North Carolina Statewide Multimodal Freight Plan

FINAL Report

Prepared for
North Carolina
Department of Transportation

Prepared by
HNTB Corporation

With
SASI World
Clearbox Forecasting

April 2023

LIST OF ACRONYMS

AADT	Average Annual Daily Traffic	FAST Act	Fixing America's Surface Transportation Act	NHS	National Highway System
APP	Areas of Persistent Poverty	FHWA	Federal Highway Administration	NHFP	National Highway Freight Program
BIL	Bipartisan Infrastructure Law	FTI	Freight Train Interference	NPMRDS	National Performance Management Research Data Set
BTI	Buffer Time Index	FY	Fiscal Year	NS	Norfolk Southern Railway
CAMPO	Capital Area Metropolitan Planning Organization	GSO	Piedmont Triad International Airport	RDU	Raleigh Durham International Airport
CAV	Connected and Automated Vehicles	HDC	Historically Disadvantaged Communities	ROW	Right-of-Way
CBRE	Global Commercial Estate Services	IIJA	Infrastructure Investment and Jobs Act	RPO	Rural Planning Organization
CCX	Carolina Connector Intermodal Rail Terminal	ITS	Intelligent Transportation Systems	SMFP	Statewide Multimodal Freight Plan
CIT	Charlotte Inland Terminal	LOS	Level of Service	STIP	State Transportation Improvement Program
CLT	Charlotte Douglas International Airport	MARD	USDOT Maritime Administration	TEU	Twenty-Foot Equivalent Unit
CRFC	Critical Rural Freight Corridors	MHD	Medium and Heavy Duty	THD	Truck Hours of Delay
CRTPO	Charlotte Regional Transportation Planning Organization	MPO	Metropolitan Planning Organization	TNC	Transportation Network Companies
CSX	CSX Transportation	NCDOT	North Carolina Department of Transportation	TSM&O	Transportation Systems Management and Operations
CTP	Comprehensive Transportation Plan	NCFN	North Carolina Freight Network	U.S.	United States
CUFC	Critical Urban Freight Corridors	NCHFN	North Carolina Highway Freight Network	USDOT	United States Department of Transportation
DMS	Dynamic Message Signs	NCPHFN	North Carolina Priority Highway Freight Network	V/C	Volume-to-Capacity Ratio
DoD	U.S. Department of Defense	NCRR	North Carolina Railroad	VMT	Vehicle Miles Traveled
FAC	Freight Advisory Committee	NCSPA	North Carolina State Ports Authority	WIM	Weigh-in-Motion
FAK	Freight All Kinds	NEVI	National Electrical Vehicle Infrastructure	ZEV	Zero Emission Vehicles

TABLE OF CONTENTS

The North Carolina Statewide Multimodal Freight Plan

Chapter 1 – North Carolina's Statewide Freight Plan

Chapter 2 – Our Freight Transportation Vision

Fueling North Carolina's Economy

Chapter 3 – Taking Stock of Our Extensive Freight Resources

Chapter 4 – Focusing on Priority Freight Assets

Chapter 5 – Driving the North Carolina Economy with Freight

Delivering The Goods

Chapter 6 – Evaluating Our Freight Needs and Challenges

Chapter 7 – Investing in The Priority Freight Network

Chapter 8 – Shaping North Carolina's Future

Appendices

Freight Wildlife Habitat Assessment Memo

Climate Change and Stormwater Memo

Freight Emissions Assessment Memo

Freight Equity Assessment Memo

Truck Parking Plan Update

Modal profiles were developed to support this update to the North Carolina Statewide Multimodal Freight Plan. You may review the profiles at https://connect.ncdot.gov/projects/planning/Statewide-Freight-Plan/Pages/default.aspx

NORTH CAROLINA STATE FREIGHT PLAN COMPLIANCE

FAST ACT - Requirement	Freight Plan Reference(s)
Plan contents – a statewide freight plan shall include, at minimum:	
Identification of significant statewide freight **trends, needs, and issues**	Chapters 3, 5, and 6
Description of **freight policies, strategies, and performance measures** that will guide freight-related transportation investment decisions	Chapters 6, 7, and 8
Critical multimodal **rural freight facilities and rural and urban freight corridors**	Chapter 4
Link to **national multimodal freight policy and highway freight program goals**	Chapter 2
Description of how **innovative technologies and operational strategies** (including ITS) that improve the safety and efficiency of freight movements were considered	Chapters 6, 7, and 8
Description of improvements to **reduce roadway deterioration by heavy vehicles** (including mining, agricultural, energy cargo or equipment, and timber vehicles)	Chapters 6, 7, and 8
Inventory of facilities with **freight mobility issues** and a description of the strategies the state is employing to address the freight mobility issues	Chapters 3, 6, 7, and 8
Description of **significant congestion or delay caused by freight movements** and any mitigation strategies	Chapters 3, 6, 7, and 8
Freight investment plan that includes a list of **priority projects** and describes **investment and matching funds**	Chapter 8
Consultation with the state **freight advisory committee**	Ongoing throughout plan development. Presented at 3 meetings (see Chapter 1)

BIL Freight Plan Requirements		
Requirement		**Freight Plan References**
Update plan every four years rather than five years		The plan update timeframe addresses this.
Plans must have an 8-year forecast period, instead of a 5-year forecast period		The plan was already meeting this requirement
The most recent commercial motor vehicle parking facilities assessment conducted by the state		The truck parking study update addresses this requirement
The most recent supply chain cargo flows in the state, expressed by mode of transportation		The Commodity Flow Profile and the other modal profiles address this requirement.
An inventory of commercial ports in the state		This is addressed in the Maritime profile and is mentioned in Chapter 3 of the Final Report
If applicable, consideration of the findings or recommendations made by any multi-state freight compact to which the state is a party		This is not currently applicable
The impacts of e-commerce on freight infrastructure in the state		This is covered in the modal profiles as well as Chapters 5 and 6 of the Final Report
Considerations of military freight		This is covered in the Military Profile and Chapter 3 of the Final Report
Impact Strategies and Goals	Equity Impacts	White paper: • Climate Change • Emissions • Equity • Habitat Fragmentation
	Extreme Weather and Natural Disaster Impacts (Climate Change)	
	Local Air Pollution Impacts	
	Flooding and Stormwater Runoff Impacts	
	Wildlife Habitat Loss Impacts	
Truck Parking Assessment	The capability of the state, to provide adequate parking facilities	The truck parking study update addresses this requirement
	The volume of commercial motor vehicle traffic in the state	This is covered in the Highway Profile, truck parking study, and Chapter 3 of the Final Report
	Whether there exist any areas within the state with a shortage of adequate truck parking facilities	The truck parking study update addresses this requirement

NORTH CAROLINA'S STATEWIDE MULTIMODAL FREIGHT PLAN

North Carolina's freight system plays a critical role for its residents and businesses daily. The freight system is responsible for a wide range of services including keeping store shelves stocked, allowing manufacturing plants to operate, transporting fuel to keep vehicles moving and providing an efficient, reliable way for the United States (U.S.) military to move troops and equipment.

The state's freight infrastructure faces continually changing demands due to changing freight trends and developments, including:

- Significant population growth in the state's urban areas;
- Adoption of new technologies such as autonomous and connected trucks;
- Concentration of manufacturing facilities along major trade corridors;
- Shortage of adequate truck parking facilities; and
- Increasing demand for same-day and next day deliveries due to the continually growing e-commerce market, which will continue to stress the capacity and operations of the state's highways, rail, and port facilities.

As North Carolina adapts to these changing conditions in an era of constrained resources, the N.C. Department of Transportation (NCDOT) must continue to balance freight mobility needs with passenger needs, environmental, social and financial concerns while addressing rapidly rising maintenance costs on aging infrastructure.

NCDOT developed the state's first Statewide Multimodal Freight Plan (SMFP) in 2017. This effort is to update the initial SMFP within the five-year update window to meet federal requirements.

The approach to updating this SMFP, links together various analyses – freight system, commodity flow, trade/economic, industry supply chain and institutional (e.g., regulations and public policies) – in a way that identifies the most critical infrastructure, operational, institutional and market-related issues and chokepoints impacting the state's freight transportation system. The SMFP addresses both current and future needs and opportunities. It allows North Carolina to consider investments under a variety of plausible futures to ensure the most robust and effective recommendations moving forward.

Federal Legislation

The Bipartisan Infrastructure Law (BIL) of 2021, also known as the Infrastructure Investment and Jobs Act (IIJA) and to be referred to as BIL throughout this plan, is a five-year, $550 billion transportation bill providing funding for the nation's transportation planning and infrastructure investments. The BIL includes several provisions specifically geared to improving the performance of the national freight network and supporting investment in freight-related surface transportation projects. At the national level, this includes the development of a National Multimodal Freight Policy, National Freight Strategic Plan, and designation of a National Multimodal Freight Network. On the funding side, it also includes $7.2 billion in formula funding for freight projects on the National Highway Freight Network (NHFN) and a $10.9 billion discretionary, freight-focused grant program for states, metropolitan planning organizations (MPOs), local governments, and other entities.

The North Carolina SMFP update was developed in compliance with BIL requirements for state freight plans to ensure the state has access to Federal funding opportunities and competitive grant opportunities. The 2017 SMFP was developed to meet the Fixing America's Surface Transportation Act (FAST Act) of 2015, the predecessor to the BIL. The updated SMFP also meets freight plan requirements included in the FAST Act. A table summarizing this SMFP's compliance with the BIL and FAST Act requirements is included as cover page.

Freight Plan Methods and Data Overview

Completing a comprehensive SMFP requires transforming data from a myriad of sources into information that is reliable and meaningful to accomplishing the goals of the SMFP. Key sources of data used in the SMFP included stakeholder input, previous studies, and numerous statistical and modeling datasets and tools.

Stakeholder Outreach

Outreach to industry and key stakeholders was a critical component in updating North Carolina SMFP. In order to better understand the needs and issues faced by producers, shippers/receivers and carriers, as well as the regional planning organizations and economic development organizations throughout North Carolina, thoughtful stakeholder outreach and engagement was structured to receive targeted feedback through the development of the Plan. There are four critical elements of this outreach: the State Freight Advisory Committee (FAC), MPOs and Rural Planning Organizations (RPOs), freight and industry stakeholder interviews, and N.C. Board of Transportation final plan approval.

NCDOT convened the NC FAC to advise on freight-related priorities, issues, projects and funding needs; act as forum for discussion of transportation decisions affecting freight mobility; communicate and coordinate regional priorities with other organizations; and promote sharing of information between sectors. The FAC members are reflective of the diverse range of stakeholders that own, operate, plan, maintain, and conduct business utilizing North Carolina's freight infrastructure. Its members include both the public and private sectors. The project team interviewed over 30 freight and industry stakeholders that helped inform the freight system profile and needs assessment. These stakeholders included: freight shippers and receivers, carriers, freight terminal/facility operators, industry associations, government agencies such as the Department of Agriculture and the Department of Commerce, regional and statewide economic development organizations and NCDOT.

The project team engaged numerous North Carolina MPOs and RPOs through the stakeholder interview process. Multiple MPOs and RPOs are also representatives on the NC FAC.

Data and Previous Studies

The 2023 North Carolina SMFP draws from a variety of proprietary and publicly- available data sources to analyze freight demand, commodity flows, business climate, freight transportation network performance, assets and infrastructure and demographic and socioeconomic statistics. This final plan document is compiled from a series of detailed technical reports available at NCDOT Freight Plan.

STAKEHOLDER ENGAGEMENT HIGHLIGHTS

Freight and Industry Stakeholder Interviews

- Shippers and Receivers
- Carriers
- Ports and Airports
- Railroads
- North Carolina Railroad Company
- Industry Associations
- NCDOT
- NC State Agencies
- Regional Economic Development Organizations
- Metropolitan Planning Organizations
- Military Bases
- Trucking Industry and Truck Parking Interests
- Neighboring States

North Carolina Freight Advisory Committee Meetings

- Formally met 3 times during the Freight Plan update development

Regional Forums

- Metropolitan Planning Organizations (MPOs)
- Rural Planning Organizations (RPOs)
- 2 virtual meetings - May 17 & 19
- 120 attendees

Electronics Survey

- Promoted through email distribution blasts, social media and newsletters
- Available June 3-20
- 100 comments provided

NORTH CAROLINA FREIGHT ADVISORY

DATA SOURCES USED IN NORTH CAROLINA STATEWIDE MULTIMODAL FREIGHT PLAN

Category	Data Source	Data Type
Freight System Demand and Commodity Flows	FHWA Freight Analysis Framework Version 5	Origin-Destination commodity flows
	U.S. Bureau of Trade Statistics	Imports and exports statistics
	U.S. Energy Information Administration	Petroleum product stocks and shipments
	N.C. Department of Transportation	Truck counts
	N.C. State Ports Authority	Port traffic and forecast
	Surface Transportation Board Confidential Carload Waybill Sample	Rail freight origin-destination commodity flows
	Bureau off Transportation Statistics TransStats Database	Air cargo by airport
	Boeing World Air Cargo Forecast	Air cargo demand forecast
	N.C. Department of Public Safety Emergency Management	Hazardous material flows
Establishment Data	Data Axle	Business establishments employment, area, and location
Transportation Cost	TranzAct Freight Waybills	Freight billing data
Network Performance	National Performance Management Research Data Set	Truck travel times
	North Carolina Department of Transportation Statewide Travel Demand Model	Truck demand and Level of Service (existing and forecast)
Safety	N.C. Department of Transportation	Truck-involved crashes
	Federal Railroad Administration Office of Safety Analysis	At-grade crossings inventory, crashes, and incidents
Assets and Infrastructure	Federal Highway Administration Office of Planning, Environment, and Realty	Freight intermodal connectors
	N.C. Department of Transportation	Highway network, rail network, weigh stations, at-grade rail crossings, bridges, tunnels, work zones, truck size and weight, Statewide Transportation Improvement Program
	U.S. Pipeline and Hazardous Materials Administration	Pipeline network
	U.S. Energy Information Administration	Hazardous material terminals
	North Carolina State Ports Authority	Port infrastructure characteristics
	Oak Ridge National Laboratory	Rail network
	National Transportation Atlas Database	Transportation facilities
Demographic and Socioeconomic Data	U.S. Census Bureau	Population, longitudinal employer household dynamics
	U.S. Bureau of Labor Statistics	Industry employment and wages
	U.S. Bureau of Economic Analysis	Gross Domestic Product
	U.S. Energy Information Administration	State energy prices and expenditures
	North Carolina Office of Management and Budget	Population projections

Past planning efforts that contributed to the development of this plan include:

- 2015- North Carolina Transportation Network and Strategic Transportation Corridors
- 2016 – Greater Charlotte Regional Freight Mobility Plan
- 2017 – North Carolina Statewide Multimodal Freight Plan
- 2017 – North Carolina Truck Parking Study
- 2018 – North Carolina Ports Economic Contribution Study
- 2018 – Triangle Regional Freight Plan
- 2019 – Eastern North Carolina Regional Freight Mobility Plan
- 2019 – North Carolina Division of Aviation Strategic Plan
- 2020 – North Carolina Truck Parking Study, Phase II
- 2021 – North Carolina Moves 2050 Plan
- 2021 – Strategic Plan of the North Carolina State Ports Authority
- 2022 – Comprehensive State Rail Plan (Draft)

NORTH CAROLINA FREIGHT VISION, GOALS AND OBJECTIVES

As part of the 2017 SMFP, NCDOT developed a freight vision, goals and objectives to meet that vision which drives performance measures and freight investment decision-making. The vision, goals, and objectives were re-evaluated as part of the 2022 SMFP update. The vision, goals, and objectives are informed by:

- FAC;
- NCDOT's Moves 2050 Plan and the Strategic Transportation Corridors; and
- National freight policy goals defined in the 2012 MAP 21Bill, 2015 FAST Act and 2021 BIL.

To achieve this vision, goals and objectives were defined. The goals primarily focus on enabling economic growth and competitiveness, with a significant focus on trade and access to markets and population centers. Another focus is on system performance goals from the perspective of passengers, shippers, carriers and stakeholders who are impacted by the operational performance, reliability and resilience of the freight system. In addition, the plan goals and objectives ensure environmental stewardship through minimization of freight-induced negative impacts on natural, cultural and environmental resources, and promote deployment of advanced technologies, and fostering public-private partnerships.

NCDOT and the FAC agreed on maintaining the eight strategic goals for North Carolina's freight transportation system that were part of the 2017 SMFP as part of the 2022 SMFP update. These strategic goals are intended to guide current and ongoing freight-related transportation planning efforts and serve as a touchstone by which to gauge the success of these efforts. In addition to articulating goals for the state's freight transportation system, several objectives are identified for each goal. These objectives remained largely the same in the 2022 SMFP update with a few exceptions related to BIL requirements and input from stakeholders. Accomplishment of these objectives will make concrete, measurable progress toward the attainment of the freight transportation system goals and ultimate realization of the North Carolina freight transportation system vision.

2022 SMFP Goals Comparison with Past Plans and Federal Policies

<table>
<tr><th>2017 NC Freight Plan</th><th>Economic Competitveness</th><th>Mobility & Reliability</th><th>Safety & Security</th><th>Innovative Technology</th><th>Asset Management</th><th>Environmental Sustainability & Livability</th><th>Collaboration & Partnership</th><th>Sustainable Funding</th></tr>
<tr><td rowspan="2">MAP-21 and FAST Act</td><td>Economic Competitiveness</td><td colspan="3">Innovation & Advanced Technology</td><td>State of Good Repair</td><td>Environmental</td><td>Multistate Connectivity</td><td rowspan="2"></td></tr>
<tr><td>Economic Efficiency and Productivity</td><td>Reliability</td><td colspan="2">Safety, Security, Efficiency, Resiliency</td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">NC Moves 2050 Plan</td><td>Support a strong economy</td><td>Provide transportation access for all</td><td>Ensure safety and security</td><td rowspan="2"></td><td colspan="3">Maintain a high-quality system</td><td rowspan="2"></td></tr>
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NORTH CAROLINA FREIGHT GOALS AND OBJECTIVES

Economic Competitiveness
Enhance economic development opportunities and competitiveness

- Support the state's freight economy sectors to attract quality growth and high paying jobs
- Invest in the ports and the airports to increase exports to key trading partners and to fully participate in the global markets
- Leverage state-owned logistical assets such as the maritime ports to accommodate increased cargo flow from the introduction of mega-container vessels and the opening of the expanded Panama Canal
- Improve access to freight-related industries, and potential industrial or mega development sites
- Improve mobility and access to intermodal operations and facilities
- Expand access to competitive multimodal transportation options
- Develop strategic highway and rail connections with regional trading partners
- Collaborate with local government in improving the "last mile" freight operations and urban area logistics

Mobility and Reliability
Improve freight system efficiency, reliability, and resiliency

- Enhance integration and connectivity across and between freight modes
- Strategically expand system capacity where existing infrastructure can longer be optimized
- Improve mobility and travel time reliability by managing traffic congestion
- Improve system productivity by lowering transportation costs
- Improve incident management system by partnering with emergency response and law enforcement agencies
- Reduce road closures during peak season and peak hours for construction and maintenance
- Coordinate traffic signals on U.S. and North Carolina routes to improve flow of through traffic
- Monitor and evaluate system performance to assess truck travel time reliability, operational conditions, and effectiveness of congestion management strategies
- Expand multimodal access to ports, airports, and other intermodal and logistics hubs
- Maintain alternate access routes and redundancy in the system for rapid recovery from weather or other disaster events

Safety and Security
Enhance freight transportation safety and security

- Reduce death, injury, and crash/incident rates on all modes to improve public health
- Reduce economic losses due to transportation crashes and incidents
- Eliminate safety hazards by proactively working with stakeholders and agencies responsible for the freight transportation system
- Improve system security to protect people, cargo, and critical infrastructure assets

Innovative Technology
Support adoption and deployment of new freight technologies

- Promote the adoption of safety, fuel efficiency, telematics, alternative fuel, electronic logging device, and other technologies for the trucking industry
- Implement adaptive signal control and other Intelligent Transportation System safety solutions on key freight transportation corridors and freight facilities
- Foster safe future use of autonomous vehicles and drones in freight transportation
- Foster the adoption of Mobility as a Service or similar last mile freight delivery operations through freight-focused planning and projects

Asset Management
Improve freight infrastructure conditions and preservation

- Maintain, preserve, and extend the service life of existing and future freight transportation infrastructure serving all modes
- Monitor infrastructure conditions and prepare an annual freight state-of-the-system report covering all modes

Environmental Sustainability and Livability
Protect and enhance the natural environment

- Support affordable electric vehicles for an equitable clean energy freight economy
- Reduce and/or mitigate the adverse environmental and community impacts of multimodal freight and passenger rail strengthen the resilience of the multimodal freight network against extreme weather events
- Support expanded multimodal freight rail services as a means of reducing carbon emissions and fuel consumed per ton and per passenger-mile and increasing the resiliency and redundancy of the system against extreme weather events
- Enhance resiliency and develop redundancy for the multimodal freight system
- Reduce the multimodal freight impacts on areas of persistent poverty
- Provide equitable opportunities for workforce development to low income and minority groups

Collaboration and Partnership
Foster public-private partnerships and collaboration with freight stakeholders

- Develop and nurture partnerships with private industries with significant role in the state's economy
- Provide a forum for public agencies, industry groups, U.S. military, and local business chambers to coordinate and integrate freight movements
- Provide a forum for participation by freight shippers and carriers in the state
- Improve access to data and information such as traffic speed, incidents, and construction management information
- Expand external communication through social media and mobile apps

Sustainable Funding
Ensure good fiscal management and sustainable funding for the state's freight network

- Secure funding for projects with long-term benefits or high benefit-cost ratio
- Leverage federal funding in freight projects
- Maintain high standards in management of public assets and resources

FREIGHT RESOURCES

The movement of goods is a major contributor to the North Carolina economy. North Carolina's freight assets are the backbone of the state's economic vitality, enabling the movement of millions of tons of freight each year. The state's freight transportation system is an important component of business retention and attraction. According to the Area Development 36th Annual Corporate Survey, several site selection factors identified in the survey were related to transportation.[1]

An inventory of the state's freight assets and an assessment of the role those assets play in supporting statewide freight transportation is the foundation of conducting the needs assessment and developing the most effective freight investment plans.

[1] https://www.areadevelopment.com/Corporate-Consultants-Survey-Results/q1-2022/36th-annual-corporate-survey.shtml

HIGHWAY FREIGHT ASSETS

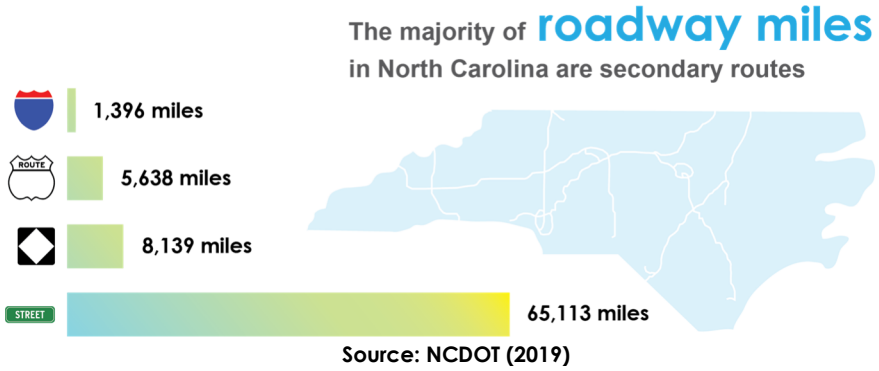
Highway transport is the primary mode of goods movement in North Carolina. By far, it accounts for the largest share of overall tonnage by mode representing nearly 83% of total inbound, outbound, internal and pass-through flows for all modes combined in North Carolina. The highway system is a critical element of the multimodal freight system as the majority of goods transported in the state utilize the highways for at least one leg of their trips.

Inventory

North Carolina maintains approximately 80,286 miles of roadway. Secondary roads account for the largest share of the state-maintained system, accounting for over 81% of all roads. State roads (i.e., North Carolina routes) are a distant second, comprising about 10% of the system. U.S. routes and interstate highways comprise the remainder of the state-maintained system at 7% and 2%, respectively.

Demand

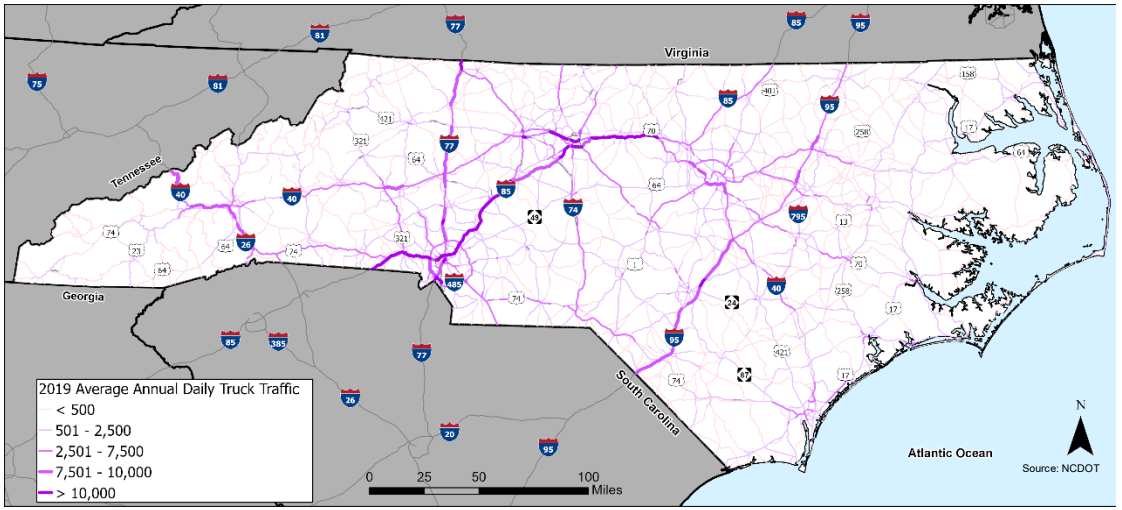
Most of North Carolina's truck flows occur on the interstate highway system. In general, I-40/I-85 is the heaviest utilized freight corridor in North Carolina based on truck volumes. Truck volumes on I-40/I-85 range from 10,000 to 16,000 trucks per day. In particular, the highest truck volumes occur on I-85 north of Charlotte as more than 16,000 trucks per day utilize this corridor.



As large numbers of freight-intensive industries are located along this corridor, I-85 is important to freight movements in which the state has a potential economic interest as local shippers are likely heavy users of the highway. Other interstate highways with particularly high truck volumes include I-77, I-40, I-26 and I-95, with portions carrying between 8,000 to 11,000 trucks daily.

There also are non-interstate highways that are important freight corridors as indicated by daily truck volumes. Some of these highways achieve daily truck volumes that are comparable to those experienced by portions of the interstate highway system.

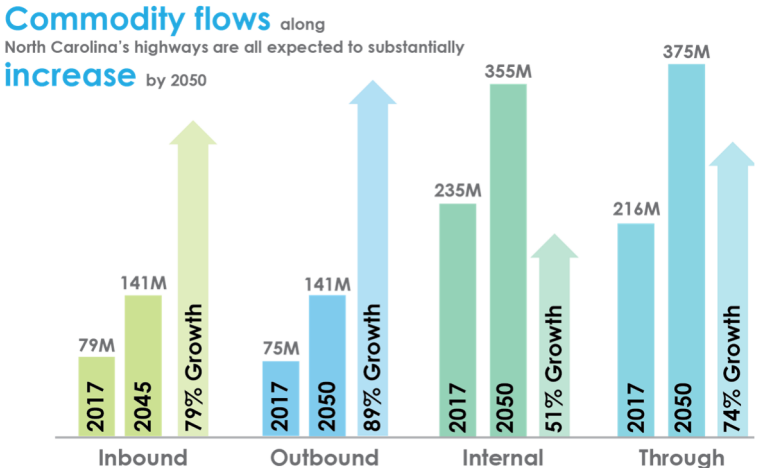
Among the largest non-interstate highway freight corridors are U.S. 74 and U.S. 70. Portions of U.S. 74 transport nearly 5,000 trucks per day. U.S. 70 carries nearly 3,000 trucks daily on its busiest segments.



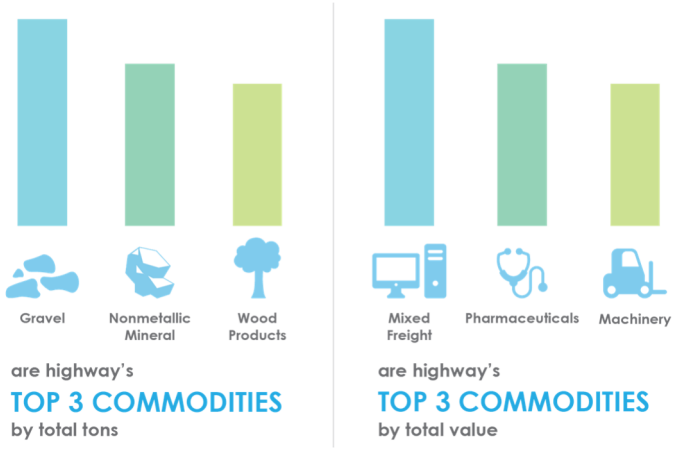
In 2017, nearly 605 million tons of cargo worth $794 billion were transported over North Carolina's highways. Nearly 43% of total truck tons began and ended within North Carolina. Truck flows inbound to North Carolina and outbound from the state had nearly equal shares of total truck flows, which allows carriers to provide more competitive truck rates for the region's shippers since they have more opportunities to reduce empty hauls. Through truck flows, those traveling through North Carolina without stopping to make a pick-up or delivery, comprised about 29%.

The top commodities, by weight, traveling on North Carolina's highways are bulk goods such as gravel, non-metallic mineral products and wood products. However, the highest-value goods transported include mixed freight (i.e., consumer products and other miscellaneous products), pharmaceuticals and machinery.

Demand for highway freight is expected to increase to over 1.011 billion tons of cargo by 2050. This represents an increase of nearly 42% over 2017 flows. Truck flows traveling through North Carolina without stopping has the highest projected share of the total trips at 37% (74% increase from 2017). A large portion of truck flows, about 35%, are expected to continue to be internal to North Carolina, and is expected to have a growth rate of 51% over the next 33 years. Inbound and outbound flows are expected to maintain balanced shares of truck flows with both claiming 14% each of the total.



Source: FHWA Freight Analysis Framework Version 5



Source: FHWA Freight Analysis Framework Version 5

A 42% increase in total tonnage over the next 33 years, especially in bulk commodity groups, will place significant pressure on North Carolina's highway system. It is expected that many of the truck trips associated with the highway commodity flows will travel on non-interstate roadways for some portion of the trip. In the absence of a modal shift, motor carriers will be forced to accommodate demand with heavier and more frequent trucks. This will contribute to congestion in the state's urban areas as heavy trucks compete with commuters for highway capacity. It will also further strain pavements and bridges.

Conditions and Performance

Overall, pavements are in good condition across the state. Secondary routes have the highest percentage of route mileage in "Good" condition with 87%, and U.S. routes have the highest percentage of route mileage in "Poor" condition with 24%.

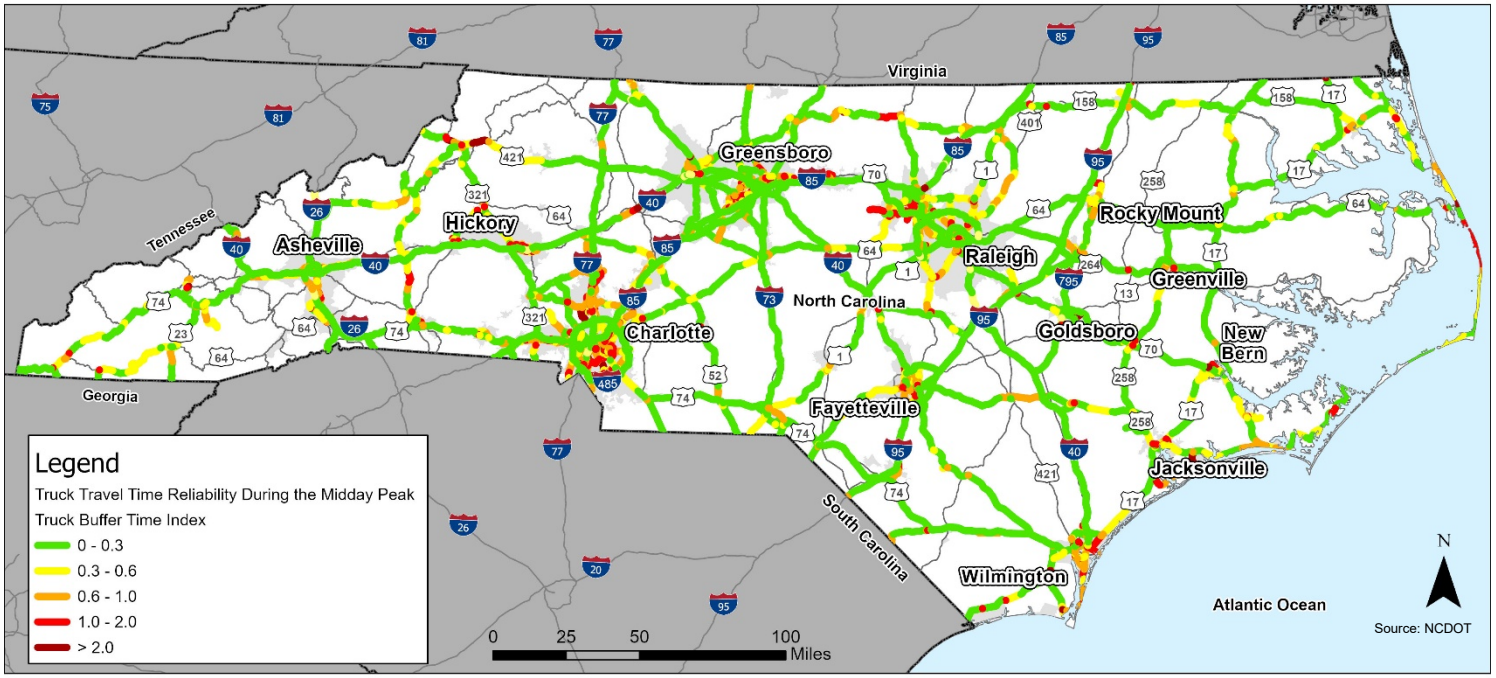
Poor to Fair pavement conditions are observed on several high truck volume routes. For instance, the U.S. 64, U.S. 264 and U.S. 70 corridors, which connect Eastern Carolina to the Triangle Region, all have stretches in Fair or Poor condition. This directly affects the performance of truck trips to the Port of Morehead City and the CSX rail intermodal facility in Rocky Mount should conditions worsen.

U.S. 74, which links the Port of Wilmington to the Charlotte Region, also has long stretches in Fair or Poor pavement conditions throughout that entire corridor.

For the most part, truck congestion is limited to the state's largest metropolitan areas – the Raleigh-Durham area, the Greensboro/Winston-Salem/High Point area and the Charlotte metropolitan area. These urban areas also have the least reliable truck travel time. These areas all have significant commuter activity on the interstate highway system, which competes with truck traffic.

Pavement Condition	Interstate Highways	U.S. Routes	N.C. Routes	Secondary Routes
Poor	13%	24%	8%	3%
Fair	22%	18%	19%	10%
Good	65%	58%	73%	87%
Total	**100%**	**100%**	**100%**	**100%**

Buffer Time Index (BTI) is the ratio of the difference between the 95th percentile truck travel time and average travel time to the average travel time. Thus, the BTI represents the extra time (i.e., buffer) that must be factored into scheduling to ensure an on-time arrival for 95% of truck trips. For example, a BTI equal to 0.5 indicates that a trip that on average takes 30 minutes would need 50% more time or an extra 15 minutes (for a total scheduled travel time of 45 minutes) to reach its destination on time with confidence.



- **Triangle Region**: Truck congestion is most pronounced near Raleigh and Durham, along the I-40 and I-440 corridors. There also is significant congestion along I-540 near its interchange with I-40.

- **Charlotte Region**: Truck congestion is heaviest along I-77 through the core of the region and north of the I-485 perimeter. The southwest portion of I-485 (between U.S. 74 and I-85) and I-85 west of I-485 also exhibit heavy truck congestion.
-

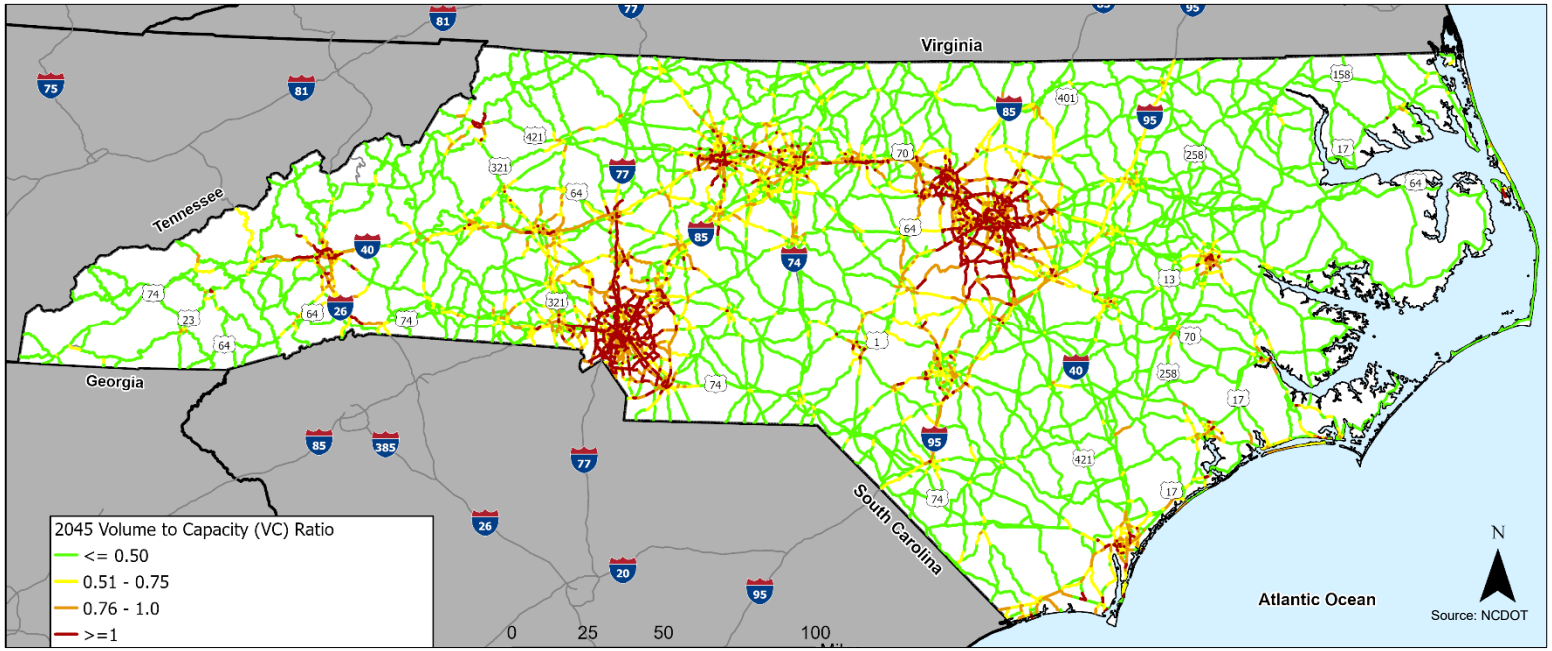
Triad Region: Truck congestion is most pronounced along I-40 Business, U.S. 220 and the portion of I-40 bounded by U.S. 421 in Winston-Salem. Like truck congestion, truck travel time is least reliable in these same urban areas.

- **Triangle Region:** Poor travel time reliability is most pronounced along I-40 and I-440 through the City of Raleigh. Along the I-40 corridor, poor reliability also extends west from Raleigh to Durham and south towards the I-40/U.S. 70 interchange.

- **Charlotte Region:** Truck travel time reliability is poorest along I-77 through the core of the region and north of the I-485 perimeter. The southwest portion of I-485 (between U.S. 74 and I-85) and the portions of I-85 northeast and west of I-485 also exit poor reliability.

- **Triad Region:** Travel time reliability is poorest along I-40 Business, U.S. 220 and the portion of I-40 bounded by U.S. 421 in Winston-Salem.

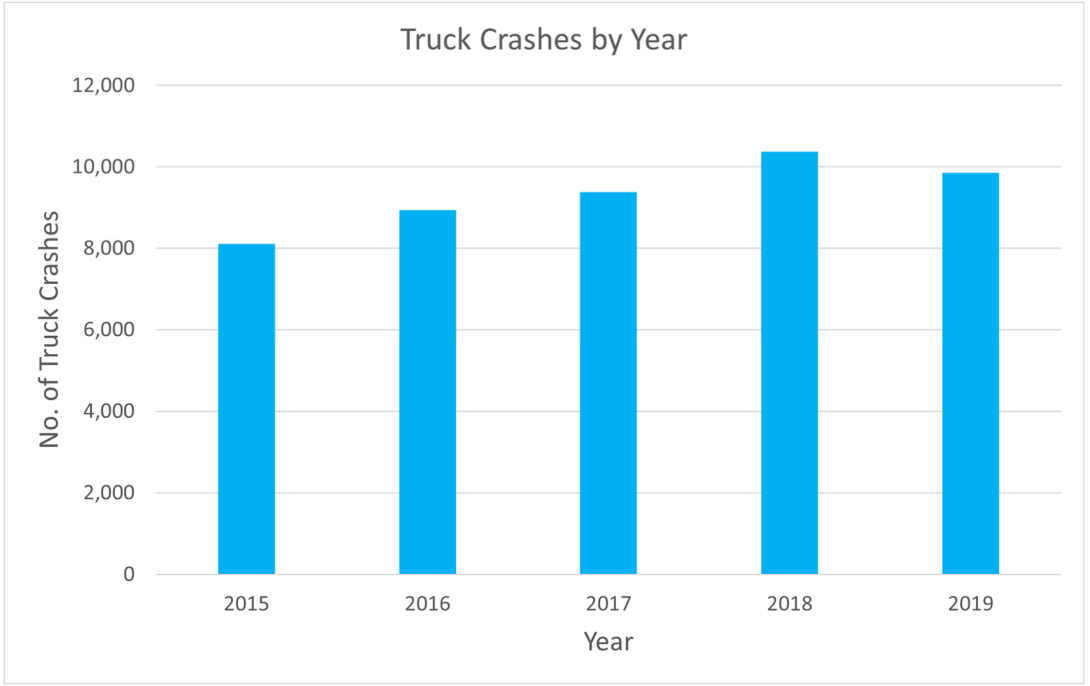
Volume-to-Capacity Ratio (V/C) is a measure that reflects mobility and quality of travel of a facility or a section of a facility. V/C is a conventional level-of-service measure for roadways, calculated by dividing the total volume of traffic on a roadway by its capacity. V/C ratio is generally reported as a decimal, for example, a V/C of 1.00 indicates the roadway facility is operating at its capacity and a V/C of 0.5 indicates the roadway facility is operating at 50 percent of its capacity. The 2045 V/C ratio shows the projected mobility conditions and congestion on the roadways by 2045.



Truck-involved crashes also are a major concern to North Carolina. Between 2015 and 2019, over 46,600 truck-involved crashes occurred in the state, with the total number of crashes increasing nearly each year. Ten counties accounted for nearly half of all truck crashes in the state, all of which are located within one of the state's major metropolitan regions: Charlotte, Raleigh/Durham, Winston-Salem/High Point/Greensboro, Asheville and Fayetteville regions.

Though most of the state system provides for uncongested and reliable truck travel, there are portions of the system where performance is challenged, particularly major metropolitan areas. Traffic volumes on North Carolina highways are predicted to grow by a substantial amount, which will result in capacity-constrained conditions on several corridors that are important to freight mobility. Furthermore, the highway system will remain the predominant mode by which freight is moved through and within the state. Mitigating the effects of growth, especially on corridors with existing challenges, is important for moving forward.

Corridors that may be exacerbated by growth include: in the Triangle Region, I-40, I-440 and I-540 near its interchange with I-40; in the Charlotte Region, I-77 through the core of the region and north of the I-485 perimeter and I-485 (between U.S. 74 and I-85); and in the Triad Region, Future I-285 and I-40 corridors. The Asheville and Wilmington regions are also expected to experience large amounts of growth that will impact the roadways in those areas.



Source: NCDOT

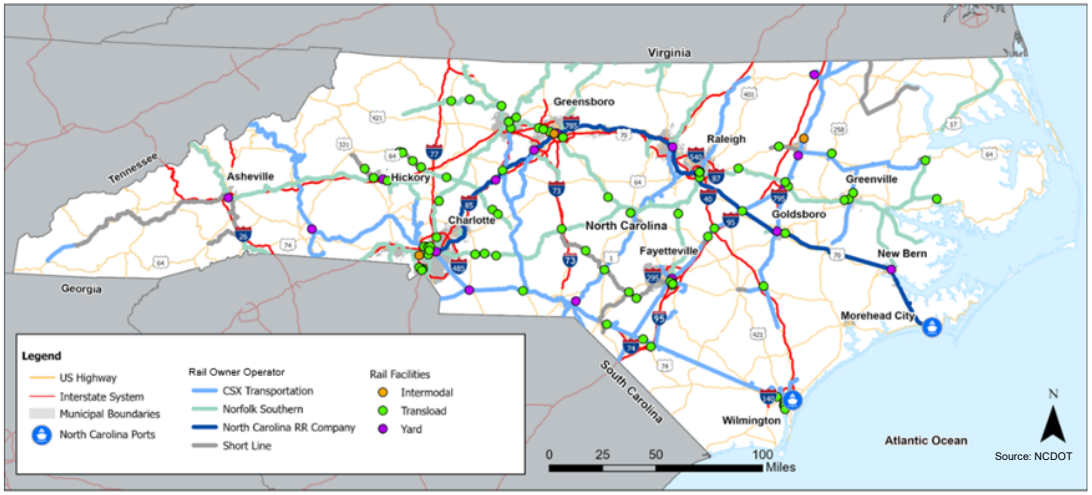
FREIGHT RAIL ASSETS

Rail transport is one of the most cost-effective means of moving freight and it is vital to many of North Carolina's key exporting industries.

Inventory

In North Carolina, there are approximately 3,200 miles of railroad serving 86 of the state's 100 counties. The state's network features two Class I railroads, Norfolk Southern Railway (NS) and CSX Transportation (CSX) and 24 short line railroads that connect businesses and industries to the Class I network. CSX and NS operate approximately 70% of the State's rail system. In addition, the North Carolina Railroad (NCRR) Company owns and manages a 317-mile corridor extending from the Port of Morehead City to Charlotte. NS operates along the corridor through an exclusive operating and maintenance agreement.

North Carolina's rail network includes two major classification yards, four intermodal terminals, two deep water ports and numerous transload facilities. The rail-served sites include proprietary industrial facilities and third- party for-hire terminals that may have waterfront facilities or more concentrated operations at inland locations. Railroad freight movements are directly affected by the ease of connections and switching operations at state ports, barge and ocean terminals, and transload facilities, as well as connections with short lines and their industrial customers.



The freight rail network in North Carolina provides services to ports, power plants, mines, military installations and industries including agriculture, forestry, plastics, furniture, food products and chemicals.

Demand

Over 81 million tons of cargo were transported on North Carolina's rail network in 2019. Of that tonnage, nearly 10% was intermodal. Over half of rail flows traveled inbound to North Carolina, while just 14% traveled outbound from the state. This leads to an imbalance in rail flows and potentially higher costs for rail services.

Through-traffic makes up 31% of total rail traffic tonnage, and more than half of the intermodal container traffic. Through-traffic is primarily on the north-south NS Crescent Corridor and CSX A Line. Generally, lower volume east-west Class I branch lines and short lines help connect North Carolina industries to the primary north-south Class I network. These branch lines-to-Class I-connections provide important national and international economic and transportation linkages for industries located in rural and small urban areas.

The top commodities moved by rail carload are coal, hazardous materials and chemicals.

Source: Surface Transportation Board Confidential Carload Waybill Sample

Top 3 Carload Commodities

by total tons

Top 3 Intermodal Commodities

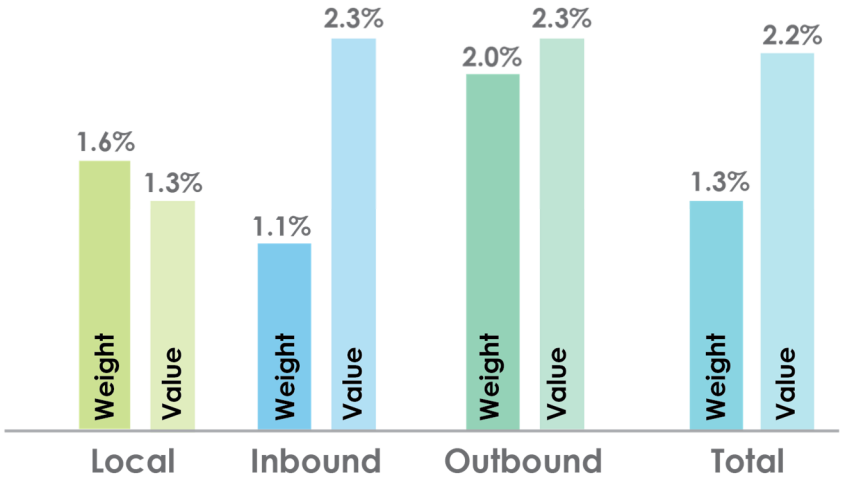
by total tons

Surface Transportation Board Confidential Carload Waybill Sample

Intermodal commodities, such as consumer goods, can be difficult to tease apart and are referred to as FAK or Freight All Kinds. FAK is a mix of commodities being shipped together and are by far the largest category. Often FAK shipments are intended for a particular retailer (e.g., Lowe's or Wal-Mart). Beyond this general intermodal category, petroleum products and farm products are top commodities.

Most of North Carolina's rail carload trade is inbound, mainly due to coal from West Virginia, Pennsylvania and Kentucky, though Illinois and Ohio are also notable trading partners. Evaluating trading partners by weight shipped is an important metric since trade by weight can be translated into truckloads and used to identify corridors where truck-to-rail diversion might be studied to relieve highway congestion.

2020-2050 Annual Growth Rates of NC Rail Freight Flow



Surface Transportation Board Confidential Carload Waybill Sample

By 2050, rail freight flows are expected to increase in North Carolina an average 1.3% per year with the dollar value increasing at a faster rate of 2.2% per year. Outbound traffic is expected to grow much faster than inbound non-container traffic over the next 33 years. This is primarily due to the projected decrease in coal usage in the state by 2050.

Source: Surface Transportation Board Confidential Carload Waybill Sample, US Bureau of Trade Statistics

Source: Surface Transportation Board Confidential Carload Waybill Sample, US Bureau of Trade Statistics

In response to the expected decline of coal traffic, the rail operators are moving to capture more intermodal business. Reduction in coal shipments passing through and terminating in North Carolina provides network capacity to accommodate growth in other commodities.

Through-traffic will grow at about 0.9% and 2.3% annually in terms of tons and value respectively. As NS and CSX invest more money into the Crescent Corridor and National Gateway Corridor, respectively, with rehabilitation of rail tracks to achieve faster delivery times, improve capacity, and run more efficient trains, North Carolina will experience growth in intermodal traffic.

Conditions and Performance

The 2017 SMFP showed that Class I rail mainline network in the state is operating below capacity – which allows for the system to be able to accommodate maintenance work and recover quickly from incidents such as weather delays, equipment failures, and minor accidents. This performance level can be assumed to still apply as there has been a slight decrease in total tonnage moved from 2014 to 2019.

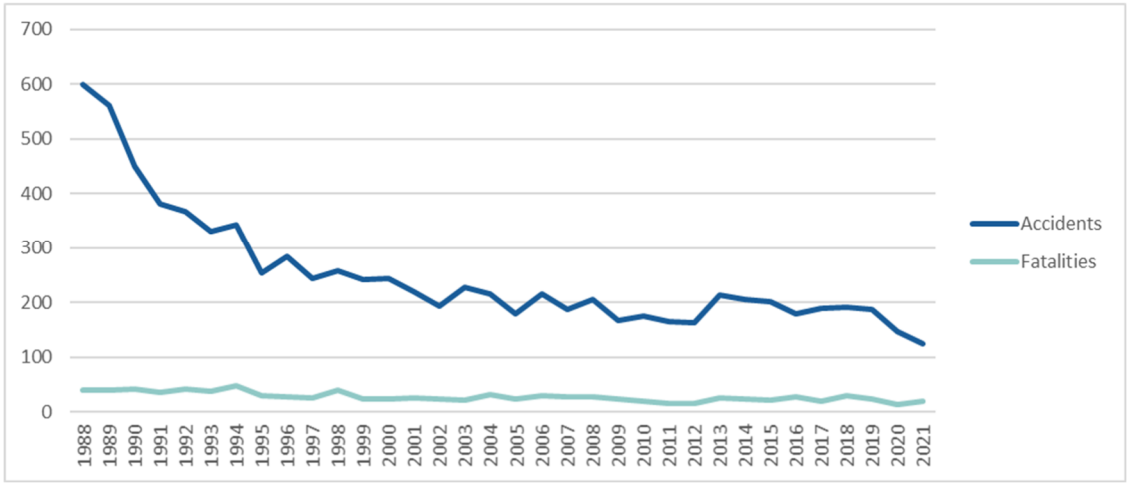
Norfolk Southern's (NS) "R-line" between Charlotte, North Carolina – Pineville, North Carolina is expected to be the most congested rail segment in the state. CSX's "A-line" between Pleasant Hill, North Carolina and Pembroke, North Carolina, and NS's "H-line" between Raleigh, North Carolina and Greensboro, North Carolina and between Greensboro, North Carolina and Danville, Virginia also experience congestion.

These segments will also be affected by increases in Amtrak (passenger rail) services. In addition, CSX's new Carolina Connector Intermodal Rail Terminal (CCX) near Rocky Mount brings a high-capacity facility to the I-95 corridor in the eastern part of the state, and is able to support local shippers as well as the Port of Wilmington. This yard is expected to handle 260,000 container lifts by the 5th year of operation, resulting in potentially 65,000 additional rail cars on the "A-line."

Currently, CSX's "A-line" between Pleasant Hill, North Carolina and Pembroke, North Carolina has several breaks in double-track sections, and in some cases there are differences in maximum speeds on second tracks. Also, CSX's "SE-line" between Pembroke, North Carolina and Hamlet, North Carolina has a low rail capacity due to single track operated without a signal. The siding on the "SE-line" is also not long enough to accommodate local trains, causing conflicts on the mainline. Freight trains from/to the CCX Carolina Connector Intermodal Rail Terminal will increase train use on these lines. Active plans to increase passenger service will also impact freight capacity. This includes the Piedmont Corridor service expansion presently underway, as well as the Southeast High Speed Rail initiative that envisions vastly increased service between Washington D.C., Richmond and stops in North Carolina, on a combination of dedicated and joint use rail lines.

NCDOT's Rail Division safety efforts include planning and implementing crossing safety programs, inspecting and overseeing infrastructure, and promoting rail safety through public awareness and education. Total rail accidents/incidents have remained fairly steady over the last decade averaging 189 events per year. On average, 13% of these events resulted in a fatality.

North Carolina Highway-Rail Incidents and Fatalities



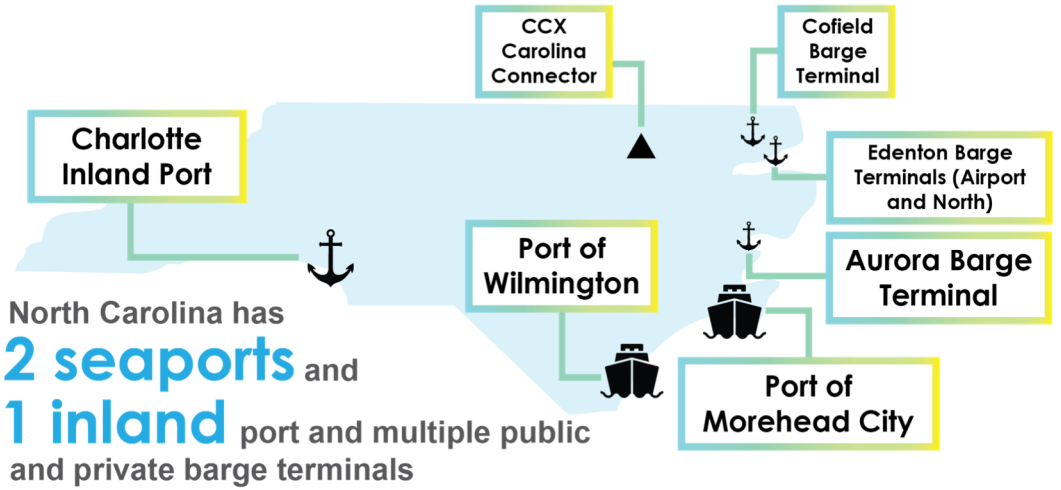
Source: NCDOT, Federal Railroad Administration Office of Safety Analysis

MARINE FREIGHT ASSETS

North Carolina's marine freight network comprises more than its marine terminals and extends well beyond the State's coastal counties. State infrastructure supporting maritime trade includes its ports, waterways, highways, rail network, as well as inland production, logistics, and distribution centers that serve maritime and other freight modes.

Inventory

There are two deep-water ports in North Carolina, the Port of Wilmington and the Port of Morehead City, which are operated by the North Carolina State Ports Authority (NCSPA). These ports are also both Strategic Seaports meaning they are capable of simultaneously handling commercial and military requirements. The state's southern facility located on the Cape Fear River is the Port of Wilmington. This port terminal provides container operations in addition to dry bulk and breakbulk cargos. Wilmington has a channel draft of 42 feet (MLLW). In 2020 it widened its turning basin in the Cape Fear River to 1,524 feet allowing new Post Panamax 14,000-Twenty-foot equivalent unit (TEU) vessels to safely and efficiently navigate in Wilmington Navigational Harbor. NCSPA also raised power lines on the Cape Fear River increasing the vessel clearance air draft to 212 feet reducing hindrances for larger container vessels entering or leaving the port.



Source: NC State Ports Authority

The Port of Wilmington recently added three ship-to-shore rail container cranes with 203 feet reach across 22 containers, bringing the total to seven rail-mounted gantry cranes. These infrastructure improvements included with bulkhead and wharf improvements provide needed upgrades to support existing customers while positioning growth opportunities for NCSPA to remain competitive in the global supply chain. Deepening the shipping channel in the Cape Fear River to 47 feet remains a priority of NC Ports, however, careful piloting has proven the port capable of handling New Post-Panamax vessels.

The Port of Morehead City is located on a multimodal 128-acre terminal accessed via water, rail, and truck and is well equipped to provide bulk, breakbulk, and Ro/Ro services. The port is located approximately four miles from the Atlantic Ocean with a 45-foot Mean Low Lower Water (MLLW)deep access channel, with no air draft restrictions, and is on the USDOT Maritime Administration's, or MARAD's, Marine Highway M-95. The port has 5,366 linear feet of bulkheads including nine berths. The port also owns approximately 150 acres across Newport River on Radio Island that is ready for freight and maritime business development opportunities.

NCSPA owns and operates an inland port, the Charlotte Inland Port (CIP) located at 1301 Exchange Street Charlotte in the northwest industrial area of Charlotte. It provides customers broad access to I-85 and I-77 corridors. CIP has ten paved acres dedicated for intermodal services with the capability to accommodate 2,000 stacked or wheeled (on-chassis) containers.

Source: NC State Ports Authority

CIP terminal has expansion capacity with an additional ten acres ready for development as needed. Serving as a staging area for loaded and empty containers the terminal provides ocean carriers with yard operations and provides on-site maintenance and repair services as well. The terminal has U.S. Customs-Trade Partnership against Terrorism or C-TPAT certification and is bonded by U.S. Customs and Border Protection. NCSPA offers "Sprint" container service via truck as well as the Queen City Express via rail to and from the Port of Wilmington and Charlotte and for further distribution. Although the terminal is adjacent to a spur track, it is not directly accessible by rail, however, CSX's Charlotte Intermodal Terminal is one mile away and the NS intermodal facility is eight miles away.

Source: FHWA Freight Analysis Framework Version 5

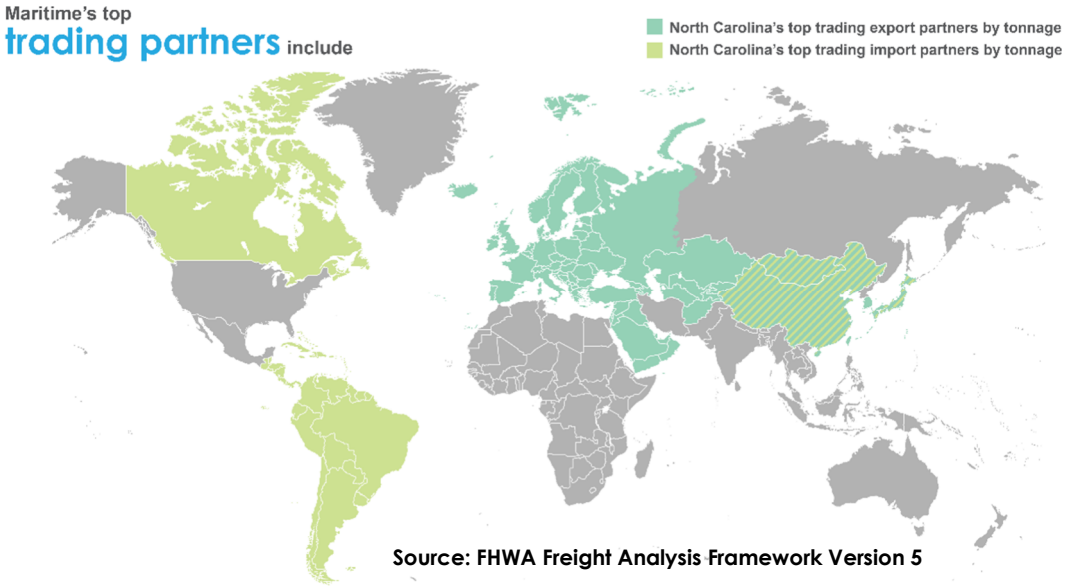
Demand

Nearly 7 million tons of cargo worth $8.3 billion were imported and exported by North Carolina ports in 2017. Of that tonnage, 57% was imports. Imports are down 8% from 2015 to 2017. The two North Carolina Ports, located at Wilmington and Morehead City, offer services for a variety of commodity types. Whether it is containers, bulk, break-bulk, or Ro/Ro, one of the ports can handle all goods.

The Port of Morehead City sees a ship approximately once every three days and a barge daily. Top imports include sulfur, rubber, metal products, scrap metal and ores and minerals. Regarding exports, phosphate, woodchips, metal products and military materiel are the top commodities. Total tonnage through the Port of Morehead City has remained relatively steady ranging from 800,000 tons to 1.13 million tons from 2017-2020. Over the past five years, the total tonnage has hovered around 1 million tons. The tonnage is all bulk and breakbulk, as containers are not handled at Morehead City.

The Port of Wilmington sees an average of one ship per day. Imports include chemicals, grains, fertilizers and cement. The top exports are forest products, woodchips, wood pulp, food and general merchandise. Total tonnage through the Port of Wilmington went from 2.1 million tons in 2017 to 2.8 million tons in 2020 and experienced a slight drop again in 2021. In 2013, tonnage hit a record high of 5.3 million. Most tonnage is accounted for in containers. Bulk peaked in 2018 and again in 2020 at around 2.9 million tons.

North Carolina's trading partners are geographically diverse. Major export regions include Europe, Eastern Asia and southwest and Central Asia. The mix is similarly diverse for imports, led by the Rest of Americas and Canada. This diversity is favorable as it shields the State from an economic downturn in a particular region of the world economy. The top 6 regions of the world North Carolina trades with for imports and exports are the same regions in a different order. Mexico and Africa remain the last two destinations for trading imports and exports. This suggests that North Carolina shippers choose to use an out-of-state port to reach some of their leading trade



Source: FHWA Freight Analysis Framework Version 5

partners due to the availability of ship calls, storage/equipment availability, or other factors.

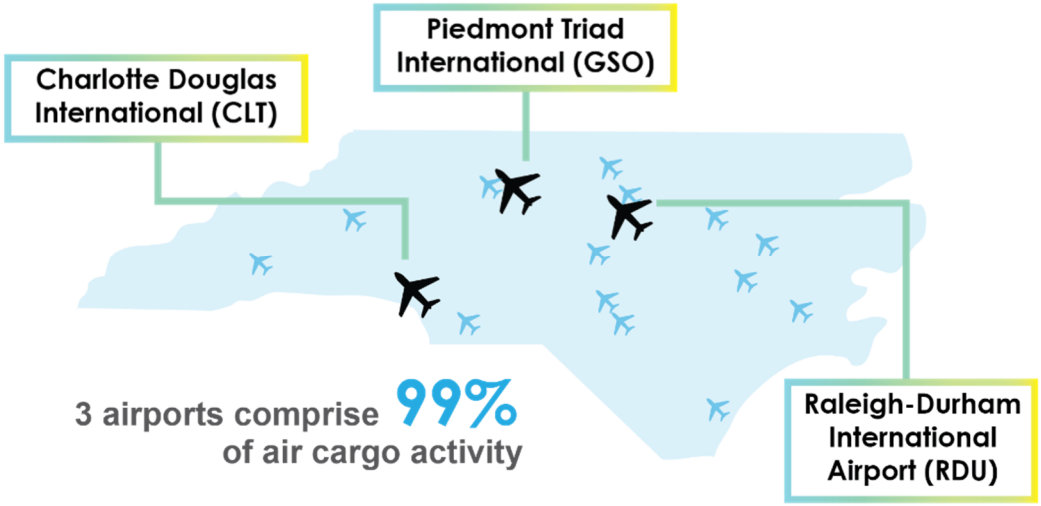
Conditions and Performance

The operation and level-of-service, or efficiency possible within the current state of each port, depends on a number of moving pieces. The activities at each port rely on physical constraints of facilities, policy decisions on commodities served and operating hours, worker and equipment productivity, weather, and numerous other factors that may or may not be controllable.

At-grade crossings are inconvenient at the Port of Wilmington, where switching activities cause backups frequently near the port's south entrance. It is not uncommon to see several trucks bound to/from the port lined up on access roads as they wait for trains to move over the crossings.

AIR CARGO ASSETS

North Carolina has 72 publicly owned airports and nearly 300 privately-owned airports throughout the state, though just 17 airports handle air cargo, including both dedicated all-cargo operations and commercial passenger belly cargo. However, three airports comprise over 99% of air cargo activity in North Carolina: Charlotte Douglas International Airport (CLT), Piedmont Triad International Airport (GSO) and Raleigh Durham International Airport (RDU).



Inventory

CLT, GSO and RDU each have critical air cargo processing infrastructure, as well as connections to highway, rail, and maritime modes.

CLT's Air Cargo Center has a total of 570,000 square feet of available space and roughly 2.2 million square feet of aircraft ramp space. The Air Cargo Center is able to link freight between air, rail, water, and truck modes. Rail connection is available to Norfolk Southern Railway (NS) which operates an intermodal container facility on the southwest side of CLT. CSX has an intermodal terminal and bulk transfer terminal in Charlotte, east of CLT, but does not connect directly to CLT.

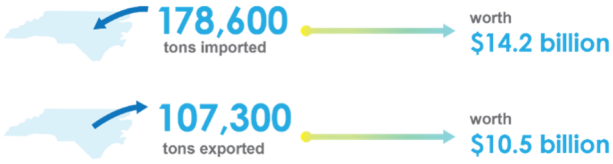
GSO's multimodal cargo facility connects to major trucking lines operating terminals near the airport. It hosts FedEx Express' Mid-Atlantic Air Hub, which is a 1 million square foot facility able to sort up to 24,000 packages per hour for freight destined for various East Coast locations. There are four apron areas at GSO dedicated to air cargo services, totaling nearly 227,000 square feet of air cargo apron space. UPS operates both express overnight cargo and ground cargo out of the airport in two separate facilities. An NS track runs along the south of the perimeter of GSO, along W. Market Street, but does not connect directly with the airport.

RDU's North Cargo and South Cargo areas of the airport have over 469,000 square feet of cargo space. The North Cargo facilities house RDU's two all-cargo carriers, FedEx and UPS. The South Cargo facilities, reserved for cargo shipped via commercial airlines, are located near Aviation Pkwy. Although there is no direct rail connection to either CSX or NS at RDU, both rail lines pass through Raleigh and near to RDU.

Demand

In 2017, North Carolina airports handled nearly 205,000 tons of cargo worth $24.7 billion. Inbound cargo totaled over 178,600 tons worth $14.2 billion, while outbound traffic totaled nearly 107,300 tons worth $10.5 billion.

Compared to other modes, air cargo is a relatively small amount (<1%) of the State's overall freight activity. However, it has a substantially higher value per ton at over $91,300 per ton compared to $1,300 per ton (highway), $300 per ton (rail) and $250 per ton (water).



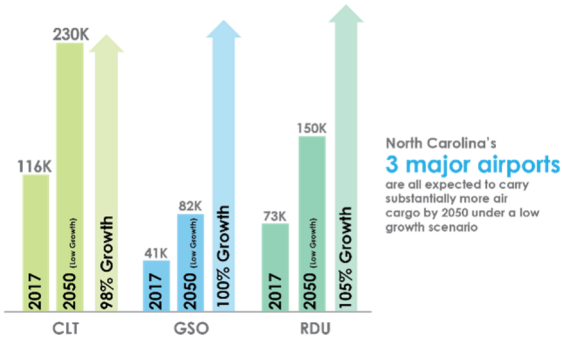
Source: Bureau of Transportation Statistics TransStats Database

North Carolina traded air cargo with over 200 airports in the U.S. and across the world, including 43 international airports in 2019. Memphis, Louisville and Cincinnati international airports are

North Carolina's top air trade partners, together these comprise 52% of the State's air cargo. Both FedEx and UPS have hubs in each of these cities.

Air freight modes tend to transport the highest proportion of high-value, low-weight commodities due to the high cost of air transport when compared to surface modes. In 2017, the top transported commodity by tonnage and air at North Carolina airports was machinery, comprising 19% of total tonnage ($4.3 billion). Electronics was the second-most transported commodity by tonnage, comprising 13% of total tonnage ($4.9 billion).

To better understand the potential growth in air cargo activity at North Carolina airports through 2050, both a low growth scenario and a high growth scenario were developed. Although the low-growth scenario is more realistic in predicting future demand for air cargo in North Carolina, the potential growth under the high growth scenario is substantial and mostly driven by growth in international markets and could result in intense pressure on the state's air cargo network and supporting multimodal infrastructure.



Source: Bureau of Transportation Statistics TransStats Database, Boeing World Air Cargo Forecast

Conditions and Performance

Although capacity exists at North Carolina's top 3 airports in North Carolina, it will be important to expand access to reach more areas of the state and provide service for highly time-sensitive commodities produced in North Carolina, such as pharmaceuticals. These products are well suited for air cargo transport, and could take advantage of increased air cargo access to grow its manufacturing and distribution base within North Carolina and across the U.S.

Air cargo carriers are experiencing price competition from other freight modes such as trucks, container ships, and railroads, while demand for expedited services (i.e., UPS and FedEx) has exploded in recent years with the latest e-commerce trends.

During the COVID-19 pandemic, the public relied upon e-commerce to obtain goods instead of brick-and-mortar stores. The increase in e-commerce increased the demand in air cargo as this mode of freight transports goods quickly. The increased trend in e-commerce at the beginning of the pandemic in 2020 accelerated the publics' shopping preferences; relying on e-commerce compared to previously relying on big box stores in person. In North Carolina, FedEx and UPS have consistently been the top air cargo carriers.

Air cargo access is critical to economic vitality, particularly for high-value commodities. Consumer markets tied to e-commerce have increased the demand for express package services over the last 5 years, which have been traditionally fulfilled by air cargo jets. However, because advances in ground logistics have made trucks a viable option for express service, North Carolina airports must ensure seamless access to air cargo facilities via the roadway net- work to stay competitive with other freight modes.

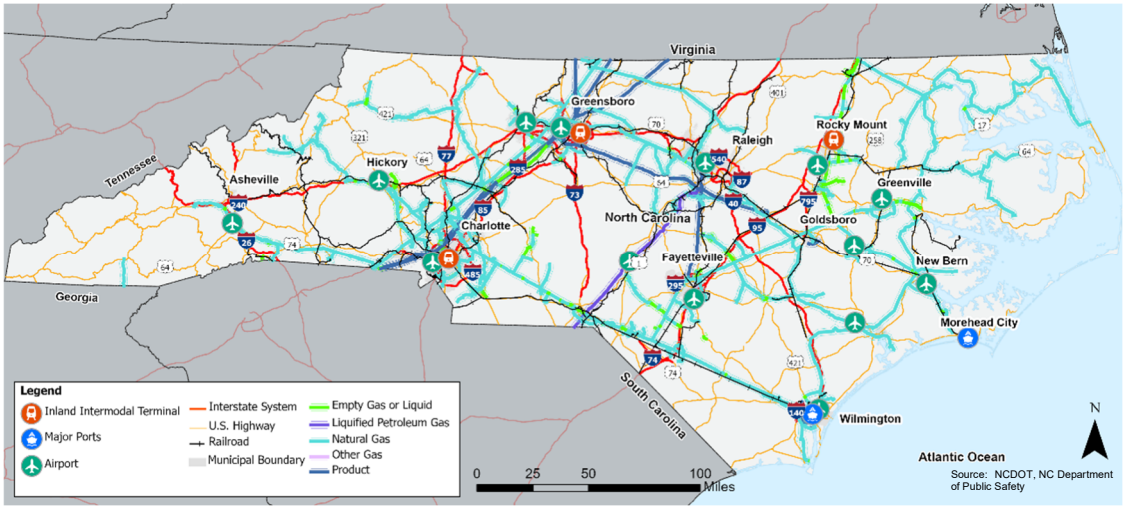
HAZARDOUS MATERIAL AND PIPELINE ASSETS

Hazardous Material (HazMat) freight movement has an enormous impact on North Carolina's transportation infrastructure. With communities growing, land-use increasingly congested and development costly, and the demands on all parts of the aging infrastructure increasing, it is important that the State consider critical investments in the transportation infrastructure that will support the safe and timely delivery of HazMat freight to local markets and to destinations outside of North Carolina.

HazMat includes any chemical, in any form, that has one or more hazardous properties and that is in transportation. HazMat, in some form, is in transportation everywhere in the state all of the time, as it is essential to the state's economy. Almost everything we drink, grow, wear, or drive, the roads we drive on and what we use to build our homes is transported at some point as HazMat freight. HazMat is routinely transported in commerce in all modes of transportation, including ship or barge, pipeline, rail, and truck.

Inventory

North Carolina imports all of its petroleum based fuel and natural gas, as well as, significant quantities of biofuels, such as ethanol. The transportation network used for transportation of fuel consists of:



- 5,451 miles of pipeline for the movement of petroleum fuel, non-fuel products, propane and natural gas,
- 38 inland motor fuel terminals,
- 12 aviation fuel terminals,
- Two propane terminals – Sylva in western North Carolina and Apex in east central North Carolina,
- Two Transload Facilities – Star, North Carolina and Midland, North Carolina,
- Private marine terminals receive petroleum ships and barges,
- Truck tank trailer fleets and support services to enable the transport and local delivery of all fuels but natural gas and
- One ethanol production facility.

NC is the **12th highest** value producer and shipper of chemicals in US with over **$3.2 Billion** shipped in 2020 by the chemical manufacturing industry.

Demand

Fuel

North Carolina imports fuel by ship, pipeline and rail, and it is then distributed to local markets within the State by pipeline, rail and truck. The demand for fuel products is projected to increase by 27% by 2050 annually in North Carolina. The demand for non-fuel petroleum products is projected to increase by 68% by 2050 annually in the state.

Selected Extremely Hazardous Substances and non-Extremely Hazardous Substances

Extremely Hazardous Substances (EHS) and Non-EHS HazMat chemicals are present on nearly every major highway, all of the interstate highway system, the entire length of both Class I railroads and many of the short line railroads in significant volumes. Volumes of over a billion pounds per year or more are represented on some parts of the transportation system. Charlotte, Winston-Salem, Raleigh and Wilmington are major HazMat hubs.

Conditions and Performance

Following are the key performance challenges for HazMat and fuel transportation in North Carolina:

- **Fuel Pipeline System Capacity**. The pipelines are operating at or near peak capacity creating a vulnerability for disruption. While there appears to be some additional capacity to import fuel via the private marine terminals, this would only be sufficient for emergency needs and surge capacity as there would be a higher cost to transport fuel to markets around the state. Consequently, the state is highly dependent on the pipelines.

- **Fuel Terminal Access and Multimodal Connectivity**. Connections to local road networks from fuel terminals need to be improved to allow for safe integration of trucks into traffic. All of the inland and marine fuel terminals are only supported with two lane roads to connect to main arterial roads, highways and the interstate system, which creates opportunities for a serious incident and HazMat event as these trucks turn or merge into traffic.

- **Splash Fuel Blending**. Both butane and ethanol are primarily shipped into the state in rail tank cars but only 4 of the inland terminals have rail access to receive them. The ones that do not have rail facilities have to pay for ethanol and butane delivery or meet in the middle somewhere and blend directly into the tanker trucks before they deliver fuel to the gas stations. Often this splash blending is done in back lots, without adequate safety processes and systems, and no community awareness. Rail connections need to be established with all fuel terminals in the State that distribute gasoline.

- The **Concurrent Line Use** of the two Class I railroad mainlines for passenger, freight and HazMat service is a deficiency. These trains have different maximum allowable speeds over the same track and have different infrastructure needs that are not compatible with each other.

- All parties to work through the Local Emergency Planning Committee in their county to develop **land-use planning** policies that prevent incompatible land-uses relative to HazMat storage, use, or transportation.

- Railroads should consider not using **siding storage** within city limits to store HazMat rail cars.

Non-EHS Chemicals	EHS Chemicals	
• Phosphoric Acid	• Anhydrous Ammonia	• Phenol
• Toluene Diisocyanate	• Chlorine	• Cycloheylamine
• Butane	• Formaldehyde	• Ethylene Oxide
• Toluene	• Hydrogen Fluoride	
	• Hydrogen Chloride	
	• Sulfuric Acid	
	• Sulfuric Dioxide	
	• Bromomethane	
	• Hydrogen Peroxide	
	• Vinyl Acetate Monomer	

FOCUSING ON PRIORITY FREIGHT ASSETS

Purpose and Role

North Carolina has extensive multimodal freight transportation assets including highways, rail lines, waterways, airports and pipelines, as well as inter change points between the modes, such as airport terminals, seaports, rail terminals, pipeline terminals and warehouse/distribution centers.

The requirement for designating a North Carolina Priority Freight Network (NCPFN) was twofold:

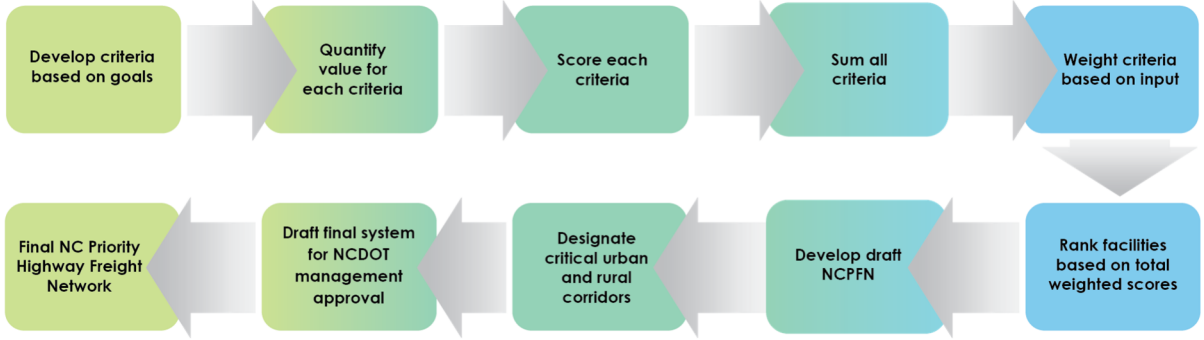
- Designation of a subsystem that is responsible for carrying the majority of freight moving in the state allows NCDOT to focus limited resources on the portion of the system that impacts the greatest number of users and the majority of the total tonnage being moved. In turn, this will maximize the statewide return on NCDOT's investments. The designated network becomes a freight transportation and economic development asset for the state.
- The FAST Act established the National Highway Freight Network which is to be supplemented by the designation of additional critical freight corridors by each of the states and large Metropolitan Planning Organizations (those having populations greater than 500,000). This program has continued under the BIL. No additional lane miles have been added to the networks during this Plan update.

North Carolina Priority Highway Freight Network

The North Carolina Priority Highway Freight Network (NCPHFN), or the state's highway network that is most critical to freight transportation, was designated using metrics that measure economic activity, goods movement, market access and connectivity and support to key industries' supply chains.

- **Economic competitiveness** (10% of total score) measures economic activities that interact with transportation investments with the goal of supporting economic growth, such as support of freight intensive employment and supporting facilities such as military bases.
- **Goods movement** (30% of total score) measures the role of the facilities in the physical movement of goods using criteria such as tonnage, value, truck volume and percentage and projected truck freight growth.
- **Strategic supply chains** (25% of total score) examine how highway facilities support key freight intensive businesses and their global supply chains. Twelve target supply chain industry sectors were identified as key freight-intensive export industries in the state and metrics such as the number of supply chains served, the number and size of businesses in key supply chains served and the volume of commodities associated with these industries carried.
- **Market access and connectivity** (35% of total score) evaluates intermodal connectivity and connectivity to trading partners and international gateways.

NCPFN EVALUATION AND DESIGNATION PROCESS



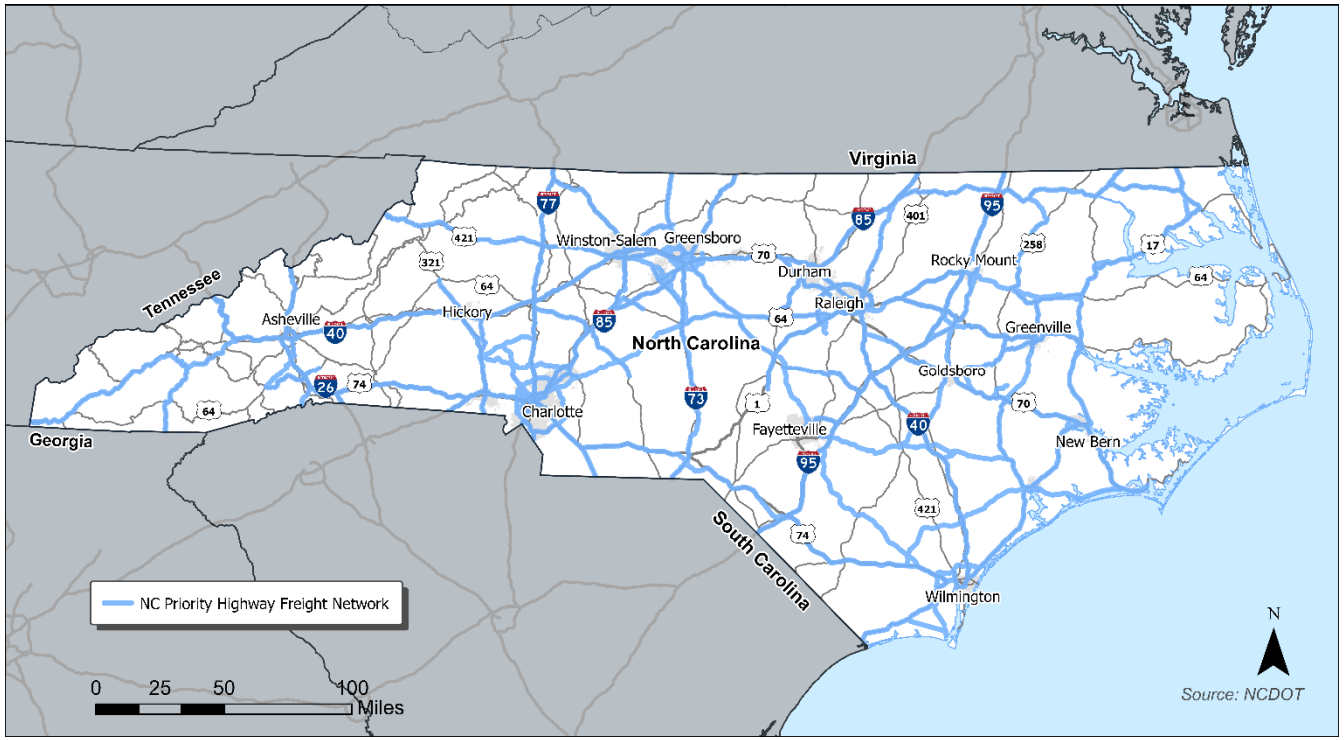
The evaluation process, completed in 2017, scored every highway segment based on criteria measuring the role of the highway in supporting:

The National Highway Freight Network (NHFN) is the starting point for the designation of the North Carolina Priority Highway Freight Network (NCPHFN). The NHFN, defined by the United States Department of Transportation, includes:

- **Primary Highway Freight System (PHFS)**– The PHFS was designated by the Federal Highway Administration (FHWA) based on eight factors, including freight tonnage and value, truck traffic, access factors, and network connectivity. North Carolina's portion of the Primary Highway Freight System totals 1,011.06 miles.
- **Non-PHFS Interstates** – The BIL included the entirety of the Interstate System – including Interstate facilities not located on the PHFS – in the NHFN. The BIL restricts National Highway Freight Program (NHFP) funding on Non-PHFS Interstates in states deemed high mile-age states, defined as containing more than two percent of the National PHFS. North Carolina is classified as a high mileage state and thus, can-not use NHFP funding on Non-PHFS Interstate.

Next, the highway facilities that scored above average in terms of their role in supporting statewide freight movement as measured by the FSD score were added. Input from NCDOT, the State Freight Advisory Committee (FAC), and the MPOs and RPOs was reviewed and helped shape the final NCFN.

NORTH CAROLINA PRIORITY HIGHWAY FREIGHT NETWORK



THE ROLE OF THE NCPHFN

- Drive policy and investment of statewide funds
- Serve as the foundation from which the Critical Urban Freight Corridors and Critical Rural Freight Corridors are designated

CRITICAL RURAL AND CRITICAL URBAN FREIGHT CORRIDORS

As part of the BIL, U.S. DOT allocated additional miles to each state, based on its PHFS mileage, to designate to the NHFN. These miles are eligible for NHFP funds and are referred to as:

- **Critical Urban Freight Corridors (CUFCs)** are defined as freight highways located within urbanized areas. They are part of the NHFN and are eligible for the NHFP funding. In an urbanized area with a population of 500,000 or more individuals, the MPO, in consultation with the State, may designate a CUFC. According to Federal Highway guidance, North Carolina may designate a maximum of 150 miles as CUFCs. Charlotte Regional Transportation Planning Organization (CRTPO) and Capital Area Metropolitan Planning Organization (CAMPO) led approval on designation within their respective Census-defined urbanized areas – NCDOT led the designation process for all other urbanized areas in 2017.

- **Critical Rural Freight Corridors (CRFCs)** are defined as freight highways located outside of urbanized areas. They are part of the NHFN and are eligible for the NHFP funding. According to Federal Highway guidance, North Carolina may designate a maximum of 300 miles as CRFCs.

For the designation of the CUFCs and CRFCs, NCDOT used the scores from the NCHFN as the starting point to rank corridors that provided connectivity to the NHFN and met the FAST Act requirements. Additionally, the projects that were on the latest State Transportation Improvement Program (STIP) were used to determine which corridors could potentially use funds from the NHFP. CAMPO and CRTPO approved the CUFCs in the Raleigh and Charlotte urbanized areas respectively. The CUFCs, CRFCs, and the NCHFN will be reviewed and updated a minimum of once every five years.

BIPARTISAN INFRASTRUCTURE BILL REQUIREMENTS/FAST ACT FOR DESIGNATING CRITICAL URBAN AND RURAL FREIGHT CORRIDORS

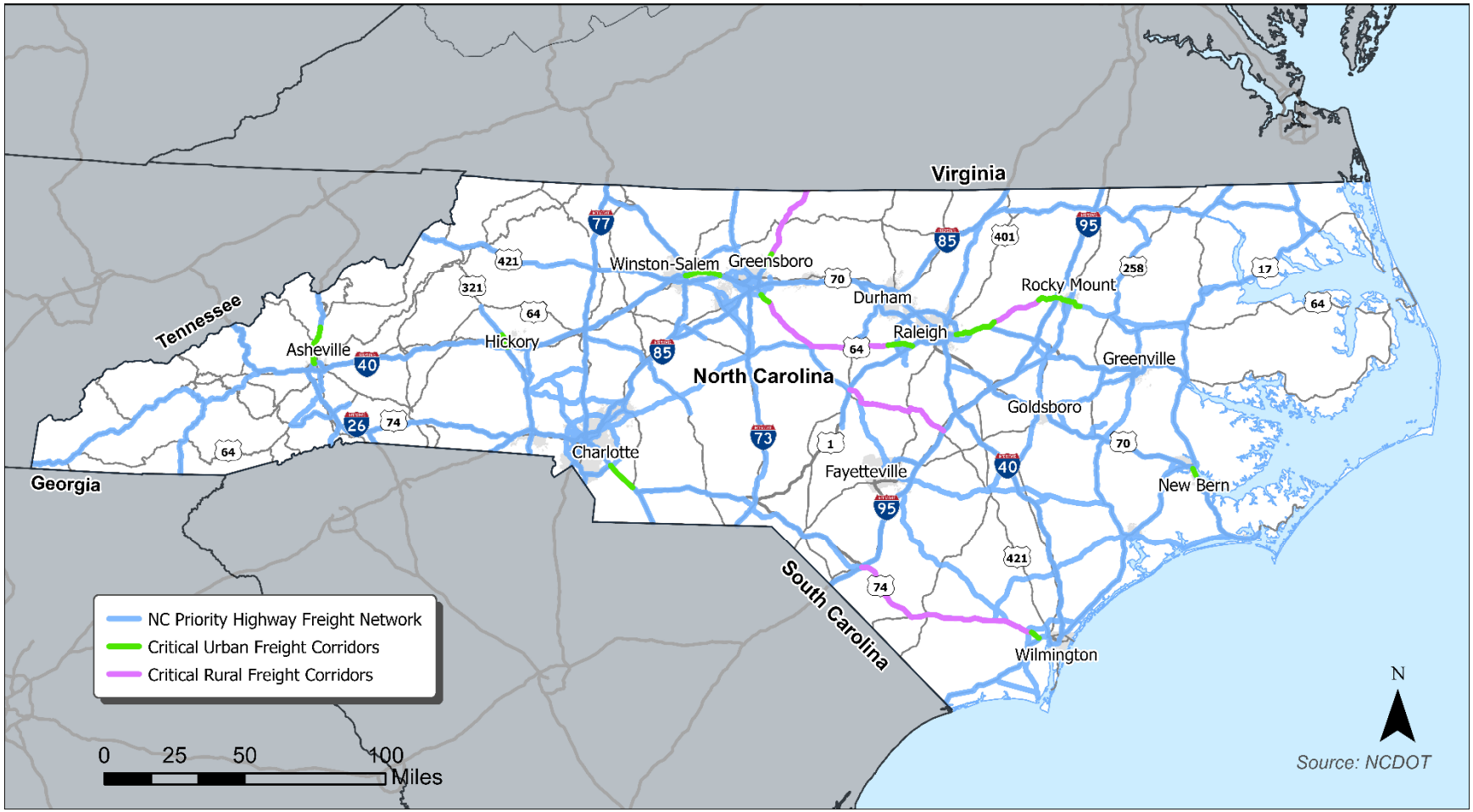
A CUFC must meet one or more of the following four criteria:

- is in an urbanized area, regardless of population; and
  - connects an intermodal facility to-
  - the primary highway freight system;
  - the Interstate System; or
  - an intermodal freight facility;
- is located within a corridor of a route on the primary highway freight system and provides an alternative highway option important to goods movement;
- serves a major freight generator, logistic center, or manufacturing and warehouse industrial land; or
- is important to the movement of freight within the region, as determined by the metropolitan planning organization or the State.

A CRFC must meet one or more of the following seven criteria:

- is a rural principal arterial roadway and has a minimum of 25 percent of the annual average daily traffic of the road measured in passenger vehicle equivalent units from trucks (Federal Highway Administration vehicle class 8 to 13);
- provides access to energy exploration, development, installation, or production areas;
- connects the primary highway freight system, a roadway described in subparagraph (A) or (B), or the Interstate System to facilities that handle more than-
  - 50,000 20-foot equivalent units per year; or
  - 500,000 tons per year of bulk commodities;
- provides access to-
  - a grain elevator;
  - an agricultural facility;
  - a mining facility;
  - a forestry facility; or
  - an intermodal facility;
- connects to an international port of entry;
- provides access to significant air, rail, water, or other freight facilities in the State; or
- is, in the determination of the State, vital to improving the efficient movement of freight of importance to the economy of the State.

CRITICAL URBAN AND RURAL FREIGHT CORRIDORS



Priority Rail Freight Assets

Rail is a key component of freight movement in North Carolina and the network is expanding. The Interim National Multimodal Freight Network includes all Class I railroads and their major terminals. The rail network that is served by the Class I railroads, including intermodal terminals, major classification yards, and transload facilities are part of the NCFN. North Carolina's rail system includes two Class I railroads, CSX and Norfolk Southern; two major classification yards; three intermodal terminal and one future intermodal terminal and rail hub; and numerous transload facilities. All of these facilities are included on the North Carolina Priority Freight Network. The rail portion of the Interim NMFN in North Carolina consists of 2,341 miles of multimodal rail freight network routes and four primary highway freight system intermodal connectors.

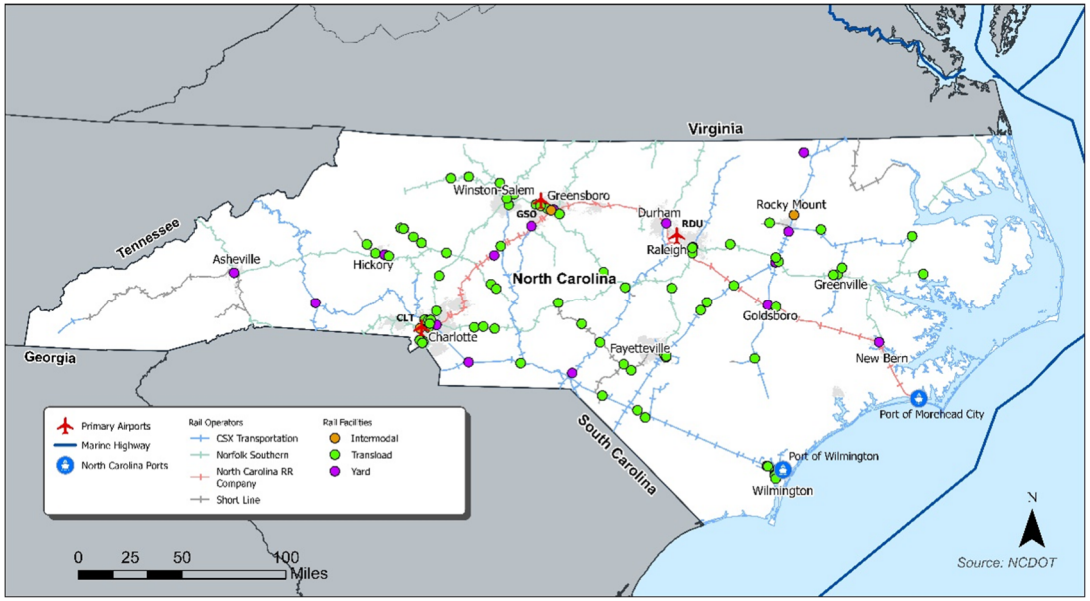
Priority Maritime Freight Assets

North Carolina ports and waterways play a key role in the efficient movement of freight and are important drivers of the North Carolina economy. The Interim National Multimodal Freight Network, was established as part of the FAST Act, was used to designate the priority maritime freight assets in North Carolina, which include: the Port of Wilmington, the Port of Morehead City, the M-95 marine highway corridor, inland and coastal waterway routes, the Pasquotank River, and Great Dismal Swamp Canal.

Priority Air Cargo Assets

North Carolina is home to three of the top 50 cargo airports in the U.S. in terms of landed weight in 2020 These air gateways are located near the largest metropolitan areas in the state, which provide better connections to other freight infrastructure, and the industries that require fast shipment of high-value/time-sensitive products. The three airports – Charlotte/Douglas International, Raleigh-Durham International and Piedmont Triad International – are on the National Multimodal Freight Network and the NCFN.

NORTH CAROLINA PRIORITY MULTIMODAL FREIGHT NETWORK



Contributions of Freight Transportation

All goods consumed or manufactured in North Carolina are, at some stage in the supply chain, considered freight, needing to be transported and stored several times from production to consumption. Freight transportation, therefore, is vital to a state's economy. It plays an important role by allowing businesses to stay competitive, by connecting regions to domestic and international trading partners and by supporting thousands of jobs and driving economic activity.

In 2019, there were approximately 313,000 people in freight-related jobs in North Carolina, ranging from truck drivers to couriers to wholesale workers. Most of these employees are related to the wholesale trade sector, with 203,000 jobs, or 65% of the total freight-related jobs. The truck transportation sector provides the second largest number of jobs, amounting to approximately 70,800 or 23% of the total freight-related jobs. Using the broad definition of the transportation sector, the sector supports nearly 581,000 jobs, including direct, indirect, and induced jobs. The sector also adds nearly $81 billion to North Carolina's economy annually. From 2015-2019, roughly 10,000 freight-related jobs have been added in North Carolina with truck transportation and warehousing and storage remaining the top two sectors providing the greatest number of freight-related jobs. The total number of freight-related jobs has grown by roughly 150,000 jobs, resulting in a 30% increase in gross state product from 2015-2019.

Supporting the State's Strategic Export Industry

North Carolina is home to a vibrant economy built in part on the effective movement of goods both to consumers as well as between businesses. This transportation of freight is organized into supply chains that combine gateways such as ports and airports, corridors, including highways and rail, and transfer and distribution centers. These gateways are used to link modes and consolidate goods and first and last mile connectors to facilitate pick-ups and deliveries of goods. The reliability of the freight transportation network is critical when planning raw material sources and the distribution of finished products. Unexpected delays can result in slowing or halted manufacturing processes and decreasing productivity, which increases manufacturing costs and prices for the end consumer.

To enhance future economic growth, North Carolina must invest and implement strategies to support the increasing demand for a safe and reliable multimodal transportation infrastructure. Eleven strategic supply chains were identified as key freight intensive export industries in the state. In 2017, these industries combined for over 727 million tons and over $956 billion worth of freight moving into, out of and within North Carolina, an increase of 22% from the 594 million tons of freight in 2012. Despite the increase in tonnage, total value of freight on the network declined 4.6% from $1 trillion in value in 2012.

Automotive, truck and heavy equipment and agriculture, food, processing and distribution sectors had the highest tonnage in 2019 while energy and the agriculture, food, processing and distribution sector had the highest tonnage in the 2017 SMFP. Distribution and logistics for consumer goods and automotive, truck and heavy equipment sectors had the highest value in 2019 while the automotive, truck and heavy equipment and aerospace and aviation sectors had the highest value in the 2017 SMFP.

Understanding the concept of a supply chain provides a better grasp of freight transportation's impact on the North Carolina economy. A supply chain is a network between a company and its

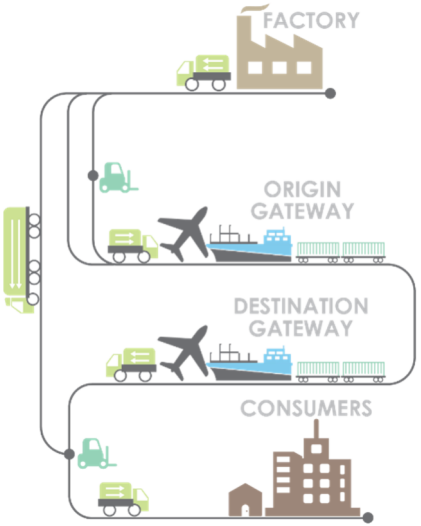
	JOBS	LABOR INCOME	GROSS STATE PRODUCT
Direct	**313,449**	**$22.2**	**$41.8**
Indirect + Induced	**268,505**	**$20.1**	**$39.1**
Total	**581,954**	**$42.3**	**$80.9**

Note: Dollar values in 2019 billions.

Source: US Bureau of Labor Statistics, US Bureau of Economic Analysis

suppliers to produce and distribute a specific product and the supply chain represents the steps it takes to get the product or service to the customer. Typical nodes in a supply chain include the following:

- **Gateways** include rail terminals, seaports, commercial border ports of entry and airports. These facilities handle large volumes between North Carolina, the nation and the world.
- **Corridors** include highways and rail lines that serve both long- and short-haul freight traffic.
- **Distribution and En-Route** facilities include warehouses and distribution centers, transload facilities where cargo can move efficiently between railroads and trucks or from truck to truck. These facilities are often concentrated in and around large population centers and gateways.
- **First and Last Mile** is an industry term for the facilities used to move cargo from distribution centers to consumers in the urban and suburban core and from manufacturers to gateways.



FREIGHT INTENSIVE INDUSTRIES CRITICAL TO NORTH CAROLINA'S ECONOMY

TOTAL TONNAGE AND VALUE FOR ALL INDUSTRIES

INBOUND, OUTBOUND AND INSTRASTATE FLOWS 2019

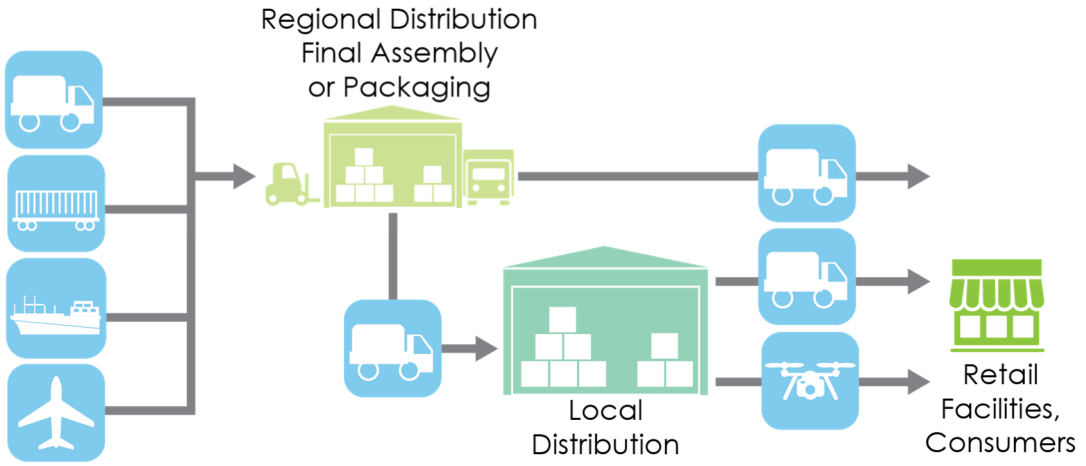
Industry	Tonnage	% of Total	Value ($M)	% of Total
Aerospace and Aviation	21,829,652	3%	$132,749	14%
Agriculture, Food Processing and Distribution	139,840,505	20%	$98,880	10%
Automotive, Truck and Heavy Equipment	221,016,587	32%	$156,635	16%
Biotechnology, Pharmaceuticals and Life Sciences	3,373,383	0%	$91,193	10%
Chemicals, Plastics and Rubber	37,306,013	5%	$97,689	10%
Distribution and Logistics for Consumer Goods	37,915,832	5%	$193,076	20%
Energy/ Green Energy	105,696,418	15%	$39,835	4%
Forestry and Wood Products	111,782,472	16%	$51,992	5%
Furniture	4,950,065	1%	$27,405	3%
Textiles, Apparel and Textile Machinery	7,883,317	1%	$64,464	7%
Total Commodity Flow	**691,594,242**	**100%**	**$953,918**	**100%**

Note: Due to some commodities overlapping in industries and not all commodities being included in an industry, the Total Commodity Flow is not the sum of all industries but rather the sum of all commodities. Aviation commodity flow movement was used as advanced manufacturing. Military commodity flow movements are tied to fuel which is categorized as energy.

Source: FHWA Freight Analysis Framework Version 5

Supply Chain Focus: Consumer Goods, Trade and Distribution

Goods desired and needed by North Carolina households and businesses enter the North Carolina state's trade, distribution and logistics supply chain after being produced domestically or abroad. Imported goods enter the state through land, sea, or airports of entry. Bulk shipments of goods are delivered from these points of origin to large distribution centers closer to or more strategic to the final market than the product's origin. In some cases, final assembly or packaging may also occur at these distribution centers. From regional distribution centers, goods may be delivered to retailers and consumers, or they may pass through an additional local distribution center before delivery. Final deliveries are predominantly made by truck to retail outlets or increasingly to the consumer's front door. However, emerging technologies in autonomous deliveries may change how the last mile transportation is accomplished, particularly in dense, urban areas.



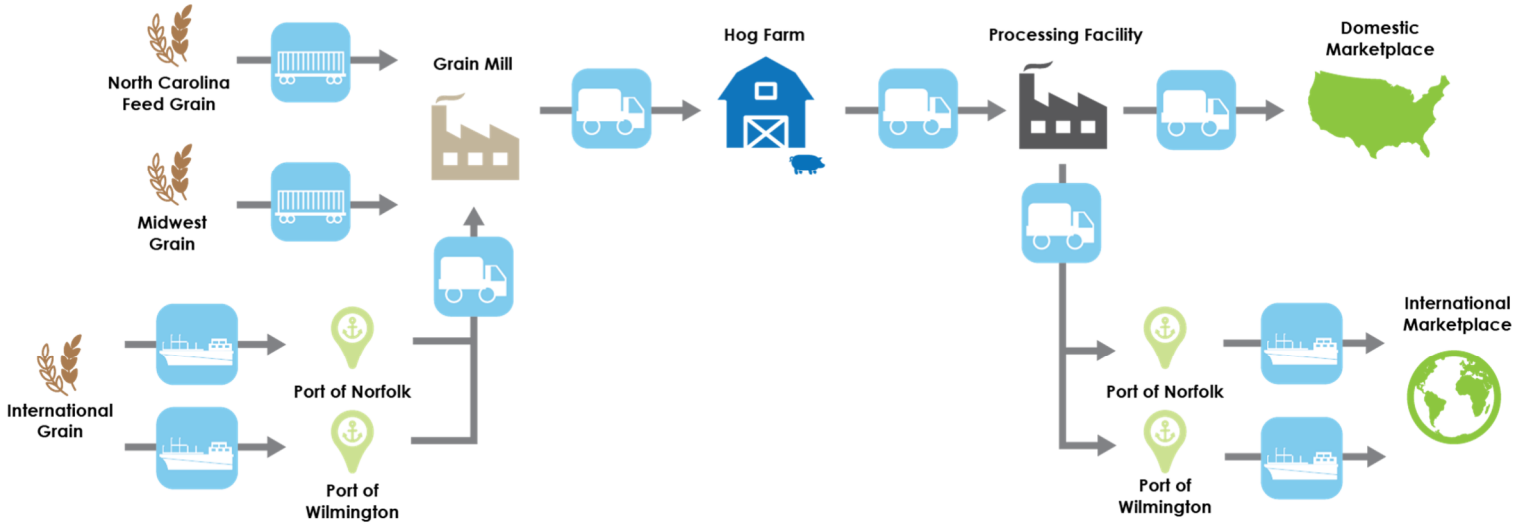
Supply Chain Focus: Agriculture, Food Processing and Distribution

The agriculture sector comprises crop production and livestock and poultry breeding. The crop production industry includes establishments that grow crops at farms, orchards, nurseries and greenhouses for human or animal consumption. The food processing and manufacturing sector transforms livestock and agricultural products into products for intermediate or final consumption. The industry groups are distinguished by the raw materials (generally of animal or vegetable origin) processed into food products. The food products manufactured in these industries are typically sold to wholesalers or retailers for distribution to consumers.

In addition to being one of the largest industries in North Carolina, agriculture, food processing and distribution establishments are found throughout the state, with concentrations in eastern North Carolina. Food manufacturing enjoys a legacy in North Carolina – including companies like Pepsi in New Bern, Winston-Salem-based Krispy Kreme Donuts, Snyder's-Lance snack and chip giant headquartered in Charlotte, poultry and meat processing companies such as Butterball, Smithfield, Tyson and Sanderson Farms, as well as Mt. Olive Pickles Company, Campbell's Soup Company, Bimbo Bakeries, Sierra Nevada Brewing Company and numerous others.

The industries within the agriculture and food processing sector require a wide range of transportation and logistics services to move raw agricultural commodities (e.g., grains, vegetables, fruits, livestock), agricultural inputs (e.g., fertilizer, pesticides) and foods products for intermediate or final consumption. Some products such as grain are bulky and low-value commodities that are mostly transported at lower unit costs by water and rail modes. Other commodities, such as fresh fruits, vegetables and meats, are highly perishable and high-value items and therefore, rely on refrigerated trucks and railcars, refrigerated cargo ships as well as air cargo to protect the integrity of the shipments. Cold chain logistics has transformed the farming industry by providing facilities with several storage areas with different temperature settings to handle regular grocery goods at ambient temperature, produce, dairy meat and frozen products, where significant amount of perishable food products can be received, stored, sorted, and assembled into loads, bound to respective grocery stores.

The most common crops and livestock in North Carolina are tobacco, soybeans, sweet potatoes, peanuts, corn, hay, cotton, cut Christmas trees, broilers, chicken, turkey, and hogs.



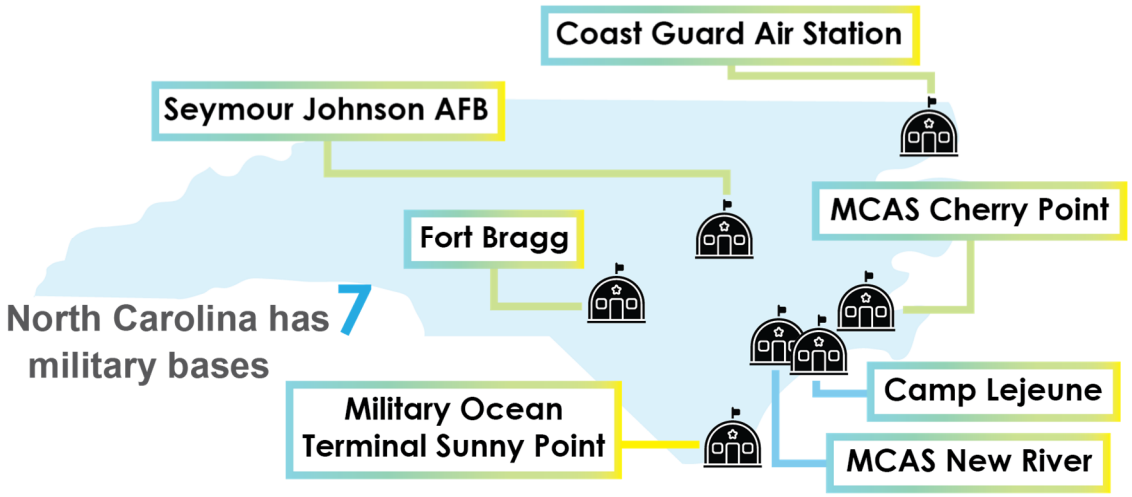
Supply Chain Focus: Military Freight

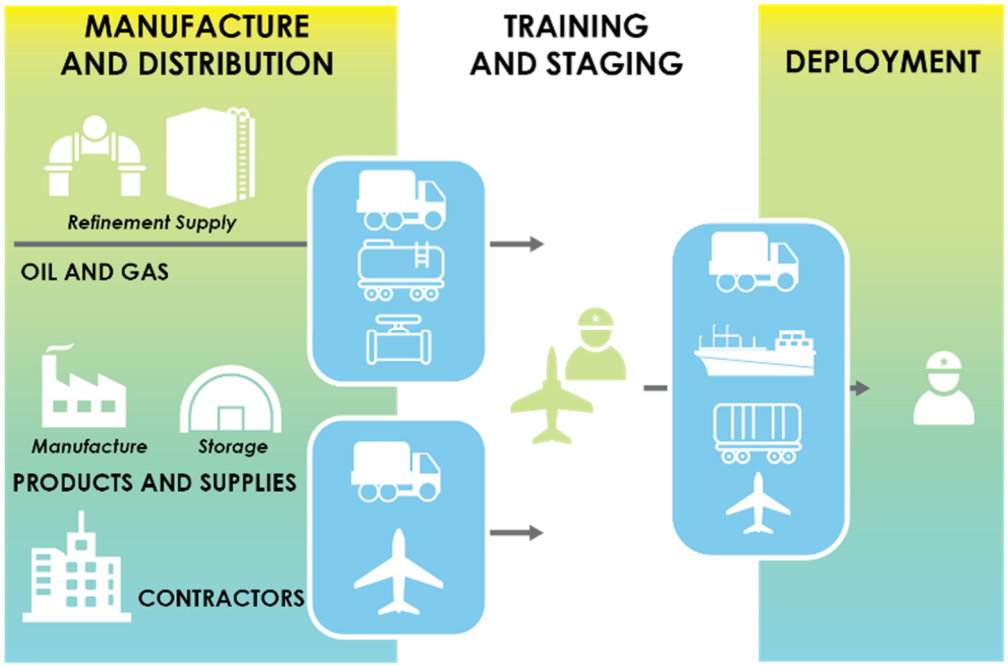
The military is a critical economic driver for the state of North Carolina. It also is a driver of freight and cargo movements, especially in the eastern portion of the state. This includes the movement of military personnel, supplies and equipment around North Carolina, the United States and throughout the world. In North Carolina, military facilities and activities consist of U.S. Department of Defense (DoD) operations and the North Carolina National Guard, with branches of the U.S. military represented, including the U.S. Army, Navy/Marines, Air Force and Coast Guard. These bases range from training facilities to military terminals and are primarily located on the eastern side of the state, along the coastline.

All of the military facilities cited freight transportation assets as a contributing factor in base expansion and realignments. Some of the key challenges and bottlenecks identified are:

- Limited rail cargo opportunities for most of the military bases due to lack of access and requirements for minimum loads, particularly in the case of heavy equipment.
- Bridge conditions can restrict movements of some of the large equipment, resulting in the need to make the moves by rail, which significantly increases the cost.

Military Bases





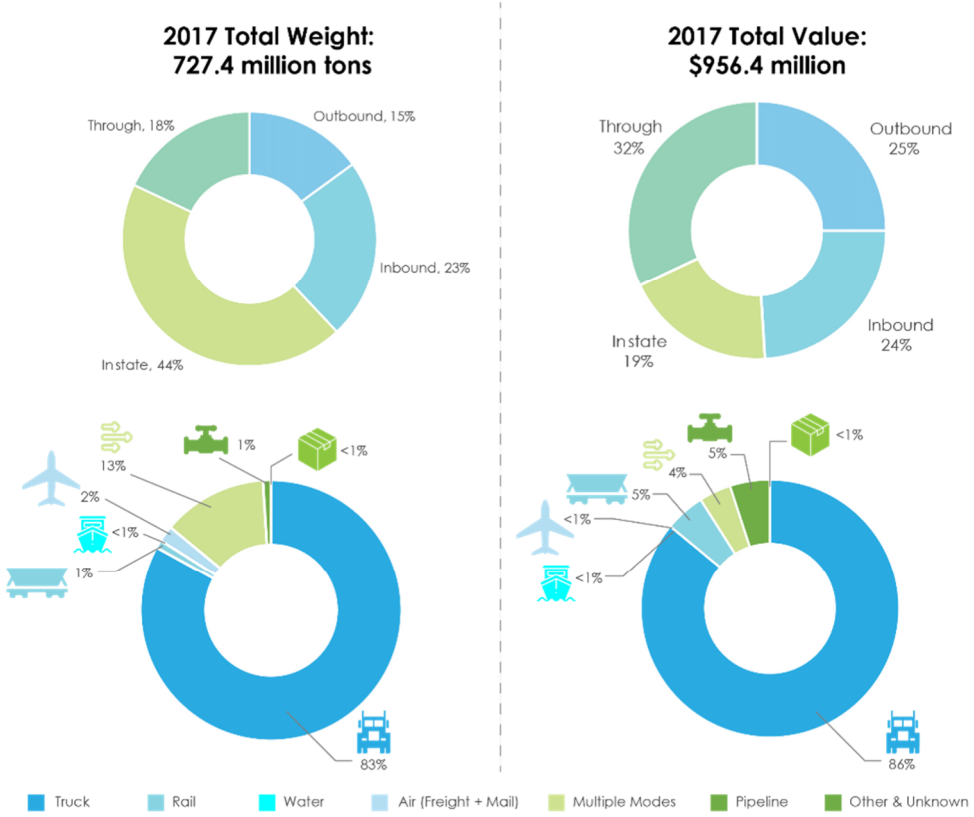
Tracking Economic and Freight Demand and Growth Forecasts

The statewide commodity flows summarize the total freight flows moving to, from, within and through North Carolina currently and in the future. It provides insight into modal dependence, route choice and equipment and service required to meet the needs of the state's businesses and residents

In 2017, 727 million tons of freight valued at $956 billion moved over North Carolina's transportation system. This is up 22% from the 594 million tons of freight and down 4.6% from $1 trillion in value in 2012. By 2050, North Carolina's transportation system is projected to carry more than 1.14 billion tons of freight valued at $1.86 trillion annually, an increase of 57% by weight and 94% by value from 2017. The weight of shipped commodities is important to understanding how freight vehicles use the transportation system. This understanding is critical when addressing factors such as bridge stress, pavement consumption and congestion. Shipment weights for different commodity types are also crucial when assessing the impacts of certain commodities and industries (including consumer goods, coal and non-metallic minerals) on the transportation system. However, it is also important to consider the value of the products being transported. It is particularly important in understanding the impacts of value-added manufacturing and service-related industries. These industries tend to generate and ship lower-weight, higher-value commodities.

Every freight shipment can be categorized as moving in one of four directions-imports, exports, interstate, or pass-through. By volume, the largest component of the state's freight movements is intrastate, accounting for 44% of the 727 million tons moved in 2017. The direction of goods movement by weight and value are in line with the 2017 SMFP. Most of these flows constitute movement of heavy bulk commodities (e.g. gravel, non-metallic mineral products, gasoline, logs and wood products) associated with construction and allowing for balanced trade lanes. This is important because it allows carriers a better opportunity to reduce empty hauls which leads to more competitive transportation rates for the region's shippers.

Trucks are the dominant mode utilized for carrying these goods, transporting 86% of the total weight and just over 83% of the total value of goods in 2017.



Note: 2050 data is shown in the Commodity Flow report.

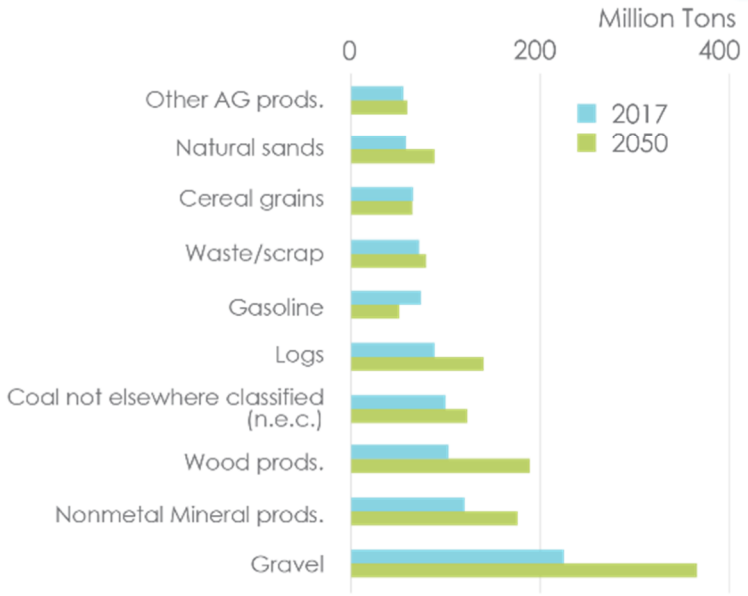
Source: FHWA Freight Analysis Framework Version 5

Total weight carried by trucks is up 7% from 2012 and the total value of goods moved by truck is up 1% from 2012.

Rail and pipeline moved the second highest weight of freight, each carrying 5% of the state's freight volumes compared to 15% of freight weight carried by rail in the 2017 SMFP. The second highest modal share measured by value was multiple modes carrying 13% of the total value of goods. Multiple modes include commodities that were imported, exported, intrastate or through movement of goods that used multiple modes of transportation. The heavy reliance on trucks to move freight has cascading impacts on infrastructure (i.e., roads and bridges), air quality and the cost to businesses and consumers.

Most of North Carolina's top trading partners are concentrated in the Southeast and Mid-Atlantic regions. It is not surprising that North Carolina relies heavily on trucks for moving its goods, when its largest trading partners are accessible by truck within a day of travel – extending from north Florida to eastern Pennsylvania along the Eastern Seaboard, as far west as Nashville in the Southeast and as far north as Cleveland in the Midwest. This footprint also contains several freight assets outside of North Carolina that are valuable to the state's shippers, such as the Ports of Jacksonville, Savannah, Charleston and Norfolk. Other important trading partners that are not within a day of travel are key rail lanes for intermodal shipments connecting to terminals in Florida, Texas, California and some nearby in Georgia and Tennessee.

COMMODITY FLOW FORECASTS OVER THE NEXT 30 YEARS



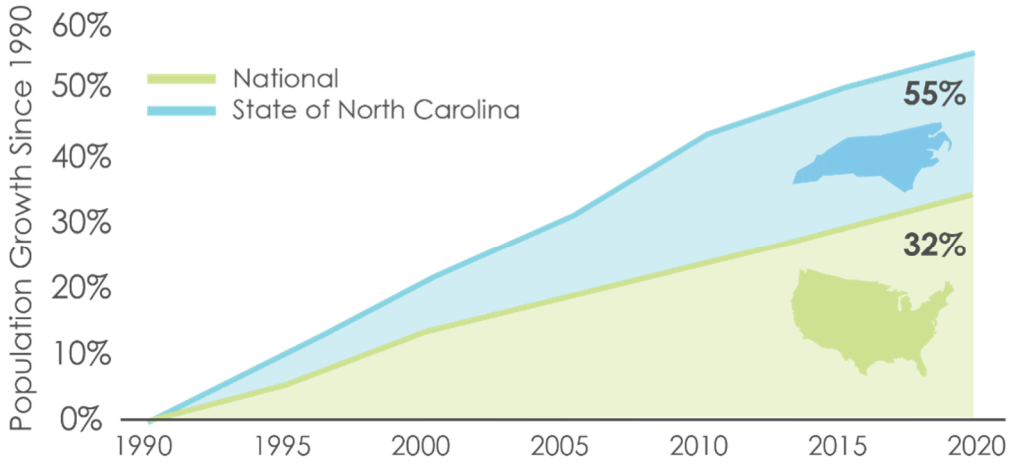
Source: FHWA Freight Analysis Framework Version 5

Trends Shaping our Future

There are several global, national and statewide trends that will continue to drive the demand for and performance of North Carolina's freight transportation system. Leading trends impacting future freight flows include continued statewide population growth, technology innovations in transportation such as the advent of autonomous vehicles, increased new business and consumer practices such as the emergence of e-commerce fulfillment centers, containerization and intermodal growth and global shifts in manufacturing.

Population and Urbanization on the Rise

North Carolina's demographics are changing. The population of North Carolina has grown from 6.7 million people in 1990 to 10.4 million people in 2020, a total growth rate of 55%. The state has added 400,000 residents since the 2017 SFMP. Over the same time period, the population of the U.S. has increased by 32%. Population change is a key contributor to economic growth and transportation demand, as increases in population create demand for goods and services. In conjunction with the expanding demand for goods and services, population impacts the number of passenger and freight trips through the North Carolina transportation system. As the number of passenger vehicles and trucks continue to multiply, competition and trucks continue to multiply, competition will rise for the increasingly scarce capacity remaining on the highway system, straining existing roadway capacity and resulting in more severe congestion. As highway congestion increases, freight rail will be increasingly in demand to meet the needs of those industries that are particularly reliant on freight.



Source: US Census Bureau

U.S. Census data indicates that a share of the Nation's population is shifting from Northeastern and Midwestern states to Southeastern states such as North Carolina. The trend of urbanization has slowed down in the past five years, largely due to the COVID-19 pandemic. Urbanized areas are still increasing in size but at a slower rate. The slower rate of urbanization combined with people moving out of city centers to more rural areas has contributed to a smaller net positive number of people moving into urban areas.

Much of this growth will be centered in North Carolina's and other states', major metropolitan areas. The urbanization, or concentration of the nation's population in metropolitan areas, will lead to the emergence of megaregions which will influence the movements of goods, people and capital. These regions will act as semi-unified entities as their economies become increasingly linked. This linking of economies necessitates a corresponding linking of freight and other infrastructure assets to support economic and population growth. For the Piedmont Atlantic megaregion (which includes North Carolina), much of the impact of an emergent megaregion will be concentrated along the I-85 corridor.

Effective freight planning will need to address goods movement within the mega-region and to neighboring mega-regions and how the future freight network will serve the state's rural communities and connect them to the mega-region. With the slowdown of the growth of urbanized areas and people moving to rural areas, the movement of freight will be more crucial than ever to ensure goods are reaching the larger population base in less dense areas of the state. This heightens the importance of addressing connectivity between rural and urban areas.

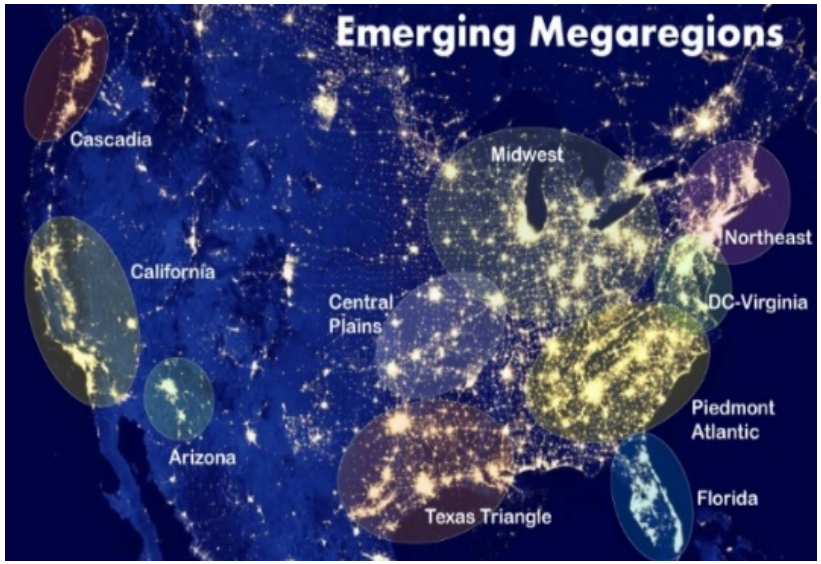
The Piedmont Atlantic region is one of the ten emerging megaregions identified by USDOT in the United States. Since trucking is currently, and predicted to remain, the predominant freight mode, much of the corresponding increase in freight activity will occur on North Carolina's highways. The I-85 corridor will become even more important as it forms the backbone of the Piedmont Atlantic megaregion.

Technology – Changing the Way Freight Moves

Technology innovations have the potential to optimize and improve the transportation network. These innovations include the freight portion of the broader trends in autonomous and connected vehicles. Researchers have predicted that when the majority of the fleet is both connected and automated, there will be significant decreases in crashes, resulting in significant increases in safety and reliability. It will also lead to significant decreases in non-recurring congestion (i.e., incidents, work zones, weather and special events), which accounts for about 50% of total congestion.[1] Decreased congestion provides the opportunity to get more capacity out of the existing system, lessening the need for expensive, time consuming capacity expansion solutions.

Commercial vehicles will likely be the earliest adopters of connected and automated vehicle technology given the intense pressures faced by the transportation industry. These include a shortage of commercial vehicle drivers that is likely to worsen over time[2], pressure from shippers to reduce costs and increase reliability and increasing demand that is expected to continue well into the future as the tonnage of freight moved on the multi- modal freight system steadily grows.[3]

The truck driver shortage has been increasing across the United States. New drivers will be needed to due to retirements in the industry and industry growth. The COVID-19 pandemic has increased the need of industries for truck drivers to move e-commerce products.



Source: USDOT Volpe Center

Regulatory issues that would allow for widespread use of relevant technologies could be realized in the next decade. Meanwhile, alternate delivery systems such as drones and freight shuttles have the potential for overhauling "last mile" approaches and pilot programs both in the U.S. and Europe are testing such deliveries. Another source of technology is the potential evolution of transportation network companies (TNC) to expand into freight delivery beyond some of the current last-mile systems such as meal delivery. A more expansive TNC approach could have implications for costs (and thus driver earnings and retention), congestion reduction and modal shift.

[1] FHWA. Office of Operations.

[2] American Trucking Association. Driver Shortage Update, 2021

[3] Bureau of Transportation Statistics. "Weight of Shipments by Transportation Mode: 2017, 2022, and 2050

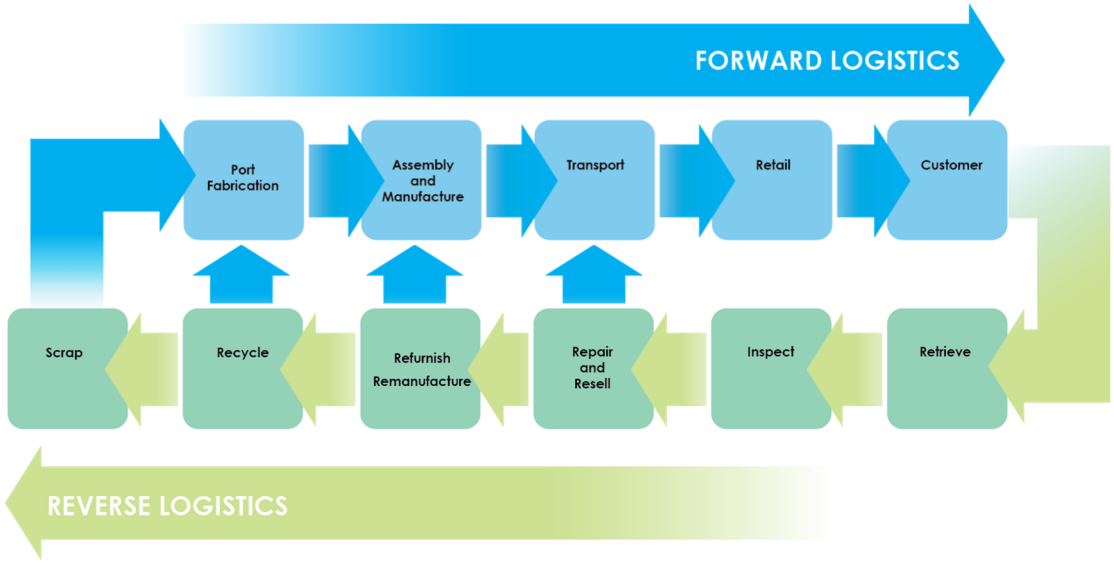
Business and Consumer Practices

Evolving business and consumer practices include changes in sourcing, advances in manufacturing and e-commerce. Manufacturing advances have increased the amount of heavy-haul transport in sectors such as energy, as more complex pieces are manufactured and shipped whole as opposed to assembled on site. Conversely, 3D printing innovations may reduce the size and distance of shipments and enable production closer to assembly or retail.

The COVID-19 pandemic has increased demand for e-commerce due to pandemic-related lockdowns. E-commerce saw the steepest increase in total sales in 2020[4]. As same-day and next-day delivery has become the norm for e-commerce transactions, retailers have begun to reposition regional distribution centers and smaller distribution centers closer to urban areas – the centers of demand. Delivery on such a short timeframe is expensive, though it has become necessary, as customers have come to expect this level of service. Strategically placed fulfillment centers allow firms to deliver the level of shipping service that consumers demand while maintaining relatively affordable costs.

E-commerce continues to grow and evolve, including changes in "omni-channel[5]" marketing, home delivery and alternate centralized parcel facilities and private fleets of delivery vehicles and coordination with TNCs. The impact of increased e-commerce and its supporting infrastructure on the North Carolina freight system is likely to be an increased importance on freight system reliability and more frequent truck trips in urban regions that utilize smaller vehicles and alternative delivery methods.

The portion of the highway network serving rail intermodal facilities, such as those in Charlotte, Greensboro and the proposed facility in Rocky Mount, will also be impacted as many e-commerce shipments with longer delivery times utilize rail intermodal service. To support the coordination of intermodal facilities with e-commerce fulfillment centers, the highway network linking these freight terminals must provide reliable performance if shippers are to develop schedules based on the level of service provided by these highway links. Reliability directly affects shipping costs and the ability of retailers to meet consumer demand.



Reverse Logistics

Reverse logistics involves all supply chain activities – returns, recalls, withdrawals, recycling, refurbishment and disposal – connected with products after the point of sale. When a product cannot move forward in the supply chain or requires backward motion, reverse logistics practices work to recover lost value and determine the product's final destination. A Mastercard Spending Pulse report released in late

December 2021 estimated that online holiday retail sales in 2021 jumped 11% compared to 2020. E-commerce made up almost 21% of total retail sales, up from 10% in 2020 and 14% in 2019, Mastercard said. The reported quoted a Global Commercial Estate Services (CBRE) estimate that $66.7 billion worth of online holiday purchases would be returned and pushed back into the

[5] Omnichannel is e-commerce that uses multiple platforms/ websites to each consumers.

strained supply chain[6]. That's up 13% from last year, and nearly 46% above the previous five-year average. The return rate for e-commerce sales can be as high as 30% compared to 10% for brick-and-mortar sales, according to reverse logistics company Optoro. A report from the National Retail Federation a year ago showed that online returns more than doubled in 2020 from 2019[7]. Factoring in transportation, processing and other losses, holiday returns will cost retailers two-thirds the price of the original item, Optoro estimates. The returns process is a complicated affair involving assessments, transportation, distribution centers and factories.

The continued expansion of this element of e-commerce trade will impact the freight transport system in North Carolina. As the volume grows, the existing flows, which are typically accommodated in delivery assigned trucks and vans could overwhelm the existing capacity and lead to an increase in the number of trucks and delivery vans on the road. Companies including Happy Returns and Optoro are expanding their footprint within customer facilities to handle product returns. As their networks expand, they will expand the number of facilities in North Carolina which will contribute to increased truck volumes associated with the collection of returned products and the dispatch of sorted shipments to the next step of the return process. In a search to reduce the costs of handling product returns, other elements of the freight transport system impacted by return traffic will have to evolve. This will include lower cost transport options including rail and rail-truck intermodal services. As an increased volume of the returned products are sent to overseas markets, the number of containers associated with this traffic volume will also increase, creating additional volumes at ports including the Port of Wilmington.

Containerization and Intermodal Shipments

The use of shipping containers was initiated in the late 1950s, but it was not until the 1980s that fully functional container terminals began to take hold. The use of containers to import and export goods was a true revolution in freight handling. Containers offered security of transport and logistical efficiencies that had not previously existed.

The efficiency of intermodal – ship to rail – container cargo is even more dramatic, cutting dwell times in the port by 50% or more. Due to efficiency of handling, the use of containers has expanded beyond use for consumer goods.

The role for intermodal terminals continues to grow as more products are shipped via container, including agricultural products and other materials previously shipped in bulk. Bulk products may be loaded and unloaded at customer facilities or with dedicated purpose-built connections for transloading. Coal, petroleum, chemicals, plastics and paper, pulp and paper

[6] TIS THE STRESSFUL SEASON FOR HOLIDAY GIFT RETURNS, CBRE, DEC., 2021

[7] $428 BILLION IN MERCHANDISE RETURNED IN 2020, NATIONAL RETAIL FEDERATION, JANUARY, 2021

products each fall into this category of freight products. Intermodal commodities are typically reported as a mix of commodities being shipped together and are often intended for a particular retailer (e.g., Lowe's or Wal-Mart). Intermodal growth in North Carolina will be impacted by the CCX terminal construction in Rocky Mount. CCX primarily serves Raleigh and the Eastern North Carolina freight market. The terminal also acts as a hub for the railroad's southeast and mid-Atlantic intermodal operations. It provides the Port of Wilmington with rail intermodal service. The facility is consolidates shipments and shipping lanes to serve the growing demand both in the region and nationally. The facility also diverts long-haul truck traffic to rail, with most being through-traffic.

Reshoring of Domestic Manufacturing

The combination of a growing wages in China and Southeast Asia and higher transportation costs has led to a number of firms shifting manufacturing back to the United States, a trend known as reshoring. An advantage of reshoring includes allowing supply chains to be more responsive to changing consumer tastes and the ability to better manage disruptions. As a result, the U.S., and the Southeast in particular, has become a more attractive location for high-value manufacturing. Not only has this spurred U.S. companies to bring back certain manufacturing activities, but it has also increased the attractiveness of the U.S. for foreign direct investment from international firms.

In 2020, over 109,000 jobs were created in the United States as a result of the reshoring efforts of companies. North Carolina ranked third as a host of 9,977 jobs. Foreign direct investment is increasing. The number of foreign firms which are selecting Southeast U.S. locations, such as VinFast and Toyota Battery, is rising.

The trend of reshoring and foreign direct investment has created an opportunity for North Carolina to leverage its freight assets to improve its competitiveness in high-value manufacturing. The expansion of the state's interstate highway system along with improved rail service and connectivity to the Port of Wilmington and the operation of the CCX terminal at Rocky Mount makes North Carolina more desirable to these types of investments. With the planned increased investments in the highway system, especially the interstate system and roadways that provide access to major freight terminals (e.g., the Port of Wilmington, the CCX terminal at Rocky Mount, Charlotte-Douglas, Piedmont Triad and Raleigh Durham International airports, etc.); North Carolina could surpass its southeast competitors.

US Manufacturing Jobs/Year 2021

	2016	2021	~ % Change
New Offshoring	~50,000*	NA****	~80%
New Reshoring and FDI	77,000*	~ 261,000**	~ 70%
Net Jobs Gained	~ +25,000	~ + 261,000***	N/A

*Estimated
** From 'Reshoring Initiative 2021 Data Report'
***Calculated from previous Plan
**** The 'Reshoring Initiative 2021 Data Report' indicates there is no measure of offshoring announcements or implementation.

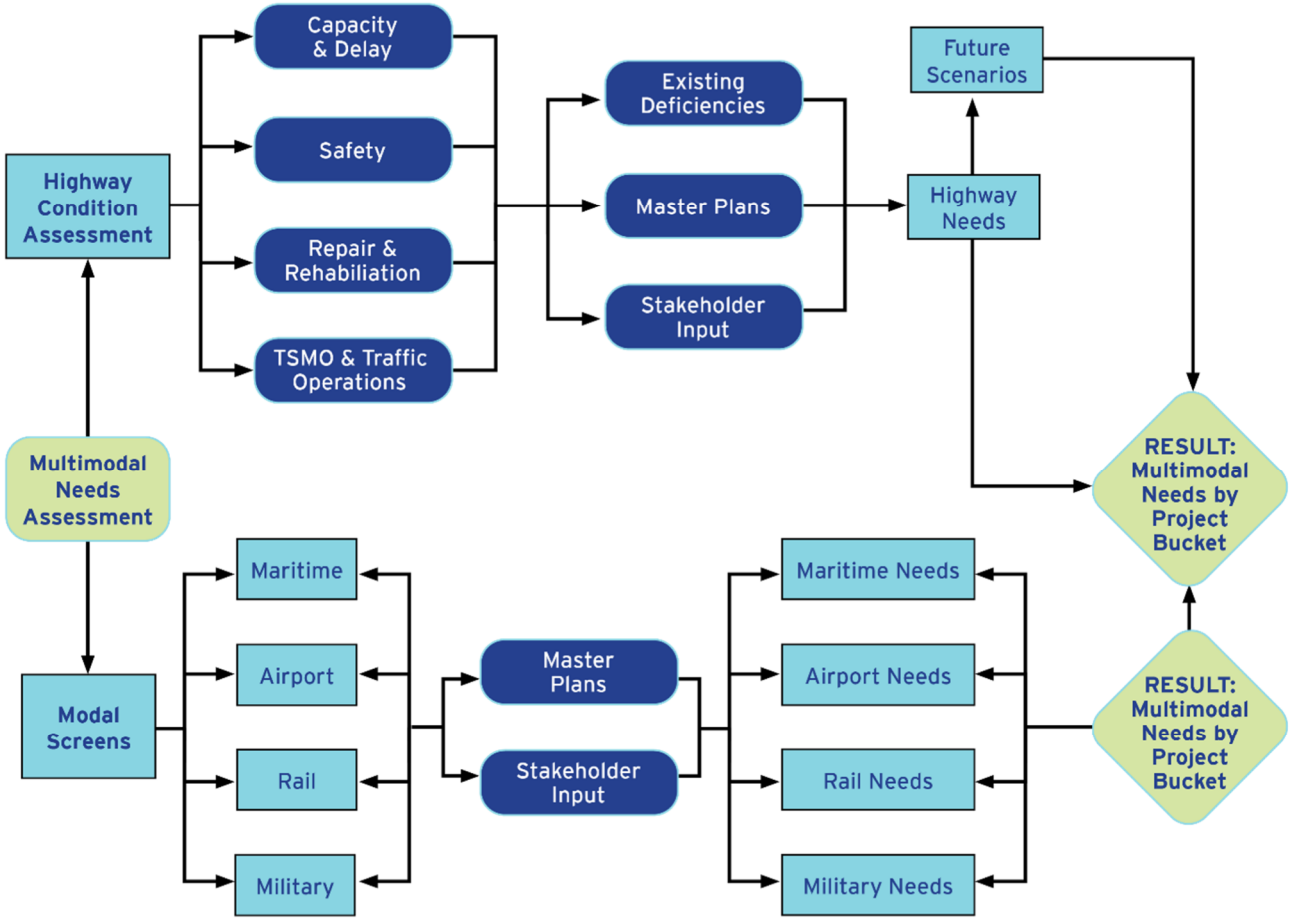
Between 2010-2021, North Carolina was 5th in the nation attracting over 16,700 reshoring manufacturing jobs in 155 companies.

MULTIMODAL NEEDS ASSESSMENT

The multimodal needs assessment involved a multi-faceted approach to identify needs and deficiencies on the North Carolina Multimodal Freight Network. The initial highway freight network condition assessment focused on a quantitative analysis of the North Carolina Highway Freight Network (NCHFN) to identify needs and deficiencies in the areas of capacity and delay; safety; repair and rehabilitation; and Transportation Systems Management and Operations (TSM&O) and traffic operations. The condition assessment criteria were specifically developed to be quantitative whenever possible to provide a direct quantifiable link between needs, prioritization criteria and future performance measure development and monitoring.

Additionally, a policy and plans review that included extensive stakeholder input was conducted to provide a qualitative needs assessment that focused on needs related to the North Carolina Multimodal Freight Network as well as future-facing needs related to connected and autonomous vehicles (CAV), technology and alternative fuels. The results and input provided during the multimodal needs assessment efforts will be used to aid in the prioritization of freight projects during future State Transportation Improvement Program (STIP) development activities.

NORTH CAROLINA FREIGHT NETWORK NEEDS ASSESSMENT PROCESS



Stakeholder Input

Input on freight-related needs, issues and projects was solicited from and provided by a range of North Carlina public and private sector stakeholders through presentations to the Freight Advisory Committee, Regional Forums and an online web-based survey. The results of these outreach efforts were documented and analyzed to identify general statewide multimodal freight needs that were used to inform the multimodal needs assessment, project prioritization process and performance measures developed for this plan.

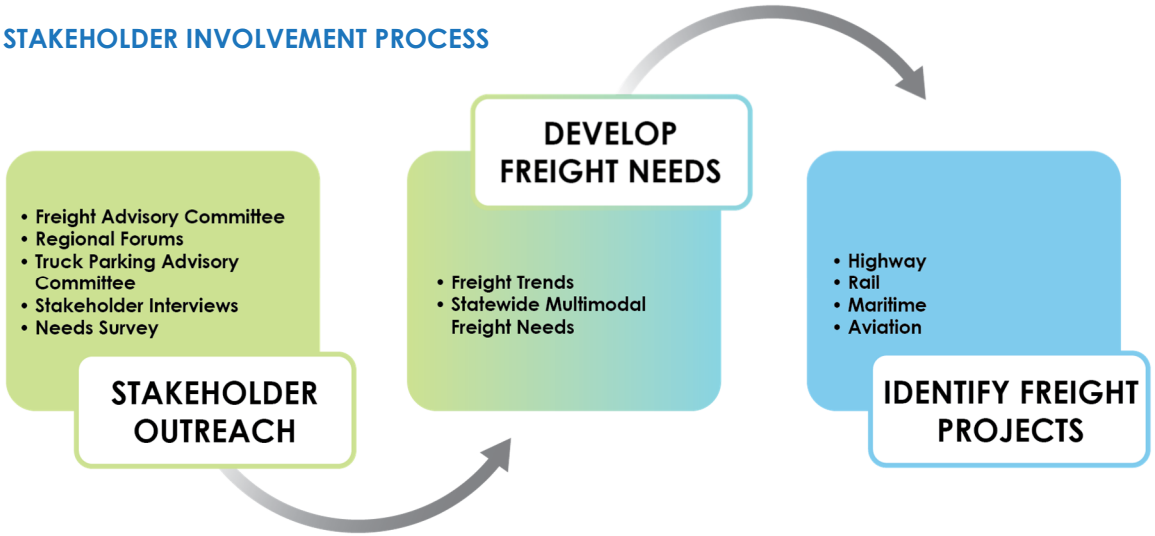
Specific needs and projects identified thorough Stakeholder input were incorporated into the update of the comprehensive statewide unfunded needs list, which includes Prioritization 6.0 Projects (the current round of NCDOT Project Prioritization). These projects can be incorporated into the project development process of NCDOT and its partner agencies for possible inclusion in future STIP and work planning activities. This list can be found in the project screening section of this chapter.

The following sections provide an overview and summary of the stakeholder coordination and input activities that were conducted to identify statewide multimodal freight trends, needs, issues and projects.

Stakeholder Outreach Activities

Stakeholder outreach was conducted throughout the development of the strategic plan utilizing numerous methods to reach a wide range of public and private freight stakeholders in North Carolina included presentations at statewide meetings, regional forums, online surveys and one-on-one interviews. The results of these outreach activities were used to support the development of the Plan through the identification of specific freight trends, needs and projects to improve and enhance freight movement on the North Carolina Multimodal Freight Network.

STAKEHOLDER INVOLVEMENT PROCESS



North Carolina Freight Advisory Committee

Presentations were given to the North Carolina Freight Advisory Committee (FAC) periodically during the development of the Multimodal Freight Plan to provide updates to key statewide freight stakeholders, solicit feedback and discuss trends, issues and needs affecting freight and goods movement in North Carolina.

Many of the attendees were interested to know how COVID-19 has impacted freight movement overall and how the effects of a possible recession look for the future of freight. It was also discussed how the development of distribution areas within the state has increased significantly within the last two years and will affect the demand of the freight system as well. All these topics will be taken into consideration under the updated Multimodal Freight Plan.

Overall, the most common challenge faced is the need for better multimodal connectivity. A majority of respondents voted that there is a need for rural connectivity in the highway system to provide freight mobility to the less populated parts of the state. The ports are also in need of highway and rail connectors. Additional modal challenges include:

- **Highway:** Congestion; significantly reduced travel speeds from posted conditions
- **Rail:** Cost of railroad services and a need for intermodal bulk and container transfer facilities (especially in the western portions of the state)
- **Air Cargo:** Timeliness of air cargo service
- **Pipeline:** Permitting processes, regulatory and state government support

Freight Plan Update Regional Forums

A series of two Freight Plan Regional Forums were held as online public meetings to provide an opportunity for partner agencies and the general public to hear about the update to the Freight Plan and provide input on freight needs, issues and projects through an interactive survey and chat box function. Attendees included NCDOT employees, MPO employees, RPO employees, municipal employees, neighboring states employees and private sector employees. Most of the attendees were from the highway industry with attendees representing all regions of North Carolina.

Key themes that were carried throughout the various topics discussed were modal connectivity challenges and safety. Multimodal connectivity was discussed as a need, especially in connections to the ports via rail. Safety was cited frequently within each freight mode but was cited as the main freight highway challenge when it comes to crashes and safe parking for truck drivers. Rail safety concerns include reducing at-grade rail crossing incidents.

Truck Parking Workshop

A separate online Multimodal Freight Plan Update meeting was held for stakeholders specifically for Truck Parking. An overview of the 2017 Truck Parking Plan was presented including the 2020 parking inventory and implementation plan. It was noted by the attendees that nighttime parking is still an ongoing issue along the interstate ramps and shoulders as well as in distribution areas.

As part of the 2022 update, the attendees were asked to identify truck parking locations that have come online since the 2017 truck parking plan and where truck parking is needed. Needs were identified around the north and south gate of Port of Wilmington, near Port of Morehead City, west of Charlotte, Salisbury, east of Burlington and north of Rocky Mount. One new location was identified near I-85 and Peeler Road interchange. Additionally, the majority of the attendees responded that hours of service (HOS) demands, and limited access to truck parking and/or pickup and delivery areas are the main reasons for unauthorized parking.

Freight Needs Survey

As a follow-up to the Regional Forums, an online survey was developed and sent out to participants to provide an opportunity for stakeholders and the public to provide additional input to the Freight Plan. The online survey asked respondents to provide feedback on the current state of the North Carolina freight network, areas for improvement, challenges and barriers, policy, investments, performance measures and freight bottlenecks.

The majority of respondents were part of the trucking industry with representation across the entire state and neighboring states. Respondents voted roads, highways and truck parking as the areas in North Carolina's freight system that needed the most work. Overall, the current challenges to freight logistics movement are travel time reliability due to congestion and inadequate intermodal connectivity. These same challenges are also believed to continue to be barriers throughout the next 10 years. The advancement of technologies is also expected to have the biggest impact on freight movement including electrification of vehicles, autonomous trucks/connected trucks, and automation in ports. As seen in the Regional Forum responses, connectivity to the ports and truck parking availability are the most pressing issues currently for North Carolina's freight system.

HIGHWAY FREIGHT NETWORK CONDITION ASSESSMENT

The NCHFN needs and condition assessment conducted for this Freight Plan was developed to provide a quantitative analysis to identify existing deficiencies on the NCHFN. The quantitative needs assessment is organized into general analysis groups consisting of capacity and delay; safety; repair and rehabilitation; TSM&O; and C/AV and alternative fuels. Individual needs assessment criteria and data analysis are defined for each group. The following sections provide an overview of each quantitative needs assessment metric; the methodology and data used in each calculation; and an assessment of the identified deficiencies or needs.

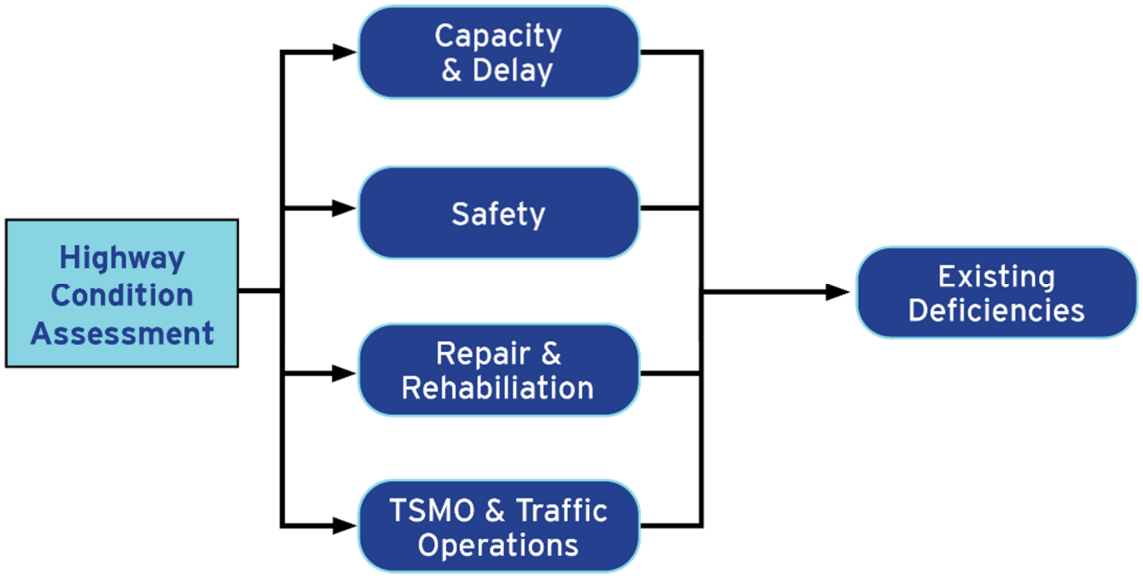
Data Sources

Data sources for the highway needs assessment activities were identified through a variety of sources that included NCDOT roadway and route data, crash data, pavement and bridge condition, statewide travel demand model, third-party probe data and other relevant data sources developed by or available to NCDOT.

HIGHWAY CONDITION ASSESSMENT PROCESS

Data Points	Source
Truck Hours of Delay	Regional Integrated Transportation Information System
Truck Travel Time Reliability	Regional Integrated Transportation Information System
Volume-to-Capacity Ratio	NCDOT Statewide Model
Truck Crashes	NCDOT
AADT	NCDOT
Bridge Condition	NCDOT
Pavement Condition	NCDOT
Road Characteristics	NCDOT
Routes	NCDOT

CONDITIONS ASSESSMENT DATA SOURCES



HIGHWAY CONDITION ASSESSMENT MEASURES

The following sections provide an overview and summary of the highway needs assessment that was conducted using data-driven quantifiable measurements for the identification and analysis of needs on the NCHFN.

Capacity & Delay Analysis

The capacity and delay analysis focus on metrics that identify potential needs and deficiencies on the NCHFN. The National Performance Management Research Data Set (NPMRDS) provides segment-level data on speed, travel time and AADT for the National Highway System (NHS). NPMRDS data was used to develop two metrics for the NCHFN: include Truck hours of Delay and Truck Travel Time Reliability (also known as Buffer Time Index). The NPMRDS defines trucks as Classes 8-13 for purposes of analysis. These metrics help to identify locations with excessive delay. Additionally, a volume-to-capacity ratio has been developed for the NCHFN. Areas with excessive truck delay may be used for future project prioritization to identify capacity needs, improve congested segments and increase NCHFN travel time reliability.

Truck Hours of Delay

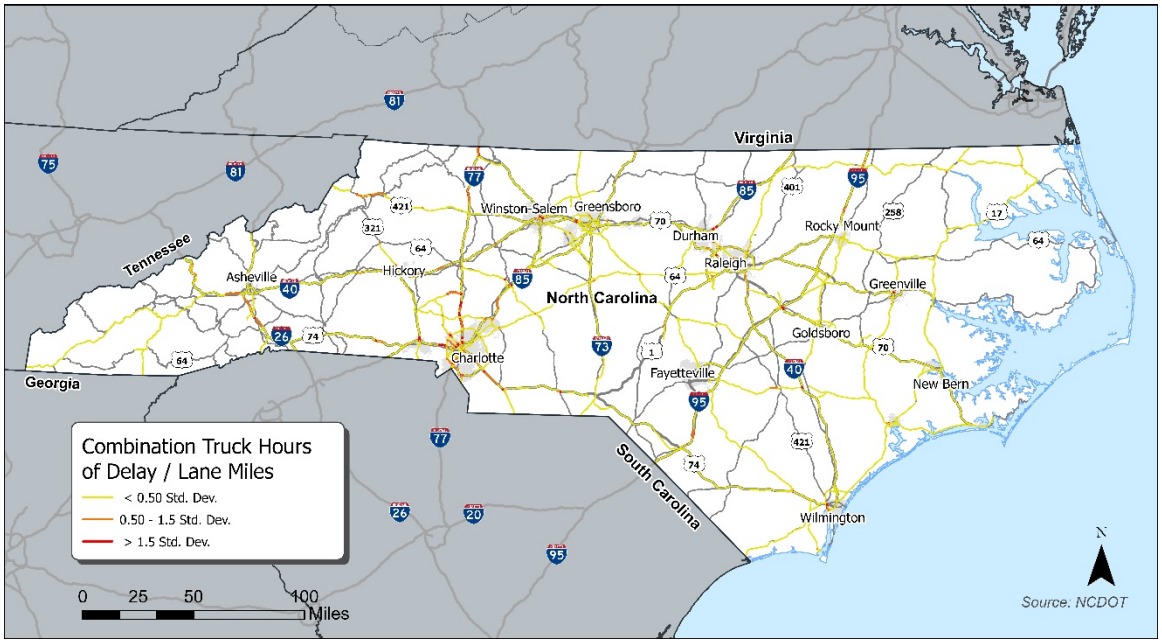
Truck Hours of Delay (Combination Truck Hours of Delay) measure the difference between daily real-world travel times and travel times under an uncongested condition (defined as LOS B). The hours of daily truck delay can be determined by the following formula:

$$Truck\ Volume \times (Hours\ of\ Daily\ Truck\ Travel\ Time - Truck\ Travel\ Time\ at\ LOS\ B)$$

The result of this analysis provides hours of truck delay along segments of the NCHFN and helps to identify congested corridors.

Within the State, a majority of truck hours of delay are located in and around major urban centers. The Charlotte urbanized area features excessive delays along the major roadways leading into the urban core. Additionally, the southern and western ring roads of the urbanized areas experience congestion. Moderate levels of truck delay are located in Winston-Salem, Raleigh and Fayetteville urbanized areas.

NORTH CAROLINA COMBINATION TRUCK HOURS OF DELAY / LANE MILES



The southwestern portions of the Asheville urbanized area contain multiple NCHFN segments featuring higher than average hours of truck delay. Boone and Elkin, in the northwestern section of the state, experience delay leading to and through the urbanized areas. Eastern sections of the state, including the coastal areas, have limited delay issues.

Truck Travel Time Reliability

Truck travel time reliability metrics, such as the Buffer Time Index (BTI), help to identify roadway corridors that experience high variability in travel times. Corridors with higher variability in travel times create unreliable and more expensive operations cost to motor carriers. Addressing segments with high variability in travel times will help to improve on-time arrivals, reduced emissions and provide cost savings.

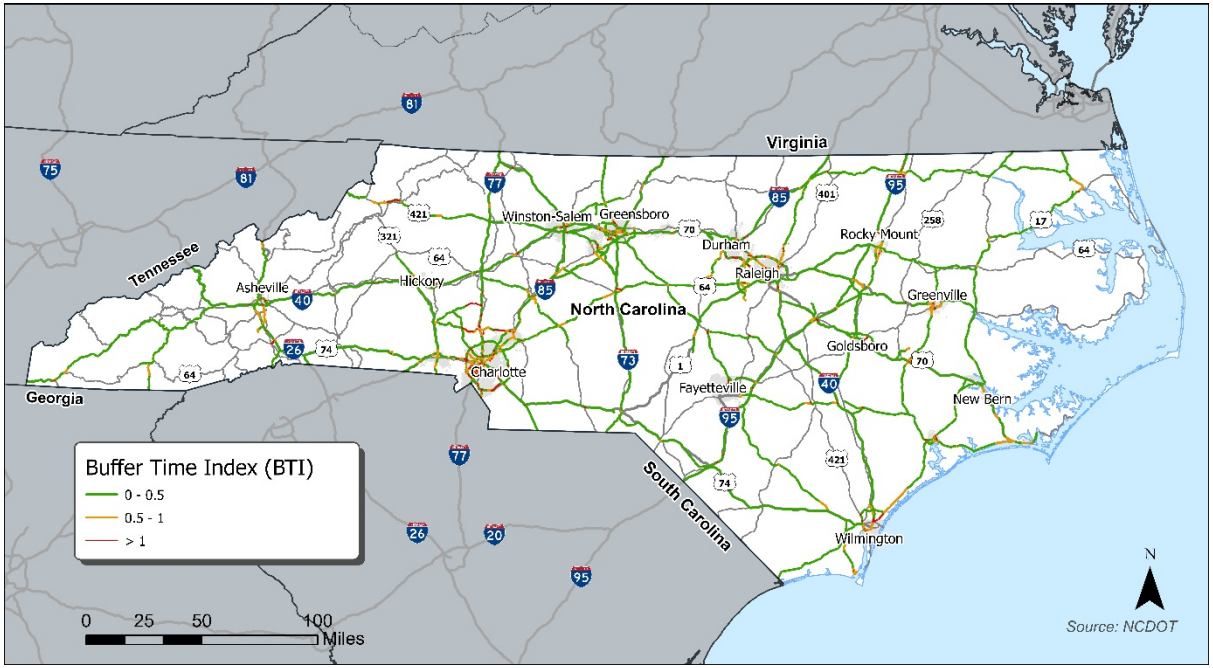
The BTI is a ratio of the 95th percentile truck travel time and average travel time. With the 95th percentile truck travel time representing the amount of time required to ensure 95% of all trips arrive on time. This provides an almost worst-case scenario for roadway conditions and the time to make a trip. The free flow travel time is defined as the travel time along the corridor in an uncongested condition.

$$BTI = \frac{95th\ \%\ Travel\ Time}{Free\ Flow\ Travel\ Time}$$

Thus, BTI represents the extra time (i.e., buffer) that must be factored into scheduling to ensure an on-time arrival for 95% of truck trips. For example, a BTI equal to 0.5 indicates that a trip that on average takes 30 minutes would need 50 percent more time or an extra 15 minutes (for a total scheduled travel time of 45 minutes) to reach its destination on time with confidence. A lower buffer time index indicates that expected travel delays are minimal and additional time may not be required to travel through that corridor. A higher BTI indicates the opposite, that extra travel time is needed to traverse a corridor.

Areas of North Carolina with the highest population densities coincide with areas of highest BTI and suffer unreliable travel times. These urbanized areas are Charlotte, Winston-Salem, Greensboro, Durham, Raleigh and Fayetteville. Rural areas and their roadways in east, central, and far west of North Carolina have relatively reliable travel times.

NORTH CAROLINA FREIGHT NETWORK BUFFER TIME INDEX



Volume to Capacity Ratio

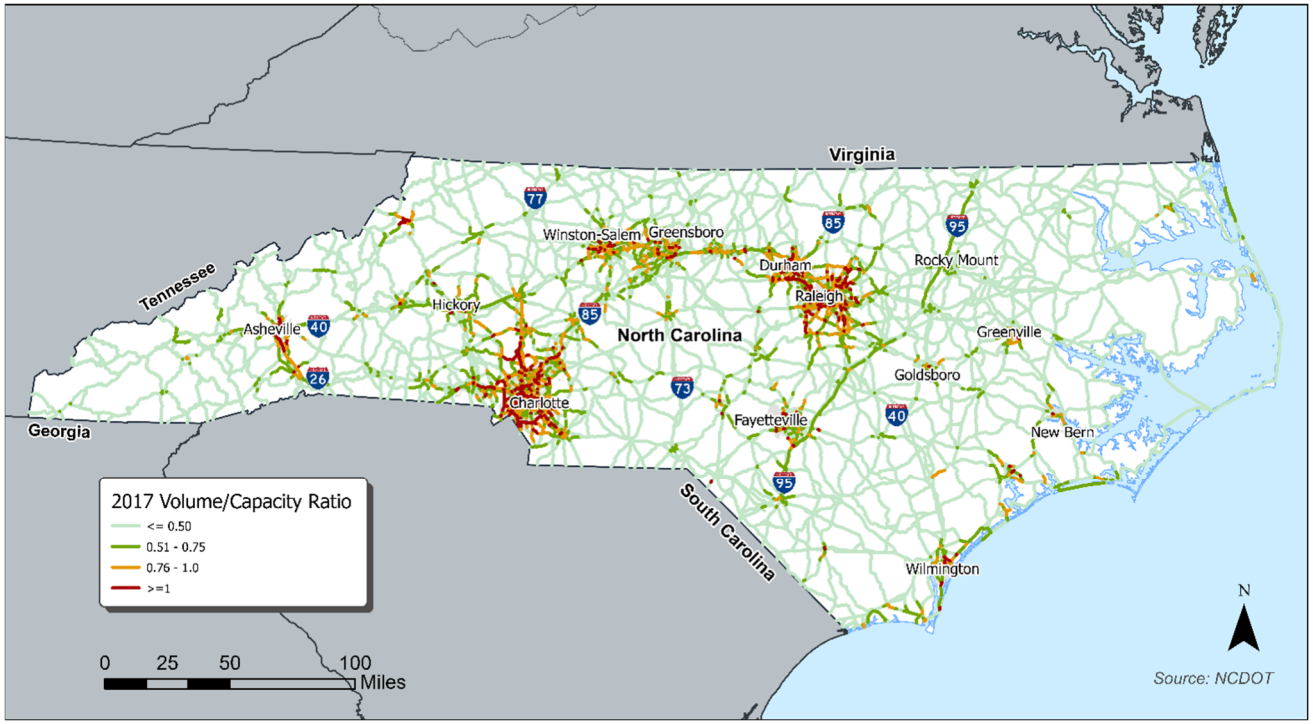
Volume to Capacity Ratio (V/C) is a measurement of the operating capacity of a roadway. In the simplest sense V/C is a ratio of the number of vehicles traveling a roadway segment compared to the theoretical total capacity of the roadway capacity.

$$V/C = \frac{Total\ Segment\ Volume}{Segment\ Capacity}$$

A V/C of 1.00 represents a roadway operating at capacity. V/C ratios less than 1.00 indicate a roadway with additional capacity available and a higher quality of level of service. When greater than 1.0 the roadway is operating above capacity reflects a congested scenario and increased travel times. This measure provides information on the quality of the travel along a corridor.

The North Carolina Statewide Model was used to determine V/C ratio on the state's roadway network for 2017. V/C issues are generally found within the urbanized areas of the state.

NORTH CAROLINA FREIGHT NETWORK VOLUME TO CAPACITY RATIO



Crash Analysis

The crash analysis focuses on individual metrics that highlight needs and deficiencies on the NCHFN. The metrics are related to the safety of commercial vehicles that could be addressed by projects and initiatives that reduce the number of severe and fatal commercial vehicle crashes.

$$Segment\ Crash\ Rate = \frac{5\ Year\ Total\ Truck\ Crashes}{5\ Year\ Million\ Truck\ Miles\ Traveled}$$

Freight Network Truck Crash Heat Map

The Truck Crashes Heat Map highlights the magnitude of crashes on the NCHFN using GIS analysis techniques. Crashes are generally focused within the state's urban areas.

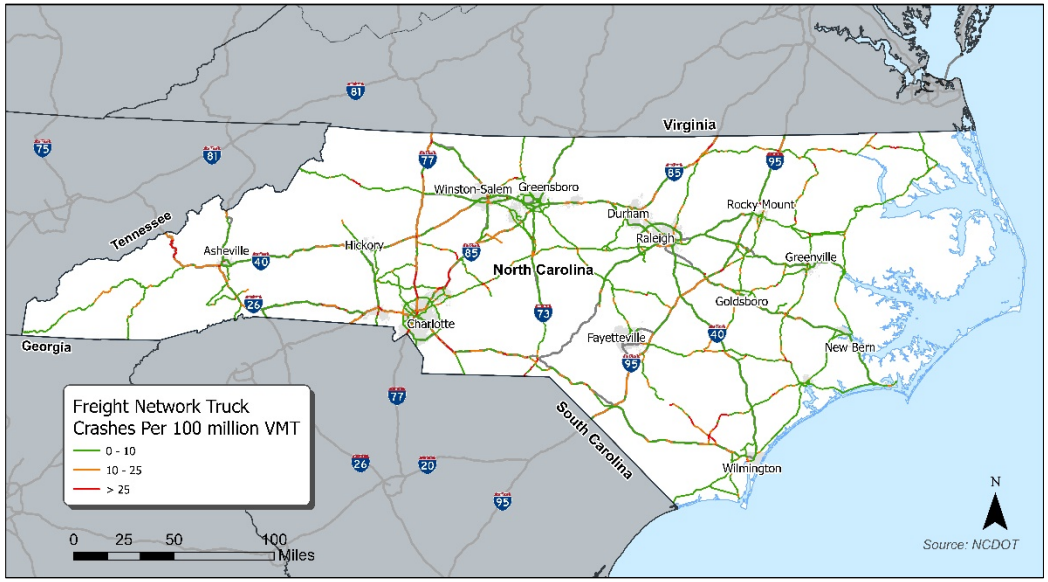
At-Grade Railroad Crashes

At grade railroad locations were examined to identify locations of crashes. Incidences at these locations affect both the highway and rail network reliability. These crashes are concentrated around the State's urban areas.

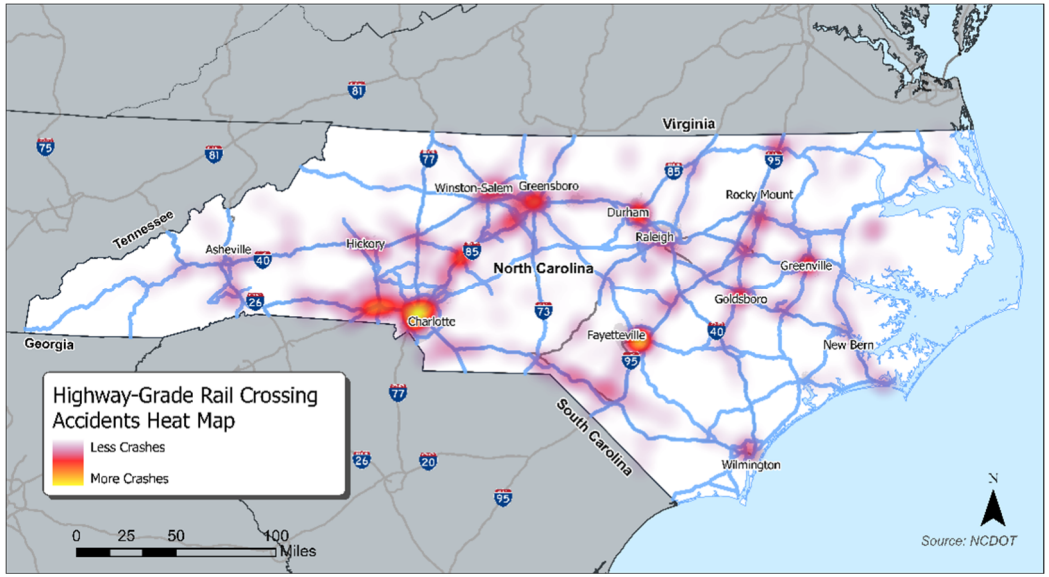
North Carolina Freight Network Truck Segment Crash Rate Map

Additionally, a truck crash rate map has been developed. The truck crash rate controls for the volumes of traffic on the corridor. This methodology allows for a uniform comparison between segments and highlight corridors with the highest rates of truck crashes. Crashes are generally focused on the State's urban areas.

NORTH CAROLINA FREIGHT NETWORK SEGMENT TRUCK CRASH RATE 2015-2019



NORTH CAROLINA FREIGHT NETWORK TRUCK CRASHES HEAT MAP 2015-2019



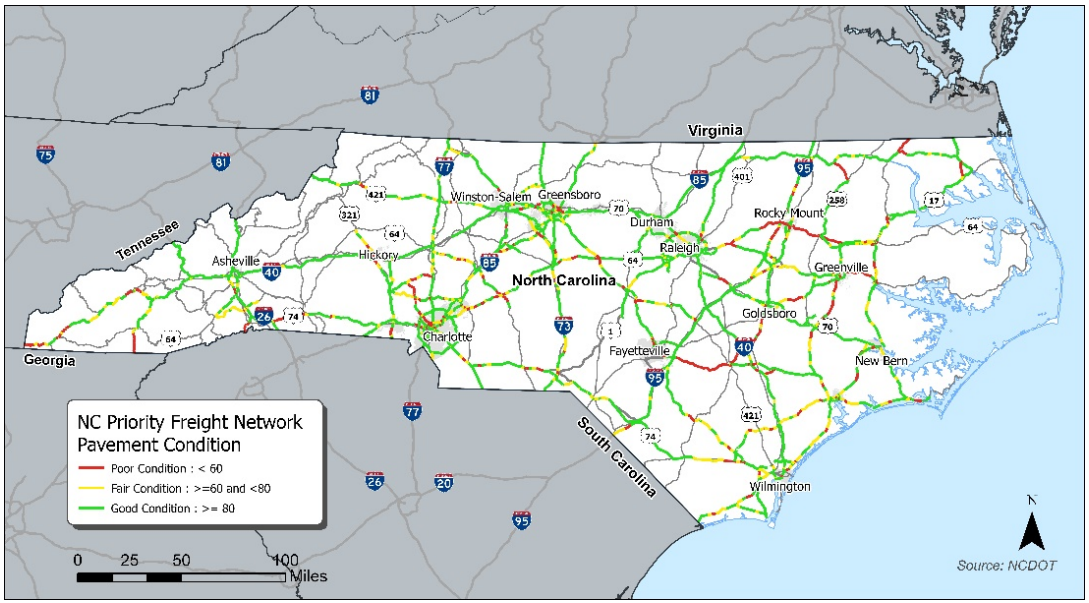
Repair & Rehabilitation Analysis

The repair and rehabilitation analysis focuses on individual metrics that highlight needs and deficiencies on the NCHFN. The metrics regard pavement and bridge condition that could be addressed by projects and initiatives that improve deficient pavement, bridges and tunnels.

Pavement Condition 2022

As part of ongoing maintenance activities and performance monitoring, the NCDOT continually monitors roadway pavement condition. Pavement rating conditions account for roughness and other roadway distress such as cracking. The lower the pavement condition the worse the quality of ride is for roadway users. Poor pavement conditions result in increased vehicle maintenance cost, increased fuel consumption, and safety concerns. Ensuring higher quality pavement conditions on the NCHFN will contribute to emissions reductions, safety and reduced operating cost for all road users.

NORTH CAROLINA FREIGHT NETWORK PAVEMENT CONDITION MAP



Pavement condition ratings were gathered from NCDOT's Pavement Condition Shapefile and classified based on condition rating.

- Poor Condition <60
- Fair Condition >=60 and <80
- Good Condition >=80

Bridge Load Restrictions 2022

Bridge load restrictions are a regulatory mechanism to alert roadway users of the maximum allowable vehicle weight a bridge structure can bare. Vehicles over the allowable weight can cause significant structural damage and create a safety issue to all roadway users. Additionally, trucks may be forced to take an alternate travel route when truck weight is in excess of a bridge's weight limit. Bridges with insufficient load ratings ultimately limit regional connectivity on the NCHFN. Ensuring all bridges on the NCHFN have the capability to support trucks in excess of 99 tons will reduce potential safety and truck detour activities.

NCDOT's Posted Bridge Shapefile was used to identify bridges with posted weights less than 99 tons.

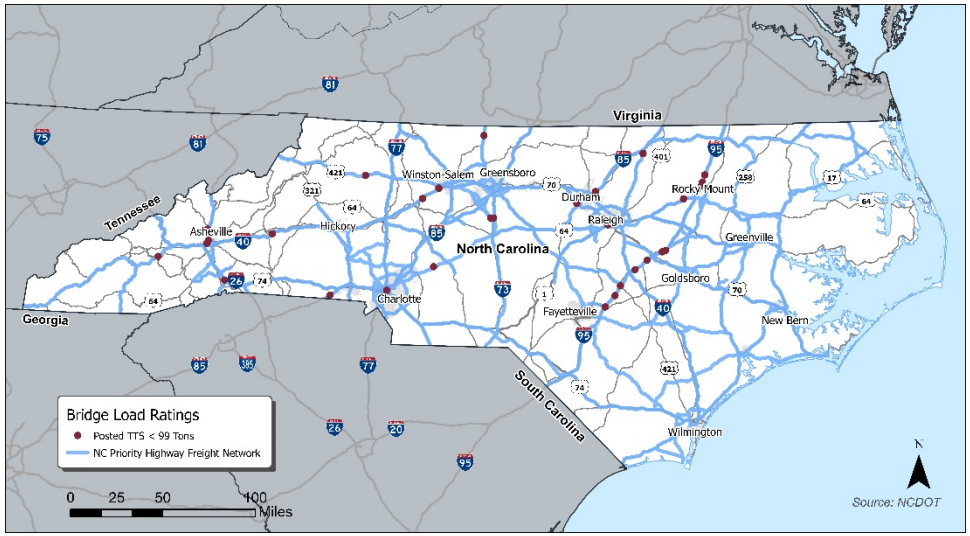
Structurally Deficient and Functionally Obsolete Bridges 2022

Structurally deficient bridges are those bridges that have some level of damage or deterioration to load bearing elements. Though they are not unsafe, they may require ongoing monitoring and higher maintenance intervals which may lead to more frequent bridge closures. These bridges are often slated for major repair or replacement in the near term. Functionally obsolete bridges are those bridges that do not meet current design standards. This may include insufficient lane widths, insufficient shoulder widths, or obsolete traffic barriers for example. These outdated designs may not contain the latest safety features that would be implemented in a replacement project. Reducing the number of bridges on the NCHFN classified as either structurally deficient of functionally obsolete will improve safety and travel time reliability.

Using the NCDOT Structures Shapefile, bridges classified as "functionally obsolete" or "structurally deficient" were identified on the NCHFN. Additionally, bridges meeting both classification standards have been identified, and may require the highest prioritization.

Due to the geography of North Carolina, mountainous areas in the western portion of the state feature more bridges in comparison to the lower lying eastern areas. This has resulted in a higher concentration of functionally obsolete or structurally deficient bridges in western North Carolina. Furthermore, a concentration of these structures is found in the State's urban areas and associated overpasses.

NORTH CAROLINA FREIGHT NETWORK BRIDGE LOAD MAP

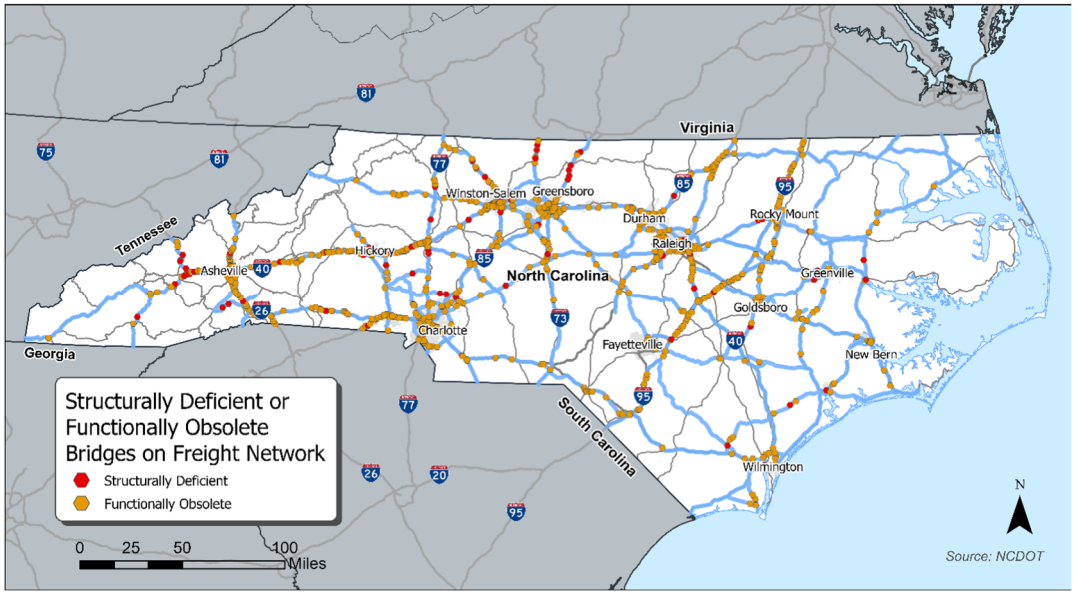


Bridge Condition Sufficiency Rating 2022

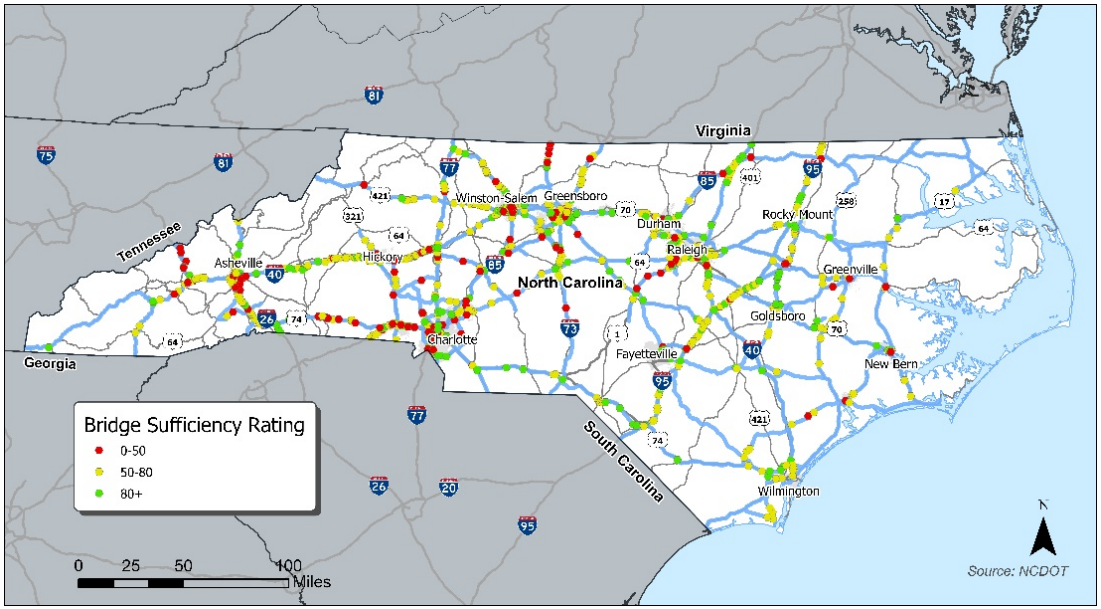
Bridge Condition Ratings provide a composite score for the conditions of bridge features including the deck, substructure and superstructure. The sufficiency rating is based on a 100-point scale with ratings less than 50 qualifying for replacement and ratings under 80 eligible for repair.

The NCDOT Structures Shapefile was used to determine the bridge sufficiency ratings on the NCHFN. The sufficiency ratings were then mapped for the NCHFN. In general, the western portion of the State has a higher concentration of lower-rated bridges.

NORTH CAROLINA FREIGHT NETWORK BRIDGE CONDITION MAP



NORTH CAROLINA FREIGHT NETWORK BRIDGE CONDITION-SUFFICIENCY MAP



TSM&O & Traffic Operations Analysis

The TSM&O and traffic operations analysis focuses on metrics that highlight needs and deficiencies on the NCFHN. The goal is to identify projects and initiatives that increase network and fiber connectivity and enhance or expand ITS and signal infrastructure.

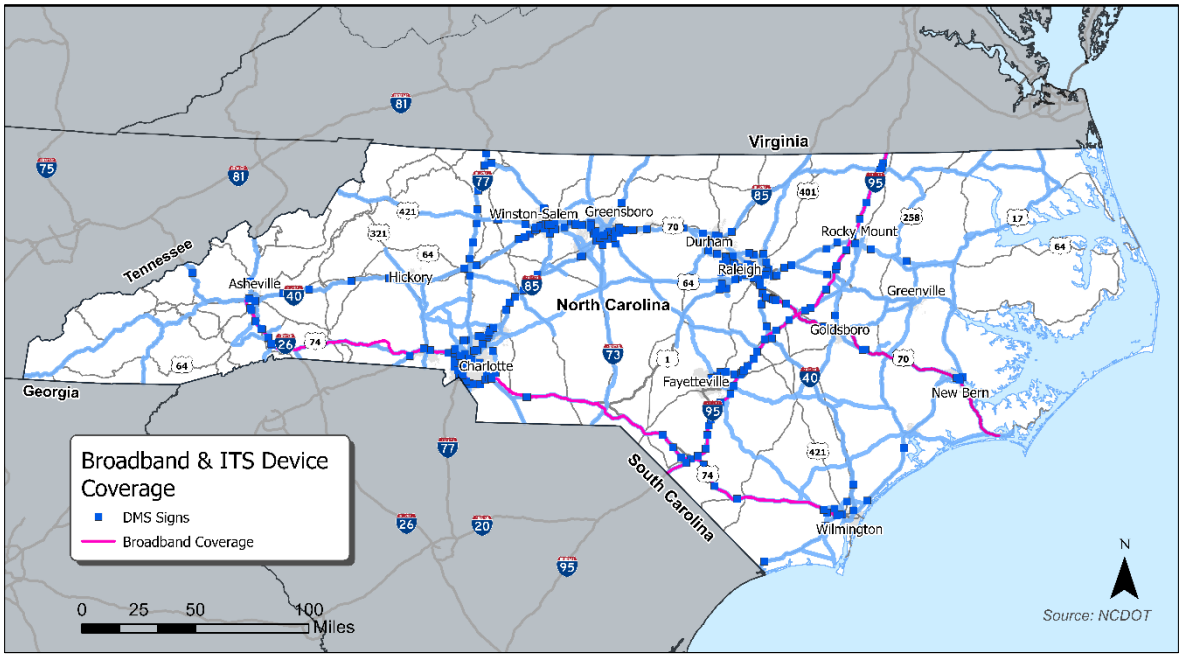
Broadband & ITS Coverage

Broadband infrastructure is a critical component in TSM&O and other operational strategies that move people and goods more efficiently on the NCDOT roadways. The DMS location map provides insight on the spatial patterns of sign locations. The fiber connectivity analysis identifies existing broadband infrastructure on the NCHFN to determine gaps and deficiencies in coverage that should be addressed in future projects to ensure statewide connectivity.

Dig Once Policy, which encourages internet service providers to cooperatively locate broadband infrastructure within NCDOT ROW.

This technology has mainly been implemented along Interstates, with a significant concentration in urban areas.

DMS SIGN LOCATIONS AND BROADBAND COVERAGE

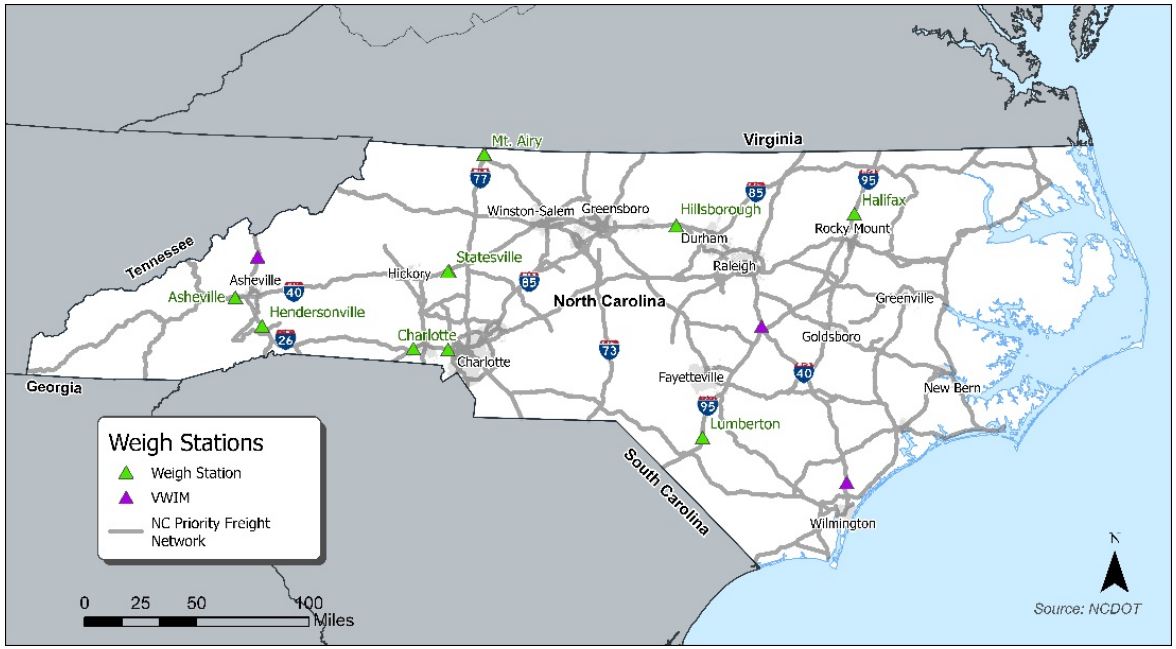


WIM Coverage

Weigh stations and weigh-in-motion (WIM) locations serve a critical role in the preservation of state infrastructure by enforcing size and weight limits of commercial vehicles. WIM sites are located throughout the state, providing continuous weight and classification data for major freight and heavy truck routes on the North Carolina Highway Network. WIM data can be utilized for a variety of uses including oversize/overweight enforcement, pavement design, safety analysis and freight planning.

Below are locations of existing weigh stations and WIM sites along with planned WIM sites identified in the NCDOT Weigh Station Feasibility Study conducted by the Transportation Mobility and Safety Division ITS and Signals Maintenance Unit.

WEIGH STATION AND WIM COVERAGE MAP



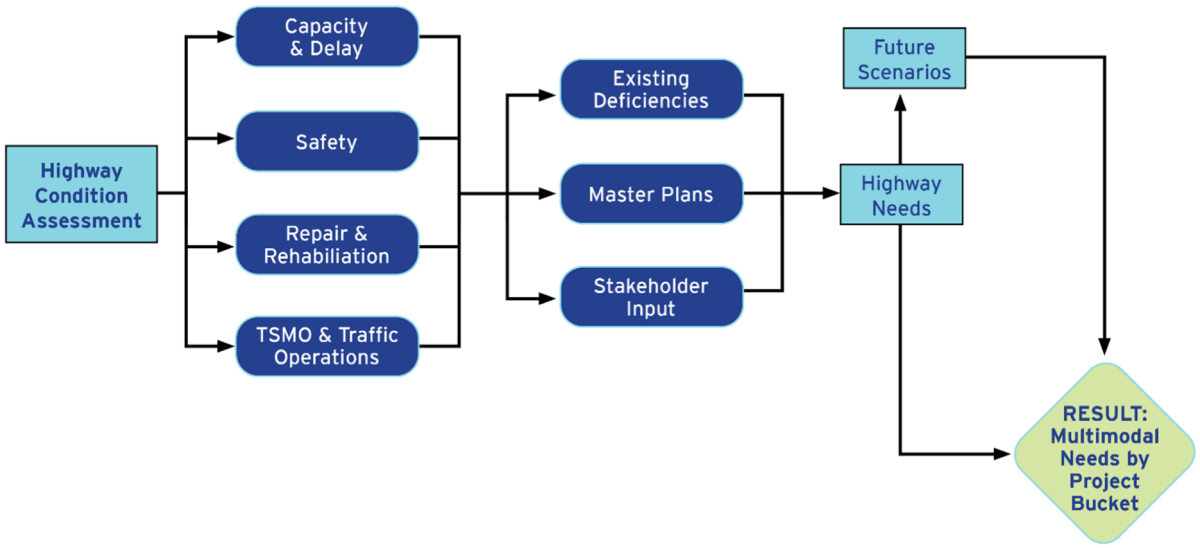
HIGHWAY FREIGHT NEEDS

Highway freight needs were identified using the analysis results from the highway freight network conditions assessment; existing policy and plans review; and the extensive stakeholder engagement and outreach efforts conducted during the development of this plan. Projects from the STIP 2020-2029 located on the highway freight network were reviewed and compared with the results of the condition assessment to identify areas that may have gaps between an identified need and a planned project that could address a specific deficiency. Detailed highway project lists and supporting information can be found in Chapter 7 Project Screening and Prioritization.

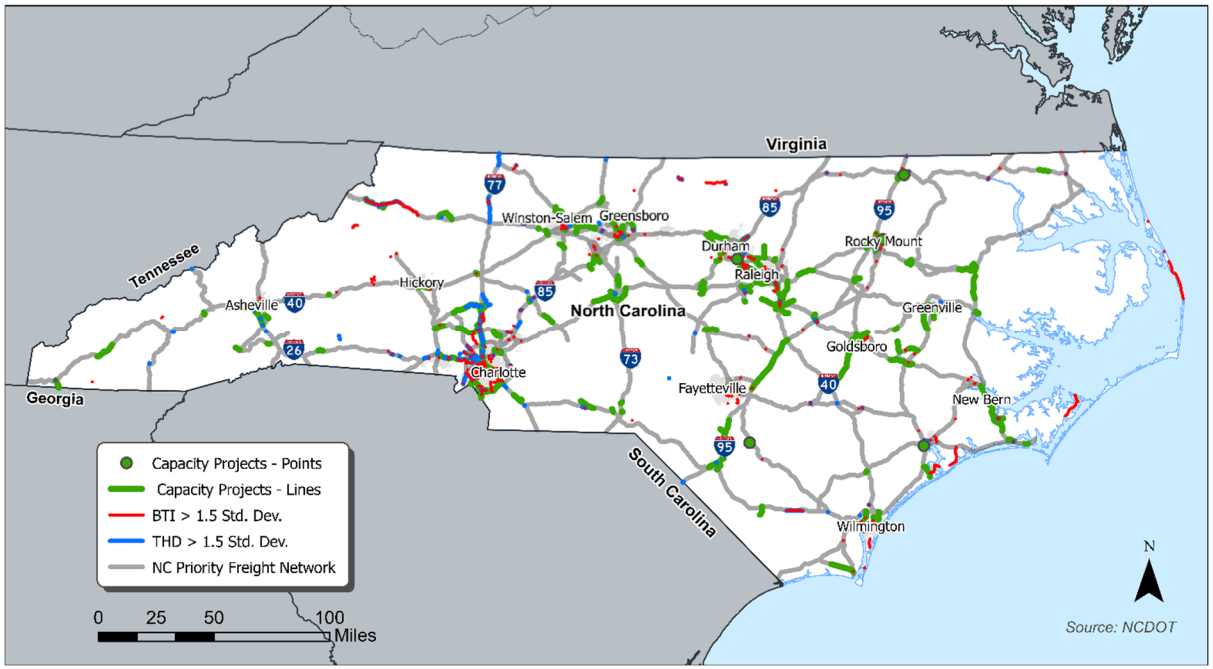
Capacity and Delay

An overview of STIP 2020-2029 Project locations and the associated Needs Assessment Gaps is shown in the figure. Roadway segments with greater than 1.5 Standard Deviations from the mean were determined for both the BTI and Truck Hours of Delay. Using standard deviations for these values highlights areas with the largest variations in congestion measures from the most common roadway conditions on the NCHFN. Future year capacity issues are consistent with existing congestion issues found through travel time analysis. BTI represents the Buffer Time Index score, and THD represents Truck Hours of Delay scores.

NORTH CAROLINA HIGHWAY CONDITION ASSESSMENT PROCESS



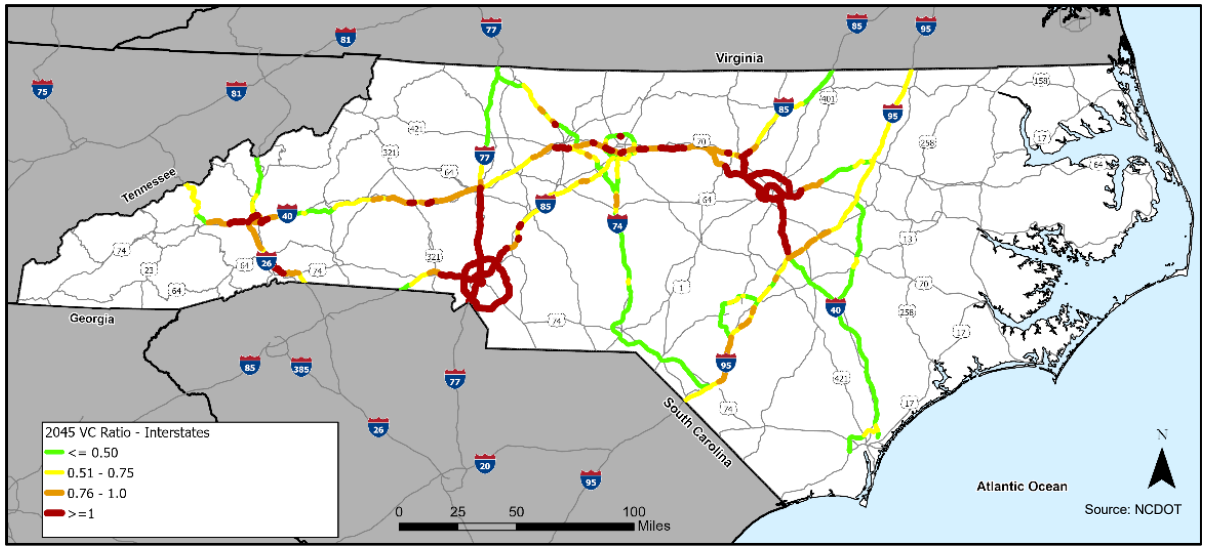
NORTH CAROLINA FREIGHT NETWORK PROJECT LOCATION AND NEEDS LOCATION TRAVEL TIME RELIABILITY 2021



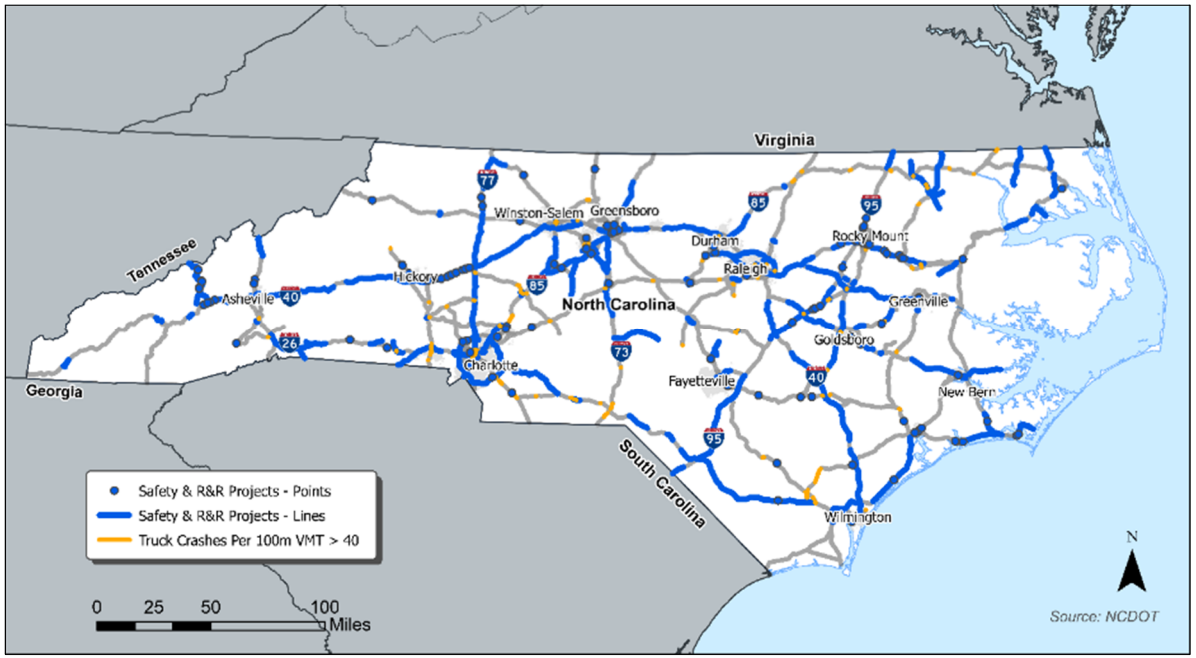
Safety

Safety on the NCHFN is addressed through a systemwide approach that includes repair & rehabilitation projects, inclusion of latest design standards into projects and projects that address identified safety needs. An overview of STIP 2020-2029 project locations and the associated needs assessment gaps is shown below. Truck crash rates per million VMT greater than 40 have been highlighted.

NORTH CAROLINA FREIGHT NETWORK PROJECT LOCATION AND NEEDS LOCATION V/C



NORTH CAROLINA FREIGHT NETWORK PROJECT LOCATION AND NEEDS LOCATION SAFETY

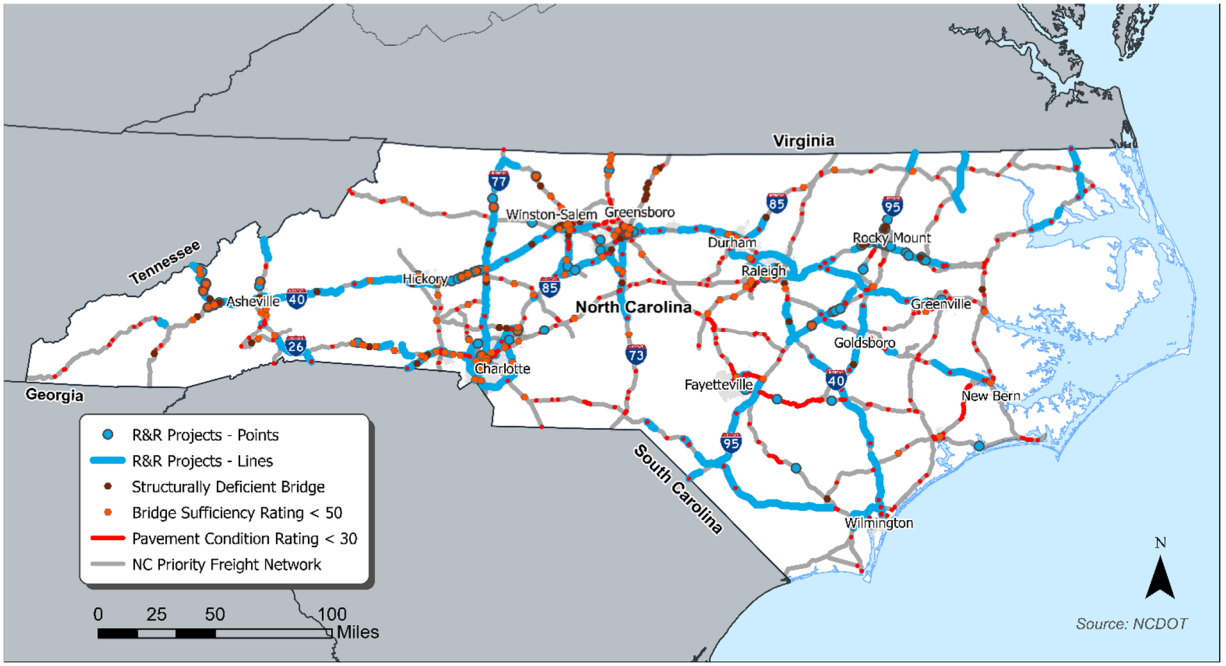


Repair & Rehabilitation 2015-2019

Bridge sufficiency ratings less than 50, structurally deficient bridges, posted weight limit bridges, and pavement conditions less than 30 have been mapped.

NCDOT also considers impacts of climate change and stormwater runoff. In 2020, NCDOT developed the North Carolina Climate Risk Assessment and Resilience Plan (2020 Resilience Plan). The State's freight assets are uniquely vulnerable to the scenarios predicted within the North Carolina Climate Science Report. As noted in the 2022 Resilience Strategy Report, the N.C. Department of Transportation has made tremendous progress, particularly in the adoption of its Resilience Policy (NCDOT Policy F.35.0102) in October 2021 codifying its intention to implement the strategies within the 2020 Resilience Strategy Report. The 2020 Resilience Plan identified "climate stressors of concern" to transportation systems including: temperature, tropical storms/hurricanes, extreme rainfall/precipitation, sea-level rise, and drought. Additional details on the scenarios most likely to impact the Strategic Freight Transportation Network and NCDOT's current activities to address these risks are available in the Impacts of Climate Change and Storm Water on Freight Planning white paper developed as part of the state freight plan update.

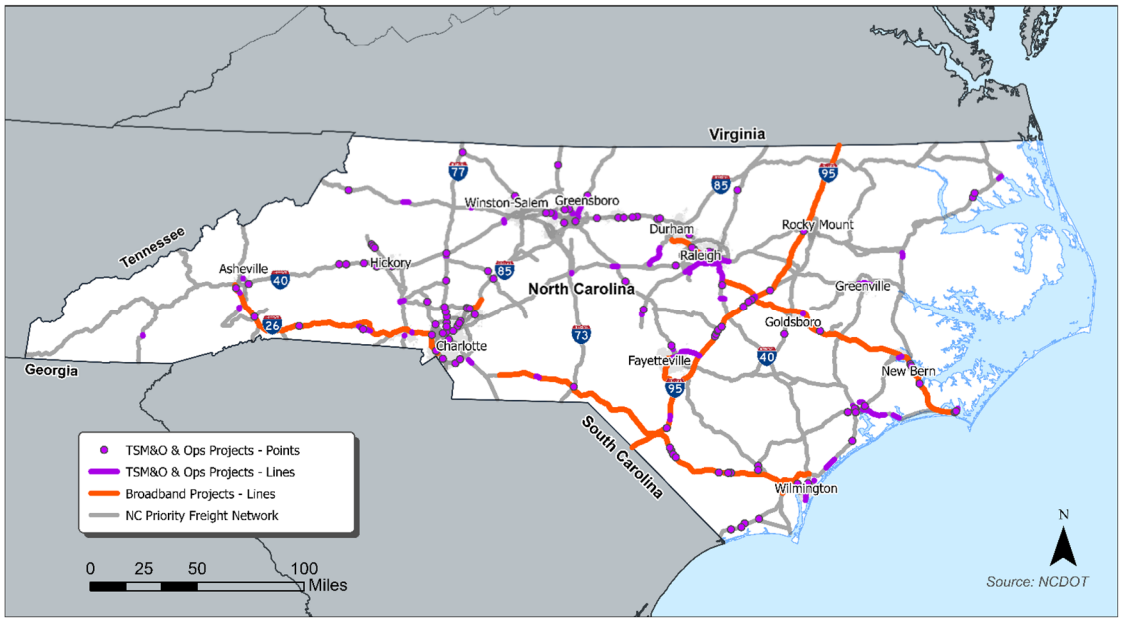
NORTH CAROLINA FREIGHT NETWORK PROJECT LOCATION AND NEEDS LOCATION REPAIR & REHABILITATION 2015-2019



TSM&O & Operations 2022

This plan recommends reviewing current broadband capabilities and DMS Signage on Interstates on the NCHFN. The interstate system provides the highest regional connectivity as well as serves the most truck miles traveled. Providing route options, travel times and other data on the Interstates will allow for improved operations during peak periods or incidents of non-recurring congestion.

NORTH CAROLINA FREIGHT NETWORK PROJECT LOCATION AND NEEDS LOCATION



Truck Parking

A truck parking study was conducted as part of this plan update. The purpose of this study is to conduct an analysis of the adequacy of truck parking facilities in the state of North Carolina and identify truck parking solutions that better serve freight transportation needs and provide a safer environment for the traveling public in and through North Carolina. This will be accomplished by utilizing the information provided in the 2017 and 2020 Truck Parking studies as a baseline. The study's key tasks include the following activities:

- Re-assess truck parking supply along the state's key freight routes;
- Assess demand for truck parking by reviewing truck growth along freight routes;
- Assess the best way to optimize public and private sector assets for truck parking;
- Identify public-private partnerships that may lead to increased truck parking; and
- Identify the costs and funding sources for increasing capacity of existing public truck parking facilities as well as converting existing rest areas, weigh stations and other assets to truck parking.

Truck parking strategies developed during the assessment include:

- Partner with truck travel centers seeking to expand facilities;
- Explore trial truck parking at selected weigh stations;
- Explore retrofitting selected abandoned rest areas;
- Explore using non-truck parking facilities for overnight truck parking;
- Conduct truck parking notification system pilot;
- Coordinate with Metropolitan Planning Organizations (MPO) and Rural Planning Organizations (RPO) on increasing awareness and acceptability; and.
- Convene a Standing Truck Parking Committee.

The following table is based on stakeholder feedback received during the development of this plan.

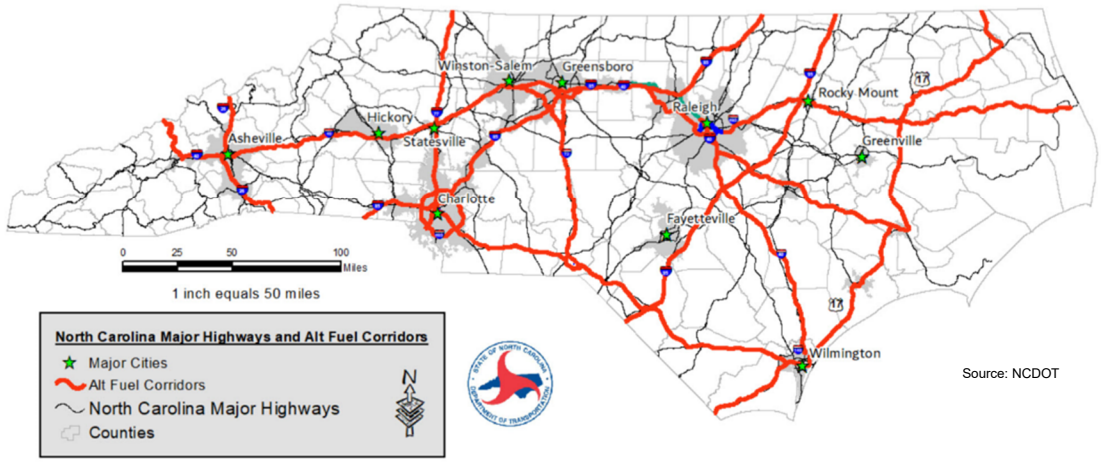
TRUCK PARKING NEEDS LOCATIONS

Project Name	County	Project Scope
I-95	Harnett, Cumberland, and Robeson	Additional Truck Parking
I-40; East of I-95	Johnston, Sampson, Duplin, Pender, New Hanover	
U.S. 401; North of Raleigh	Warren, Franklin, and Wake	
US 64 & US 17 Interchange; Williamston	Martin	
I-26; South of Asheville	Buncombe and Henderson	
I-85; West of Charlotte	Mecklenburg	
I-40; West of Asheville	Haywood and Buncombe	
Port of Wilmington; North and South Gate	New Hanover	
Alligator Tram Rd and Old Winberry Rd Intersection; near Port of Morehead City	Carteret	
NC 152; South of Salisbury (near Macy's fulfillment center, 1.2 million sq ft)	Rowan	
I-85 and U.S. 29; along Webb Rd (near 700k sq ft warehouse under construction)	Rowan	
I-85 and Long Ferry Rd Interchange (near Red Rocks development, 2.7 million sq ft)	Rowan	
U.S. 1; Southwest of Raleigh	Wake	
U.S. 421; near Greensboro Randolph Mega Site	Guilford	
I-85; near Walmart Distribution Center by Greensboro	Guilford	
I-40 and W Ten Rd; east of Greensboro	Guilford	
N.C. 87; along Ashley Loop	Rockingham	
I-95; near CCX facility north of Rocky Mount	Nash	

CAV and Alternative Fuels

Current use of alternative fuels in the freight industry are often limited to first-mile last-mile operations. Consistent with FHWA's criteria for Alternative Fuel Corridors as well as National Electrical Vehicle Infrastructure (NEVI) Program Guidance, co-location of freight alternative fuels infrastructure should be examined at locations where NEVI funding is being used. Initially, build out will occur along the State's alternative fuel corridors. NCDOT's NEVI plan is currently under development.

NORTH CAROLINA ALTERNATIVE FUELS CORRIDOR

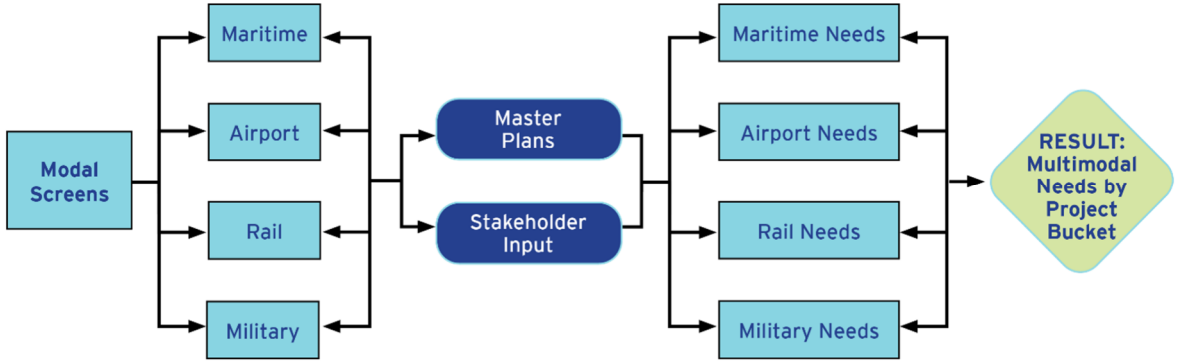


Source: NCDOT

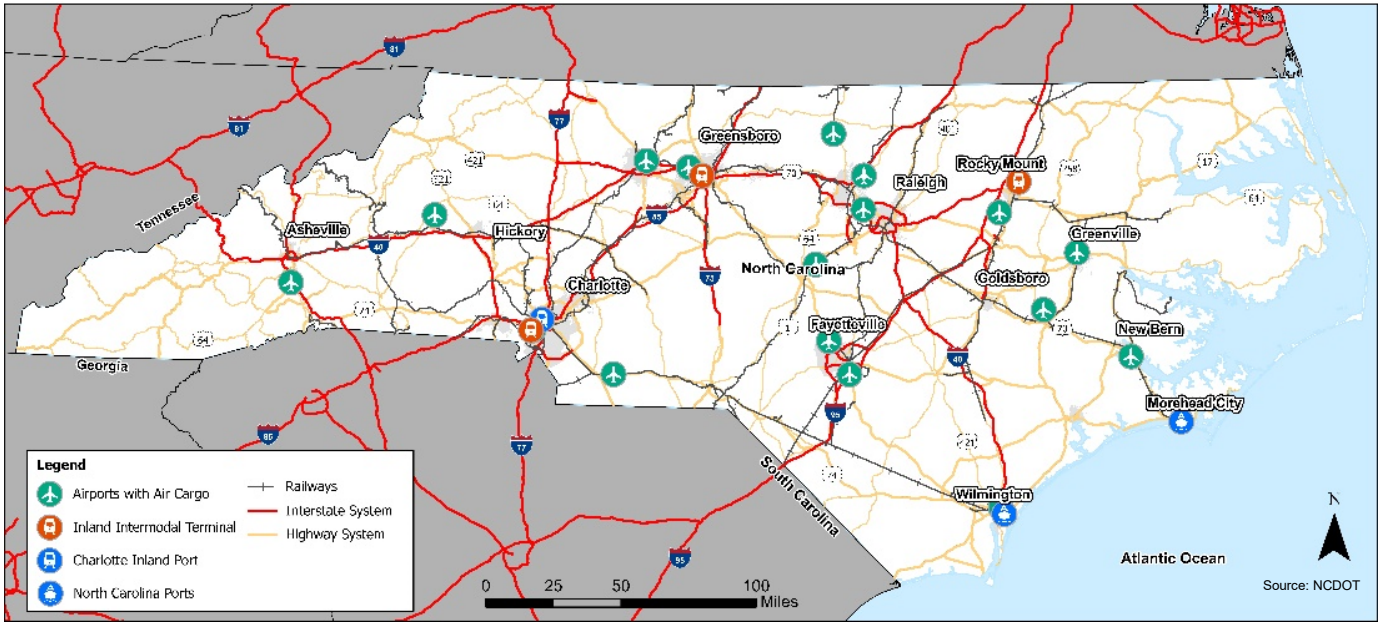
MULTIMODAL FREIGHT CONDITIONS ASSESSMENT

Additionally, a policy and plans review was conducted to provide a qualitative conditions assessment that focused on needs related to the North Carolina Multimodal Freight Network as well as future facing needs related to connected. The results and input provided during multimodal needs assessment efforts will be used to aid in the prioritization of freight projects during future STIP development activities.

MULTIMODAL CONDITIONS ASSESSMENT PROCESS



NORTH CAROLINA MULTIMODAL FREIGHT FACILITIES



RAIL CONDITIONS ANALYSIS

Plans Review

The 2021 Draft North Carolina State Rail Plan was reviewed during the development of the 2022 Rail Profile to get a better understanding of the current state of the State's rail system and identify existing deficiencies and project opportunities that can improve the efficiency of the system. Rail needs are included in Chapter 7.0 of this document.

Stakeholder Input

The Draft State Rail Plan was developed through the input and discussion of freight rail stakeholders. The main identified deficiency is congestion. Most of the rail lines are shared between freight and passenger services. There is a growing demand for passenger, intercity and commuter rail combined with capacity limits along the existing freight rail line that is causing congestion to grow. As noted in the Rail Profile, most of the Amtrak Passenger Rail delays are due to Freight Train Interference (FTI) lasting more than 360 minutes between the three main Class I Railroad lines. Additionally, there are infrastructure limitations such as narrow tunnels, utility lines and deficient bridges that restrict the ability to withstand oversized loads or to double stack containers. Overall, there is also a limited connectivity between modes, especially between rail and port, as well as last mile connections between the Class I railroads and short line railroads.

Through stakeholder input, project opportunities were identified in the Rail Needs table. Many of the projects include connector tracks that expand access to short line rail lines and ports, as well as redundant lines that can help relieve the congestion of the Class I rail lines. Other projects include upgrading track components and infrastructure that improves time efficiency and safety for rail. Project opportunities are summarized below:

RAIL NEEDS

Project Name	County	Project Scope
Forest City to Hamlet		Connector track between CSX SG-Line and SF-Line
Statewide		Passing siding and transloading track to expand capacity at short line facilities
South of Rockingham (South Carolina State Line) to North of Henderson (Virginia State Line)		S-Line and SA-Line Acquisition (Redundant rail corridor)

AIRPORT CONDITION ANALYSIS

Plans Review

The 2022 Air Cargo Profile and the 2015 North Carolina Airport System Plan Update were reviewed to get a better understanding of the current state of the State's airport system, identify existing deficiencies and project opportunities that can improve the efficiency of the system. Airport needs are included in Chapter 7.0 of this document.

Stakeholder Input

Airport authorities were interviewed for the development of the Air Cargo Profile including the Burlington-Alamance Airport Authority, Charlotte-Douglas International Airport, Piedmont Triad International Airport Authority, Raleigh-Durham International Airport and the NCDOT Aviation Division.

Through the interviews, it was discussed trucks have become a viable option for express delivery with the rise in demand from e-commerce. Expanding air cargo access can improve mobility and help maintain cargo as a competitive mode. Facility infrastructure and industrial development is other areas that can benefit from financial investment. The airport authorities have considered or have already developed expansion plans where the construction of storage facilities is being built on-site for tenants and customers to lease. Developing an industrial area around the airports can also help increase the value of air cargo services.

Project opportunities were also identified in these interviews. Most of the projects include creating better access to the airport facilities and upgrading and expanding the infrastructure to provide a more efficient service. Project opportunities are summarized below:

AIRPORT NEEDS

Project Name	County	Project Scope
Tucker St; East of Burlington-Alamance Airport	Alamance	Create access from Tucker St into facility
Hwy 49; East of Burlington-Alamance Airport	Alamance	Improvements
Hwy 62; West of Burlington-Alamance Airport	Alamance	Expansion
Burlington-Alamance Airport; On-campus	Alamance	Build storage sites for businesses
I-69; Piedmont Triad International Airport	Guilford	Proposed Interstate
Piedmont Triad International Airport; On-campus	Guilford	Proposed multimodal yard
Piedmont Triad International Airport; On-campus	Guilford	Proposed rail spur on the west side of the facility

PORTS CONDITION ANALYSIS

Plans Review

The 2022 Maritime Ports Profile was reviewed to get a better understanding of the current state of the State's Port system and identify existing deficiencies and project opportunities that can improve the efficiency of the system. Port needs are included in Chapter 7.0 of this document.

Stakeholder Input

The North Carolina State Ports Authority's Planning Director was interviewed for the development of the Ports Profile to learn more about the existing deficiencies and what projected projects in their 5-Year Capital Projects List were of most importance. Some of the identified deficiencies mostly involve congestion from the railroads and infrastructure and facility amenity limitations.

The Port of Morehead City experiences a bottleneck into the port's entrance for passenger vehicles. Due to the slow train speeds and the blocking of at-grade crossings, the highway corridor leading into the ports becomes congested. The Port of Wilmington experiences truck congestion on the access roads as they wait for trains to move from the at-grade crossings due to switching activities near the south entrance of the port.

The top priority projects for the North Caroline Ports Authority are summarized below:

PORT NEEDS

Project Name	County	Project Scope
Port of Wilmington; North Gate & Inland Road Improvements	New Hanover	New North gate; improvements to U-5734, U-5729, U.S. 74 & U.S. 70 to highway standards
Port of Wilmington; Channel Deepening	New Hanover	Deepening from 42 to 47 ft
Port of Morehead City; Expansion Capital	Carteret	New warehouse north of A-Frame building
Port of Morehead City; Expansion Capital	Carteret	Radio Island development and rail improvements
Port of Wilmington; Intermodal Rail Facility	New Hanover	Add dedicated intermodal rail facility at Port of Wilmington

PROJECT SCREENING AND PRIORITIZATION

Project Screening

The first step in the project screening and prioritization process involved a review of existing NCDOT STIP 2020-2029 highway and modal projects and scopes to further classify potential freight projects on the North Carolina Multimodal Freight Network for inclusion the Freight Plan. Projects were classified into six categories that include capacity to aid NCDOT in more easily identifying funding opportunities, implementation offices and partners, and schedules during the implementation of this Plan. The results of the quantitative analysis will serve as prioritization criteria in the reports following section.

NORTH CAROLINA STIP SCREENING AND CATEGORIZATION PROCESS

Project Categories

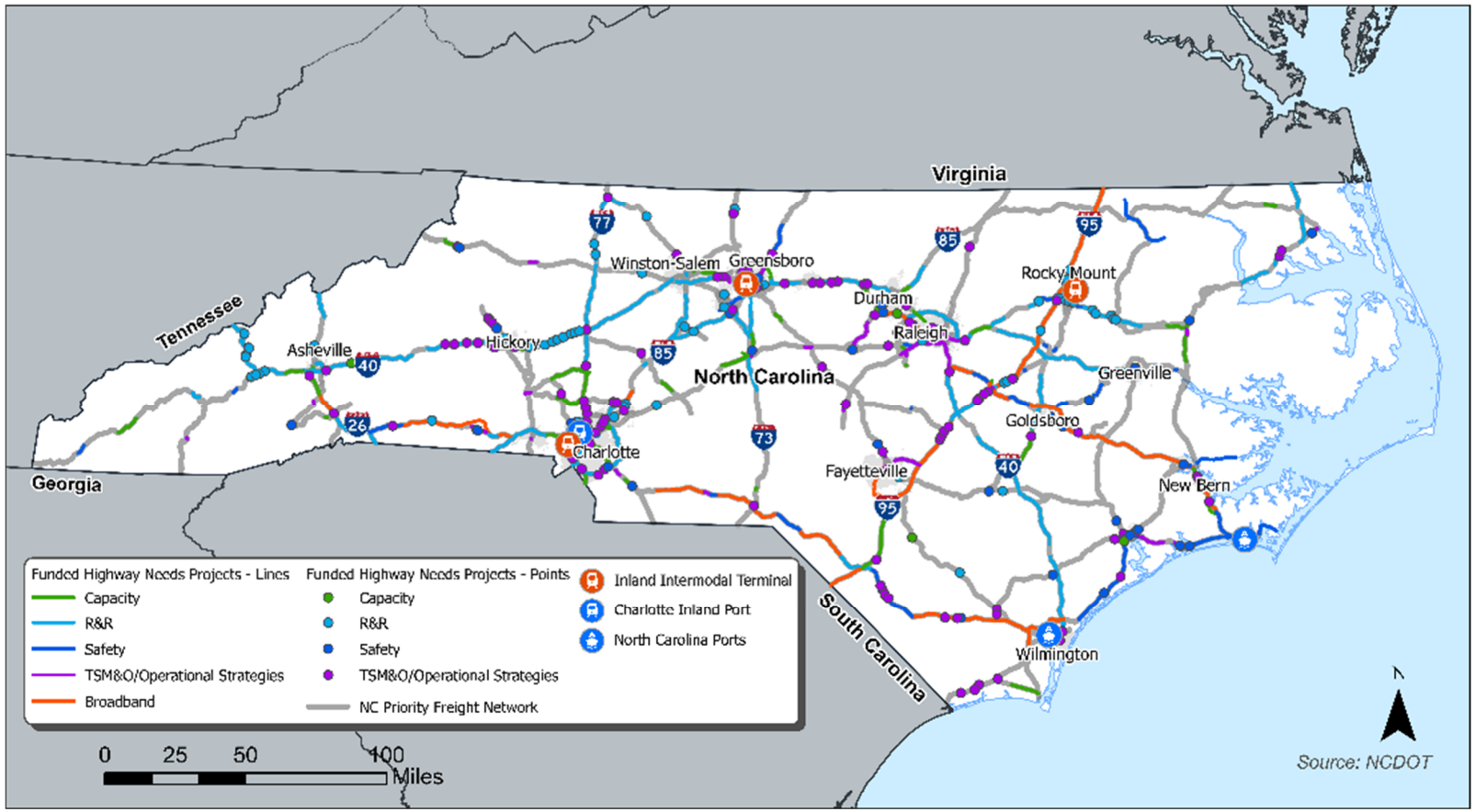
The STIP 2020-2029 Projects have been classified into five categories to aid NCDOT in more easily identifying funding opportunities, implementation offices and partners, and schedules during the implementation of this Plan.

- **Capacity:** Projects that require additional capacity (add lanes, new berth, cargo facility expansion, etc.)
- **Repair and Rehabilitation:** Projects requiring repair and rehabilitation of existing facilities (resurfacing, berth rehab, runway rehab, rail crossing improvements, etc.)
- **Transportation Systems Management and Operations (TSM&O)/Operational Strategies:** Projects to improve freight operations on the multimodal freight network that do not require major construction activities (traffic signal timing, dynamic messaging signs, turn lanes, intersection improvements, gate management systems, rail crossing signs, advanced notification systems, etc.)
- **Safety:** Projects to improve safety on the multimodal freight network for both freight carriers and the traveling public that address specific crash types (road departure, intersections, curvature/geometry, etc.)
- **Connected and Autonomous Vehicles / Alternative Fuels:** Projects focused on the development and adoption of connected/autonomous vehicle technology and alternative fuel regarding the freight industry (V2X infrastructure, enhanced striping and signage, alternative fuel accessibility, etc.)

NCDOT Freight Network Projects

The Freight Network Projects are categorized by project category. Additional information on NC Freight network projects' cost and scope can be located in the appendices of this document.

NORTH CAROLINA HIGHWAY FREIGHT NETWORK FUNDED PROJECTS



Existing Freight Prioritization Factors

Prioritization Freight Factors

The NCDOT Prioritization Factors are quantitative in nature. The current factors focus on identifying corridors with high freight related uses. An additional criterion is the future interstate completion factor which support the completion of interstate corridors between National Highway System Routes.

Truck Volume

Truck volume data is derived by multiplying the corridors truck percentage by the AADT. The raw measures data is then scaled.

$$Truck\ Volume\ Measure \times 0.50$$

Truck Percentage

Truck percentage data is derived from traffic surveys. The raw measures data is then scaled.

$$Truck\ Percentage \times 0.50$$

Future Interstate Completion Factor

$$\frac{Project\ Length}{Miles\ of\ Route\ between\ NHS\ Routes} \times 100$$

Complete Criteria

$$(Truck\ Volume\ Measure \times 0.50) + (Truck\ Percentage \times 0.50) + Future\ Interstate\ Completion\ Factor$$

Federal Freight Factors

The overarching goals for federal freight programs are outlined in the National Highway Freight Program and include:

- Investing in infrastructure and operational improvements that strengthen economic competitiveness, reduce congestion, reduce the cost of freight transportation, improve reliability and increase productivity;
- Improving the safety, security, efficiency and resiliency of freight transportation in rural and urban areas;
- Improving the state of good repair of the NHFN;
- Using innovation and advanced technology to improve NHFN safety, efficiency and reliability;
- Improving the efficiency and productivity of the NHFN;
- Improving state flexibility to support multi-state corridor planning and address highway freight connectivity; and
- Reducing the environmental impacts of freight movement on the NHFN.

Prioritization factors have been developed under individual competitive grant programs. A large majority of the competitive grant programs' applications require a benefit-cost analysis (BCA) or other quantitative measures that address project impacts. Therefore, as NCDOT undertakes freight prioritization, the focus should be on developing quantitative prioritization measures that can support future competitive grant applications.

Proposed Freight Prioritization Factors

Factors are intended to address multiple planning needs. These include:

- Quantifiable-Factors are generally quantitative and allow for uniform project comparison across project types. Factors are consistent with quantitative needs screening criteria developed in previous plan sections.
- Measurable-Factors are based upon publicly/NCDOT developed data and are based upon accepted methodologies. Additionally, project impacts can be measured over time and support system performance measurement.
- Aligned with national and state goals-factors are consistent with overarching goals for both FHWA and NCDOT freight programs and other plans such as the National Electric Vehicle Infrastructure (NEVI) Alternative Fuel Corridors (AFC) which identify electric vehicle charging station corridors.
- Support BCA-Factors can be used in the development of future BCAs to support competitive grant applications.

Congestion

Truck Travel Time Delay

Prioritization of corridors, interchanges, and intersections with excessive freight delay provides a uniform methodology to identify locations with the greatest opportunity to reduce delay. Additionally, reduction in delay supports multiple plan goals including increasing travel time reliability, reduction in emissions and economic competitiveness.

Future Volume/Capacity

Based on the expected conditions in 2045, V/C ratios provide insight into future capacity failures. Prioritizing based on roadway segments with the highest congestion provides the greatest opportunity to reduce delay. Reduction in delay supports multiple plan goals including increasing travel time reliability, reduction in emissions and economic competitiveness.

Stakeholder Identified Issues

Input from stakeholders on issues along the North Carolina Highway Freight Network (NCHFN) help to verify problem locations identified through quantitative analysis. Additionally, stakeholder input is important for future narrative development on project needs and impacts.

Safety

Segment Truck Crash Rate

Segment crash rates help to identify corridors with a greater than expected number of accidents in comparison to other segments of the NCFN. These locations provide the opportunity to identify correctable crashes that may be addressed during a projects design. A freight network with reduced incidents of non-reoccurring congestion support goals of safety, travel time reliability and emissions reductions.

Replacement & Rehabilitation

Bridge Condition-Structurally Obsolete

Addressing bridges along the NCFN that are structurally obsolete will reduce the potential for bridge closures and freight related detours. A freight network with structurally sound bridge sub- and superstructure ensures route options for drives, supports network resiliency in case of closures along other segments of the NCFN and enhances economic competitiveness.

Posted Bridges

Addressing bridges along the NCFN that have posted weight limits will reduce the potential for freight related detours. A freight network that can accommodate all truck classes ensures route options for drives, supports network resiliency in case of closures along other segments of the NCFN and enhances economic competitiveness.

Pavement Condition Rating

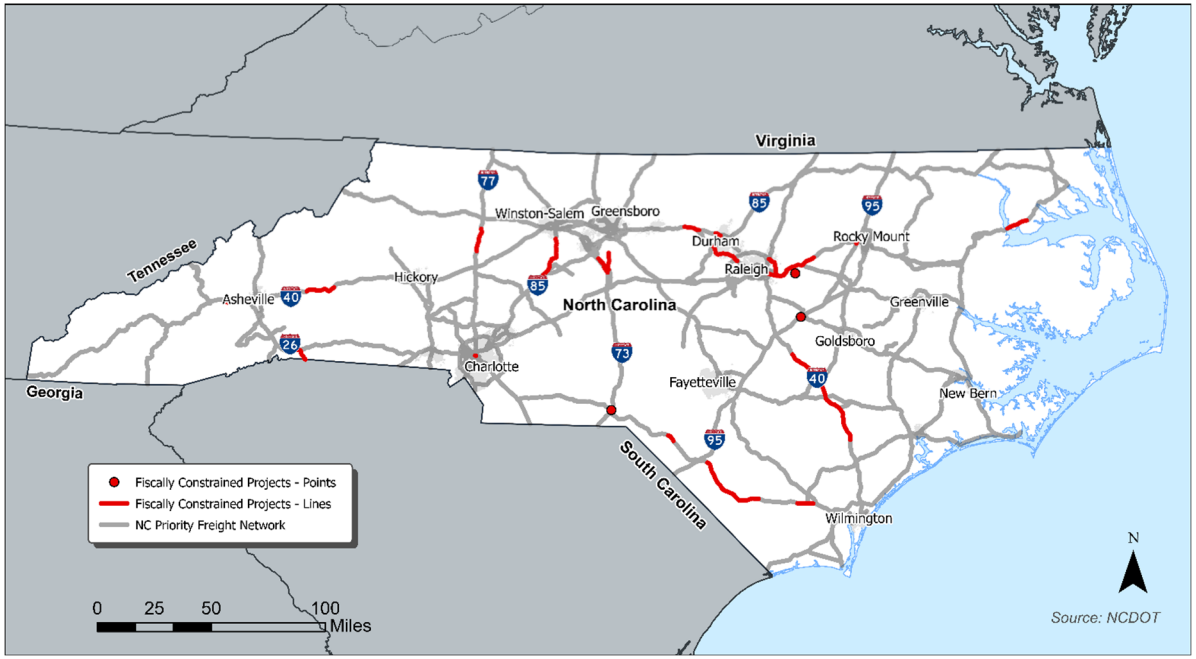
Substandard pavement condition creates safety issues, increases vehicle maintenance cost, and increase emissions. Keeping the pavement within an acceptable condition on the NCFN addresses the three issues previously identified and helps contribute to the State's overall economic competitiveness.

Funded and Unfunded Freight Projects

National Highway Freight Program Funded Projects

NCDOT has previously identified projects receiving NHFP funding. These projects will continue under this plan. A project table has been provided as well.

NATIONAL HIGHWAY FREIGHT PROGRAM FUNDED PROJECTS 2023-2028



NATIONAL HIGHWAY FREIGHT PROGRAM FUNDED PROJECTS IN MILLIONS OF DOLLARS

Project Name	TIP / Project Number	County	Programmed Project Cost ($M)	Total Federal Share ** ($M)	NHFP ($M)	Match ($M)	Source of Match
2023			**$60.11**	**$48.08**	**$36.16**	**$5.47**	
Asset Management and Utilization			**$60.11**	**$48.08**	**$36.16**	**$5.47**	
US 64: SR 1306 (South Old Franklin Road) to SR 1603 (Old Carriage Road). Pavement Rehabilitation.	I-6045	Nash	$19.30	$15.44	$12.66	$3.86	State Highway Trust Fund
US 74 (Future I-74): East of NC 41 to the Columbus County Line. Pavement Rehabilitation.	HI-0016	Robeson	$9.20	$7.36	$6.25	$1.84	State Highway Trust Fund
US 74 (Future I-74): Scotland County Line to I-74/US 74 Business. Pavement Rehabilitation.	HI-0017	Robeson	$3.00	$2.40	$2.00	$0.60	State Highway Trust Fund
I-26: Mile Marker 65 to South Carolina State Line. Pavement Rehabilitation.	I-5927	Polk	$20.60	$16.48	$13.85	$4.12	State Highway Trust Fund
I-277: West of I-77 to East of I-77. Bridge Rehabilitation.	I-6052	Mecklenburg	$8.01	$6.40	$1.40	$1.61	State Highway Trust Fund
2024			**$29.96**	**$23.96**	**$36.88**	**$6.00**	
Asset Management and Utilization			**$29.96**	**$23.96**	**$36.88**	**$6.00**	
I-40: East of SR 1224 (Monte Vista Road) to pavement joint West of SR 3412 (Sand Hill Road). Reconstruct pavement.	I-2513AA	Buncombe	$31.70	$25.36	$19.88	$6.34	State Highway Trust Fund
US 74 (Future I-74): East of NC 214 to the West of SR 1824 (Water Tank Road). Pavement Rehabilitation.	HI-0015	Columbus	$7.70	$6.16	$4.00	$1.54	State Highway Trust Fund

I-95: SR 1770 (Sunset Avenue) to SR 1544 (North Halifax Road). Pavement and Bridge Rehabilitation.	I-5934	Nash	$5.46	$4.36	$3.50	$1.10	State Highway Trust Fund
I-85: Orange County Line to US 15/ US 501 In Durham. Pavement Rehabilitation.	I-5941	Durham	$16.80	$13.44	$9.50	$3.36	State Highway Trust Fund

Project Name	TIP / Project Number	County	Programmed Project Cost ($M)	Total Federal Share ** ($M)	NHFP ($M)	Match ($M)	Source of Match
2025			**$128.87**	**$103.07**	**$37.62**	**$25.80**	
Asset Management and Utilization			**$128.87**	**$103.07**	**$37.62**	**$25.80**	
I-285 / US 52 / NC 8: I-85 to Forsyth County Line. Pavement Rehabilitation.	HI-0005	Davidson	$30.15	$24.11	$9.52	$6.04	State Highway Trust Fund
I-40: Mile Marker 73 to Mile Marker 86. Pavement Rehabilitation.	I-5900	McDowell	$25.11	$20.08	$8.60	$5.03	State Highway Trust Fund
I-40: East of NC 147 to SR 3015 (Airport Boulevard). Pavement Rehabilitation.	I-5995	Wake, Durham	$32.41	$25.92	$9.50	$6.49	State Highway Trust Fund
I-87 / Future I-87 / US 64 / US 264: SR 1003 (Rolesville Road) to Nash County Line. Pavement Rehabilitation.	I-6001	Franklin, Wake	$41.20	$32.96	$10.00	$8.24	State Highway Trust Fund
2026			**$75.79**	**$60.62**	**$38.37**	**$15.17**	
Asset Management and Utilization			**$75.79**	**$60.62**	**$38.37**	**$15.17**	
I-77: Mile Marker 58.4 to Yadkin County Line. Pavement Rehabilitation.	I-5920	Iredell	$19.29	$15.42	$12.37	$3.87	State Highway Trust Fund
I-87 / US 64 / US 264: I-440 in Raleigh to SR 1003 (Rolesville Road). Pavement Rehabilitation.	I-5944	Wake	$28.60	$22.88	$13.00	$5.72	State Highway Trust Fund
I-540: Triangle Town Center Boulevard in Raleigh to I-87/US 64/US 264 in Knightdale. Pavement Rehabilitation.	I-5945	Wake	$27.90	$22.32	$13.00	$5.58	State Highway Trust Fund

NATIONAL HIGHWAY FREIGHT PROGRAM FUNDED PROJECTS IN MILLIONS OF DOLLARS

Project Name	TIP / Project Number	County	Programmed Project Cost ($M)	Total Federal Share ** ($M)	NHFP ($M)	Match ($M)	Source of Match
2027			**$54.70**	**$43.76**	**$39.14**	**$10.94**	
Asset Management and Utilization			**$54.70**	**$43.76**	**$39.14**	**$10.94**	
I-40: SR 1001 (Sugar Hill Road) to NC 226. Pavement Rehabilitation.	HI-0009	McDowell	$14.90	$11.92	$9.89	$2.98	State Highway Trust Fund
US 74 (Future I-74): West of SR 1585 (Union Valley Road) to West of US 701 Business. Pavement Rehabilitation.	HI-0019	Columbus	$5.40	$4.32	$4.00	$1.08	State Highway Trust Fund
US 74 (Future I-74): Robeson County Line to West of SR 1585 (Union Valley Road). Pavement Rehabilitation.	HI-0020	Columbus	$15.00	$12.00	$11.50	$3.00	State Highway Trust Fund
I-40: Mile Marker 34 to Buncombe County Line. Pavement Rehabilitation.	I-5928	Haywood	$9.75	$7.80	$6.75	$1.95	State Highway Trust Fund
I-40/ I-85: West of SR 1114 (Buckhorn Road) to West of SR 1006 (Orange Grove Road). Pavement Rehabilitation.	I-5958	Orange	$9.65	$7.72	$7.00	$1.93	State Highway Trust Fund
2028			**$78.01**	**$62.40**	**$39.92**	**$15.61**	
Asset Management and Utilization			**$78.01**	**$62.40**	**$39.92**	**$15.61**	
I-73 / US 220: SR 1009 (Old US Highway 311) to Guilford County Line. Pavement Rehabilitation.	HI-0003	Randolph	$8.12	$6.49	$4.00	$1.63	State Highway Trust Fund
I-74: SR 1928 (Cedar Square Road) to I-73/ US 220. Pavement Rehabilitation.	HI-0004	Randolph	$8.14	$6.51	$4.00	$1.63	State Highway Trust Fund
I-40: Johnston County Line to the Duplin County Line. Pavement Rehabilitation.	HI-0011	Sampson	$22.40	$17.92	$10.00	$4.48	State Highway Trust Fund
I-40: Sampson County Line to the Pender County Line. Pavement Rehabilitation.	HI-0012	Duplin	$31.10	$24.88	$17.92	$6.22	State Highway Trust Fund
US 17 (Future I-87): Bertie County Line to Perquimans County Line. Pavement Rehabilitation.	I-6027	Chowan	$8.25	$6.60	$4.00	$1.65	State Highway Trust Fund

Highway

Project Name	County	Project Scope
I-87/ U.S. 17	Perquimans	Convert at-grade intersection to an interchange
U.S. 74, U.S. 76	Columbus	Upgrade at-grade intersection to interchange
U.S. 74	Columbus	Convert at grade intersection to grade separation
Kivett Drive	Guilford	Convert a grade separation of Kivett Drive and I-85 to an interchange
I-85 Business, U.S. 29, U.S. 70	Davidson	Re-construct interchange at intersection of I-85 Business/U.S. 29/70 & U.S. 64 East of Lexington
N.C. 55 Bypass	Wake	Upgrade existing at grade intersection to interchange
N.C. 55 Bypass (Main Street)	Wake	Upgrade existing at grade intersection to interchange
U.S. 220	Rockingham	Reconfigure interchange
U.S. 17 (Shallotte Bypass)	Brunswick	Upgrade existing at grade intersection to interchange
U.S. 117	Duplin	Upgrade at-grade intersection to interchange
N.C. 54 (Raleigh Road)	Orange	Improve interchange
U.S. 15, U.S. 501	Orange	Intersection improvement for a standalone superstreet intersection concept, improve interchange
N.C. 24 (Kenansville Bypass)	Duplin	Improve intersection
U.S. 421 (Former I-40 Business)	Forsyth	Upgrade interchange to improve safety and capacity
I-77	Mecklenburg	Convert existing diamond interchange with two loops to a diverging diamond
U.S. 1	Wake	Improve interchange to 6 lane DDI
U.S. 220	Rockingham	N.C. 770 Bridge over U.S. 220 needs to be widened and ramps upgraded to Interstate standards
I-42, U.S. 70	Craven	Improve interchange
SR 1437 (Old Fayetteville Road	Brunswick	Convert grade-separation to an interchange
U.S. 158 Bypass	Warren	Add northeast bound left turn lane
U.S. 421	Chatham	Construct interchange at U.S. 421 and N.C. 902
I-95	Johnston	Improve interchange to current standards allowing for future widening of I-95
I-40	Forsyth	Add Lanes to I-40 WB exit loop, modify traffic signal at intersection of U.S. 158. Extend deceleration lane on I-40 WB
U.S. 1	Lee	Construct single roundabout at intersection of U.S. 421 on/off ramps for southbound direction and N.C. 42 (western intersection)
I-40	Buncombe	Upgrade interchange
U.S. 321 Business (North Carolina Ave/Main Street)	Catawba	Realign offset intersections connecting U.S. 321 (BUS) North Carolina Avenue) to S.R. 2003 (S. Main Ave)
I-85	Mecklenburg	Conversion of existing interchange to diverging diamond interchange, includes improvements at the Hoskins Road intersection
U.S. 258 (Richlands Hwy), N.C. 24	Onslow	Add right turn lane on northbound U.S. 258 and right turn lane on S.R. 1329
I-85	Mecklenburg	Construct two additional constrained loops within the interchange

Project Name	County	Project Scope
I-440	Wake	Upgrade existing interchange to folded interchange concept on the existing structure
U.S. 258 (Mutual Boulevard)	Edgecombe	Construct U.S. 64 Westbound off-ramp and upgrade interchange to interstate standards for future I-87
U.S. 74	Mecklenburg	Construct Express Lanes Ramp Connectors through the U.S. 74/I-485 interchange in Matthews.
I-485	Mecklenburg	Convert the existing diamond interchange at I-485/Rocky River Road to a DDI interchange design
I-485, N.C. 51 (Pineville-Matthews Road)	Mecklenburg	This project is intended to make improvements to the I-485/N.C. 51 interchange and make operational improvements along N.C. 51 between Park Road and Polk Street in Pineville
I-485	Mecklenburg	This project is intended to improve the interchange at I-485/N.C. 49 in southwest Charlotte. Additional improvements will be needed along N.C. 49 between Arrowood Road and Westinghouse Boulevard to reduce congestion and improve traffic operations.
I-277	Mecklenburg	Upgrade numerous interchanges and ramps along the I-277 Loop in Uptown Charlotte to improve safety mobility and capacity
I-40	Buncombe	Upgrade interchange improve EB off-ramp connection to S.R. 2838 (Porters Cove Road)
Apex Citywide Signal System	Wake	Upgrade existing infrastructure and install new fiber controllers signals and other equipment as necessary
N.C. 24 (Southwest Boulevard), N.C. 24 (MLK Jr Boulevard0	Sampson	Construct roundabout or other improvement at the intersection of N.C. 24 and Butler Rd/Tram Rd
I-540	Wake	Improve interchange through ramp improvements and improvements along Buffaloe Rd to reduce delay at interchange
N.C. 55	Durham	Add third SB lane on N.C. 55 from Meridian to I-40 EB on-ramp and improve ramp terminals. Also Add bike/ped facilities
I-40/ I-85	Alamance	Upgrade interchange and capture some developments that are going on north and south of the interstate
I-74/U.S. 74	Columbus	Upgrade the interchange on Future I-74/U.S. 74 at U.S. 76 from a trumpet to a collector/distributor and add ramps to S.R. 1005 (Peacock Rd)
U.S. 17 Business (MLK Jr Boulevard)	Craven	Upgrade intersection into the Chick-fil-a restaurant/Twin Rivers Mall entrance
I-240	Buncombe	Improve Interchange
U.S. 64	Randolph	Conversion of the intersection of E. Salisbury St. and U.S. 64 into a traditional 3-way signalized intersection
N.C. 87	Lee	Improve intersection to superstreet
U.S. 258, N.C. 24	Onslow	Install a traffic signal. Add a right turn lane from northbound U.S. 258/N.C. 24 to W. Franck Street).
U.S. 17	Onslow	Preferred improvement is a Reduced Conflict Intersection (RCI). Add additional left and right turning lanes to westbound N.C. 50. Extend right turn lane on northbound U.S. 17.
U.S. 64 (Mocksville Road)	Davidson	Upgrade intersection of ramps from U.S. 52 (I-285) at U.S. 64 with installation of RAB's at each ramp.
U.S. 17	Bertie	Construct interchange to allow mobility for future I-87
U.S. 70	Craven	Improve Hwy 70/Future I-42 interchange over U.S. 17 Business/Martin Luther King Jr. Blvd.
N.C. 16	Lincoln	Convert the at grade intersection of N.C. 16 and Saint James Church Rd to an interchange.

Project Name	County	Project Scope
N.C. 49	Stanly	Improve the intersection stem alignment to a more perpendicular setting and add a right turn lane with wider radius to accommodate larger vehicles. In addition, add a left turn lane from NC49 onto Wesley Chapel Road.
SR 1412 (New Road)	Pender	Convert Grade Separation of I-40 and SR 1412 (New Road) to an Interchange to relieve existing congestion of I-40 and N.C. 210 interchange.
I-40	Durham	Widen the I-40 eastbound exit ramp to provide an exclusive left turn lane onto Davis Drive and provide additional stacking capacity. Widen the I-40 eastbound entrance ramp to provide receiving lanes and construct additional northbound right turn lane on Davis Drive. Extend southbound left turn lane on Davis Drive for the eastbound I-40 entrance ramp.
I-85	Mecklenburg	Convert existing interchange to diverging diamond interchange
I-40	Catawba	Construct roundabouts at both ramp terminals.
SR 2114 (McCanless Road)	Rowan	Construct a grade separated interchange
I-40, I-85	Guilford	This project is to improve the interchange by constructing roundabout at the westbound I-40/85 off-ramp/on-ramp, implementing access management on Mt. Hope Church Road and also the realignment of Knox Road northwest of the interchange.
Greensboro Citywide Signal System	Guilford	Upgrade signal system to implement ATSPM (Automated Traffic Signal Performance Measures) using video-based detection and high-resolution data collection capabilities to improve efficiency and reduce congestion. Includes purchase installation and integration of new central signal system software as well as local field software installation video detection equipment and associated equipment upgrades. Approximately 525 intersections. GUAMPO has a detailed cost estimate of $12 million.
N.C. 24, N.C. 87	Harnett	Upgrade at-grade intersection to an interchange.
I-85	Davidson	Operational Improvements in and around the I-85 and N.C. 109 interchange.
US 70 (Wendover Avenue)	Guilford	Improve interchange to remove some free-flowing ramps to eliminate portions or all of the cloverleaf interchange that will provide a smaller footprint and provide improved bicycle and pedestrian accommodations.
US 52, N.C. 49	Stanly	Modernize Intersection
US 74	Anson	Define Movement at problem intersections. Movement in two ""inner city"" intersections should be evaluated as part of this study.
US 74	Anson	Enhance movement between vehicles and pedestrians.
US 52 (Future I-285)	Forsyth	Upgrade Akron Drive bridge over existing U.S. 52 (Future I-285) to accommodate a future 6 lane interstate facility. Tie into existing ramps with associated roadway and bridge improvements on Akron Drive between Sheraton Street & Ogburn Avenue. Remove driveway access off of SB U.S. 52 Ramp. Ramp construction on Akron Drive associated with new bridge upgrade will tie into existing acceleration/deceleration ramps currently in use.
South Main Street	Davidson	Improve the existing intersection with one that will better accommodate traffic.
I-42, 70 Bypass	Johnston	Construct full cloverleaf interchange at U.S. 70 BYP and I-95. Project will include relocating a section of I-95 along with other various improvements. See FS-1604A for details.
US 264 Alternate (Raleigh Rd Pkwy West)	Wilson	Upgrade intersection with roundabout.

Project Name	County	Project Scope
SR 2147 (Westmoreland Road) in Cornelius	Mecklenburg	Convert existing grade separation to SPUI interchange
US 521 (Johnston Road)	Mecklenburg	Construct grade separation on U.S. 521 at Ballantyne Commons Parkway and southbound auxiliary lane from I-485 Outer exit ramp to Ballantyne Commons Parkway
N.C. 16 (Brookshire Boulevard)	Mecklenburg	Intersection Improvements
I-485	Mecklenburg	Interchange improvements
I-40, I-540	Wake	Construct access road along I-40 westbound from east of I-540 ramp to Page Road as per NCDOT study recommendations.
US 1	Wake	Convert signalized intersection to interchange based on City of Raleigh corridor study conducted by WSP.
US 19, U.S. 129, U.S. 74	Graham, Cherokee	Modernize Roadway
I-26, U.S. 19, U.S. 23	Buncombe	Upgrade existing 4-lane section to Interstate Standards
I-26, U.S. 19, U.S. 23	Buncombe	Upgrade existing 4-lane section to Interstate Standards
US 74	Scotland, Robeson	Upgrade Freeway to Interstate Standards
I-26	Henderson	Add Additional Lanes.
I-74, U.S. 52	Surry, Stokes, Forsyth	N.C. 65 in Winston-Salem to I-74 in Surry County. Upgrade to interstate standards.
I-73, I-74, U.S. 220	Montgomery	Upgrade freeway to interstate standards
U.S. 64	Davidson	Widen to Multi-Lanes.
U.S. 1	Richmond	Widen to Multi-Lanes.
U.S. 13	Gates	Widen to Multi-Lanes.
U.S. 17	Craven	Widen to Multi-Lanes.
U.S. 17	Beaufort	Widen to Multi-Lanes. Project ends 0.4 miles South of S.R. 1127 to join up with existing 4-lane section.
N.C. 49	Stanly	Widen to Multi-Lanes to make facility continuous.
N.C. 49	Randolph	Widen to Multi-lanes.
I-42, U.S. 70	Lenoir, Jones	Upgrade Roadway to Freeway.
N.C. 87	Bladen	Widen to Multi-Lanes.
N.C. 87	Bladen, Columbus	Widen to 4 lanes from S.R. 1730 (Elwell Ferry Road) in Bladen County to R-2561CA at SR 1808 (Woodyard Road) in Columbus County.
N.C. 87	Columbus	Widen to 4 lanes from R-2561CA at S.R. 1811 (Narrow Gap Road) to U.S. 74 / 76.
U.S. 158	Guilford, Gates, Pasquotank	Widen to Multi-Lanes.
U.S. 158	Rockingham, Guilford	Modernize
U.S. 158, N.C. 903	Halifax	Widen to Multi-Lanes.
U.S. 158	Northampton	Widen to Multi-Lanes Part on New Location.
U.S. 158	Warren, Halifax	Widen to Multi-Lanes with Bypasses of Norlina Macon and Littleton on New Location
U.S. 74, U.S. 76	Brunswick, Columbus	Upgrade Roadway to interstate Standards
U.S. 70, N.C. 12	Carteret	Upgrade Existing Roadway.

Project Name	County	Project Scope
U.S. 321	Caldwell	Add Additional Lanes.
N.C. 58 (Kingold Boulevard)	Greene	Widen Existing Two-Lane Road to Four Lanes with depressed median and access management improvements.
U.S. 23, U.S. 441	Macon	Implement Access Management Strategies.
N.C. 53	Pender	Modernize N.C. 53 in Burgaw from U.S. 117 Bypass to SR 1400 (Smith St) and construct streetscape improvements per the N.C. 53 Corridor Study
N.C. 211	Brunswick	Widen N.C. 211 to 4 lanes from U.S. 17 in Supply to SR 1112 (Sunset Harbor Rd) per Feasibility Study WS-40814
I-74, U.S. 74	Columbus, Robeson	Upgrade U.S. 74 to Interstate Standards
N.C. 68	Guilford	Widen from 4 Lane Divided to 6 Lane Divided.
U.S. 117	Duplin, Sampson	Upgrade U.S. 117 to Interstate with interchanges at U.S. 117 and N.C. 50
U.S. 117	Wayne, Duplin	Upgrade U.S. 117 to Interstate with an interchange at S.R. 1147.
U.S. 421 (Former I-40 Business)	Forsyth, Guilford	Widen to 6 Lane Freeway.
N.C. 46, U.S. 158	Northampton	Widen to Multi-Lanes with Bypass of Jackson Part on New Location.
I-95	Robeson	Widen Roadway to 6 Lanes.
I-95	Cumberland	Widen Roadway to 8 Lanes.
I-95	Northampton, Halifax	Widen Roadway to 6 Lanes.
I-77	Mecklenburg	Widen existing freeway by constructing four managed lanes (two in each direction) does not include the cost of the I-277 (Belk Frwy) interchange but does include the cost of the I-277 (Brookshire Frwy) interchange.
U.S. 13, U.S. 258	Greene	From the U.S. 13 Bypass to the intersection of the proposed U.S. 258 Bypass upgrade to a 4-lane divided boulevard. From the proposed U.S. 258 Bypass to the U.S. 13/U.S. 258 split improve to a 4-lane median-divided expressway.
I-87, U.S. 64	Edgecombe, Nash, Franklin	Upgrade U.S. 64 to Interstate Standards. Project consists of two segments on either side of Rocky Mount MPO.
I-587, U.S. 264	Pitt, Greene	Upgrade roadway to interstate standards
I-87, U.S. 17	Bertie, Martin	Upgrade roadway to Interstate. By improving the current major thoroughfare to an interstate, the project is intended to improve mobility, connectivity, as well as encouraging economic development. In conjunction with these improvements, the safety along the corridor should increase as access is more appropriately managed.
I-87, U.S. 17	Bertie	Upgrade roadway to Interstate
I-87, U.S. 17 (Windsor Bypass)	Bertie	Upgrade freeway to interstate standards
I-87, U.S. 17 (Elizabeth City Bypass)	Pasquotank	Upgrade freeway to interstate standards
U.S. 74	Rutherford, Polk, Cleveland	Upgrade freeway to interstate standards
I-87, U.S. 17	Perquimans, Chowan, Pasquotank, Camden	Upgrade roadway to Interstate
I-40	Buncombe	Widen Existing Roadway

Project Name	County	Project Scope
U.S. 220	Rockingham	Upgrade U.S. 220 expressway to interstate standards.
U.S. 264	Pitt, Beaufort	Upgrade roadway to freeway standards.
U.S. 15, U.S. 501	Orange, Durham	Construct capacity and operational improvements and add sidewalks, side paths, and transit accommodations.
U.S. 1, U.S. 158	Vance, Warren	Widen Roadway
I-77	Iredell	Widen from N.C. 150 in Mooresville to I-40 in Statesville
N.C. 24, N.C. 87	Harnett	Widen roadway to 6 lanes and add sidewalks and bike lanes or a multi-use path on both sides of the road.
N.C. 24, N.C. 87	Cumberland, Harnett	Widen to 6 lanes with median
U.S. 17 (Wilmington Hwy)	Onslow	Improve multiple intersections along corridor from S.R.1119 (High Hill Rd) to SR 116 (Onslow Pines Rd).
U.S. 17 (Martin Luther King Jr. Boulevard)	Craven	Limit turning movements of cross-streets- Request the Congestion Management Team recommend an appropriate concept based on their expertise
U.S. 13, N.C. 11	Pitt, Edgecombe	Upgrade roadway to Interstate Standards. Note: Existing median type is depressed grass but there is no guardrail. There was not an option for depressed grass median with no guardrail.
U.S. 220	Rockingham	Upgrade U.S. 220 expressway to freeway standards.
SR 1200 (Stantonburg Road)	Pitt	Construct medians with specified turn lanes sidewalks on each side and protected bike lane.
U.S. 17 Business (Marine Boulevard)	Onslow	Improve multiple intersections along corridor between N.C. 24 EB off-ramp and U.S. 258 signalized intersection.
N.C. 73	Lincoln	Widen from 2 to 4 lanes from Anderson Creek west of S.R. 1383 (Ingleside Farm Rd) to N.C. 16 including widening of railroad bridge and interchange improvements at N.C. 16.
I-40	Iredell	Widen from four lanes to six lanes as recommended by FS-1512A in 2016
U.S. 64	Nash, Edgecombe	Upgrade U.S. 64 to Interstate 87.
U.S. 17	Craven, Beaufort	Widen to Multi-Lanes. Project ends.4 miles South of SR1127 to join up with existing 4-lane section.
U.S. 158 (Murfreesboro Bypass)	Hertford, Northampton	Convert multi lane divided section to superstreet concept to match segment from U.S. 158 Business east to U.S. 13 near Winton. Included with the superstreet concept will be an interchange at the intersection of U.S. 158, U.S. 258 and N.C. 11. Also included will be the realignment of SR 1179 Chowan College Rd. eastward tying into U.S. 258 north of the proposed interchange approach fill section.
I-40	Catawba	Widen roadway to six lanes.
U.S. 74	Cherokee, Macon	Widen roadway to multi-lanes and add paved shoulders.
U.S. 220 (North Fayetteville Street)	Randolph	Widen to multi-lanes.
I-85	Durham	Widen roadway and improve ramps (lengthen on ramps and remove two-way ramps).
N.C. 16 (Brookshire Boulevard)	Mecklenburg	Widen from 4 lanes to 6 lanes with median and multi-use path.
U.S. 29	Guilford	Implement access management and safety improvements. Includes ramp closures and consolidations.
I-540	Wake, Durham	Implement managed motorways along corridor and construct managed shoulders in both directions along I-540. Managed shoulders are expected to be in operation for approx. 3 hours during morning and evening peak periods (6 hours total).

Project Name	County	Project Scope
I-87, U.S. 64	Wake	Widen interstate to 8 lanes and include managed motorways components along corridor from I-540 to U.S. 64 BUS.
N.C. 24 (West Corbett Avenue)	Onslow	Construct superstreet/superstreet intersection along N.C. 24 corridor from Belgrade-Swansboro to Front Street before crossing bridge. Improve safety and eliminate left turns.
I-485	Mecklenburg	Construct one Express Lane in each direction (in the median) on I-485 between I-77 and I-85 in southwest Charlotte
I-485	Mecklenburg	Construct one Express Lane in each direction along I-485 in the median between the U.S. 74 interchange (Exit 51) and the N.C. 24/27 interchange (Exit 41) at Albemarle Road
U.S. 220 (North Fayetteville Street)	Randolph	Widen to a multilane facility
I-277	Mecklenburg	This project will upgrade numerous interchanges and ramps between North Davidson Street and Graham Street along the I-277 loop in Uptown Charlotte to improve safety mobility and capacity. Improvements shall also be consistent with those specified in NCDOT Feasibility Study FS-1610A. Division 10 is open to alternative solutions.
I-40	Haywood, Buncombe	Widen Roadway.
McConnell Road	Guilford	Install roundabout at Gorrell Street and Willow Hope St.
U.S. 17 (Ocean Highway), U.S. 74, U.S. 421 (Carolina Beach Road), U.S. 117 (Shipyard Boulevard), U.S. 17 BUS, Cape Fear Crossings Alternative	Brunswick, New Hanover	Upgrade existing facilities to provide additional mobility and access between New Hanover and Brunswick Counties and to the NC Port of Wilmington. Includes new river crossing south of existing Cape Fear Memorial Bridge. Cape Fear Crossings Alternative
I-40, I-440, I-87, U.S. 1	Wake, Johnston	Convert interstates and freeways to managed motorways including I-40 from Wade Ave to N.C. 42 I-440 I-87 to I-540 and US-1 south to NC-540.
I-40	Burke, Catawba	Widen Existing Roadway
N.C. 211	Brunswick	Widen N.C. 211 to 4-lanes from U.S. 17 to N.C. 906
SR 4464 (Bryan Boulevard)	Guilford	Add auxiliary lane between the on and off ramps in both directions of Bryan Boulevard in between Holden Road and Westridge Road. This project would tie on to U-5852 and essentially extend it to Westridge Road.
N.C. 87	Brunswick	N.C. 87 - Widen N.C. 87 (George II Hwy) to 3 lanes from the signal at SR 1539 (E Boiling Spring Rd) to the signal at SR 1541 (Cougar Rd) in Boiling Spring Lakes
N.C. 87	Brunswick	N.C. 87 - Add a southbound auxiliary lane to N.C. 87 from N.C. 133 (River Rd) to N.C. 133 (Long Beach Rd)
U.S. 258 Business	Pitt	Improve intersection.
N.C. 73	Lincoln	Widen to 4-lane boulevard.
U.S. 52 (Future I-74)	Stokes	Upgrade freeway to interstate standards - Shoulder widening, construct outside 12' FD paved shoulders (2' dirt shoulder), 4' FD paved median shoulders, interchange improvements, and intermittent bridge replacements.
U.S. 321 Business (Maiden Highway)	Lincoln	Widen to 4-lane roadway.
U.S. 421	Chatham, Lee	Upgrade existing corridor to Interstate-grade freeway

Project Name	County	Project Scope
U.S. 17 (Future I-87)	Perquimans, Pasquotank, Bertie	Upgrade to Interstate
U.S. 70	Craven	Multiple intersection improvements
I-77	Yadkin, Surry	Improve & lengthen acceleration and deceleration lanes on I-77 to the N.C. 67 interchange.
U.S. 64	Chatham	Construct Reduced Conflict Intersections along the US64 Corridor in the vicinity of Lake Jordan
U.S. 17	Pender, New Hanover	Convert roadway to superstreet configuration and provide access management.
U.S. 52	Stanly	Construct a Roundabout.
U.S. 52 (Future I-74)	Forsyth	Widen roadway & upgrade freeway to interstate standards - Add additional travel lane in each direction to achieve a 6-lane roadway, construct outside 12' FD paved shoulders (2' dirt shoulder), 4' FD paved median shoulders, interchange improvements, and intermittent bridge replacements.
U.S. 52 (Future I-285)	Forsyth	Upgrade U.S. 52 to interstate standards (I-285) by widening existing 4-lane facility to 6-lanes, widen paved shoulders, upgrade bridges / interchanges. Begin 6-lane section at W. Clemmonsville Rd. interchange overpass.
N.C. 280 (Asheville Highway)	Transylvania, Henderson	Upgrade roadway, Eliminate 5-lane section to 4 lane divided add multi use path on one side and bike lanes. Widen 4-lane undivided section to 4-lane divided with a 17.5' median. Continue Multi use path and bike lanes.
N.C. 24 (Cedar Point Boulevard)	Carteret	Convert N.C. 24 into a superstreet within the town of Cedar Point; upgrade intersection of N.C. 24 and N.C. 58 to a diamond interchange with one loop.
N.C. 49	Cabarrus	Widen existing two-lane cross section to NCDOT Highway Cross Section 4F
N.C. 280 (Airport Road)	Buncombe, Henderson	Construct a raised median that precludes across-roadway movements along N.C. 280 (Airport Rd). Incorporate complete streets elements and other access management strategies such as driveway limited-movement designs and reduced conflict intersection designs.
N.C. 49	Cabarrus, Stanly	Widen facility to math existing multi-lane from Mt. Pleasant, NC to Ritchfield, NC
U.S. 64	Davidson	Upgrade the two I-85/U.S. 64 ramp intersections at exit ramps for right turns only & by eliminating full movement access in the median crossovers of the existing 4 lane section of U.S. 64. Construct leftovers on 64 at I-85 ramp intersections and at the intersections of Bowers Road & New Bowers Road. Install left turns with bulb-outs as-needed for U-turns.
U.S. 258 (U.S. 258 South)	Lenoir	Add an alternating passing lane, improve intersection visibility, add rumble stripes along the center yellow lines and the white lines along the shoulders, and add more reflective thermoplastic paint to road markings.
U.S. 258	Lenoir	Widen to a four-lane boulevard from Tyree Road (SR 1341) to the proposed Kinston Bypass"
N.C. 24	Duplin	The proposed project (DUPL0001-H) is to install a 2-lane roadway with a raised median with curb and gutter with 12-foot travel lanes, and 5-foot on road bike lanes with sidewalks from the Sampson County line to I-40 with appropriate median breaks and traffic signals.
U.S. 70 (Arendell Street)	Carteret	Make intersection improvements at the following intersections: Arendell St/N 35th St; Arendell St/N 20th St; Arendell St/N 24th and 23rd Sts (Atlantic Beach Causeway); Arendell St/N 4th St.
U.S. 258 (Richlands Hwy)	Onslow	Construct superstreet
N.C. 24 (Freedom Way)	Carteret	Upgrade a portion of N.C. 24 to a superstreet in Carteret County from SR 1119 (Red Barn Road) to SR 1147 (McCabe Road).
U.S. 17 (Wilmington Highway)	Onslow	Upgrade roadway to a superstreet.

Project Name	County	Project Scope
U.S. 17 Business (South Marine Boulevard)	Onslow	Widen existing roadway to replace TWLTL with center median. Improve right turning lanes from US17 Business to U.S. 258.
I-95	Johnston	Widen I-95 from 4 to 8 lanes from Exit 90 U.S. 701 to Exit 95 U.S. 70 Bus.
N.C. 87	Cumberland	Convert existing at-grade intersections to reduced conflict intersections.
U.S. 421	Randolph	Upgrade U.S. 421 from Expressway to Freeway
I-587, U.S. 264	Nash, Wilson, Wake, Johnston	Upgrade U.S. 264 to interstate standards.
U.S. 117 (Shipyard Boulevard)	New Hanover	Improve access management along U.S. 117 corridor between U.S. 421 and Rutledge Drive.
U.S. 117 (Shipyard Blvd)	New Hanover	Install speeds sensors and coordinated warning activation prior to the entrance to the South Gate at the Port of Wilmington. The project would also include flashing speed limit signs and sensors coordinated with the traffic signal at U.S. 421 to allow for freight truck priority during peak times.
SR 4240 (Gate City Boulevard)	Guilford	Smart corridor project which includes installation of dedicated wireless communication, advanced vehicle detection technology, connected vehicle roadside equipment, enhanced surveillance, traveler information, transit priority and data management to improve multimodal safety and mobility. (Also submitted under Bike/Ped mode).
I-95	Nash	Widen I-95 from 4 to 8 lanes with median barrier from U.S. 64 to N.C. 4.
N.C. 87	Lee, Harnett	Upgrade Arterial to Superstreet
U.S. 64	Chatham	Upgrade 5-lane U.S. 64 to a superstreet from the Walmart Entrance Road to SR 1003 (Silk Hope Road). The western terminus connects with the superstreet design of funded R-5737.
I-42, U.S. 70	Johnston	Upgrade to interstate standard.
U.S. 158	Halifax	Widen to 4-lane divided section; Partial Segment of Previous R-2581 project
U.S. 158	Halifax	Widen existing road to 4-lane divided with limited access control. Partial Segment of Previous R-2581 project
U.S. 25 (Hendersonville Road)	Buncombe	Implement access management along the corridor with complete streets improvements.
I-85	Durham, Granville	Widen existing I-85 - Continuation of I-85 widening Project currently in SPOT. Approximately 3.6 miles.
I-40	Haywood	Install 5 CCTV Cameras at the following locations: MM 18, MM 11.3 MM 7, MM 6 and MM 1 along I 40. Install 6 gates at the following locations: MM 13.5, MM 11.3, MM 8.5, an Interstate Gate at MM 20 and Ramp Gates at MM 20 and MM 15 along the I-40 corridor. 3 Dynamic message signs to inform motorists of Closure ahead.
U.S. 15	Durham	Add travel lanes to 15/501. Include 3 NB through lanes (perhaps 2 lanes plus 1 choice lane) for NB vehicles traveling through the Business/Bypass interchange. If needed, include improvements at/between Erwin Road to the west of 15-501 and Erwin Road to the east of 15-501.
I-77	Mecklenburg, Iredell	Add third general purpose (GP) lane in each direction on I-77 from I-485 (Exit 19) to N.C. 150 (Exit 36)
I-77	Mecklenburg, Iredell	Purchase the I-77 Express Lanes contract and keep the Express Lanes as planned
U.S. 264 Alternate (Raleigh Road Parkway)	Wilson	Convert existing 4 lane divided section to a reduced conflict intersection facility.
U.S. 421	Chatham	Improve at-grade intersection along U.S. 421 between Siler City and the Lee County line with Reduced Conflict Intersections.
SR 1140 (Burnett Boulevard)	New Hanover	Widen existing roadway to 3-lane cross section to allow for truck stacking at entrance of the North Gate of the Port of Wilmington.

Project Name	County	Project Scope
U.S. 1	Wake	Convert facility to a managed freeway ("managed motorway") with ramp metering and other ATM/ITS.
I-40, U.S. 70	Johnston	Convert facility to a managed freeway ("managed motorway") with ramp metering and other ATM/ITS.
I-540	Wake	Implement managed motorways along corridor and construct managed shoulders in both directions along I-540. Managed shoulders are expected to be in operation for approx. 3 hours during morning and evening peak periods (6 hours total).
I-40	Johnston	Widen interstate to 8 lanes and incorporate managed motorways treatments along corridor including ramp metering, variable speed limits and lane control, messaging, and other ITS components.
U.S. 1	Wake	SB auxiliary lane to connect from Walnut Street ramp, continue under Cary Parkway bridge and tie into existing aux lane which runs from Cary Parkway to U.S. 64. On ramp from Cary Parkway will merge into this extended aux lane. Loop ramp from Cary Parkway will need to shift slightly, just by decreasing radius if possible. otherwise shift ramp terminal also.
I-40	Durham	Add service roads to reduce weaving, per recommendations in the HNTB study.
I-277 (John Belk Freeway)	Mecklenburg	Add one lane in each direction on I-277 and improve interchanges along the corridor to improve operations
U.S. 264 Alternate (Greenville Boulevard)	Pitt	Convert 5-lane corridor to 4-lane divided with construction of raised concrete center median within the existing TWLTL. Construct bicycle and pedestrian accommodations along corridor in support of complete streets initiative. Intersection Improvements at select locations to improve capacity and mobility. Bus stop improvements including shelters and benches along corridor shall be considered where appropriate.
U.S. 70 (Future I-42)	Johnston	Upgrade roadway to Interstate Standards. (**See Feasibility Study FS-1604A)
U.S. 64 (Future I-87)	Martin, Edgecombe	Upgrade existing freeway to Interstate Standards. To include ITS and Signing Improvements, existing ramps (Exits 502,505, 507, 512, & 514) widen to 16' lane width.
U.S. 17 (Future I-87)	Martin	Upgrade Arterial to Interstate Standards
U.S. 17	Pender	Upgrade to a controlled access facility with service roads.
I-540	Wake	Add EB auxiliary lanes from Leesville Road to U.S. 401. Note that I-5968 adds an EB auxiliary lane from U.S. 70 to Leesville Road. Add WB auxiliary lanes from U.S. 401 to U.S. 70. Adding auxiliary lanes will also enable more effective ramp metering by allowing more ramp storage, which will contribute to additional travel time savings.
I-540	Wake, Durham	Coordinated adaptive ramp metering (CARM), aka "Managed Freeways", without lane use control gantries. In addition to 14 new ramp meters, 4 existing ramp meters will be upgraded with improved detection, software, and ramp storage.
N.C. 55	Wake	Widen to 6-lane superstreet with grade separation at Jesse Dr.
N.C. 55	Wake	Widen to 6-lane superstreet from E. Williams St. to U.S. 1 with grade separation at Jesse Drive, and upgrade to 6-lane expressway from S. Main St. to E. Williams St. with interchanges at S. Main St. and Holly Springs Rd. and grade separation at Avent Ferry Road; $8M local contribution.
Lamont Road, Macridge Road	Cumberland, Harnett	Widen to Multilanes with New Location
N.C. 55	Wake	Upgrade N.C. 55 corridor to 6 lane expressway/superstreet
West Arlington Boulevard	Pitt	Convert 5-lane corridor to 4-lane divided with construction of raised concrete center median within the existing TWLTL. Construct bicycle and pedestrian accommodations along corridor in support of complete streets initiative. Intersection Improvements at select locations to improve capacity and

Project Name	County	Project Scope
		mobility. Bus stop improvements including shelters and benches along corridor shall be considered where appropriate.
East Arlington Boulevard	Pitt	Convert 5-lane corridor to 4-lane divided with construction of raised concrete center median within the existing TWLTL. Construct bicycle and pedestrian accommodations along corridor in support of complete streets initiative. Intersection Improvements at select locations to improve capacity and mobility. Bus stop improvements including shelters and benches along corridor shall be considered where appropriate.
U.S. 17 (Carolina Avenue), U.S. 264 (Bridge Street)	Beaufort	Construct Additional pedestrian signal/ button at SE & SW corners; increased signal crossing time; median refuge, improve corridor for safety
N.C. 11 (Memorial Drive)	Pitt	Convert 5-lane corridor to 4-lane divided with construction of raised concrete center median within the existing TWLTL. Construct bicycle and pedestrian accommodations along corridor in support of complete streets initiative. Intersection Improvements at select locations to improve capacity and mobility. Bus stop improvements including shelters and benches along corridor shall be considered where appropriate.
U.S. 264	Pitt	Upgrade roadway to interstate standards.
N.C. 11, SR 1119 (Jolly Road), SR 1149 (Mill Street), SR 1108 (Littlefield Road), SR 1120 (Dennis McLawhorn Road)	Pitt	Improve intersection by constructing Reduced-Conflict Intersections (RCI) at Jolly Rd (SR 1119), Dennis McLawhorn Rd (SR 1120) and Littlefield Rd. Improve Mill St (SR 1149)/Vernon White Rd (SR 1130) intersection per NCDOT Congestion Management's conceptual design through Pre-submittal process.
U.S. 1	Wake	Upgrade corridor to include freeway lanes, dedicated bus lanes, access roads, interchanges and grade separations as identified in City of Raleigh's recent Capital Blvd corridor study; Managed Motorway aspects

Stakeholder Needs

Unfunded highway and multimodal projects are defined below. These projects have been identified based on plans reviewed and stakeholder outreach.

Rail

Project	County	Project Scope
NS M Line	Randolph	Construct new siding at Sophia near MP 15 on the NS M Line to accommodate freight traffic.
CSX AC Line (abandoned)	Duplin, Pender, New Hanover	Restoration of the Wallace to Castle Hayne Rail Corridor from just north of Wilmington to Wallace.
KSH Line	Lenoir	Construction of extension of KSH rail line from existing terminus MP 5.65 in Global TransPark to the CSX AA line near MP 173.45 parallel with N.C. 11.
CSX S Line/NCDOT Capital Yard	Wake	Construction of NCDOT north Lead track extension towards grade separation with Capital Boulevard in Raleigh.
CSX AF Line	Pender, New Hanover	Construct approximately 1.5 mile rail line extension from MP AF 286.60 (near Invista) to support new rail volumes inbound & outbound from Pender Commerce Park. Project includes at-grade crossing improvements to U.S. 421 (Crossing # 629 171T).

Project	County	Project Scope
NCRR/NS H Line	Durham, Orange	Construction of second main track from Control Point Funston (MP 49.8) to East Durham Yard (MP 56) in Durham.

Rail Grant Projects

Consolidated Rail Infrastructure and Safety Improvements Program Projects

Railroad Corridor	Railroad Corridor (City to City)	Project Scope
ACB-Line	Wilmington Beltline	Access management improvements at S. 6th St., and close Martin St. crossing (629441P). Included on STIP as part of project P-5740.
ACB-Line	Wilmington Beltline	Closure of Martin/Hooper St. crossing (629443D). Included on STIP as part of project P-5740.
ACB-Line	Wilmington Beltline	Closure of S. 9th St. (629438G) Included on STIP as part of project P-5740.
ACB-Line	Wilmington Beltline	Closure of Clay St. (642724T) Included on STIP as part of project P-5740.
ACB-Line	Wilmington Beltline	Cantilevers and new crossing surface at Covil Ave. (629426M) Included on STIP as part of project P-5740.
ACB-Line	Wilmington Beltline	Cantilevers, new crossing surface, and pedestrian crossing at Princess Place Dr. (629288B) Included on STIP as part of project P-5740.
ACB-Line	Wilmington Beltline	Channelization improvements at S. 5th St. (629442W) Included on STIP as part of project P-5740.
ACB-Line	Wilmington Beltline	Addition of crossing gates at S. 13th St. (629435L) Included on STIP as part of project P-5740.
ACB-Line	Wilmington Beltline	Addition of crossing gates at Colonial Dr. (629429H) Included on STIP as part of project P-5740.
ACB-Line	Wilmington Beltline	Addition of crossing gates at Forest Hills Dr. (629428B) Included on STIP as part of project P-5740.
ACB-Line	Wilmington Beltline	Addition of crossing gates at Mercer Ave. (629427U) Included on STIP as part of project P-5740.
ACB-Line	Wilmington Beltline	Addition of crossing gates, and new crossing surface at N. 30th St. (629287U) Included on STIP as part of project P-5740.
ACB-Line	Wilmington Beltline	Addition of crossing gates, signals, crossing surface improvements, utility pole relocation, and road realignment at King St. (629284Y) Included on STIP as part of project P-5740.
ACB-Line	Wilmington Beltline	Addition of crossing gates and signals at S. 7th St. (629440H) Included on STIP as part of project P-5740.
ACB-Line	Wilmington Beltline	Addition of crossing gates and signals at S. 10th St. (629437A) Included on STIP as part of project P-5740.
ACB-Line	Wilmington Beltline	Addition of crossing gates and signals at S. 12th St. (629436T) Included on STIP as part of project P-5740.
ACB-Line	Wilmington Beltline	Addition of crossing gates, signals, and new crossing surface at S. 8th St. (629439N) Included on STIP as part of project P-5740.

Railroad Corridor	Railroad Corridor (City to City)	Project Scope
ACB-Line	Wilmington Beltline	Addition of crossing gates, signals, and driveway access improvements at S. 4th St. (629445S) Included on STIP as part of project P-5740.
ACB-Line	Wilmington Beltline	Crossing signal upgrades and channelization at US 76/ Oleander Dr. (629431J) Included on STIP as part of project P-5740.
ACB-Line	Wilmington Beltline	New crossing surface, and gate arms at Marstellar St. (629434E) Included on STIP as part of project P-5740.
ACB-Line	Wilmington Beltline	New crossing surface, and addition of raised median at US17/ Market St. (629290C) Included on STIP as part of project P-5740.
ACB-Line	Wilmington Beltline	New crossing surface, and addition of raised median at N. 23rd St. (629286M) Included on STIP as part of project P-5740.
ACB-Line	Wilmington Beltline	Addition of crossing gates and signals at Wrightsville Ave. (629430C) Included on STIP as part of project P-5740.
ACB-Line	Wilmington Beltline	New crossing surface improvements, and upgrade sidewalks at S.16th St. (629433X) Included on STIP as part of project P-5740.
ACB-Line	Wilmington Beltline	New crossing surface improvements, and upgrade sidewalks at S.17th St. (629432R) Included on STIP as part of project P-5740.
ACB-Line	Wilmington Beltline	Signal upgrades at Henry St. (629289H) Included on STIP as part of project P-5740.
SF-Line	Monroe to Hamlet	Closure of Boylin Rd. (SR 1420) crossing. (631757A)
SF-Line	Monroe to Hamlet	Crossing surface improvements at N. Sutherland Ave. (631579R)
SF-Line	Monroe to Hamlet	Bridge improvements to support siding addition at Private Rd./Dozer Rd. (908637E)
SF-Line	Monroe to Hamlet	Bridge improvements to support siding addition at Roosevelt Blvd./US 74. (631580K)
SF-Line	Monroe to Hamlet	New siding track starting at Main St. (631785D)
SF-Line	Monroe to Hamlet	Crossing improvements at Stewart St. (631572T)
SF-Line	Monroe to Hamlet	Crossing improvements at Bivens St. (631573A)
SF-Line	Monroe to Hamlet	Crossing improvements at Edgewood Dr. (631574G)
SF-Line	Monroe to Hamlet	Crossing improvements at Private Rd. (631575N)
SF-Line	Monroe to Hamlet	Crossing improvements at Bivens Rd. (631576V)
SF-Line SF-Line	Monroe to Hamlet Monroe to Hamlet	Crossing improvements at Secrest Ave. (631578J) New siding track ending at Normand St. (631581S)

Unfunded Railroad Needs Projects

Railroad Corridor	Railroad Corridor (City to City)	Project Description
KNR-Line	Kinston to Snow Hill	Construction of extension of KSH rail line from existing terminus MP 5.65 in Global TransPark to the CSX AA line near MP 173.45 parallel with NC 11.

Railroad Corridor	Railroad Corridor (City to City)	Project Description
S-Line	Hamlet to Henderson	Construct grade separation and close West Maynard Rd. crossing (643400U) in Cary. (STIP Project No. P-5739)
SF-Line	Monroe to Hamlet	Construct Grade Separation at Wesley Chapel Stouts Rd. crossing. (STIP Project No. P-5744)
NC-Line	Greensboro to Goldsboro	Construct grade separation at Harrison Ave. crossing (734755X) in Cary. (STIP Project No. P-5708).
Main Line	Charlotte to Raleigh	Construct grade separation at Yanceyville St. crossing (722542D) in Greensboro. (STIP Project No. P-5735)
Main Line	Charlotte to Raleigh	Salisbury Station Building Improvements: Upgrade City of Salisbury station building, expand waiting space and surface parking. (STIP Project No. P-5733)
Main Line	Charlotte to Raleigh	Construct grade separation in vicinity of 5th Street and closure of 7th Ave. at-grade crossing (722306Y) in Lexington. (STIP Project No. P-5731). Subsequent Federal grant will be used for construction of station.
Main Line	Gastonia to Charlotte	Extend Clanton Rd. to US 29/74 (Wilkinson Blvd.) with a grade separation of NS RR and close the Donald Ross Rd. crossing. (STIP Project No. P-5730)
NC-Line	Raleigh to Goldsboro	Construct grade separation at Shotwell Rd. Close existing at-grade crossing in Clayton. (STIP Project No. P-5743)
NCRR Main Line, NC-Line	Charlotte to Raleigh	Construct grade separation at S. English St. crossing (722955X) in Greensboro. (STIP Project No. P-5747)
NCRR Main Line, NC-Line	Charlotte to Raleigh	Construct grade separation at Vandora Springs Rd. crossing (735324J) in Garner. (STIP Project No. P-5738)
NCRR Main Line, NC-Line	Charlotte to Raleigh	Construct grade separation at Hoskins St. crossing (722351T) in High Point. (STIP Project No. P-5752)
NCRR Main Line, NC-Line, and S-Line	Charlotte to Raleigh	Extend Beryl Rd. to Royal Avenue, and close Beryl Rd. crossing (630647L). (STIP Project No. P-5736)
NCRR Main Line, NC-Line, and S-Line	Charlotte to Raleigh	Construct grade separation at Trinity Rd. crossing (630657S) in Cary. (STIP Project No. P-5734)
Main Line	Charlotte to Raleigh	Construct grade separation at Turner St. crossing (722327S) in Thomasville. (STIP Project No. P-5751)
NCDOT	Wallace to Castle Hayne	Restoration of the Wallace to Castle Hayne corridor. Phase 1: Wallace to Burgaw Phase 2: Burgaw to Castle Hayne
Various	Selma to Goldsboro	Raleigh to Goldsboro Passenger Service: Infrastructure for *Piedmont* Service Raleigh to Goldsboro (includes Raleigh to Selma).
NC-Line	Greensboro to Goldsboro	NC-Line Improvements - Morrisville to Cary: Construction of second main track between MP H 66.9 (Clegg) and MP H 73.1 (Fetner) in Morrisville and Cary.
NC-Line	Greensboro to Goldsboro	NC-Line Improvements - Durham: Construction of a second main track from Control Point Funston (MP 49.8) to East Durham Yard (MP 56) in Durham.
NC-Line	Greensboro to Goldsboro	NC-Line Improvements - East Durham: Construction of second main track from East Durham Yard (MP 58.5) to Nelson (MP 63.5) in Durham.
NC-Line	Greensboro to Goldsboro	NC-Line Improvements - Triple Track Bridge Over I-40: Construct triple track bridge over I-40 in Durham County (Crossing #734 743D).
NC-Line	Greensboro to Goldsboro	NC-Line Improvements - Raleigh: Construction of second main track between MP H 81.0 (Boylan) and MP H 84.2 (S. Raleigh) in Raleigh
NC-Line	Greensboro to Goldsboro	NC-Line Improvements - Garner: Construction of second main track between MP H 85.4 (Bagwell) and MP H 90.4 (Auburn) in Garner.

Railroad Corridor	Railroad Corridor (City to City)	Project Description
NC-Line	Greensboro to Goldsboro	NC-Line Improvements - Clayton: Construction of second main track between MP H 94.0 (Wake) and MP H 100.0 (Powhatan) near Clayton.
NC-Line	Greensboro to Goldsboro	NC-Line Improvements - Raleigh Crossover: Construction of crossover near MP H 74 in Raleigh.
NC-Line	Greensboro to Goldsboro	NC-Line Curve Improvements - Hillsborough: Curve improvement projects on the NC-Line to increase operating speeds for the Piedmont service. Construction of curve radius improvements from MP H 44.5 to MP H 48 near Hillsborough.
NC-Line	Greensboro to Goldsboro	NC-Line Curve Improvements - Efland: Curve improvement projects on the NC-Line to increase operating speeds for the Piedmont service. Construction of curve radius improvements from MP H 38 to MP H 40.4 near Elfland.
NC-Line	Greensboro to Raleigh	NC-Line Curve Improvements - McLeansville and Greensboro: Curve improvement projects on the NC-Line to increase operating speeds for the Piedmont service, beyond those identified separately. Curve in East Durham is funded as STIP Project P-5706, Additional curves near Hillsborough and Efland are listed. Representative curves include McLeansville, and east Wagoner Bend in Greensboro.
NC-Line, A-Line	Greensboro to Goldsboro	Rocky Mount to Raleigh Passenger Service: Passenger Rail from Imperial Tobacco Site to Raleigh Union Station. Construct and upgrade rail facilities necessary to support passenger service to/from Raleigh. Connection should be made via Rocky Mount Station. Proposed 3 runs a day - AM, midday, PM.
Various	Charlotte to Kings Mountain / SC State Line	Passenger Service - Charlotte to Gastonia and Kings Mountain: Infrastructure to support extension of Piedmont intercity passenger service from Charlotte to Gastonia and Kings Mountain.
New Location	Charlotte to Atlanta	Atlanta to Charlotte High Speed Rail: High speed rail service from Charlotte to Atlanta.
SE-Line	Wilmington	Wilmington Multimodal Station: Construct a passenger station to accommodate future rail service to downtown Wilmington. The passenger station will be a part of a larger multimodal center ultimately accommodating public transportation, private mass transportation, passenger rail, bicyclists and pedestrians.
AF-Line	Wilmington to Pender County	Construction of rail line extension from MP 286.60 (near Invista to Pender Commerce Park). Project includes at-grade crossing improvements to US 421 (Crossing #629 171T).
SF- and SG-Lines	Monroe to Charlotte	Proposed rail connector track between the CSX SG-Line (Monroe to Waxhaw) and CSX SF Line (Monroe to Charlotte) on new alignment. (Approximately MP SG 306.09 to MP SG 311.32 and MP SF 306.10 to MP SF 310.45). This proposed track would be located on the west side of the City of Monroe in Union County, however the exact alignment has yet to be determined.
A-Line	Dillon, SC to Weldon	Weldon Station: Renovate existing building and construct siding improvements including platform, to serve as Weldon train station.
M-Line	High Point to Asheboro	Construct new siding at Sophia, near MP 15, on the Main Line
Main Line	Charlotte to Raleigh	NS mainline North End track improvements in Charlotte.
N/A	Charlotte	Stonewall Street extension near the Charlotte Gateway Station.
CLNA	Greenville	Expand capacity of loading station on short line near Pitt County Recycling Center.
S-Line	Hamlet to Henderson	Construction of grade separation at SW Cary Parkway and closure of existing at-grade crossing (Crossing #643 702W) in Cary. (Previously listed as STIP Project No. P-5746)

Railroad Corridor	Railroad Corridor (City to City)	Project Description
S-Line	Hamlet to Henderson	Capital Yard - North Lead Track: Construction of NCDOT north Lead track extension towards grade separation with Capital Boulevard in Raleigh.
S-Line	Hamlet to Henderson	Construction of grade separation at SR 2044 (Ligon Mill Road) and closure of existing at-grade crossing (Crossing #630 598S) in Wake Forest.
S-Line	Hamlet to Henderson	Construction of grade separation at Wolfpack Lane (Crossing #630 609C) and closure of existing at-grade crossing. Project includes separation of Atlantic Avenue.
SF-Line	Monroe to Hamlet	Construction of grade separation in the vicinity of SR 1469 (Freedom Drive) (Crossing #631 759N) and closure of existing SR 1469 at-grade crossing to bypass NC 218 west of Polkton. Project will include roadway connection from SR 1416 (Peachland-Polkton Road) to existing NC 218.
S-Line	Hamlet to Henderson	Construction of Alexander Avenue extension to SR 1267 (Dabney Drive) and grade separation. Project also includes the closure of SR 1228 (Chavasse Avenue) existing at-grade crossing (Crossing #630 489N) in Henderson.
SF-Line	Monroe to Hamlet	Construction of Railroad Street extension to either SR 1703 (Ninth Street) or SR 1703 (Wall Street) and close Cowan Street existing at-grade crossing (Crossing #631 747U) in Lilesville.
SDS-Line	Raleigh	Construction of grade separation of SR 3124 (Morrisville Parkway) and closure of existing at-grade crossing (Crossing #926 247P) in Cary.
S-Line	Hamlet to Henderson	Construction of new switching facility from MP 180 to MP 182 near New Hill area to relocate existing switching facility from downtown Apex.
S-Line	Hamlet to Henderson	Construction of additional tracks south of downtown Apex from MP 171.21 to MP 172.14.
S-Line	Hamlet to Henderson	Construction of grade separation of E. Holding Avenue and closure of existing at-grade crossing (Crossing #630 591U) in Wake Forest.
S-Line	Hamlet to Henderson	Construction of grade separation of Elm Street and closure of existing at-grade crossing (Crossing #630 589T) in Wake Forest.
S-Line	Hamlet to Henderson	Construction of grade separation of SR 1133 (Bert Winston Road) and closure of existing at-grade crossing (Crossing #630 527V) north of Youngsville.
S-Line	Hamlet to Henderson	Construction of grade separation of SR 1267 (Eric Medlin Road) and closure of existing at-grade crossing (Crossing #630 517P) near Franklinton.
S-Line	Hamlet to Henderson	Construction of grade separation of N. Dixon Avenue and closure of existing at-grade crossing (Crossing #630 668E) in Cary.
S-Line	Hamlet to Henderson	Construction of grade separation of Old Apex Road and closure of existing at-grade crossing (Crossing #630 669L) in Cary.
S-Line	Hamlet to Henderson	Construction of grade separation of High House Road and closure of existing at-grade crossing (Crossing #643 399C) in Cary.
S-Line	Hamlet to Henderson	Construction of grade separation of Laura Duncan Road and closure of existing at-grade crossing (Crossing #630 689X) in Apex.
S-Line	Hamlet to Henderson	Construction of grade separation of SR 2013 (Gresham Lake Road) and closure of existing at-grade crossing (Crossing #630 602E) in Raleigh.
S-Line	Hamlet to Henderson	Construction of grade separation on extension of SR 1931 (Harris Road) to Flathery Avenue in Wake Forest. Project also includes closure of existing at-grade crossing of Brick Street (Crossing #630 582V).
CSX S-Line, NS NC-Line	Greensboro to Goldsboro	Construction of grade separation on South West Street Raleigh, NC. Project also includes closure of the existing at-grade crossing at West Cabarrus Street (Crossing #735 488A). (Previously listed as STIP Project No P-5745)

Railroad Corridor	Railroad Corridor (City to City)	Project Description
S-Line	Hamlet to Henderson	Construction of grade separation at Apex Peakway near S. Salem Street in Apex, NC. Project also includes closure of existing at-grade crossing of SR 1153 (Tingen Road) (Crossing #630 696H).
SF-Line	Monroe to Hamlet	Construction of grade separation of Hovis Road and closure of existing at-grade crossing (Crossing #631 792N) in Charlotte.
SF-Line	Monroe to Hamlet	Construction of grade separation in the vicinity of Hoskins Road and closures of existing Hoskins Road at-grade crossing (Crossing #631 426M) and Goff Street at-grade crossing (Crossing #631 425F) in Charlotte.
S-Line	Hamlet to Henderson	Bear Pond Road grade separation (Henderson).
EC-Line	Goldsboro to Morehead City	Construct grade separation at US 70EB and WB. Close existing at-grade crossing near Newport. (STIP Project No. P-5742)
CSX S-Line, NS NC-Line	Greensboro to Goldsboro	Construction of grade separation on Jones Franklin Road extension in Raleigh
CSX S-Line, NS NC-Line	Greensboro to Goldsboro	Construction of grade separation on Edwards Mill Road extension and closure of sR 1657 (Nowell Road) existing at-grade crossing (Crossing #630 654W) in Raleigh. Closure dependent on funding of either Edward Mills Road or Corporate Center Drive.
CSX S-Line, NS NC-Line	Greensboro to Goldsboro	Construction of grade separation on Corporate Center Drive extension and closure of SR 1657 (Nowell Road) existing at-grade crossing (Crossing #630 654W) in Raleigh. Closure dependent on funding of either Edward Mills Road or Corporate Center Drive.
NC-Line	Greensboro to Goldsboro	Construction ot at-grade crossing improvements at Blackwell Street (Crossing #735 229N), US 15 (Mangum Street) (Crossing #735 231P), and SR 1118 (Fayetteville Street) (Crossing #910 605Y) per Durham TSS in Durham.
NC-Line	Greensboro to Goldsboro	Construction of grade separation at Dimmocks Mill Road (Crossing #735 154S) and closure of Bellvue Street existing at-grade crossing (Crossing #735 152D) and West Hill Avenue existing at-grade crossing (Crossing #735 151W). Project includes a pedestrian tunnel at Hill Avenue
CSX S-Line, NS NC-Line	Greensboro to Goldsboro	Construction of grade separation on realigned Powell Drive to Youth Center Drive and closure of existing Powell Drive existing at-grade crossing (Crossing #630 650U) in Raleigh.
EC-Line	Goldsboro to Morehead City	Construction of grade separation of US 17 and closure of existing at-grade crossing (Crossing #466 041T) in Bridgeton.
NB-Line	Vanceboro	Construction of 4-lane, divided grade separation at US 17 Bypass (Crossing #466 092D) near Vanceboro.
NC-Line	Greensboro to Goldsboro	Construction of grade separation of SR 2683 (Rush Street) and closure of existing at-grade crossing (Crossing #735 480V) in Raleigh.
NC-Line	Greensboro to Goldsboro	Construction of grade separation of SR 2539 (Yeargan Road) and closure of existing at-grade crossing (Crossing #735 476F) in Garner.
NC-Line	Greensboro to Goldsboro	Construction of grade separation at New Rand Road and closure of existing at-grade crossing (Crossing #735 328L) in Garner.
NC-Line	Greensboro to Goldsboro	Construction of grade separation at Jones Sausage Road and closure of existing at-grade crossing (Crossing #735 331U) in Garner.
NC-Line	Greensboro to Goldsboro	Construction of grade separation of SR 2555 (Auburn-Knightdale Road) and closure of existing at-grade crossing (Crossing #735 336DF) near Garner.
NC-Line	Greensboro to Goldsboro	Construction of grade separation of Guy Road and closure of existing at-grade crossing (Crossing #735 390W) in Garner.

Railroad Corridor	Railroad Corridor (City to City)	Project Description
NC-Line	Greensboro to Goldsboro	Construction of grade separation at Powhatan Road and closure of existing at-grade crossing (Crossing #735 410F) in Clayton.
EC-Line	Goldsboro to Morehead City	Construction of new at-grade crossing at SR 1124 (Howard Boulevard) and extension to Orange Street. Project will close existing E. Chatham Street at-grade crossing (Crossing #722 664H) in Newport. Reconfigure adjacent street network as needed.
KNR-Line	Kinston to Snow Hill	Construction of grade separation of NC 148 (CF Harvey Parkway) and closure of existing at-grade crossing (Crossing #930 684S) near Kinston.
CPLJ Line	Jacksonville to Morehead City	Construction of grade separation at SR 1756 (Lake Road) and closure of existing at-grade crossing (Crossing #722 882P) near Havelock.
NC-Line	Greensboro to Goldsboro	Construction of grade separation at Rudd Station Road and closure of existing at-grade crossing (Crossing #722 550V) north of Greensboro.
Main Line	Charlotte to Raleigh	Construction of grade separation of NC 150 and closure of existing at-grade crossing (Crossing #722 553R) north of Greensboro.
Main Line	Charlotte to Raleigh	Construction of grade separation of SR 1352 (Oakdale Road) and closure of existing at-grade crossing (Crossing #722 355V) in Jamestown.
Main Line	Charlotte to Raleigh	Construction of grade separation of SR 1332 (Scientific Street) and closure of existing at-grade crossing (Crossing #722 352A) in Jamestown.
Main Line	Charlotte to Raleigh	Construction of grade separation of Pendleton Street and closure of existing at-grade crossing (Crossing #736 238R) in High Point.
Main Line	Charlotte to Raleigh	Construction of grade separation at SR 2120 (Long Ferry Road) and closure of existing at-grade crossing (Crossing #715 307N) in Spencer.
NC-Line	Greensboro to Goldsboro	Construction of grade separation at SR 1317 (Neal Road) and closure of existing at-grade crossing (Crossing #735 202E) in Durham.
K-Line	Charlotte to Raleigh	Extension of NS K Line onto PTIA site. Construction of 4,928TF rail spur from MP K 6.7 to PTI airport Phase 1 site. Project includes improvements for siding and Phase 1 improvements.
NC-Line	Greensboro to Goldsboro	Construction of grade separation at SR 1954 (W. Ellis Road) and closure of existing at-grade crossing (Crossing #735 236Y) in Durham. (Previously listed as STIP Project No. P-5716)
NC-Line	Greensboro to Goldsboro	Construction of grade separation at SR 3024 (Ward Road) and closure of existing at-grade crossing (Crossing #722 962H) in Greensboro. Project also includes closure of at-grade crossing of SR 3025 (Maxfield Road) (Crossing #722 964W)
NC-Line	Greensboro to Goldsboro	Construction of grade separation at SR 3040 (Wagoner Bend Road) and closure of existing at-grade crossing (Crossing #722 966K) in Greensboro. Project also includes closure of at-grade crossing of SR 3026 (Buchanan Church Road) (Crossing #722 965D) (Previously listed as STIP Project No. P-5727)
Main Line	Charlotte to Raleigh	Construction of grade separation at SR 1191 (Old Dowd Road) and closure of existing at-grade crossing (Crossing #716 184H) in Charlotte.
NC-Line	Greensboro to Goldsboro	Construction of new railroad bridge, or other railroad approved methoed, over Exchange Park Lane (Crossing #735 158U) to accommodate pedestrian traffic within the structure.
NC-Line	Greensboro to Goldsboro	Grade separate Buckhorn Road by building a roadway bridge over the tracks (this includes three (3) grade separated options included in Mebane's Train Separated Study and NCDOT Express Design). These options depict an ability to construct a grade separation while limiting surrounding impacts. The project involves realigning the widened - 4 lane divided - Buckhorn Road north of the I-40 interchange to US 70.

Railroad Corridor	Railroad Corridor (City to City)	Project Description
Main Line	Charlotte to Raleigh	Construction of grade separation near Orr Road (SR 2848) in Mecklenburg County. Includes closure of existing at-grade crossing (Crossing #715 350U) in Charlotte.
Main Line	Raleigh to Morehead City	Trent River Bridge modernization/replacement.
CLNA	Raleigh to Bellhaven	Greenville Boulevard/14th Street grade separation (Greenville).
CSX AA-Line, CLNA	Raleigh to Bellhaven	14th Street grade separation and close Crossing # 641614E near Beatty Street (Greenville).
CLNA	Raleigh to Bellhaven	NC 11 (Memorial Drive) near Moye Boulevard grade separation (Greenville).
AA-Line	Parmele to Kinston	Construct grade separation at Firetower Road (SR 1708) near Baywood Drive. Close existing at-grade crossing (#641 620H) in Greenville.
NS L-Line (abandoned)	Piedmont Triad	Restoration of the NS L Line in Eden and Rockingham County. Connecting to the active NS L Line in Southern Virginia.
WTRY	Wilmington	Front Street railroad signals (RW-65).
WTRY	Wilmington	Remove Davis Yard at-grade crossing.
AC-Line	Charlotte to Wilmington	Restore former Atlantic coast Rail line from Malmo to the RJ Corman Carolina line in Whiteville.
AC-Line	Charlotte to Wilmington	Restore former Atlantic coast Rail line from Malmo to the International Logistics Park near the Columbus/Brunswick County Line.
AC-Line	Charlotte to Wilmington	Wilmington Rail Realignment Project. Build a new rail bridge across the Cape Fear River providing access from the Port of Wilmington to the CSX SE-Line in Davis Yard.
ACH	RJCS	Construct grade separation of the RJCS ACH Line and SR 1005 (Peacock Road) in Chadbourn
WTRY	Wilmington	Interchange redesign near Northwest District Park
NS NC-Line /CSX A-Line / CSX SE-Line	Raleigh to Wilmington	Southeastern NC Service - Infrastructure and equipment to support passenger service from Raleigh to Wilmington either via the NC-Line and W&W via Selma, Goldsboro, Wallace, and Castle Hayne or via the A-Line and Fayetteville. Final alignment to be determined.
SE-Line	Hamlet to Wilmington	Construct a grade separation of SR 1426 (Mt. Misery Rd) over the CSX SE line (Crossing # 630 589T)
SE-Line	Hamlet to Wilmington	Construct a grade separation of SR 1740 (Old Lake Rd) over the CSX SE line (Crossing # 631 483B)
N/A	Tabor City to Myrtle Beach	Tabor City Station Building: Construct a passenger rail depot in Tabor City to serve a potential tourist train to Myrtle Beach.
NC-Line	Greensboro to Goldsboro	Close the existing the at-grade SR 1402 (Crossing # 735 474S)which connects East Washington Street and US 70. This closure will then be replaced with an at-grade crossing by extending Mattress Factory Road (SR-1146) northward across East Washington Street and the NCRR/Norfolk Southern railroad right-of-way to intersect US 70.
NC-Line	Greensboro to Goldsboro	This project would realign Mt. Willing Road to line up with Efland Cedar Grove Road at US 70 and would remove the at-grade crossing (735145T) of the Norfolk Southern Rail Line at mile post H-37.31 and would construct a bridge over this line. This line serves as a connect from Greensboro to Durham.
SE-Line	Hamlet to Wilmington	Construct a grade separation of NC 11 over the CSX SE-Line near Sandyfield
SE-Line	Hamlet to Wilmington	Construct a grade separation of the CSX (SE) Line and SR 1846 (Sand Hole Road) and closure of an existing at-grade crossing (#631 484H) near Riegelwood.

Railroad Corridor	Railroad Corridor (City to City)	Project Description
SE-Line	Hamlet to Wilmington	Upgrade existing rail crossing of SR 1846 (Sand Hole Road) and the CSX SE-Line (#631 484H) in Riegelwood.
SE-Line	Hamlet to Wilmington	Upgrade the double rail crossing at SR 1818 (Neils Eddy Road) and the CSX SE-Line to make the crossing level (#631 488K) in Acme, NC.
K-Line	Charlotte to Raleigh	Construction of at grade crossing as part of the SR 2264 (Akron Drive) extension project.
SE-Line	Hamlet to Wilmington	Restore rail line from active rail line at SR 1437 (Luter Road) into the Laurinburg/Maxton Airport. Includes restoration of grade crossings at Luter Rd., Airport Rd., and Pioneer Rd.
S-Line, A-Line	Raleigh to Petersburg	The project will construct a rail corridor between Raleigh and Petersburg along the SEC alignment. It includes right of way acquisition beyond the S-Line (acquired separately), track construction, grade separations, associated highway improvements, and new signal installations. The project provides freight network resiliency and would also support future passenger services.
SA-Line	Henderson to Weldon	This project will purchase the out of service SA-Line and construct rail infrastructure to allow for restoration of local freight service.
AF-Line	Wilmington	Safety improvements to US 17 / 421 Railroad Crossing south of I-140/Dan Cameron Bridge, Crossing ID# 629163B. Install gates, signalization and supplementary safety measures per FRA guidelines to achieve optimal benefit per spending.
WTRY	Port of Wilmington	Construct new rail line connecting the Cape Fear Memorial Bridge to the WTRY (Port) north end trackage in Wilmington.
O-Line	Charlotte to Winston-Salem	Construction of Mazeppa Road Grade Separation and closure of existing at-grade crossing (Crossing #721 665L) in Mooresville. Mazeppa and Connectors Road will be constructed over NC 115 and NS O Line.
N/A	Charlotte	Charlotte Locomotive and Railcar Maintenance Facility: Construction of Phase 1B of the Locomotive Railcar Maintenance Facility (LRMF) in Charlotte.
Main Line	Charlotte to Raleigh	Widen underpass at crossing #716196C in Cramerton.
A-Line	Dillon, SC to Weldon	Construct industrial spur track and mainline wye connection between Halifax Corporate Park and CSX A Line. Proposed mainline wye connection is located at CSX A-Line MP 91.02.
NC-Line	Greensboro to Goldsboro	Install three wheelchair ramps, four crosswalks, and relocate stop bars for pedestrian access at SR 1118 (Fayetteville Street) (Crossing # 910 605Y) in Durham
NC-Line	Greensboro to Goldsboro	Install 200' of decorative fence, four streetscape lights, six wheelchair ramps, and sidewalk for pedestrian safety at US 15 Bus (Mangum Street) (Crossing # 735 231P) in Durham.
NC-Line	Greensboro to Goldsboro	Install 200' of decorative fence and 25' of restricted access fence, four streetscape lights, four wheelchair ramps, and sidewalk. Improve safety by clustering traffic signal cabinets on north and south side off crossing at Blackwell/Corcoran Street (Crossing # 735 229N) in Durham
NC-Line	Greensboro to Goldsboro	Construction of grade separation at SR 3040 (Wagoner Bend Road) and closure of existing at-grade crossing (Crossing # 722 966K) in Greensboro. Project also includes closure of at-grade crossing of SR 3026 (Buchanan Church Road) (Crossing # 722 965D) and Naco Road Extension.
NC-Line	Greensboro to Goldsboro	Repair sidewalks, concrete structures, walls, landscaping and bridge structure at SR 1127 (Chapel Hill Street), Crossing Number 735 228G in Durham.

Railroad Corridor	Railroad Corridor (City to City)	Project Description
NC-Line	Greensboro to Goldsboro	Install wheelchair ramps and crosswalks for pedestrian access and safety at SR 1445 (Duke Street) (Crossing # 735 227A) in Durham.
NC-Line	Greensboro to Goldsboro	Install wheelchair ramps and crosswalk for pedestrian access and safety at Buchanan Boulevard (Crossing Number 735 225L) in Durham.
NC-Line	Greensboro to Goldsboro	Widen shoulder on Swift Avenue in Durham, within railroad ROW with edgeline for pedestrian access and safety. Install four wheelchair ramps and two crosswalks.
Main Line	Greensboro to Goldsboro	Mackay Road Grade Separation; includes relocating Atwater Drive.
NC-Line	Greensboro to Goldsboro	Construct grade separation of SR 1003 (Buffalo Road) and closure of existing at-grade crossing (Crossing #735 422A) as element of highway interchange project in Selma.
A-Line	Dillon, SC to Weldon	Replace rail bridge over US 70 Bus (E Market St) and raise grade so that roadway grade under bridge can also be raised to minimize flooding. Crossing #629960S.
SE-Line	Hamlet to Wilmington	Rail line between NC 72 and SR 1549 (Pine Log Road) in Robeson County. Construct rail spur south from the main line into the "I-95 Eagle Site" industrial park, an NC Commerce-certified industrial site.
VF-Line	Fayetteville to Raleigh	Construction of grade separation on SR 6108 (SW Judd Parkway) and closure of existing at-grade crossing (Crossing # 959 203G) in Fuquay Varina.
VF-Line	Fayetteville to Raleigh	Construction of grade separation at SR 1100 (Wagstaff Road) and closure of existing at-grade crossing (Crossing # 465 831V) in Fuquay Varina.
VF-Line	Fayetteville to Raleigh	Construction of grade separation at Piney-Grove Rawls Rd and closure of existing at-grade crossing. Crossing # 465836E
VF-Line	Fayetteville to Raleigh	Construction of grade separation at Rawls Church Road and closure of existing at-grade crossing. Crossing # 465837L
VF-Line	Fayetteville to Raleigh	Construction of grade separation at Spence Mill Rd and closure of existing at-grade crossing. Crossing # 465838T
VF-Line	Fayetteville to Raleigh	Construction of grade separation at Chalybeate Road and closure of existing at-grade crossing.
VF-Line	Fayetteville to Raleigh	Construction of grade separation of US 401 and closure of existing at-grade crossing (Crossing #465 843P).
VF-Line	Fayetteville to Raleigh	Construction of grade separation at Lafayette School Rd and closure of existing at-grade crossing (#465 845D).
VF-Line	Fayetteville to Raleigh	Construction of grade separation at SR 1443 (Lafayette Rd) and closure of existing at-grade crossing (Crossing # 465 846K) in Fuquay-Varina, Harnett County
VF-Line	Fayetteville to Raleigh	Construction of grade separation at SR 2215 (Harnett Central Rd) with NS and closure of existing at-grade crossing (Crossing # 960 078T) in Kipling, Harnett County
VF-Line	Fayetteville to Raleigh	Construction of grade separation at SR 1437 (Ballard Rd) and closure of existing at-grade crossing (Crossing # 465 853V) in Harnett County
VF-Line	Fayetteville to Raleigh	Construction of grade separation at US 401 and closure of existing at-grade crossing (Crossing # 465856R) north of Lillington in Harnett County
A-Line	Dillon, SC to Weldon	Construction of grade separation at SR 1330 (Raleigh Road) with CSX and closure of existing at-grade crossing (Crossing # 629730R) in Johnston County
A-Line	Dillon, SC to Weldon	Construction of grade separation at SR 1354 (Camelia Rd) with CSX and closure of existing at-grade crossing (Crossing # 629729W) in Johnston County
A-Line	Dillon, SC to Weldon	Construction of grade separation at SR 1353 (Olivers Grove Rd) with CSX and closure of existing at-grade crossing (Crossing# 629728P) in Johnston County

Railroad Corridor	Railroad Corridor (City to City)	Project Description
A-Line	Dillon, SC to Weldon	Construction of grade separation at SR 1166 (Parkertown Rd) with CSX and closure of existing at-grade crossing (Crossing # 629727H) in Johnston County
S-Line	Hamlet to Henderson	Construction of grade separation at SR 1149 (Friendship Rd) with CSX and closure of existing at-grade crossing (Crossing # 630706L) in Friendship, Wake County
S-Line	Hamlet to Henderson	Construction of grade separation East Whitaker Mill Rd and closure of existing at-grade crossing (Crossing # 630613S) in Raleigh
SE-Line	Hamlet to Wilmington	Extend rail spur into the I-95 Kings Industrial Park; project located southwest of Lumberton near Kenny Biggs Road at United State Cold Storage spur.
S-Line	Hamlet to Henderson	Construct rail spur approximately 7,800 feet from main line going into the proposed Energy Way Industrial Park. Located near Hamlet between the At-grade rail crossing with Airport Rd and the At-grade rail crossing with Osborne Rd.
SE-Line	Hamlet to Wilmington	Extend rail spur across Tyner Rd (SR1574) about 1/4 mile into the "Hwy 72 Rail Industrial Site". This site is bounded by Tyner Rd (SR 1574), Lowe Rd (SR 1550), NC 72, and Pine Log Rd (SR1549)
AA-Line	Raleigh to Bellhaven	Improve existing train track foundation by installing concrete tops at the intersection of 14th St and Beatty St (Crossing # 641 614E).
AA-Line	Raleigh to Bellhaven	Improve existing at-grade rail crossing on Arlington Boulevard (Crossing # 642 719W) with adequate Concrete Panels/Tubs for high vehicle and truck traffic in the region. Improve safety for all road users (near Greenville).
AA-Line	Raleigh to Bellhaven	Improve existing at-grade rail crossing on 5th St (Crossing # 641 609H) with adequate Concrete Panels/Tubs for high vehicle and pedestrian traffic in Greenville, NC.
WTRY	Port of Wilmington	Multimodal bridge replacement of the Cape Fear Memorial Bridge in Wilmington. The proposed project would span the Cape Fear River connecting to rail lines to the Port of Wilmington on the eastern side, and Davis Yard on the western side.
WTRY	Port of Wilmington	New trackage connecting Davis Yard in Navassa with a southern rail crossing (on or parallel to) the Cape Fear Memorial Bridge. This section will include a crossing of US 17/74/76/NC 133 as well as the Cape Fear River parallel to Thomas Rhodes bridge (US 74/421).
ML-Line	Aberdeen to Fayetteville	Construct grade separation at NC 20 (St. Pauls Dr) and closure of existing at-grade crssing (Crossing # 847338C) in Raeford (Hoke County)
AE-Line	Fayetteville	Construct grade separation at US 401 Bypass (Country Club Drive) and closure of existing at-grade crossing (Crossing # 629 913J) in Fayetteville (Cumberland County)
AE-Line	Fayetteville	Construct grade separation at Langdon Street and closure of existing at-grade crossing (Crossing # 629 910N) in Fayetteville (Cumberland County)
AF-Line	Fayetteville	Construct grade separation at W. Russell Street and closure of existing at-grade crossing (Crossing # 629 572T) in Fayetteville
AE-Line	Fayetteville	Construction of grade separation at CSX rail crossing of Shaw Mill Road and closure of existing at-grade crossing (Crossing # 629 914R) in Fayetteville
A-Line	Dillon, SC to Weldon	Construction of grade separation at CSX A LIne Rail Crossing of Hay Street and closure of existing at-grade crossing (Crossing #629 881F) in Fayetteville
AF-Line	Fayetteville	Construction of grade separation at CSX AF line rail crossing of SR 1404 (Hay Street) and closure of at-grade crossing (Crossing # 629 570E) in Fayetteville.
A-Line	Dillon, SC to Weldon	Construction of grade separation at CSX rail crossing of Beard Road (Crossing # 629 872G) in Eastover.
AE-Line	Fayetteville	Construction of grade separation at CSX AE Line rail crossing of Cumberland Street (Crossing # 629 907F) in Fayetteville.

Railroad Corridor	Railroad Corridor (City to City)	Project Description
A-Line	Dillon, SC to Weldon	Construction of grade separation at CSX A line rail crossing of Cumberland Street (Crossing # 629 877R) in Fayetteville.
VF-Line	Fayetteville to Raleigh	Construction off grade separation at Norfolk Southern rail crossing of Ramsey Street (Crossing# 465 906S) in Fayetteville.
VF-Line	Fayetteville to Raleigh	Construction of grade separation at Norfolk Southern rail Crossing of Cumberland Street (Crossing # 465 912V) in Fayetteville.
A-Line, AE-Line	Fayetteville	Ft. Bragg Lead Connector Project. Add additional connector track along the western quadrant of the CSX A line and AE line junction

Air Cargo

Federally Funded Project Table

Project Name	County	Project Scope
Wilkes County Airport: Eastside Development and Access Road	Wilkes	Project includes land acquisition, site preparation and paving of a partial parallel taxiway, taxilanes, ramp areas, and access road extension for hangar development. PC# 2307
Wilkes County Airport: New Fuel Farm	Wilkes	The current above ground fuel tanks are dated and not compliant with current industry standards. Maintenance and replacement of failed components is problematic. New tanks will be compliant with current industry standards and will require less maintenance. PR# 4471
Wilkes County Airport: Taxilane and Hangar Construction (Phase 1&2)	Wilkes	Phase I - paving two taxilanes for a 10 bay T-hangar building and construction of a 10 bay T-hangar. Phase II - paving one taxilane for the north hangar development area and construction of a 10 bay T-hangar. Phase includes paving a connector taxiway one taxilane and construction of a 20 bay T-hangar building on the north hangar development area. (includes Project Request Numbers: 2301 & 4240)
Wilkes County Airport: New Airport Terminal	Wilkes	Construct new airport terminal. Anticipated size of the new terminal building is 8500 square feet to replace the existing building. The age of the existing facility is approximately 35 years old. (PR#4140)
Wilkes County Airport: Eastside Parallel Taxiway	Wilkes	This project would complete a second parallel taxiway east of Runway 1/19 to connect to the eastside development area and promote future growth. PC#3803
Avery County - Morrison Field: Avery Airport Terminal and Hangar	Avery	Construct new terminal building and hangar building (PR#4347)
Ashe County Airport: Construct new terminal building and hanger building	Ashe	Construct a new terminal building and hanger building to address facility deficiencies and capacity issues.
Elizabeth City CG Station - Regional Airport: Corporate Hangars	Pasquotank	Construct corporate storage and box hangars with access road, utilities, and aprons to support existing demand for based aircraft and aircraft currently on waiting list. (4172).
Odell Williamson Municipal Airport: T-Hangars & Taxiways	Brunswick	Construct one 10-unit T-Hangar and the taxiways/taxilanes. Includes Project Request Number: 0004479
Concord Regional Airport: South Apron Expansion	Cabarrus	Construction of an apron to the north of the commercial terminal building. The dimension of the apron will be 450' by 280'. This project is to accommodate future growth for additional airline service to the airport. (3574, 3576)
Concord Regional Airport: Fire Station/Security Center	Cabarrus	Construct a fire station and security center. (3451, 2239)
Concord Regional Airport: Commercial Terminal Expansion	Cabarrus	The proposed dimensions of the expansion would be 130 x 175' and will be expanded along with the south apron increasing the capacity to four airline gates with two remote parking pads as this would fill up the remaining land area at the current site and is a much more cost effective solution than constructing at another location on the airport. (3578)
Michael J. Smith Field: Improve Runway 8-26 Strength	Carteret	Improve pavement strength of Runway 8-26 to 100,000 lbs dual wheel. (PC #3024)
Michael J. Smith Field: Apron Expansion	Carteret	Expand Apron to accommodate future Aircraft growth and types (8350 square yard expansion) (includes Project Request Number: 3022)
Michael J. Smith Field: Hangars (Phase 2)	Carteret	Design and construction of a new 12-Unit T-Hangar to replace the hangars being taken as part of the US70 relocation project. (Project Request Number 2378)

Project Name	County	Project Scope
Michael J. Smith Field: Runway 8-26 Extension to 6000'	Carteret	Extend the runway and parallel taxiway to 6000' - includes environmental assessment land acquisition and relocation of N.C. 101 (Project Request Numbers: 3018, 2373, 3015, 3020, 2376, 4455)
Michael J. Smith Field: New Terminal Building	Carteret	As the existing terminal building is less than 2000 sf, it does not have sufficient capacity as defined by the NCDOT General Aviation Development Plan. Project would construct new terminal building north of existing structure. (PC Project Request Number: 3017)
Lumberton Regional Airport: Runway 13-31 Taxiway B&C Construction	Robeson	Construct taxiways to the cross wind runway 13-31. The pavement condition was rated ""failing"" in the 2008 Pavement Management Inspection Report that was conducted by the NCDOA. Corresponds to Partner Connect project # 3582.
Coastal Carolina Regional Airport: Hangar Construction	Craven	Hangar construction for mid-size corporate aircraft and apron (4196)
Coastal Carolina Regional Airport: Runway 4-22 Strengthening	Craven	Project includes strengthening the Runway 4 approach portion of the existing runway 4-22 to match the strength of the remaining runway and to accommodate the critical aircraft identified in the Master Plan update. (Project Request Number 4197)
Coastal Carolina Regional Airport: Corporate Development	Craven	Includes development of current airport property on the south side of Runway 4-22 to support aviation related industrial development including support of the F-35 program. (3829)
Coastal Carolina Regional Airport: Runway 04 Approach Light System	Craven	Project includes installation of a Medium Intensity Lighting System with Runway Alignment Indicator Lights (MALSR). Allowing the airport to meet published state system plan standards for commercial service airports and reducing instrument approach minimums to better serve the community. (3727)
Coastal Carolina Regional Airport: Entrance Road Rehabilitation / Construction	Craven	This project is for the construction of the rehabilitation of the main entrance road to the Airport terminal area and parking. The circular road can be accessed via Airport Road and Williams Road off Highway 70. The road circles the parking lot and passes in front of the passenger terminal. (3171)
Coastal Carolina Regional Airport: Hangar Construction	Craven	This project involves construction of two new 60' x 60' hangars and apron. (4200)
Rockingham County / NC Shiloh Airport: Construct Corporate Hangers	Rockingham	Construct corporate hangars (six - 60 'x 60') and access aprons. (includes Project Request Numbers: 2544).
Rocky Mount-Wilson Regional Airport: GA Terminal Building Renovations	Nash	The project includes PC Project Request Number: 3701 Renovate the existing terminal building and improve the main building entrance and improve the parking lot. Furnish the terminal with furniture and add landscaping.
Harnett Regional Jetport: Hangars & Taxiways	Harnett	This project will construct hangar taxiways and hangars. The hangar development includes a 5 unit hangar and a 13 unit t-hangar building. (includes Project Request Numbers: 2195, 2196, 2198)
Columbus County Municipal Airport: Perimeter Fencing	Columbus	Construct perimeter fencing to increase safety and reduce wildlife inundation (PC# 2389/3049).
Columbus County Municipal Airport: Hangars & Taxiways - Phase 2	Columbus	CPC (Columbus County Airport) - Construct one 8-unit T-hangar three 60'x60' corporate hangars (PC# 4056) and accompanying taxiways on the west side of the Phase 1 hangars (PC# 2388)
Columbus County Municipal Airport: Runway Extension to 6000'	Columbus	Purchase land to extend the RPZ and extend the existing runway to a final length of 6000 feet (PC # 3051/3052).
Columbus County Municipal Airport: Water and Sewer extension	Columbus	Extend the existing water and sewer infrastructure to the new terminal building site and other necessary infrastructure. (PC# 4433).

Project Name	County	Project Scope
Asheboro Regional Airport: Terminal Building	Randolph	Construct new terminal building (includes Project Request Numbers: 3047). New PC #3799
Henderson Field: Runway Lighting System Rehabilitation	Pender	This project includes the removal of the existing lighting system and installation of a new lighting system. The project includes installing new REILs at both runway ends, connected to the new lighting system. This includes the installation of a new airfield lighting vault. The vault would be a precast building constructed in the terminal area. New equipment would be installed in the airfield lighting vault, including a new regulator for the runway lighting system. (PC# 4295)
Henderson Field: Runway Pavement Rehabilitation	Pender	"The last Runway 9-27 pavement rehabilitation project at Wallace-Henderson Field (ACZ) occurred in 2005. In 2019 an update to the Pavement Management System for ACZ was completed, reporting a current runway pavement PCI of 70. The report projects that the PCI will decrease to 61 in the next five years, well below the State System Plan objective. (PC# 4279)
Henderson Field: Hangars and Taxilane	Pender	There are currently no airport owned hangars available for lease on the airport. The existing hangars are privately owned and are old and dilapidated and need to be replaced as soon as possible. This project will include site preparation for and construction of an 8-unit hangar. (PC# 2483)
Henderson Field: Parallel Taxiway-Complete	Pender	This project is the design and construction of a parallel taxiway. This parallel taxiway will extend from the apron to the east end and the west end of the runway. The Environmental Assessment for this project will be completed as part of the EA for the Runway Extension Project. [(PC# 3214 (east) & 4297 (west)]
Henderson Field: Partial Parallel Taxiway - East	Pender	This project includes the design and construction of the eastern partial parallel taxiway. This portion of the taxiway will connect to the end of Runway 27 and to the east edge of the existing terminal area apron. The Environmental Assessment for this project was completed as part of the EA for the Runway Extension Project. (PC#3214)
Henderson Field: Partial Parallel Taxiway - West	Pender	This project includes the design and construction of the western partial parallel taxiway. This portion of taxiway will connect to the end of Runway 9, to the taxiway being constructed with PC Project #2485 and to the west edge of the existing terminal area apron. The Environmental Assessment for this project was completed as part of the EA for the Runway Extension Project. (PC#4297)
Smith Reynolds Airport: Terminal improvement with hangar development	Forsyth	Make improvements to existing terminal building entrance road and construction of a new hangar. Project would also include the demolition of old hangar old cargo building and office building. After improvements are made the fixed based operator (FBO) would relocate to terminal which would become the front door to the community. Project included on pen and ink change to Airport Layout Plan (ALP). (PR#3900 & 4469)
Smith Reynolds Airport: Terminal Renovations	Forsyth	Make improvements to terminal building and entrance road. Project would also include the demolition of old air cargo building. After improvements are made, the terminal would become the front door to the community. Project included on pen and ink change to Airport Layout Plan (ALP). (PR# 3900)
Smith Reynolds Airport: Hangar Renovation	Forsyth	Project would include renovations to an existing hangar, demolition of a old hangar and construction of a new hangar. The existing hangars are at capacity at INT. Project included on pen and ink change to Airport Layout Plan (ALP). (PR#4469)

Project Name	County	Project Scope
Columbus County Municipal Airport: Construct New Terminal Building	Columbus	Construct a new terminal building. The existing terminal building does not meet the recommended square footage (3200 SF) for terminal buildings. CPC is far enough away from the coast that this airport with a 5500' runway length could allow emergency aircraft to land and use the facility as a command station during a hurricane. The Terminal building could also serve as a disaster recovery center for southeastern NC during natural disasters. (PC# 2387)
Coastal Carolina Regional Airport: RVR Installation	Craven	This project involves runway visual range installation for precision takeoff and landing operations. (4212)
Shelby-Clevland County Regional Airport: T-Hangar Taxilanes South - Paving & Hangar Building	Cleveland	This project includes construction of one proposed 10-unit T-hangar building and associated taxilanes connecting to the existing apron area.
Shelby-Clevland County Regional Airport: Airport Entrance Road	Cleveland	This project includes the demolition and reconstruction of the airport entrance and portions of highway 150. The improvements will eliminate the existing unsafe skewed intersection replacing it with a 90 degree intersection while maintaining the appropriate sight distances.
Lincolnton-Lincoln County Airport: Terminal Area Expansion - Paving	Lincoln	Two new corporate taxilanes are needed to provide access to new corporate hangar sites and T-hangars made available by the terminal area expansion completed in FY 2019. This phase of the project includes paving the taxilanes made available by the terminal area expansion site preparation project completed in FY 2019.
Columbus County Municipal Airport: Improve Runway Safety Area and Widen Runway	Columbus	CPC (Columbus Co Municipal) - In order to improve operational safety, this project would accommodate visibility minimums to the Runway 24 approach as low as 1/2 mile. This requires the Runway Safety Area must be widened to 300' wide and lengthened to at least 600' beyond the runway end. The runway must also be widened from 75' to 100' and an approach lighting system MALSR must be installed for the Runway 24 approach. (PC#s 3720/3721/3722)
Lincolnton-Lincoln County Airport: Runway, Taxiway, Taxilane, and Terminal Area Improvements	Lincoln	Rehabilitate existing runway and taxiway edge lighting systems. Construct a new paved asphalt/stone base corporate hangar taxilane, a new concrete/stone base apron and a new paved/stone base vehicular drive. Construct two new corporate taxilanes. Replace existing South Apron with a thicker flexible pavement section.
Lincolnton-Lincoln County Airport: South Apron Strengthening	Lincoln	The preliminary estimate includes removal of the existing flexible pavement section and replacement with a thicker flexible pavement section.
Lincolnton-Lincoln County Airport: Obstruction Survey - Runway 5 Approach - 30:1 Surface	Lincoln	Perform a survey for the approach to Runway 5 to locate obstructions in the 30:1 approach surface
Lincolnton-Lincoln County Airport: New Helicopter Parking Areas	Lincoln	Two helicopter parking areas are proposed north of the existing aircraft parking apron. The parking areas will each consist of a 50-foot by 50-foot concrete pad, with elevated edge lighting and a paved access drive to the aircraft parking apron.
Richmond County Airport: Apron and Taxiway Rehabilitation	Richmond	Rehabilitate the apron and taxiway pavements that were rated as fair in the 2019 PCI Report. (includes PS Project Request Numbers 4231 and 4232)
Cape Fear Regional Jetport / Howie Franklin Field: Runway Rehabilitation	Brunswick	This project will strengthen the existing runway to support 500 annual departures of a Gulfstream 650 as the critical aircraft. The project will also remove the displaced threshold so aircraft can utilize the entire runway length for landing. (PC #3744 & 2974)
Cape Fear Regional Jetport / Howie Franklin Field: SUT Terminal Area Hangar Development (Phase 1)	Brunswick	SUT (Cape Fear Regional Jetport) - This project will provide 20 T-hangars with supporting infrastructure located adjacent to the new terminal area/west apron. (PC #2177)
Lumberton Regional Airport: Hangar Taxilane	Robeson	This project will provide a hangar taxiway for corporate hangar development northeast of terminal building. (includes PC Project Request Number: 2409)

Project Name	County	Project Scope
Richmond County Airport: Land Acquisition (38 AC)	Richmond	Acquire land for the Runway 14 safety area and to clear trees that penetrate approach to Runway 14. (includes PC Request Number 2935)
Lumberton Regional Airport: MALSR Appoach Lighting	Robeson	Install medium-intensity approach lighting system (MALSR) off the Runway 5 end. (Includes PC project request # 2423. The sponsor would like this project completed with Project Request # 2411).
Wilmington International Airport: Emergency Boat Ramp Access Launch Rwy 6	New Hanover	This project will provide ARFF Rescue boat a concrete water access ramp along with a dock to provide life safety during an aircraft crash emergencies in Smith Creek. Includes (Project Request Number: 3806)
Wilmington International Airport: 1st Paved Aircraft Taxi Lane	New Hanover	Construct a new hangar taxi lane to provide access into development hangar leasehold area per ILM's Airport Layout Plan. Includes (3821)
Laurinburg-Maxton Airport: New Terminal Building	Scotland	This project will remove the existing aged terminal building and replace it with a new 7500 sf terminal building in the same location. (includes PC Project Request Number: 2932)
Wilmington International Airport: Perimeter Road Improvements	New Hanover	Project will improve safety by relocating the Airport's vehicle perimeter road outside NAVAID critical areas and Object Free Areas. The road will be all-weather road allowing traffic to be separated from Aircraft movement areas. Includes (3415)
Lumberton Regional Airport: Two 10 Unit T-Hangars and Taxiway	Robeson	Project will build two 10-Unit T- hangars and associated taxiways and aprons for the Lumberton Regional Airport increasing current capacity. Corresponds to Partner Connect Project Request #2424 (HANGAR TAXIWAYS AND T-HANGARS)
Wilmington International Airport: 1st General Aviation Hangar Taxilane	New Hanover	Construct a new hangar taxilane to provide access into development hangar leasehold areas per ILM ALP. Includes (3759)
Gastonia Municipal Airport: Hangars	Gaston	Construction Site preparation for expansion of Hangar Area (5 hangars, 2 corporate)
Henderson-Oxford Airport: New Corporate Hangar	Granville	Construct a new 100' X 120' corporate hangar and associated apron. Includes PC Project Request Number: 2896.
Henderson-Oxford Airport: North Terminal Area Development	Granville	Construct a new parallel taxiway with terminal area apron and new terminal building Project will also include access road and parking for new terminal. Includes PC Project Request Numbers: 3462, 3463, 3464, & 3465.
Person County Airport: New Corporate Hangar	Person	This project will construct a new 130' x 120' corporate hangar at the Person County Airport. The hangar will include office space, restroom faciliites, vehicle parking lot, and apron area connected to the existing taxiway. A fire suppression system will also be installed in accordance with the NC Building Code requirements. Includes PC Project Request Number: 4174.
Henderson-Oxford Airport: Corporate Hangar - 50' x 60'	Granville	Construct a new 50' x 60' corporate hangar as well as apron taxilane and access road. Includes PC Project Request Numbers: 3067.
Person County Airport: Terminal Expansion and Parking Expansion	Person	Expand existing 2000 terminal building to +/-5000 sq ft. Expand terminal auto parking and 6in waterline from SR 1131 to terminal area. Includes PC Project Request Number: 2439.
Person County Airport: Airfield Pavement Strengthening	Person	Strengthen Runway Taxiway and Apron Pavements to 90000# for Critical Air Freight Aircraft. The design strength for current taxiway and apron pavements are 30000# SWG 68.000# DWG. The pavement PCI's range from 67 (Fair) on the runway 74 (Satisfactory) on the taxiways & 67 (Fair) on the apron. Airport currently has operations by aircraft in excess of the pavement design strength. Includes PC Project Request Number: 3406.

Project Name	County	Project Scope
CLT - Charlotte Douglas International Airport: Concourse B Expansion	Mecklenburg	Construct an additional 8-10 gates needed to support the future aircraft gate requirements. This expansion would widen the concourse and expand to the west off of the south end of the concourse. This includes passenger boarding gates hold rooms public restrooms circulation areas with moving sidewalks concession areas and other support areas. (3663)
CLT - Charlotte Douglas International Airport: Center Airfield Lighting Vault Relocation	Mecklenburg	Relocation of the Center Airfield Lighting Vault to facilitate the construction of the South Ramp Expansion to accommodate the Concourse B and Concourse C Expansions.(3666)
CLT - Charlotte Douglas International Airport: South End Around Taxiway	Mecklenburg	The Airport has proposed to construct an End Around Taxiway (EAT) that would extend south from the Taxiway V and S intersection, around the approach end of Runway 36C, and connect to Taxiway F. (4483)
CLT - Charlotte Douglas International Airport: Two Aircraft Hold Pads	Mecklenburg	This project would construct two hold pads between the west runway and the proposed fourth parallel runway. (4487)
CLT - Charlotte Douglas International Airport: Terminal Lobby Expansion Construction	Mecklenburg	Construct an expansion of the current terminal lobby including all four levels of the ticketing area for additional public circulation space main lobby area baggage claim lobby area security check point areas and airline ticket counter queuing spaces as well as associated mechanical and support areas. (3673)
CLT - Charlotte Douglas International Airport: Third Aircraft Rescue and Firefighting Station	Mecklenburg	Construct a third aircraft rescue and firefighting station as a requirement of the construction of a fourth parallel runway. (3671)
CLT - Charlotte Douglas International Airport: Deice Pad	Mecklenburg	Construct a dedicated deice facility. The centralized location will require the construction of a crossfield taxiway for planes to use during time-sensitive operations. To access the deice pad, the Airport will extend Taxiway F by 3,000 feet to the south toward the approach end of Runway 36C. (4481)
CLT - Charlotte Douglas International Airport: Satellite Terminal	Mecklenburg	Construct a satellite concourse to support future aircraft gate requirements. This includes passenger boarding gates, hold rooms, public restrooms, circulation areas with moving sidewalks, concession areas, and other support areas. (4482)
SVH - Statesville Regional Airport: Terminal Renovation	Iredell	Replace existing terminal with new facility in the same location as the existing aged facility PC 3371
CLT - Charlotte Douglas International Airport: General Aviation Group Hanger	Mecklenburg	This group hangar would be 52,000 sf of hangar space and 10,000 sf of Admin/Crew space with options to add more hangars adjacent or near the original in the future. (4484)
CLT - Charlotte Douglas International Airport: North End Around Taxiway Phases I & II (Half NEAT)	Mecklenburg	The Airport has proposed to construct an End Around Taxiway (EAT) that would extend north from the Taxiway V and N intersection, around the approach end of Runway 18C, and connect to the north end of the Concourse A and West Ramp Expansion Phase I. (4485)
CLT - Charlotte Douglas International Airport: North End Around Taxiway Phase (Full NEAT)	Mecklenburg	The Airport has proposed to construct an End Around Taxiway (EAT) that would extend north from a future taxiway on the west side of the proposed fourth parallel runway, turn east and take aircraft around the approach end of Runway 18C and the future runway. It will then connect to the north end of the Concourse A and West Ramp Expansion Phase I. (4486)
RCZ - Richmond County Airport: Taxiway Rehab	Richmond	Rehabilitate taxiway pavement (includes PC Project Request Numbers 3247 and 3248)
EQY - Charlotte-Monroe Executive Airport: Strengthen Runway to 95,000 Dual Wheel, Fillet Widening	Union	Currently, the pavement at EQY has a strength of 67,500 DW. With the increase in air traffic from larger aircraft, EQY intends to strengthen airfield pavement to 95,000 DW. This project will include the strengthening of the entire 7,000 foot Runway 5-23. (Proj. Req. #2822)e 7,000 foot Runway 5-23. (Proj. Req. #2822)

Project Name	County	Project Scope
EQY - Charlotte-Monroe Executive Airport: North Hangar Area Phase IA	Union	Construct an apron, a taxiway and access road for future corporate hangar development off the north corner of the parallel taxiway. This project is required to be completed prior to phase 1b and subsequent phases of the north hangar area to provide access to the runway and taxiway system. (includes Project Request Numbers: 2830)
EQY - Charlotte-Monroe Executive Airport: Strengthen Taxiways to 95000 Dual Wheel Fillet Widening (Phase 1)	Union	Rehabilitation and strengthening of taxiways to 95000 dual wheel and widen fillets at selected taxiways where group 3 aircraft operations are anticipated. This project is the next phase of improvements that include unfunded project elements and a continuation of project AV-5814.(2814)
EQY - Charlotte-Monroe Executive Airport: Terminal Building Expansion	Union	A proposed 6200 square foot expansion to the existing terminal building includes a new conference center reconfiguration of existing offices and new office space. (includes Project Request Numbers: 2831)
MRN - Foothills Regional Airport: New Terminal Building & Aircraft Parking Apron	Burke, Caldwell	Construct a larger replacement terminal building and expand aircarft parkign apron. PC Project Request Number 3202
MRN - Foothills Regional Airport: T-Hangar Expansion	Burke, Caldwell	Construct new T-Hangars. PC Project Request Number: 4179
ISO - Kinston Regional Jetport at Stallings Field: Construct North Parallel Taxiway	Lenoir	PC Project Request Number(s): 2727, 3128, 3141, 3142, 2725. Construct parallel taxiway to accommodate future hangars and traffic.
ISO - Kinston Regional Jetport at Stallings Field: Northside Development Area	Lenoir	171,500 sq ft hangar w/fire suppression system and concrete apron and taxiway for MRO facility north of Runway 23 threshold. Project includes taxiway and landside improvements Project Requests 3476 & 3477
ISO - Kinston Regional Jetport at Stallings Field: Construct Hangar Development	Lenoir	Construct Taxilane to T-hangar area (Phase 2) at the southeast end of the airfield. Approximately 510'x45') and apron (approximately 510'x190'). Also construct a new 10 unit T-Hangar. PC Project Request Number(s): 2722, 3135
ISO - Kinston Regional Jetport at Stallings Field: PCC Apron Construction	Lenoir	Construct PCC apron north side of Runway 5 (North Cargo Area) for corporate hangar area (approx. 8,200 sy) . PC Project Request Number: 3220
DPL - Duplin County Airport: MALSR Construction	Duplin	Installation of new medium intensity approach lighting with rails for Runway 23. PC Project Request number: 4254
DPL - Duplin County Airport: Connector Taxiway	Duplin	Install new taxiway connector between the runway and taxiway just north of the t-hangar area. PC Project Request Number: 4105
W40 - Mount Olive Municipal Airport: Airport Entrance Road Improvements	Wayne	Realign Mount Olive Airport Road between Everett Road and the terminal area to allow for the development proposed in the terminal area. This work would include rehabilitation of approximately 400 ft of existing roadway and construction of approximately 600 ft of new roadway. PC Project Request Number: 3397
DPL - Duplin County Airport: Corporate Hangars & Terminal/Corporate Apron Expansion	Duplin	Expansion of the new corporate area between the terminal building and the Airpark. Project will include construction of an approximately 5,600 sy concrete apron expansion; site preparation and construction of two 120'x100' hangars; and construction of an asphalt access road and parking lots to serve the hangars. PC Project Request Number: 3261
DPL - Duplin County Airport: Industrial AirPark Development Phase II	Duplin	Establishment of four industrial lots, 4-100'x100' hangars each with 2000 SF of office space, and the development of associated airside infrastructure (aprons/taxilane) as well as landside roadway access. This project includes wetland mitigation which is included in the cost of the development.PC Project Request Number: 3262

Project Name	County	Project Scope
W40 - Mount Olive Municipal Airport: Apron Expansion & Airport Entrance Road Improvements	Wayne	Construction of approximately 8,000 SY of new apron space to provide additional aircraft parking, maneuvering space and to allow the Jet A and AV Gas fuel systems to be installed in their ultimate locations depicted on the ALP. Also, Realign Mount Olive Airport Road between Everett Road and the terminal area to allow for the development proposed in the terminal area. This work would include rehabilitation of approximately 400 ft of existing roadway and construction of approximately 600 ft of new roadway. (PC #'s 2327 & 3397)
W40 - Mount Olive Municipal Airport: T-Hangar Taxiway Construction	Wayne	Construction of a new T-Hangar taxilane to serve a future T-hangar at Mt Olive Airport. PC Project Request Number: 2338
W40 - Mount Olive Municipal Airport: T-Hangars & Taxiway Construction	Wayne	Construction of a new T-Hangar taxilane and a 10 unit T-Hangar building. PC Project Request Number: 4322 & 2338
W40 - Mount Olive Municipal Airport: Perimeter Fencing	Wayne	Installation of perimeter fencing around the airport to increase airport security and help reduce any potentialwildlife issues. PC Project Request Number: 2328
EWN - Coastal Carolina Regional Airport: Future Development Land Acquisition	Craven	Land acquisition of approximately seven acres on Clermont road to accommodate future expansion of the airport. Joined with the property on which the old passenger terminal was located provides easy access to Runway 4/22 and Runway 14/32. (3172)
EQY - Charlotte-Monroe Executive Airport: Air Traffic Control Tower & Access Road	Union	Construct new air traffic control tower and construct a new access road to the proposed air traffic control tower. (includes Project Request Numbers: 2832)
OAJ - Albert J. Ellis Airport: Entrance Roadway Extension and Realignment	Onslow	Construct new entrance road between the terminal area and N.C. 111. (3110)
OAJ - Albert J. Ellis Airport: GA Terminal Access Roadway Phase 3	Onslow	Construct new roadway to divert traffic away from the main terminal (3104)
OAJ - Albert J. Ellis Airport: Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights	Onslow	Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights project. (4310)
OAJ - Albert J. Ellis Airport: OAJ - Air Carrier Apron Improvements	Onslow	This project will rehabilitate existing heavy aircraft pavement in the Terminal area. Milling and overlaying of asphalt and replacing joint sealant on PCC pavement. (4311)
OAJ - Albert J. Ellis Airport: GA Apron Expansion and Hangar Site Preparation	Onslow	Construction a southern expansion of the GA Apron and site preparation. (4309)
EXX - Davidson County Airport: Corporate Hangar Construction	Davidson	Construct a 10,000 square foot corporate hangar on the east side of the Davidson County Airport to accommodate requests for this type of facility. The airport has received several request for corporate hangar space and are currently unable to accommodate the aircraft. This project includes PC Project Request Number 4319.
OAJ - Albert J. Ellis Airport: OAJ - Taxiway Mill/Overlay/Strengthening	Onslow	This project will mill and overlay the main parallel taxiway A. (4312)
EXX - Davidson County Airport: Avionics Shop Hangar, 16 T-Hangars, 10,000 sf Corporate Hangar	Davidson	The Avionics Shop includes the environmental document, design, bidding and construction of a new 10,000 SF hangar with 3,000 SF of office space. The project includes PC Project Request Number: 4315. The T-Hanger will fill an immediate need boosting the County's tax base and increasing operations at the airport. The Project includes PC Project Request Number: 2536. The airport has a shortage of corporate hangar space. This Project includes Project Request Number: 4319.
EXX - Davidson County Airport: T-Hangar Construction	Davidson	Construction of these T-Hangars is needed to meet current demand. They will be located adjacent to the existing t-hangars on the east side of the airport. This project includes the PC Project Request Number 2536.

Project Name	County	Project Scope
EXX - Davidson County Airport: Construct Avionics Hangar	Davidson	The Avionics Hangar will be centrally located and adjacent to the maintenance hangar. There is a avionics shop owner that would like to relocate to the airport. The project includes the PC Project Request Number 4315.
IXA - Halifax Northampton Regional Airport: T-Hangars	Halifax	Construction of one 12-unit T-hanger building that is a little bigger than the standard T-hangers (includes Project Request Numbers: 2789)
BUY - Burlington - Alamance Regional Airport: Aviation Terminal Building and Terminal Area Development	Alamance	This project will perform land acquisition and construction of new Terminal (8000 sf) and Flight Operations (55000 sf). Included with this project is the public access road public vehicle parking and aircraft parking apron and approximately 9 acres of land acquisition. It will take over 5 years to complete all phases of this project. Includes PC Project Request Numbers: #4477 & 4478
ILM - Wilmington International Airport: Widen North-South Taxiway System	New Hanover	The airport has had plans to widen the North-South TWY system to make the width consistent throughout. Currently the TWY system width ranges from 51 to 75 feet. The project will also add shoulders and keep the TWY lights on pavement to reduce mowing and maintenance. Includes (2988)
MQI - Dare County Regional Airport: Southeast Box Hangars	Dare	Construct a 3-unit box hangar adjacent to the taxilanes and 14-unit T-Hangar that was most recently constructed (Southeast side) in accordance with Airport Master Plan and ALP. (includes Project Request Numbers: 2358)
7W6 - Hyde County Airport: Corportate Hangars Apron and Taxiway	Hyde	Design and Installation of 3 60'x60' Corporate Hangars and associated apron/taxiways (3078)
EDE - Northeastern Regional Airport: Box Hangars	Chowan	The airport has a waiting list for hangars. This project provides additional box hangars. (2482)
PMZ - Plymouth Municipal Airport: Corportate Hangars Apron and Taxiway	Washington	Construct 80'X100' corporate hangar including site preparation apron and taxilane access. (includes Project Request Numbers: 2734)
ONX - Currituck County Regional Airport: Corportate Hangar with Office	Currituck	Construction of 10000 SF Corporate Hangar and 3000 SF office space. (includes Project Request Numbers: 2624)
ONX - Currituck County Regional Airport: T-Hangar Apron and Taxiway	Currituck	Construction of one new 10-unit T-Hangar and Hangar Taxiway and Apron Site work and Paving. (includes Project Request Numbers: 2633)
EWN - Coastal Carolina Regional Airport: Runway 4/22 Extension 500'	Craven	Extend main runway 500 feet (3827, 3724)
JQF - Concord Regional Airport: North Apron Expansion	Cabarrus	The proposed project is for the construction of an apron expansion to the north. The dimensions of the apron expansion will be approximately 300' X 300'. (2247)
ILM - Wilmington International Airport: Widen Taxiways	New Hanover	Increase width of all taxiways to 75' that will accomendate all aircraft that utilize ILM. Includes Project Request Number: (3450)
ILM - Wilmington International Airport: Taxiway J Improvements	New Hanover	This project will be designed and constructed to meet the new FAA requirements which does not allow direct access to or from an aircraft ramp to a runway. Includes (Project Request Number: 3810)
IXA - Halifax Northampton Regional Airport: Apron and Taxilane for Corportate Hangars	Halifax	Construction of taxilane and apron for corporate hangar development and site preparation for 6 corporate hangars and associated parking lots. (includes Project Request Numbers: 2170)
ILM - Wilmington International Airport: Runway 6-24 Pavement Rehabilitation	New Hanover	Rehabilitate runway 6-24 due to it exceeding its useful life of 20 years. Signs of alligator cracking in the pavement and exposed aggregate on the runway. This project will include all runway markings and possible taxiway markings. Includes (3787)
ETC - Tarboro-Edgecombe Airport: Runway Extention to 5000	Edgecombe	Upgrade runway by 1000 ft to a length of 5000 ft. (3771)

Project Name	County	Project Scope
SVH - Statesville Regional Airport: RUNWAY 28 EXTENSION TO 8000' (Phase 2)	Iredell	Project consists of extending the runway from its current length of 7000' to 8000 to the east. Phase II completes mitigation, site preparation, paving & lighting for the runway extension after the land acquisition and road relocation is completed in Phase I. PC# 4167, 4168 & 4169"
GSO - Piedmont - Triad International Airport: Taxiway J between Taxiway A and D	Guilford	New taxiway to increase capacity and improve aircraft movement between Taxiways A and D. (4480)
GSO - Piedmont - Triad International Airport: Perimeter Road	Guilford	Construct Perimeter Road on southeast side of the airport to improve safety, access, and response time for emergency vehicles. (4457)
GSO - Piedmont - Triad International Airport: Perimeter Fence	Guilford	"Construct perimeter fencing to improve safety around the airport. (4459)
GSO - Piedmont - Triad International Airport: Extension of Runway 32	Guilford	"Runway 14-32 will be extended 875 feet on the 32 end to increase the overall length to 7,255 feet. Will provide future operation projections and improve capacity. (4456)
MRN - Foothills Regional Airport: Full Parallel Taxiway	Burke, Caldwell	Construct partial parallel taxiway to Runway 3 end for full parallel per FAA standards. PR#2577
FQD - Rutherford County - Marchman Field: East Airfield Development & Terminal Building	Rutherfordton	Design and site work to provide a partial parallel taxiway and new apron for larger corporate aircraft parking fueling and hangar development. This project also consists of a terminal building to serve the east side of the airport. (2269, 2920)
FQD - Rutherford County - Marchman Field: Full Parallel Taxiway	Rutherfordton	Construct a new taxiway with the standard 300' of separation from the Runway (3798)
ILM - Wilmington International Airport: Runway 35 Wind Cone/PAPI Replacement	New Hanover	Replace PAPI and wind cone equipment consistent with end-of-life cycle replacement schedule. (3805)
ILM - Wilmington International Airport: Runway 17/35 Blast Pads	New Hanover	Increase safety by constructing new blast pads, project simultaneous with runway pavement replacement project. Reduces Foreign Object Debris and erosion. Includes PC (3814)
ILM - Wilmington International Airport: Runway Protection Zone (RPZ)	New Hanover	At the approach of runway 17 is developed property and per FAA Standards, the airport would like to purchase and own the Runway Protection Zone (RPZ) in Fee for Land Use Compliance. (Project Request Number: 3804)
ILM - Wilmington International Airport: Midfield Taxiway Improvements	New Hanover	Improve Safety by removing an FAA identified ?Hot Spot? safety area that may cause confusion during airfield navigation. (Project Request Number: 3760)
ILM - Wilmington International Airport: Runway 6-24 Blast Pads	New Hanover	Increase safety by replacing deteriorating blast pads, project simultaneous with runway pavement replacement project, reducing foreign object debris and extending pavement life of runway. (3807)
ILM - Wilmington International Airport: Runway 24/Taxiway Extension	New Hanover	Increase capacity for larger aircraft by extending runway length and providing aircraft access to the future runway end. Includes PC (3822)
ILM - Wilmington International Airport: Runway 6 MALSR Catwalk	New Hanover	Improve safety and capacity by installing MALSR and Catwalk (with FAA Funding assistance) to reduce approach minimums on primary runway. Includes PC (3813)
FQD - Rutherford County - Marchman Field: Runway 5 Extension to 6,000'	Rutherfordton	Extend the runway to 6000' as shown on the current ALP. (includes Project Request Numbers: 3209)
ASJ - Tri-County Airport: Hangar Taxiway and 6-Unit T-Hangars	Hertford	This project will construct a new 6-Unit T-Hangar at Tri-County Airport. The project will also construct a new taxilane to provide access to the T-Hangars from the existing North Apron. (2648)
LHZ - Triangle North Executive Airport: New Terminal, Landside and Airside Improvements	Franklin	Construct new airport terminal, landside parking/access and utilities, and airside access (apron, taxilane) (includes PR #2685)

Project Name	County	Project Scope
LHZ - Triangle North Executive Airport: Airport Rd Relocation & Industrial Area Access	Franklin	Relocate Airport Rd., and associated utilities, purchase ROW, construct access road and apron to accommodate the intended use of the industrial/commercial area. (Includes PR #3536 & 4239)
LHZ - Triangle North Executive Airport: NAVAID Improvements	Franklin	Relocate the AWOS, replace existing MALSR, upgrade the glideslope (includes PR #3677)
ZEF - Elkin Municipal Airport: Hangar Site Preparation and T-Hangar Taxilane - East	Surry	This project will prepare multiple individual hangar location for build out by the airport or individuals. This project will construct an 10 Unit T-hangar and prepare site ready locations for box hangars on the eastside of the terminal area. PC#2222
ZEF - Elkin Municipal Airport: Box Hangar	Surry	This project will include site preparation and construction of one box hangar. Site preparation will also be completed for additional box hangars (leaving site ready platforms). Large Box Hangars are needed to enable additional aircraft to be based in multi aircraft and corporate aircraft hangars at the airport. PC#4141
MWK - Mount Airy-Surry County Airport: New General Aviation Apron and Terminal Building	Surry	Construct new GA apron and terminal building, parking lot, and entrance road. Includes PC Project Request Number: #2601
AFP - Anson County - Jeff Cloud Field: Acquire privately owned existing hangars and land.	Anson	Airport is Currently leasing privately owned hangars on privately owned land which abuts airport property.
ZEF - Elkin Municipal Airport: Runway 7 Extension 1000 FT with Partial Parallel Taxiway	Surry	This project will extend the Runway 7 end 1000 ft and complete a partial parallel taxiway on the same end. Land acquisition is needed for the runway protection zone. PC#2981
OCW - Washington-Warren Field: T-Hangar and Taxiway	Beaufort	Includes construction of a new 6 unit T-Hangar Site Preparation and necessary taxiway located south of the existing T- Hangar development. The airport requests the ability to reserve FY 17 18 and 19 Vision 100 Funds to complete this project. (includes Project Request Numbers: 2672)
IPJ - Lincolnton-Lincoln County Airport: Runway-Taxiway Lighting Rehabilitation	Lincoln	Rehabilitate existing runway and taxiway edge lighting systems. Included in this project would be the replacement of the existing runway edge lights with new height intensity base mounted edge lights, installation of conduit, replacement of all associated vault electrical equipment. Also included in this project would be the replacement of MITL fixtures with base mounted LED fixtures, installation of conduit, replacement of all cables and replacement of all associated vault equipment.
IPJ - Lincolnton-Lincoln County Airport: South Corporate Hangar Taxilane and Vehicular Drive	Lincoln	A new paved asphalt/stone base corporate hangar taxilane, a new concrete/stone base apron and a new paved/stone base vehicular drive. This phase of the total project involves construction only.
AKH - Gastonia Municipal Airport: New Terminal Building	Gaston	GA Terminal Bldg: Upgrade Existing, reconfiguration of existing offices and new office space for FBO, customers, pilots and citizens, also to upgrade security of current facility
PGV - Pitt-Greenville Airport: Corporate Hangars	Pitt	"Corporate Hangar Construction (4333)
PGV - Pitt-Greenville Airport: Runway 8-26 Rehabilitation	Pitt	"Runway 8-26 Rehabilitation & Removal of 3rd Runway & Associated Taxiways (4329)
PGV - Pitt-Greenville Airport: Design & Construct Rehabilitate Taxiways	Pitt	"Design & Construct Rehabilitate Taxiways A (North), A5, A6, A7 and Improve Runway 2-20 Subgrade between A6 & A7
PGV - Pitt-Greenville Airport: Drainage Improvements-City of Greenville Swale	Pitt	"Drainage Improvements-City of Greenville Swale (4327)
AKH - Gastonia Municipal Airport: Runway Realignment Extension	Gaston	Extension of the existing runway 03/21 from its current length of 3,770 feet to a total length of 5,000 feet across Union Road to the south, with associated parallel taxiway. Includes construction of roadway tunnels along the ultimate alignment of Union Road to pass vehicular traffic under the extended runway and taxiway system.

Project Name	County	Project Scope
PGV - Pitt-Greenville Airport: Replace AWOS	Pitt	Replace AWOS
PGV - Pitt-Greenville Airport: Design, Construct-Rehabilitate South Taxiways	Pitt	"Design, Construct-Rehabilitate Taxiways A (South) A1, A3, A4 (4328)
PGV - Pitt-Greenville Airport: Security Fence Replacement & Perimeter Road Improvements	Pitt	"Security Fence Replacement & Perimeter Road Improvements (2557)
EHO - Shelby-Clevland County Regional Airport: Runway 5 Extension and NAVAIDs	Cleveland	Environmental Assessment, Land Easements for Runway Extension, Extend Runway to 5,500 Feet, Localizer Antenna & MALSR. An environmental assessment must be performed requesting a FONSI for a runway extension prior to the construction of the runway, extended runway safety area and parallel taxiway extension. Approximately 55.3 acres of avigation easement needs to be acquired for the future runway extension that are not currently under control by the City of Shelby. Obstruction clearing will also be included in this project. This project includes extending the runway 5 end a distance of 500 feet, along with a corresponding extension of the parallel taxiway to the new runway end. Also included is a 150 foot wide by 300 foot long extended runway safety area beyond the new runway end.
SIF - Rockingham County / NC Shiloh Airport: Terminal Apron Expansion (New Apron and Access Taxiway)	Rockingham	Expand terminal apron (includes Project Request Numbers: 2542).
PGV - Pitt-Greenville Airport: Taxiway A North Jet Blast Deflector	Pitt	Install Jet Blast Deflector at Taxiway A North (4331)
ETC - Tarboro-Edgecombe Airport: T-Hangars & Taxilane	Edgecombe	Construction of a 6-unit T-Hangar building and taxilanes for access (3431)
PGV - Pitt-Greenville Airport: Taxiways B & C Rehabilitation	Pitt	"Rehabilitate Taxiways B & C (4332)
ETC - Tarboro-Edgecombe Airport: Corporate Apron and Hangar	Edgecombe	Expand the Corporate Apron by 8,400 SF and construct a 80' X 80' Hangar. (2898)
JNX - Johnston Regional Airport: T-Hangars Apron and Corporate Area Site Prep	Johnston	This project provides for construction of the new corporate area development. It will include the construction of a new t-hangar area and construction of a new apron. Elements of construction will include clearing and grubbing grading and drainage paving and erosion control measures. (includes Project Request Numbers: 2127)
JNX - Johnston Regional Airport: Taxiway Widening	Johnston	The existing taxiway pavements will be approaching the end of their useful life and require pavement rehabilitation. Assumed design would include a 3"' asphalt maintenance overlay. The taxiways will be widened to 50' at this time to conform to C- III standards. (includes Project Request Numbers: 2129)
AFP - Anson County - Jeff Cloud Field: Frontage Road Land Acquisition	Anson	To purchase land along SR 1645 to make airport grounds contiguous to the surrounding road with no breaks.
VUJ - Stanly County Airport: Visual Clearing	Stanly	The airport has several extended areas of perimeter overgrowth which is starting to impede the line of sight for certain aircraft during takeoff. These areas are in need of extensive tree removal for safety during departure and take-off.
RCZ - Richmond County Airport: Fuel Farm Modification	Richmond	Modify the existing fuel farm so that Jet 'A' can be pumped as self-service and sold through the existing point of sale system.
TTA - Raleigh Executive Jetport at Sanford-Lee County: South Side Site Prep	Lee	Site preparation for hangar development on south side of airport
TTA - Raleigh Executive Jetport at Sanford-Lee County: Wildlife Protection Fence	Lee	Construct wildlife protection fence (Partner Connect ID 3881)

Project Name	County	Project Scope
AFP - Anson County - Jeff Cloud Field: Airport Perimeter Fencing	Anson	"This project would fund the completion of perimeter fencing to AFP. The airport currently has only partial fencing and still needs approx. 2000 lin.ft. to be fully contained. The prior section was funded through MPE, and project bids exceeded the available funding.
TTA - Raleigh Executive Jetport at Sanford-Lee County: Develop areas east of airport	Lee	Develop new aviation-related business areas east of airport (Partner Connect ID 3877).
TTA - Raleigh Executive Jetport at Sanford-Lee County: Wash, Fuel, Run-up Area, Fuel Truck Parking	Lee	Improve wash/fuel facilities, fuel truck parking (Partner Connect ID 4133 and 4134)
VUJ - Stanly County Airport: Land Purchase for Sight-line extension	Stanly	This project scope is to purchase several parcels of privately owned land surrounding the perimeter of the Stanly County Airport. The purchase of this land will allow for the sightline improvements and future airport expansion.
RCZ - Richmond County Airport: Runway lighting rehab and PAPI replacement	Richmond	Rehabilitate the aging Runway 14-32 lighting and replace outdated PAPIs which both systems are over 20 years old. Additionally, the Airport has been having problems with pilots trying to utilize the radio controller in the electrical vault. (Includes PC Project Request numbers 3245 and 3246)
RCZ - Richmond County Airport: Extend Runway 14 RSA	Richmond	Extend Runway 14 Runway Safety Area and relocate displaced threshold. (Includes PC Project Request Numbers 2938 and 3237)
OCW - Washington-Warren Field: Gravity Sewer Line to serve hangars	Beaufort	Project involves installation of approximately 2400 LF of new gravity sewer line from the intersection of Airport Road and Market Street to the terminal area to serve existing and future corporate hangar tenants and the maintenance hangar. (includes Project Request Numbers: 3002)
MCZ - Martin County Airport: T-hangar	Martin	Construct a 10 unit T-Hangar Construct an access road to existing T-hangars (includes Project Request Numbers: 2156/2154)
RCZ - Richmond County Airport: 10 Unit T-Hangar	Richmond	Preparation of site for and construction on a 10 Unit T-Hangar. (Includes PC Project Request Number 4238)
TTA - Raleigh Executive Jetport at Sanford-Lee County: T-Hangar Construction	Lee	Construct 15-unit T-hangar building (Partner Connect ID 4132)
TTA - Raleigh Executive Jetport at Sanford-Lee County: Corporate Hangar Apron Expansion Phase 2	Lee	Construct phase 2 of corporate hangar apron expansion project (Partner Connect ID 2401). Please note this project was previously funded in P4.0 as AV-5856 but lost its funding in P5.0.
TTA - Raleigh Executive Jetport at Sanford-Lee County: West Side Taxi Lane Connection and Taxi Lane Rehab	Lee	Build new taxi lane connecting south ramp road and all taxi lanes on Ammons Farm Roadside of T-hangars (Partner Connect ID 3883); rehabilitation of T-hangar taxi lanes (Partner Connect ID 3882)
RCZ - Richmond County Airport: Corporate Hangars	Richmond	12,000 sf Corporate Hangar and apron extension.
MCZ - Martin County Airport: Corporate Hanger	Martin	Construct 60'x60' corporate hangar. (Includes Project Request Numbers: 2837)
OCW - Washington-Warren Field: Maintenance Hangar	Beaufort	Project includes design and construction of new 100' x 100' maintenance hangar. The existing hangar was damaged during the tornado that hit the airport in 2012. The airport request the ability to reserve FY 17 18 and 19 vision 100 Funds to complete this project. (includes Project Request Numbers: 3003)
RCZ - Richmond County Airport: Fuel Farm Construction	Richmond	Design and construction of a new fuel farm and fuel truck access road (includes PC Project Request Numbers 2941 and 3240.
SOP - Moore County Airport: Hangar Development (2502)	Moore	Continue hangar development per GA development plan as demand warrants. Includes construction of a new 10 Unit T-Hangar and 5 Unit Box Hangar. (Partner Connect ID 2502)

Project Name	County	Project Scope
SCR - Siler City Municipal Airport: Parallel Taxiway	Chatham	Construct parallel taxiway (Partner Connect ID 3124 and 3127)
SOP - Moore County Airport: Apron Pavement Strengthening	Moore	Strengthen pavement in four apron areas where the pavement is more than 25 years old. Includes construction of a new concrete apron where larger aircraft park today (100,000# DWG), as well as construction of new pavement and rehabilitation of existing bituminous pavements. (Partner Connect ID 2490)
SOP - Moore County Airport: Hangar Development (2925)	Moore	Continue hangar development per GA development plan as demand warrants. Includes construction of a new 10 Unit T-Hangar and 5 Unit Box Hangar. (Partner Connect ID 2925)
SOP - Moore County Airport: Taxiway Pavement Strengthening	Moore	Rehabilitate and strengthen taxiways to support 100,000 lb DWG aircraft loads (Partner Connect ID 3396)
SOP - Moore County Airport: Corporate Hangar Development	Moore	Construct a 120x100 executive hangar (Partner Connect ID 2506)
SOP - Moore County Airport: Hangar Taxiways Phase 3	Moore	Construct Hangar Taxiways to new hangar area. (Partner Connect ID 2509)
SOP - Moore County Airport: Runway Pavement Strengthening	Moore	Strengthen runway pavement (Partner Connect Project # 3229)
IXA - Halifax Northampton Regional Airport: Maintenance Hangar	Halifax	The proposed maintenance hangar will be located approx. 850 feet southwest of terminal. Construction of a 100' X 120' aircraft maintenance hanger. (includes Project Request Numbers: 2791)
GWW - Wayne Executive Jetport: Terminal Building	Wayne	Construction of new 6000 sq ft terminal building to accommodate additional users (includes PC Project Request Number: 2146).
GWW - Wayne Executive Jetport: Apron Expansion, Corporate Hangars and Hangar Access Road	Wayne	Expansion of the existing aircraft apron and construction of 2 new corporate hangers (100' x 100'). Also includes construction of an access road (approximately 750 linear feet) and parking for existing and future corporate hangers (includes PC Project Request Numbers: 3546, 2148, 4476).
GWW - Wayne Executive Jetport: T-Hangar Building - Phase 1	Wayne	Construction of new 12 unit t-hangar building on hangar-ready site (includes PC Project Request number 4122).
GWW - Wayne Executive Jetport: Land Acquisition (~14 Ac.) for Future Airport Development	Wayne	Acquisition of approximately 14 acres of land adjacent to Airport Road for future development (includes PC Project request number 3544).
GWW - Wayne Executive Jetport: Parking Lot Reconfiguration	Wayne	Expand existing terminal area parking and re-design existing layout (includes PC Project Request number 3547).
GWW - Wayne Executive Jetport: New Taxilane & T-Hangar (Phase 2)	Wayne	Construction of new t-hangar taxilane and a 12-unit t-hangar building (includes PC Project request number 3548 and 4257).
GWW - Wayne Executive Jetport: Runway Safety Area (RSA) Improvements	Wayne	Eliminate Ditches in Runway Safety Area (RSA) and correct grade deficiencies to improve safety (includes PC Project Request number 3042).
GWW - Wayne Executive Jetport: Airfield Pavement Strengthening	Wayne	Strengthening of existing airfield pavement to accommodate use by larger aircraft. The proposed pavement strength should, at a minimum, be increased to 65,000 lbs. DW and an ACN of 12 (includes PC Project request numbers: 3549 & 4258)
Wayne Executive Jetport: Land Acquisition (~37 Ac.) for Future Hangar Development	Wayne	Acquisition of approximately 37 acres of land for expansion of the Corporate Area (includes PC Project request number 3754).
Wayne Executive Jetport: Land Acquisition - Easement (~91 Ac.)	Wayne	Easement acquisition of ~91 Acres for future Runway 23 approach (includes PC Project Request number 3552).
Wayne Executive Jetport: Perimeter Fence (Construction)	Wayne	Removal of existing fence and installation of approximately 1,100 LF of ornamental fence in the terminal area and approximately 19,000 LF of wildlife fence around the airport perimeter. (includes PC Project Request numbers 2149,4253 and 4255).

Project Name	County	Project Scope
Wayne Executive Jetport: Runway 23 Extension & Glide Slope Relocation	Wayne	1,000' Extension of Runway 23 and NAVAID relocation/installation. Includes fee simple acquisition of ~33 AC needed for the extended runway and RPZ. This project includes the following Wayne County Parcel ID Numbers: 0032210, 0066664, 0100875, 0100877, 0100878, 0100879, 0032207, 0100880, 0100876, 0032256, 0102207, 0032160 (partial), 0032209, & 0032161. (includes PC Project Request number 3302 & 4416).
Wayne Executive Jetport: LAND ACQUISITION - CORPORATE AREA	Wayne	Fee simple acquisition of a 19.6 AC parcel (ID #0031235) of land needed for the future expansion of the Corporate Area. (includes PC Project Request number 3551).
Wayne Executive Jetport: Land Acquisition - Easement (~25 Ac.)	Wayne	Easement acquisition of ~25 acres for AWOS critical area and transitional surface (includes PC Project Request number 3554).
Harnett Regional Jetport: Runway Extension to 5500'	Harnett	The project will extend the runway from 5000 feet to 5500 feet and provide a 150-foot-wide runway safety area (RSA). (Project Request Numbers: 2191 & 3048)
Harnett Regional Jetport: Terminal Area Hangar Dev.	Harnett	This project will provide land acquisition of approximately 35 acres and construction of new T-hangars and Corporate hangars with the required supporting infrastructure (i.e. taxiways/taxilanes, access roads, utilities, etc.) for the Airport. (PC #2194)
Pitt-Greenville Airport: Airfield Drainage Improvements	Pitt	Airfield Drainage Improvements (2558)
Clinton-Sampson County Airport: Hangars	Sampson	There are currently no airport owned hangars available for lease on the airport and no leasable area for new private/corporate hangar construction. This project will develop a hangar complex adjacent to the new southwest parallel taxiway. This project will include site preparation for and construction of two 8-unit 40x40 Hangars. (includes Project Request Numbers: 2464)
Curtis L Brown Jr. Field: Corporate Taxilane & Hangars	Bladen	Site preparation and construction of two new corporate hangars. Project to include site preparation, taxilane and ramp paving, utility installation and construction of two hangars (one 80'x80' and one 100'x100') (includes Project Request Numbers: 2142, 4474)
Pitt-Greenville Airport: Access Road Improvements	Pitt	Access Road Improvements (2549)
Clinton-Sampson County Airport: Hangars 2	Sampson	There are currently no airport owned hangars available for lease on the airport and no leasable area for new private/corporate hangar construction. Project will develop a hangar complex adjacent to the new southwest parallel taxiway over the course of four phases. This project will include site preparation for and construction of two 8 unit 40x40 Hangars.(includes Project Request Numbers: 3265)
Curtis L Brown Jr. Field: Airport industrial park phase II	Bladen	Phase 2 - Airport industrial park. Site prep for and construction of three 150'x120' hangars and construction of approximately 5560 sq yd aircraft apron and parking lot. Includes Project Request Number 3404 & 4475.
Pitt-Greenville Airport: Rental Car Facility	Pitt	Construct a Consolidated Rental Car Facility. (3275)
Western Carolina Regional Airport: New Terminal	Cherokee	Construct Terminal Building (includes Partner Connect Request Number: 2955)
Shelby-Clevland County Regional Airport: Taxiway Overlay, Widening and Direct Access Taxiways	Cleveland	Correct nonstandard taxiway geometry with fillet taper widenings. Also includes two new taxiway connectors that will replace two nonstandard direct access taxiways. A nominal 3 inch overlay will also be done in this project. All taxiway markings and lights/signs will also be replaced.

Project Name	County	Project Scope
Tucker St; East of Burlington-Alamance Airport	Alamance	Create access from Tucker St into facility
N.C. 49; East of Burlington-Alamance Airport	Alamance	Improvements
N.C. 62; West of Burlington-Alamance Airport	Alamance	Expansion
Burlington-Alamance Airport; On-campus	Alamance	Build storage sites for businesses
I-69; Piedmont Triad International Airport	Guilford	Proposed Interstate
Piedmont Triad International Airport; On-campus	Guilford	Proposed multimodal yard
Piedmont Triad International Airport; On-campus	Guilford	Proposed rail spur on the west side of the facility

Seaports

Project Name	County	Project Scope
Port of Wilmington; Container Yard Expansion Plan	New Hanover	Refrigerated capability, complete paving, container berth improvements, dedicated intermodal facility, and new container cranes
Port of Wilmington; North Gate & Inland Road Improvements	New Hanover	New north gate, and improving U-5734, U-5729, U.S. 74 & U.S. 70 to highway standards
Port of Wilmington; Channel Deepening	New Hanover	Deepening from 42 to 47 ft
Port of Morehead City; Infrastructure Improvements	Carteret	Berths 4/5, 6/7, and 8/9 improvements
Port of Morehead City; Expansion Capital	Carteret	New warehouse north of A-Frame building, new bulk warehouse W6 (was W8)
Port of Morehead City; Expansion Capital	Carteret	Radio Island development and rail improvements

SHAPING NORTH CAROLINA'S FREIGHT FUTURE

The world is quickly changing, and North Carolina must be proactive, resilient and flexible in responding to those changes. However, the traditional planning process relies on trying to predict the future based on a single long-term forecast. The peril of planning based on a single forecast is that, if the "most likely" future fails to occur, investments may be less effective, ineffective or even counterproductive. There also is an opportunity cost – investing in the wrong solutions implies that not enough was invested in the right ones.

This Plan update has carried forward, unchanged, the scenarios that were developed during the last freight plan. These overarching strategies developed from the scenarios remain pertinent to understanding the future of North Carolina's Freight Network. Sub-strategies have been updated to reflect changes in the freight industry as well as North Carolina's overall economy.

The Freight strategies are:

- Funded Projects (Immediate Strategies) address a current need and are generally projects existing within the STIP. Robust Strategies are priority strategies that may not be funded or only partially funded.
- Hedging Strategies are projects that might not be necessary but would need to be under implementation now.
- Transformative Strategies place North Carolina on the cutting edge of innovative trends within the United States and Internationally.
- Deferred Strategies are items where a wait-and-see approach is appropriate.

Fiscally Constrained Freight Investment Plan

A fiscally constrained Freight Program has been developed for FY 2023-2028. The fiscally constrained plan relies upon funding from FHWA through the NHFP and NCDOT funding from the State Highway Trust fund. Rail, port, and air cargo projects can be found in Chapter 7 of the plan.

Immediate Strategies

The immediate-term strategy for the use and allocation of NHFP dollars is the maintenance and improvement of the existing condition of the NCFN. The repair and rehabilitation needs that have been identified under the previous plan remain a priority. Maintaining a high-quality freight network contributes to overall safety, mobility, and economic competitiveness.

Project Name	TIP / Project Number	County	Programmed Project Cost ($M)	Total Federal Share ** ($M)	NHFP ($M)	Match ($M)	Source of Match
2023			**$60.11**	**$48.08**	**$36.16**	**$5.47**	
Asset Management and Utilization			**$60.11**	**$48.08**	**$36.16**	**$5.47**	
US 64: SR 1306 (South Old Franklin Road) to SR 1603 (Old Carriage Road). Pavement Rehabilitation.	I-6045	Nash	$19.30	$15.44	$12.66	$3.86	State Highway Trust Fund
US 74 (Future I-74): East of NC 41 to the Columbus County Line. Pavement Rehabilitation.	HI-0016	Robeson	$9.20	$7.36	$6.25	$1.84	State Highway Trust Fund
US 74 (Future I-74): Scotland County Line to I-74/US 74 Business. Pavement Rehabilitation.	HI-0017	Robeson	$3.00	$2.40	$2.00	$0.60	State Highway Trust Fund
I-26: Mile Marker 65 to South Carolina State Line. Pavement Rehabilitation.	I-5927	Polk	$20.60	$16.48	$13.85	$4.12	State Highway Trust Fund
I-277: West of I-77 to East of I-77. Bridge Rehabilitation.	I-6052	Mecklenburg	$8.01	$6.40	$1.40	$1.61	State Highway Trust Fund
2024			**$29.96**	**$23.96**	**$36.88**	**$6.00**	
Asset Management and Utilization			**$29.96**	**$23.96**	**$36.88**	**$6.00**	
I-40: East of SR 1224 (Monte Vista Road) to pavement joint West of SR 3412 (Sand Hill Road). Reconstruct pavement.	I-2513AA	Buncombe	$31.70	$25.36	$19.88	$6.34	State Highway Trust Fund

US 74 (Future I-74): East of NC 214 to the West of SR 1824 (Water Tank Road). Pavement Rehabilitation.	HI-0015	Columbus	$7.70	$6.16	$4.00	$1.54	State Highway Trust Fund
I-95: SR 1770 (Sunset Avenue) to SR 1544 (North Halifax Road). Pavement and Bridge Rehabilitation.	I-5934	Nash	$5.46	$4.36	$3.50	$1.10	State Highway Trust Fund
I-85: Orange County Line to US 15/ US 501 In Durham. Pavement Rehabilitation.	I-5941	Durham	$16.80	$13.44	$9.50	$3.36	State Highway Trust Fund
2025			**$128.87**	**$103.07**	**$37.62**	**$25.80**	
Asset Management and Utilization			**$128.87**	**$103.07**	**$37.62**	**$25.80**	
I-285 / US 52 / NC 8: I-85 to Forsyth County Line. Pavement Rehabilitation.	HI-0005	Davidson	$30.15	$24.11	$9.52	$6.04	State Highway Trust Fund
I-40: Mile Marker 73 to Mile Marker 86. Pavement Rehabilitation.	I-5900	McDowell	$25.11	$20.08	$8.60	$5.03	State Highway Trust Fund
I-40: East of NC 147 to SR 3015 (Airport Boulevard). Pavement Rehabilitation.	I-5995	Wake, Durham	$32.41	$25.92	$9.50	$6.49	State Highway Trust Fund
I-87 / Future I-87 / US 64 / US 264: SR 1003 (Rolesville Road) to Nash County Line. Pavement Rehabilitation.	I-6001	Franklin, Wake	$41.20	$32.96	$10.00	$8.24	State Highway Trust Fund
2026			**$75.79**	**$60.62**	**$38.37**	**$15.17**	
Asset Management and Utilization			**$75.79**	**$60.62**	**$38.37**	**$15.17**	
I-77: Mile Marker 58.4 to Yadkin County Line. Pavement Rehabilitation.	I-5920	Iredell	$19.29	$15.42	$12.37	$3.87	State Highway Trust Fund

I-87 / US 64 / US 264: I-440 in Raleigh to SR 1003 (Rolesville Road). Pavement Rehabilitation.	I-5944	Wake	$28.60	$22.88	$13.00	$5.72	State Highway Trust Fund
I-540: Triangle Town Center Boulevard in Raleigh to I-87/US 64/US 264 in Knightdale. Pavement Rehabilitation.	I-5945	Wake	$27.90	$22.32	$13.00	$5.58	State Highway Trust Fund
2027			**$54.70**	**$43.76**	**$39.14**	**$10.94**	
Asset Management and Utilization		**$54.703.55**	**$54.70**	**$43.76**	**$39.14**	**$10.94**	
I-40: SR 1001 (Sugar Hill Road) to NC 226. Pavement Rehabilitation.	HI-0009	McDowell	$14.90	$11.92	$9.89	$2.98	State Highway Trust Fund
US 74 (Future I-74): West of SR 1585 (Union Valley Road) to West of US 701 Business. Pavement Rehabilitation.	HI-0019	Columbus	$5.40	$4.32	$4.00	$1.08	State Highway Trust Fund
US 74 (Future I-74): Robeson County Line to West of SR 1585 (Union Valley Road). Pavement Rehabilitation.	HI-0020	Columbus	$15.00	$12.00	$11.50	$3.00	State Highway Trust Fund
I-40: Mile Marker 34 to Buncombe County Line. Pavement Rehabilitation.	I-592	Haywood	$9.75	$7.80	$6.75	$1.95	State Highway Trust Fund
I-40/ I-85: West of SR 1114 (Buckhorn Road) to West of SR 1006 (Orange Grove Road). Pavement Rehabilitation.	I-5958	Orange	$9.65	$7.72	$7.00	$1.93	State Highway Trust Fund
2028			**$78.01**	**$62.40**	**$39.92**	**$15.61**	
Asset Management and Utilization			**$78.01**	**$62.40**	**$39.92**	**$15.61**	
I-73 / US 220: SR 1009 (Old US Highway 311) to Guilford County Line. Pavement Rehabilitation.	HI-0003	Randolph	$8.12	$6.49	$4.00	$1.632	State Highway Trust Fund

I-74: SR 1928 (Cedar Square Road) to I-73/ US 220. Pavement Rehabilitation.	HI-0004	Randolph	$8.14	$6.51	$4.00	$1.63	State Highway Trust Fund
I-40: Johnston County Line to the Duplin County Line. Pavement Rehabilitation.	HI-0011	Sampson	$22.40	$17.92	$10.00	$4.48	State Highway Trust Fund
I-40: Sampson County Line to the Pender County Line. Pavement Rehabilitation.	HI-0012	Duplin	$31.10	$24.88	$17.92	$6.22	State Highway Trust Fund
US 17 (Future I-87): Bertie County Line to Perquimans County Line. Pavement Rehabilitation.	I-6027	Chowan	$8.25	$6.60	$4.00	$1.65	State Highway Trust Fund

Medium- and Long-Term Strategies

The medium and long-term strategies fall into the categories of Robust, Hedging and Deferred. The robust strategies are highest priority since they are needed and effective under multiple plausible freight futures. The hedging strategies are medium priorities but may become high priorities depending on the direction and pace of freight trends. Thus, sufficient planning and preparation should be in place to allow NCDOT to move relatively quickly if needed. The deferred strategies are lower priority and do not require much pre-work. Key robust and hedging strategies are summarized.

Hedging Strategies (Medium Priority)
Infrastructure
Expand key two lane rural routes on the NCPHFN. The priority facilities that need expanding will depend on regional and industry growth trends but plans should be advancing for all two-lane facilities on the NCPHFN.
Develop and modify infrastructure to be capable of handling platooning and autonomous vehicles.
Invest in upgrading rail lines and other rail facilities.
Invest in alternative routes for highly congested corridors.
Invest in roadways, interchanges and rail spurs to serve large development sites.
Preserve rail corridors, especially those going out of service
Utilize existing air cargo and maritime relationships to create more complementary cargo networks
Operations
Invest in urban locations to service increasing number of fulfillment centers.
Develop alternative freight delivery vehicle operating guidelines.

Impact Strategies
Climate Change
Implement the strategies within the 2020 Resilience Strategy Report
Support strategies to increase infrastructure resilience along NCDOT coastal highways.
Emissions
Continue to foster partnerships like the Port Initiative's and implement environmentally sustainable port strategies through partnerships between USEPA and ports.
Support development of actionable strategies to aid in the NC Clean Transportation Plan, one of the five workgroups focusing on developing actionable strategies to address emissions from medium- and heavy-duty vehicles.
Equity
Develop a deployment strategy for ZEV charging stations.
Create effective infrastructure deployment strategies.
Habitat Fragmentation
Identify opportunities to improve habitat fragmentation such as trenches used to provide safe passage underneath railroad tracks for wildlife.
Stormwater
Implement Executive Order 80 through the Department of Environmental Quality (DEQ), with support of other agencies and stakeholders, to prepare the North Carolina Climate Risk Assessment and Resilience Plan (2020 Resilience Plan).

Robust Strategies (Highest Priority)
Infrastructure
Maintain safe, reliable connections to ports, rail terminals, air cargo facilities, military bases and major logistics and manufacturing sites.
Invest in modernizing the interstates, ensuring that they meet design standards to accommodate freight vehicles of today and in the future. This includes replacing bridges with weight restriction and weight limits on the NCPHFN.
Pursue mitigation strategies to protect the NCPFN against climate change and increasing weather events.
Invest in mobility solutions in the major urban areas to more efficiently and safely move both people and freight.
Ensure adequate connectivity between rural regions and the state's gateways and urban centers. Invest in heavy haul corridors in regions with ports, energy exploration and agricultural production.
Implement truck parking strategies at abandoned rest areas and weigh stations from the Statewide Truck Parking Study. The trucking industry suggested exploring industry user fees as a funding mechanism.
Address congestion hot spots on NCPHFN. This may include examining mass transit opportunities for removing passenger vehicles from these routes.
Increase truck parking capacity along key corridors
Develop strategies surrounding e-commerce and distribution
Ensure cyber security remains a top priority as freight networks continue to grow
Operations
Develop resiliency strategies to mitigate impact of man-made or natural disruptions of the NCPFN.
Invest in incident clearance on the NCPHFN. Reexamine the MOVES program for incident clearance for potential implementation.
Develop digital backbone to deploy technology to leverage real-time travel and truck parking data aimed at the freight industry.
Invest in ITS technology along key corridors to increase efficiency and reliability
Institutional
Enhance public awareness programs such as "Sharing the Road" with trucks and "BeRailSafe" with rail.
Add safety signage on NCPHFN about safe traveling distances and passing guidelines related to trucks. Implement Freight Performance Measure Program and target setting.
Conduct a vehicle inventory and use survey (VIUS) for commercial vehicles to enhance NCDOT's tools and processes for identifying and evaluating freight needs and projects.
Conduct a Statewide Rail Access and Utilization Study that assesses the opportunity for truck to rail diversion and an assessment of regional rail bottlenecks and solutions.
Implement freight planning requirements into the Comprehensive Transportation Planning (CTP) efforts at NCDOT, Metropolitan Transportation Plans performed by the Metropolitan Planning Organizations and the Comprehensive Transportation Plans performed by the Regional Planning Organizations.

The previous version of the Freight Plan included substantive discussions of many medium and long-term strategies to implement North Carolina's vision. With the passage of the BIL, a greater focus has been placed on climate change/resiliency, equity, emissions and habitat conservation. These issues are discussed in depth throughout this document and in topic-specific white papers in the appendix. Specific issues addressed include:

- Understanding how climate change will impact all areas of North Carolina and ensuring that critical components of the Priority Freight Network have sufficient resiliency and redundancy to ensure efficient operation, even during severe climatic events.
- Evaluating current and planned freight infrastructure improvements with regards to Areas of Persistent Poverty (APPs) and Historically Disadvantaged Communities (HDCs). Project should seek to address not only current effects but also those that negatively impacted communities in the past.
- Replacing diesel and gasoline infrastructure with more efficient electrical units and transitioning Medium and Heavy Duty (MHD) trucks from carbon-based engines to zero emission vehicles (ZEVs).
- Evaluating current and planned freight infrastructure improvements with regards to impacts to wildlife habitat, especially wildlife corridors. This includes pursuing strategies to reduce current and future animal strike incidents.

Transformative Strategies

Transformative or shaping strategies are those that can alter the State's freight future. In other words, the State's public and private sectors proactively pursue strategies with the intention of altering current trends. Following are three potential transformative strategies.

Next Gen Truck Technology Strategy

Expand Rail Freight Market Opportunities Strategy

Next Gen Truck Technology Strategy

Autonomous, Connected and Electric Trucking and Drones are a Game Changer for Fuel Efficiency, Safety, and Mobility

A technique that has been used for years in the trucking industry, drafting or truck platooning, is about to enter the world of autonomous driving known as Level 2 truck platooning. Level 2 truck platooning is an extension of cooperative adaptive cruise control that uses automated lateral and longitudinal vehicle control, while maintaining a tight formation of vehicles with short following distances. A platoon is led by a manually driven truck and allows the drivers of the following truck(s) to disengage from the driving tasks and monitor the system performance. Driving in a platoon formation has demonstrated the potential for significant fuel saving benefits and associated reductions in emissions from the vehicles within the platoon. Additionally, electrification of truck fleets allows for transport companies to reduce their impact on the environment. Electric trucking also has the capability to be used with autonomous and connected technology.

The Triangle Expressway was designated as a USDOT Autonomous Vehicle Proving Ground in 2017. Volvo Truck/Fedex Platooning Demonstration was performed in 2018[1]. The demonstration project detailed included:

- Veridea Parkway served as the proving ground and southern terminus of route
- Davis/Hopson interchange was used as northern terminus of route
- Salt barn location at Green Level was used to store tractors/trailers overnight
- Demonstration occurred outside a.m. and p.m. peak periods
- Trucks were spaced 75 to 100 feet apart as they traveled at 62 miles per hour
- All tractors had licensed drivers, each with 15+ years driving experience
- Safety Was Paramount in all demonstrations

A report issued by the U.S. Energy Information Administration on autonomous projects stated that heavy-duty, long-haul commercial vehicles will be the first large group of early autonomous technology adopters simply due to the potential for efficiency gains and lower operating costs. Other likely developments related to Next Gen Truck Technology predicted in the report include:

> "Research suggests that platooning technology can provide a 5 to 20% fuel savings, depending on the gap, speed, number of vehicles and location of a vehicle within a platoon…Platooning also offers other benefits, such as emission reductions, additional vehicle safety features and increased highway throughput, just to name a few."
>
> TTI Senior Research Engineer Beverly Kuhn

- Truck platooning provides most of the fuel economy benefits associated with autonomous trucks. Platooning can be carried out by Level 1 autonomous vehicle technology and the industry can expect to see it deployed far earlier than more advanced autonomous technology.
- The real driver of the rate of adoption for high levels of autonomous driving technology in trucking is dependent on the driver shortage and associated cost issues. If these trends do not improve, it is likely the industry will move toward those greater degrees of autonomous technology.

[1] North Carolina Turnpike Authority, Board of Directors Operations Committee Meeting, July 2018, Volvo Trucks/FedEx Platooning Demonstration.

- Truck platooning has the potential to ease congestion on highway corridors, since it does away with the "accordion" effect of having lines of vehicles speed up and slow-down in unpredictable ways. Even a market penetration rate of around 10% for truck platooning can provide a noticeable increase in roadway throughputs and associated increased vehicle efficiencies.
- Drivers in trucks operating in autonomous mode will also be able to engage in route optimization and seek out freight in real time, which the report says truck platooning will increase trucking revenue, reduce miles driven and possibly reduce the number of trucks required to haul cargo, while increasing the cargo density of the trucks that are moving freight.
- By 2050, fuel consumption could be reduced by as much as 18% for commercial light trucks, buses and heavy-duty "freight trucks." This reduction would be accelerated by the usage of electric commercial vehicles
- 94% of insurance executives expect liability coverage to change as a result of autonomous vehicles, while 52% expect property damage coverage to change (reduced rates).

Another important need to help make the Next Gen Truck Technology Strategy successful is the implementation of the National Electric Vehicle Infrastructure (NEVI) to add 500,000 new charging stations to alternative fuel corridors (AFC) across the country by 2030. North Carolina has identified how they will build out electric vehicle charging stations every 50 miles along AFC's in the North Carolina NEVI Plan[2]

State policy to accelerate the adoption of zero-emission trucks and buses in North Carolina was advanced in 2022 by Executive Order 271[3]. The Executive Order directs the NC Department of Environmental Quality to begin rulemaking for Advanced Clean Trucks (ACT), a policy that will grow the state's zero-emission medium- and heavy-duty vehicle (MHDV) market by setting sales targets to increase the number of zero-emission trucks and buses sold in North Carolina. Executive Order 271 also sets important complementary actions into motion, ensuring that a transportation pollution health assessment is conducted, and that necessary zero-emission vehicle infrastructure needs are met as the market grows.

Drones

Drones are being deployed to deliver packages for Amazon, UPS and health care providers in the United States. In fact, NCDOT partners flew more than 3,400 medical delivery flights, and NCDOT completed more than 300 flights in response to natural disasters.[4] A delivery by drone provides a 98% decrease in carbon emissions to the atmosphere compared to a car or truck-based delivery[5]. On-demand drone deliveries will allow for goods to be moved faster from warehouse to the consumer while providing a carbon reduced alternative to the last-mile effort of the movement of goods. Drone pilots are required to hold a FAA Part 135 Single Pilot license to be authorized to fly a drone carrying a package under 55 lbs[6]. Amazon is the first company to hold a license to operate a drove carrying a package of over 55 lbs. Several factors will determine the speed at which drones are widely used in the United States: regulation, public acceptance and cost[7]. These critical factors will help determine the progress of the use of drones for delivery purposes into the future.

[2] North Carolina Electric Vehicle Infrastructure Deployment Plan, August 1, 2022.

[3] State of North Carolina, Executive Order No. 271, Growing North Carolina's Zero-Emission Vehicle Market, October 2022

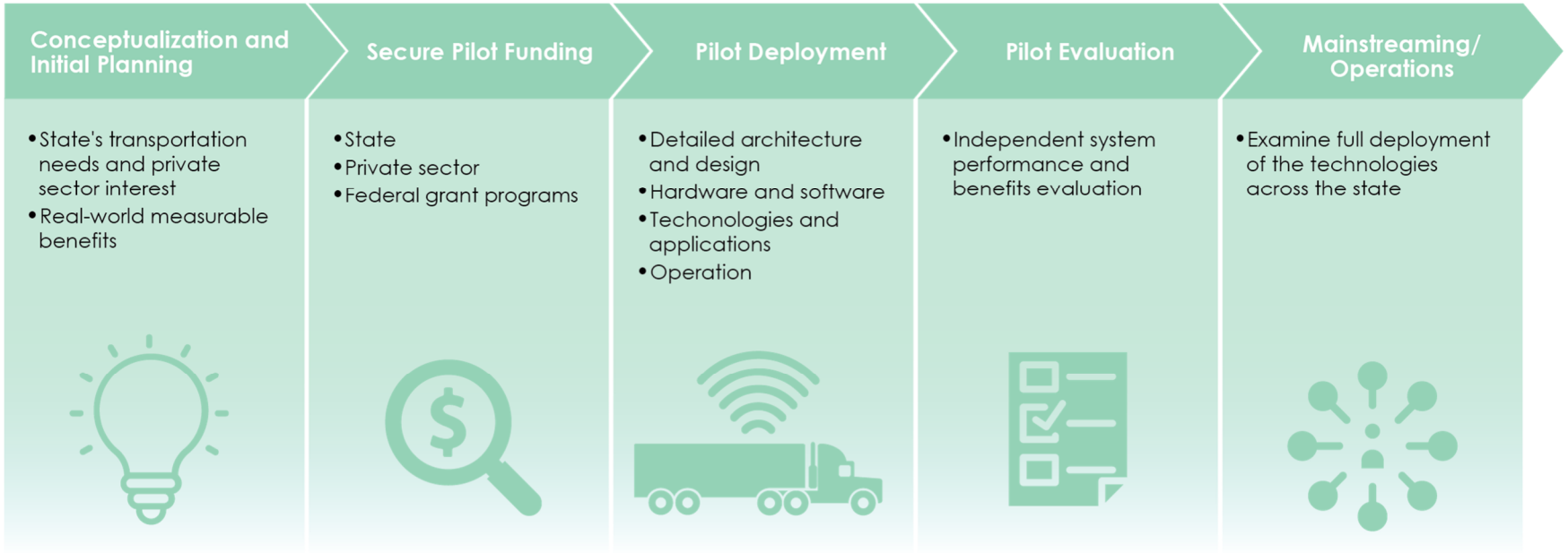
[4] Groundbreaking Drone Work to Continue at NCDOT, NCDOT, 11/2020

[5] Health Via Drone, 2022. Forbes.

[6] Package Delivery by Drone (Part 135), 2022. FAA.

[7] Drone Delivery: More lift than you think, 2022. McKinsey & Company.

Process for Planning and Implementing Technology Pilots



North Carolina is a leader in the knowledge economy and a hub for research and development for all things technology, especially truck manufacturing. Combining this with the state's expansive highway system positions North Carolina to take advantage of this opportunity. Not only could deploying the technology be a boom for shippers and carriers, but leading the research and development, and equipment production could have unprecedented impacts on the state's role in freight transportation and all its related upstream and downstream opportunities.

Expand Rail Freight Market Opportunities Strategy

North Carolina is in a position to significantly grow rail freight in the state by capitalizing on recent developments within the state as well as global shifts in trade patterns. Through strategic actions, North Carolina can expand its rail freight market, making the state more competitive for shippers and easing the pressures on the highway system.

Expanding/Modernizing Rail Infrastructure

North Carolina recognizes the need and importance of continually improving its rail infrastructure to benefit all residents and businesses. The rail network serves both passenger and freight needs with direct improvements to one often indirectly impacting the other. Rail is also a vital economic development asset as many shippers require reliable, efficient rail service to remain competitive. Modernizing the rail system increases its functionality, for example:

- Continue upgrading all trackage to sustain 286,000 lb. loads improves customer service by standardizing load limits throughout the State to minimize transfer and repacking issues and time.
- Continuing the strong Federal Railroad Authority's Competitive Discretionary Grant Programs FRA CRISI program increases safety by replacing aged and obsolete rail structures, and reducing at-grade highway/rail crossings.
- Reconstructing rail corridors to accommodate double-stacked containers and oversized (wide) project cargo creates flexible, high capacity facilities that dovetail well with private industry's push to intermodal yard automation.
- Implementation of Positive Train Control
- Increase of track speeds through improving track curves to improve network efficiencies.
- Partnering with private rail carriers to provide expedited, regular service.
- Preserving and increasing the number of direct rail served sites.

Shifting Distribution Center Activity Along Eastern Seaboard

North Carolina can capitalize on trade shifts from the Panama Canal's expansion, which has led to larger ships reaching the U.S. East Coast, by encouraging distribution center clusters around North Carolina's freight hubs, including the ports, airports, intermodal facilities, and short rail corridors. The State can build on the momentum of the CCX Intermodal Terminal being developed in Rocky Mount, North Carolina on CSX's crucial A-Line which parallels I-95, the National Gateway Corridor, through coordinated rail corridor improvements such as installing passing sidings and/or double-tracking busy sections of track, and grade-separating highway/railroad crossings that increase corridor safety, efficiency, and reliability. Additionally, the State can incentivize rail-centric mega sites plus encourage rail connections to other mega sites (Siler City, Randolph County, Brunswick County and New Hanover County) to aid in the clustering to further support the East Coast's growing container ship market.

Truck to Rail Diversion

As the roads become further congested and widening them becomes less of an option to meet growing demand, diverting truckloads to rail cars can extend the life of the current road network as well as better utilize the state's extensive rail network. Adding last-mile highway connectors to rail-served facilities will aid in simplifying diversions. Removing at-grade crossings will benefit both road and rail travel time reliability and safety.

New Industrial or Other Freight-Oriented Development

Starting with the North Carolina Statewide Logistics Plan in the early 2000's, North Carolina's agencies, rail- road companies, and private businesses have taken an active role in addressing freight and logistics needs to shape the state of North Carolina through policies, programs and projects that support and encourage freight movement and freight-oriented developments. For instance, from talks with agricultural and pharmaceutical industry experts, it was found that North Carolina had a lack of refrigerated facilities near their ports so cold shipments were often sent to neighboring states' ports. Highlighting this gap in services was one step that led to the new in-port cold storage facility in Wilmington. Similarly, North Carolina's Port of Morehead City was found to be one of the stronger project cargo ports on the East Coast that could further expand by offering white glove service for new industries such as windmills.

Attracting North Carolina Traffic from Neighboring States' Intermodal Facilities

South Carolina has Greer and Dillon; Virginia has Front Royal. These intermodal facilities directly stream goods to their ports and the two Class I railroads in the North Carolina region thereby creating booming economic development in their vicinities. Each of these out-of-state intermodal facilities is currently serving several of North Carolina's home grown industries and agriculture. North Carolina has an opportunity to recapture this business by building on its current facilities, including the Charlotte Intermodal Terminal. By carefully master planning the CCX

Intermodal Terminal in Rocky Mount along with its surrounding areas, North Carolina can draw in additional traffic. Additionally, North Carolina can capitalize on the large number of short lines in the state to further increase eco- nomic development by connecting these large national terminals with local industry.

The North Carolina Freight Network is one of the state's most important economic assets. To continue to compete in a global economy, the state must ensure sufficient investment to protect, enhance, and grow freight transportation assets and opportunities. Protect the assets and the businesses that depend on them by ensuring a state of good repair; Enhance the assets by addressing congestion, safety and modernization needs; and Grow the assets by investing in critical new facilities and programs necessary to meet the rapidly expanding and changing needs of manufacturers, logistics providers, and consumers.

CONCLUSION

The North Carolina Statewide Multimodal Freight Plan documents the freight transportation strengths, weaknesses, opportunities and challenges, both currently and into the future. The Plan sets forth recommendations and strategies to assist the state in meeting existing needs and future challenges. More importantly, it lays out strategies that can shape not only the future of the state's freight transportation system, but the future of the North Carolina's economic well-being. In meeting the FAST Act and BIL requirements, the plan also positions the state to take advantage of federal funding opportunities for freight infrastructure. However, that will not be enough. The needs far exceed available resources. This plan can serve as a call for action to position North Carolina to compete in a global economy dependent on the safe and efficient movement of freight.

The North Carolina Freight Network is one of the state's most important economic assets. To continue to compete in a global economy, the state must ensure sufficient investment to Protect, Enhance, and Grow freight transportation assets and opportunities. Protect the assets and the businesses that depend on them by ensuring a state of good repair; Enhance the assets by addressing congestion, safety, and modernization needs; and Grow the assets by investing in critical new facilities and programs necessary to meet the rapidly expanding and changing needs of manufacturers, logistics providers, and consumers.

NORTH CAROLINA
STATEWIDE MULTIMODAL FREIGHT PLAN
Planning for the Future of Freight Movement

FREIGHT WILDLIFE HABITAT ASSESSMENT - FINAL

North Carolina Statewide Multimodal Freight Plan

Freight Wildlife Habitat Assessment

Prepared for:
North Carolina Department of Transportation

Prepared by:
HNTB Corporation
343 E Six Forks Rd #200
Raleigh, NC 27609

Date
April 2023

ACRONYMS

CTP	Conservation Planning Tool
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEIS	Final Environmental Impact Statement
GIS	Geographic Information System
MPRSA	Marine Protection, Research, and Sanctuaries Act
NCDOT	North Carolina Department of Transportation
NCNHP	North Carolina Natural Heritage Program
NEPA	National Environmental Policy Act
STIP	State Transportation Improvement Program
USACE	US Army Corps of Engineers

FREIGHT WILDLIFE HABITAT ASSESSMENT

There is an unavoidable conflict between human transportation activity and the natural environment. The conflict is most obvious in vehicular impacts but also extends to impacts to animal habitats, especially foraging and breeding habitats. The N.C. Department of Transportation (NCDOT) keeps statistics on reported animal crashes at both the county-wide and statewide level. From 2013 to 2020, Wake County reported the largest number of animal crashes, with high levels of crashes reported in Pitt, Guilford, Union, Randolph, and Duplin Counties. In 2020, a total of 18,607 crashes were reported statewide. Between 2018 and 2020, wildlife crashes caused over $160 million in damages.

Freight improvement projects, no matter how well designed, have the potential to impact wildlife habitat. Various state and federal regulations are in place to ensure protect wildlife habitat. The National Environmental Policy Act (NEPA) of 1969 was created to ensure federal agencies consider the environmental impacts of their actions and decisions. Federal agencies are required to systematically assess the environmental impacts of their proposed actions and consider alternative ways of accomplishing their missions, which are less damaging to and protective of the environment. NEPA Section 101(b) states "it is the continuing responsibility of the federal government to use all practicable means, consistent with other essential considerations of national policy" to avoid environmental degradation, preserve historic, cultural, and natural resources, and "promote the widest range of beneficial uses of the environment without undesirable and unintentional consequences."

The Endangered Species Act (ESA) of 1973 is designed to protect species from extinction as a "consequence of economic growth and development untempered by adequate concern and conservation." This act is designed to protect both the species and “the ecosystems on which endangered species and threatened species depend.”

NCDOT evaluates each project to determine how to avoid and minimize impacts. Larger scale initiatives also take place to evaluate measures to protect habitat of federally endangered species, such as pine forests for the red cockaded woodpecker, stream habitat for mussel species such as the Carolina heelsplitter, caves and other hibernation areas for bat species such as the Northern long-eared bat, and savannah grasslands and prairie habitat for plant species such as Schweinitz’s sunflower. Examples of wildlife avoidance and minimization measures include:

- Widening toward the existing median when feasible to minimize habitat disturbance outside of the existing roadway.
- Evaluation of wildlife crossings for projects in known wildlife corridors or prime habitat areas. A wildlife crossing under Interstate 40 at Harmon Den Road in Haywood County is currently under construction.
- Minimization of impacts to streams and wetlands by using steeper slopes and rock plating where feasible.

Potential Highway Freight Habitat Impacts

NCDOT estimated the impact of improvements to facilities listed as Priority Highway Freight Network on wildlife habitat through a desktop evaluation using geographic information system (GIS) data. The department reviewed projects listed in the 2020-2029 State Transportation Improvement Program (STIP) that added capacity to facilities on the Priority Freight Network. This effort identified approximately 180 projects with potential habitat impacts.

To estimate the acreage of impacted habitat from the identified projects, roadway improvements were grouped into the following seven categories. Note, all medians were assumed to be maintained/disturbed habitat and facilities were interpreted as line features in some instances to expedite review.

1. Projects adding one lane to an existing four-lane, median divided facility were estimated to make improvements within the median. For these projects, impacts are most likely to occur in the vicinity of ramps. Ramp segments were identified and buffered by 40 feet from edge of pavement. The total ramp buffer width is 80 feet.

2. Widening of non-median divided facilities by one lane in each direction were estimated from edge of pavement buffered by 40 feet plus 30 feet for each 2 lanes lane added (15-foot lanes in both directions) to provide a conservative assessment of total area needed, including clearing requirements. This led to a total assigned buffer width of 110 feet.

3. New location two-lane projects that will not be median-divided were estimated to impact a 110-foot corridor for the entire length of the improvements based on the following assumptions, two 12-foot lanes, 4-foot shoulder/clearing areas, buffered by 40 feet in each direction. For a conservative assessment, this includes projects that listed segments of new location alignment, as the limits of new location construction were not specified.

4. New location median divided facilities were estimated to impact a 250-foot corridor for the entire length based on a review of recently constructed or in progress new location, four lane facilities.

5. Projects that added a center turn lane or median were assumed to add 15 feet (for the lane or median) buffered by edge of pavement plus 40 feet (in both directions). This led to a total buffer width of 95 feet.

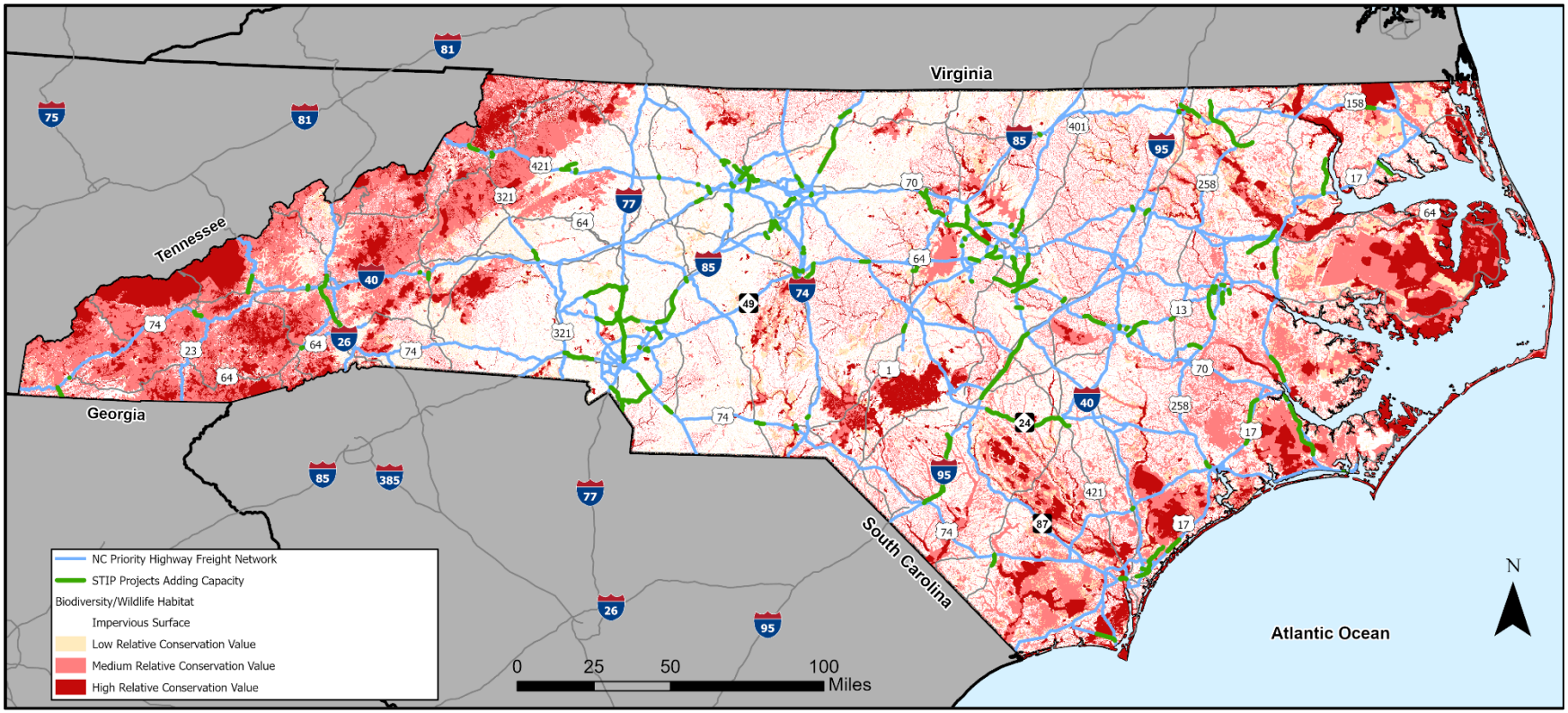
6. Projects that added more than one lane to a highway (generally for projects improving I-95) were anticipated to add 40 feet of lanes outside of the current facility plus an additional 40-foot buffer. This buffered the current edge of pavement by 80 feet on each side of the facility and led to a total width of 160 feet.

7. Improvements to non-median-divided facilities where lanes and a median were added were estimated from edge of pavement buffered by 40 feet plus 30 feet for each lane added (15 feet in both directions) with a 30-foot median added to provide a conservative estimate for a total buffer width of 130 feet.

NCDOT used the above assumptions to estimate habitat impacts based on improvements to facilities listed as Priority Highway Freight Networks. It should be noted that these improvements benefit not only freight, but also passenger transportation and in many cases, active transportation options.

To determine the habitat impacts associated with these improvements, NCDOT used the North Carolina Natural Heritage Program (NCNHP) Conservation Planning Tool (CPT) data layer to assign conservation values to land uses anticipated to be impacted by the proposed improvements. The tool designates habitat quality on a scale of one to ten. For this report, to simplify reporting, these values were grouped into three values (low – ranking 1 to 3; medium – ranking 4 to 6; and high – ranking 7 to 10). Figure 1 shows a map of these outputs where higher quality habitat is the darkest shade and tends to coincide with national parks, refuges, forests, and military installations.

Figure 1. Priority Highway Freight Network with Relative Conservation Value Areas



Source: NC NHP CTP, Biodiversity/Wildlife Habitat Assessment, May 2021

Table 1 summarizes impacts to habitats with low, medium, and high conservation values associated with STIP improvements to facilities listed as Priority Highway Freight Network.

Table 1. Acreage of Habitat Types Impacted by Improvements to Facilities Listed as Priority Highway Freight Network

Biodiversity / Wildlife Habitat Impacts from N.C. Priority Highway Freight Network Corridors by Relative Conservation Value		
Type	Potentially Impacted Area	Percentage of Total Impacts
Impervious Surface	8,080 acres	35%
Low Relative Conservation Value	690 acres	3%
Medium Relative Conservation Value	8,540 acres	37%
High Relative Conservation Value	5,770 acres	25%

Source: NCNHP CTP, Biodiversity/Wildlife Habitat Assessment, May 2021

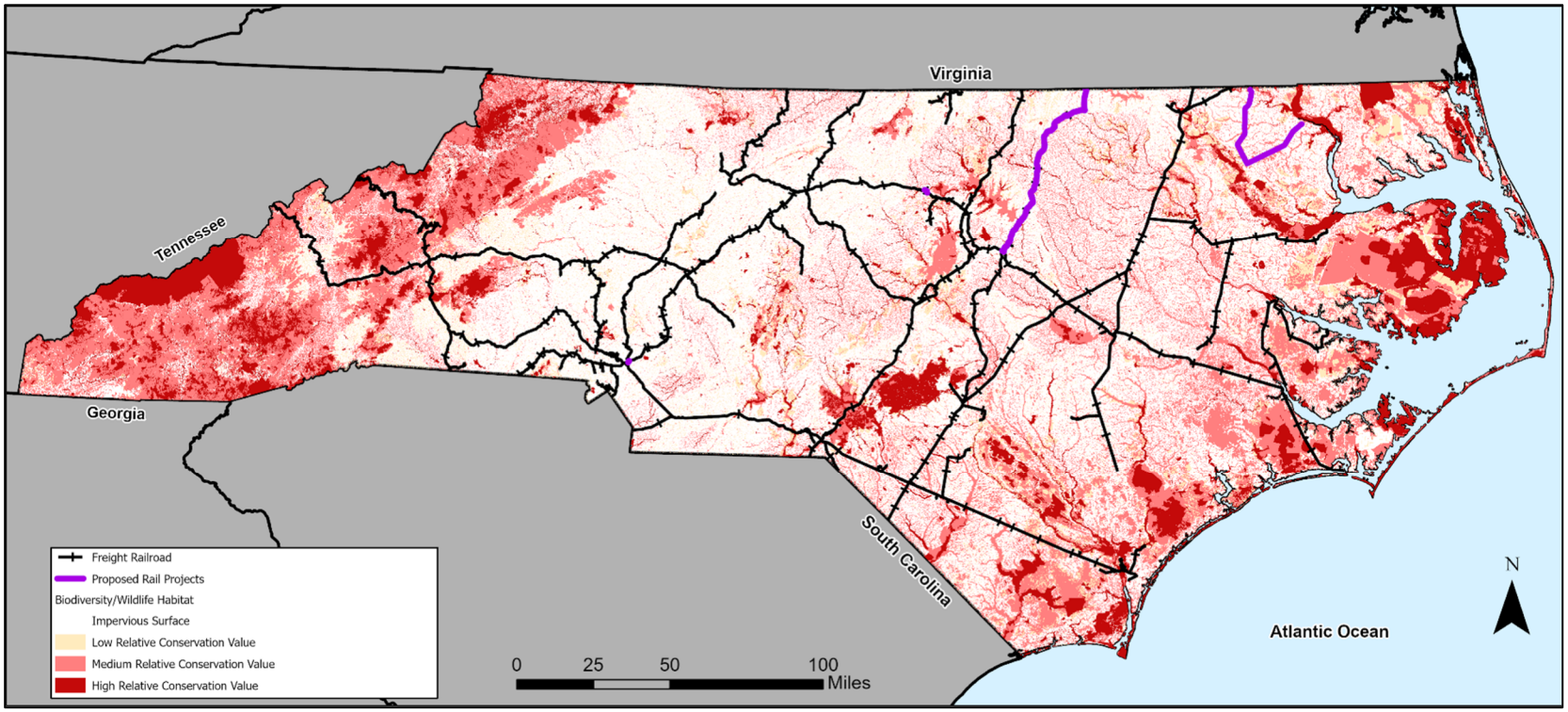
Potential Priority Rail Freight Habitat Impacts

Like roads, railways fragment habitat and can affect a variety of wildlife species in varying ways. Collisions are the most common cause of mortality, but some animals die from electrocution or being stuck between the rails, leaving them susceptible to predation, starvation or dehydration. Exactly how many animals die is unknown. Railway mortalities are usually not as visible to the public as roadkill, and railways can be harder to access for research and data collection. NCDOT does not currently track rail/animal strike data, according to NCDOT's Rail Division. A 2018 study of endangered gopher tortoises (*Gopherus polyphemus*), which have been known to cross railways near John F. Kennedy Space Center in Florida, noted that "nearly all tortoises in the vicinity of railways are susceptible to becoming entrapped or experiencing reduced movement and dispersal." The researchers recommended that trenches could be used to provide safe passage underneath railroad tracks.

Railroads frequently generate “edge habitats,” where a variety of different plant species mix. These habitats often provide food sources that attract animal species. Approaches used to reduce wildlife impacts in these areas include acoustic warning systems that use recordings of barking dogs or alarms to teach animals to avoid track areas and providing clear sight lines for animals to see on-coming vehicles.

There is evidence that soil and hydrology contamination may affect vegetation and aquatic fauna while noise can affect terrestrial vertebrates. In fact, noise, light, and vibration due to railways have been observed to reduce the abundance and richness of some insects, amphibians, and birds, and to cause avoidance behavior on predators. In general, rail companies attempt to limit impacts by limiting work to existing rail rights of way. Figure 2 shows current and proposed projects in the Priority Freight Railroads in relation to conservation habitat areas. Habitat areas are scaled in the same manner as in Figure 1.

Figure 2. Priority Rail Freight Network with Relative Conservation Value Areas



For planned projects, limited data on potential habitat impacts are available for projects without NCDOT involvement and a completed environmental document. NCDOT’s largest rail improvement project currently under development is the improvement/restoration of the S-Line

corridor from Raleigh, NC to Richmond, VA. In the Final Environmental Impact Statement (FEIS), NCDOT calculated impacts to forested and maintained/disturbed habitats based on the limits of proposed disturbance (slope stake limits) plus 25 feet. Based on the FEIS, approximately 66% (975 acres) of the proposed area of disturbance was maintained/disturbed habitat and 34% (494 acres) was forested habitat.

Port and Airport Habitat Impacts

Estimates suggest that wildlife strikes cost the civil aviation industry in the U.S. up to $625 million annually, and nearly 500 people have been killed in wildlife strikes worldwide. Most wildlife strikes occur in the airport environment: 72% of all strikes occur when the aircraft is 500 ft (152 m) or greater above ground level, and 41% of strikes occur when the aircraft is on the ground during landing or takeoff.

The Federal Aviation Administration (FAA) keeps a record of airport/wildlife strikes. From May 1, 2021 to April 30, 2022, a total of 408 aircraft/wildlife strikes were reported. While bird and bat species were most often reported as the impacted species, strikes were also reported with white-tailed deer, turtle, striped skunk, raccoon, and coyote. FAA also estimates that only one in five strikes are reported, which adds up to a significant threat to property and life.

The NCDOT's Division of Aviation offers a wildlife program through a cooperative agreement with the U.S. Department of Agriculture's Wildlife Services. The program provides five regional trainings and assessments of one-third of the state's 72 public airports each year. It also provides "quick-response", direct management activities for airports experiencing wildlife hazards.

The quick response program provides both proactive and reactive management such as harassing geese, gulls, raptors and other birds using pyrotechnics, habitat management and, if warranted, lethal control. The USDA may live trap and relocate hazardous raptors such as hawks and falcons to suitable habitats miles away from the airport.

Trainings provide instruction and hands-on practice identifying common animal species, potential habitats and food sources that attract animals to airports and methods to safely deter wildlife from interfering with airport operations.

Limited data are available for potential habitat impacts associated with port and airport maintenance and expansion projects. Based on a GIS review, NC port facilities are located in developed areas, with limited potential for additional critical habitat disturbance.

NORTH CAROLINA
STATEWIDE MULTIMODAL FREIGHT PLAN
Planning for the Future of Freight Movement

IMPACTS OF CLIMATE CHANGE AND STORMWATER ON FREIGHT PLANNING - FINAL

TABLE OF CONTENTS

Climate Change **1**
Temperature 4
Tropical Storms/Hurricanes 4
Extreme Rainfall/Precipitation 5
Flooding 5
Landslides 9
Sea Level Rise 10
Droughts and Wildfires 10
Highway Stormwater Program **10**
Current Activities **11**

LIST OF FIGURES

FIGURE 1.1. ASSETS WITHIN THE STATE MULTIMODAL FREIGHT NETWORK BY REGION 3
FIGURE 1.2. DETOUR ROUTE AVOIDING N.C. ENTIRELY AFTER HURRICANE FLORENCE 5

LIST OF TABLES

TABLE 1.1. SCENARIO OUTCOME PROBABILITY 1
TABLE 1.2 ASSETS WITHIN THE STATE MULTIMODAL FREIGHT NETWORK BY REGION 2

ACRONYM LIST

DEQ	Department of Environmental Quality
EO	Executive Order
FIMAN	Flood Inundation Mapping Alert Network
FIMAN-T	Flood Inundation Mapping Alert Network for Transportation
GHG	Green House Gas
NCCSR	North Carolina Climate Science Report
NCDOT	North Carolina Department of Transportation
NCEM	North Carolina Emergency Management
ZEV	Zero Emission Vehicle
ZEFV	Zero Emission Freight Vehicle

CLIMATE CHANGE

To limit the impacts of climate change, North Carolina Gov. Roy Cooper signed Executive Order (EO) 80: North Carolina's Commitment to Address Climate Change and Transition to a Clean Energy Economy, on October 29, 2018. EO 80 directed the Department of Environmental Quality (DEQ), with support of other agencies and stakeholders, to prepare the North Carolina Climate Risk Assessment and Resilience Plan (2020 Resilience Plan).

EO 80 also called for cabinet agencies to develop State Climate Risk Assessment and Resiliency Plans that support communities and sectors of the economy most vulnerable to the effects of climate change and to enhance the State's ability to protect human life and health, property, natural and built infrastructure, cultural resources and other public and private assets of value to North Carolinians. In response to EO 80, DEQ enlisted subject matter experts to provide the current state of climate science and change, documented in the North Carolina Climate Science Report (NCCSR), September 2020. State agencies developing the 2020 Resilience Plan referenced the key findings and executive summary from the NCCSR to understand the historical and projected climate trends and how they will impact state assets, programs and services. The NCCSR further examined the potential impacts of climate change on the three ecoregions of North Carolina: mountains, piedmont, and coastal plain. The report concluded "…large changes in North Carolina's climate, are ***very likely*** by the end of this century…." All trends point to likely, very likely, or virtually certain scenarios (Table 1) of increased annual average temperatures, heavy rainfall and extreme precipitation frequency and intensity, increasing hurricane intensity and associated heavy precipitation, sea level rise, storm surge flooding, inland flooding, severe droughts and wildfires.

TABLE 0.1. SCENARIO OUTCOME PROBABILITY

Likelihood Term	Probability of Outcome
Virtually Certain	99-100%
Very Likely	90-100%
Likely	66-100%

Source: NCCSR

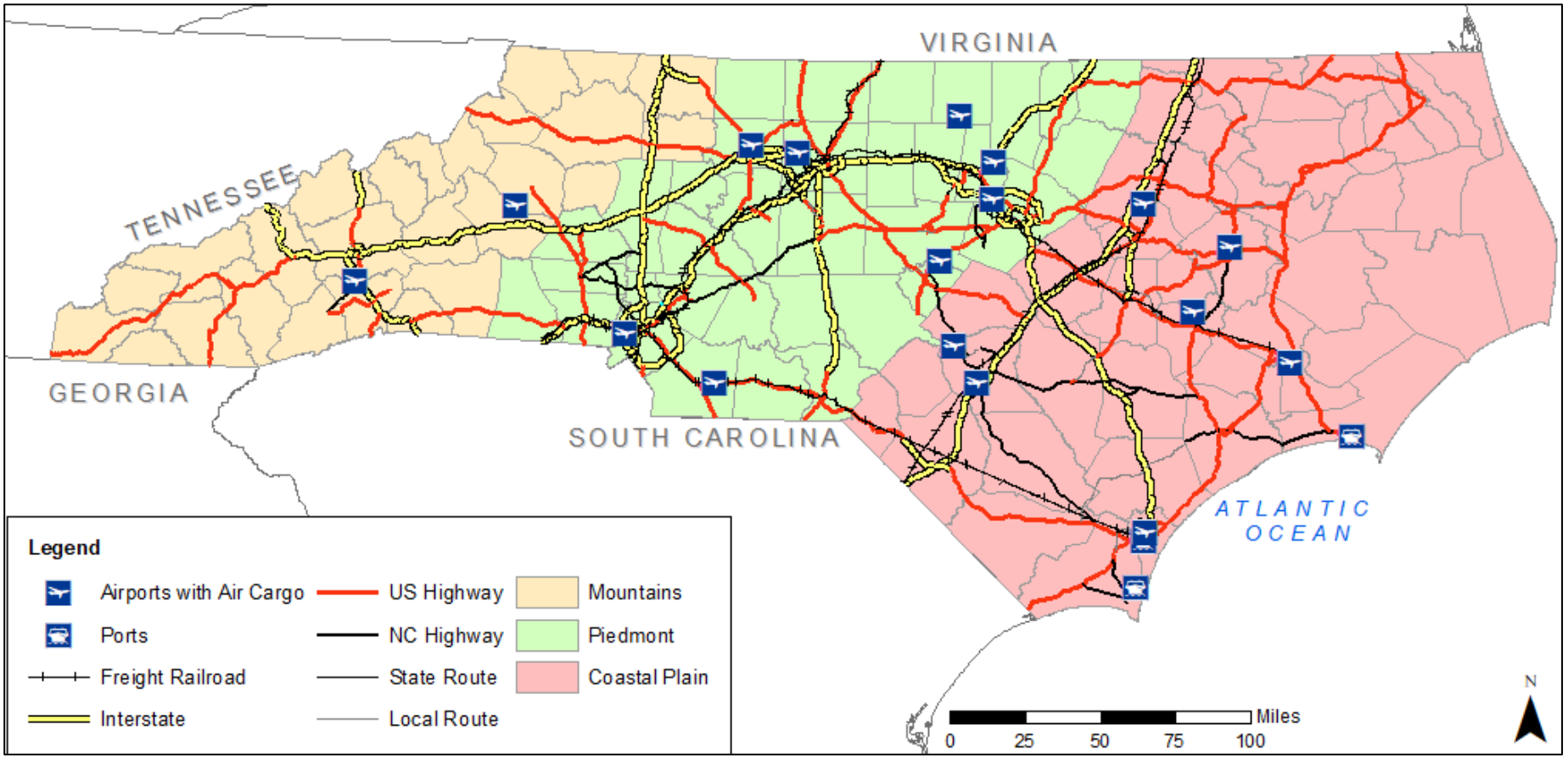
Within each of the NCCSR-identified ecoregions (shown in Figure 1) are assets included in the State Multimodal Freight Network, as shown in Table 2.

TABLE 0.2 ASSETS WITHIN THE STATE MULTIMODAL FREIGHT NETWORK BY REGION

Multimodal Freight Asset	Mountains	Piedmont	Coastal Plain	Total
Highway (centerline miles)	593	1,794	1,870	4,257
Railroad (centerline miles)		575	544	1,119
Airports with Air Cargo (#)	2	8	7	17
Ports (#)			2	2
Inland Terminals (#)		2	2	4

Source: NCDOT

FIGURE 0.1. ASSETS WITHIN THE STATE MULTIMODAL FREIGHT NETWORK BY REGION



Each of these assets is uniquely vulnerable to the scenarios predicted within the NCCSR. This Climate Change White Paper focuses on the scenarios most likely to impact the Strategic Freight Transportation Network. As noted in the 2022 Resilience Strategy Report, the N.C. Department of Transportation has made tremendous progress, particularly in the adoption of its Resilience Policy (NCDOT Policy F.35.0102) in October 2021 codifying its intention to implement the strategies within the 2020 Resilience Strategy Report. The 2020 Resilience Plan identified "climate stressors of concern" to transportation systems including: temperature, tropical storms/hurricanes, extreme rainfall/precipitation, sea-level rise, and drought.

Temperature

According to the NCCSR, it is ***very likely*** that temperatures in North Carolina will increase substantially in all seasons. This increase is estimated to be 2°-4°F under the conservative scenario by mid-century.

North Carolina has not experienced an overall increase in hot (maximum above 90°F during the day in summer) and very hot (maximum above 95°F during the day in summer) days since 1900. However, the NCCSR concluded that it is likely in the future that the number of hot and very hot days will increase and correspondingly, it is likely the number of cold days (maximum of 32°F) will decrease. The most recent 10 years (2009–2018) represent the warmest 10-year period on record in North Carolina, averaging about 0.6°F warmer than the next warmest decade in the 20th century (1930–1939).

It is reasonable to expect that an overall average temperature increase would require a corresponding increase in the use of fuel to keep drivers and freight at an appropriate temperature. At the present time, the majority of freight is moved using a non-renewable fuel source. This increased use of fuel further exacerbates rising temperatures as more greenhouse gas emissions (GHG) are trapped in the atmosphere creating a cycle of continued warming.

On Jan. 7, 2022, Cooper issued EO 246, North Carolina's Transformation to a Clean, Equitable Economy. EO 246 sets goals to reduce statewide greenhouse gas emission to at least 50% below 2005 levels by 2030 and increase the total number of registered zero emission vehicles (ZEVs) to at least 1.25 million by 2030 and increase the sale of ZEVs such that they make up 50% of new vehicle sales by 2030.

The North Carolina ZEV Plan was finalized in October 2019 and contained goals of "established interstate and intrastate ZEV corridors, increase the installation of ZEV infrastructure and outline best practices for increasing ZEV adoption in North Carolina." To meet the governor's goals outlined in EO 80 and EO 246, NCDOT can invest in zero emission freight vehicle (ZEFV) research as well as investing to ensure that the Strategic Freight Network is prepared to support the growth in the ZEFV market and supporting technology. Further discussion of emissions relative to the State Multimodal Freight Network is in the Emission White Paper.

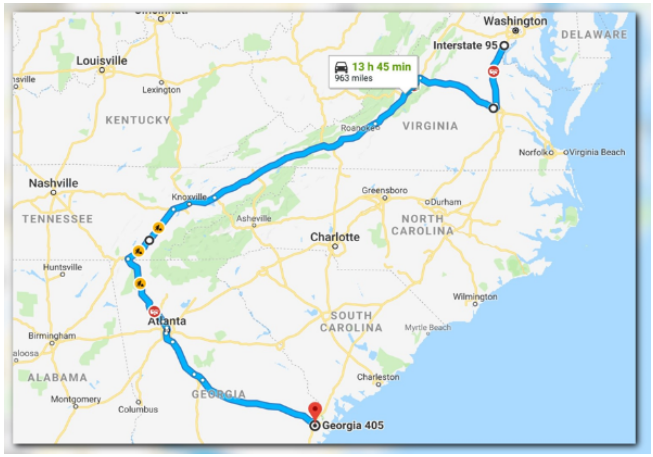
Tropical Storms/Hurricanes

The NCCSR concluded that in addition to rising air temperatures, it is ***very likely*** that ocean temperatures will also increase. Increased air and water temperatures, especially in the tropics, are thought to lead to increased frequency and intensity of hurricanes and tropical storms. Damage from hurricanes and tropical storms is most often caused by wind, rain, storm surge, and wave activity. The amount of damage caused by a hurricane or tropical storm event is increasingly caused by a combination of these variables.

In the 2020 Resiliency Plan, NCDOT noted "the impact of tropical storms on land transportation could include more debris on roads and rail lines, interrupting travel and movement of people and goods. For air transportation, hurricane force winds can produce significant damage to airport facilities, including signals, signage and ground transportation, runways and terminals, parking structures, and facilities. In addition, such storms can cause more frequent interruptions in air service including system functionality and reliability, operations of runways and terminals, as well as internal and external vehicular access routes. The impact of tropical storms on marine transportation could include damage to port and ferry infrastructure resulting from wave action and storm surges. Tropical storms can also cause marine channels to fill in. This may impede general mobility along the waterways and the state's ferry service along the marine highway system."

Hurricanes Matthew, Florence, and Dorian (2016, 2018, and 2019, respectively) created widespread flooding that affected the movement of freight. Hurricane Florence exceeded the prediction for a 500-year storm event with over 30 inches of rain recorded in some areas of eastern North Carolina. Further discussed in the Flooding section, Hurricane Florence closed both I-95, I-40, and other major highways for at least one week. Following the event, out-of-state travelers were asked to avoid North Carolina entirely. Those traveling up I-95 from Georgia, were advised to use I-16 West to I-75 North through Tennessee to I-81 North to I-64 East and back to I-95 in Virginia as shown in Figure 1.2. This detour is estimated to take 13.5 hours of travel time compared to the 6 hours travel from Savannah, G.A. to Richmond, V.A. would normally take. As roads were reopened, freight traffic was able to use I-95 into South Carolina but was diverted onto I-26 in South Carolina and up I-85 in North Carolina.

FIGURE 0.2. DETOUR ROUTE AVOIDING N.C. ENTIRELY AFTER HURRICANE FLORENCE



Source: WFMY News

Extreme Rainfall/Precipitation

The NCCSR concluded that it is ***likely*** that annual total precipitation in the state will increase, and it is ***very likely*** that precipitation and frequency will increase due to an overall increase in atmospheric water vapor content. Intense rain events generate significant localized runoff (pluvial runoff) that can result in dangerous driving conditions and can overload stormwater drainage systems causing water backups, resulting in street and highway flooding. Flooding can also disrupt rail operations by impacting railroad embankments and bridges, which compromise railroad integrity.

Flooding

NCDOT maintains over 80,000 of miles of roadway in a state that has 5,200 square miles of water and 48,000 square miles of land ranging in elevation from zero to 6,684 feet. North Carolina's location on the east coast also makes it vulnerable to tropical cyclones. Since 1851, North

Carolina has experienced over 387 tropical system events. Most recently however, Hurricane Matthew in 2016 and Hurricane Florence 2018 caused significant disruption of the transportation network. Hurricane Florence alone was responsible for over 31 deaths, and over 2,500 road closures. Both Interstate 95 and I-40 were closed for over a week due to flooding. Total transportation damages from Hurricane Florence, which included bridge, culvert and road washouts were over $227 million. While hurricane impacts have been significant, damages from localized storm events have also been increasing. In 2020, the department had over 500 culverts and bridges that were damaged during non-tropical cyclone events. Based on the NCCSR, it is ***virtually certain*** that sea level rise will continue, likely that annual precipitation and inland flooding will increase and likely that hurricane intensity will increase. Facing these flooding threats, NCDOT has worked with public and private partners on two 3-year flood management tool pilot projects: Flood Inundation Mapping Alert Network (FIMAN) for Transportation – (FIMAN-T) and BridgeWatch.

- **Flood Inundation Mapping Alert Network (FIMAN)**

  FIMAN-T was developed from FIMAN an NC Emergency Management (NCEM) product that is a sophisticated system of integrated technologies and datasets that effectively communicate flood information to emergency managers and the public. The goal of the FIMAN system is to reduce loss of life and flood-related property damage by providing emergency managers and the public with more timely, detailed, and accurate information. FIMAN integrates gages owned by the state, USGS, and other agencies to provide a network of 400 gages. The FIMAN web application uses responsive design and modeling techniques to display real-time and forecasted flood information, accessible from any desktop, laptop, or mobile device. One of the most powerful aspects of FIMAN is its ability to not only measure and display current and forecasted stream gage information, but to analyze, map, and communicate flood risks in real-time. Every 15 minutes, the application updates with data from over 400 sites across the state. Tools inside FIMAN overlay the flood inundation boundary with existing building information to quantify buildings impacted by flooding and provide exportable damage summary statistics. The FIMAN site also integrates available flood forecast information provided by the National Weather Service for sites across North Carolina. This forecast information is displayed to FIMAN users showing the forecasted flood extent, anticipated timeline, and estimated building-level impacts. FIMAN users and emergency managers can also sign up to receive alerts from FIMAN when flood levels at chosen areas rise to certain risk thresholds.

- **Flood Inundation Mapping Alert Network for Transportation (FIMAN-T)**

  In 2020, NCDOT and NCEM partnered to develop FIMAN for Transportation (FIMAN-T), a web-based tool used to provide NCDOT officials and emergency management stakeholders with real-time and forecasted flood inundation depths along roads, bridges, and other NCDOT assets in support of risk-based decision-making during flooding events. The goal of FIMAN-T is to provide visualization and metrics for roadway inundation, bridge hydraulic performance and identify potentially impacted NCDOT assets. This has enhanced NCDOT's responsiveness during flooding events by generating data and reports for use in disaster response and planning. FIMAN-T leverages the real time, 3D inundation mapping coupled with LIDAR derived roadway elevation layers to compute flooding depths over roadways for both current and forecasted conditions. The application features an interactive dashboard allowing users to navigate between current conditions, modeled scenarios, and forecasted conditions where available. The dashboard also features different "info-widgets" that provide detailed information including stream elevation, an interactive stage hydrograph, and forecasted peak. In addition, the road affected widget gives you the option to

view a summary table of all impacted roads within the inundation extent of the selected gage, or a sortable and filterable table showing all impacted roadway segments. NCDOT and NCEM are working together to expand FIMAN-T sites to include high risk transportation corridors such as I-40, I-95, N.C. 24, U.S. 74 and other areas. In addition, new functionality has been added to FIMAN-T to include forecasted hurricane and tropical storm surge inundation and roadway impacts for the entire NC coastline allowing emergency managers and first responders to have awareness of potential roadway and evacuation impacts from an approaching storm. The partnership with Coastal Emergency Risk Assessment (CERA) has not only allowed NCDOT to map forecasted storms, but also allowed the mapping of historical storms through hindcast analysis.

- **BridgeWatch**

  In addition to piloting FIMAN-T, NCDOT is working with industry partners and NCEM to implement a 3-year pilot of BridgeWatch. BridgeWatch compliments FIMAN-T by providing storm event situational awareness on 15,000 culverts and bridges. BridgeWatch is an online bridge-monitoring application service to enable transportation professionals to proactively monitor, in real-time, valuable infrastructure to prevent and protect against hazardous conditions for private, public, and commercial transportation. BridgeWatch collects and processes real-time data at regular intervals from meteorologic, hydrologic, oceanographic, and seismologic sources, gages, and other sensing devices. Data comparisons are then performed with internal NCDOT bridge parameters such as flood impact (floodwaters reaching structure levels) or roadway overtopping. NCDOT officials and emergency managers can customize alerts, when appropriate, via any electronic medium (cell phones, email, application dashboard, etc.) when bridges are experiencing a dangerous or critical condition. North Carolina is leveraging detailed river modeling and high-resolution LIDAR datasets to refine bridge elevations statewide for more accurate alerts. These datasets are being used to implement the following thresholds:

  - Rainfall Alerts: The system actively monitors Next-Generation Radar (NEXRAD) and other forecasts for thousands of bridge drainage areas statewide. Officials are notified if rainfalls (actual or forecasted) trigger predetermined thresholds.
  - Storm Surge Alerts: National Hurricane Center advisories are monitored comparing forecasted storm surge levels to bridge elevations. Custom alerts are available for when forecasted storm surge may impact bridges.
  - Freeboard Alerts: Officials are notified when stream levels rise close to a critical level at a bridge.
  - Low Chord Alerts: The low chord is typically the lowest structure member (beam) above the stream or river. Officials are notified when flood waters reach these critical levels. Alerts can be used to prioritize inspections and possible road closures during a flood.
  - Road Overtopping: Officials are also notified as sensors in the field detect water levels that could indicate that the roadway is overtopped either at the bridge or bridge approaches. This valuable information can be used for road closure, emergency response and post event inspection prioritization.

NCDOT, NCEM and the N.C. Department of Environmental Quality are also working together to integrate BridgeWatch and DamWatch. The goal is to inform NCDOT of roads that may be impacted by imminent dam failure. The 3-year pilots will conclude in 2022 with recommendations on how

to leverage these flood management tools in the future. Years one and two of the pilot have been focused on product development and initial training. Year three will be focused on end-user training, application, reporting and interoperability with other traffic management systems.

Emergency Management Coordination

Chapter 166A of the North Carolina General Statutes (NCGS) establishes the authority and responsibilities of the Governor, state agencies and local government for the preparation, response, recovery and mitigation of disasters. The principal department tasked with oversight and control of emergency management in North Carolina is the Department of Public Safety (NCDPS). The Secretary of NCDPS is responsible to the Governor for all state emergency management activities. The Director of Emergency Management also has the role of State Emergency Response Team (SERT) leader.

The NCDOT is a key SERT partner managing transportation infrastructure. NCDOT's infrastructure plays a critical role in safe and expeditious transport of supplies, commodities, equipment, personnel and survivors. In addition to the traditional role of maintaining and repairing roads, bridges, airports, ferries, waterways and rail impacted by hazards, NCDOT is now being expected by SERT partners to provide real-time and forecasted multi-modal situational intelligence. With this new added role, NCDOT must provide the defined information to the appropriate stakeholders at key points of planning and decision-making.

An increased level of coordination is occurring across the Division of Highways to communicate and share data to inform storm preparedness decisions. The Division of Highway's Transportation Mobility and Safety Unit oversees statewide traffic operations and interfaces with state/local law enforcement to provide real time traffic data for emergency response. The Technical Services Division provides staff expertise and resources to disseminate storm response preparedness and recovery information. The State Maintenance Operations Unit supports a storm preparedness program that oversees optimal use of emergency relief funds. The Global TransPark and local airports serve as staging areas for recovery efforts, providing warehousing and access to points of distribution (e.g. water distribution, vaccination sites, military bases, stadiums). This section provides an overview of these coordinated activities and the role of the units which oversee these efforts.

- **Storm Emergency Response Page** – An internal NCDOT SharePoint site serves as a clearinghouse of NCDOT's storm coordination information and agency responses to extreme weather events for units within the Division, the Chief Engineer's Office, the Secretary's Office, Communications Office and the Information Technology Office. This site helps to facilitate the following:
  - Share information with Senior Leadership such as anticipated impacts to the transportation infrastructure to assist with making decisions.
  - Increase knowledge between staff and senior leadership to allow for immediate situational awareness in both directions.
  - Identify and develop IT consistent solutions to assist with data collection, data sharing and data analytics.
  - Ensure communication and collaboration occurs across multiple disciplines and organizations.

  - Develop in-house strike teams to quickly produce plans of action, scope, schedule, preliminary construction plans and costs for recovery from major infrastructure damage.
  - Prepare a storm webpage for sharing relevant information including reports from the National Weather Service, traffic information, links to resources and the latest available storm response tools.

- **Application for Site-Specific Information Storage and Tracking (ASSIST)** – ASSIST was developed by State Maintenance Operations because of needs identified during the department's financial recovery efforts of Hurricane Matthew in 2016. Using the Survey123 platform within ArcGIS, the survey was designed for mobile, offline, field data collection, and has been continuously updated to coincide with, and better fulfill, federal agencies' (Federal Emergency Management Agency and Federal Highway Administration (FHWA)) data requirements for reimbursement. First employed during Hurricane Florence recovery efforts in 2018, ASSIST collects data points such as geo-locations, pictures, damage dimensions and initial preliminary estimates. The collected information can be displayed as a searchable and filterable data layer within ArcGIS and can be used by field, central or management personnel to make real-time, data driven decisions to support the department's physical efforts throughout an event. Preliminary information is used to support event declarations by state and federal agencies and once reviewed, confirmed and additional data added, the gathered information is submitted to federal agencies for reimbursement.

Additional measures are under way to assess the freight rail, airport, and port networks for resiliency and redundancy of the systems according to the 2022 Resilience Strategy Report. Further assessing these routes based on future inundation modeling may lead to more resilient design strategies in the future.

Landslides

Occurring most commonly in the Mountain Region, a landslide is defined as the movement of a mass of rock, debris, or earth down a slope. Landslides are a type of "mass wasting," which denotes any down-slope movement of soil and rock under the direct influence of gravity. Highway freight networks are particularly vulnerable due to the limited number of routes that may be taken to detour around the slide. An example of this is the rockslide that occurred on Feb. 22, 2019, that closed I-40 from Iron Duff to the Tennessee state line. Interstate 40 was closed in both directions for one week, I-40 westbound lanes remained closed for 1 month, with westbound traffic using one eastbound lane. This closure is further discussed in the Truck Parking Study.

NCDOT may review current design standards and practices and look for additional possible redundant routes through and around the mountain area. Similar to FIMAN-T, NCDOT is exploring the possibility of working with public-private partners to develop a monitoring system for slopes that may be prone to landslide activity.

Sea Level Rise

The NCCSR states that it is ***virtually certain*** that sea level along the North Carolina cost will continue to rise. As of 2020, sea level along the northeastern coast (Town of Duck) of North Carolina has risen about twice as fast as along the southeastern coast (City of Wilmington). This higher sea level worsens the impacts of storm surge, high tides, and wave action, whether a storm is present or not. Flooding at high tide is anticipated to become a daily occurrence by 2100 under all scenarios. This particularly effects the highway and rail transportation freight network in low-lying coastal areas. Marine port facilities may require changes to accommodate the higher tides and storm surges. As storm surges become more severe, interruptions to service can be expected.

Droughts and Wildfires

The NCCSR concluded that it is ***likely*** severe droughts in North Carolina will be more frequent and intense, which could lead to the likely increase in climate conditions conducive to wildfires. Smoky conditions produced by wildfires could cause delays and reduce safety due to decreased visibility for road and air travel. Further, wildfires can denude the landscape, further exacerbating conditions leading to landslides from more frequent or intense storms.

HIGHWAY STORMWATER PROGRAM

NCDOT is required by its National Pollutant Discharge Elimination System (NPDES) permit to implement a Post-Construction Stormwater Program (PCSP). The primary objective of the PCSP is to manage stormwater runoff from NCDOT projects by requiring structural and non-structural best management practices (BMPs) to protect the water quality of NC's lakes, streams, rivers, and estuaries. The requirements described in the PCSP apply to NCDOT projects that increase built-upon area. As required by the PCSP, NCDOT implements structural BMP described in the BMP Toolbox and/or non-structural pollution minimization measures described both in the PCSP and the BMP Toolbox. For most projects, documentation that the PCSP requirements were followed is provided through the preparation of a Stormwater Management Plan.

In addition, NCDOT must maintain and implement site-specific Stormwater Pollution Prevention Plans (SPPPs) for each of its industrial facilities. The Spill Prevention Control and Countermeasure (SPCC) Plan requirements of Title 40 of the Code of Federal Regulations, part 112 (40 CFR 112) have been fully integrated into the SPPPs to emphasize oil spill prevention and response practices at NCDOT industrial facilities. NCDOT continues to maintain and implement 204 site-specific SPPPs at NCDOT county maintenance yards, equipment shops, ferry terminals and a ferry maintenance facility, roadside environmental shops, traffic services shops, bridge maintenance yards, a rail maintenance facility, the Global TransPark, and remote salt and material storage locations. NCDOT SPPPs describe potential pollution sources and structural BMPs at each facility and provide non-structural BMPs to minimize potential impacts on stormwater from on-site industrial activities.

CURRENT ACTIVITIES

As noted in the NCDOT Resilience Strategy Report (2021), high impact weather events and natural hazards disrupt the safety and reliability of North Carolina's multimodal freight transportation network. The NCDOT is taking steps to incorporate Absorptive, Restorative, Equitable Access and Adaptive (AREA) capacity to prepare and respond to the threat of natural hazards and extreme events by focusing more coordinated efforts on transportation resilience. Numerous projects have been undertaken to address resilience and are detailed in the NCDOT Resilience Strategy Report (2021), and summarized as follows:

- **I-95/I-40 Flood Resilience Feasibility Study**

  This 2019 study addresses the vulnerability of two major interstate corridors – I-40 and I-95 – to natural flooding disasters and develops adaptation measures to mitigate against future flooding disasters. It was conducted in response to a directive from the NCDOT secretary of transportation to identify improvement options and estimate costs to make sections of I-95 and I-40 more resilient to future storm events. The improvement options span from south of the I-40/I-95 interchange in central NC to Wilmington. Each improvement option is intended "to decrease the potential for flooding of the interstate segments and minimize disruption to transportation during extreme weather events" and the study methodologies could be used to inform flood resilient design considerations for projects in the State Transportation Improvement Program (STIP).

- **U.S. 70/Future I-42 Risk and Resilience Vulnerability Study**

  The U.S. 70/ Future I-42 study area extends from Wake/Johnston County line to Marine Corps Outlying Field (MCOLF) – Atlantic. This study assesses the vulnerability of routes to airports, ports, and the NCRR rail line adjacent to the corridor. As part of the data collection effort, NCDOT is coordinating with FHWA and other state agencies. All sections of U.S. 70 will be assessed, with a focus on vulnerable areas where storm surge and floods impact the highway. This study will assess infrastructure vulnerability and risk using FHWA's Vulnerability Assessment Scoring Tool (VAST), stakeholder engagement, and other agency expertise/resources. VAST is an Excel based tool that uses data and stakeholder input to create an indicator-based vulnerability assessment of transportation assets. As a part of this assessment, a gap analysis will be performed to identify missing data needed to perform a better assessment.

- **U.S. 74 Risk and Resilience Vulnerability Study**

  The U.S. 74 study area extends from I-485 in Matthews to the Port of Wilmington and includes a 10- mile buffer on either side of the corridor using City Simulator model developed by Atkins. To understand the potential vulnerabilities that will be exposed by continued growth along with future weather challenges, a holistic assessment of the transportation corridor and its various interacting systems is required. This assessment will include people, economy, weather, and infrastructure. This assessment is taking a stakeholder-inclusive approach by including several NCDOT units, N.C. state agencies, federal partners, metropolitan planning organizations, and rural planning organizations. The objective of this pilot study is to determine goals and objectives for future U.S. 74 resiliency, identify and define any vulnerabilities of the

U.S. 74 corridor to future extreme weather events – including large storms, hurricanes, and heat waves – and to develop and stress-test mitigation and adaptation scenarios against future conditions and quantify benefits relative to goals and objectives.

- **I-95 Flood Resiliency Design and Innovation through USDOT BUILD Grant**

  During hurricanes Matthew and Florence, I-95 was flooded in 10 locations between exits 13 and 76. In Lumberton, flooding of the Lumber River closed I-95 for more than seven days. The NCDOT was awarded a USDOT BUILD Grant for STIP Projects I-6064 and I-5987 to incorporate flood resilience, a flood alert network and conduct a flood vulnerability stress test. Through the use of complex hydrological modeling, the department will build a new highway that will withstand future extreme events and provide flood alert information that will improve safety, performance (to freight hubs, military bases, and rural access to major urban markets) and provide greater resilience to maintain the use of transportation lifelines.

- **North Carolina Future Precipitation for Resilient Design**

  The frequency and intensity of both floods and droughts are expected to increase in response to a warming climate; however, significant uncertainties remain regarding regional changes, especially for extreme rainfall. Traditional design has been based on long-term historical data that assumed that the past conditions would represent future conditions. Since this is not the case, Global Climate Models (GCM) are helping engineers and scientists predict future climate conditions. NCDOT, NCEM, the North Carolina State Climate Office and researchers will be using GCMs in this three-year study to (1) assist NCDOT with climate adaptation and resilience planning and (2) improve confidence in future flood risk using existing downscaling data/methodologies and tailored high-resolution climate model projections. The study is scheduled to be completed in 2023.

- **NCHRP 20-44(23) – Pilot Test of Climate Change Design Practices Guide for Hydrology and Hydraulics**

  NCDOT staff are participating in the study with the possibility that N.C. will be one of the pilot project sites. The objective of National Cooperative Highway Research Program (NCHRP) 20-44(23) project is to conduct pilot tests in concert with several state DOTs to determine the effectiveness and ease of implementation of the Design Practices Guide produced in NCHRP Project 15-61 (Applying Climate Change Information to Hydrologic and Coastal Design of Transportation Infrastructure). The research is expected to conclude in 2022.

- **FHWA – Pooled Fund Study – Intensity-Duration-Frequency / Depth-Duration-Frequency Atlas 14 Rainfall Update**

  Rainfall data for design has not been updated in N.C. since 2004. The purpose of this study is to update precipitation frequency estimates first published in NOAA Atlas 14 Volume 2 for D.E., M.D., N.C. and V.A. The estimates and bounds of 90 percent confidence intervals will be provided at 30 arc-second durations of 5-minute through 60-day average recurrence intervals of 1 year through 1,000 years. The study results will be published on the web as NOAA Atlas 14 Volume 13 through the Precipitation Frequency Data Server. The 2-year study was planned to start in the summer of 2021.

- **NCDOT Research Project 2021-03: Predicting Roadway Washout Locations During Extreme Events**

  Recent extreme rainfall events have revealed the transportation network's vulnerabilities to road washouts. Currently, NCDOT reacts to these problems as they are reported from the field. Knowing where washouts are likely to occur will lead to identifying locations for countermeasures

to protect the roadway and assist with positioning of resources more efficiently. The purpose of this research project is to develop models and test several approaches for predicting crossing washouts based on forecasted rainfall. Washouts and the model predictions will be used to develop a network of “safe” routes for each watershed. The research will be completed in 2023.

- **Transportation Asset Management Program – Pipe Inventory Program**

  NCDOT’s asset management practice is shifting towards a forward-looking approach to identify at-risk culverts and pipes that often meet criteria for federal funds. Knowing the location and condition of the department’s drainage structures is an important component of building resilience into the state’s network. Recently, NCDOT undertook a statewide inventory and condition assessment of culverts and crossline pipes that are not part of the National Bridge Inventory (NBI), coordinated closely through the Chief Engineer’s office in the Division of Highways. The effort creates the first statewide comprehensive geospatial record of approximately 26,000 non-NBI structures (culverts and pipes over 48 inches in diameter) and approximately 350,000 crossline pipes (48 inches and below). The data collected as part of the pipe inventory program supports the department’s lifecycle approach to asset management. The next phase of the program is to re-evaluate each asset on a cyclical basis, and to incorporate ongoing changes to the inventory.

- **NC Research Project 2022-18 in cooperation with University of North Carolina Chapel Hill: A Web based Geospatial Analytics Tool for Quantify Freight Risk and Resilience in Transportation**

  This project is a comprehensive study on the risk and resiliency profiles of North Carolina public roads, specifically primary and secondary freight routes, with the objective of establishing a geospatial analytics platform for transportation data integration and modeling. The platform, identified as “Geo-FRIT", provides a web-based geospatial analytics tool for quantifying freight risk and resilience in transportation. Geo-FRIT will allow for data collection and sharing among NCDOT divisions, and routing analytics as well as advanced modeling of disaster data for risk-based freight routing through spatial simulation-driven scenario analysis. This project can enhance freight management and safety via web-based data access, integration, and automation, which also promotes transportation resiliency. NCDOT can benefit substantially from state-of-the-art geospatial technologies that allow for the automated fusion and dissemination of digital data associated with risk-based freight rerouting. Moreover, the integrated platform can help researchers in modeling transportation resiliency and risks during various disasters. The Geo-FRIT tool provides solid support for risk-based freight routing analysis that can lead to significant labor and operational cost savings for NCDOT and enhance highway safety, emergency management, community transportation planning, and public health.

- **N.C. 24 Causeway – White Oak River**

  N.C. 24 is a key route for community members in Cedar Point and Swansboro, providing important connectivity between Marine Corps Base Camp Lejeune, Marine Corps Auxiliary Landing Field Bogue, the Port of Morehead City and Marine Corps Air Station Cherry Point. The highway also serves as a vital evacuation route for hurricanes and a commuter road with approximately 26,000 vehicles passing through the area each day. The priority sites along N.C. 24 proposed sustained damages from hurricanes Florence, Irene and Ophelia, and are particularly vulnerable to future storm degradation. In partnership with the North Carolina Coastal Federation, NCDOT procured a National Fish and Wildlife Fund grant to build living shorelines and surge and wave-energy countermeasures adjacent to N.C. 24 that will have transferability for future projects. NCDOT plans to use this project to support its strategy to increase infrastructure resilience along NCDOT coastal highways.

- **N.C. 12**

  It is a critical route linking barrier islands along N.C.'s coast with resilience related improvements occurring through multiple STIP projects. The new Herbert C. Bonner bridge connecting Oregon inlet to Pea Island included design elements in its span to adapt to changing oceanic and sound tidal conditions. Specifically, four channel spans allow wave action and natural channel flow beneath the structure to migrate while simultaneously maintaining adequate access for vessels. Further south in Rodanthe the "jug-handle" bridge (B-2500B) has been built on the back (landward) side of the island to provide redundant and accessible travel access if N.C. 12 is overtopped or washed out in a major event.

- **Coastal Roadway Inundation Simulation Tool**

  The Coastal Roadway Inundation Simulator (CRIS) was developed through a partnership with NCDOT and NCEM to simulate and quantify the effects of coastal flood inundation on the N.C. transportation system. With the assistance of NCFMP Road LiDAR, at points every 50 feet along roadways, CRIS subtracts the roadway elevation from the inundation level to determine the depth of flooding on the road. This tool is intended for emergency planning and response, evacuation, road closure, and future resiliency planning purposes.

- **Statewide Roadway and Rail Inundation Tool**

  The Roadway Inundation Tool was also developed through a partnership with NCDOT and NCEM to quantify the effects of both modeled riverine and coastal flooding on the N.C. transportation network. RIT allows users to examine everywhere a primary or secondary road crosses a stream that has an approved hydraulic flood study completed by the NCFMP and both visualize and quantify flood impacts from multiple flood recurrence intervals.

NORTH CAROLINA
STATEWIDE MULTIMODAL FREIGHT PLAN

Planning for the Future of Freight Movement

FREIGHT EMISSIONS ASSESSMENT - FINAL

ACRONYMS

CMAQ	Congestion Mitigation Air Quality
CO_2	Carbon Dioxide
DERA	Diesel Emissions Reduction Act
ECA	Emission Control Area
EO	Executive Order
IMO	International Maritime Organization
GHG	Green House Gases
MHD	Medium- and Heavy-Duty
NOx	Nitrogen Oxides
NCDOT	North Carolina Department of Transportation
PM	Particulate Matter
USEPA	United States Environmental Protections Agency
VOCs	Volatile Organic Compounds
ZEV	Zero Emission Vehicle
ZEFV	Zero Emission Freight Vehicle

FREIGHT EMISSIONS ASSESSMENT

Freight transportation plays an important role in our global economy. Billions of tons of cargo are transported around the world each year by trucks, planes, ships, and trains. According to the Massachusetts Institute of Technology, freight transportation makes up 8% of global greenhouse gas (GHG) emissions, and as much as 11% if warehouses and ports are included.

Emissions from freight transport include GHGs, particulate matter (PM), nitrogen oxides (NO_x) and volatile organic compounds (VOCs). According to the U.S. Environmental Protection Agency (USEPA), the transportation sector is responsible for:

- Over 55% of NO_x total emissions inventory in the U.S.
- Less than 10% of VOCs emissions in the U.S.
- Less than 10% of $PM_{2.5}$ and PM_{10} emissions in the U.S.

The transportation sector also contributes to emissions of air toxics, which are compounds that are known or suspected to cause cancer or other serious health and environmental effects. Examples of mobile source air toxics include benzene, formaldehyde, and diesel particulate matter. In addition, GHG emissions have been linked to climate change.

According to the 2022 North Carolina Greenhouse Gas Inventory, transportation is the largest GHG-emitting sector in North Carolina, representing approximately 36% of gross GHG emissions. Table 1 shows the breakdown of transportation related GHG emissions by vehicle type.

TABLE 1. GHG TRANSPORTATION EMISSIONS BY VEHICLE/EQUIPMENT TYPE

Highway (~90% of Emissions)	Non-Highway Mobile Sources (~10% of Emissions)		Alternative Fuel Vehicles (<1% of Emissions)
Light-Duty Vehicles	Off-road Transportation	Off-road Equipment	Compressed Natural Gas
Passenger Cars	Airplanes	Construction	
Passenger Trucks	Trains	Agriculture	
Heavy Duty Trucks	Marine Vessels	Logging	
Buses	Recreational Vehicles	Recreation	
Commercial Trucks			

Source: North Carolina Department of Environmental Quality

Based on data from the North Carolina Volkswagen Mitigation Plan, freight also constitutes a large percentage of NO_x emissions in North Carolina, as shown in Table 2.

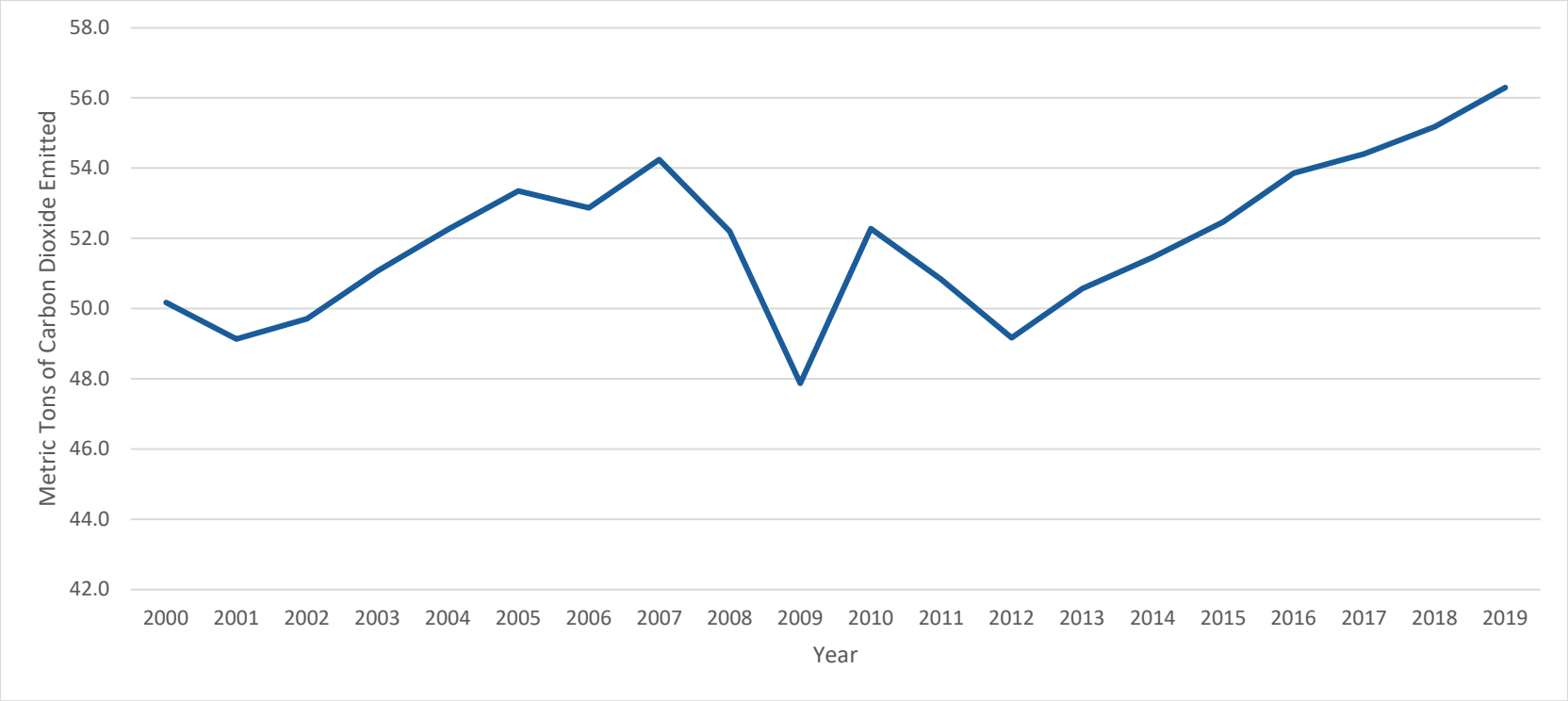
TABLE 2. MOBILE SOURCE NO_X EMISSIONS BY SOURCE (FREIGHT SOURCES IN BOLD)

Mobile Source NO_x Emissions Source	Emissions (tons/year)	Percent of total*
Commercial Marine Vessels	4,395	2.8%
Non-road Equipment – Diesel	17,476	11.1%
On-road Diesel Heavy-duty Vehicles	29,755	18.9%
Locomotives	6,790	4.3%
On-road Diesel Light-duty Vehicles	4,489	2.9%
On-road Non-diesel Heavy-duty Vehicles	709	0.5%
Aircraft	4,290	2.7%
Non-road Equipment – Gasoline	6,446	4.1%
Non-road Equipment - Other	1,803	1.1%
On-road Non-diesel Light-duty Vehicles	81,276	51.6%
Total	**157,428**	

Source North Carolina Phase 2 Volkswagen Mitigation Plan, 2021
*Note, percentages do not add up to 100% due to rounding

As detailed in the Statewide Multimodal Freight Plan, North Carolina freight is heavily dependent on trucks. This trend is anticipated to continue through 2050. Emission trends for total transportation use have also been relatively constant, with an average increase from 2000 to 2019 of about 300,000 metric tons of Carbon Dioxide (CO_2) per year. Data on transportation-related CO_2 emissions in North Carolina during this period are shown in Figure 1.

Figure 1. North Carolina Transportation Carbon Dioxide Emissions, 2000 to 2019



Source: US Energy Information Administration

Reduction and Mitigation Programs

Heavy-Duty Vehicle Fuel Efficiency Standards

The National Highway Traffic Safety Administration's fuel efficiency standards for heavy-duty trucks are currently stayed. However, if the stay is removed, the new standards would affect companies that manufacture, sell, or import into the United States new heavy-duty engines and new Class 2b through Class 8 trucks. Improving fuel efficiency may result in a reduction of all emissions generated as products of combustion.

National Clean Diesel Program (Diesel Emissions Reduction Act Funding)

The Clean Diesel Program offers funding in the form of Diesel Emissions Reduction Act (DERA) grants and rebates as well as other support for projects that protect human health and improve air quality by reducing harmful emissions from diesel engines. North Carolina has been a

recipient of 10 National DERA Awarded Grants that have been used in part to address freight related emissions by replacing diesel cargo handling equipment and ground support vehicles at airports and replacing drayage trucks. Additionally, North Carolina has used its state allocation of DERA funds (including those provided through the American Reinvestment and Recovery Act of 2009) to replace long-haul trucks and provide rebates for auxiliary power units as well as funding to repower locomotive engines.

Congestion Mitigation Air Quality

The Congestion Mitigation Air Quality (CMAQ) program was authorized though the Intermodal Surface Transportation Efficiency Act and reauthorized in subsequent transportation bills. This program was implemented to support surface transportation projects and other related efforts that contribute to air quality improvements and provide congestion relief. The Port of Wilmington has leveraged CMAQ funding to subsidize the intermodal rail service between Wilmington and Charlotte, thereby taking trucks off the roads and significantly reducing emissions, especially in Charlotte which is a nonattainment area.

SmartWay

Freight transportation is a large contributor to air pollution and climate change. SmartWay helps the freight transportation industry improve supply chain efficiency to reduce air pollution from their operations. The three core elements of the SmartWay program include transport partnerships between shippers and carriers and the USEPA, brand awareness of fuel-saving technologies, and global collaboration. In 2018, the USEPA honored two North Carolina truck carriers, Eagle Transport Corporation and Old Dominion Freight Line, Inc., with the annual SmartWay Excellence Awards at the 2018 American Trucking Associations Annual Management Conference & Exhibition in Austin, Texas. The North Carolina recipients are among 40 being recognized nationally as industry leaders in supply chain environmental and energy efficiency.

Ports Initiative

The Ports Initiative is working to develop and implement environmentally sustainable port strategies through partnerships between USEPA and ports. The program identifies opportunities to reduce air pollution and improve air quality in port communities and reduce the carbon pollution that contributes to climate change while supporting jobs and the economy. USEPA is supporting these efforts through a number of programs, including funding through the Diesel Emission Reductions Act.

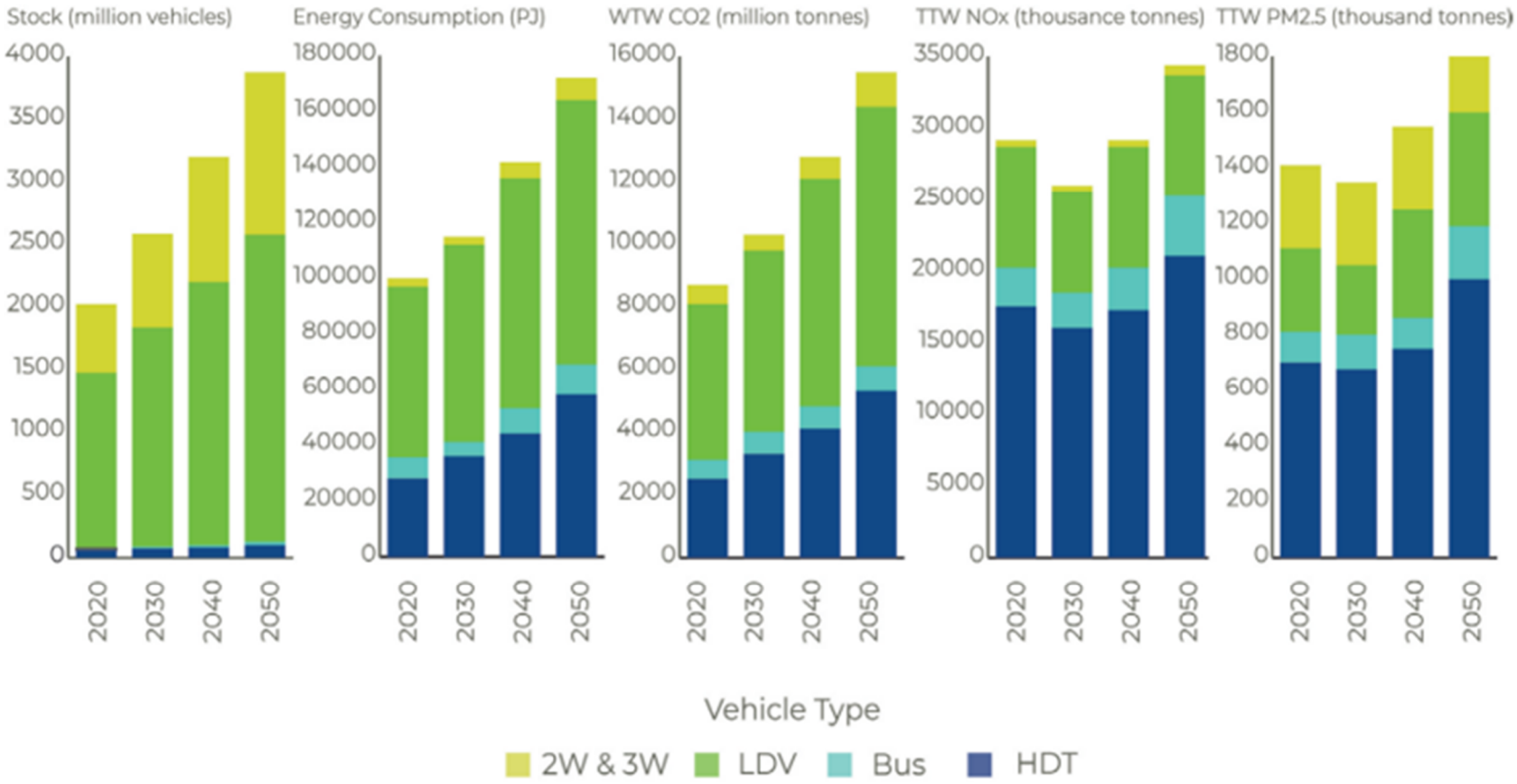
NCPorts continues active work to reduce emissions. The new Ship to Shore container cranes are all electric and help reduce the amount of emissions coming from the port facilities.

Emerging Technologies and Initiatives for Freight Emission Reduction

Zero Emission Freight Vehicles

ZEFVs provide a technological solution that can replace and improve upon the current system that relies predominantly on diesel-powered trucks. This transition is essential. If "business as usual" operations continue, the anticipated emissions from heavy-duty diesel trucks are anticipated to become an increasingly large percentage of energy consumption and emissions of CO_2, NO_x, and $PM_{2.5}$ as shown in Figure 2.

Figure 2. "Business as Usual" Projections of Global Truck Stock, Energy Consumption, and Tailpipe Emissions



Source: Zero Electric Vehicle Alliance

The ZEFV market has already progressed out of its infancy, with some vehicle segments approaching commercialization stages, though uptake and model availability of larger ZEFVs has been limited to date. The outlook for ZEFV uptake has been bolstered with supportive, large-scale pledges from fleets and manufacturers. Governments are also supporting the transition by placing limitations on diesel use, establishing ZEFV sales requirements, and forming multi-state coalitions to develop and implement market-enabling policies, thereby creating opportunities for ZEFVs to fill the spaced vacated by diesel consumption.

On July 15, 2020, Gov. Cooper joined a bi-partisan group that now includes 17 states, the District of Columbia, and the Canadian Province of Quebec in signing a Memorandum of Understanding (MOU) committing to the electrification of medium- and heavy-duty vehicles, including large pickup trucks and vans, delivery trucks, box trucks, school and transit buses, and long-haul delivery trucks. The goal is to ensure that 100 % of all new truck and bus sales are zero-emission vehicles (ZEVs) by 2050, with an interim target of 30 % by 2030.To help meet these goals, North Carolina and the other signatories are working through the Multi-State ZEV Task Force to develop a Multi-State Medium- and Heavy-Duty ZEV Action Plan.

Clean Transportation Plan

Gov. Cooper signed Executive Order (EO) 80, "North Carolina's Commitment to Address Climate Change and Transition to a Clean Energy Economy" (Oct. 29, 2018) that states North Carolina will support the 2015 Paris Agreement and honor the state's commitments to the Unites States Climate Alliance. Another initiative, EO 246 (Jan. 7, 2022), stated North Carolina would release an updated GHG inventory by Jan. 31, 2022, and biennially thereafter. It also established a pathways analysis to evaluate potential emission-reduction pathways for achieving net-zero GHG emissions across North Carolina's economy by 2050. The EO stated that North Carolina would develop a Clean Transportation Plan that included transitioning medium- and heavy-vehicles to ZEVs. In developing the NC Clean Transportation Plan, one of the five workgroups developed focuses on developing actionable strategies to address emissions from medium- and heavy-duty vehicles.

The Clean Transportation Plan for MHD Vehicles builds off the Multi-State ZEV Task Force work and is committed to the electrification of MHD vehicles. It also includes environmental justice outreach to impacted communities as well as exploring the use of low-carbon fuels. These outreach steps are important, because communities adjacent to freight corridors often bear the greatest burden from air pollution and climate change.

Connected and Autonomous Vehicles

Connected and Autonomous Vehicles (CAVs) technology has the potential to improve the efficiency of transportation systems resulting in both reduced accidents and emissions. This technology helps make truck platooning possible resulting in fuel savings of 5 to 20 %. In January 2017, the Triangle Expressway was designated as a USDOT Autonomous Vehicle Proving Ground and truck platooning was passed in July 2017. In collaboration with Volvo, truck platooning was demonstrated along this route beginning April 2018. The demonstration took place at the Veridea Parkway outside of a.m. and p.m. peak hour traffic conditions. Trucks were spaced 75 to 100 feet apart and traveled at 62 miles per hour.

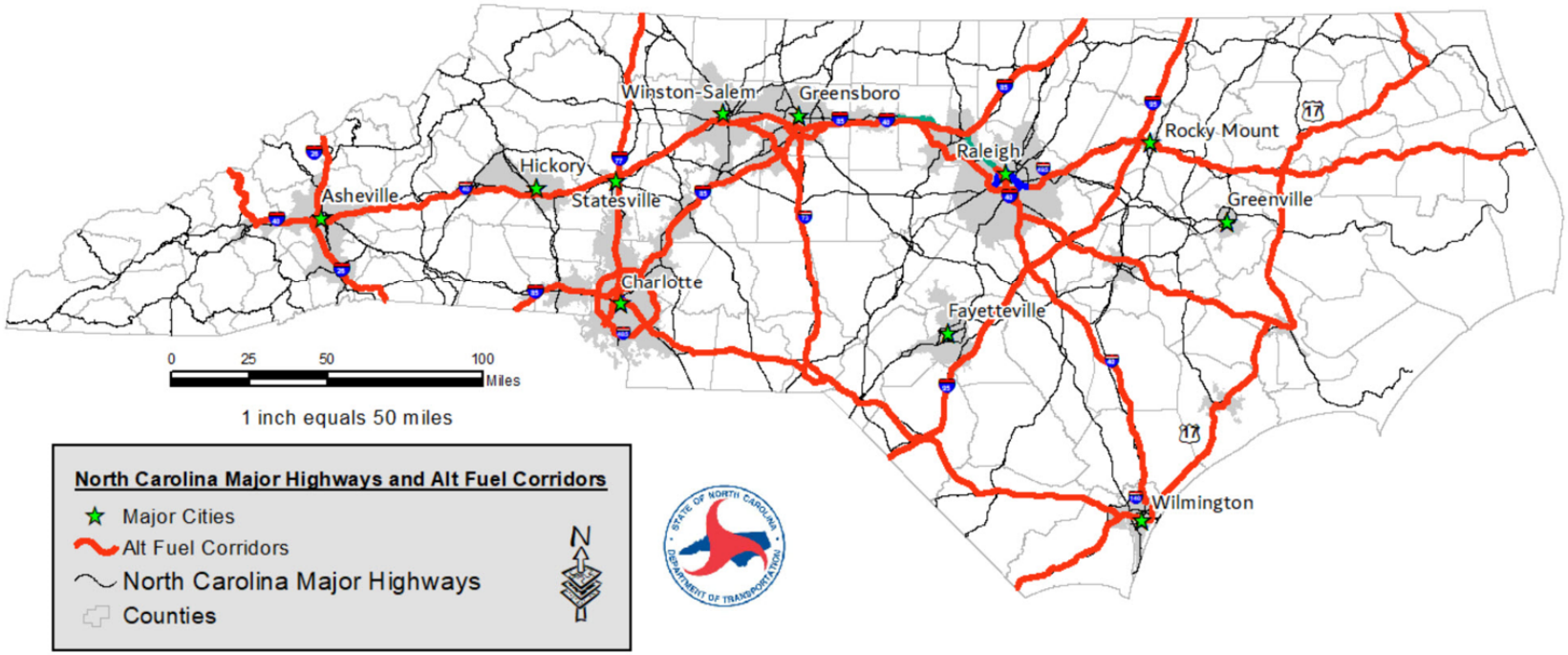
North Carolina Alternative Fuel Infrastructure Support

Because transportation emissions constitute the largest percentage of GHG emissions in North Carolina and trucks carry the preponderance of the state's freight, reducing truck emissions will be a key for North Carolina to meet its stated emissions goals. This will involve the conversion of conventionally fueled vehicles to cleaner alternatives such as propane, natural gas, biofuels, electric, and hydrogen.

As part of the Volkswagen Settlement Mitigation Program, the North Carolina Department of Environmental Quality (NCDAQ) is allocating the full 15 % ($10,198,826) allowed in the agreement for ZEV charging infrastructure projects as outlined in the North Carolina Volkswagen Mitigation Plan. During Phase 2 of the Volkswagen settlement, North Carolina will facilitate interstate travel with ZEVs by supporting projects to enhance and extend the current ZEV infrastructure network on high-traffic routes between population hubs.

NCDOT has participated in the FHWA Alternative Fuel Corridor program since its inception in 2016. Through this program, several corridors have been designated (Figure 3). National Electric Vehicle Infrastructure (NEVI) investment must occur along these routes until a build out status is certified. As these routes align with most of the state's interstates and major U.S. routes that also serve a freight purpose, this investment will aid in the electrification of freight vehicles.

Figure 3. North Carolina Alternative Fuel Corridors



NORTH CAROLINA
STATEWIDE MULTIMODAL FREIGHT PLAN

Planning for the Future of Freight Movement

FREIGHT EQUITY ASSESSMENT - FINAL

North Carolina Statewide Multimodal Freight Plan

Freight Equity Assessment

Prepared for:
North Carolina Department of Transportation

Prepared by:
HNTB Corporation
343 E Six Forks Rd #200
Raleigh, NC 27609

Date
April 2023

ACRONYMS

APP	Area of Persistent Poverty
BIL	Bipartisan Infrastructure Law
CEQ	Council on Environmental Quality
EO	Executive Order
GHG	Greenhouse Gases
HDC	Historically Disadvantaged Communities
IIJA	Infrastructure Investment and Jobs Act
MHDV	Medium- and Heavy-duty Vehicles
NCDOT	North Carolina Department of Transportation
RAISE	Rebuilding American Infrastructure with Sustainability and Equity
ZEV	Zero Emission Vehicle

FREIGHT EQUITY ASSESSMENT

Many freight routes pass through traditionally underserved communities. Highway and rail lines may divide these communities, while port and airport facilities are often located adjacent to them. Although the communities are in proximity to the freight facilities, they often do not enjoy the benefits those facilities bring to the local and national general population.

On January 27, 2021, President Biden signed Executive Order (EO) 14008, Tackling the Climate Crisis at Home and Abroad, creating the government-wide Justice40 Initiative. On July 20, 2021, the Office of Management and Budget released Interim Implementation Guidance for the Justice40 Initiative (M-21-28), which has guided the U.S. Department of Transportation's work on Justice40 along with relevant statutory authorities. The Justice40 Initiative aims to deliver 40% of the overall benefits of federal investments in climate and clean energy, including sustainable transportation, to disadvantaged communities.

On January 7, 2022, Governor Cooper issued EO 246, *North Carolina's Transformation to a Clean, Equitable Economy*. In line with EO 80 (*North Carolina's Commitment to Address Climate Change and Transition to a Clean Energy Economy),* The order stated that the Governor's Office and Cabinet agencies shall incorporate environmental justice and equity considerations and benefits in implementing this EO. EO 246 sets goals to reduce statewide greenhouse gas (GHG) emissions to at least 50% below 2005 levels by 2030. The executive order also requires the development of a statewide Clean Transportation Plan, due April 2023, that includes an update to the North Carolina ZEV plan. In addition, North Carolina is a signatory of the July 13, 2020 *Multi-State Medium- and Heavy-Duty Zero Emission Vehicle Memorandum of Understanding*.

The 2021 Infrastructure Investment and Jobs Act (IIJA), also known as the Bipartisan Infrastructure Law (BIL), seeks to recognize the often negative impacts existing and planned transportation facilities have had on traditionally underserved populations. Negative impacts may include:

- Fragmenting communities;
- Traffic noise and air quality impacts;
- Limiting active transportation and transit options; and
- Reducing access to employment, cultural, or educational opportunities.

This document will focus on reviewing past and planned projects through an equity lens using a desktop GIS evaluation. By reviewing where the freight network potentially impacts historically disadvantaged communities (HDCs), NCDOT can ensure that future effects are minimized, in addition to assessing the ability of projects to address past damages.

Existing and Planned Priority Highway Freight Network Equity

The N.C. Department of Transportation (NCDOT) evaluated the current Priority Highway Freight Network as well as projects listed in the 2020-2029 North Carolina State Transportation Improvement Program (STIP) that added capacity to facilities on the North Carolina Priority Freight Network.(NCPFN) To identify disadvantaged communities, NCDOT used the U.S. Department of Transportation's data on HDCs and Areas of Persistent Poverty (APPs) using 2010 Census Tract data developed for the Rebuilding American Infrastructure with Sustainability and Equity (RAISE) 2022 Grants.

APPs are defined by the RAISE grant program as (1) territories or possessions of the United States, (2) counties that had greater than 20 percent of the population living in poverty in the 1990 and 200 US Census as well as the (3) 2020 Small Area Income Poverty Estimates or census tracts that had a poverty rate of at least 20 percent as measured by the 2014-2018 5-year data series available from the American Community Survey (ACS). HDCs are tribal lands, territories or possessions of the Unites States, or census tracts that meet certain defined criteria. The RAISE Grant equity tables were based on 2010 Census data as in-depth assessments had not been completed for 2020 Census data.

NCDOT determined the percentage of the NCPHFN miles that run through APP or HDC areas. Facility miles were counted if one or both sides of the facility were in an APP or HDC Census Tract. The results of these analyses are shown in Figures 1 and 2 and Table 1. Based on this assessment, a substantial percentage of the NCPHFN passes through APP or HDC Census Tracts.

The extent to which an APP or HDC community is impacted by current or planned highway infrastructure is highly site/project specific. For example, a past interstate construction project may have acted as a barrier for area residents to access jobs, goods, and services. It may have also reduced air quality, increased traffic noise, and limited active transportation options. These factors are often associated with higher rates of diabetes, asthma, and heart disease. A project to improve these facilities may address some of these past impacts by improving active transportation options on structures crossing the interstate, providing noise walls, and reducing idling traffic.

Figure 1. Existing NC Priority Highway Freight Network and Planned Improvements and Census Tracts Identified as APP

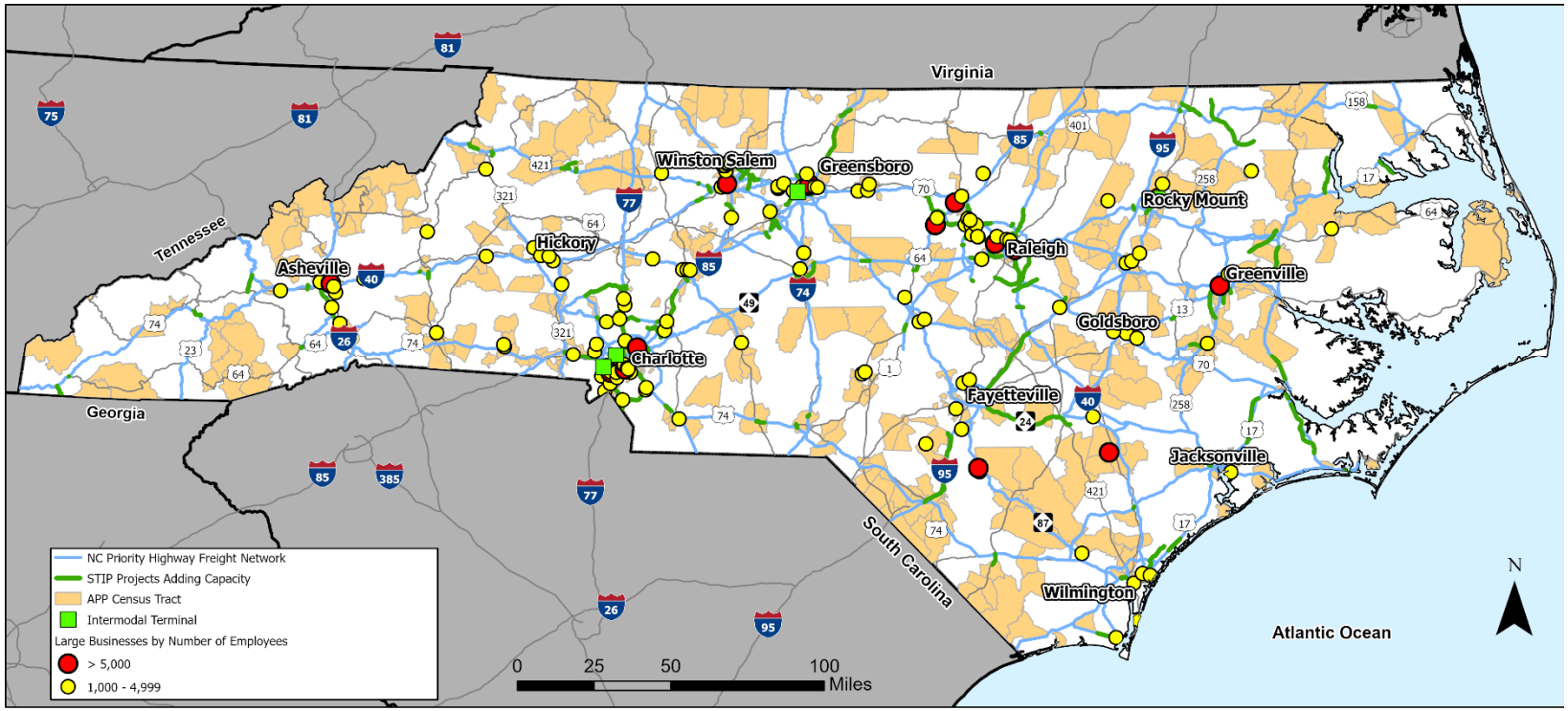


Figure 2. Existing NC Priority Highway Freight Network and Planned Improvements and Census Tracts Identified as HDC

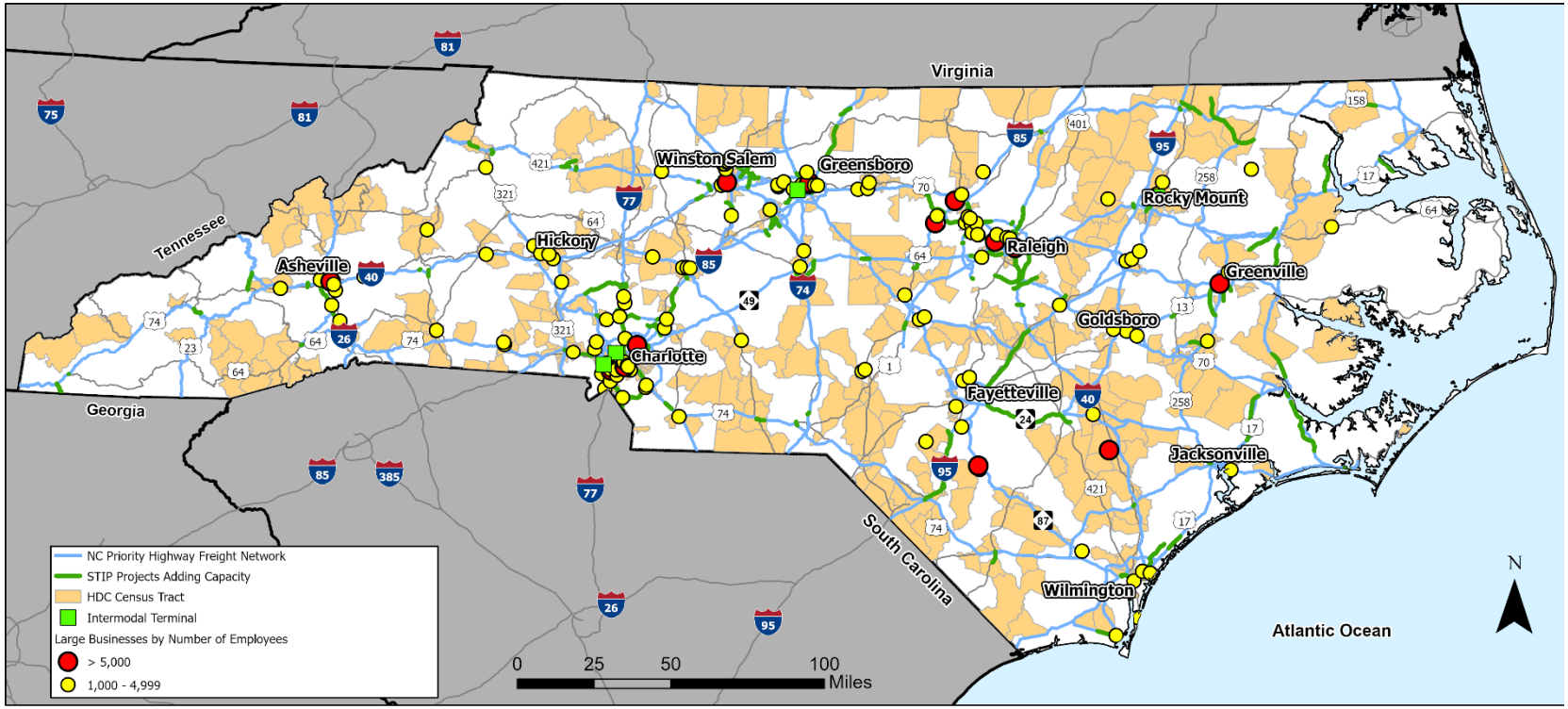


TABLE 1 APP AND HDC CENSUS TRACTS IN RELATION TO THE NC PRIORITY HIGHWAY FREIGHT NETWORK

Area of Persistent Poverty (APP) Data for North Carolina and Priority Highway Freight Network		
	Total in APP Census Tracts	Percent in APP
North Carolina Population (2010 Census) in APP	2,251,022 people	25%
Existing Priority Highway Freight Network in APPs	1,204 miles	28%
Planned Priority Highway Freight Network Improvement Projects in APPs	133 miles	18%
Historically Disadvantaged Community (HDC) Data for North Carolina and Priority Highway Freight Network		
North Carolina Population (2010 Census) in HDC	2,887,491 people	28%
Existing Priority Highway Freight Network in HDCs	1,300 miles	31%
Planned Priority Highway Freight Network Improvement Projects in HDCs	171 miles	23%

Existing and Planned NC Priority Rail Freight Network Equity

Rail transportation networks are often considered to be demarcation zones in communities. The phrase “wrong side of the tracks” dates from 19th century England, when it was noted that rail networks often served as a dividing line between prosperous and poor neighborhoods. In a January 2012 report, the Trade, Health, and Environment Impact Project stated, “Operation of the trucks, locomotives, and yard equipment that service rail yards negatively affects communities’ health and quality of life with increased air pollution, noise, traffic congestion, and industrial blight. Most rail yards operate round-the-clock, with stadium style lights allowing night-time operations. Of particular concern are diesel particulate emissions, which have been linked to lung cancer and other health effects.”

NCDOT determined the percentage of the NC Priority Rail Freight Network miles that run through APP or HDC areas. Facility miles were counted if one or both sides of the facility were in an APP or HDC Census Tract. The results of these analyses are shown in Figures 3 and 4 and Table 2. Based on this assessment, a higher percentage of the NC Priority Rail Freight Network passes through APP or HDC Census Tracts than does the NC Priority Highway Freight Network.

Certain rail projects in the 2020-2029 STIP do not have defined extents at this time. General project locations are shown as points in Figure 3 and 4, but exact lengths of improvements are not yet known. 27 grade separation projects are programmed in the 2020-2029 STIP. These projects include grade separating highways and railroads, as well as pedestrian improvements such as constructing pedestrian underpasses below railroads. Grade separation projects are likely to benefit communities, particularly APP and HDC areas, as they will provide a connection across railroads that were previously a dividing line.

Figure 3. Existing Freight Railroad Network and Census Tracts Identified as APP

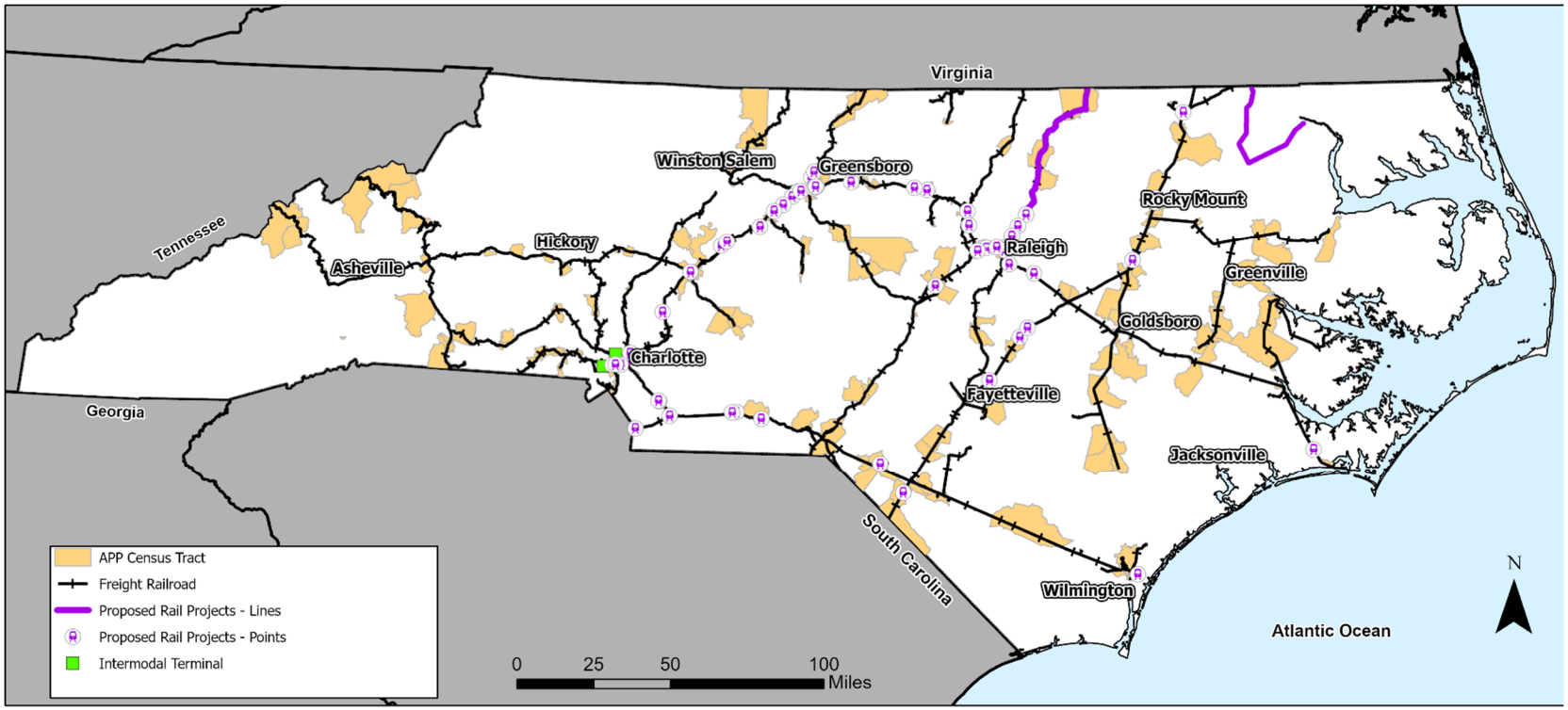


Figure 4. Existing Freight Railroad Network and Census Tracts Identified as HDC

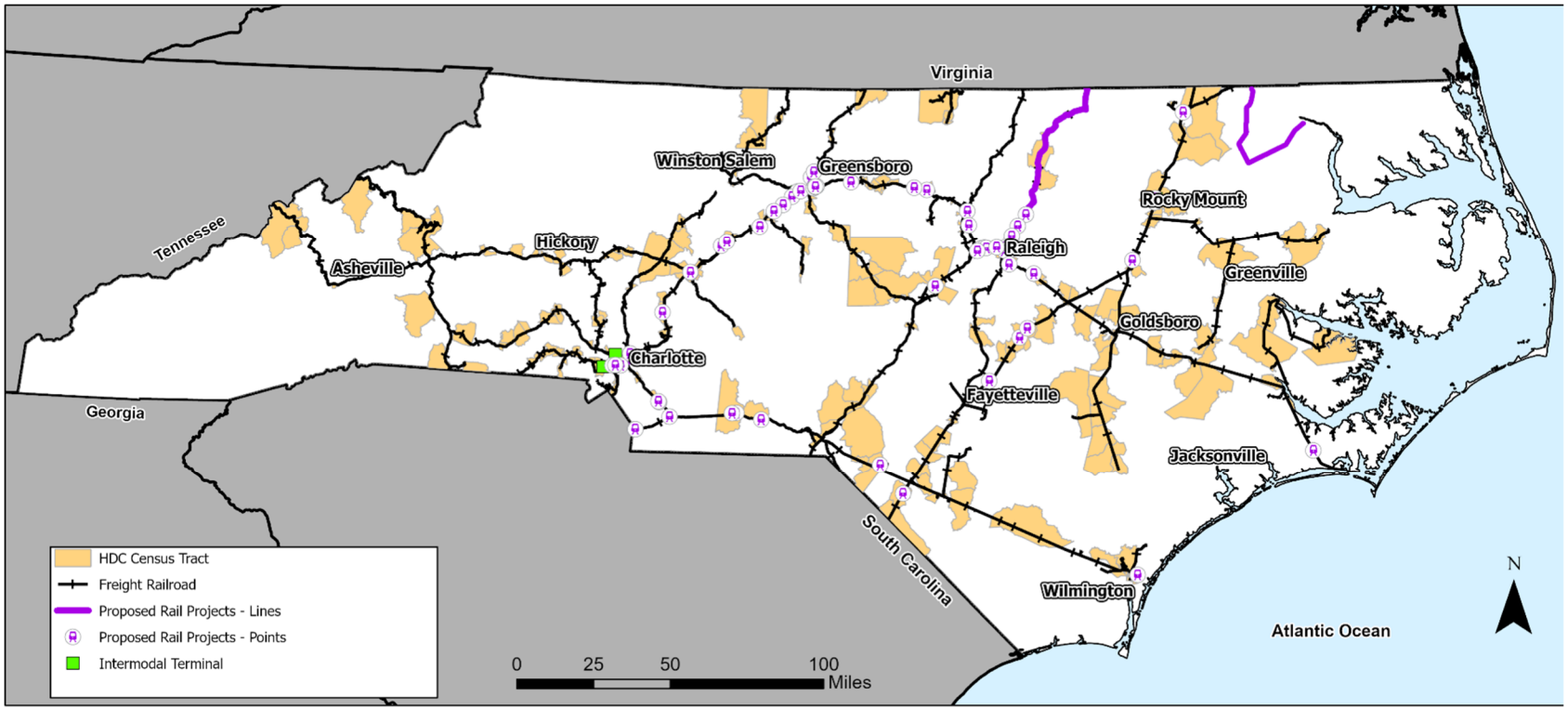


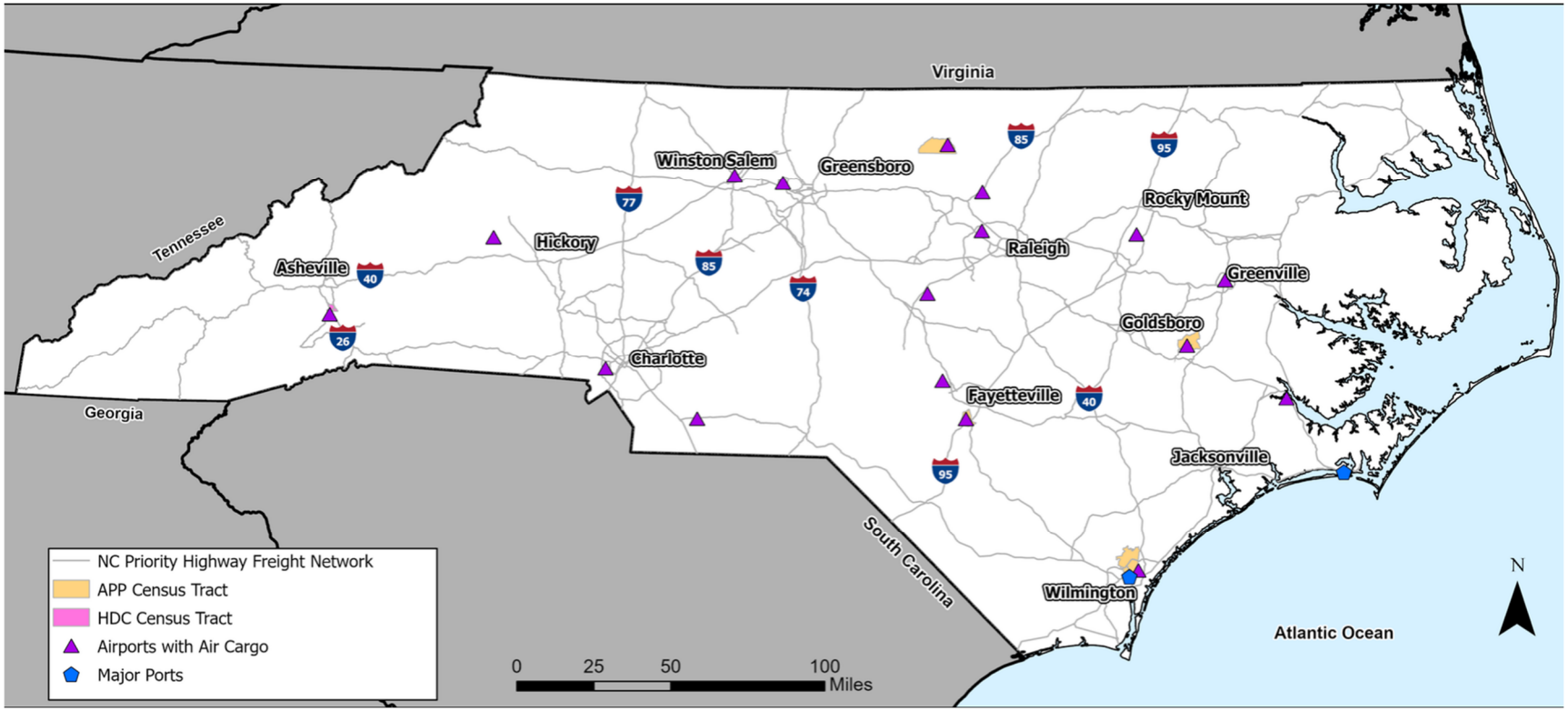
TABLE 2 APP AND HDC CENSUS TRACTS IN RELATION TO THE PRIORITY RAIL FREIGHT NETWORK

Area of Persistent Poverty (APP) Data for North Carolina and Priority Rail Freight Network		
	Total in APP Census Tracts	Percent in APP
North Carolina Population (2010 Census) in APP	2,251,022 people	25%
Existing Priority Rail Freight Network in APPs	1,405 miles	38%
Planned Priority Rail Freight Network Improvement Projects in APPs	51 miles	43%
Historically Disadvantaged Community (HDC) Data for North Carolina and Priority Rail Freight Network		
North Carolina Population (2010 Census) in HDC	2,887,491 people	28%
Existing Priority Rail Freight Network in HDCs	1,560 miles	42%
Planned Priority Rail Freight Network Improvement Projects in HDCs	44 miles	37%

Port and Airport Equity

Due to security and other concerns, port and airport facilities are generally isolated from adjoining communities. For this reason, these facilities often serve as barriers to transportation, especially for communities that lack access to personal vehicles. Also, as is the case with other modes of freight transportation, these facilities tend to be located in low-income areas.

Figure 5. Existing Port and Airport Facility Census Tracts Identified as APP or HDC



Effects of Freight Networks and Facilities on Equity

Negative health, educational, and income disparities are often associated with APP and HDC areas. The U.S. Council on Environmental Quality (CEQ) developed the Climate and Economic Justice Screening Tool as part of the Justice40 Initiative. The tool allows users to review specific Census Tracts to determine APP and HDC status, as well as assessing demographic factors including:

- Vulnerability to climate change (anticipated agricultural, building, and population losses);
- Energy burden;
- Clean transit (diesel particulate matter and traffic proximity);
- Affordable and sustainable housing;
- Legacy pollution;
- Clean water and wastewater infrastructure;
- Health burdens (ranking in percentile in terms of asthma, diabetes, heart disease, and low life expectancy); and
- Workforce training and development.

Next Steps

While it is not the purpose of the North Carolina Statewide Multimodal Freight Plan to address all the causes of inequity for APP and HDC areas, there are steps that can be taken to repair past damage and avoid or minimize future impacts associated with freight transport. These steps include:

- Reducing emissions;
- Noise mitigation;
- Improving active transportation options (especially for facilities that intersect freight networks); and
- Installing broadband on freight corridors.

Any improvement projects associated with the freight network should explore these options to the extent practicable.

The 2020 *Multi-State Medium- and Heavy-Duty Zero Emission Vehicle Memorandum* notes that “transportation is now the nation’s largest source of GHG emissions, and, after light-duty vehicles, medium- and heavy-duty trucks are the next largest source of transportation sector GHG emissions.” Signatory States agreed to “develop a multi-state action plan to identify barriers and propose solutions to support widespread electrification of medium- and heavy-duty vehicles (Zero Emission Medium- and Heavy-Duty Vehicle Action Plan).” The Zero Emission Medium- and Heavy-Duty Vehicle Action Plan will consider:

- Financial vehicle and infrastructure incentives;
- Non-financial vehicle and infrastructure incentives;
- Actions to encourage public transit and public fleet zero emission MHDV deployment;
- Effective infrastructure deployment strategies;
- Funding sources and innovative financing models to support incentives and other market enabling programs;

- Leveraging environmental and air quality benefits associated with adoption of the California Advanced Clean Trucks rule under Section 177 of the Clean Air Act;
- Coordinated outreach and education to public and private MHDV fleet managers;
- Utility actions to promote zero emission medium- and heavy-duty vehicles (MHDVs), such as electric distribution system planning, beneficial rate design and investment in “make-ready” charging infrastructure;
- Measures to foster electric truck use in densely populated areas;
- Addressing vehicle weight restrictions that are barriers to zero emission MHDV deployment;
- Uniform standards and data collection requirements; and
- Any other initiative the Task Force deems appropriate.

North Carolina is working to implement the plan and is currently developing a deployment strategy for ZEV charging stations.

The impacts of freight emissions and other negative environmental effects on health in disadvantaged communities is another area of interest. The NCDOT Environmental Analysis Unit focuses in on highway noise, and it will be included in their assessment to ensure adequate abatement. Rarely are the triggers for hotspot or project level air quality analysis met. There have not been studies specifically targeted to impacts to disadvantaged communities within NCDOT. However, the Department of Health and Human Services currently has a study underway to explore the impacts of Medium and Heavy-Duty vehicles on disadvantaged communities and as NCDOT has been a partner in providing data from the freight plan for this study, the results can be included in our next freight plan update.

NORTH CAROLINA
STATEWIDE MULTIMODAL FREIGHT PLAN

Planning for the Future of Freight Movement

TRUCK PARKING PLAN UPDATE - FINAL

North Carolina Statewide Multimodal Freight Plan

Truck Parking Plan Update

Prepared for:
North Carolina Department of Transportation

Prepared by:
HNTB Corporation
343 E Six Forks Rd #200
Raleigh, NC 27609

With:
SASI World
Clearbox Forecast Group

Date
April 2023

TABLE OF CONTENTS

Executive Summary **ES-1**
Stakeholder Outreach ES-2
Truck Parking Supply ES-2
Truck Parking Demand ES-3
Truck Parking Facility Analysis ES-3

1.0 Introduction **1**
1.1 Study Purpose 1
1.2 Truck Parking Overview (Phase I and II) 1
1.3 Organization of the Report 5

2.0 Stakeholder Outreach **6**
2.1 Issues 7

3.0 Truck Parking Supply in North Carolina **9**
3.1 Truck Parking Availability along Major Corridors 9
3.2 Truck Parking Inventory 13
3.3 Summary of Truck Parking Supply 18

4.0 Truck Parking Demand **21**
4.1 Truck Volumes 21
4.2 Freight Generators 23
4.3 Public Parking Facility Demand 25
4.4 Private Parking Facility Demand 25
4.5 Truck Parking Demand Analysis Methodology 26
4.6 Identifying Gaps on Study Corridors 30
4.7 Truck Safety 33

5.0 Truck Parking Facility Analysis **40**
5.1 Public Truck Parking Funding 42
5.2 Truck Parking Options 43

Appendix A. Truck Parking Advisory Group

List of Figures

Figure 2.1 Truck Parking Survey Responses 6
Figure 3.1 North Carolina Strategic Transportation Corridors 9
Figure 3.2 North Carolina Strategic Transportation Corridors with Truck Parking Facility within Two Miles 2017-2022 12
Figure 3.3 Public and Private Truck Parking Locations by NCDOT Division 14
Figure 3.4 Truck Parking Locations added since 2017 16
Figure 3.5 North Carolina Truck Parking Facilities by Type 2022 17
Figure 4.1 Truck Volumes on the North Carolina Interstate Highway System (2019) 22
Figure 4.2 Truck Volumes on Non-Interstate Highways (2019) 23
Figure 4.3 Freight-Intensive Industries by Economic Sector - Manufacturing 24
Figure 4.4 Freight-Intensive Industries by Economic Sector - Transportation/Utility 24
Figure 4.5 Freight-Intensive Industries by Economic Sector - Wholesale Trade 25
Figure 4.6 Top 10 Parking Locations in North Carolina 26
Figure 4.7 Truck Parking Utilization and Average AADTT Growth (2016 – 2019) in North Carolina 31
Figure 4.8 Truck Crashes by Year 2015-2019 33
Figure 4.9 Truck Crashes in North Carolina, 2015 35
Figure 4.10 Truck Crashes in North Carolina, 2016 35
Figure 4.11 Truck Crashes in North Carolina, 2017 36
Figure 4.12 Truck Crashes in North Carolina, 2018 36
Figure 4.13 Truck Crashes in North Carolina, 2019 37
Figure 4.14 Truck Crashes on Ramps on STC Corridors 37
Figure 5.1 Location of Three Abandoned Rest Areas 44
Figure 5.2 North Carolina Weigh Stations 45

List of Tables

Table 3.1 List of North Carolina Corridors with Truck Parking within Two Miles of the Corridor 10
Table 3.2 Counties with Authorized Truck Parking Facilities 13
Table 3.3 New Truck Parking Facilities Added in 2022 15
Table 3.4 Truck Parking Facilities by NCDOT Highway Division 2017-2022 18
Table 3.5 Number of Truck Parking Spaces for Different Facility Types (2017) 19
Table 3.6 Number of Truck Parking Spaces for Different Facility Types (2020) 19
Table 3.7 Number of Truck Parking Spaces for Different Facility Types (2022) 19
Table 4.1 Regularly Full Facilities in 2017 with Negative Average Annual Growth (2016-2019) 29
Table 4.2 Regularly Available Facilities in 2017 with Negative Average Annual Growth (2016-2019) 30
Table 4.3 Truck Parking Supply and Demand Summary Table 31
Table 4.4 Top Ten Counties by Truck Crashes 2015-2019 34
Table 4.5 Truck Crashes Occurring Near Highway Ramps, 2015 – 2019 38
Table 4.6 Truck Crashes Occurring Near Weigh Stations, 2015 – 2019 38

ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
AADTT	Average Daily Truck Traffic
ATRI	American Transportation Research Institute
ConOps	Concept of Operations
DMS	Dynamic message sign
DOT	Department of Transportation
FASTLANE	Fostering Advancements in Shipping and Transportation for the Long-term Achievement of National Efficiencies Grant Program
FHWA	Federal Highway Administration
FMSCA	Federal Motor Carrier Association
GPS	Global positioning systems
HOS	Hours of Service
HVAC	Heating, ventilation and air conditioning
IFTA	International Fuel Tax Agreement
IIJA	Infrastructure and Investment Jobs Act
MPO	Metropolitan Planning Organization
NATSO	Add National Association of Truck Stop Operators
NAICS	North American Industry Classification System
NCDEQ	North Carolina Department of Environmental Quality
NCDOT	North Carolina Department of Transportation
NCSHP	North Carolina State Highway Patrol
NCTA	North Carolina Trucking Association
OOIDA	Owner Operator Independent Drivers Association
P3	Public-private partnership
PHFS	Priority Highway Freight System (PHFS)
ROW	Right-of-way
RPO	Rural Planning Organization
STC	North Carolina Strategic Transportation Corridor
STI	Strategic Transportation Initiative
STIP	Statewide Transportation Improvement Program
TPAG	Truck Parking Advisory Group
TPAS	Truck Parking Availability System
US DOT	United States Department of Transportation

Executive Summary

Truck parking continues to be a serious concern for truck drivers, motor carriers, truck facility operators and public officials throughout the United States. According to a recent report, "Critical Issues in the Trucking Industry" (ATRI, 2021):

> "This is the tenth year that the lack of available truck parking has made the top ten list of industry concerns, and among commercial drivers it has consistently ranked in their top three. In 2020, when a number of states closed public rest areas due to COVID concerns, truck parking was the number one concern among truck drivers."[1]

Commercial drivers seeking to comply with the Federal Motor Carrier Safety Administration's (FMCSA) Hours of Service (HOS) regulations may be forced to park on highway shoulders, ramps and other unsafe locations when legal parking is either not available, or the location of available parking is not known. Improving truck parking in strategic locations will help to make conditions safer for truck drivers and other travelers, reduce unnecessary fuel consumption, and improve the efficiency of commercial vehicle operations. In response to increasing concerns regarding unauthorized truck parking, the N.C. Department of Transportation (NCDOT) updated previous 2017 and 2020 statewide truck parking studies.

The introduction chapter of this report provides an overview of the previous 2017 and 2020 Truck Parking studies. Those studies identified the primary truck parking issues in North Carolina and provided recommendations for addressing the truck parking issues. This study team believes that the previous truck parking issues and recommendations are still valid today.

The purpose of this study is to conduct an analysis of the adequacy of truck parking facilities in North Carolina and identify truck parking solutions that better serve freight transportation needs and provide a safer environment for the traveling public in and through the state. This will be accomplished by utilizing the information provided in the 2017 and 2020 Truck Parking studies as a baseline. The study's key tasks include the following activities:

- Re-assess truck parking supply along the state's key freight routes;
- Assess demand for truck parking by reviewing truck growth along freight routes;
- Assess the best way to optimize public and private sector assets for truck parking;
- Identify public-private partnerships that may lead to increased truck parking;
- Identify the costs and funding sources for increasing capacity of existing public truck parking facilities as well as converting existing rest areas, weigh stations and other assets to truck parking.

[1] Critical Issues in the Trucking Industry – 2021, ATRI, October 2021

Stakeholder Outreach

Stakeholder outreach focused on convening the Truck Parking Advisory Group (TPAG) and engaging the private sector that provides 85% of all truck parking in the state. The project team met with private sector providers including UpTime Trucking, Flying J, and Pilot Truck Stop. The Truck Parking Advisory Group meeting held June 8, 2022, provided an overview for the 2022 Truck Parking Update.

- While truck parking is generally available within 10-20 miles of the NC state line, there is still a need to expand truck parking throughout the state.
- Truck parking was also identified as one of the top 3 freight highway challenges in North Carolina during the Regional Forum meetings held during the North Carolina Multimodal Statewide Freight Plan Update on May 17 and 19, 2022.
- As part of the June 8, 2022, Truck Parking Advisory Group meeting, participants were asked to identify truck parking needs and new facilities. The Advisory Group identified 6 new truck parking facilities that have opened or are planned to open since the 2020 Truck Parking study.
- The Truck Parking Advisory Group also identified reasons for trucks parking in unauthorized locations. The main reasons cited for unauthorized parking include the “hours of service demands,” “limited access to truck parking and/or pickup or delivery areas,” and “limited overnight truck parking facilities.”

New and existing parking facilities should take these factors into account when siting new locations or upgrading existing facilities, particularly around industrial parks and industrial locations. This will ensure the maximum amount of truck drivers can access parking facilities. The information confirmed results from the previous survey conducted by ATRI in 2017, where hour of service demands and parking while off duty were top issues for drivers.

Truck Parking Supply

Truck parking supply refers to the number of authorized truck parking spaces capable of meeting truck parking requirements. This update first assessed 2017 - 2020 truck parking data to understand previous conditions, and then included any new truck parking that has been developed in the years since.

In total, there are over 6,600 authorized truck parking spaces throughout North Carolina. The supply of truck parking aligns with the heaviest traveled truck corridors and continues to cluster around key metropolitan regions. Public and private truck parking facilities vary by NCDOT Highway Division. Most truck parking facilities are in Highway Divisions 7, 10, and 12. The fewest number of truck parking facilities are in Highway Divisions 2 and 5.

Since the 2020 Truck Parking Study, 8 new truck parking facilities have been added to the system – 8 private and 0 public. The 8 new truck parking facilities include the 6 identified by the TPAG, plus 2 facilities identified through parking provider outreach. The inventory of truck parking facilities in North Carolina, displayed in Figure 3.3, consists of 190 parking facilities supplying over 6,600 parking spaces throughout the state. Figure ES.1 displays facilities by

those added between 2017 and 2020, and those added between 2020-2022. Of the 190 available facilities, approximately 50 % are private, 27 % are public, 13 % are Wal-Marts and 10% are weigh stations. Of the 6,600 parking spaces, about 87% are private.

Truck Parking Demand

Today, the demand for truck parking in North Carolina exceeds capacity, which will likely persist for the next 5-10 years given future freight flows projected by the U.S. Department of Transportation (US DOT).

The study team grew the previously collected 2017 truck parking utilization data to reflect estimated 2022 utilization. For the 2022 Truck Parking Plan update, truck parking demand at existing 2017 sites and new sites (identified in the 2020 update and in 2022) were determined by analyzing Annual Average Daily Truck Traffic (AADTT) and associated growth rates. AADTT from the NCDOT Traffic Survey Unit was used to calculate growth rates over last five years (2016-2019) to confirm growth on the Priority Highway Freight System (PHFS). Data from 2020 and 2021 were excluded because of the COVID-19 pandemic's effect on travel patterns. Growth rates were then applied to the truck parking facility utilization rates from the previous 2017 study. A growth rate was applied to each truck parking facility based on the corridor and the NCDOT division to accurately reflect the demand of each corridor.

In summary, the 2017 Truck Parking Plan identified 93 out of 111 (84%) truck parking facilities that were full most nights. This 2022 Truck Parking Plan update determined 104 out of 111 (94%) facilities are now full most nights. New facilities added between 2017 and 2022 (as described in Chapter 3) may help alleviate some capacity issues; however, it is unlikely the new facilities have enough spaces to address all truck parking needs. The results of the truck parking demand analysis are displayed in Figure 4.7. The definition of "full parking facilities" on the map means that the facility is full at least Monday through Thursday. Full parking facilities are depicted in red, available spaces in green, new facilities in purple, and spaces without utilization information in gray. 1Truck parking shortages present highway safety concerns when trucks are forced to park illegally on highway shoulders and ramps. The lack of safe, convenient, and easy-to-find parking forces truck drivers to make difficult choices, with dangerous consequences. When truck drivers reach their HOS limits without having found an appropriate parking location, they must choose whether to park illegally or drive illegally. Truck drivers face these decisions on a regular basis. To further analyze potential safety concerns caused by parking shortages, truck crash data over the 2015 - 2019 time period was analyzed as part of the North Carolina Statewide Multimodal Freight Plan and as part of the Truck Parking Study. Over this five-year period, a total of 46,630 truck-involved crashes occurred in the state. The total number of crashes increased each year, except in 2019. Ten counties accounted for nearly half of all truck-involved crashes in the state over the five-year period. This is consistent with the same counties through which trucks travel in the highest volumes and in which the highest concentration of freight generators are located.

Truck Parking Facility Analysis

Truck parking was identified in the 2017 Truck Parking Study as a major challenge to safety and economic productivity. Lack of available truck parking negatively impacts the safety of truck drivers and the traveling public when trucks park in unauthorized areas. Additionally, economic

productivity and efficiency is reduced when drivers must begin searching for parking well in advance of their hours-of-service expiring, costing them valuable driving time and fuel. The combination of hours-of-service restrictions and a lack of truck parking availability impacts the ability of shippers to get their goods to market. Furthermore, each of these issues impacts the motoring public by introducing safety hazards along the roadway and increasing local congestion due to trucks searching for parking in areas adjacent to major roadways or freight generators.

A high-level summary of some of the national trends in truck parking was performed that included:

- Increasing capacity at all rest areas and weigh stations for truck parking,
- Truck parking only sites being developed,
- Older weigh stations being converted/upgraded for truck parking,
- Repurposing existing DOT right-of-way (ROW) for truck parking, and
- Utilizing technology to provide real time parking availability information.

The North Carolina Truck Parking Plan, 2017, indicated that NCDOT transitioned from a budget line item in the State Transportation Improvement Program (STIP) to construct new rest areas to a process where the Roadside Environmental Unit is now providing an “off the top” amount of state maintenance funds of around $3 million to address both routine maintenance items, such as fixtures, painting, and other needs, and to update older facilities, such as new electric wiring or replacement of HVAC systems.

Staff expressed concerns over the current budget’s inability to keep up with normal maintenance issue as well as the lack of funding for new truck parking. Truck parking improvements are now only made in conjunction with corridor improvements adjacent to truck parking facilities.

The 2017 Plan revealed that 85% of the truck parking supply across North Carolina was operated by the private sector. With additional parking added over the last five years, the percent operated by the private sector has increased to 87%. Therefore, it would be appropriate to include the private sector as part of the solution. However, there are several options that NCDOT can explore to provide additional public parking spaces which include the department:

- Building truck parking lots at abandoned rest areas,
- Using weigh stations for additional truck parking,
- Pursuing public-private parking arrangements,
- Conducting site exploration at major interstate crossings, and
- Utilizing excess passenger car parking at existing rest areas.

1.0 Introduction

The N.C. Department of Transportation (NCDOT) completed a Truck Parking Study in 2017 (Phase I), as part of the Statewide Multimodal Freight Plan. The study analyzed the adequacy of off-road truck parking across the state and provided parking solutions that better serve freight transportation providers, creating a safer environment for all road users traveling in and through North Carolina.

In 2020, NCDOT developed an addendum Truck Parking Study (Phase II). Phase II included a Concept of Operations (ConOps), Technical Report and Implementation Plan. Both the 2017 Phase I and 2020 Phase II Truck Parking documents are located on NCDOT's Truck Parking Study website.

To ensure truck parking supply adequately meets parking demand across North Carolina, NCDOT has undertaken an update to the 2017 and 2020 Truck Parking Studies. This update will meet the requirements established within the Infrastructure Investment and Jobs Act (IIJA). These requirements include:

- Utilizing the most recent commercial motor vehicle parking facilities assessment conducted by NCDOT,
- Assess North Carolina's ability to provide adequate parking facilities,
- Develop a clear understanding and utilization of commercial motor vehicle traffic data in North Carolina, and
- Identify where gaps or areas within the state with a shortage of truck parking facilities.

1.1 Study Purpose

To meet the requirements of the IIJA related to truck parking, this truck parking study will include updated 2022 truck parking supply and demand data, verified in the field where possible. Stakeholder outreach efforts will verify that the truck parking supply established in the 2017 Plan and updated in 2022 remains consistent.

1.2 Truck Parking Overview (Phase I and II)

In response to increasing concerns regarding unauthorized truck parking, NCDOT conducted its first ever statewide Truck Parking Study in the fall of 2016. That study found that North Carolina had 167 parking facilities supplying 4,848 parking spaces throughout the state. Truck parking utilization in North Carolina indicates that parking facilities along I-26, I-77, I-85, and most of I-95 are at capacity for truck parking, and demand is projected to increase as freight volumes are forecast to grow by 43% by 2040. Additionally, truck driver survey respondents noted that parking demand is high statewide, not just in one geographical area or corridor.

Truck Parking Plan, Phase I

There are seven primary truck parking issues in North Carolina:

- **Parking capacity limitations.** Truck parking shortfalls highlight the capacity constraints at most public facilities and many private facilities. While some existing parking facilities could be redesigned to increase truck parking capacity, other challenges include cost, local opposition and available real estate.
- **Safety.** Truck parking shortages present highway safety concerns when trucks are forced to park illegally on highway shoulders and ramps. Drivers reported parking on a road shoulder or ramp for 10% of stops in North Carolina. The lack of safe, convenient, and easy-to-find parking in the corridor forces truck drivers to make difficult choices, with dangerous consequences. When truck drivers reach their Hours of Service (HOS) limits without having found an appropriate parking location, they must choose whether to park illegally or drive illegally. Truck drivers face these decisions on a regular basis.
- **Communicating parking information**. More truck drivers would use available parking facilities if they were better informed about parking availability. This lack of information results in some truckers driving longer than is safe while they search for a place to stop for the night. Some states are implementing electronic communication and detection systems, which provides better traveler information.
- **Lost productivity.** Almost 90% of drivers surveyed spent more than 30 minutes on average searching for truck parking in North Carolina, which is a potential drain on driver productivity.
- **Shipper/receiver practices.** Almost 75% of drivers surveyed experienced loading/unloading delays of over an hour. In addition, many distribution facilities only operate on weekdays, and do not allow for on-site parking before or after deliveries.
- **Public opposition.** There's a negative perception of trucks and truck stops among the general public, which limits the ability to expand existing facilities or build new facilities in some areas. As land is developed, it is increasingly difficult to find land available for additional truck parking. In addition, most parking demand occurs in metropolitan areas, where real estate prices are higher compared to areas that are more rural.
- **Maintaining parking facilities.** Most state DOTs in fast-growing locations like North Carolina cannot keep up with the growing backlog of maintenance needs. DOT leaders typically prioritize maintenance of deteriorating pavement and bridge structures ahead of constructing new or expanding existing rest areas with truck parking.

Providing adequate, safe parking for trucks requires both public- and private-sector efforts and there is no single solution. Numerous recommendations for addressing truck parking shortages were identified, including:

- Partner with truck travel centers seeking to expand facilities,
- Explore trial truck parking at selected weigh stations,
- Explore retrofitting selected abandoned rest areas,
- Explore using non-truck parking facilities for overnight truck parking,

- Conduct truck parking notification system pilot,
- Coordinate with Metropolitan Planning Organizations (MPO) and Rural Planning Organizations (RPO) on increasing awareness and acceptability, and
- Convene a Standing Truck Parking Committee.

The Phase I Study noted that the largest gap in supply existed on Interstate-26, I-77, I-85, and I-95 corridors. The largest increase in capacity occurred on I-40, which was noted as an area with a critical gap in the Phase I Study, while interstates with a high level of need have seen locations open on I-77 (Pilot at Exit 42), I-85 (Pilot at Exit 71), and I-95 (Pilot at Exit 106). The public supply of truck parking is unchanged other than the removal of a single space on I-77 following the consolidation of four rest areas into a single, new facility just south of Exit 59.

Providing adequate, safe parking for trucks requires both public and private sector efforts and there is no single solution. Following is a summary of the opportunities and recommendations for ensuring adequate and safe truck parking in North Carolina.

- **Partner with truck travel centers seeking to expand facilities**. Since the private sector controls 85% of the truck parking supply in the state, the private sector should be part of the truck parking solution. This is already occurring as private travel centers expand existing operations, build new facilities, and retrofit older facilities. It would be beneficial to establish a formal relationship between NCDOT and travel centers. For example, the facility operator Pilot has acquired Wilco Hess and Speedy stores in North Carolina, most of which have existing truck parking. They are retrofitting one facility on I-95 at Exit 77 (Hodges Chapel Road in Harnett County) and are considering several new locations along I-77 and I-85, both of which are high-volume truck corridors with parking limitations. NCDOT and the area MPOs/RPOs could coordinate with Pilot while it considers locations for new facilities to better understand the site plan considerations and possibly help mitigate any opposition to new truck parking facilities by communicating the benefits of increased economic development. The facility operator Loves is also retrofitting sites and several new facilities are under construction in the state. In addition to coordinating site plan considerations, there may be opportunities to coordinate truck parking signage and availability across public and private facilities, since improved parking information would benefit truck drivers.
- **Employ technology solutions.** Technology has the potential to significantly improve the truck parking situation in North Carolina. One of the biggest challenges is ensuring that truck drivers are aware of the location of truck facilities and parking availability and can easily plan rest periods ahead of time and while in transit. Technology solutions to this issue come in two parts: communication and detection. Communication systems include signage (both fixed and variable), smartphones and web-based applications. This technology is advancing rapidly, and smart phones are now being used for crowd-sourcing information through social media. Detection systems improve the way in which parking spaces are monitored, tracked and counted.
- **Explore trial truck parking at selected weigh stations**. The Hillsborough Weigh Stations on I-40/I-85 and the new Gaston County Weigh Station on I-85 have room for

overnight truck parking. These locations have back lots for queuing that could be striped for tractor-trailer truck parking. Funding would be required for striping, signage, new technology and expanded trash collection. Daytime restroom access is available at these sites. Technology options can be scaled proportionately to the amount of time the site is at capacity. The advantages to this option would be the relatively low cost of implementation to provide some additional truck parking. Disadvantages include disrupting weigh station activities with entering and exiting trucks, increased maintenance and potential confusion over where trucks should park.

- **Explore retrofitting selected abandoned rest areas.** Of the four abandoned rest areas evaluated in this study, one site measuring approximately 12 acres along I-85 in Cleveland County has the best potential for redevelopment.
- **Use weigh station technology to communicate truck parking**. Should weigh stations be established as acceptable for overnight truck parking, technology could play a role in communicating truck parking availability and in expanding weigh stations for truck parking. Technology retrofits could be cost-effective since weigh stations already have electronic communication capabilities. One example of a pilot program would be to consider installing dynamic message signs (DMS displaying available spaces in advance of the Hillsborough Weigh Stations and/or the Gaston County Weigh Station to communicate and manage truck parking at those sites. These are the only sites identified where there is currently room for overnight truck parking. The utilization information could be collected using either in-pavement sensors or remote cameras. At these locations, the DMS signs could also serve the dual purpose of communicating whether or not the weigh station is open for commercial vehicle inspections.
- **Conduct truck parking notification system pilot**. Many states are exploring truck parking communication and detection systems, and some states have implemented pilot programs. The I-95 Corridor Coalition is testing an electronic truck parking detection system at the Ladysmith Rest Area in Caroline County, Virginia, and the Welcome Center in Laurel, Maryland. Public and private facilities along I-95 in North Carolina could become engaged in an expansion of this program. Other states exploring this technology include Florida, Virginia, Wisconsin and Kansas. Private facilities are also participating in programs sponsored by the USDOT and other partners such as “Park My Truck,” which estimates truck parking availability based on a survey of demand at participating truck parking locations. Many of these efforts have been funded via Federal grants. NCDOT should consider apply for a FASTLANE grant in cooperation with the private sector.
- **Coordinate with Metropolitan Planning Organizations (MPOs) and Rural Planning Organizations (RPOs) to develop guidelines and mitigation strategies aimed at easing public opposition to private truck parking facilities.** MPOs and RPOs can help to mitigate public opposition to truck parking. They can also assist with truck parking implementation because they are familiar with the impacts of truck parking on surrounding communities. As businesses locate new facilities, MPOs and RPOs can help to ensure that adequate truck parking is part of the development design process.

MPOs and RPOs could convene truck parking subcommittees as part of the MPO and RPO Technical Committees, conduct local truck parking studies and add truck parking to the issues discussed with the private sector representatives of the MPO and RPO freight advisory committees.

- **Convene a standing Truck Parking Committee.** A standing statewide Truck Parking Committee, similar to the steering committee for the current study effort, could help oversee the implementation of study recommendations and provide regular updates to the NCDOT Board of Transportation on progress. The committee could develop an implementation plan to detail the actions, resources, and roles and responsibilities for each of the recommendations.

Truck Parking Plan, Phase II

The Phase II Truck Parking Study advanced the recommendations identified in Phase I of the North Carolina Truck Parking Study to implementation by developing detailed concepts of operations (ConOps) for the most feasible and highest priority recommendations for maximizing utilization of existing truck parking, increasing the supply of truck parking and facilitating ongoing education, and awareness of the need and benefits of freight activity and truck parking.

The ConOps document previously submitted to NCDOT and presented to the Truck Parking Advisory Committee, introduced several possible solutions to mitigate the State's truck parking issues. These include:

- Truck Parking Availability System (TPAS) along I-95.
- New or expanded truck parking capacity on I-26 and I-85.
- Emergency parking options along I-26 and I-40.
- Policy options and best practices for developing additional truck parking.

The ConOps detailed the potential number and location of spaces that could be made available for truck parking, what is needed in terms of resources (rough order of magnitude cost estimates) and policy and regulatory issues that need to be resolved. This document (Implementation Plans) provides a framework or steps for implementing the ConOps. It summarizes the solution and highlights the programmatic, policy, regulatory, and resource considerations that need to be addressed to put the solutions in place. Some of the information provided may seem repetitive. This is because the implementation plans are written, so they each be read and acted upon independently.

1.3 Organization of the Report

Beyond the Introduction chapter, this plan update is organized into four chapters:

Chapter 2 - Stakeholder Outreach

Chapter 3 - Truck Parking Supply

Chapter 4 - Truck Parking Demand

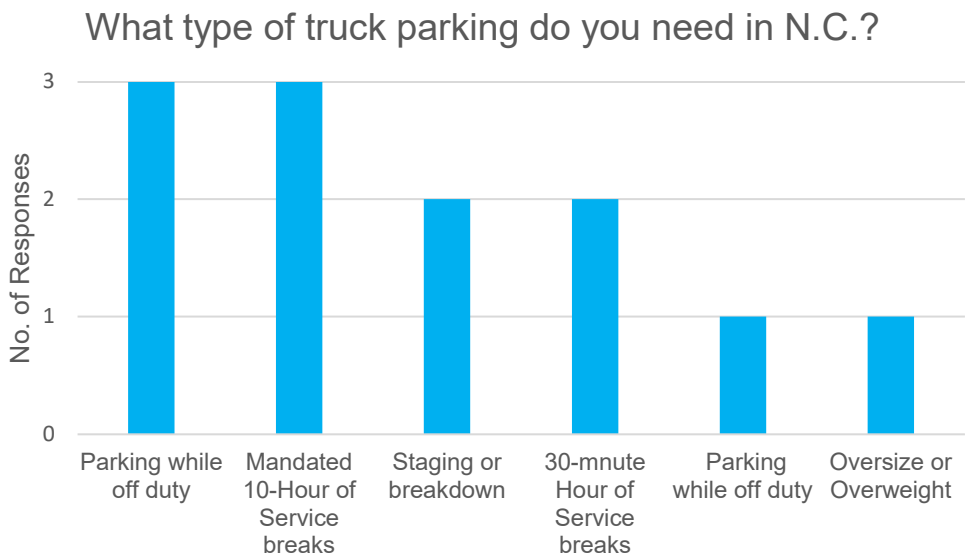
Chapter 5 - Truck Parking Facility Analysis

2.0 Stakeholder Outreach

Understanding the issues and trends facing the trucking industry helped organize our outreach efforts. For the Truck Parking Update, the project team met with the Truck Parking Advisory Group (Shown in Appendix A), made up of freight and trucking industry representatives with insights in truck parking challenges and opportunities. The Truck Parking Advisory Group meeting held June 8, 2022, provided an overview of the 2022 Truck Parking Update. The meeting served as a discussion of the Plan and as a way for stakeholders to provide comments and feedback. Since 85% of truck parking in North Carolina is privately supplied, meeting with private sector providers of UpTime Trucking, Flying J, Loves and Pilot Truck Stop was important. These private sector meetings provided an update to the plan and were used to gather data and receive feedback on key issues and needs.

While truck parking is generally available within 10-20 miles of the N.C. state line, there is still a need to expand truck parking throughout the state, as shown through stakeholder discussions and survey results. **Figure 2.1** shows the responses received from industry stakeholders when asked what kind of truck parking they feel are needed most.

Figure 2.1 Truck Parking Survey Responses

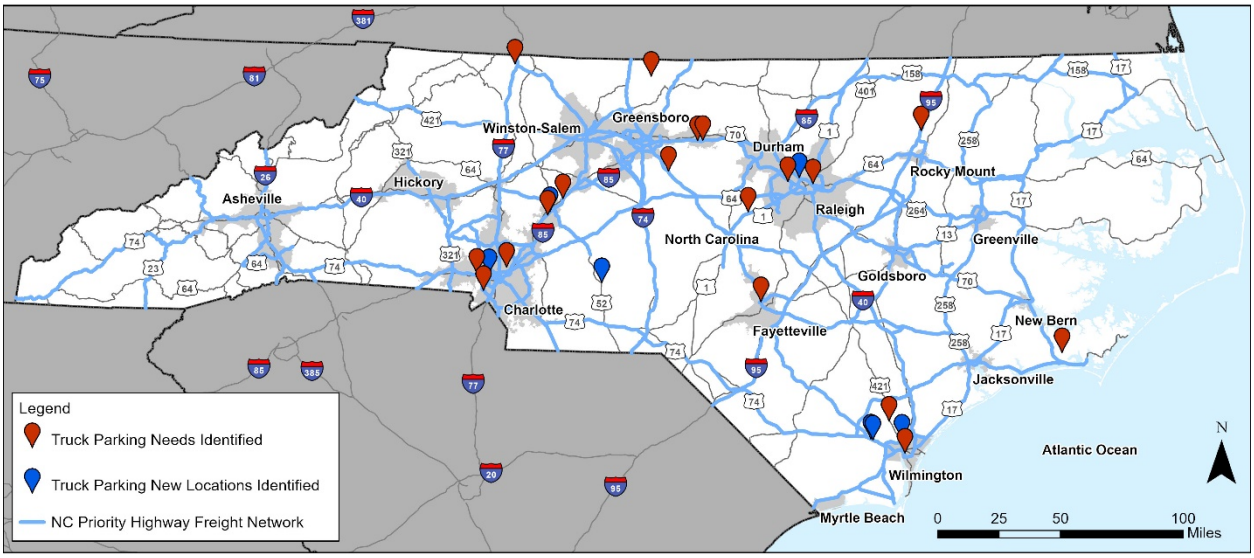


Source: June 8, 2022, Truck Parking Advisory Group meeting input during meeting

Truck parking was also identified as one of the top three freight highway challenges in North Carolina during the Regional Forums meetings held during the North Carolina Multimodal

Statewide Freight Plan Update on May 17 and 19. As part of the June 8, 2022, Truck Parking Advisory Group meeting, participants were asked to identify truck parking needs, as noted in red on the map below and new truck parking locations, identified in blue on the map. New truck parking locations identified through input received from a Multimodal Freight Plan Survey were incorporated into this map as well. It should be noted that this map is not reflective of all the new truck parking needs nor all the new truck parking locations in the state.

Figure 2.2 Truck Parking Needs and New Locations Identified by Truck Parking Advisory Group and from the Multimodal Freight Survey



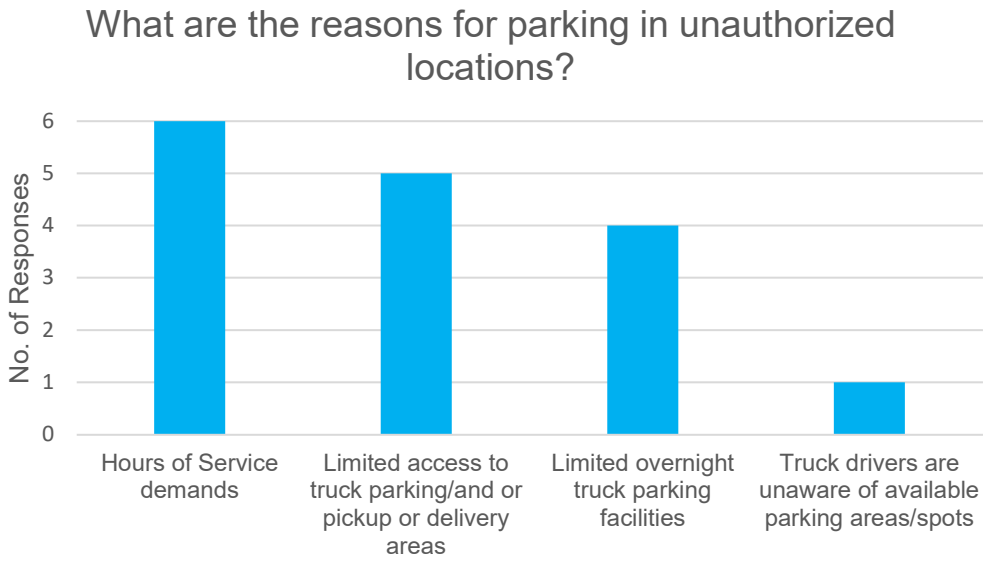
Source: June 8, 2022, Truck Parking Advisory Group meeting input during meeting and input from Multimodal Freight Survey question related to truck parking. Locations are approximate.

2.1 Issues

> Wilmington, NC ports and surrounding industrial parks/industrial locations do not have adequate parking for the volume of commercial vehicle that travel the areas surrounding. –Commenter from Multimodal Freight Survey June 15, 2022.

The Truck Parking Advisory Group also identified reasons for trucks parking in unauthorized locations (**Figure 2.3**). The main reasons cited for unauthorized parking include the "hours of service demands," "limited access to truck parking and/or pickup or delivery areas," and "limited overnight truck parking facilities." New and existing parking facilities should take these factors into account when setting up new locations or upgrading existing facilities, particularly around industrial parks and industrial locations. This will ensure the maximum amount of truck drivers can access parking facilities. The information gathered from the Truck Parking Advisory Group confirmed results from the previous survey conducted by ATRI in 2017, where hour of service demands and parking while off duty were top issues for drivers.

Figure 2.3 Unauthorized Parking Survey Response



Source: June 8, 2022, Truck Parking Advisory Group meeting input during meeting

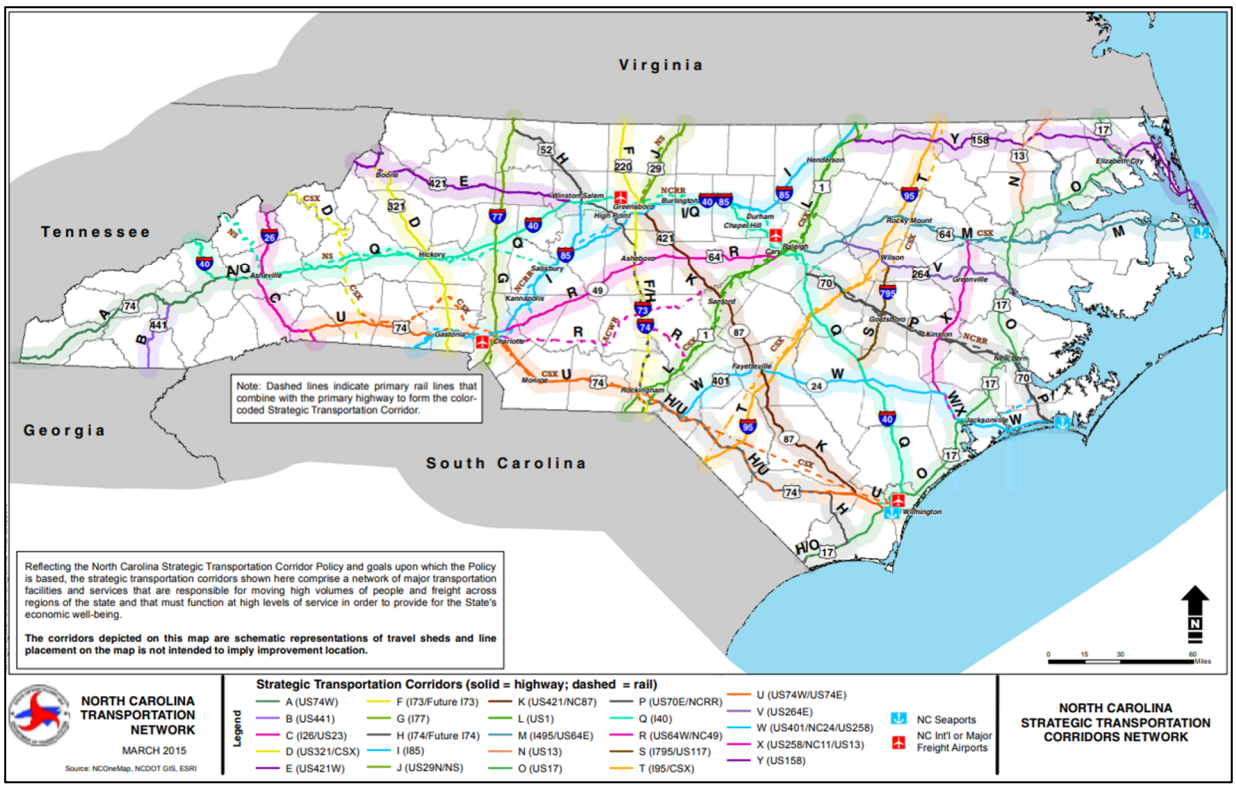
3.0 Truck Parking Supply in North Carolina

Truck parking supply refers to the number of authorized truck parking spaces capable of meeting truck parking requirements. This plan update first assessed 2017 and 2020 truck parking data to understand previous conditions, and then included any new truck parking that has been developed in the years since.

3.1 Truck Parking Availability along Major Corridors

Truck parking in North Carolina occurs mainly along major truck corridors in the state, where high-truck volumes have been identified in previous analyses. These corridors are part of the North Carolina's Strategic Transportation Corridors (STC) network, as represented in Figure 3.1. This section summarizes existing truck parking supply, locations of parking, and delineation between public and private facilities.

Figure 3.1 North Carolina Strategic Transportation Corridors



Source: NCDOT

The 2017 Truck Parking Plan identified 167 total parking facilities and 4,848 total parking spaces across the state. In 2020, the number of parking facilities increased by 15, adding 1,194 parking spots to the total parking supply. And by 2022, 8 facilities were added to the system,

supplying 582 additional parking spaces. Table 3.1 provides a breakdown of truck parking within two miles of a corridor for years 2020 to 2022, and Figure 3.2 displays these same locations, spatially, across North Carolina. Parking supply analysis revealed that most of these corridors matched the STC system except for the N.C. 11 and N.C. 13 corridors. Interstates are listed in descending order based on the number of truck parking facilities.

Table 3.1 List of North Carolina Corridors with Truck Parking within Two Miles of the Corridor 2017-2022

Corridor	2017 Truck Parking Facilities	2017 Truck Parking Spaces	2020 and 2022 Parking Facilities	2020 and 2022 Parking Spaces	Total Facilities	Total Parking Spaces
I-40	35	852	5	301	40	1153
I-85	26	523	5	460	31	983
I-95	24	1,216	1	125	25	1341
I-77	17	405	2	150	19	555
I-26	10	154	0**	44	10	198
I-40,85	8	852	2	255	10	1107
U.S. 70	6	44			6	44
U.S. 17	5	47			5	47
U.S. 13	4	135			4	135
I-73,74	3	76			3	76
I-74	3	10	1	50	4	60
N.C. 24	3	45			3	45
U.S. 220	3	103			3	103
U.S. 421	3	21	1	20	4	41
U.S. 74	3	111			3	111
U.S. 64	2	17			2	17
I-73			1	25	1	25
I-440	1	Variable			1	0

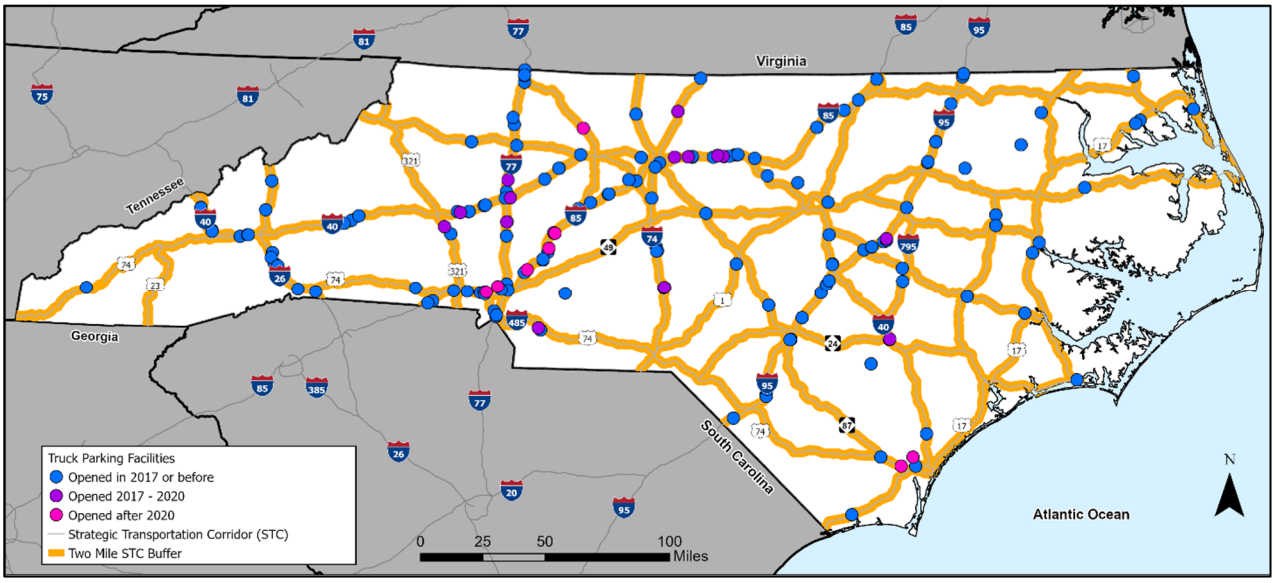
Corridor	2017 Truck Parking Facilities	2017 Truck Parking Spaces	2020 and 2022 Parking Facilities	2020 and 2022 Parking Spaces	Total Facilities	Total Parking Spaces
N.C. 11	1	10			1	10
N.C. 33	1	10			1	10
U.S. 1	1	15			1	15
U.S. 158	1	4			1	4
U.S. 19	1	3			1	3
U.S. 220, 311	1	53			1	53
U.S. 264	1	10			1	10
U.S. 29	1	10	1	109	2	119
U.S. 321	1	35	1	104	2	139
U.S. 74, 76	1	22	1		2	22
U.S. 77	1	Variable			1	0
N.C. 16			1	133	1	133
U.S. 52			1		1	0
Total	**167**	**4,783***	**23**	**1,776**	**190**	**6,559***

* Totals do not include weigh-station or Wal-Mart parking areas

** No new parking facilities added in 2022, but renovations occurred, which increased parking supply

Source: North Carolina Department of Transportation, 2017 Statewide Multimodal Freight Plan; Consultant analysis.

Figure 3.2 North Carolina Strategic Transportation Corridors with Truck Parking Facility within Two Miles 2017-2022



Source: North Carolina Department of Transportation; Consultant analysis.

Table 3.2 lists the counties in North Carolina that have at least one truck parking facility. Of the 100 counties in the state, 64 have at least one authorized truck parking facility.

Table 3.2 Counties with Authorized Truck Parking Facilities

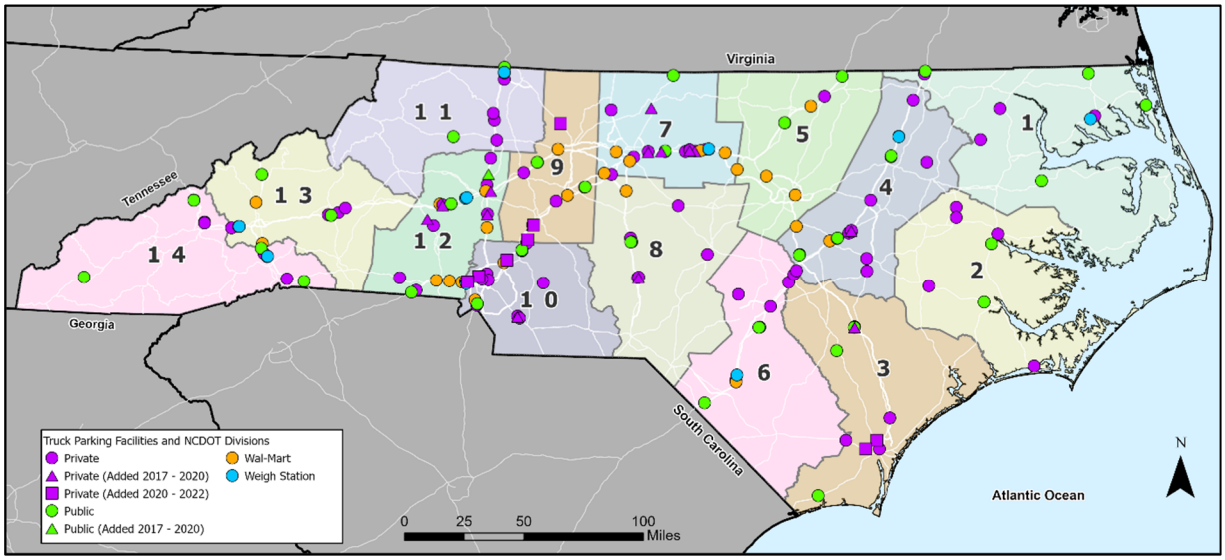
Alamance	Currituck	Johnston	Randolph
Beaufort	Davidson	Lee	Robeson
Bertie	Davie	Lenoir	Rockingham
Brunswick	Duplin	Madison	Rowan
Buncombe	Durham	McDowell	Sampson
Cabarrus	Edgecombe	Mecklenburg	Stanly
Camden	Forsyth	Montgomery	Surry
Carteret	Gaston	Nash	Union
Caswell	Granville	New Hanover	Vance
Catawba	Guilford	Northampton	Wake
Chatham	Halifax	Orange	Warren
Cherokee	Harnett	Pasquotank	Washington
Cleveland	Haywood	Pender	Wayne
Columbus	Henderson	Perquimans	Wilkes
Craven	Hertford	Pitt	Wilson
Cumberland	Iredell	Polk	Yadkin

3.2 Truck Parking Inventory

Truck parking facilities in North Carolina include public rest areas, privately owned and operated truck stops, and specific businesses that allow for truck parking. Truck parking location information in North Carolina was obtained through stakeholder outreach, online websites and applications that report both available public and private truck parking stops, aerial photography of private facilities and NCDOT inventories that document public truck parking facilities, including rest areas and weigh stations.

Criteria used to identify truck parking in 2017 included, 1) sites with large trucks identified on Google Maps, (i.e. class 8 and above in FHWA vehicle classification) and 2) sites that allow overnight parking according to online truck parking sites. This same approach was carried forward into this update. Figure 3.3 displays the locations of public and private sector truck parking facilities across the state, within NCDOT Highway Divisions. Truck parking facilities added since the 2017 Truck Parking Plan are symbolized based on the year added. Facilities included in the 2017 Truck Parking Plan inventory are shown as circles, facilities added between 2017 to 2020 are shown as triangles, and facilities added between 2020 and 2022 are shown as squares.

Figure 3.3 Public and Private Truck Parking Locations by NCDOT Division



Note: Numbers on map refer to NCDOT divisions

Source: North Carolina Department of Transportation; Consultant analysis.

3.2.1 New Truck Parking Facilities

Private

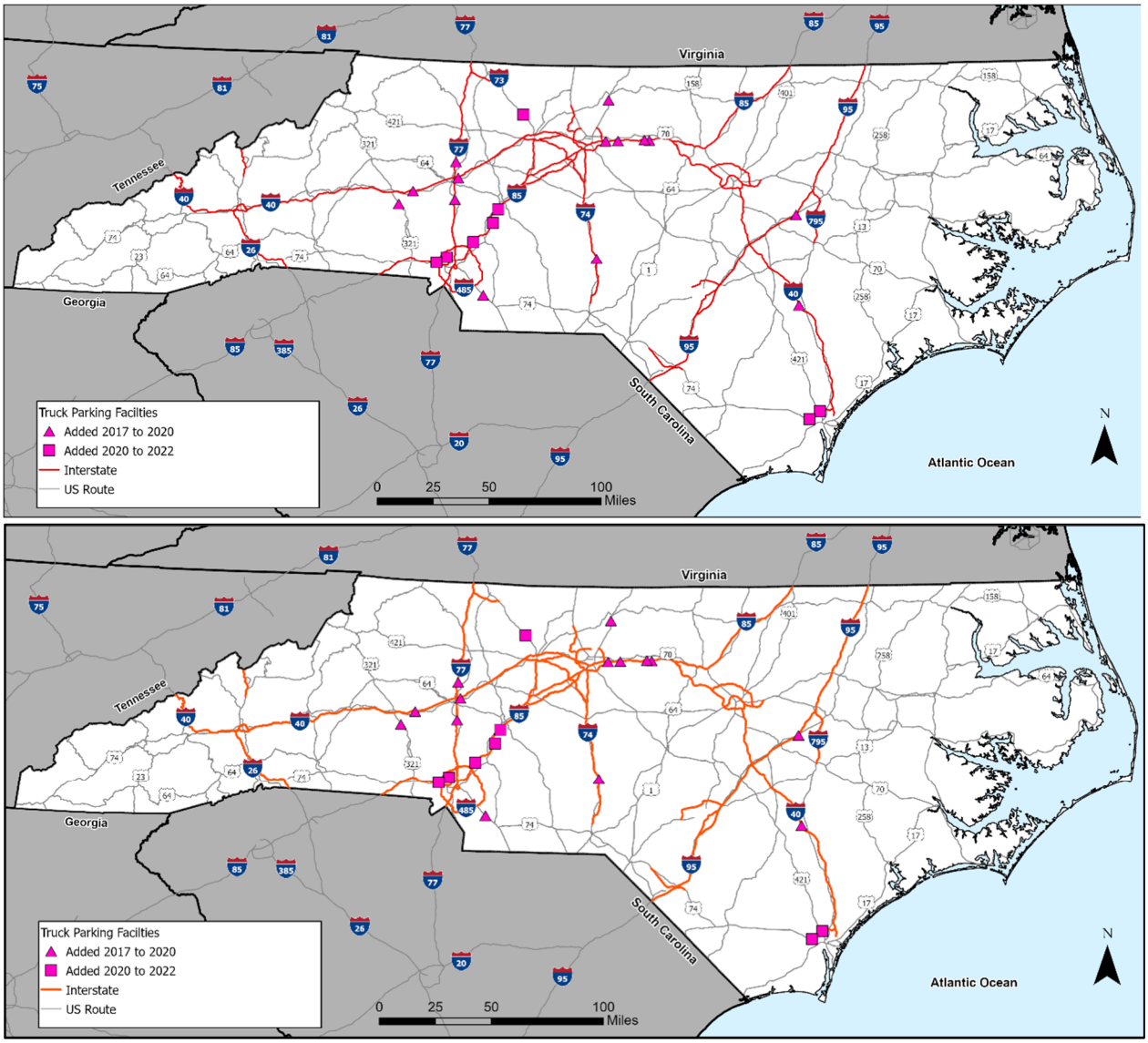
There are 95 privately owned parking facilities in North Carolina, and they include Pilot/Flying J, Loves, Kangaroo Express, Mayway, Sheetz, Uptime and others. As of 2022, these private facilities make up 87% of the state's truck parking supply, as shown in Figure 3.5. Fourteen private facilities were added between 2017 and 2020, with an additional eight added between 2020 and 2022, as shown in Figure 3.4 and Table 3.3. In total, since 2017, there has been a 28% increase in private parking facilities, with a 19% increase occurring in 2020 and a 9% increase occurring in 2022. Wal-Mart is another type of private parking facility that allows overnight parking at select locations. There are 25 identified across the state that allow overnight truck parking, as shown in Table 3.4.

Table 3. 3 New Truck Parking Facilities Added in 2022

Name	Corridor	Division	Number of Spaces	Status
Loves	U.S. 52	9		Under Development
Mayway Truck Stop	U.S. 74,76	3		Under Development
Pilot	U.S. 421	3	20	Complete
Sheetz	I-85	9		
Uptime Parking	I-85	10	290	Complete
Uptime Parking	I-85	10	95	Complete
Uptime Parking	N.C. 16	10	133	Complete
Uptime Parking	I-85	10		Under Development
Total			**538**	

Source: Truck Parking Advisory Group, Consultant Analysis

Figure 3.4 Truck Parking Locations added since 2017

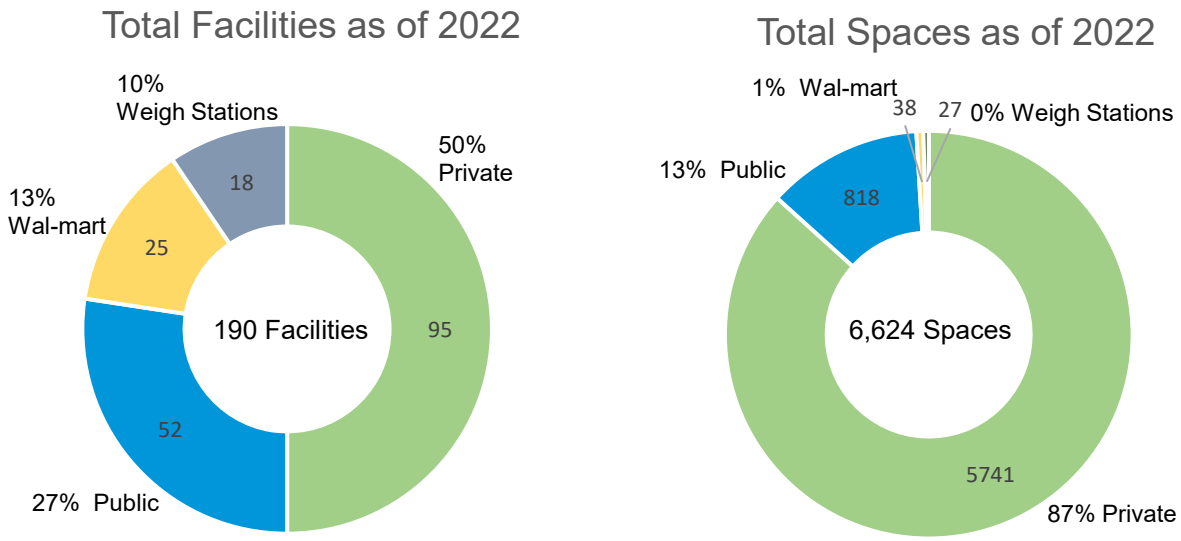


Source: North Carolina Department of Transportation; Consultant analysis.

Public

Public rest areas across the state are maintained by the NCDOT Roadside Environmental Unit, and provide restrooms, vending machines, and designated parking for automobiles and trucks. These areas are spaced evenly throughout the state and provide rest areas even in the most remote parts of the state. Weigh stations are the other public facility that trucks use for parking. However, these areas are not ideal due to their lack of amenities (restrooms and vending). As of 2022, there are 52 public rest areas across North Carolina as shown in Figure 3.5, making up 27% of all parking facilities. In 2020 there was one public facility added. Weigh stations have remained at 18 across the same five-year period (Table 3.3).

Figure 3.5 North Carolina Truck Parking Facilities by Type 2022



Source: North Carolina Department of Transportation; Consultant analysis.

Table 3.4 shows all parking facility type by division across all years, 2017-2022. Facilities that were added between 2020 and 2022 are noted by an asterisk.

Table 3.4 Truck Parking Facilities by NCDOT Highway Division 2017-2022

Highway Division	Private Facilities	Public Facilities	Wal-Mart	Weigh Station	Total
1	4	4	0	1	9
2	5	2	0	0	7
3	6*	3	0	0	9*
4	9*	6	2	2	19*
5	1	3	4	0	8
6	7	3	1	2	13
7	14*	3	5	2	24*
8	7*	2	1	0	10*
9	7*	4	2	0	13*
10	12*	3	2	3	20*
11	4	3	0	2	9
12	11*	7*	6	2	26*
13	4	3	2	2	11
14	4	6*	0	2	12*
Total	**95**	**52**	**25**	**18**	**190**

* Includes new facilities constructed 2020 – 2022

Source: North Carolina Department of Transportation; Consultant analysis.

3.3 Summary of Truck Parking Supply

In total, there are over 6,600 authorized truck parking spaces throughout North Carolina. The supply of truck parking aligns with the heaviest traveled truck corridors and continues to cluster around key metropolitan regions. Public and private truck parking facilities vary by NCDOT Highway Division. Most truck parking facilities are in Highway Divisions 7, 10, and 12. The fewest number of truck parking facilities are in Highway Divisions 2 and 5.

Table 3.5 Number of Truck Parking Spaces for Different Facility Types (2017)

2017		
Facility Type	**Number of Truck Parking Facilities**	**Number of Truck Parking Spaces**
Private	73	4,064
Public	51	719
Wal-Mart	25	38
Weigh Station	18	27
Total	**167**	**4,848***

*Sum of truck parking spaces by facility type per NCDOT 2017 Truck Parking Plan, Table 3.4

Source: NCDOT 2017 Truck Parking Plan

Table 3.6 Number of Truck Parking Spaces for Different Facility Types (2020)

2020						
Facility Type	**Facilities Added**	**Total Facilities as of 2020**	**% Increase**	**Parking Spaces Added**	**Total Spaces as of 2020**	**% Increase**
Private	14	87	19%	1,139	5,203	28%
Public	1	52	2%	55	774	8%
Wal-Mart	0	25	0%	0	38	0%
Weigh Station	0	18	0%	0	27	0%
Total	**15**	**182**		**1,194**	**6,042**	

Source: North Carolina Department of Transportation; Consultant analysis

Table 3.7 Number of Truck Parking Spaces for Different Facility Types (2022)

2022						
Facility Type	**Facilities Added**	**Total Facilities as of 2022**	**% Increase**	**Parking Spaces Added**	**Total Spaces as of 2022**	**% Increase**
Private	8	95	9%	538	5,741	10%
Public	0	52	0%	44	818	6%
Wal-Mart	0	25	0%	0	38	0%
Weigh Station	0	18	0%	0	27	0%
Total	**8**	**190**		**582***	**6,624***	

* Does not reflect final counts at new facilities under development

Source: North Carolina Department of Transportation; Consultant analysis

The provision of parking from private providers continues to be strongest parking type in North Carolina, providing 87% of all available truck parking. As shown in Table 3.7, a total of 10 facilities were added between 2020 and 2022, with eight being private and two being public. The largest increase in parking facilities and spaces occurred between 2017 and 2020, with 1,139 private parking spaces added (a 28% increase) at 14 parking facilities (a 19% increase). In 2022, 582 additional truck parking spaces were added to the system (10% increase). In both 2020 and 2022 there were no new weigh stations or Wal-Mart parking added in North Carolina. Retrofitting weigh stations may be one strategy for the state to consider as it continues to work to expand the parking supply.

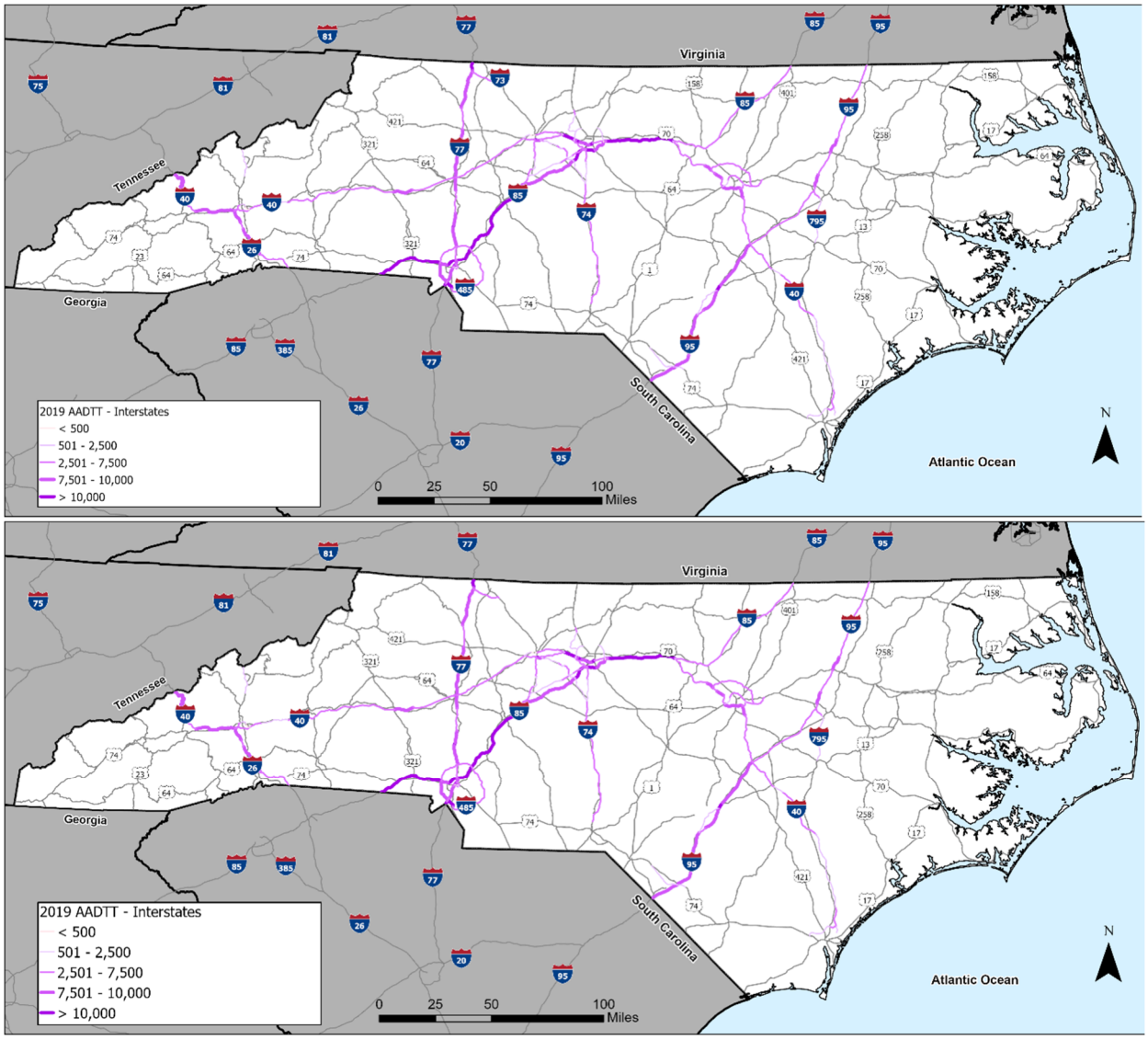
4.0 Truck Parking Demand

As defined in the 2017 and 2020 Truck Parking Plans, truck parking demand is defined as parking for 45 minutes or longer. To understand demand, it is important to understand the number of trucks traveling on each route, which routes are being used, and why those routes are being used over other routes. To better understand these factors, this section presents data on truck volumes and freight-generators that facilitate truck traffic. Following the volume and freight-generator sections, this section will present data on truck parking locations and potential safety implications of unauthorized truck parking.

4.1 Truck Volumes

Truck counts help to identify the busiest and most important truck corridors in the state. In Figure 4.1, roadways with higher truck volumes are displayed with heavier purple lines while those with lower truck volumes are displayed with thinner purple lines. Roadways with fewer than 500 trucks per day are shown in grey. Most of North Carolina's truck flows occur on the interstate highway system. In particular, the highest truck volumes in the state are estimated to occur on I-85 between Greensboro and Durham, with over 16,000 trucks per day. Other interstate highways with particularly high truck volumes include I-77, I-40, I-26 and I-95. This matches the information collected in the 2017 truck driver survey, with survey respondents indicating the need for additional truck parking along each of these highways throughout North Carolina. No truck driver survey was performed in 2020 or 2022. I-77 between I-40 and NC 150 and between NC 73 and I-485 (north of Charlotte) experience between 7,000 and 9,000 trucks per day. I-26 south of Asheville experiences similar volumes. I-40 between Winston Salem and Greensboro carries between 6,000 to 12,000 trucks daily. I-95 near its interchange with I-40 carriers over 9,500 trucks per day. Since North Carolina is situated in the middle of the Northeast Corridor, a significant portion of north-south truck traffic includes through traffic from the border states of Virginia, South Carolina, Tennessee and Georgia.

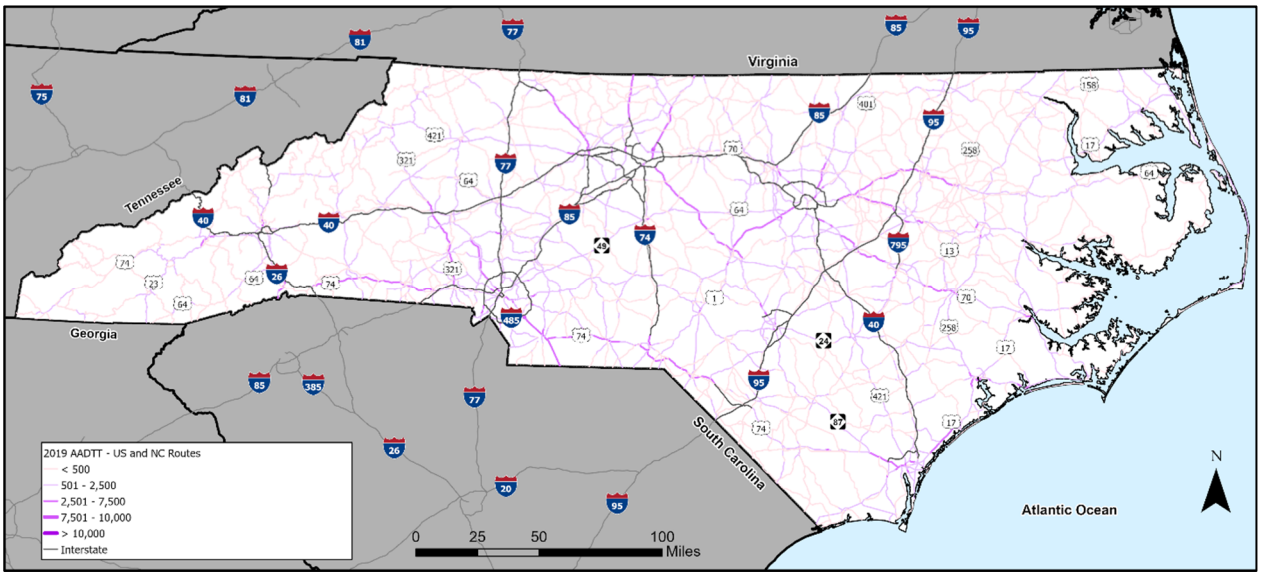
Figure 4.1 Truck Volumes on the North Carolina Interstate Highway System (2019)



Source: North Carolina Department of Transportation; Consultant analysis.

Several non-interstate highways are important freight corridors as indicated by daily truck volumes displayed in Figure 4.2. Some of these highways achieve daily truck volumes that are comparable to those experienced by the interstate highway system. Among the largest non-interstate highway freight corridors are U.S. 74 and U.S. 70, which provide east-west connectivity over the southern portion of North Carolina and between Morehead City and Raleigh. These highways exhibit freight flows that approach those of interstate highways. At its busiest, portions of U.S. 74 transports over 7,000 trucks per day. U.S. 70 carries over 4,000 trucks daily along its busiest portions. This level of freight activity correlates to the fact that these highways connect major metro areas and distribution hubs and freight generators (in places like Charlotte and Raleigh/Durham) with the North Carolina ports (such as in Wilmington and Morehead City).

Figure 4.2 Truck Volumes on Non-Interstate Highways (2019)

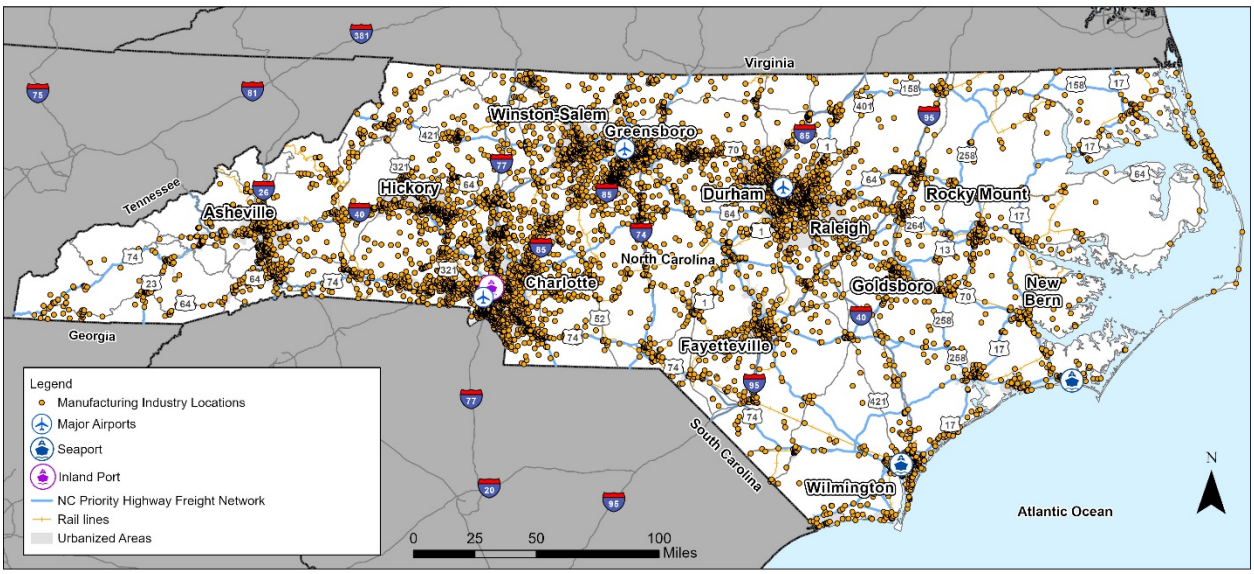


Source: North Carolina Department of Transportation; Consultant analysis.

4.2 Freight Generators

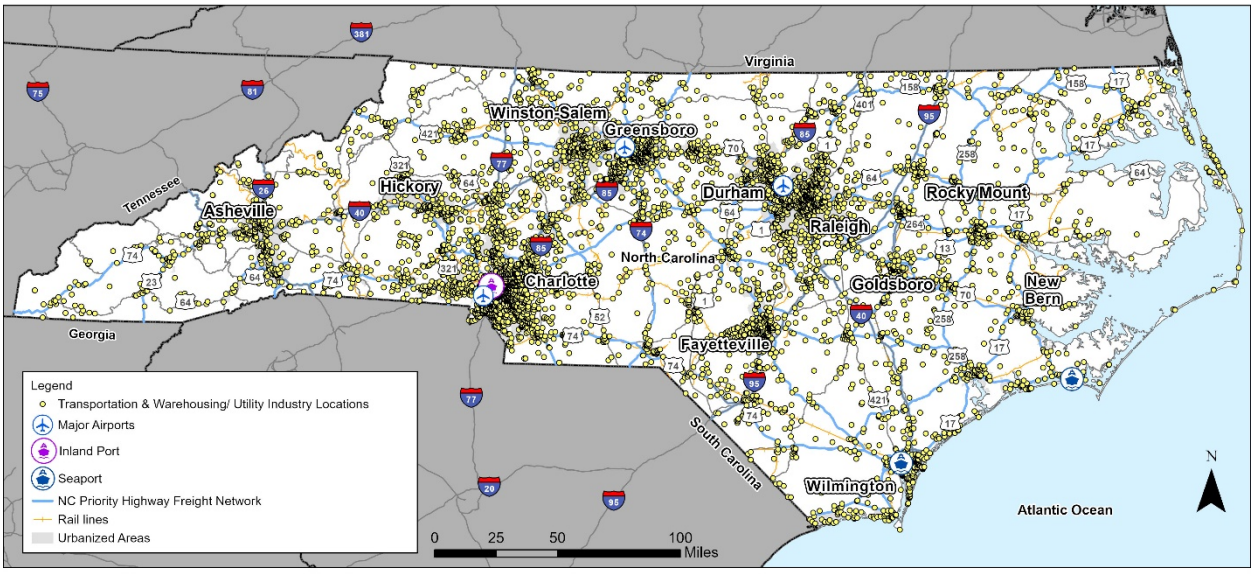
Another factor affecting truck parking needs are freight generators, or freight intensive industries. Truck parking occurs near freight generators as drivers wait to either pick up or drop off deliveries. Some businesses allow truck drivers to park before or after they deliver their loads. Examples include Wal-Mart stores and food distribution centers. Other businesses do not allow for this type of parking, requiring drivers to seek alternative solutions for truck parking. The following three maps, Figure 4.3 through Figure 4.5, depict locations of freight-intensive industries in the state by economic sector. For purposes of this analysis, freight-intensive industries are defined as those with primary North American Industry Classification System (NAICS) codes corresponding to manufacturing, construction, wholesale trade, transportation and warehousing, and agriculture. Largely, these facilities are clustered in the state's major metropolitan regions: Charlotte, Raleigh/Durham, Greensboro/Winston-Salem,, Fayetteville and Wilmington regions.

Figure 4.3 Freight-Intensive Industries by Economic Sector - Manufacturing



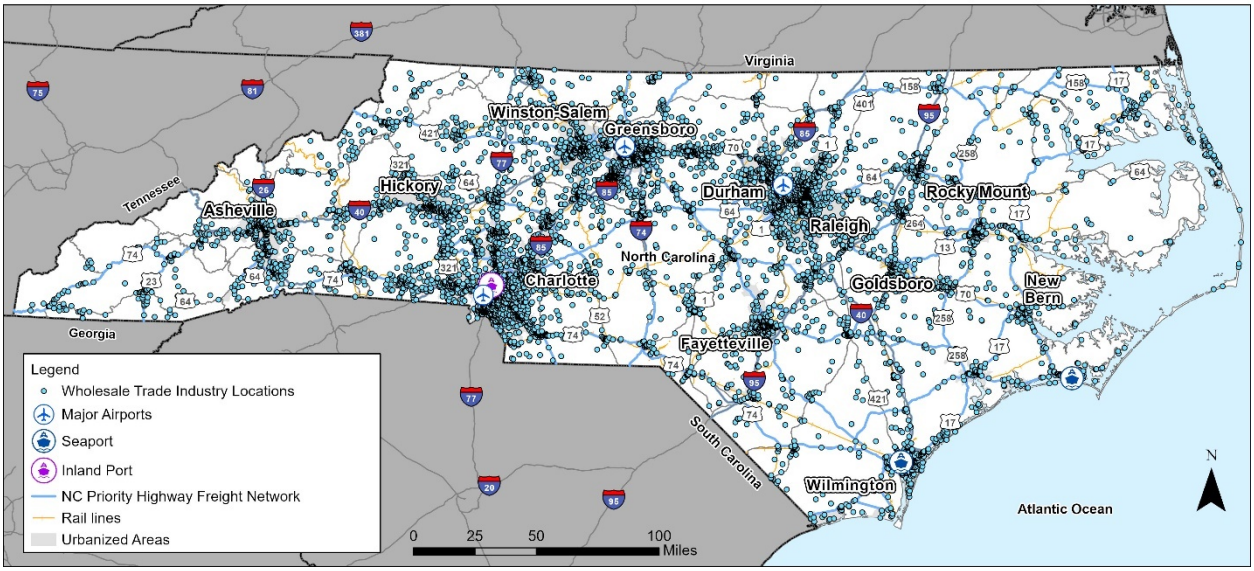
Source: Data Axle, 2021

Figure 4.4 Freight-Intensive Industries by Economic Sector - Transportation/Utility



Source: Data Axle, 2021

Figure 4.5 Freight-Intensive Industries by Economic Sector - Wholesale Trade



Source: Data Axle, 2021

4.3 Public Parking Facility Demand

In 2014, the American Association of State Highway and Transportation officials (AASHTO) was conducting research for Jason's Law and requested parking utilization rates from multiple states. In response to this request, NCDOT conducted a survey of 49 public parking facilities to determine utilization rates. A total of 47 out of 49 public parking facilities were included in the truck parking inventory developed as part of the 2017 Truck Parking Plan. The two parking facilities that were not included were in remote locations and therefore had low utilization rates. Survey results confirmed nearly all, or 87% of the rest areas were "more than 100% full" between 7:00 p.m. and 5:00 a.m., except for rest areas in Randolph and Brunswick Counties, (which were 50% to 100 % full on average), and Camden, Caswell, Dare, Macon, Madison, Sampson and Wilkes Counties (which were 0 to 50 % full on average). During the summer months of June, July and August and in December, public rest areas in six counties were more than 100 % full. This included rest areas McDowell, Mecklenburg, Nash, Northampton, Polk and Randolph Counties.

4.4 Private Parking Facility Demand

As part of the 2017 Truck Parking Plan, representatives from 73 private truck parking facilities around the state were surveyed. Responses were obtained from 67 representatives, for a response rate of 92 %. Of those surveyed, 74 % of respondents said their truck parking spaces were "full most nights." 58 % indicated they were "full every weekend," and 19 % indicated they were "full only from Monday through Thursday" during the week. These results indicated that private truck parking facilities are full most nights, and that there are different demands on parking capacity depending on the day of the week. This is largely due to the fact major distribution centers often have weekday-only hours of operation. Though this 2022 Truck

Parking Plan did not update the 2017 utilization survey, it is assumed these data are similar or worse in 2022.

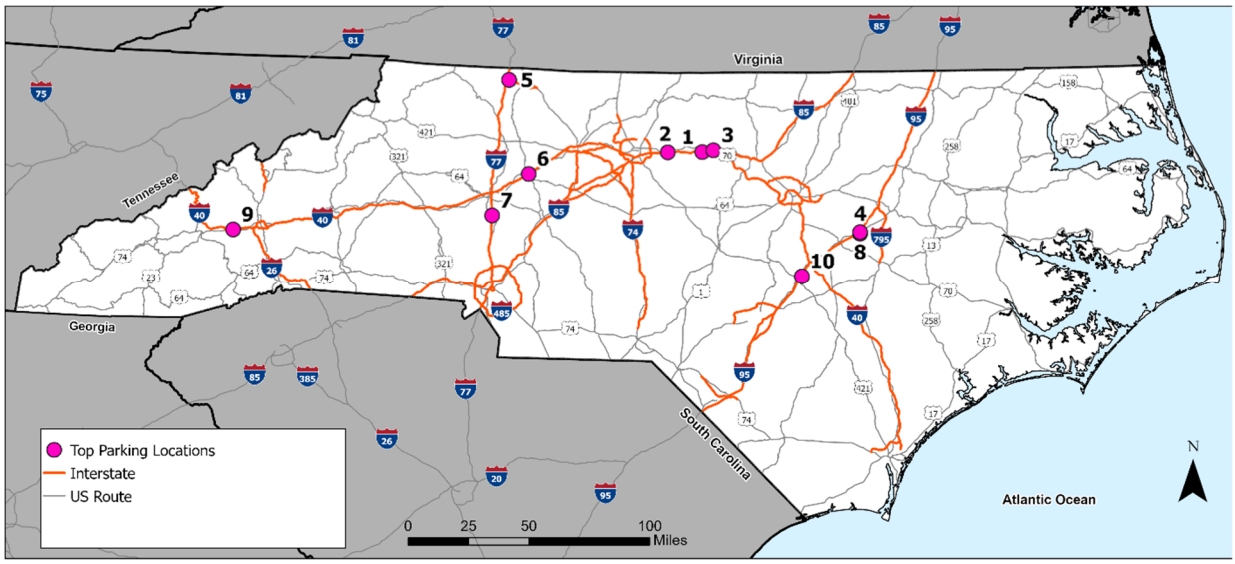
4.5 Truck Parking Demand Analysis Methodology

The 2017 and 2020 Truck Parking Plans included significant survey and data collection efforts through ATRI. This 2022 study grew the previously collected truck parking utilization data to reflect estimated 2022 utilization. For the 2022 Truck Parking Plan update, truck parking demand at existing 2017 sites and new sites identified in 2020 were determined by analyzing AADTT and associated growth rates. Other factors that were considered in determining truck parking demand were nearby businesses and resources that attract truck traffic, such as freight generators. Freight generators throughout the state were identified using 2021 Data Axel data from the Statewide Multimodal Freight Plan.

4.5.1 2017 Truck Parking Demand Analysis Overview

Under the 2017 Truck Parking Plan, ATRI truck GPS data for the 167 identified parking locations were processed in order to identify the top parking locations. For the analysis, an "official" stop at a parking location was classified to be between 8 and 38 hours. This stop time is based on historic experience, industry operational models, and by the Hours of Service (HOS) regulations. A baseline of 1,000 trucks across all locations was applied to determine the parking rate of the top ten parking locations in the state. This baseline is a way to normalize the number of trucks at each parking location in order for each facility to be directly comparable to one another. For example, the top ranked parking location, Pilot, has 58 trucks parking at this facility for every 1,000 trucks spread across all parking locations studied in the state. The remaining 942 trucks are considered parked at other parking facilities. Figure 4.6 shows the top ten parking locations in North Carolina based on the number of trucks. The top ten parking locations are all privately owned facilities.

Figure 4.6 Top 10 Parking Locations in North Carolina



Source: North Carolina Department of Transportation; ATRI; Consultant analysis; 2017.

The 2017 Truck Parking Plan also studied the average length of time that truck drivers remained at one parking location. At the top ten parking locations, the average stop time was approximately 13 hours. To better understand the challenges of finding parking at the top ten parking locations, the number of trucks per hour of the day was analyzed. As expected, parking frequency at each location dramatically increases in the late afternoon to early evening timeframe and reaches peak frequency around 8 p.m.

The top ten parking locations by frequency and stop time are all privately owned facilities. Average stop time and relative stopped truck volume per 1,000 trucks at other types of facilities were also considered in the 2017 report. The average stop time and relative volume per 1,000 trucks at public facilities, Wal-Mart, and weigh stations was much lower than those of private facilities. At these other locations, the average stop time ranged from ten to eleven hours, and the relative volume ranged from one to five trucks per 1,000 trucks stopped. The 2017 study indicated that this difference in parking frequency and stop time may be related to the quality and/or quantity of amenities offered at private truck parking facilities.

2017 results indicated the top truck parking locations are clustered in the central part of North Carolina. In addition, two of the ten parking locations are close to the Virginia and Tennessee state borders. The top parking locations clustered in central North Carolina are consistent with the highest truck volumes in the state along I-85. The near-border parking locations may be highly frequented parking locations due to different freight regulations between each state. For example, over-sized/over-weight vehicles are not allowed to travel at night in North Carolina; however, this is not the case in Virginia. All parking locations are adjacent to the following four major interstates: I-77, I-85, I-40 and I-95. The parking frequency along these four interstates match the 2017 survey results, with respondents indicating the need for additional truck parking along each of these highways throughout North Carolina. Truck GPS point data showed parking per hour of the day with a drastic increase in the number of trucks parking during the evening. This echoes survey respondents who indicated the most difficult time to find truck parking is during the evening hours. The Truck Parking Advisory Group confirmed in June 2022 that the 2017 survey data are still accurate.

4.5.2 2022 Truck Parking Demand Analysis

The study team grew the previously collected 2017 truck parking utilization data to reflect estimated 2022 utilization. For the 2022 Truck Parking Plan update, truck parking demand at existing 2017 sites and new sites (identified in the 2020 update and in 2022) were determined by analyzing AADTT and associated growth rates. AADTT from the NCDOT Traffic Survey Unit was used to calculate growth rates over last five years (2016-2019) to confirm growth on the PHFS. 2020 and 2021 data were excluded because of the COVID-19 pandemic's effect on travel patterns. Growth rates were then applied to the truck parking facility utilization rates from the previous 2017 study. A growth rate was applied to each truck parking facility based on the corridor and the NCDOT Highway Division based on each corridor's AADTT.

For the purpose of this 2022 Truck Parking Plan, all facilities determined to be regularly "full" in the previous study are assumed to remain at capacity if their associated corridor growth rates were positive. Of the 93 truck parking facilities identified as "full" in the 2017 Truck Parking Plan, eight facilities had negative truck volume growth rates on their associated corridors. The

negative truck volume growth rates ranged from -6.97 % on I-77 in Mecklenburg County to -0.01 % on U.S. 29 in Caswell County. The majority of facilities with negative growth rates were in rural counties such as Northampton, Wayne, Cherokee, and Pitt. Four of the eight facilities with negative growth rates are on I-77 in Mecklenburg County. Because the AADTT data used was from 2016-2019, it was assumed the negative growth rate over this time period is an outlier due to construction of the I-77 express lanes and not truly representative of truck volumes on the corridor. Trucks likely avoided this route during construction to avoid congestion and delays. A list of facilities determined to be “full” in 2017 with an assumed decrease in demand in 2022 is included in Table 3.1. Four facilities (excluding the I-77 facilities) previously determined to be full regularly may now have available truck parking spaces.

Table 4.1 Regularly Full Facilities in 2017 with Negative Average Annual Growth (2016-2019)

Facility Name	County	Highway Corridor	Total Number of Spaces	Average Annual Growth Rate (2016-2019)
Charlotte Travel Plaza[1]	Mecklenburg	I-77	50	-6.97%
Sam's Mart[1]	Mecklenburg	I-77	7	-6.97%
Wal-Mart[1]	Mecklenburg	I-77	Variable	-6.97%
Welcome Center: Mecklenburg County I-77[1]	Mecklenburg	I-77	17	-6.97%
Pilot	Northampton	I-95	42	-5.5%
Welcome Center: Northampton County I-95	Northampton	I-95	20	-5.5%
Rest Area: Cherokee County U.S. 19/129	Cherokee	U.S. 19	3	-2.85%
Fuel Doc Travel Center	Pitt	U.S. 13	32	1.59%

[1] The negative growth rate over this time period is assumed to be an outlier due to construction of the I-77 express lanes and not truly representative of truck volumes on the corridor.
Source: NCDOT 2017 Truck Parking Plan; NCDOT Traffic Survey Unit; Consultant analysis.

Eighteen truck parking facilities were determined as regularly “available” in the 2017 plan. Of those 18 facilities, 15 were determined to have increased truck volumes and therefore, positive growth rates on their associated corridors. The positive truck volume growth rates on facilities previously determined to have available truck parking spaces ranged from 0.01% on I-95 in Halifax County to 10.62% on N.C. 24 in Stanly County. As a result of the positive truck volume growth at 15 of the previously determined “available” truck parking facilities, it is assumed these facilities are now likely approaching or at capacity. A list of facilities determined to be “available” in 2017 with an assumed decrease in demand in 2022 is included in Table 4.2.

Table 4. 2 Regularly Available Facilities in 2017 with Negative Average Annual Growth (2016-2019)

Facility Name	County	Highway Corridor	Total Number of Spaces	Average Annual Growth Rate (2016-2019)
Downeast Truck Stop	Wayne	U.S. 13	30	-6.71%
County Mart	Pitt	U.S. 13	38	-1.59%
Visitor Center: Caswell County US 29	Caswell	U.S. 29	10	-0.01%

Source: NCDOT 2017 Truck Parking Plan; NCDOT Traffic Survey Unit; Consultant analysis.

In summary, the 2017 Truck Parking Plan identified 93 out of 111 (84%) truck parking facilities with utilization information were full most nights. This 2022 Truck Parking Plan update determined 104 out of 111 (94%) facilities are now full most nights. New, additional facilities added between 2017 and 2022 (as described in Chapter 3) may help alleviate capacity issues at these full facilities, but it is unlikely the new facilities have enough spaces to address all truck parking needs.

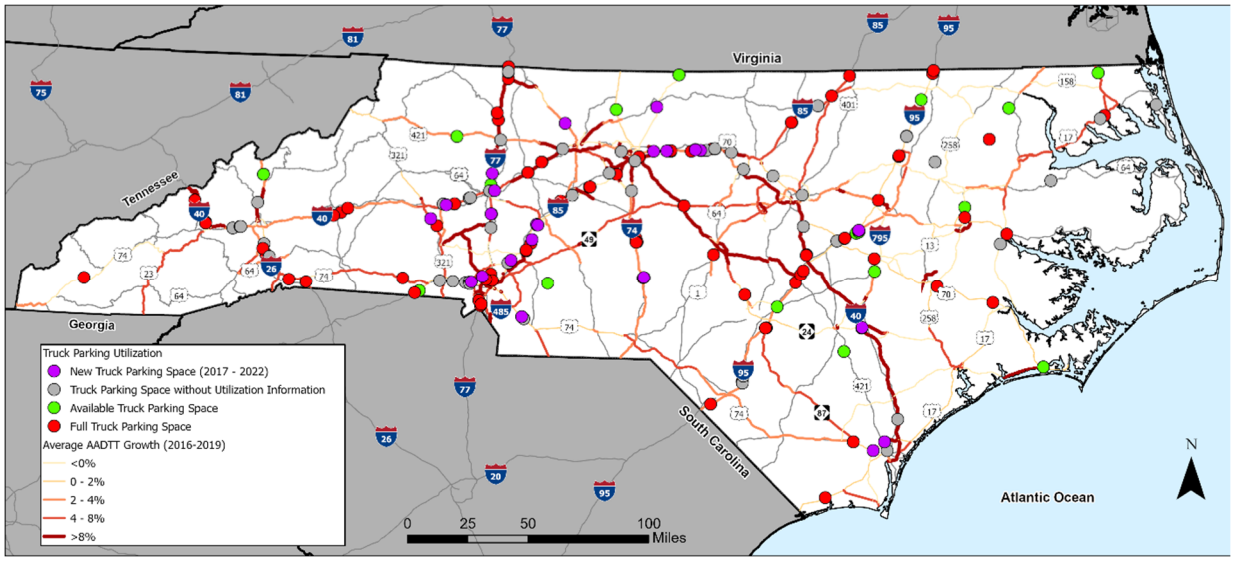
4.6 Identifying Gaps on Study Corridors

Truck parking shortages are a national concern affecting the efficiency of U.S. supply chains and safety for truck drivers and other roadway users. The results of the truck parking demand analysis are displayed in Figure 4.7. The definition of “full parking facilities” on this map means that the facility is full at least Monday through Thursday. Full parking facilities are depicted in red, available spaces in green, and spaces without utilization information in gray.

The 2017 Truck Parking Plan contacted private parking facility managers to obtain utilization rates for private facilities. This study grew the previously collected truck parking utilization data using AADTT growth rates to reflect estimated 2022 utilization.

Corridors at capacity for truck parking include I-26, I-77, I-85 and most of I-95. Therefore, these corridors should be the focus of acquiring additional parking facilities or expanding existing facilities. This correlates with the high truck volumes on those corridors and the large concentrations of distribution facilities in Charlotte, Greensboro and Raleigh areas. It is worth noting that although a facility may report that spaces are full, they may not actually be filled with a parked truck. According to the North Carolina Trucking Association (NCTA), some larger carriers have parking provisions in their fuel contracts with the larger private facility operators. Therefore, some spaces are reserved for these carriers and will not be available for use by others even if they are empty. The 2017 study was not able to confirm the extent to which this results in unused spaces. However, it does open the potential for a truck parking clearinghouse by which carriers could sell off their excess or unused parking on a nightly basis.

Figure 4.7 Truck Parking Utilization and Average AADTT Growth (2016 – 2019) in North Carolina



Source: North Carolina Department of Transportation; Consultant analysis; 2022.

Table 4.3 summarizes truck parking demand and capacity information from the 2017 Truck Parking Plan for highly utilized facilities. Though the information is from the 2017 analysis using ATRI truck GPS data, it is assumed that demand and capacity is similar or greater in 2022 given the increase in trucks on the state's highways.

Table 4.3 Truck Parking Supply and Demand Summary Table

Rank	Name/Location	Nearest Interstate	Average Time Stopped (hours)	Frequency (per 1,000 trucks)	Capacity (# truck parking spaces)
Private Parking					
1	Pilot	I-40, 85	13.03	58	140
2	Travel Centers of America	I-40	13.43	55	186
3	Petro Mebane	I-40,85	13.13	55	285
4	Metro Kenly	I-95	13.03	53	250
5	Pilot	I-77	12.09	50	150
6	Travel Centers of America	I-40	13.49	44	134
7	WilcoHess	I-77	12.90	35	84
8	Flying J	I-95	12.99	34	145
9	Candler Travel Center	I-40	12.37	29	106

Rank	Name/Location	Nearest Interstate	Average Time Stopped (hours)	Frequency (per 1,000 trucks)	Capacity (# truck parking spaces)
10	Pilot	I-95	12.93	28	300
Public Parking					
1	Rest Area: Iredell/Yadkin Counties	I-77 North	10.90	5	11
2	Rest Area: Cumberland County	I-95 North	11.35	4	18
3	Rest Area: Cabarrus County	I-85 North	11.38	4	21
Wal-Mart					
1	Wal-Mart: Belmont	I-85 North	10.67	4	Variable
2	Wal-Mart: Charlotte	I-485	10.84	3	Variable
3	Wal-Mart: Mooresville	I-77	11.60	3	Variable
Weigh Station					
1	Weigh Station: Charlotte	I-85 North	11.63	1	Variable
2	Weigh Station: Mount Airy	I-74 East	9.78	1	Variable
3	Weigh Station: Charlotte	I-85 South	13.81	1	Variable

Source: NCDOT 2017 Truck Parking Plan.

4.6.1 Rest Areas

Rest areas in North Carolina are constructed and maintained by NCDOT. Open 24 hours a day, every day, North Carolina's highway rest areas offer opportunities for convenient stops and provide easy roadside access to public restrooms and drinking water. Thirty-two rest areas across the state account for 478 total truck parking spaces as of June 2022. In the past, the rest area program was funded by the STIP, but this is no longer the case. This has greatly impacted the program in a negative way. The rest area program previously had a ten-year replacement/upgrade program in the STIP, but the program was eliminated in 2015. All rest area projects now rely solely on state funding instead of the 80 % federal and 20 % state funding that was in place previously.

Under the new funding program, the only way to build new or greatly expanded rest areas is to tie them to major widening projects. The most recent example of this is on I-26 south of Asheville under STIP (2020-2029) projects I-4400 and I-4700. The existing rest areas on I-26 in Henderson County were reconstructed as part of STIP project I-4400/I-4700 and opened in June 2022 with an additional 44 truck parking spaces. According the NCDOT Roadside

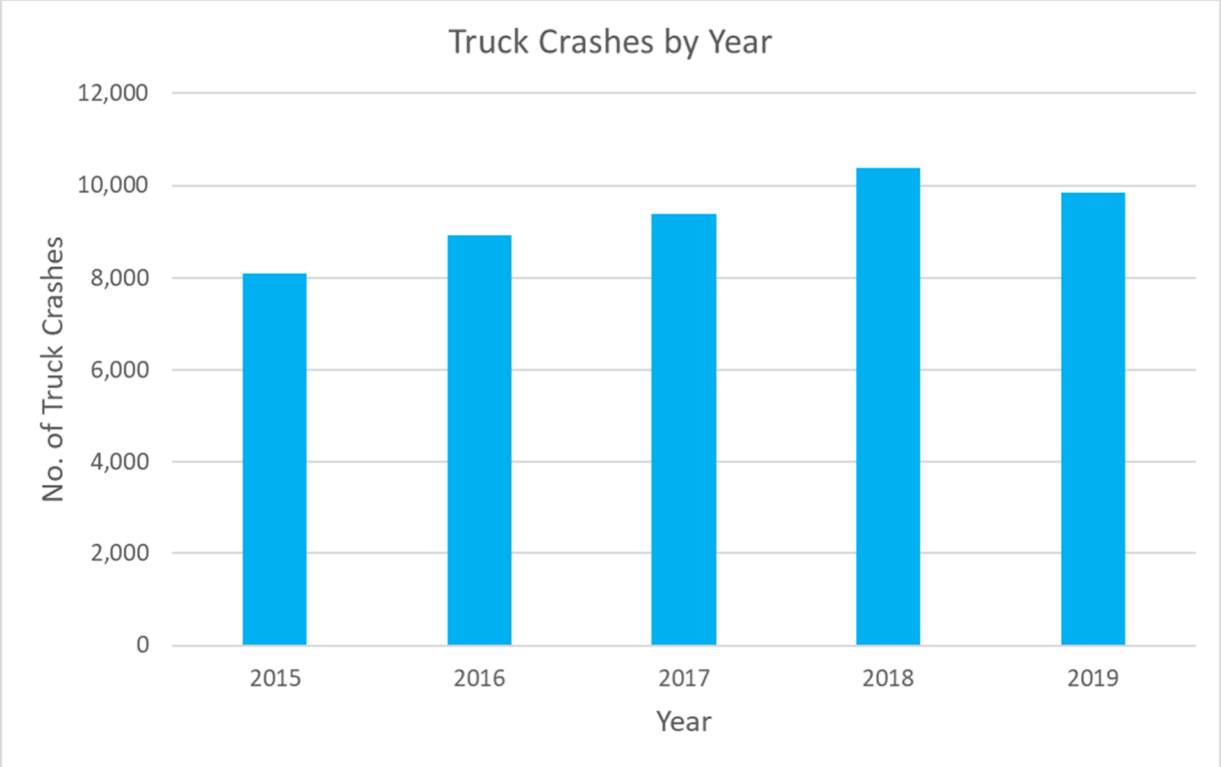
Environmental Unit's Rest Area Supervisor, the average cost to build two rest areas (one in each highway direction) is $20 million. is $20 million.

Most rest area's truck parking spaces are full nightly. Based on the utilization analysis completed for this Plan, stakeholder engagement, and interviews with NCDOT Roadside Environmental Unit's Rest Area Supervisor, the only current rest area with regularly available parking is the I-26 rest area in Madison County. It is recommended that NCDOT explore further funding avenues for rest area expansion, as little to no rest area improvements are planned due to lack of funding.

4.7 Truck Safety

Truck crash data over the 2015 - 2019 time period was analyzed as part of the North Carolina Statewide Freight Plan and as part of the Truck Parking Study. Data from 2020 and 2021 were excluded because of the COVID-19 pandemic's effect on travel patterns. Over this five-year period, a total of 46,630 truck-involved crashes occurred in the state. Figure 3.8 illustrates that the total number of crashes increased each year, except in 2019. As shown in Table 4.4, ten counties accounted for nearly half of all truck-involved crashes in the state over the five-year period. This is consistent with the same counties through which trucks travel in the highest volumes and in which the highest concentration of freight generators are located.

Figure 4.8 Truck Crashes by Year 2015-2019



Source: North Carolina Department of Transportation; Consultant analysis.

Table 4.4 Top Ten Counties by Truck Crashes 2015-2019

County	Number of Truck Crashes	Percentage of Total Crashes	Number of Truck Crashes on Ramps	Percentage of Truck Crashes on Ramps
Mecklenburg	7,507	16%	671	44%
Wake	3,502	8%	155	10%
Guilford	2,302	5%	241	16%
Forsyth	1,782	4%	96	6%
Gaston	1,507	3%	69	5%
Iredell	1,490	3%	66	4%
Buncombe	1,315	3%	75	5%
Cabarrus	1,271	3%	51	3%
Durham	1,242	3%	68	4%
Cumberland	1,143	2%	34	2%
Top 10 Counties	**23,079**	**49%**	**1,526**	**99%**
Statewide Total	**46,630**	**100%**	**2,084**	**100%**

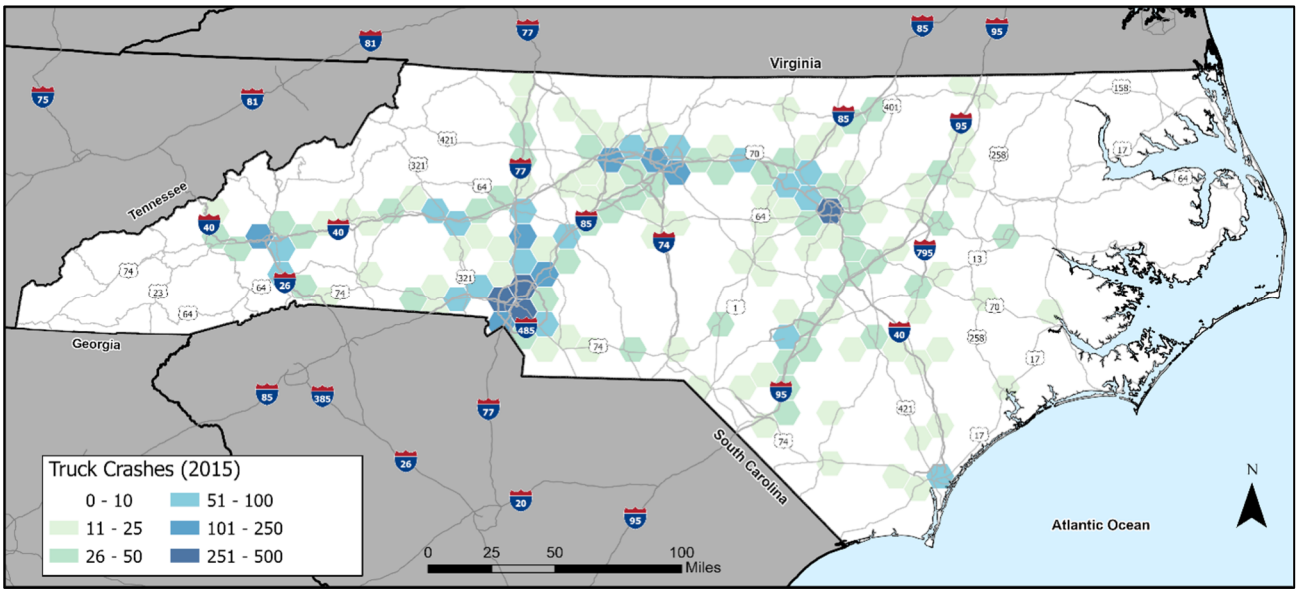
Source: NCDOT Crash Data, 2015-2019.

Mecklenburg County accounted for the highest number of truck crashes, followed by Wake and Guilford counties. This is consistent with the trend of high truck volumes on I-40 and I-85, along which most of the truck crashes occurred over the five-year period.

Figure 4.9 to Figure 4.13 display truck crashes per 10 square miles for each year between 2015 and 2019. The total number of crashes for each year were summarized into hexagons (10 square miles in size) and symbolized using graduated colors. Areas of the state with less than 10 truck crashes per 10 square miles annually are not shown. As the number of crashes in the area increases, the colors used to symbolize these areas are darker green/blue. This method of spatial aggregation allows for easy visualization of high-density data.

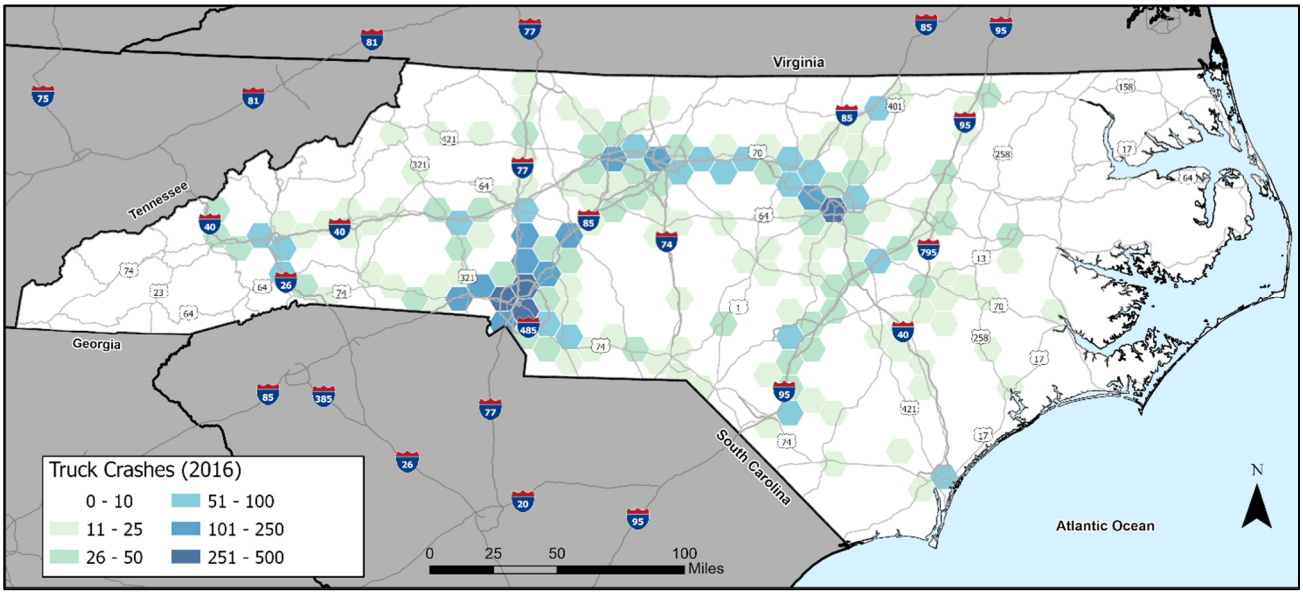
As can be observed, the number of truck crashes consistently increase around high truck volume corridors including I-85, I-77 and I-40. Moreover, the number of truck crashes increase in vicinity of major urbanized areas such as Raleigh, Greensboro and Charlotte. This is consistent with the trend of freight generators, which have high concentration in the aforementioned urbanized areas.

Figure 4.9 Truck Crashes in North Carolina, 2015



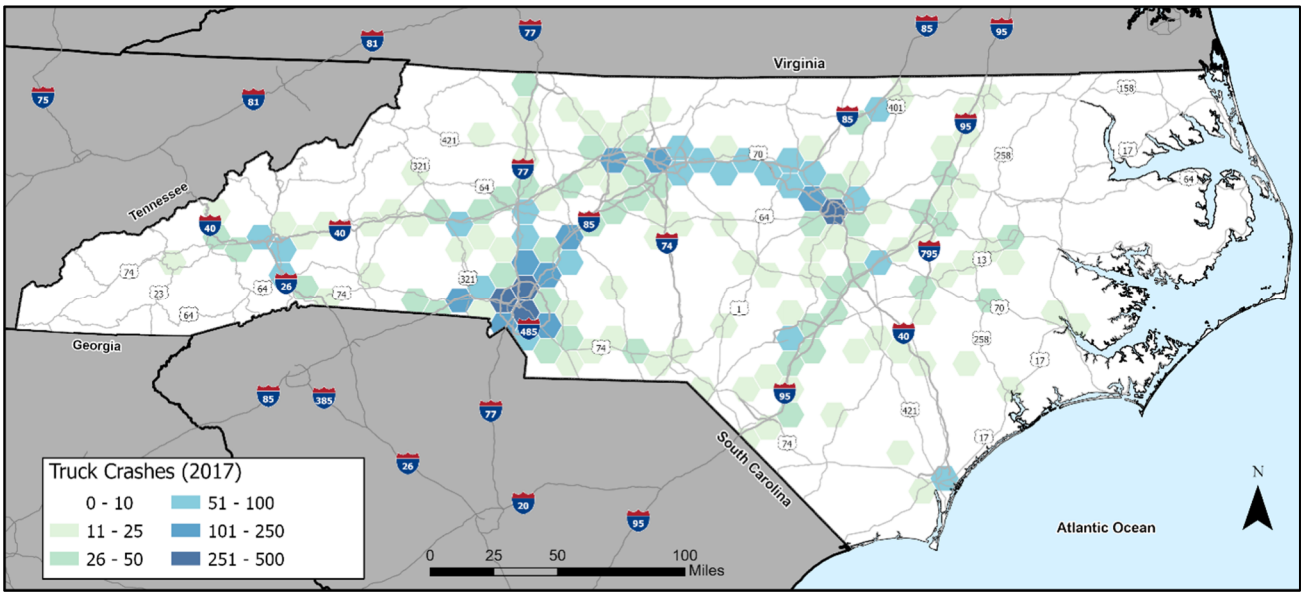
Source: NCDOT Crash Data, 2015-2019.

Figure 4.10 Truck Crashes in North Carolina, 2016



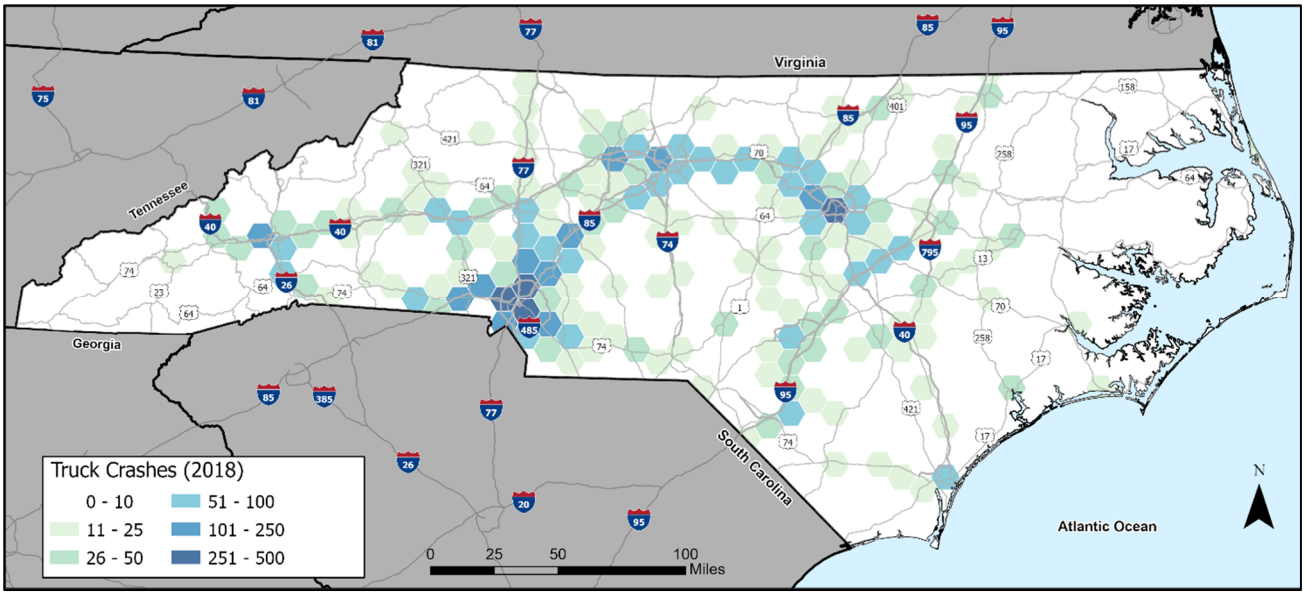
Source: NCDOT Crash Data, 2015-2019.

Figure 4.11 Truck Crashes in North Carolina, 2017



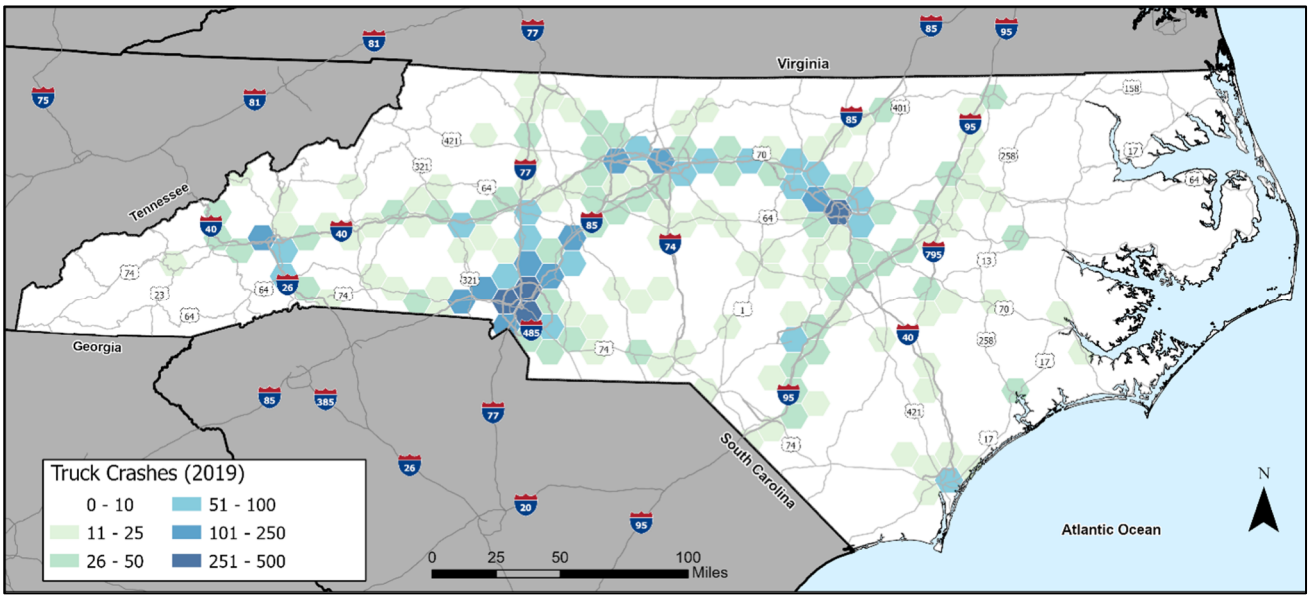
Source: NCDOT Crash Data, 2015-2019.

Figure 4.12 Truck Crashes in North Carolina, 2018



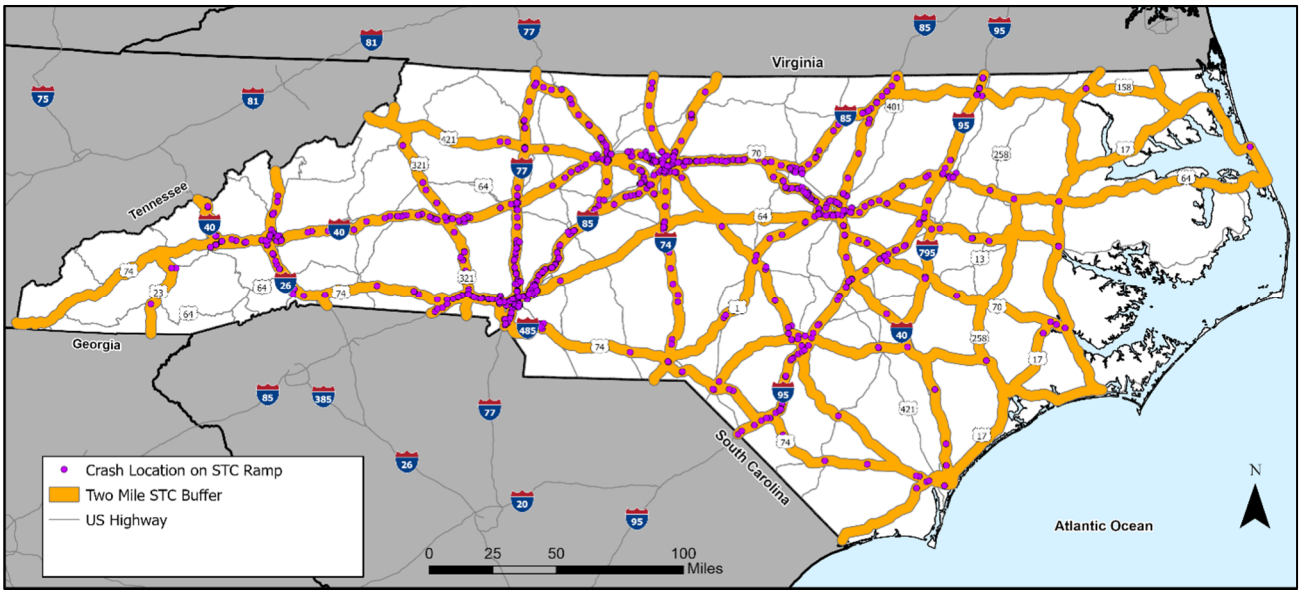
Source: NCDOT Crash Data, 2015-2019.

Figure 4.13 Truck Crashes in North Carolina, 2019



Source: NCDOT Crash Data, 2015-2019.

Figure 4.14 Truck Crashes on Ramps on STC Corridors



Source: NCDOT Crash Data, 2015-2019.

A total of 36% of the total truck-related crashes occurring in North Carolina occurred on highway ramps within two miles of a truck parking facility, as shown in Figure 4.14. The lack of truck parking spaces and information about available truck parking nearby forces truck drivers to park illegally on ramps. It is important to recognize that truck crashes on ramps could be due to any number of factors besides parked trucks. Although these ramp crashes did not represent a majority of the total crashes, there is clearly a safety risk associated with trucks parking along ramps. In interviews with private truck stop operators under the 2017 Truck Parking Plan, it was said that ramp parking is the first sign to passing trucks that parking facilities are at capacity. When trucks park on shoulders or ramps, they become a fixed object within the travel way

endangering the traveling public. Off-ramps are more dangerous than on-ramps since vehicles exiting interstate highways are traveling at a higher rate of speed.

Truck ramp crashes along STC Corridors from 2015 to 2019 occurred primarily within the urban areas around the cities of Charlotte, Greensboro and Raleigh and along I-85, I-40, I-77, I-26 and I-95. A significant number of on-ramp crashes involving trucks occur close to truck parking facilities. To determine how many of these crashes were due to parked trucks would require examining the individual crash reports, which is recommended for future study. However, ramp crashes are just one safety concern regarding adequacy of truck parking. Of more concern is having truck drivers remain beyond their legal hours of service on the roadways.

Table 4.5 illustrates the percentage of on-ramp truck crashes occurring within a half-mile, one-mile and two-miles of a truck parking facility. Truck crashes on ramps could be reduced by expanding truck parking spaces near main truck corridors in the state, and by implementing technologies to allow truck drivers to find available truck parking. Adding more truck parking spaces to existing parking facilities would also help to meet truck parking demand.

Table 4.5 Truck Crashes Occurring Near Highway Ramps, 2015 – 2019

Location	1/2-Mile Radius	1-Mile Radius	2-Mile Radius
Truck Crashes Near Parking Facilities	308	476	741
Total Truck Crashes on Ramps	2,084	2,084	2,084
Percent of Truck Crashes on Ramps of All Truck Crashes	**15%**	**23%**	**36%**

Source: NCDOT Crash Data, 2015-2019.

North Carolina weigh stations can experience ramp queues when stations are opened and are at risk for interstate truck crashes. However, N.C. State Highway Patrol (NCSHP) routinely monitors ramp queue lengths during weigh station operations to ensure this does not happen. To evaluate truck ramp crashes near weigh stations, truck crashes occurring from 2015 - 2019 within a half-mile of each weigh station were totaled. The results, presented in Table 4.6, indicate that the percentage of truck crashes near weigh stations is not significant regardless of whether the crash was on ramp or at other locations.

Table 4.6 Truck Crashes Occurring Near Weigh Stations, 2015 – 2019

Location of Truck Crash	On-Ramp	Other Locations
Truck Crashes Within 1/2-Mile of Weigh Stations	0	158
Total Crashes	2,084	46,630
Percent of Truck Crashes	**0%**	**0.3%**

Source: NCDOT Crash Data, 2015-2019.

The 2017 Truck Parking Plan reviewed other studies to evaluate weigh station locations and truck crashes. In a Weigh Station Feasibility Study conducted for NCDOT in 2003, which included a review of accident reports, study authors could not establish a definitive link between the weigh stations and the crashes reported near them.

5.0 Truck Parking Facility Analysis

Truck parking was identified in the North Carolina Statewide Multimodal Freight Plan, Truck Parking Study, 2017 as a major challenge to safety and economic productivity. Lack of available truck parking negatively impacts the safety of truck drivers and the traveling public when trucks park in unauthorized areas. Additionally, economic productivity and efficiency is reduced when drivers must begin searching for parking well in advance of their hours-of-service expiring, costing them valuable driving time. The combination of hours-of-service restrictions and a lack of truck parking availability impacts the ability of shippers to get their goods to market. Furthermore, each of these issues impacts the motoring public by introducing safety hazards along the roadway and increasing local congestion due to trucks searching for parking in areas adjacent to major roadways or freight generators.

As local and national economies continue to rely on freight movement, the necessity of parking continues to remain of critical importance across the country and in North Carolina. Below is a high-level summary of some of the national trends in truck parking, with a review of both Texas and Florida strategies.

Increasing capacity at all rest areas and weigh stations for truck parking

- Texas has identified dozens of rest areas to be considered for truck parking expansion by restriping and repurposing formally closed or underutilized rest areas for truck parking.[2]
- Florida has increased truck parking along I-10 at the Gadsden Rest Area by restriping a portion of existing car parking and adding official parallel parking along the rest area ramps. Florida has also Increased truck parking along I-95 at the Martin County Rest Area by 30% through new restriping design without the addition of new pavement.[3]

Truck parking only sites being developed

- Texas is considering utilizing available ROW to build new truck parking only facilities and develop truck staging lots in urban settings.[4]

Older weigh stations being upgraded for truck parking

- Florida installed 24-hour restrooms and vending machines at weigh stations on I-4, just east of Tampa. With the addition of restrooms and vending machines, these areas can accommodate overnight truck parking.[5]

Activating existing DOT ROW to truck parking

[2] https://ftp.txdot.gov/pub/txdot/move-texas-freight/studies/truck-parking/final-report.pdf
[3] https://ftp.txdot.gov/pub/txdot/move-texas-freight/studies/truck-parking/final-report.pdf
[4] https://ftp.txdot.gov/pub/txdot/move-texas-freight/studies/truck-parking/final-report.pdf
[5] https://ops.fhwa.dot.gov/freight/infrastructure/truck_parking/workinggroups/parking_capacity/product/row.htm

- Florida has identified utilizing DOT ROW for truck parking in a variety of locations, including through a parking on median concept and utilizing available ROW adjacent to existing DOT provided rest areas.[6]

Utilizing Technology

- Technology impacts on truck parking. Technology implementation is similar but fragmented between public sector and private sector-driven initiatives. The public and private sectors are taking parallel paths towards the development and implementation of trucking information management systems. Those already in the marketplace today have roughly similar functionalities: gather information about available spaces and disseminate that information through a wide range of user interfaces. Parking information is disseminated through smartphone applications, in-cab systems and roadside DMS. In order to ensure safe operations, smartphone applications need to be FMCSA "one-touch" compliant by relying on hands-free voice interactive commands. A smartphone or in-cab application may sense a vehicle's roadway heading and GPS location to present parking availability information to drivers for facilities in proximity to the vehicle's position and travel path. These systems have come a long way in the past few years providing drivers with real time information through push notifications to provide up to date information along the entire route. However, the ability to predict availability at a time in the future is still lacking.[7] Another approach, typically used by the private sector, are reservation systems.
- Impacts of autonomous vehicles. Most of the studies reviewed acknowledge that autonomous and connected vehicles are coming and will have the potential to greatly impact both freight movements in general and truck parking. However, a full discussion and analysis of those impacts is lacking. Initial test deployments of this technology have focused on long-haul, Interstate corridors. If this trend continues, it will reduce the need for long-term truck parking along rural stretches of highway. However, since autonomous vehicle technology will likely take longer to be deployed in urban areas, short-term parking areas near urban interchanges (where loads switch between autonomous and human drivers) and staging parking to support urban deliveries will continue to remain a need.[8]

Truck Parking Policy, Outreach and Coordination Strategies

- Develop guidelines for integrating truck parking into the project development process.
- Consider truck parking needs prior to purchase or sale of ROW.
- Coordinate with private property owners to allow truck parking at large parking facilities when not in use.
- Create guidance to help local agencies include truck parking demand as part of Traffic Impact Analyses for new developments.

[6] https://ftp.txdot.gov/pub/txdot/move-texas-freight/studies/truck-parking/final-report.pdf
[7] https://ftp.txdot.gov/pub/txdot/move-texas-freight/studies/truck-parking/technical-memos/1.pdf
[8] https://ftp.txdot.gov/pub/txdot/move-texas-freight/studies/truck-parking/technical-memos/1.pdf

- Develop guidelines for integrating truck parking plans into local and regional transportation and land use plans.
- Encourage commercial and industrial property owners to provide truck parking on-site.
- Create guidance for next generation logistics parks that include integrated and full-service truck parking facilities

5.1 Public Truck Parking Funding

The North Carolina Truck Parking Plan, 2017, indicated that prior to the development of the Strategic Transportation Initiative (STI), NCDOT created a budget line item to construct new rest areas. Staff used a condition assessment survey to rate the quality, safety, cleanliness of vertical buildings and pavement needs. Historically, NCDOT has used the assessment data and expected budget financial support to plan for future facilities based on need. The NCDOT Roadside Environmental Unit also works with the 14 Division Engineers to determine which rest areas suffer from lack of utilization or age and recommend eroding facilities (such as pump stations and water/sewer lines) for closing or consolidation. NCDOT's cycle of proactive management and assessment has been successful in maintaining a high quality standard of rest areas with limited resources.

STI legislation recognized that NCDOT needed a method to determine which projects in its delivery pipeline would be subject to the new data driven approach. Future planned rest areas could not compete for capital funds and be included in the STIP since the department's prioritization process does not include criteria to score and compare them to other infrastructure needs, such as highway capacity projects. Therefore, the Roadside Environmental Unit is now provided an "off the top" amount of state maintenance funds of around $3 million to address both routine maintenance items, such as fixtures, painting, and other needs, and to update older facilities, such as new electric wiring or replacement of HVAC systems. Highway Divisions s have the budgetary discretion to determine at what investment level and by what funding source, such as resurfacing funds, to address these pavement needs. They must do this while also balancing investment in a growing backlog of priority pavement/bridge needs throughout their respective Highway Divisions. Therefore, NCDOT's ability to plan for and construct new rest areas that address passenger demand and accommodate additional truck parking is extremely constrained. All of the truck parking modifications identified in the 2017 and 2020 Truck Parking Plans have been completed. No additional public-sector truck parking has been added by NCDOT.

NCDOT staff routinely observes an increased level of trash associated with truck parking at existing rest areas, even during times when truck parking is plentiful and amenities are fully available. Staff expressed concerns about how new publicly funded truck-only parking facilities would address these ongoing needs, which may exacerbate the already small Highway Division maintenance budgets and service contracts. Staff noted such parking lots would need security safety equipment and bathroom facilities, which would add to NCDOT's maintenance budget. This issue was identified in the previous Truck Parking Studies as well.

5.2 Truck Parking Options

The private sector controls about 85% of the truck parking supply in the state, according to the 2017 Truck Parking Study. Therefore, it would be appropriate to include the private sector as part of the solution. However, there are several options that NCDOT can explore to provide additional public parking spaces. In 2017, NCDOT used data, interviews and best practices from ten other related truck parking studies, to explore several options to improve the state's truck parking situation, along with advantages and disadvantages to each option. The options discussed below are not listed in priority order.

5.2.1 NCDOT Builds Truck Parking Lots at Abandoned Rest Areas

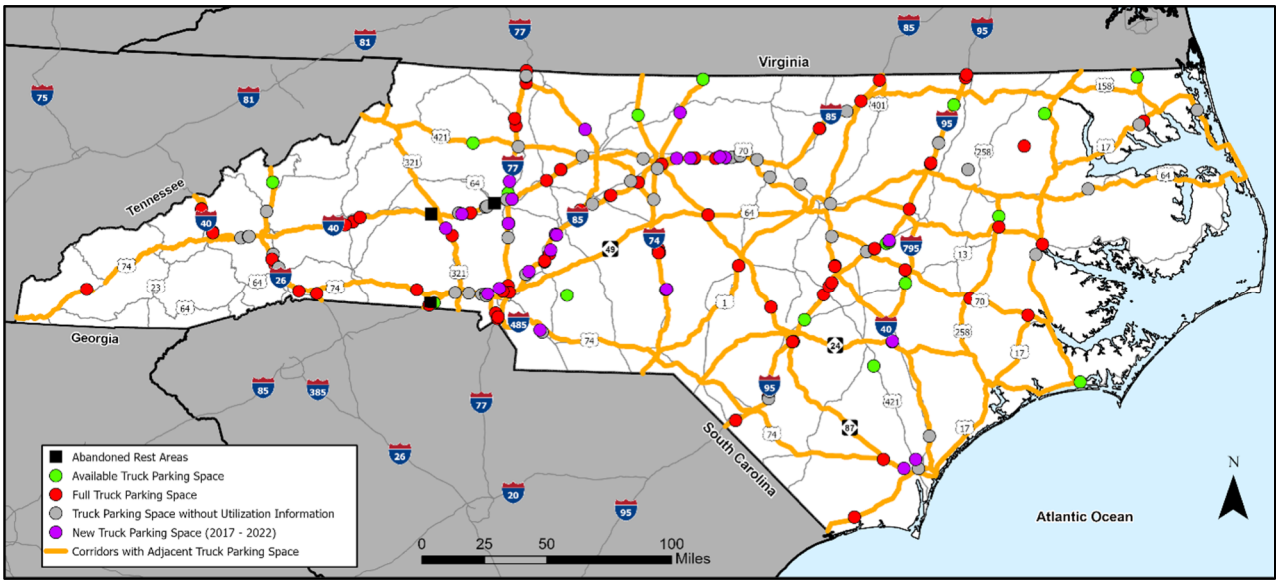
Advantages

NCDOT still owns the ROW for five abandoned rest area sites. Two are located on I-40 and three on I-85. For an abandoned rest area to be considered for reuse and renovation, it should meet two criteria: (1) there should not be available truck parking facilities with low utilization nearby, and (2) the site should be close to one of the main freight highway corridors. Several abandoned rest areas identified by NCDOT were evaluated to determine if they met the above-mentioned criteria.

Two sites on I-40 in Burke County are near multiple private parking facilities along I- 40 that are keeping up with truck parking demand along this corridor. A third site is located on I-85 five miles north of North Carolina's southern border in Cleveland County. This site is near available parking locations including a North Carolina welcome center and King's Mountain Truck Plaza.

However, I-85 is a high demand corridor with insufficient overall parking capacity. The size of this site is approximately 12 acres. Therefore, this site along I-85 is in a better location for re-use than the I-40 locations with regard to parking demand and parcel size. Two sites along I-40 in Iredell County are in a good location but lack the acreage required for any significant truck parking.

Figure 5.1 Location of Three Abandoned Rest Areas



Source: CS, NCDOT, 2017

Disadvantages

Ramps at each site are not up to current interstate standards and would need to be lengthened. The sites would also require upgrading water and sewer utilities to be considered in the construction cost to prepare this site for safe truck transport and parking. Residential development has expanded adjacent to the I-40 site, increasing the likelihood of community resistance to truck parking development. The community would experience higher decibel levels of noise and could be concerned about increased safety and security risks. Additional considerations include restrooms, installing adequate lighting and security cameras, providing vending machines and maintaining trash collection.

The sizes of these sites vary, from one half to twelve acres. This is an important consideration given the space needed for truck parking. Of the four proposed sites, the Cleveland County site on I-85 should be considered as a high-level planning candidate for parking new rest area since the site may have sufficient land for vehicle access, new facilities and parking.

5.2.2 NCDOT Uses Weigh Stations for Additional Truck Parking

Advantages

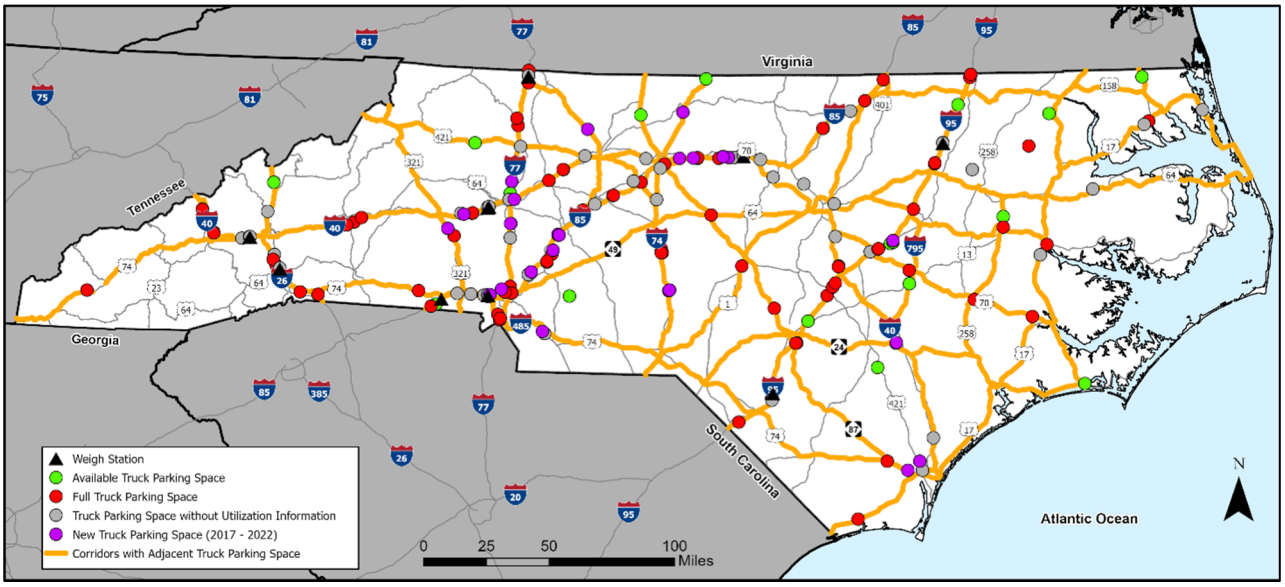
For a weigh station to be considered for truck parking, staff concluded they meet the following criteria: (1) there should not be available truck parking facilities nearby, and (2) the location should be close to one of the main freight corridors. The weigh stations identified are located in areas, which *may* help mitigate the overcapacity problem at existing rest areas.

Engineering costs and construction expenses are not as problematic at weigh stations compared to rest areas, and some weigh stations could accommodate truck parking. Most weigh stations have adequate lighting and security camera installation that could make truck parking accommodations more cost effective, depending on the condition of the utilities in place. Truck

drivers may feel safer parking at a weigh station staffed by NCSHP, even if the facilities are not staffed overnight.

Figure 5.2 illustrates the location of weigh stations with respect to other truck parking locations. The weigh stations on I-26 and I-77 are good candidates for expansion to accommodate truck parking based on their locations. However, these sites are too small to accommodate more than two or three trucks for overnight parking due to size limitations. Out of the eight pairs of weigh stations, seven were constructed in the 1970s. Parking is adequate for patrol cars, but not adequate for truck inspections, impoundment and even short-term parking at most locations. However, three sites have the potential to accommodate overnight truck parking. These include the two Hillsborough stations on I-40/I-85 in Orange County, and the new Charlotte NB Station that recently opened on I-85 in Gaston County.

Figure 5.2 North Carolina Weigh Stations



Source: CS, NCDOT, 2017

Disadvantages

NCDOT is already facing challenges of replacing utility lines to these sites due to their remote locations. Weigh stations have been designed to accommodate truck queuing for weighing and inspection purposes, not for truck parking. Some additional site work may be required to accommodate truck parking, including additional signage and striping to configure truck parking spaces. To be effective, implementing truck parking at weigh stations would need to be communicated broadly to truck drivers that weigh stations can be “safe havens” for truck drivers reaching the end of their hours of service.

A weigh station review document was developed for NCDOT, Transportation Mobility and Safety Division, ITS and Signals Management Unit. The document is, in part, a review of the existing Weigh Station Feasibility Study The intent of the document is to provide an overview and high-level update of the original study and identify current best practices for consideration in the evaluation of and recommendations for the statewide weigh stations.

The document was developed through a review of the Study, the 2017 North Carolina Multimodal Freight Plan, the 2016 Greater Charlotte Regional Freight Mobility Plan, and stakeholder coordination. The goal of the document was to determine the applicability of information contained in the previous Study and document information that has changed or requires updates.

To support the information contained in the report review, a separate Weigh Station Best Practices document was prepared, which outlines the current and evolving state of the industry for weigh station layout, features, site selection, technology, data storage, asset management and policies and procedures.

The document provides recommendations based on the condition changes resulting from deployed technology and facility upgrades that have occurred since the original study was published. Recommendations are made for the development of a business plan and policy considerations as well as further analysis of recommended improvements based on the 2022 freight plan currently under development.

5.2.3 NCDOT Pursues Public-Private Parking Arrangements

NCDOT can also work with the private sector to promote privately financed rest areas similar to the facility in Delaware along I-95. Since the private sector controls 85% of the truck parking supply in the state, the private sector can be part of the truck parking solution. Working with the private sector, NCDOT can establish public-private partnerships (P3) to design and construct additional truck parking facilities.

When Congress created the Interstate Highway System, community leaders were concerned that local businesses, would be jeopardized as truck drivers and motorists bypassed their towns. As a result, Congress prohibited states from offering commercial services, such as food and fuel, at commercial rest areas on the interstate ROW. Since that time, businesses such as restaurants, fuel stations and truck stops have clustered near the interstates at the interchanges along the interstates to provide traveler services. Due to their advantageous locations, state-owned commercial rest areas compete with businesses on the sale of services to highway travelers.[20]

P3s are legal in North Carolina. Government entities may enter into a P3 for any public-private project for which the entity determines it has a critical need. The General P3 Statute defines P3 as “a capital improvement project undertaken for the benefit of a governmental entity and a private developer under a development contract that includes construction of a public facility or other improvements, including paving, grading, utilities, infrastructure, reconstruction, or repair, and may include both public and private facilities”. There are two primary statutes that govern P3s in the state[21]:

- Section 143-128.1C of the North Carolina General Statutes (General P3 Statute), which authorizes governmental entities to enter into P3s to acquire, construct, own, lease as a lessor or lessee, and operate or participate in the acquisition, construction, ownership, leasing, and operation of a public- private project or of specific facilities within a public-private project. The General P3 Statute is primarily a procurement statute.

- Sections 136-18(39) and (39a) and 136-89.180 to 136-89.220 of the North Carolina General Statutes (DOT and TA P3 Statutes), which authorize the North Carolina Department of Transportation and the North Carolina Turnpike Authority to develop transportation infrastructure using P3s.

Advantages

These types of arrangements, found in other states, are receiving favorable results from private and public entities. In addition to the Delaware example, the reuse of brownfield sites that was recommended as a solution for additional truck parking in Illinois DOT's "Trucker's Parking/Rest Facility Study" (2008) and Virginia DOT's "Virginia Truck Parking Study" (2015), is one potential option for implementing a P3 arrangement. Using underutilized retail, manufacturing, and seasonally affected sites could also be employed for additional truck parking.

Disadvantages

There may be limited locations where this arrangement is feasible. There are also limitations within the interstate ROW areas in North Carolina for such projects due to federal regulations.

5.2.4 NCDOT Conducts Site Exploration at Major Interstate Crossings

Highly visible locations of abandoned facilities, distribution centers and warehouses at the intersection of major Interstates or at the state border where truckers can rely on availability and better time their stops based on delivery are another option for truck parking. These areas typically have more room due to the land required for ramps for both major interstates. Examples include the intersections of I-40 and I-95, I-40 and I-85 and I-26 and I-40.

Advantages

These types of arrangements, found in other states, are receiving favorable results from private and public entities. These locations would provide more land on which to construct such facilities.

Disadvantages

Access to such facilities may require the construction of long access roads due to access management requirements on interstate highways. Existing interchange intersections may be already at capacity for development, particularly in urban areas.

5.2.5 Utilizing Excess Passenger Car Parking at Existing Rest Areas

While the truck parking at public rest areas is at or near capacity, there is some underutilization of passenger spaces at existing rest areas. All rest areas on North Carolina Interstates have segregated parking for trucks and automobiles.

Advantages

NCDOT already owns and operates the facilities so the costs for restriping and designating the spots could be modest.

Disadvantages

According to NCDOT staff, underutilized peripheral passenger spots would require trucks to traverse through passenger parking lots, subsequently increasing safety risks to families and motorists. Additionally, the engineering constraints of this segregated parking configuration, including lack of turning radii through the passenger lot and the need to lengthen stalls, may prove cost prohibitive and may not generate enough new parking availability to address near term parking shortages. Finally, the net gain in truck parking spaces would be minimal.

Appendix A. Truck Parking Advisory Group Invited Participants

Names	Organizations
Justin Sykes	American Petroleum Industry
Alexandra Shirk	ATRI
Dan Murray	ATRI
Laura Sandt	Collaborative Sciences Center for Road Safety
Will Seel	Council of Supply Chain Management Professionals
Nichole Mumford	Council of Supply Chain Management Professionals
Chris Davies	Freight Works Transportation and Logistics
Jerry Cook	Hanes Brands
Ginger Laidlaw	NATSO
Lane Bailey	NC Association of Regional Councils of Government
Peter Daniel	NC Chamber
Buddy Holson	NC League of Transportation and Logistics
Jason Orthner	NC Rail Division
Stephanie Ayers	NC State Ports Authority
Steve Massey	North Carolina Trucking Association
Andrew King	OOIDA
Bryce Mongeon	OOIDA
Collin Long	OOIDA
Joe Milazzo	Regional Transportation Alliance
Michael Tart	State Police Department
Michelle Grainer	Sweet Potatoes Packers and Shippers Contact
Rick Warner	TSPS
Jeff Wofford	UPS Airlines
Petrina Lawrence	Women in Trucking

Names	Organizations
Susie Crane	Uptime Truck Parking
Terrye Ward	Ideal Transport, Inc.
Will Reich	Best Logistics Group, Inc.
Jason Wing	Red Classic Transit
Jim Gore	Loves Truck Stop
Adam Trundle	Loves Truck Stop
Staton Smith	Loves Truck Stop
Shelia Blanchard	NCDEQ
April Fletcher	South Carolina Port Authority
Cathie Vick	Virginia Port Authority
Ben Hinnant	Overweight and Oversize Permits
Bill Slagle	Economic Development Partnership of NC
Karen Pentz	Guildford Technical Community College
John Pope	Cargo Transporter
Karl Robinson	R&R Transportation