
Pamlico Sound	Swan Quarter	Ocracoke South	22,867	61,939	+170.9
Pamlico Sound	Cedar Island	Ocracoke South	98,947	157,004	+58.7
Currituck Sound	Currituck	Knotts Island	61,637	78,936	+28.1
Pamlico River	Bayview	Aurora	118,276	99,996	-15.5
Cape Fear River	Southport	Fort Fisher	495,029	471,858	-4.7
Hatteras Inlet	Hatteras	Ocracoke North	891,599	857,850	-3.8
Neuse River	Cherry Branch	Minnesott Beach	467,113	427,592	-8.5
<b>Summary</b>			<b>2,155,468</b>	<b>2,155,175</b>	<b>0.0</b>

### 8.1.3 Trends and Forces

A sampling of trends and forces that have had an influence in recent years, or which are anticipated to drive modal needs and the ability to solve those needs, are as follows:

- Recent major storm events on the North Carolina coast have raised awareness of both the tenuous nature of the ferry system and its critical role in both evacuation and storm recovery efforts. In an ongoing reworking of the Ferry Division’s mission and structure, increasing attention is being given to maintenance of terminals and channels, schedule adherence, and passenger safety. The newly emerging vision for ferries focuses on “state of good repair” and incorporates the four basic elements:
  - “Highway” maintenance (terminals and channels)
  - (Transit) operations

- Facility/Fleet management
- Emergency management
- Service frequency has fluctuated each year due to changes in state funding and U.S. Coast Guard staffing requirements. In 2009, the Coast Guard restricted the length of ferry worker shifts and increased the number of staff members required on vessels with more than 149 passengers, which caused the Division to temporarily decrease the number of runs per day on five of seven routes.
- Environmental Protection Agency Tier 3 diesel emission regulations require continued replacement of vessel power plants.
- Increased vessel inspection frequency by the Coast Guard takes vessels out of service, potentially affecting service frequency.
- An aging fleet and maintenance needs at the ferry terminals continue to pose needs for preserving a state of good repair for ferry infrastructure. The FTA has been placing increased emphasis on its State of Good Repair program.
- Due to vessel size, in some cases, peak demand cannot be satisfied due to insufficient deck space for occupants of passenger cars.
- Acquisition of two newer vessels will allow replaced vessels to serve as reserves in the event of mechanical breakdowns.
- Increases in fuel costs, vessels, and infrastructure renewal stress available funding resources.
- Fare increases may need to be considered to partially offset funding needs for operations and capital projects.
- While overall ferry use has been stable over recent years, population growth (including retirees) and increased tourism are expected to result in expanded terminal and fleet requirements.
- Security requirements may become more stringent, affecting staffing and operations costs, as well as possibly facility configurations.

## 8.2 Performance

### 8.2.1 Performance Standards

On the NCDOT list of executive performance measures, Ferry Division performance is measured by one mobility performance standard: system-wide average ferry service reliability. Reliability is measured by completed trips as a percentage of scheduled trips. Reasons that a scheduled trip may not be completed include mechanical problems with vessels, unsafe weather conditions, channel maintenance and dredging, and Coast Guard vessel inspection. In both FY 2010 and FY 2011, the division exceeded the target of 95% with performance measures of 97% and 98% for these two years, respectively. As described in the previous section, the Division has no standby vessels, which results in schedule disruptions any time one or more vessels are out of service.

### 8.2.2 Existing Performance

Current ferry service reliability for each route based on the 2010 Annual Performance Report is shown in **Table 8-7**. The system-wide average performance meets the target of 97 percent for 2010.

**Table 8-7. Existing Ferry Performance**

Terminal 1	Terminal 2	Scheduled Runs	Missed Runs			Reliability (%)
			Weather	Mechanical	Other	
Swan Quarter	Ocracoke South	1650	20	43	6	95.1
Cedar Island	Ocracoke South	3034	22	253	62	88.9
Currituck	Knotts Island	4,356	82	137	20	94.5
Bayview	Aurora	6,078	35	64	0	98.4
Southport	Fort Fisher	10,164	46	189	43	97.3
Hatteras	Ocracoke North	19,660	127	0	1	99.3
Cherry Branch	Minnesott Beach	19,940	520	121	27	96.6
System-Wide Average		64,882	852	807	159	97.2

**Legend**

Meets target

In 2008, the Ferry Division, in conjunction with SPOT Scored the existing ferry performance at an LOS C for the mobility investment goal at the Statewide and Regional tiers, and at an LOS B for the health investment goal at the Statewide and Regional tiers. In 2011, the SPOT updated its LOS performance categories; the existing performance for ferries was scored at an LOS C for all investment types, with the exception of mobility at the Regional tier, ranked at LOS B.

## 8.3 Current Deficiencies

### 8.3.1 Basis for Deficiencies

In 2008, the Ferry Division, in conjunction with SPOT, developed LOS performance categories and associated financial needs for the ferry system. The Ferry Division and SPOT performance analysis showed that for the ferry system to address mobility and health goals at the Statewide and Regional tiers there were needs totaling \$698 million to achieve an LOS A performance level. For the 10-year period of 2009-2018, the existing performance level was scored at an LOS B for Statewide and Regional tiers under mobility and an LOS C for Statewide and Regional tiers under health, which related to a combined funding level of \$214 million. The difference between LOS A and the then-current performance is \$484 million. The improvements were geared to new or replacement vessels and terminal infrastructure refurbishment. The Ferry Division and SPOT performance analysis was recently updated with Prioritization 2.0 figures, used to derive ferry deficiencies for the 2040 Plan. The total estimated cost of identified ferry needs to achieve an LOS A performance level improvements in the 10-year Prioritization 2.0 is \$809million, an increase of \$111 million from 2008 Prioritization 1.0 estimates. Because the 2040 Plan analysis uses estimates provided by the NCDOT Ferry Division, the resulting 30-year LOS framework for ferry needs is consistent with the 10-year Prioritization 2.0 estimates.

### 8.3.2 Changes since Prior Plan

In 2006, an NCDOT update to the needs estimates in the 2004 STP identified 25-year ferry system needs to the year 2030. In the analysis, needs were calculated for both capital and operating cost components, by the improvement types of preservation, modernization, and expansion, at the Statewide and Regional tiers. However, none of these identified needs were identified as current deficiencies but were treated as accruing needs. The 2040 Plan identifies 30-year ferry needs in 5-year increments to the year 2040. The current deficiencies are identified separately from accruing needs and are included in total ferry modal needs.

## 8.4 Summary of Modal Needs

The accruing ferry modal needs estimates were developed by the NCDOT Ferry Division. As shown in **Table 8-8** and **Figures 8-1** through **8-5**, the 30-year ferry needs total \$1.77 billion. At \$1.36 billion, the accruing needs represent 77 percent of all identified ferry needs, with current deficiencies accounting for \$404 million, or 23 percent of the total. As shown in **Figure 8-1**, the identified accruing ferry needs are spread fairly evenly among all phases of the 2040 Plan, with Phase 2 slightly ahead of the other phases and accounting for 14 percent of the total estimated need. As shown in **Figures 8-2** and **8-3**, the existing service needs account for 85 percent, or \$1.51 billion, of the identified ferry needs, while service expansion accounts for 15 percent, or \$262 million. This is due to all the existing ferry services in need of additional capacity in the future; as a result, future ferry needs will include new vessels for expanded service or vessel replacements with larger capacity. To accommodate future ridership increases, terminal infrastructure improvements (such as gantries, ramps, dolphins, mooring, and welcome centers) will be necessary.

Most of the cited improvements are projected to be on the operating side, at 77 percent, or \$1.36 billion, of the total, while capital improvements account for 23 percent, or \$413 million, of the total \$1.77 billion in identified ferry needs (see **Figure 8-4**). As shown in **Figure 8-5**, operating expenses are projected to remain at similar levels throughout the duration of the 2040 Plan, while capital costs are projected to be most pronounced during the first three phases of the 2040 Plan, from 2011 to 2025, accounting for 52 percent, or \$215 million, of the identified \$413 million in capital needs.

**Table 8-8. Ferry Needs by 5-Year Increments (\$ in Millions)**

Need Category	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
Existing Service								
Capital:								
Ramps/Gantries/Dolphins/Bulkheads	3	2	2	1	1	1	1	11
Facilities	14	1	4	4	5	12	18	59
Vessels	73	53	61	52	27	36	0	302
Subtotal Existing Capital	90	56	66	57	33	50	19	371
Operating:								
Operating Costs	208	109	109	109	109	109	109	863
Maintenance Costs	66	35	34	35	34	35	34	272
Subtotal Existing Operating	274	144	143	144	143	144	143	1,135
<b>Total Existing Service</b>	<b>363</b>	<b>200</b>	<b>209</b>	<b>201</b>	<b>176</b>	<b>194</b>	<b>162</b>	<b>1,506</b>
New/Expanded Service								
Capital:								
Ramps/Gantries/Dolphins/Bulkheads	0	0	0	0	0	0	0	0
Facilities	0	0	0	0	0	0	0	0
Vessels	6	14	21	0	0	0	0	41
Subtotal New/Expanded Capital	6	14	21	0	0	0	0	42
Operating:								
Operating Costs	24	22	22	22	22	22	22	154
Maintenance Costs	10	9	9	9	9	9	9	66
Subtotal New/Expanded Operating	34	31	31	31	31	31	31	220
<b>Total New/Expanded Service</b>	<b>40</b>	<b>45</b>	<b>52</b>	<b>31</b>	<b>31</b>	<b>31</b>	<b>31</b>	<b>262</b>
<b>Total Capital Needs</b>	<b>96</b>	<b>70</b>	<b>88</b>	<b>57</b>	<b>33</b>	<b>50</b>	<b>19</b>	<b>413</b>
<b>Total Operating Needs</b>	<b>308</b>	<b>175</b>	<b>174</b>	<b>175</b>	<b>174</b>	<b>175</b>	<b>174</b>	<b>1,355</b>
<b>Total Ferry Needs</b>	<b>404</b>	<b>245</b>	<b>262</b>	<b>232</b>	<b>207</b>	<b>225</b>	<b>193</b>	<b>1,767</b>

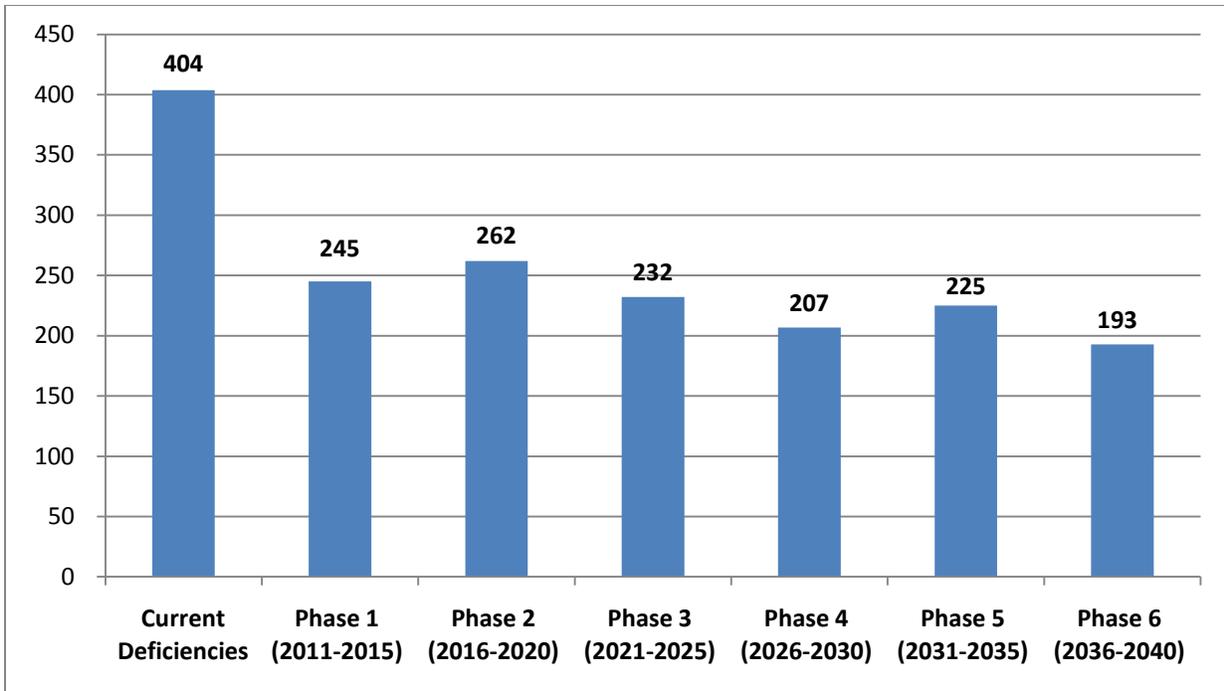


Figure 8-1. Ferry Needs by 5-Year Increments (\$ in Millions)

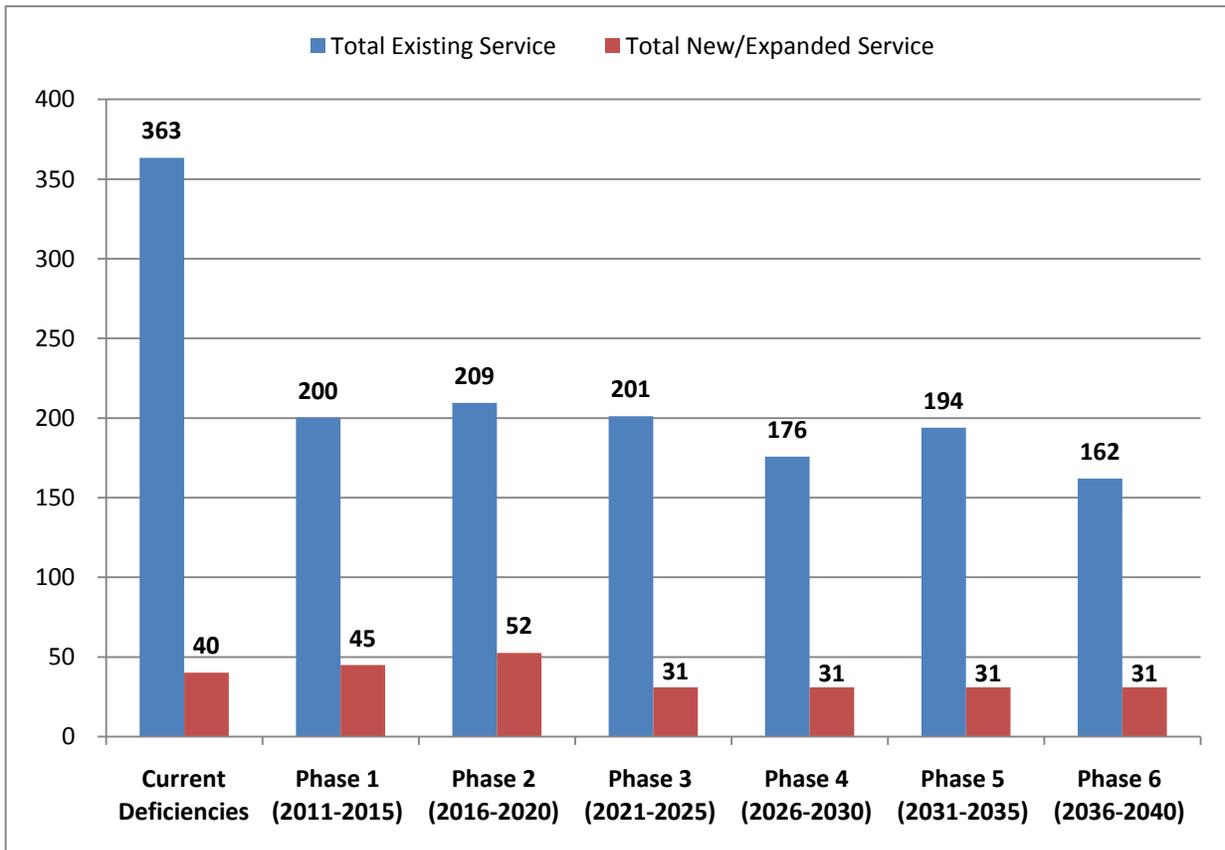


Figure 8-2. Ferry Needs by 5-Year Increments: Existing and New/Expanded Service (\$ in Millions)

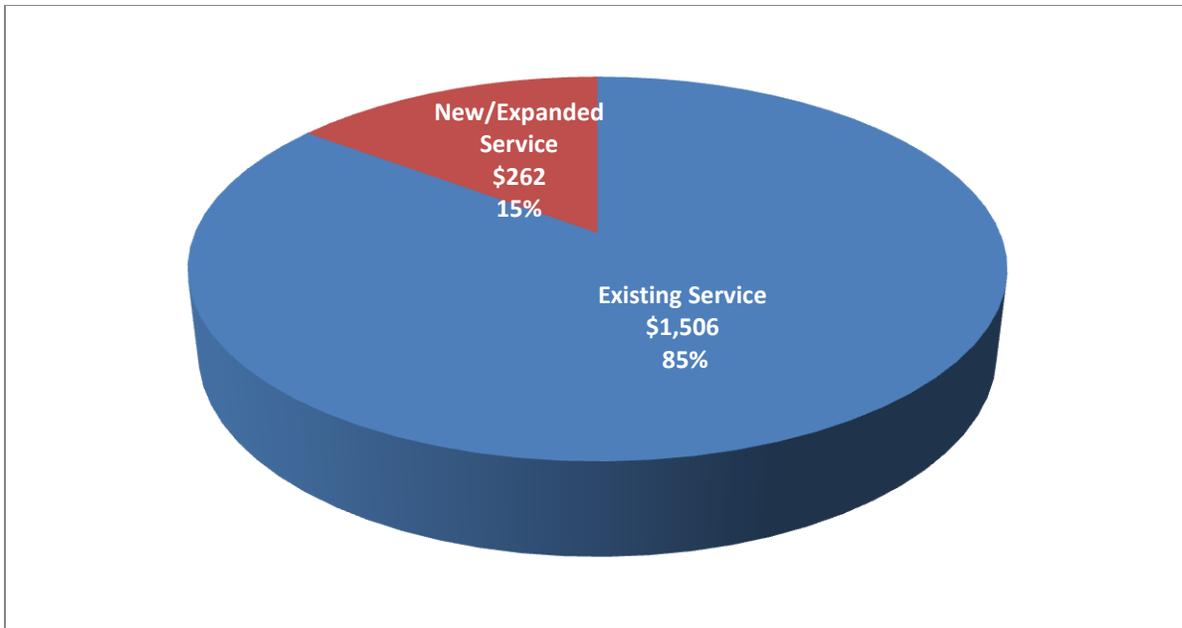


Figure 8-3. Ferry Needs: Existing and New/Expanded Service (\$ in Millions)

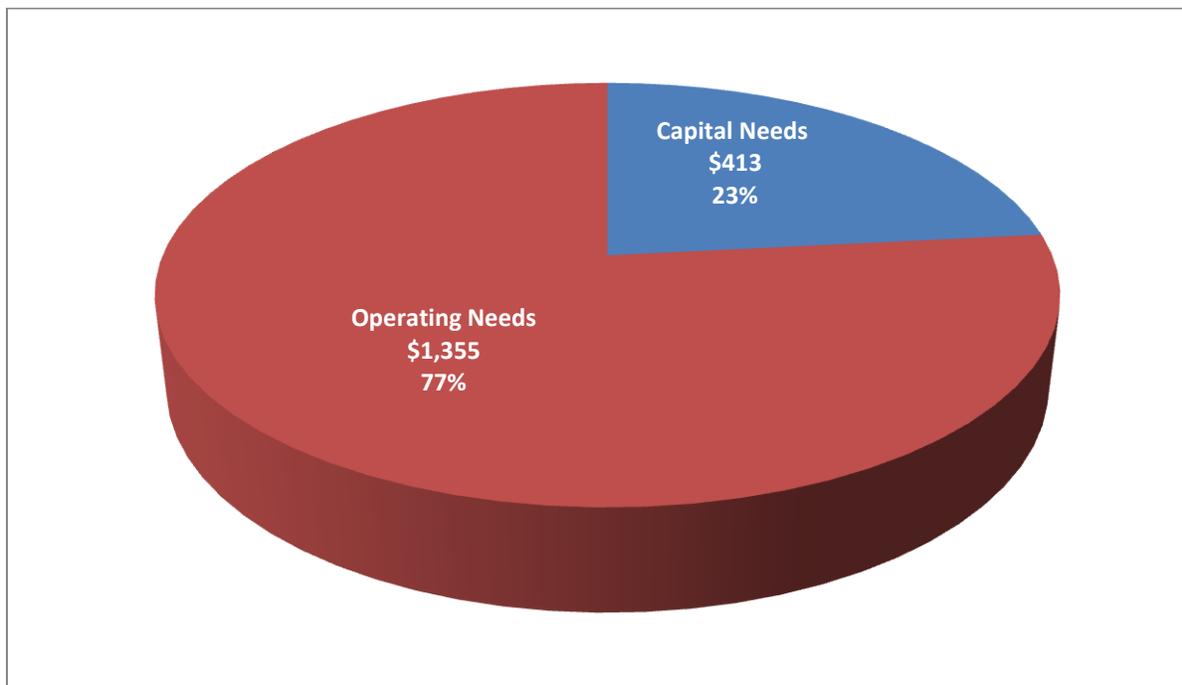


Figure 8-4. Ferry Needs: Capital and Operating (\$ in Millions)

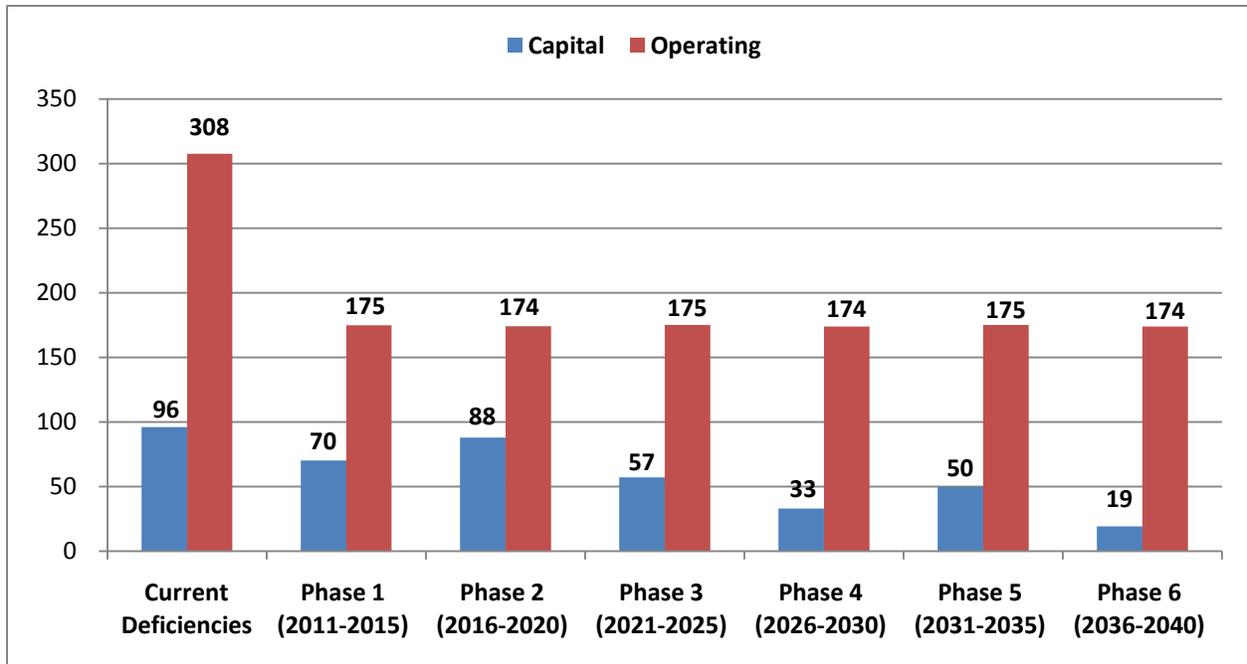


Figure 8-5. Ferry Needs by 5-Year Increments: Capital and Operating (\$ in Millions)

### 8.4.1 Needs by Investment Goal

Based on investment goal, as shown in **Table 8-9** and **Figures 8-6** and **8-7**, 85 percent (\$1.51 billion) of identified ferry needs are infrastructure health needs (e.g., new vessels for expanded service or vessel replacements with larger capacity; terminal infrastructure improvements), while 15 percent (\$262 million) are mobility needs (e.g., new vessels or improvements to terminals for new capacity). There are no identified safety improvements for the 2040 Plan. The majority of identified needs are for mobility ferry improvements, nearly 85 percent of the total. Accruing needs for infrastructure health represent 76 percent of all identified health ferry needs. The accruing mobility and infrastructure health ferry needs are programmed fairly evenly throughout the duration of the 30-year Plan.

**Table 8-9. Ferry Needs by Investment Goal (\$ in Millions)**

Investment Goal	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
Mobility	40	44	52	31	31	31	31	<b>262</b>
Health	363	204	208	201	177	193	162	<b>1,509</b>
<b>Total</b>	<b>404</b>	<b>248</b>	<b>260</b>	<b>232</b>	<b>208</b>	<b>225</b>	<b>193</b>	<b>1,770</b>

Note: Ferry has no identified safety needs.

The Seven Portals Study Draft Final Report prepared for the Governor’s Logistics Task Force and the Governor’s Logistics Task Force Subcommittee Reports released in August 2011 noted the economic importance of ferry services provided by NCDOT, particularly their impact on supporting the generation of tourism revenue.

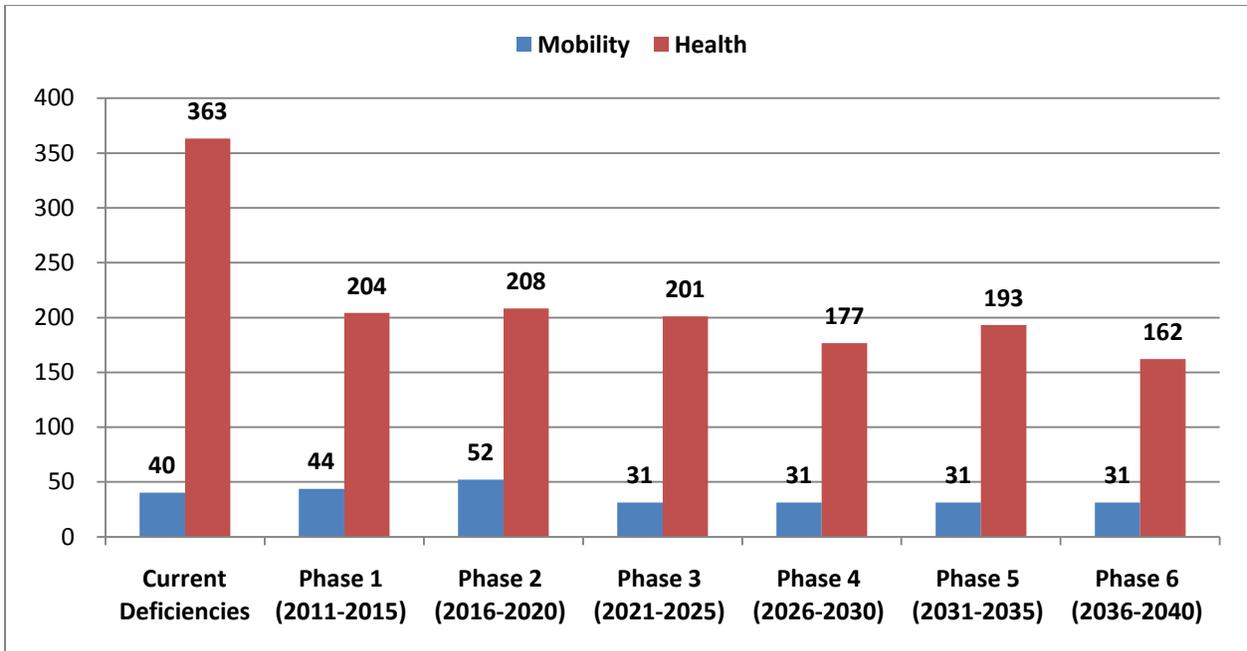


Figure 8-6. Ferry Needs by Investment Goal by 5-Year Increments (\$ in Millions)

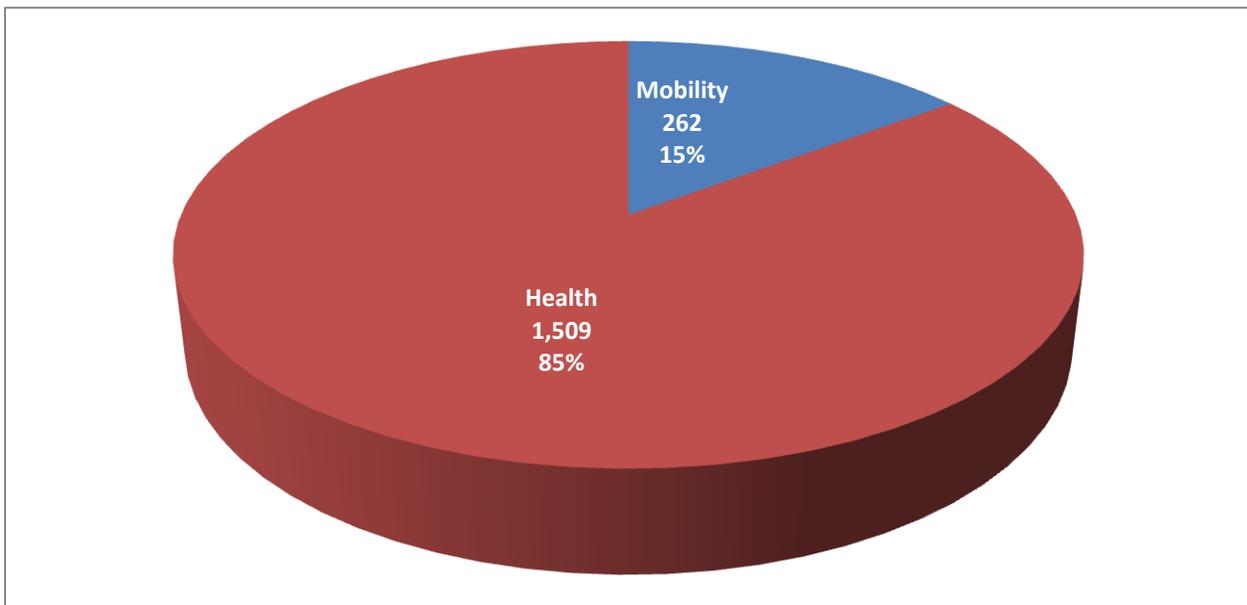


Figure 8-7. Ferry Needs by Investment Goal (\$ in Millions)

### 8.4.2 Needs by North Carolina Multimodal Investment Network Tier

In terms of the NCMIN breakdown, 67 percent (\$1.19 billion) of the identified ferry needs are on the Statewide NCMIN tier, while 33 percent (\$578 million) are on the Regional tier, as shown in **Table 8-10** and **Figures 8-8** and **8-9**.

The Statewide tier ferry routes are classified as ferry routes connecting Statewide tier highway facilities, as shown in **Table 8-11**. The three routes on the Statewide tier are critical in terms of connecting mainland North Carolina with the communities on the Outer Banks. The Regional tier ferry routes are classified as ferry routes connecting Regional tier highway facilities, and are also shown in **Table 8-11**. NCMIN lacks designated Subregional ferry routes. Statewide and Regional tier needs are spread fairly evenly throughout the six phases of the 2040 Plan, with the first two phases slightly ahead of the rest by the estimated need amount.

**Table 8-10. Ferry Needs by North Carolina Multimodal Investment Network Tier (\$ in Millions)**

Tier	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
Statewide	278	138	193	162	130	163	128	1,192
Regional	125	110	67	70	78	62	65	578
<b>Total</b>	<b>404</b>	<b>248</b>	<b>260</b>	<b>232</b>	<b>208</b>	<b>225</b>	<b>193</b>	<b>1,770</b>

**Table 8-11. Ferry Routes by North Carolina Multimodal Investment Network Tier (\$ in Millions)**

Tier	Route
Statewide	Hatteras to Ocracoke
Statewide	Ocracoke to Cedar Island
Statewide	Southport to Fort Fisher
Regional	Knotts Island to Currituck
Regional	Swan Quarter to Ocracoke
Regional	Bayview to Aurora
Regional	Minnesott Beach to Cherry Branch
Regional	Manns Harbor State Shipyard

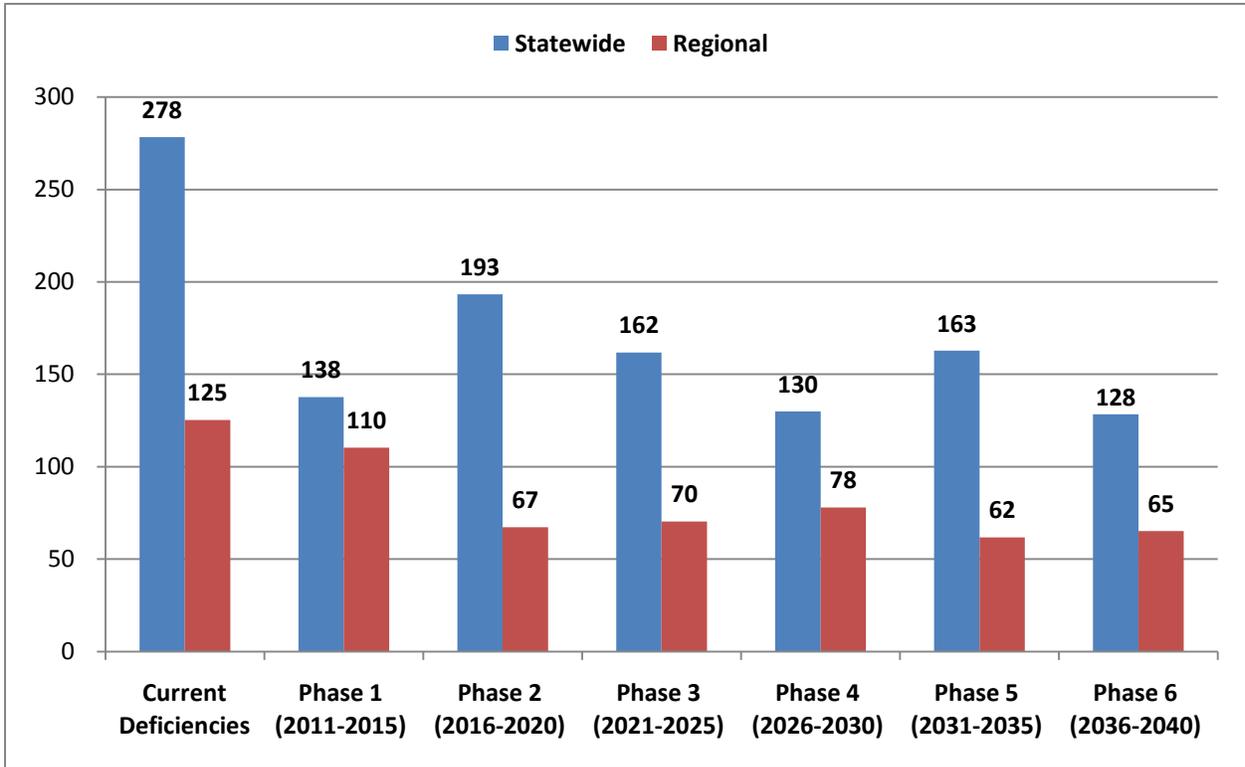


Figure 8-8. Ferry Needs by North Carolina Multimodal Investment Network Tier by 5-Year Increments (\$ in Millions)

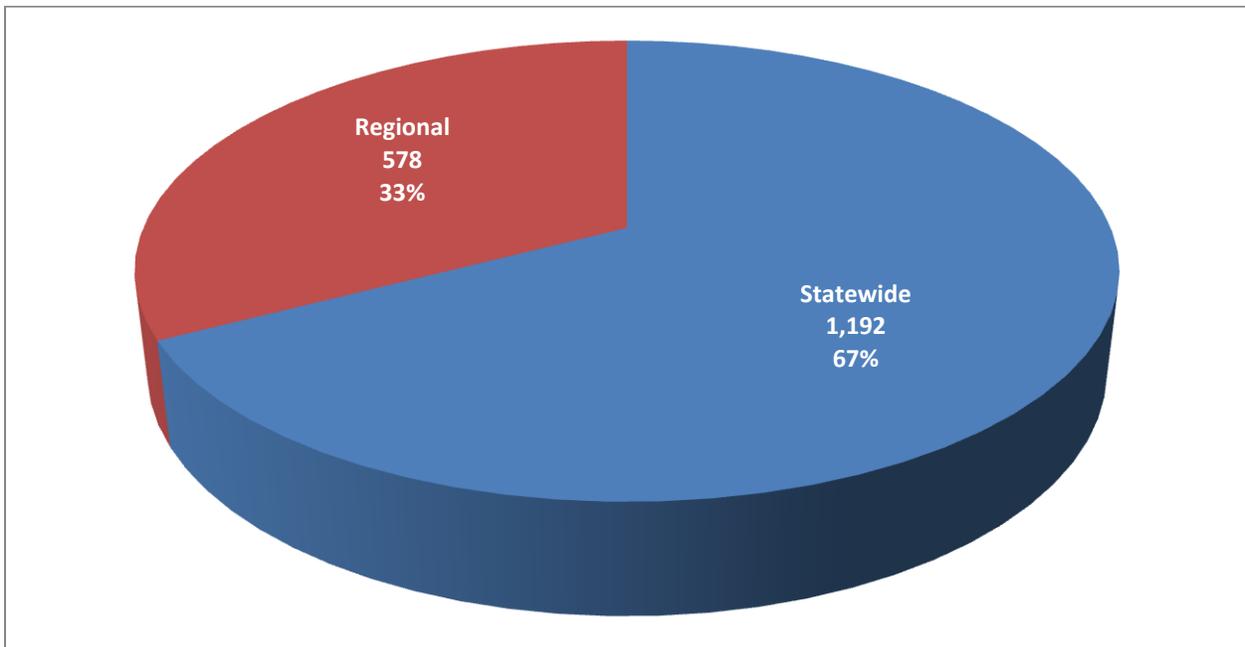


Figure 8-9. Ferry Needs by North Carolina Multimodal Investment Network Tier (\$ in Millions)



# Chapter 9 Bicycle and Pedestrian

## 9.1 Existing Conditions

### 9.1.1 Inventory Summary

#### Existing Facilities

Bicycle and pedestrian infrastructure in North Carolina includes both state and municipal facilities, which may be on-road or off-road. Dedicated on-road bicycle facilities include wide outside lanes, shoulders, and bicycle lanes. Bicyclists also use general-purpose lanes on roadways on which both motor vehicles and bicycles are allowed; these include all roadways in the state with the exception of controlled-access freeways. Dedicated on-road pedestrian facilities include sidewalks, crosswalks, curb-ramps, and pedestrian refuge islands. Pedestrians also use shoulders and unpaved areas adjacent to roadways in the absence of sidewalks. Off-road pedestrian and bicycle facilities include shared-use paths and trails, which can be adjacent to roadways or on separate alignments and may be paved or unpaved.

The defined Statewide, Regional, and Subregional NCMIN tiers for the bicycle and pedestrian facilities are shown in **Table 9-1**.

**Table 9-1. Bicycle and Pedestrian Tier Definitions in the North Carolina Multimodal Investment Network**

Statewide Tier	Regional Tier	Subregional Tier
North Carolina bicycling highways (on-road)	<ul style="list-style-type: none"> <li>NCDOT-designated multi-county regional routes (on-road)</li> <li>Off-road facilities spanning multiple jurisdictions with a length of at least 20 miles</li> </ul>	<ul style="list-style-type: none"> <li>Off-road facilities with a length shorter than 20 miles</li> <li>Town, city, or county on-road bicycle networks</li> <li>All sidewalks</li> </ul>

Source: NCDOT NCMIN: [http://www.ncdot.org/download/performance/NCMIN\\_Definitions.pdf](http://www.ncdot.org/download/performance/NCMIN_Definitions.pdf)

Of the approximately 79,000 miles of state-maintained roadways on which both motor vehicles and bicycles are allowed, approximately 2,500 miles along nine routes have been designated by NCDOT as Bicycling Highways. Printed guides of the Bicycling Highways are available from NCDOT. These routes generally offer a more lightly traveled alternative to major parallel roadways. In the years since the designation of the Bicycling Highways, motor vehicle traffic volumes along some sections of many of the routes have increased significantly. The NCDOT Bicycle and Pedestrian Division is currently evaluating potential modifications to the designated routes to improve safety. The nine existing routes are summarized below.

- Carolina Connection, 200 miles, is part of US Bike Route 1, which extends from Maine to Florida. This route runs from north-south from state line to state line through central North Carolina.

- Mountains to Sea, 700 miles, runs east-west across the state between Murphy in the mountains and Manteo on the coast.
- Ports of Call, 300 miles, runs north-south from the South Carolina state line to the Virginia state line along the coast through Southport, Wilmington, New Bern, Bath, and Edenton.
- North Line Trace, 400 miles, runs east-west just south of the Virginia state line.
- Cape Fear Run, 160 miles, roughly parallels the Cape Fear River through the southeast coastal plain.
- Piedmont Spur, 200 miles, runs east-west through the Piedmont region of the state, as an alternate to the Mountains to Sea route.
- Ocracoke Option, 170 miles, runs east-west through the coastal plain region of the state from Wilson to Ocracoke, as an alternate to the Mountains to Sea route.
- Southern Highlands, 120 miles, runs east-west between the Blue Ridge Mountains in the southwestern part of the state through the foothills to join the Piedmont Spur.
- Sandhills Sector, 125 miles, runs east-west between the Pee Dee and Cape Fear rivers.

In addition to these nine on-road bicycling routes are a variety of other on- and off-road facilities that serve pedestrians and bicyclists throughout the state. Each year, NCDOT funds project development and construction of bicycle lanes, paved shoulders, and multi-use paths and trails. NCDOT also funds spot safety and signing improvements, as well as safety education and bicycle mapping projects.

### **Existing Funding Mechanisms**

Bicycle and pedestrian improvements are programmed through four funding mechanisms within the STIP: the Bicycle and Pedestrian program, the Congestion Mitigation and Air Quality (CMAQ) program, the Enhancement program, and the Urban and Rural Highway programs. Approximately \$6 million annually is programmed for independent projects through the Bicycle and Pedestrian program, of which 80 percent is from federal sources. Traditionally, the CMAQ and Enhancement programs fund bicycle and pedestrian improvements as well, but those programs do not track funding by specific project type. Similarly, many pedestrian and bicycle improvements are incidental to projects funded through the Urban and Rural Highway programs, but the amount of funding used for these incidental improvements, such as the addition of a sidewalk or bicycle lane as part of a corridor widening project, is not accounted for separately in the STIP. An additional \$1.4 million (\$100,000 per division) is administered by the Highway Divisions for pedestrian improvements independent of the STIP.

In 2003, the Bicycle and Pedestrian Division and the Transportation Planning Branch initiated a Planning Grant Initiative program to provide funding to municipalities to develop comprehensive bicycle and pedestrian plans. The funding cap for this program has been \$400,000 annually since the inception of the program, of which \$250,000 is state funding and \$150,000 is federal funding. This funding is distributed outside of the STIP, and requires a local match on a sliding scale based on municipal population. To date, 122 plans have been funded through this program.

Local funding plays a significant role in funding bicycle and pedestrian improvements as well. This funding is separate from federal and state sources. Larger municipalities in the state directly fund bicycle and pedestrian facilities. North Carolina counties also fund greenway developments with local funding. Yet since counties do not maintain roadways, they generally do not have programs to provide or maintain sidewalk or on-street bicycle accommodations.

### **9.1.2 Changes since Prior Plan**

Funding for bicycle and pedestrian programs has remained steady since 2006, when a NCDOT update to the needs estimates identified in the 2006 STP was completed. As detailed in Section 9.1.1, \$6 million is programmed each year through the Transportation Improvement Program for both bicycle and pedestrian improvements, \$1.4 million is programmed separately through the divisions for pedestrian improvements, and \$400,000 is programmed through the Planning Grant Initiative. Funding levels and trends for bicycle and pedestrian improvements through other programs such as the Urban and Rural Highway programs are difficult to determine because spending on pedestrian and bicycle improvements is not accounted for separately from funding for other types of improvements.

Policy-level changes such as the adoption of the Complete Streets policy in 2009 may drive an increase in spending on bicycle and pedestrian improvements through these programs. The Complete Streets policy requires consideration of bicycle and pedestrian modes during the planning and design of new highway facilities and highway facility improvements and is intended to encourage non-motorized transportation.

#### **New Programs**

The successful Planning Grant Initiative has provided funding to more than 100 municipalities for comprehensive bicycle and pedestrian plans, as described in Section 9.1.1. Currently, the Bicycle and Pedestrian Division is able to fund approximately 12 to 15 plans per year. Annual applications for funding through this program have decreased, although the number of applications each year still exceeds available funding. Annual demand for this program is expected to wane as the number of municipalities with completed plans increases. In anticipation of this, the Bicycle and Pedestrian Division is investigating potential new programs to augment the Planning Grant initiative. In 2007, the Bicycle and Pedestrian Division initiated a Regional Bike Plan program, for which four plans are currently in development. Two current pilot programs are the Pedestrian Safety and Access program and Pedestrian/Bicycle Access to Transit program in conjunction with the Public Transportation Division. The Bicycle and Pedestrian Division receives approximately \$400,000 annually for their regional planning effort.

### **9.1.3 Trends and Forces**

A sampling of trends and forces that have had an influence in recent years, or that are anticipated to drive modal needs and the ability to solve those needs, are as follows:

- North Carolina's population will grow significantly, and there will be a larger share of elderly and retirees. Interest in and demand for improved bicycle and pedestrian facilities will rise, along

with greater acceptance of sustainability principles to lessen reliance on carbon-fueled transportation.

- The Complete Streets policy provides a mechanism to advance bicycle and pedestrian facilities on expanded or newly constructed highway corridors.
- The NCDOT grant program has been a catalyst in the development of bicycle and pedestrian plans statewide, and expansion of the program would more rapidly broaden the ability of local jurisdictions to implement bicycle and pedestrian projects in a prioritized fashion.
- There is a growing recognition of the health benefits of a more active lifestyle involving non-auto mobility. A healthier lifestyle with walking and bicycling for recreational and other trip purposes would begin to counteract obesity and related health conditions.
- Structural workforce changes might make bicycle and pedestrian modes more compelling to use. Declining wages in parts of the workforce and protracted high unemployment that is expected to persist can induce demand for bicycle and pedestrian travel.
- Improved coordination of bicycle and pedestrian facilities with public transit would incrementally help address the mobility challenges that the state's urban areas will face as the state's population grows by 42 percent by 2040, with a disproportionate amount of growth occurring in the six major metropolitan areas. Mounting congestion in these areas will make the need for mobility choices more compelling.

## 9.2 Performance

Beginning in 2008, NCDOT has annually evaluated its organizational effectiveness based on numerical performance measures aligned with its mission, goals, and values. Each performance measure is associated with one of five institutional goals, of which three are related to the transportation network and two are internal administrative goals. The three transportation network performance goals are to improve safety, mobility, and infrastructure health. The framework for this performance-driven analysis assumes that the LOS A for the bicycle and pedestrian mode equals modal needs and the difference between LOS A and existing performance equals current deficiencies.

### 9.2.1 Performance Standards

The lack of an inventory of bicycle and pedestrian facilities throughout North Carolina and the lack of a consistent program for maintaining bicycle and pedestrian usage prohibits the development of an ideal approach for measuring LOS. Ideally, the prime techniques for measuring LOS would be the level of roadway corridors equipped with bicycle and pedestrian facilities (in addition to the presence of off-road facilities) and the level of bicycle and pedestrian usage in trips by purpose. In addition, current LOS grades for the bicycle and pedestrian mode varies across North Carolina, from municipality to municipality, and from urban to rural areas, making assigning a composite statewide score challenging.

The NCDOT Prioritization 2.0 process acknowledged that limited data are available to evaluate bicycle and pedestrian LOS on a statewide basis. The NCDOT Bicycle and Pedestrian Division determined the

current statewide LOS for the bicycle and pedestrian mode to be at the low end of LOS D, based on the following measures:

- Means of Transportation to Work/Mode Share: Used to indicate the usage/levels of biking and walking.
- Crash Totals and Rates: Used to provide some indication of the safety of biking and walking.
- Percentage of Road with Paved Shoulders and Percentage of Signed State Bicycle Routes with Paved Shoulders: Used to provide an estimate of non-curb/gutter roadways that are equipped with standard bicycle shoulders.
- Plans: Used to indicate the percentage of the state's municipal population that the municipal plans funded by NCDOT have captured.
- Physical Activity and Overweight Percentages: Used to indicate the general health of the population. Studies have shown a positive correlation between the level of biking and walking and the health of the community.

The low score resulted from a low modal share of the bicycle and pedestrian mode, a high crash rate, a low percentage of roadways equipped with paved shoulders, and an inactive population. Limited funding for bicycle and pedestrian enhancements and the general land use patterns prevalent across the state not being conducive to bicycle and pedestrian travel are other factors that contributed to the low score. Several recent sources of data describe bicycle and pedestrian mobility and safety in North Carolina; these sources include U.S. Census Bureau American Community Survey data, a 2011 public input survey on attitudes about bicycling and walking, and Division of Motor Vehicle crash records. A snapshot of current rates of bicycling and walking and current safety statistics based on these data sources is described below.

### **9.2.2 Existing Performance**

Over the period 2005-2009, the U.S. Census Bureau Journey to Work data for North Carolina indicate that approximately 9,600 residents, or 0.23 percent, usually travel to work by biking, and approximately 76,000 residents, or 1.8 percent, usually travel to work by walking. Nationally, 0.50 percent of workers commute by biking, and 2.9 percent commute by walking.

In 2011, the Bicycle and Pedestrian Division in conjunction with the Institute for Transportation Research and Education at North Carolina State University conducted a public input survey on attitudes surrounding bicycling and walking. More than 16,000 people completed the questionnaire.

Approximately 15 percent of respondents indicated that they bicycle mostly for daily needs including commuting to work and running errands, while 65 percent indicated that they bicycle mostly for recreation, and 20 percent indicated that they seldom bicycle. Approximately 18 percent indicated that they walk mostly for daily needs, while 72 percent indicated that they walk mostly for recreation, and 10 percent indicated that they seldom walk.

In addition to questions about their bicycling and walking habits, respondents were asked to indicate their opinions about bicycling and walking safety in their communities. When asked about bicycling for daily needs in their community, 79 percent indicated that they believe it is dangerous, and 79 percent indicated that they would bicycle more for daily needs if safety issues were addressed. In addition, 60 percent indicated that they believe bicycling for recreation in their community is dangerous, while 84 percent indicated that they would bicycle more for recreation if safety issues were addressed. When asked about walking for daily needs in their community, 43 percent indicated that they believe it is dangerous, while 71 percent indicated that they would walk more for daily needs if safety issues were addressed. In addition, 30 percent indicated that they believe walking for recreation in their community is dangerous, while 77 percent indicated that they would walk more for recreation if safety issues were addressed.

NCDOT maintains a database of bicycle and pedestrian crash data that includes all bicycle-motor vehicle and pedestrian-motor vehicle crashes reported to the North Carolina Division of Motor Vehicles by investigating officers for the years 1997 to 2008. In 2010, the University of North Carolina Highway Safety Research Center performed an analysis using this database of bicycle and pedestrian crash data. The analysis found that on average 25 bicyclists were killed, and 850 were injured or possibly injured each year during the period from 2004 to 2008, based on reports from 4,954 bicycle-motor vehicle crashes filed with the North Carolina Division of Motor Vehicles during this 5-year period. The study reports that after falling below 1,000 annual crashes in 1998 and 1999, the number has trended generally upward since 2002, with 1,042 crashes reported in 2008. The study also presents an analysis of trends related to crash types and facts, which are summarized below.

#### **Bicycle Crashes**

- 2.6% resulted in a bicyclist fatality
- 6.1% resulted in a disabling injury to a bicyclist
- 69% occurred in urban areas
- 63% occurred along two-lane roadways
- 43% occurred at intersections
- 40% involved bicyclists under the age of 20
- 16% involved bicyclists between the ages of 20 and 29
- 13% involved bicyclists between the ages of 30 and 39
- 17% involved bicyclists between the ages of 40 and 49
- 70% occurred in urban areas
- 59% occurred along two-lane roadways
- 20% occurred at driveways
- 27% involved pedestrians under the age of 21
- 19% involved pedestrians between the ages of 21 and 30
- 16% involved pedestrians between the ages of 31 and 40
- 17% involved pedestrians between the ages of 41 and 50

#### **Pedestrian Crashes**

- 7% resulted in a pedestrian fatality
- 9% resulted in a disabling injury to a pedestrian

## 9.3 Current Deficiencies

### 9.3.1 Basis for Deficiencies Summary

In 2008, the Bicycle and Pedestrian Division, in conjunction with the SPOT, developed LOS performance categories and associated financial needs for bicycle and pedestrian infrastructure as part of the biannual Prioritization process for the STIP. The Bicycle and Pedestrian Division and SPOT performance analysis was recently updated with Prioritization 2.0 figures, used to derive current deficiencies for the bicycle and pedestrian mode for the 2040 Plan. The total estimated cost of 635 bicycle and pedestrian projects identified in the 10-year Prioritization 2.0 is \$469 million, or \$46.9 million annually on average, taken as a statement of reasonable annual current need of bicycle and pedestrian improvements.

The 30-year capital needs for bike/pedestrian projects were primarily derived from estimated costs of projects submitted as part of the strategic prioritization process, and involved evaluating the projects submitted as part of the strategic prioritization process to determine the prime goal met: safety or mobility. Safety projects were defined as projects that enhanced the existing transportation corridor for bicyclists and pedestrians. This included all projects meeting the prioritization crash criteria factor, crossing improvements, sidewalks, on-road bike facilities, and side paths. Mobility projects were defined as projects that primarily provided a new travelling corridor for bicyclists and pedestrians. This included multi-use path/greenway projects that did not meet the prioritization crash criteria factor and pedestrian bridges. Analyzing projects in this manner resulted in essentially an equal split in safety and mobility projects with regards to project cost estimates.

While the accruing bicycle and pedestrian modal needs estimates were largely developed using Prioritization 2.0 estimates to derive the forecasts, the following forecast was developed to help arrive at the estimates:

- Statewide population growth is estimated using growth rates provided by the North Carolina Office of State Management and Budget.
- Current funding levels for bicycle and pedestrian improvements, adjusted for population growth, are used to derive future needs in 5-year increments. Average annual needs are multiplied by five to derive total needs over a 5-year period for each of the six increments.
- For Prioritization 1.0 needs, average annual needs are multiplied by five to derive total needs over a 5-year period for each of the six increments.
- For Prioritization 2.0 needs, average annual needs are multiplied by five to derive total needs over a 5-year period for each of the six increments. Prioritization 2.0 was chosen as the main source of input data.

The following should be noted: (a) the total estimated cost does not account for approximately 70 projects where construction cost estimates were not provided in Prioritization 2.0; (b) some MPO/RPOs provided an exhaustive list of needs while others did not; and (c) needs are primarily based on facility types such as bike lanes, paved shoulders, multi-use paths, and sidewalks, while intersection improvement needs are not fully reflected. Also, while utilizing the prioritization process determined

general capital needs, there still may be certain spot improvement/safety projects (refuge islands, intersection improvements, pedestrian signals, signage, etc.) that are not accounted for. To manage these types of projects, the NCDOT Bicycle and Pedestrian Division has, in the past, funded projects through its spot improvements program (EB-4013), and Highway Divisions have funded certain projects through safety and discretionary funds.

### 9.3.2 Changes since Prior Plan

The 2006 STP Mid-Cycle Update Technical Report identified 25-year bicycle and pedestrian needs to the year 2030. In the analysis, needs were calculated separately for the two modes at the Statewide, Regional, and Subregional tiers. However, none of these identified needs were identified as current deficiencies, but rather were treated as accruing needs. The 2040 Plan identifies 30-year bicycle and pedestrian needs in 5-year increments to the year 2040. The current deficiencies (sometimes referred to as backlog) are identified separately from accruing needs and are included in total bicycle and pedestrian modal needs.

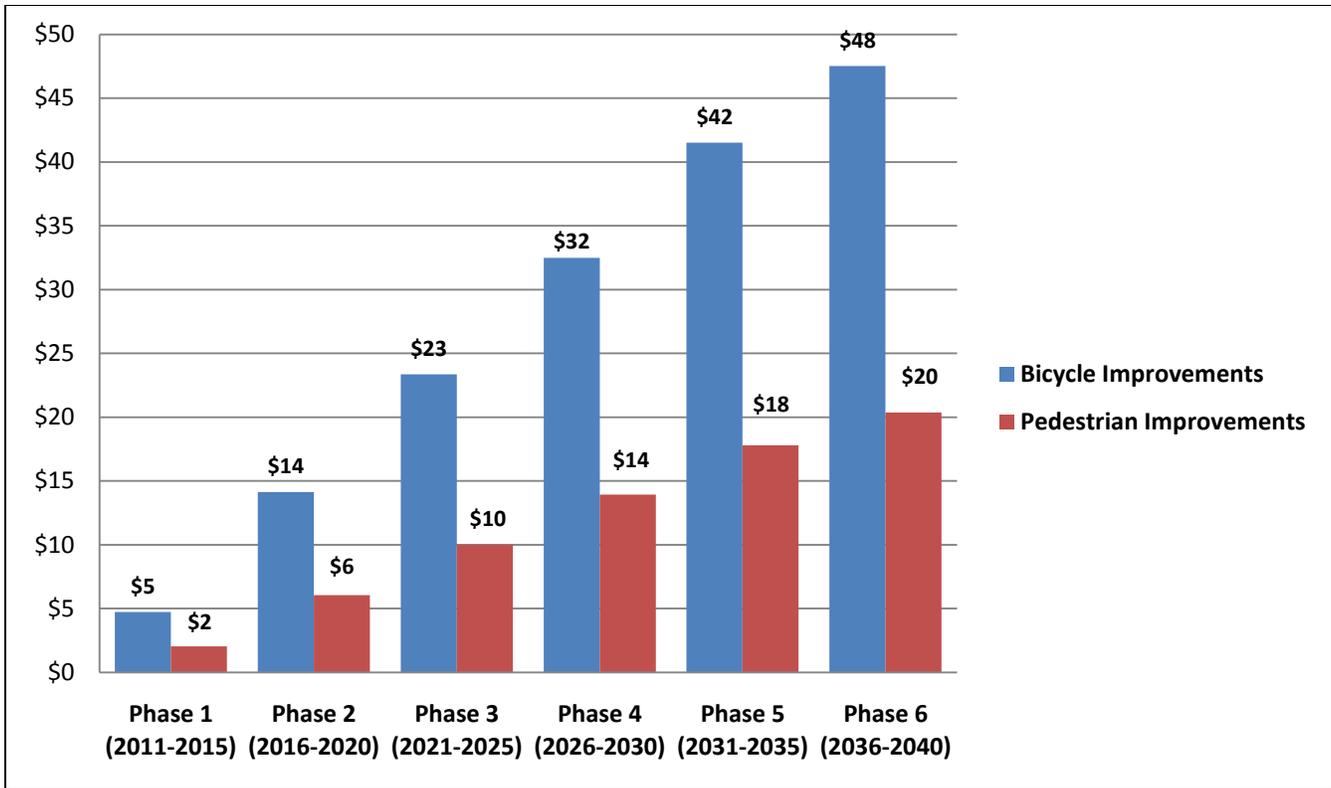
## 9.4 Summary of Modal Needs

The accruing modal needs for the bicycle and pedestrian mode are based on Prioritization 2.0 10-year needs and the forecasted population growth rate for North Carolina. As shown in Tables 9-2 and 9-3 and Figures 9-1 through 9-5, the 30-year bicycle and pedestrian needs total \$1.29 billion. At \$1.05 billion, current deficiencies represent 81 percent of all identified bicycle and pedestrian needs.

**Table 9-2. Bicycle and Pedestrian Needs by 5-Year Increments (\$ in Millions)**

Need Category	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
Bicycle improvements	736	5	14	23	32	42	48	<b>899</b>
Pedestrian improvements	315	2	6	10	14	18	20	<b>386</b>
<b>Total</b>	<b>1,051</b>	<b>7</b>	<b>20</b>	<b>33</b>	<b>46</b>	<b>59</b>	<b>68</b>	<b>1,285</b>

Bicycle improvements represent 70 percent of the total estimated needs, with the remaining 30 percent representing pedestrian improvements. The estimated accruing needs are projected to gradually increase in each subsequent 5-year increment for both bicycle and pedestrian travel modes, with the final two 5-year increments accounting for ten percent of the total identified need. The main reason for sequential increase in estimated bicycle and pedestrian needs is population growth leading to increased demand for bicycle and pedestrian facilities.



Note: Current deficiencies (\$736 million for Bicycle Improvements and \$315 million for Pedestrian Improvements) not shown due to scale. All shown bicycle and pedestrian needs are mobility needs.

Figure 9-1. Bicycle and Pedestrian Needs by 5-Year Increments (\$ in Millions)

### 9.4.1 Needs by Investment Goal

For estimated needs by investment goal, the 2040 Plan classifies all bicycle and pedestrian needs as mobility needs, as shown in **Table 9-3**. Bicycle improvement needs represent 70 percent of the estimated needs by investment goal, with the remaining 30 percent representing pedestrian improvements; this amounts to \$899 million and \$386 million, respectively.

The Bicycle and Pedestrian Division programs support construction of facilities by local jurisdictions, but infrastructure health (maintenance) is a local obligation. Also, there is no tracking of costs for maintaining bicycle or pedestrian facilities along state highway system roads as these are included in basic roadway maintenance. Finally, while the Bicycle and Pedestrian Division supports programs addressing safety, the level of funding relatively small, and was included within the mobility investment goal figure.

**Table 9-3. Bicycle and Pedestrian Needs by Investment Goal (\$ in Millions)**

Need Category	Investment Goal			
	Infrastructure Health	Safety	Mobility	Total
Bicycle improvements	-	450	449	899
Pedestrian improvements	-	193	193	386
<b>Total</b>	-	<b>643</b>	<b>642</b>	<b>1,285</b>

### 9.4.2 Needs by NCMIN Tier

When combined, bicycle and pedestrian needs are mostly projected to be on the Subregional NCMIN tier: \$1.16 billion, or 90 percent, is allocated to the Subregional tier, followed by \$103 million, or eight percent, to the Regional tier, and \$26 million, or two percent, to the Statewide tier, as shown in **Tables 9-4 and 9-5** and **Figures 9-4 through 9-6**. While 86 percent of bicycle improvements are projected to be on the Subregional tier, representing future improvements to town, city, and county on-road bicycling highways and off-road facilities with lengths of less than 20 miles, all pedestrian needs are classified as being part of the Subregional tier because the NCMIN lacks designation for pedestrian facilities at the Regional and Statewide tiers. A significant portion of all the identified bicycle improvements is projected on the Regional and Statewide tier, eleven percent and three percent, respectively. Regional bicycle needs on the Regional NCMIN tier include improvements to the NCDOT designated multi-county regional routes (on-road) and off-road facilities spanning multiple jurisdictions with a length of at least 20 miles. Bicycle needs on the Statewide tier include improvements to the designated North Carolina bicycling highways (on-road).

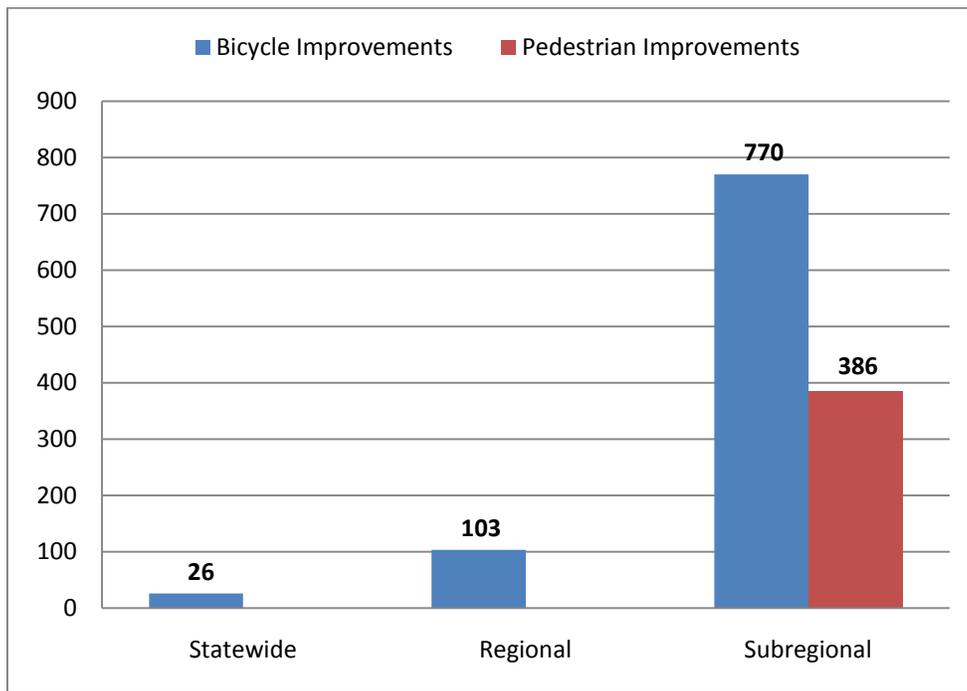
As noted above, large municipalities and some counties routinely fully fund pedestrian improvements without matching funding from federal or state sources; however, locally funded improvements are excluded from this analysis.

**Table 9-4. Bicycle and Pedestrian Needs by North Carolina Multimodal Investment Network Tier (\$ in Millions)**

Need Category	NCMIN Tier			
	Statewide	Regional	Subregional	Total
Bicycle improvements	26	103	770	899
Pedestrian improvements	-	-	386	386
<b>Total</b>	<b>26</b>	<b>103</b>	<b>1,156</b>	<b>1,285</b>

**Table 9-5. Bicycle and Pedestrian Needs by North Carolina Multimodal Investment Network Tier by 5-Year Increments (\$ in Millions)**

NCMIN Tier	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
Statewide	21	-	-	1	1	1	1	<b>26</b>
Regional	84	1	2	3	4	5	5	<b>103</b>
Subregional	946	6	18	30	42	53	61	<b>1,156</b>
<b>Total</b>	<b>1,051</b>	<b>7</b>	<b>20</b>	<b>33</b>	<b>46</b>	<b>59</b>	<b>68</b>	<b>1,285</b>



**Figure 9-2. Bicycle and Pedestrian Needs by North Carolina Multimodal Investment Network Tier (\$ in Millions)**

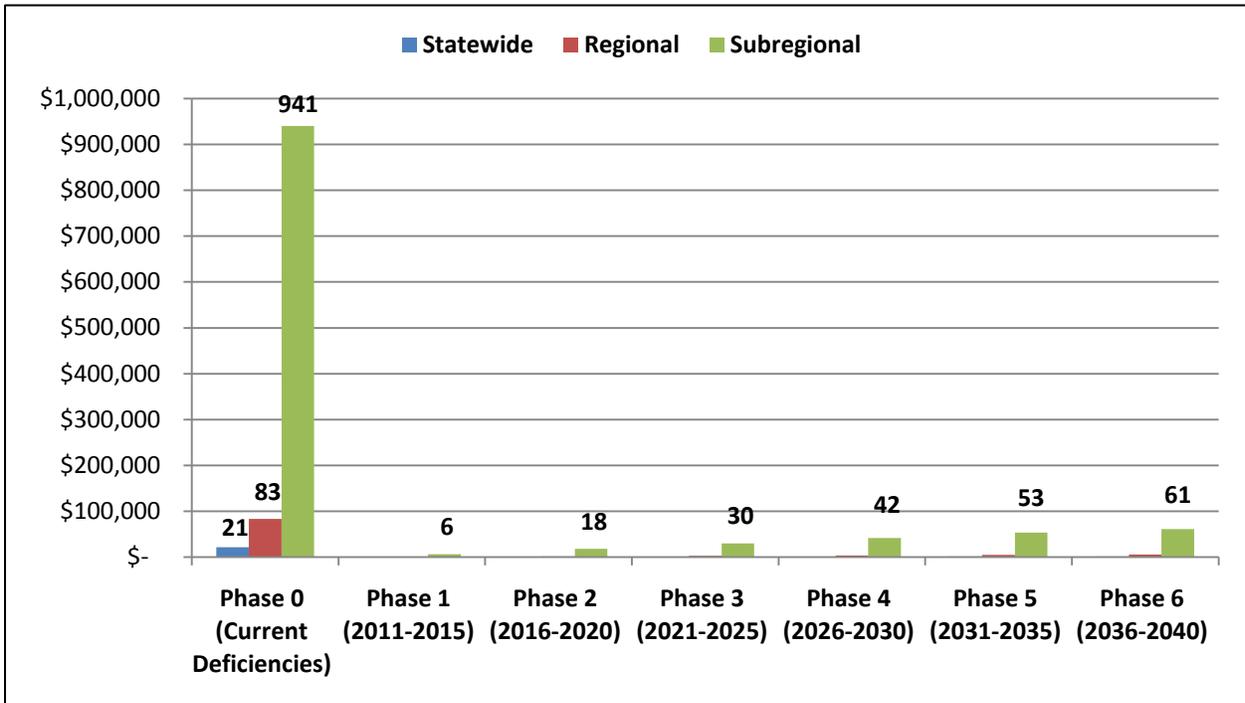


Figure 9-3. Bicycle and Pedestrian Needs by North Carolina Multimodal Investment Network Tier by 5-Year Increments (\$ in Millions)

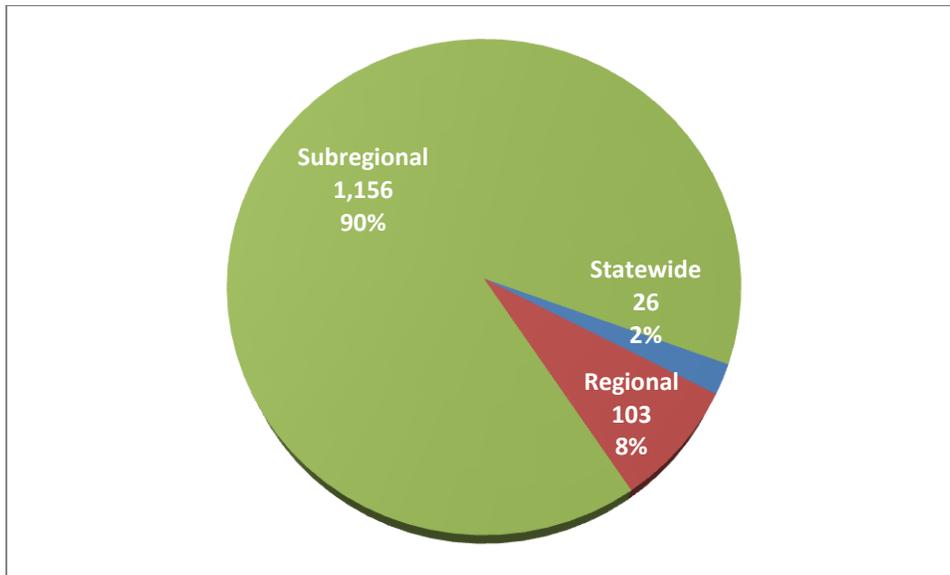


Figure 9-4. Bicycle and Pedestrian Needs by North Carolina Multimodal Investment Network Tier (\$ in Millions)

# Chapter 10

## Ports

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### 10.1 Existing Conditions

#### 10.1.1 Inventory Summary

The North Carolina ports system is owned and operated by the North Carolina State Ports Authority (NCSPA), an independent public agency that has not been part of NCDOT and has not received dedicated state funding for operating or capital expenditures. The North Carolina ports system consists of two seaports (Wilmington and Morehead City) and two inland terminals (Charlotte and Piedmont Triad, located in Greensboro). The inland terminals at Charlotte and Greensboro are served by I-77 and I-85 and I-40 and I-85, respectively. CSX and Norfolk Southern rail lines run through both cities.

The North Carolina Global TransPark (GTP), a 2,500 acre, multi-modal industrial park offering unparalleled access to air, rail, highways, and North Carolina's two international ports, is a separate authority from the ports and is not included in the analysis. Although the 2040 Plan does not consider either the specific infrastructure needs or funding associated with GTP, as a major facility in the state, its future needs will be substantial, especially with NC's increased focus on logistics and economic impacts of transportation facilities such as the GTP.

While the NCMIN classification lacks designations for ports, this analysis assumes that the Port of Wilmington and the Port of Morehead City should be classified as belonging to the Statewide tier. Because NCDOT will be overseeing state ports in the future, it is reasonable to assume they would be placed on the Statewide tier for ports, given their strategic importance to trade across the state. The Port of Wilmington serves container cargo as well as bulk and breakbulk cargo. The port is served by a CSX rail line and I-40. In 2010, the Port of Wilmington served 442 ships carrying approximately 250,000 20-foot-equivalent units of container cargo, 1.3 million tons of bulk commodities, and 207,000 tons of breakbulk commodities. **Table 10-1** summarizes the top import and export commodities at the Port of Wilmington.

**Table 10-1. Port of Wilmington Top Commodities (2010)**

Import Commodity	Import Tonnage	Export Commodity	Export Tonnage
Chemicals	654,915	Forest products	355,273
Animal feed	371,014	Wood pulp	208,021
Cement	147,528	General merchandise/misc.	114,424
Metal products	128,026	Food products	110,605
Machinery parts	117,077	Wood chips	88,014

Source: NCSPA, *Port of Wilmington 2010 Statistics*

The Port of Morehead City serves container cargo as well as bulk and breakbulk cargo. The port is served by a Norfolk Southern rail line and US 70. In 2010, the Port of Morehead City served 122 ships and 465 barges carrying approximately 1.6 million tons of bulk commodities and 200,000 tons of breakbulk

commodities. **Table 10-2** summarizes the top import and export commodities at the Port of Morehead City.

**Table 10-2. Port of Morehead City Top Commodities (2010)**

Import Commodity	Import Tonnage	Export Commodity	Import Tonnage
Sulfur products	298,706	Phosphate	1,090,649
Rubber	119,358	General merchandise/misc.	47,091
Scrap metal	83,525	Military	2,748
Metal products	57,811	N/A	N/A
Ore, mica, schist	26,268	N/A	N/A

Source: NCSA, *Port of Morehead City 2010 Statistics*

N/A = Not available

The NCSA conducts regular assessments of the economic contributions of its ports to the state economy. The most recent assessment, completed in 2011 by the Institute for Transportation Research and Education at North Carolina State University, determined the following statistics for calendar year 2009:

- More than 65,000 jobs were directly or indirectly supported by the North Carolina ports.
- More than \$2.4 billion in wages was supported by port activity.
- Approximately \$7.5 billion of economic contribution was associated with goods movement through the ports.
- More than \$500 million in taxes were received by state and local governments due to activity supported by the ports.

### 10.1.2 Changes since Prior Plan

At the Port of Wilmington over the period from 2006 to 2010, the total volume of cargo handled remained relatively constant between 3.4 million and 3.5 million tons, with a 1-year drop in 2009 to 3.1 million tons; however, the volume of breakbulk cargo steadily decreased over that same period from approximately 1.2 million tons in 2006 to just 207,000 tons in 2010. At the same time, the volume of container cargo steadily increased from 950,000 tons in 2006 to more than 1.9 million tons in 2010. The volume of bulk cargo remained steady at approximately 1.3 million tons each year over the same 5-year period. **Figure 10-1** shows the cargo volume handled at the Port of Wilmington for the period from 2001 to 2010.

At the Port of Morehead City over the period from 2006 to 2010, the total volume of cargo handled decreased steadily from 2.3 million tons in 2006 to 1.8 tons in 2010. **Figure 10-2** shows the cargo volume handled at the Port of Morehead City for the period 2001 to 2010.

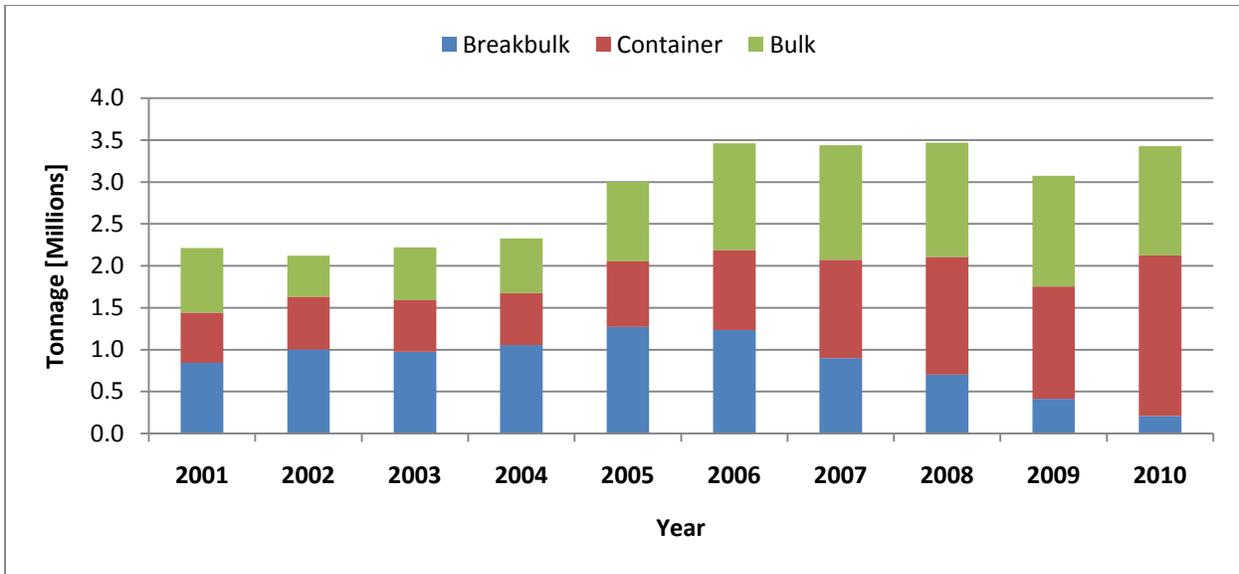


Figure 10-1. Port of Wilmington Cargo Volume for Period 2001-2010

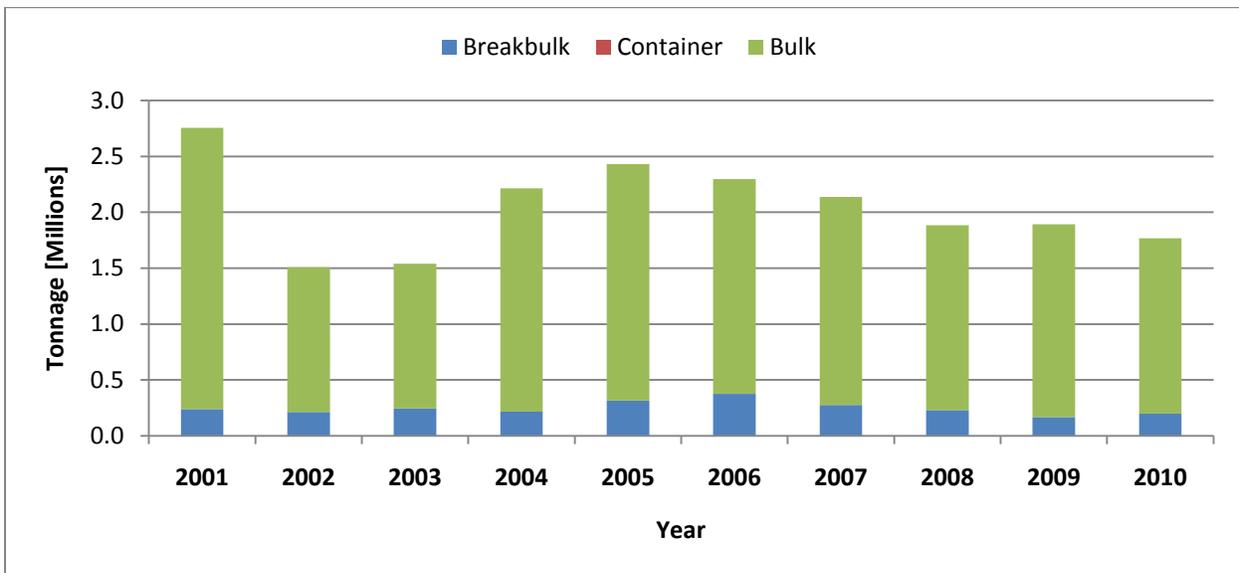


Figure 10-2. Port of Morehead City Cargo Volume for Period 2001-2010

### 10.1.3 Trends and Forces

A sampling of trends and forces that have had an influence in recent years, or which are anticipated to drive modal needs and the ability to solve those needs, are as follows:

- While NCDOT’s direct role in ports and maritime facilities has been very limited financially, there is a significant role in coordinating and improving the landside highway and rail access. This intermodal connectivity, the links from the ports to their hinterland by way of rail and highway facilities, is an essential complement to the internal capacity of the ports themselves to competitively serve shippers and markets. Both existing North Carolina ports need enhanced

highway access. Each port is served by one Class 1 railroad. Dual access (if it can be achieved) could provide a more competitive rail environment. Completion of the Wallace and Castle Hayne connection would restore an alternate rail access corridor for the Port of Wilmington.

- NCDOT's future role in funding for ports will shift dramatically due to the transition of the maritime facilities' oversight authority from the North Carolina Department of Commerce to the NCDOT.
- Channel maintenance and increased dredged depth affect the efficiency of ship movements, and federal funding over the last decade has been strained, even for maintenance dredging.
- Security requirements and associated costs have siphoned off funds once used for capacity and preservation projects. While this situation seems to have stabilized, new measures could cause further loss of funds for basic needs.
- Ports in neighboring states to the north and south are aggressively positioning for potential jumps in containerized cargo traffic through the Panama Canal. The Hampton Roads port complex in Virginia has the required 50-foot dredge depth for the new, larger post-Panama container ships. The Port of Savannah in Georgia, which handles a large share of import and export containers, is seeking a deeper channel. The Port of Miami has authorization for a 50-foot channel but is seeking project funding.
- The North Carolina Maritime Strategy study has been initiated to answer the question: "How can North Carolina prepare itself to become a portal to the global economy?" The study is reviewing the impact of the pending completion of the Panama Canal expansion and other factors to define the role of the ports in supporting jobs creation and economic viability, a strategy plan to move North Carolina forward as a portal to global commerce.
- For other modes, projects to maintain and/or expand infrastructure and channels have become incrementally more expensive in recent years, putting increasing pressure on relatively flat funding sources to cover all needs.

The Governor's Logistics Task Force Subcommittee Reports released in August 2011 made a strong recommendation that North Carolina invest in its ports. The reports noted that port facilities have been seen to be a strong economic engine and an asset to the state from both commerce and transportation perspectives. Through strategic investment in its ports, North Carolina can capitalize on its exports (agricultural and other natural assets) and help the nation with its balance of trade challenges.

The ongoing North Carolina Maritime Strategy study is examining a variety of strategic investment options for state ports. The Seven Portals Study Draft Final Report, prepared for the Governor's Logistics Task Force, described the following four studied options for North Carolina ports:

1. **Status quo.** Keep ports in good working condition and serve existing and new clients. Provide full breadth of services by partnering with larger ports (Norfolk and Charleston).
2. **Minor enhancements.** Rely on niches, such as particular commodities (e.g., agriculture and farm machinery), strengthening the ties with the military, possibly specializing in high-value,

time-sensitive products. The option would involve upgrading highway links, improving rail access, and enhancing ocean-side facilities such as turning basins and wharfs.

3. **Major enhancements.** Become a major participant in maritime trade. Find niches, make onsite improvements, improve the landside support (create inland ports near 1-95/US 70, 1-95/US 74, and further west).
4. **Become a major participant in the deep water port business.** Engage in head-to-head competition with Norfolk, Port Elizabeth, Charleston, and Savannah. Lock in globally operative anchor tenants, create strategic alliances with the military, make onsite improvements, become rail carrier indifferent, create high-capacity intermodal capability, increase load/unload capacity, improve landside support and access, and make ocean-side enhancements (such as dredging, cranes, and turning basins).

The North Carolina Maritime Strategy study is similarly exploring the appropriate potential role of the North Carolina ports in the global trading environment. A final determination of state policy towards the ports in this regard is pending. The findings of this study, the resulting ports positioning strategy and policy decisions on priorities and funding, are all pending completion of the study.

## 10.2 Performance

NCDOT has not included performance measures for ports in its annual system performance assessment because the ports had been controlled by the NCSPA. NCDOT has funded landside transportation network improvements to provide access to ports via highways and rail. Performance measures related to those modes are included in their respective chapters of this report. Currently, the NCS PA is undergoing a transition process in which its oversight authority will be transferred from the North Carolina Department of Commerce to the NCDOT. Because the two ports until recently operated as independent entities, they had not been graded under NCDOT's Project Prioritization process. It is expected that this rating will be developed during the Prioritization 3.0 cycle beginning in 2013.

## 10.3 Current Deficiencies

NCDOT has not quantified deficiencies for the ports system because it has not provided direct funding. However, NCDOT has funded transportation network improvements to provide access to ports via highways and rail. Funding deficiencies related to those modes are included in their respective chapters of this report. The NCSPA's Transportation Priorities released in March 2011 listed specific projects that would benefit its ports. For Port of Wilmington, major improvements include I-74 upgrade from Wilmington to Charlotte, I-140 Wilmington Bypass, and Cape Fear Skyway Bridge. For the Port of Morehead City, the US 70 upgrade is listed as the main priority. The NCSPA also lists the following rail priorities for the state that would benefit the ports:

- Intermodal (container) rail service
- Newport River bascule bridge replacement
- Turn at Pembroke

- Castle Hayne to Wallace Rail Corridor Restoration
- Unknown operational requirements on Radio Island
- Reroute Norfolk Southern track around Morehead City

When completed, the listed highway and rail improvements will provide improved connectivity to the Port of Wilmington and the Port of Morehead City.

### 10.3.1 Changes since Prior Plan

In 2006, an NCDOT update to the needs identified in the 2004 STP included a description of 25-year ports needs to the year 2030. In the analysis, needs were described based on future cargo growth and enhanced access to ports, without providing actual estimates. The 2040 Plan identifies 30-year ports needs in 5-year increments to the year 2040. The analysis relies on the data provided by the NCSPA. Current deficiencies are identified separately from accruing needs and are included in total ports modal needs.

## 10.4 Summary of Modal Needs

The ports modal needs estimates were developed based on the data provided by the NCSPA. The accruing needs were developed based on the authority's FY 2011-2020 budget (10-year period average) and the FY 2011 Capital Budget Request adjusted for growth projections. All estimates are reported in constant 2011 dollars.

As shown in **Table 10-3** and **Figure 10-3**, the 30-year ports needs total \$1.62 billion. At \$1.55 billion of the total, the accruing needs represent 96 percent of all identified ports needs, with current deficiencies accounting for \$66 million, or 4 percent of the total. As shown in **Figure 10-3**, the identified accruing ports needs are spread fairly evenly among all phases of the 2040 Plan, with a slight increase in identified needs overtime. When current deficiencies are excluded from calculations, the final phase of the 2040 Plan, Phase 6, accounts for \$276 million, or 18 percent, of the total identified accruing needs.

**Table 10-3. Port Needs by 5-Year Increments (\$ in Millions)**

Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
66	238	250	256	263	269	276	<b>1,620</b>

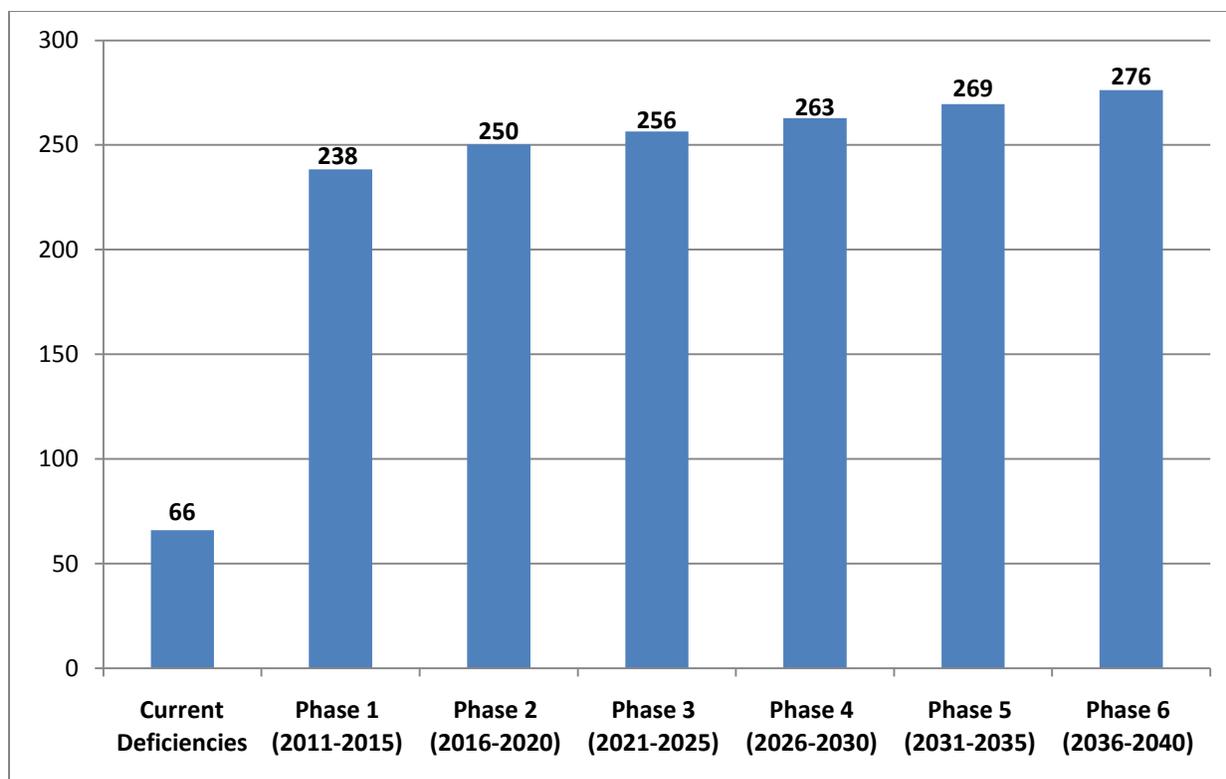


Figure 10-3. Port Needs by 5-Year Increments (\$ in Millions)

### 10.4.1 Needs by Investment Goal

Based on investment goal, as shown in **Table 10-4** and **Figures 10-4** and **10-5**, 88 percent (\$1.43 billion) of identified ports needs are infrastructure health needs, 8 percent (\$123 million) are mobility needs, and 4 percent (\$62 million) are safety needs. Current deficiencies represent a small portion of the identified need for each investment goal: three percent for infrastructure health, 11 percent for mobility, and 11 percent for safety. The identified needs by investment goal are scheduled for implementation throughout the six phases of the 2040 Plan, with a slight increase in estimated need in its later phases.

Table 10-4. Port Needs by Investment Goal (\$ in Millions)

Investment Goal	Phase 0 (Current Deficiencies)	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
Safety	7	8	9	9	9	10	10	62
Health	46	213	224	229	235	241	247	1,434
Mobility	13	17	18	18	19	19	20	123
<b>Total</b>	<b>66</b>	<b>238</b>	<b>250</b>	<b>256</b>	<b>263</b>	<b>269</b>	<b>276</b>	<b>1,620</b>

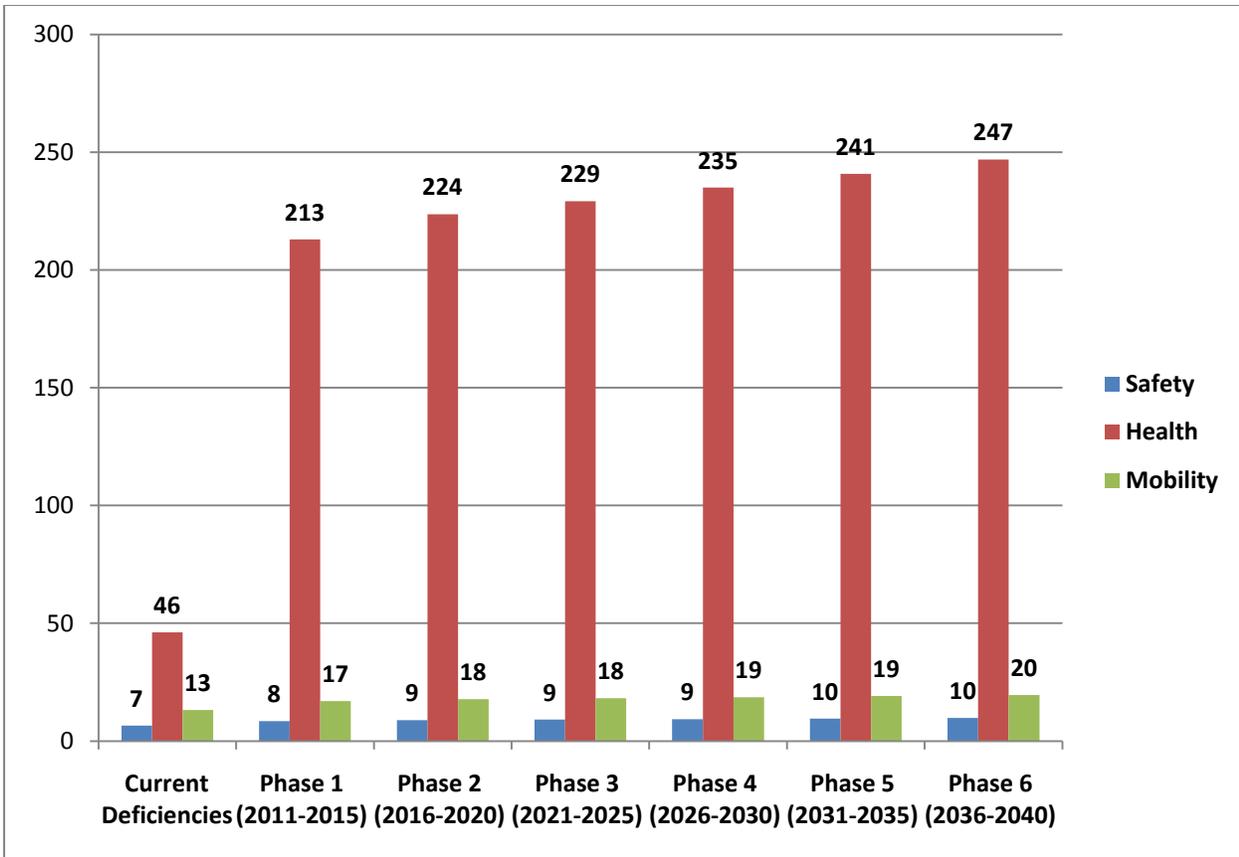


Figure 10-4. Port Needs by Investment Goal in 5-Year Increments (\$ in Millions)

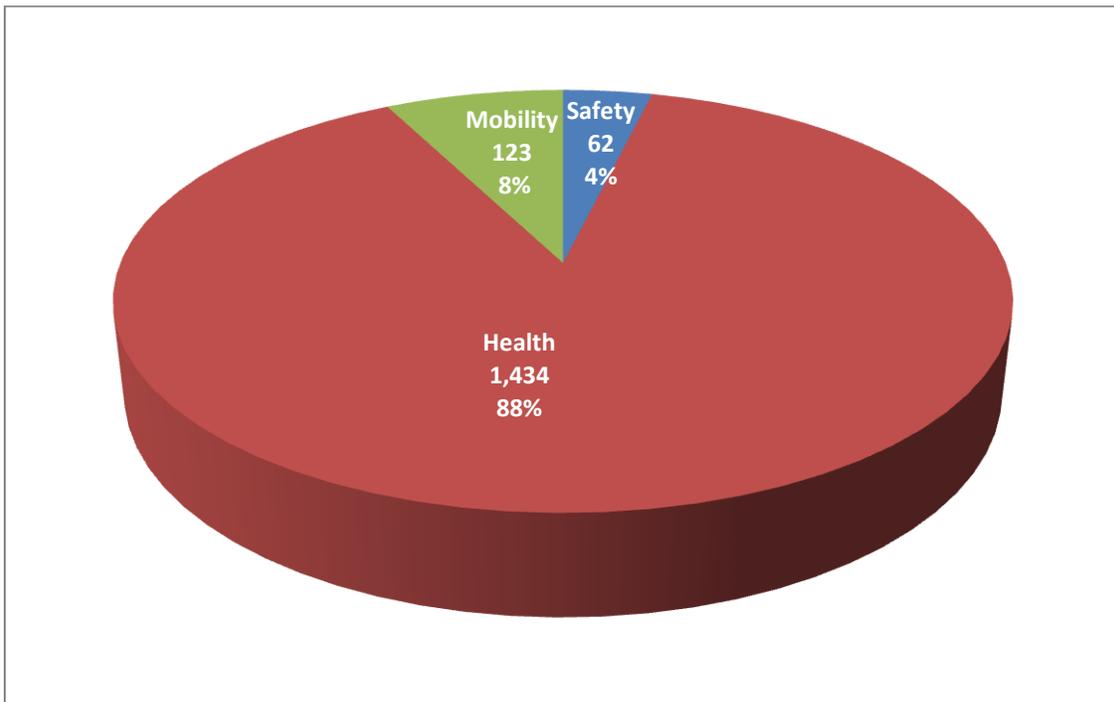


Figure 10-5. Port Needs by Investment Goal (\$ in Millions)

### 10.4.2 Needs by North Carolina Multimodal Investment Network Tier

Ports are not currently part of the NCMIN tier classification. However, due to their economic importance to the state, the Port of Wilmington and the Port of Morehead City, and inland terminals in Charlotte and Greensboro could be assigned tentative Statewide tier designation. Thus, in terms of the NCMIN breakdown for ports, 100 percent (\$1.62 billion) of the identified needs are on the Statewide NCMIN tier, as shown in **Table 10-5**.

**Table 10-5. Port Needs by North Carolina Multimodal Investment Network Tier (\$ in Millions)**

NCMIN Tier	Phase 0 (Current Deficiencies)	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
Statewide	66	238	250	256	263	269	276	1,620



# Chapter 11

## Summary

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### 11.1 Existing Conditions

#### 11.1.1 Inventory Summary

The NCDOT administers and partners in a substantial and well-developed multimodal transportation network. This system in which NCDOT partners with other agencies and jurisdictions statewide comprises nearly 80,000 state-operated roadways, 72 publicly operated airports, a ferry system with seven key service routes, two important coastal seaports and complementary inland ports, a widely dispersed system of pedestrian and bicycle facilities, a system of publicly and privately operated railroads supporting significant freight and passenger movements, and a widely dispersed set of municipal, county, and regional transit services addressing the mobility needs of both the general public and special transportation markets.

Collectively, these transportation facility and service assets provide a broad array of essential and strategic transportation capacity that impacts the daily lives of the state's residents and critically underpins the diverse movement of freights and goods into, out of, through, and within the state. The critical role and economic significance of this composite transportation network in supporting the mobility and movement of workers, students, retirees, visitors, tourists, businesses, raw and manufactured goods, military personnel and assets, and a vast array of other elements. The importance of this network to the state's economy cannot be understated.

While for most of these movements it is the destination rather than the journey that is the priority, still it is the swift, efficient, convenient, reliable, and resilient execution of the journey that is the paramount priority in seeing that the destination is reached. Therefore, the effective management of these collective transportation assets and transport services across the public and private sectors is vital to sustain the anticipated growth in the state's population, business sector, manufacturing, agriculture, military, and tourism, and to serve the mobility and transport needs of that growth.

#### 11.1.2 Changes since Prior Plan

Modal needs have shifted somewhat since the last approved plan, both in terms of the nature and extent of specific needs and in the unit costs of infrastructure project delivery costs. The following points summarize key changes since the prior plan:

- Highways

Progress has been made in remediating structurally deficient bridges. Improved maintenance regimes have made pavement maintenance dollars go further, but there are still significant backlogs in other highway maintenance work, as well as in capacity enhancements and roadway modernization.

- Aviation

The general structure of the NCDOT program of grants supports the state's public aviation facilities, but the need for state and federal funding to support specific airport projects is exceeded by local facility needs. Strategic investments to support regional economic development potentials are another emerging need category.

- Public Transportation

Public transit services are a partnership arrangement, with NCDOT contributing state funding and channeling federal grants to county and local services outside the major metropolitan areas and providing some financial support to metropolitan and regional transit services. Local transit revenue shortages are affecting the ability to match non-local funds, ironically at the time of rising needs for transit given the adverse economic climate. Long-term identified needs are significant.

- Railroads

NCDOT envisions continued strategic investments in private Class 1 railroads to enhance publicly sponsored rail operations and to address targeted safety priorities. Continued public investment in the state's passenger railroad services are sought, as well as long-term investment in high speed rail through the state.

- Ferries

Ferries have seen the introduction of several replacement vessels, but considerable needs remain to address other infrastructure and added capacity for peak demand periods. The state ferry system's mission is evolving, with the ferry system considered an extension of the highway system. Ferries' infrastructure health and safety will need to be addressed more directly in light of the recast definition of the highway system that meets the dual mission to maintain the "waterside" highway and to provide mobility to the traveling public.

- Bicycles and Pedestrians

A detailed analysis of these modes reveals a substantial overall need, with significant accumulated backlog of needs.

- Ports

Ports are being considered under the umbrella of NCDOT, having previously been administered by the NCSPA. Ports have ongoing modal needs not unlike other modes. Should the ongoing North Carolina Maritime Strategy report identify worthwhile "game changing" investments in the existing ports or new facilities, those new strategies would need to be reflected in the ports modal needs.

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## 11.2 Current Performance

### 11.2.1 Performance Standards

Beginning in 2008, NCDOT has performed an annual evaluation of its organizational effectiveness based on numerical performance measures aligned with its mission, goals, and values. The three transportation network performance goals are to improve safety, mobility, and infrastructure health. Over the past three years of the annual evaluation process, NCDOT has refined and updated its performance measures and performance targets. The current measures associated with public transportation performance included in the 2011 Annual Performance Report are summarized below.

### 11.2.2 Existing Performance

NCDOT has defined several performance metrics for the various modes on its list of executive performance measures. These metrics and the current status are as follows:

- Safety
  - The highway fatality rate has been declining over last few years. The current rate is 1.25 fatalities per 100 million VMT, below the target ceiling of 1.66.
- Mobility
  - Incident Clearance Time – Target of less than 75 minutes; current measure is 66 minutes.
  - Ferry Service Availability – Scheduled runs fulfilled; current measure is 98 percent, which is above the 95 percent target.
  - Rail Customer Satisfaction – Based on user survey; current measure is 87.2, above target of 87.
  - Public Transportation Utilization – Based on total annual commuter vehicle miles of travel avoided; target is 25 percent and is exceeded by current performance of 25.7 percent.
  - Highway Reliability – Travel time index of surveyed interstate highways is presently 1.02, below the ceiling of 1.35
- Health
  - Bridges rated in good condition – Current value is 71.8 percent against target of 65 percent.
  - Pavement miles rated in good condition – Current value is 67.8 percent, just under the 70 percent target.
  - Roadway features condition index – Current value is 87, exceeding the target of 84.
  - Average rest area condition – Current score of 94 exceeds the target of 90.

In 2008, the NCDOT modal units, in conjunction with the SPOT, developed LOS performance categories and associated financial needs for public transportation infrastructure as part of the biannual Prioritization process for the STIP. This assessment scored the ability of specified investment categories of the modes to address safety, mobility, and health goals at the Statewide, Regional, and Subregional tiers. Existing performance was scored at mostly LOS C for the mobility and health investment goals at the Statewide, Regional, and Subregional tiers (only the Subregional tier for health was rated at LOS B).

In 2012, the ratings of existing performance for the modal investment categories were updated as part of the Prioritization 2.0 process part of the biannual update of the STIP. In this process, modal units working with SPOT developed refined performance metrics; ascribed 10-year investment values associated with the various LOS steps, and determined their existing performance levels against this framework. Similar to the 2008 assessment, most investment categories were evaluated to be performing at LOS D, with several at LOS C, a few at LOS B, and a couple at LOS A. A composite weighted performance rating across all modes and investment categories yielded a result in the upper range of LOS D. These assessments are summarized graphically in **Table 11-1**, showing the current system performance by various modal investment categories evaluated as part of the Prioritization 2.0 process. In this assessment it is noted that various capital and operations costs (such as roadside maintenance, Intelligent Transportation Systems, Statewide tier Aviation) are not included in the analysis. Also the Ports mode was not assessed as its transition into the NCDOT management realm has just been initiated.

**Table 11-1. Current Modal System Performance Based on Prioritization 2.0 Assessments**

Mode	Goal	Tier	Improvement Type	Current Year LOS (A - F)
Aviation	Safety	Regional & Subregional	All	D
	Mobility	Regional & Subregional	All	D
	Health	Regional & Subregional	All	D
Bike & Ped	Mobility	All tiers	All	D
	Safety	All tiers	All	D
Ferry	Mobility	All tiers	All	C
	Health	All tiers	All	C
Public Transportation	Safety	All tiers	All	C
	Mobility	All tiers	All	D
	Health	All tiers	All	C
Rail	Mobility	Statewide	All	D
Highway	Safety	All Tiers	All	C
	Mobility	Statewide	All	B
		Regional	All	A
		Subregional	All	A
	Health	Statewide	Interstate Pavement	B
			Pavement (Contract Resurfacing)	D
			Modernization	C
		Regional	Pavement (Contract Resurfacing)	D
			Modernization	D
		Subregional	Pavement (Contract Resurfacing)	D
Modernization			F	
All tiers	Bridge	C		

This assessment of performance indicates that the level of funding applied currently to transportation system investments yields existing performance at LOS C overall, and that improved performance in individual categories or overall would require increased investment.

## 11.3 Current Deficiencies

### 11.3.1 Basis for Deficiencies

The Prioritization 2.0 performance analysis estimated the costs for all transportation modes to address safety, mobility, and health goals at the Statewide, Regional, and Subregional tiers for respective levels of service. Based on this analysis, there was a calculated implied current deficiency of \$48 billion. The 2040 Plan identifies 30-year transportation needs in 5-year increments to the year 2040. The current deficiencies, sometimes referred to as backlog, are identified separately from accruing needs, and are included in total transportation system modal needs. The 2040 Plan analysis has yielded an estimate of \$45 billion in current deficiency. This estimate was developed based on information provided by modal units and MPOs, as well as an analysis of existing performance as identified in Prioritization 2.0.

### 11.3.2 Changes since Prior Plan

The 2004 STP and the 2006 STP Mid-Cycle Update Technical Report, both of which identified 25-year total transportation system needs, did not consistently include current deficiencies in their needs analysis; that is to say, all needs were included but were not broken out as to current or accruing, so a plan-to-plan comparison is not possible. The 2006 plan cycle did estimate current deficiencies for the highway mode only of \$30 billion, which adjusted to a 2011 cost basis, is \$42 billion. The 2040 Plan estimate of current deficiencies for the highway mode is nearly \$29 billion.

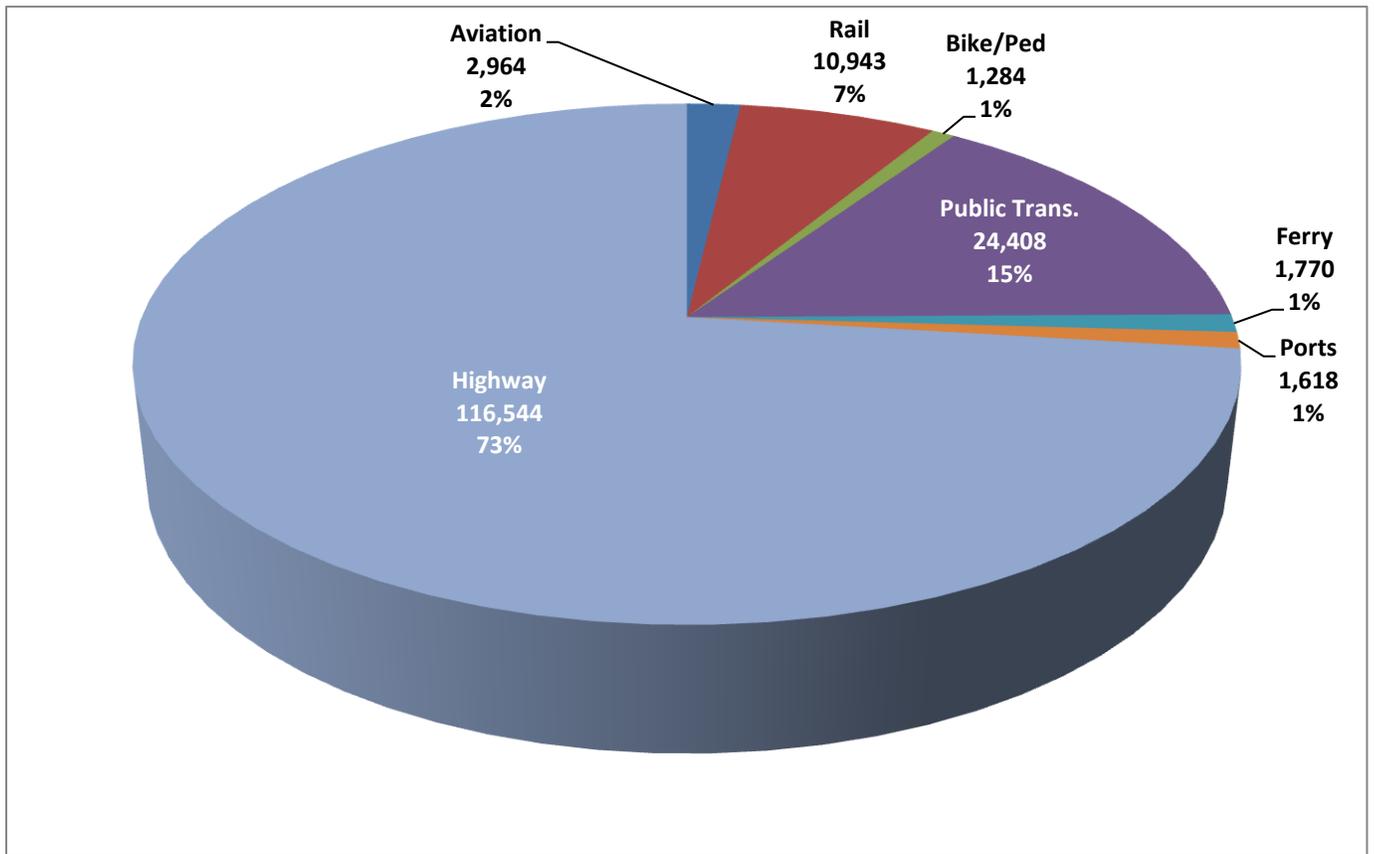
## 11.4 Summary of Modal Needs

The overall transportation system modal needs estimates were developed based on the estimates of the individual needs of each mode as documented in other chapters of this report. All estimates are reported in constant 2011 dollars.

As shown in **Table 11-2** and **Figures 11-1** and **11-2**, the 30-year transportation modal needs total \$159.53 billion. At \$114.59 billion, the accruing needs represent 72 percent of all identified needs, with current deficiencies accounting for \$44.95 billion, or 28 percent of the total identified need.

**Table 11-2. Summary of Modal Needs by 5-Year Increments (\$ in Millions)**

Mode	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
Aviation	682	261	300	345	396	456	524	2,964
Rail	242	782	2,558	362	5,350	711	938	10,943
Bike/Ped	1,051	7	20	33	46	59	68	1,284
Public Transportation	13,875	1,296	3,250	2,490	1,029	1,234	1,234	24,408
Ferry	404	248	260	232	208	225	193	1,770
Ports	66	238	250	256	263	269	276	1,618
Highways	28,626	9,172	9,687	14,383	10,144	22,107	22,425	116,544
<b>Grand Total</b>	<b>44,946</b>	<b>12,004</b>	<b>16,325</b>	<b>18,101</b>	<b>17,436</b>	<b>25,061</b>	<b>25,658</b>	<b>159,532</b>



**Figure 11-1. Total Transportation Needs (\$ in Millions)**

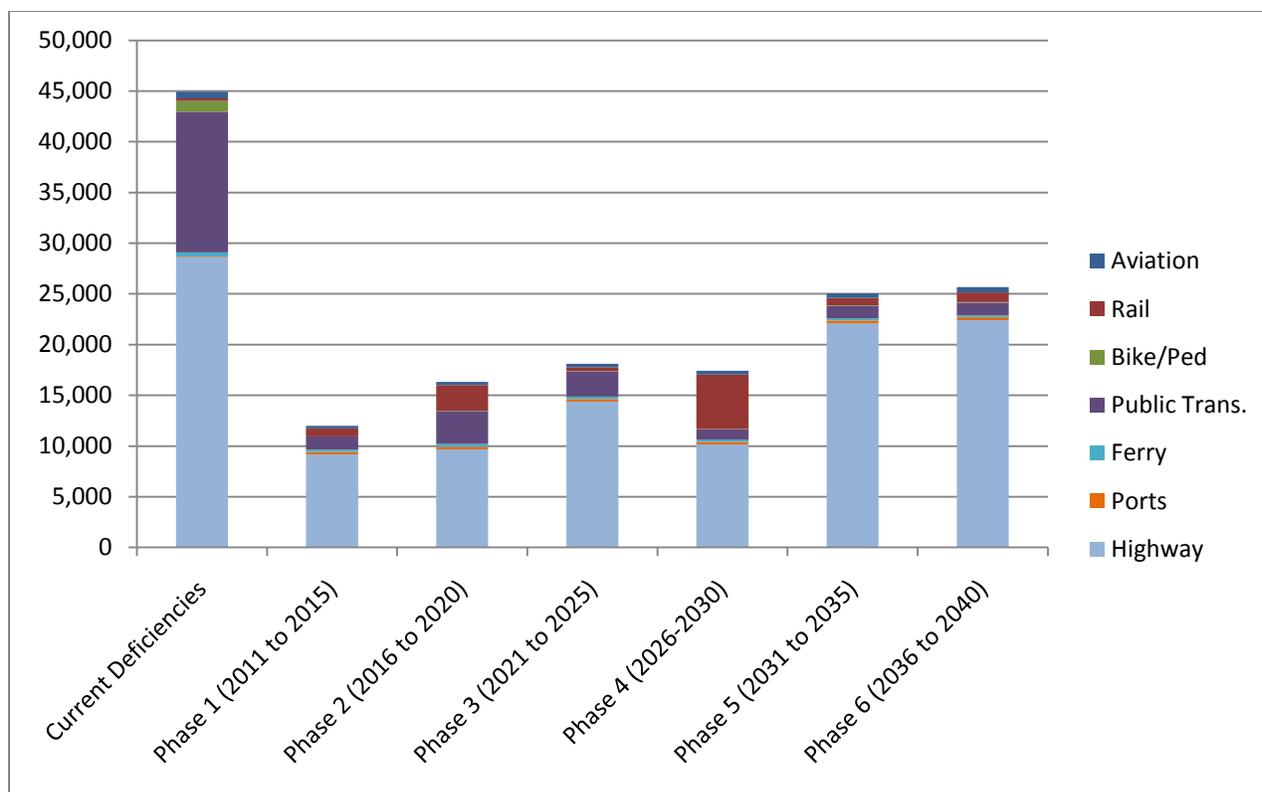


Figure 11-2. Total Transportation Needs by 5-Year Increments (\$ in Millions)

### 11.4.1 Needs by Investment Goal

By investment goal, as shown in **Table 11-3** and **Figures 11-3** and **11-4**, 53 percent (\$84.57 billion) of identified transportation needs are mobility needs, 45 percent (\$71.08 billion) are infrastructure health needs, and the remaining 2 percent (\$3.88 billion) are safety needs. Identified needs by investment goal vary widely by mode depending on the particular needs and role in each investment goal.

Table 11-3. Total Transportation Needs by Investment Goal (\$ in Millions)

Mode	Investment Goal			
	Health	Safety	Mobility	Total
Aviation	1,338	174	1,452	2,964
Rail	36	231	10,676	10,943
Bicycle/Pedestrian	-	643	642	1,285
Public Transportation	9,058	274	15,076	24,408
Ferry	1,508	-	262	1,770
Ports	1,434	62	123	1,619
Highway	57,701	2,499	56,343	116,543
<b>Total</b>	<b>71,075</b>	<b>3,883</b>	<b>84,574</b>	<b>159,532</b>

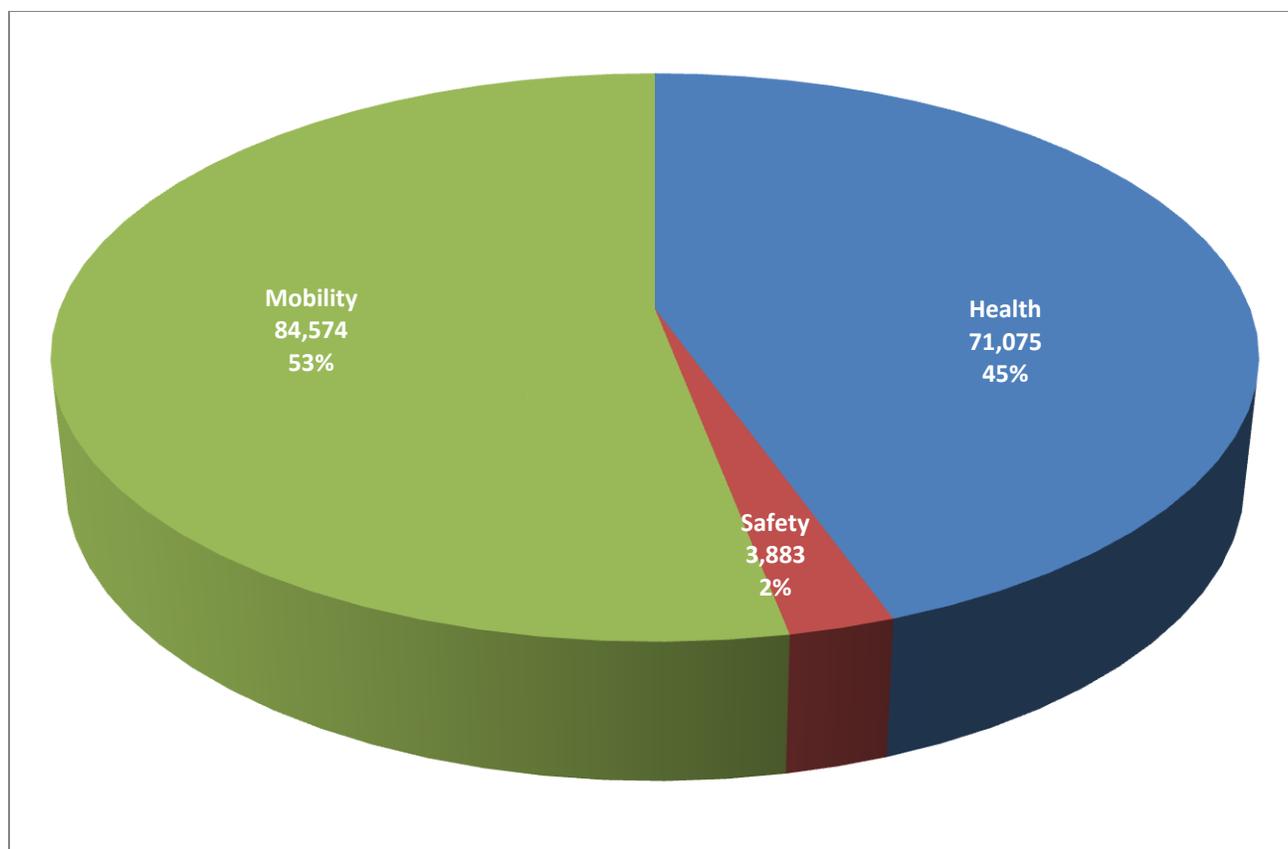


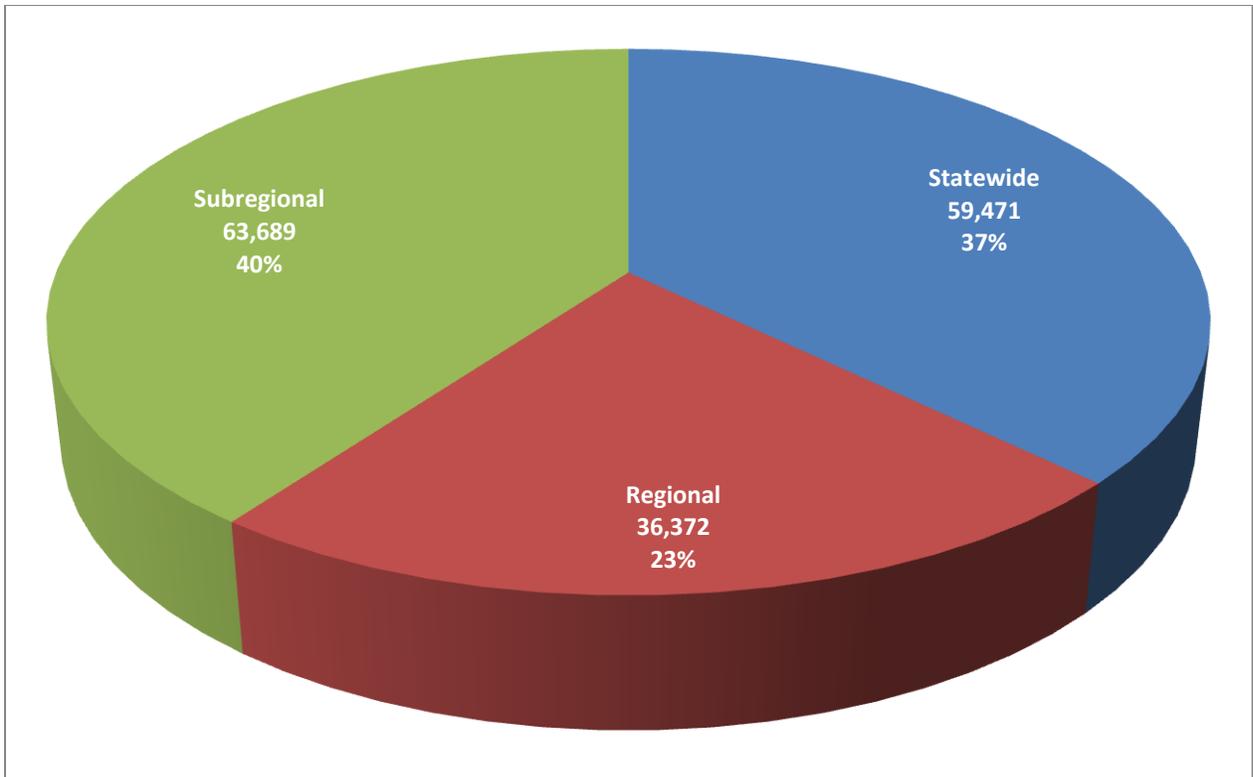
Figure 11-3. Total Transportation Needs by Investment Goal (\$ in Millions)

### 11.4.2 Needs by NCMIN Tier

Based on NCMIN Tier, as shown in **Table 11-4** and **Figure 11-4**, 37 percent (\$59.47 billion) of identified transportation needs are Statewide tier needs, 23 percent (\$36.37 billion) are Regional tier needs, and 40 percent (\$63.69 billion) are Subregional tier needs. Identified needs by tier vary widely by mode depending on the particular needs and role in each of the NCMIN tiers.

**Table 11-4. Total Transportation Needs by North Carolina Multimodal Investment Network Tier (\$ in Millions)**

Mode	NCMIN Tier			
	Statewide	Regional	Subregional	Total
Aviation	76	2,339	549	2,964
Rail	7,919	1,896	1,128	10,943
Bicycle/Pedestrian	26	103	1,156	1,285
Public Transportation	254	13,055	11,099	24,408
Ferry	1,192	578	-	1,770
Ports	1,619	-	-	1,619
Highways	48,385	18,401	49,757	116,543
<b>Total</b>	<b>59,471</b>	<b>36,372</b>	<b>63,689</b>	<b>159,532</b>



**Figure 11-4. Total Transportation Needs by North Carolina Multimodal Investment Network Tier (\$ in Millions)**

### 11.4.3 Summary of Needs by Mode, Investment Goal, NCMIN Tier and Subcategories

**Table 11-5** presents a detailed tabulation of needs by mode, investment goal, NCMIN tier, and various subcategories used in certain modes to generate modal needs at the necessary level of detail. Not all modes have needs in all tiers or investment goals. Also, for several modes including Highways, Public Transportation, and Rail, additional investment subcategories are shown, based on how the modal needs were estimated for these modes. The columns show the six 5-year investment phases of the 30-year plan period, plus current deficiencies for each mode, based on achievement of LOS A per the performance and investment framework.

**Table 11-5. Total Transportation Needs by Mode, Investment Goal, North Carolina Multimodal Investment Network Tier, and Subcategories (\$ in Millions)**

Mode / Sub-Mode	Investment Goal	NCMIN Tier	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
	Mobility	Regional	459	98	112	129	148	171	196	1,313
		Subregional	79	7	8	9	10	12	14	139
	Mobility Subtotal		538	104	120	138	159	183	210	1,452
	Safety	Regional	86	6	7	9	10	11	13	143
		Subregional	19	1	2	2	2	2	3	31
	Safety Subtotal		105	8	9	10	12	14	16	174
	Health	Statewide	-	9	10	11	13	15	17	76
		Regional	27	98	112	129	149	171	197	883
		Subregional	12	42	48	55	64	73	84	379
	Health Subtotal		39	148	171	196	226	259	298	1,338
<b>Aviation Total</b>			<b>682</b>	<b>261</b>	<b>300</b>	<b>345</b>	<b>396</b>	<b>456</b>	<b>524</b>	<b>2,964</b>

Mode / Sub-Mode	Investment Goal	NCMIN Tier	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total	
Rail - Passenger	Mobility	Statewide	242	-	978	-	4,981	55	535	6,792	
		Regional	-	-	1,066	86	86	86	86	1,412	
		Subregional	-	596	46	45	46	326	68	1,128	
	Mobility Subtotal			242	596	2,090	132	5,114	468	690	9,332
	Safety	Statewide	-	1	46	46	46	46	46	46	231
		Safety Subtotal			-	1	46	46	46	46	231
	Health	Statewide	-	-	-	-	-	6	13	18	36
		Health Subtotal			-	-	-	-	6	13	18
<b>Rail - Passenger Total</b>			<b>242</b>	<b>598</b>	<b>2,136</b>	<b>178</b>	<b>5,166</b>	<b>526</b>	<b>754</b>	<b>9,600</b>	
Rail - Freight	Mobility	Statewide	-	104	341	104	104	104	104	860	
		Regional	-	81	81	81	81	81	81	484	
	Mobility Subtotal			-	184	421	184	184	184	184	1,344
<b>Rail - Freight Total</b>			<b>-</b>	<b>184</b>	<b>421</b>	<b>184</b>	<b>184</b>	<b>184</b>	<b>184</b>	<b>1,344</b>	
<b>Rail Total</b>			<b>242</b>	<b>782</b>	<b>2,558</b>	<b>362</b>	<b>5,350</b>	<b>711</b>	<b>938</b>	<b>10,943</b>	
Bike/Ped	Mobility	Regional	52	-	1	2	2	3	3	64	
		Subregional	473	3	9	15	21	27	31	578	
		Mobility Subtotal			525	3	10	17	23	30	34
	Safety	Statewide	21	-	-	1	1	1	1	1	26
		Regional	32	-	1	1	1	1	2	2	39
		Subregional	473	3	9	15	21	27	31	31	578
Safety Subtotal			526	3	10	17	23	30	34	643	
<b>Bike/Ped Total</b>			<b>1,051</b>	<b>7</b>	<b>20</b>	<b>33</b>	<b>46</b>	<b>59</b>	<b>68</b>	<b>1,285</b>	

Mode / Sub-Mode	Investment Goal	NCMIN Tier	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total	
Public Trans. - Urban	Mobility	Statewide	107	17	11	8	8	10	10	170	
		Regional	5,760	270	272	1,812	286	354	354	9,108	
		Subregional	1,009	579	2,464	55	55	69	69	4,300	
	Mobility Subtotal			6,876	866	2,747	1,874	349	433	433	13,578
	Safety	Statewide	4	-	-	-	-	-	-	-	5
		Regional	92	4	4	4	4	4	5	5	120
		Subregional	85	4	4	4	4	4	5	5	111
	Safety Subtotal			180	8	8	9	9	11	11	235
	Health	Statewide	54	3	3	4	4	5	5	5	79
		Regional	2,147	120	120	158	222	268	268	268	3,302
		Subregional	2,425	220	292	350	350	404	404	404	4,446
	Health Subtotal			4,627	343	416	511	575	677	677	7,827
	<b>Public Trans. - Urban Total</b>			<b>11,683</b>	<b>1,217</b>	<b>3,171</b>	<b>2,394</b>	<b>933</b>	<b>1,121</b>	<b>1,121</b>	<b>21,640</b>
Public Trans. - Rural	Mobility	Regional	227	9	9	11	11	13	13	293	
		Subregional	940	37	37	44	44	51	51	1,205	
	Mobility Subtotal			1,166	46	46	55	55	64	64	1,498
	Safety	Regional	6	-	-	-	-	-	-	-	7
		Subregional	26	1	1	1	1	1	1	1	31
	Safety Subtotal			32	1	1	1	1	1	1	38
	Health	Regional	182	6	6	7	7	9	9	9	225
		Subregional	812	26	26	33	33	39	39	39	1,006
Health Subtotal			994	32	32	40	40	47	47	1,231	
<b>Public Trans. - Rural Total</b>			<b>2,193</b>	<b>79</b>	<b>79</b>	<b>96</b>	<b>96</b>	<b>113</b>	<b>113</b>	<b>2,768</b>	
<b>Public Transportation Total</b>			<b>13,875</b>	<b>1,296</b>	<b>3,250</b>	<b>2,490</b>	<b>1,029</b>	<b>1,234</b>	<b>1,234</b>	<b>24,407</b>	

Mode / Sub-Mode	Investment Goal	NCMIN Tier	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
Ferry	Mobility	Statewide	15	27	35	23	23	23	23	171
		Regional	25	17	17	8	8	8	8	91
	Mobility Subtotal		40	44	52	31	31	31	31	262
	Health	Statewide	263	111	158	139	107	139	105	1,021
		Regional	101	93	50	62	70	54	57	487
	Health Subtotal		363	204	208	201	177	193	162	1,509
<b>Ferry Total</b>			<b>404</b>	<b>248</b>	<b>260</b>	<b>232</b>	<b>208</b>	<b>225</b>	<b>193</b>	<b>1,770</b>

Mode / Sub-Mode	Investment Goal	NCMIN Tier	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
Ports	Mobility	Statewide	13	17	18	18	19	19	20	123
	Mobility Subtotal		13	17	18	18	19	19	20	123
	Safety	Statewide	7	8	9	9	9	10	10	62
	Safety Subtotal		7	8	9	9	9	10	10	62
	Health	Statewide	46	213	224	229	235	241	247	1,434
	Health Subtotal		46	213	224	229	235	241	247	1,434
<b>Ports Total</b>			<b>66</b>	<b>238</b>	<b>250</b>	<b>256</b>	<b>263</b>	<b>269</b>	<b>276</b>	<b>1,620</b>

Mode / Sub-Mode	Investment Goal	NCMIN Tier	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
Highways - Bridges	Health	Statewide	51	656	656	656	656	656	656	3,986
		Regional	24	196	196	196	196	196	196	1,199
		Subregional	92	811	811	811	811	811	811	4,959
<b>Highways - Bridges Total</b>	<b>Health</b>		<b>167</b>	<b>1,663</b>	<b>1,663</b>	<b>1,663</b>	<b>1,663</b>	<b>1,663</b>	<b>1,663</b>	<b>10,144</b>
Highways - Pavement	Health	Statewide	466	1,011	1,066	1,125	1,186	1,251	1,320	7,425
		Regional	319	693	731	771	813	858	905	5,091
		Subregional	817	1,773	1,870	1,972	2,080	2,194	2,314	13,018
<b>Highways - Pavement Total</b>	<b>Health</b>		<b>1,602</b>	<b>3,477</b>	<b>3,667</b>	<b>3,868</b>	<b>4,080</b>	<b>4,303</b>	<b>4,538</b>	<b>25,534</b>
Highways - Roadway Maintenance	Health	Statewide	21	220	255	255	255	255	255	1,517
		Regional	23	235	273	273	273	273	273	1,622
		Subregional	199	2,071	2,406	2,406	2,406	2,406	2,406	14,301
<b>Highways - Roadway Maintenance Total</b>	<b>Health</b>		<b>242</b>	<b>2,526</b>	<b>2,934</b>	<b>2,934</b>	<b>2,934</b>	<b>2,934</b>	<b>2,934</b>	<b>17,440</b>
Highways - Safety	Safety	Statewide	317	86	86	86	86	86	86	833
		Regional	317	86	86	86	86	86	86	833
		Subregional	317	86	86	86	86	86	86	833
<b>Highways - Safety Total</b>	<b>Safety</b>		<b>950</b>	<b>258</b>	<b>258</b>	<b>258</b>	<b>258</b>	<b>258</b>	<b>258</b>	<b>2,500</b>
Highways - Modernization	Health	Statewide	806	23	23	23	23	23	23	947
		Regional	1,047	37	37	37	37	37	37	1,268
		Subregional	1,293	87	87	87	87	87	87	1,813
<b>Highways - Modernization Total</b>	<b>Health</b>		<b>3,146</b>	<b>147</b>	<b>147</b>	<b>147</b>	<b>147</b>	<b>147</b>	<b>147</b>	<b>4,027</b>

Mode / Sub-Mode	Investment Goal	NCMIN Tier	Current Deficiencies	Phase 1 (2011-2015)	Phase 2 (2016-2020)	Phase 3 (2021-2025)	Phase 4 (2026-2030)	Phase 5 (2031-2035)	Phase 6 (2036-2040)	Total
Highways - Expansion - Non-Metro	Mobility	Statewide	8,008	203	198	216	167	173	186	9,152
		Regional	135	95	81	118	100	107	146	782
		Subregional	34	30	62	49	108	101	94	478
<b>Highways - Expansion - Non-Metro Total</b>	<b>Mobility</b>		<b>8,177</b>	<b>328</b>	<b>342</b>	<b>383</b>	<b>375</b>	<b>381</b>	<b>426</b>	<b>10,412</b>
Highways - Expansion - Metro	Mobility	Statewide	8,398	262	59	1,865	97	6,784	6,273	23,737
		Regional	2,511	88	126	778	146	1,455	2,114	7,219
		Subregional	3,433	258	237	2,251	206	4,026	3,944	14,355
<b>Highways - Expansion - Metro Total</b>	<b>Mobility</b>		<b>14,342</b>	<b>608</b>	<b>422</b>	<b>4,894</b>	<b>449</b>	<b>12,265</b>	<b>12,331</b>	<b>45,310</b>
Highways - ITS	Mobility	Statewide	-	36	81	106	43	25	33	323
		Regional	-	37	80	37	103	39	2	297
	Mobility Subtotal		-	72	161	143	145	64	34	620
	Health	Statewide	-	78	78	78	78	78	78	465
		Regional	-	15	15	15	15	15	15	90
	Health Subtotal		-	93	93	93	93	93	93	555
<b>Highways - ITS Total</b>			<b>-</b>	<b>165</b>	<b>254</b>	<b>236</b>	<b>238</b>	<b>156</b>	<b>127</b>	<b>1,175</b>
<b>Highways Total</b>			<b>28,626</b>	<b>9,172</b>	<b>9,687</b>	<b>14,383</b>	<b>10,144</b>	<b>22,107</b>	<b>22,425</b>	<b>116,544</b>
<b>Grand Total</b>			<b>44,946</b>	<b>12,004</b>	<b>16,325</b>	<b>18,102</b>	<b>17,437</b>	<b>25,061</b>	<b>25,658</b>	<b>159,532</b>

## 11.5 Level of Service Targets

The modal needs reported above are based on achievement of LOS A, consistent with the performance and investment framework. While achieving LOS A would deliver the highest performance for the state's transportation network, it is believed that more cost effective improvements could be delivered with a targeted investment approach. On a system-wide basis, the existing quality of North Carolina's transportation system is LOS C. Generally, a modal network rated at an optimum LOS A would provide excellent quality conditions, very convenient service, and wide availability of service, but possibly at an unattainable cost to build, maintain, and operate. In comparison, a transportation system at LOS C is veering toward broader safety concerns, deferred maintenance, and congestion and land access issues that constrain economic opportunity. In comparison, an above average system that achieves LOS B would provide good quality conditions, convenient service, and good availability of service, and with a higher return on investment than could be obtained for LOS A investment.

For the 2040 Plan and its longer timeframe, consistency with the Prioritization 2.0 process and clearer links to system quality levels needed for more cost-effective investment provides a logical basis for reporting a set of multimodal system quality targets lower than LOS A. The 2040 Plan builds upon modal targets as they have been identified in the 10-Year Project Prioritization process. Rather than reporting the modal needs at the optimal LOS A (as described in detail in this report), it applies the "Target LOS" identified by NCDOT modal business units as the basis for defining 10-year needs and funding gaps. During implementation of Prioritization 2.0, SPOT staff has worked with NCDOT's modal business units and has conducted public and NCDOT Board of Transportation workshops to define target levels of service that might be achieved with anticipated 10-year resources.

**Table 11-6** provides context for the overall Level of Service by mode and identifies:

- Descriptions of each modal levels of service
- Average **desired** overall Target LOS for each mode
- Average **current** overall LOS for each mode

**Table 11-6. Level of Service Targets**

Level of Service	General Condition	Highways	Public Transportation	Aviation	Bicycle/Pedestrian	Ferries	Passenger Rail	Ports*
<b>A EXCELLENT</b>	High quality conditions, very convenient service, widely available	Very smooth roads, minimal congestion	Frequent service and good geographic coverage	No safety issues	Many and varied bike and pedestrian routes	No ferry delays	Good cross-state rail service	No safety issues
<b>B ABOVE AVERAGE</b>	Good quality conditions, convenient service, good availability	Generally smooth roads, some congestion	Good bus service	Some safety issues	Some bike routes	Periodic ferry delays	Decent state rail service	Some safety issues
<b>C AVERAGE</b>	Minimally acceptable conditions, minimally convenient service, moderate availability	More rough roads, potholes & deficient bridges, common congestion	Infrequent service and limited geographic coverage	Many safety issues	Scattered bike routes	Frequent ferry delays	Limited state rail service	Many safety issues
<b>D BELOW AVERAGE</b>	Poor facility conditions, very minimal service, limited availability	Many rough roads, broad congestion	Barebones service	Many safety issues	Few bike routes	Frequent ferry delays	Poor state rail service	Many safety issues
<b>F FAILING</b>	Deteriorated facility conditions, spotty and irregular services, very limited availability	Widespread rough roads, potholes & deficient bridges, widespread congestion	Very restricted service	Widespread safety issues	No bike routes	Regular and long ferry delays	No state rail service	Widespread safety issues
Shaded cells denote optimal overall modal level of service ('LOS A'), based on degree to which modal systems would provide the best possible quality of service, as defined by performance standards.								
Shaded cells denote desired overall modal level of service ('Target LOS'), as determined by NCDOT as part of its 10-Year Project Prioritization process, based on degree to which modal systems meet defined performance standards.								
Shaded cells denote current overall modal level of service, as determined by NCDOT as part of its 10-Year Project Prioritization process, based on degree to which modal systems meet defined performance standards.								
*Ports came under NCDOT management in 2012, and LOS has not yet been rated.								

Target LOS reflects a more reasonable and attainable approach to statewide transportation modal needs that, although less than LOS A, is still better than existing conditions. While Target LOS performance varies from mode to mode, by investment goal and by tier, **Table 11-7** shows Target LOS is an improvement over the existing LOS C performance.

**Table 11-7. 30-Year Transportation Target Levels of Service by Investment Goal and North Carolina Multimodal Investment Network Tier**

Mode	Investment Goal	Tier		
		Statewide	Regional	Subregional
Aviation	Health	B	B	B
	Safety	B	B	B
	Mobility	C	C	C
Rail	Health	C	(1)	(1)
	Safety	C	(1)	(1)
	Mobility	C	B	B
Bicycle/ Pedestrian	Health	(2)	(2)	(2)
	Safety	C	C	C
	Mobility	C	C	C
Public Transportation	Health	B	B	B
	Safety	B	B	B
	Mobility	B	B	B
Ferry	Health	B	B	(3)
	Safety	(4)	(4)	(3)(4)
	Mobility	B	B	(3)
Ports	Health	B	(5)	(5)
	Safety	B	(5)	(5)
	Mobility	B	(5)	(5)
Highways	Health	A	B	C
	Safety	B	B	B
	Mobility	A	A	A

(1) No defined rail infrastructure health or safety needs on Regional or Subregional tier  
(2) No defined bicycle/pedestrian infrastructure health needs  
(3) All ferry routes are defined as being on Statewide or Regional tier  
(4) No defined ferry safety needs  
(5) All reported ports needs are defined as being on Statewide tier

### 11.5.1 Summary of Needs by Level of Service Targets and Mode, Investment Goal, NCMIN Tier and Subcategories

**Table 11-8** presents a tabulation of needs by Level of Service ranging from A to D, and Target LOS (described in Section 11.5 above). Not all modes have needs in all tiers or investment goals. The modal needs estimates presented in the table can be used to compare achievement of LOS A per the performance and investment framework to Target LOS and other diminished Level of Service targets: LOS B, LOS C, and LOS D.

Overall, when LOS A is compared to Target LOS, the estimated 30-year modal needs decreases from \$160 billion to \$123 billion in 2011 dollars, or a difference of \$37 billion. The 30-year needs at LOS B are estimated at \$130 billion, followed by LOS C at 94 billion, and LOS D at \$66 billion. These cost estimates became the basis for further financial analysis and strategic investment recommendations, described in detail the *Financial Plan and Investment Strategies Report* and the *2040 Plan*.

**Table 11-8. Total Transportation Needs by Level of Service, Mode, Investment Goal, and North Carolina Multimodal Investment Network Tier (\$ in Millions)**

Mode / Sub-Mode	Investment Goal	NCMIN Tier	LOS A Total	LOS B Total	LOS C Total	LOS D Total	Target LOS Total
	Mobility	Regional	1,313	1,188	685	240	685
		Subregional	139	126	73	25	73
	Mobility Subtotal		1,452	1,314	758	265	758
	Safety	Regional	143	127	102	52	127
		Subregional	31	27	22	11	27
	Safety Subtotal		174	154	124	63	154
	Health	Statewide	76	61	46	30	61
		Regional	883	872	806	772	872
		Subregional	379	374	346	331	374
	Health Subtotal		1,338	1,306	1,197	1,133	1,306
<b>Aviation Total</b>			<b>2,964</b>	<b>2,775</b>	<b>2,080</b>	<b>1,461</b>	<b>2,218</b>
Rail - Passenger	Mobility	Statewide	6,792	5,796	541	-	541
		Regional	1,412	1,130	847	565	1,130
		Subregional	1,128	902	677	451	902
	Mobility Subtotal		9,332	7,828	2,065	1,016	2,573
	Safety	Statewide	231	185	139	92	139
		Safety Subtotal		231	185	139	92
	Health	Statewide	36	29	22	14	22
Health Subtotal		36	29	22	14	22	
<b>Rail - Passenger Total</b>			<b>9,599</b>	<b>8,042</b>	<b>2,225</b>	<b>1,123</b>	<b>2,733</b>
Rail - Freight	Mobility	Statewide	860	688	516	344	516
		Regional	484	387	290	194	290
	Mobility Subtotal		1,344	1,075	806	538	806
<b>Rail - Freight Total</b>			<b>1,344</b>	<b>1,075</b>	<b>806</b>	<b>538</b>	<b>806</b>
<b>Rail Total</b>			<b>10,943</b>	<b>9,117</b>	<b>3,031</b>	<b>1,660</b>	<b>3,539</b>
Bike/Ped	Mobility	Statewide	26	22	17	7	17
		Regional	103	81	62	27	62
		Subregional	1,156	926	693	307	693
	Mobility Subtotal		1,285	1,029	773	341	773
<b>Bike/Ped Total</b>			<b>1,285</b>	<b>1,029</b>	<b>773</b>	<b>341</b>	<b>773</b>
Public Trans. - Urban	Mobility	Statewide	170	136	102	68	136
		Regional	9,108	7,970	6,831	5,920	7,970
		Subregional	4,300	3,454	2,820	2,256	3,454
	Mobility Subtotal		13,578	11,560	9,753	8,244	11,560
	Safety	Statewide	5	4	2	1	4
		Regional	120	60	42	24	60
		Subregional	111	56	36	21	56
	Safety Subtotal		236	119	80	46	119
	Health	Statewide	79	53	26	18	53
		Regional	3,302	2,840	2,311	1,783	2,840
Subregional		4,446	3,638	3,436	3,233	3,638	
Health Subtotal		7,827	6,530	5,773	5,034	6,530	

Mode / Sub-Mode	Investment Goal	NCMIN Tier	LOS A Total	LOS B Total	LOS C Total	LOS D Total	Target LOS Total
<b>Public Trans. - Urban Total</b>			21,641	18,209	15,606	13,324	18,209
Public Trans. - Rural	Mobility	Regional	293	251	230	209	251
		Subregional	1,205	964	844	723	964
	Mobility Subtotal		1,498	1,215	1,074	932	1,215
	Safety	Regional	7	5	4	3	5
		Subregional	31	22	18	11	22
	Safety Subtotal		38	27	23	14	27
	Health	Regional	225	167	108	83	167
Subregional		1,006	766	527	383	766	
Health Subtotal		1,231	933	635	467	933	
<b>Public Trans. - Rural Total</b>			2,767	2,175	1,732	1,412	2,175
<b>Public Transportation Total</b>			<b>24,408</b>	<b>20,384</b>	<b>17,338</b>	<b>14,736</b>	<b>20,384</b>
Ferry	Mobility	Statewide	171	161	151	68	161
		Regional	91	83	75	36	83
	Mobility Subtotal		262	244	226	105	244
	Health	Statewide	1,021	960	898	408	960
		Regional	487	390	292	195	390
Health Subtotal		1,508	1,349	1,190	603	1,349	
<b>Ferry Total</b>			<b>1,770</b>	<b>1,593</b>	<b>1,416</b>	<b>708</b>	<b>1,593</b>
Ports	Mobility	Statewide	123	98	74	49	98
		Mobility Subtotal		123	98	74	49
	Safety	Statewide	62	50	37	25	50
		Safety Subtotal		62	50	37	25
	Health	Statewide	1,434	1,147	860	574	1,147
Health Subtotal		1,434	1,147	860	574	1,147	
<b>Ports Total</b>			<b>1,619</b>	<b>1,295</b>	<b>971</b>	<b>648</b>	<b>1,295</b>
Highways - Bridges	Health	Statewide	3,986	3,189	2,392	1,594	3,986
		Regional	1,199	959	719	480	959
		Subregional	4,959	3,967	2,975	1,984	2,975
<b>Highways - Bridges Total</b>			10,144	8,115	6,086	4,058	7,921
Highways - Pavement	Health	Statewide	7,425	6,898	3,606	2,970	7,425
		Regional	5,091	4,073	3,055	2,036	4,073
		Subregional	13,018	10,414	7,811	5,207	7,811
<b>Highways - Pavement Total</b>			25,534	21,385	14,471	10,214	19,309
Highways - Roadway Maintenance	Health	Statewide	1,517	1,214	910	607	1,517
		Regional	1,622	1,298	973	649	1,298
		Subregional	14,301	11,441	8,581	5,720	8,581
<b>Highways - Roadway Maintenance Total</b>			17,440	13,952	10,464	6,976	11,395
Highways - Safety	Safety	Statewide	833	666	314	333	666
		Regional	833	666	314	333	666
		Subregional	833	666	314	333	666
<b>Highways - Safety Total</b>			2,499	1,999	941	1,000	1,999
Highways - Modernization	Health	Statewide	947	758	568	379	758
		Regional	1,268	1,014	761	507	761
		Subregional	1,813	1,450	1,088	725	725

Mode / Sub-Mode	Investment Goal	NCMIN Tier	LOS A Total	LOS B Total	LOS C Total	LOS D Total	Target LOS Total
<b>Highways - Modernization Total</b>			4,028	3,222	2,417	1,611	2,244
Highways - Expansion - Non-Metro	Mobility	Statewide	9,152	7,322	5,491	3,661	7,322
		Regional	782	626	469	313	782
		Subregional	478	382	287	191	478
<b>Highways - Expansion - Non-Metro Total</b>			10,412	8,330	6,247	4,165	8,582
Highways - Expansion - Metro	Mobility	Statewide	23,737	18,990	14,242	9,495	18,990
		Regional	7,219	5,775	4,331	2,888	7,219
		Subregional	14,355	11,484	8,613	5,742	14,355
<b>Highways - Expansion - Metro Total</b>			45,311	36,249	27,187	18,124	40,564
Highways - ITS	Mobility	Statewide	323	258	194	129	258
	Mobility	Regional	297	238	178	119	297
	Mobility Subtotal		620	496	372	248	555
	Health	Statewide	465	372	279	186	372
		Regional	90	72	54	36	90
Health Subtotal		555	444	333	222	462	
<b>Highways - ITS Total</b>			1,175	940	705	470	1,017
<b>Highways Total</b>			<b>116,543</b>	<b>94,192</b>	<b>68,519</b>	<b>46,617</b>	<b>93,030</b>
<b>Grand Total</b>			<b>159,532</b>	<b>130,386</b>	<b>94,128</b>	<b>66,172</b>	<b>122,833</b>