

North Carolina Future Investment Resources for Sustainable Transportation (NC FIRST) Commission



FINAL COMMISSION REPORT

January 2021

Contents

1. Letter from the Co-Chairs	9
2. Executive Summary	11
3. The NC FIRST Commission	14
Mission	14
About the Commission	14
How Recommendations and Related Options Were Chosen	15
Members	15
4. Introduction.....	18
5. Where We Are Now.....	19
North Carolina’s Transportation Network.....	19
<i>The Condition of the Transportation Network.....</i>	<i>21</i>
<i>How North Carolina Compares to Peer States.....</i>	<i>25</i>
How State and Federal Transportation Funding Work Now	29
<i>NCDOT Budget.....</i>	<i>31</i>
<i>North Carolina Turnpike Authority</i>	<i>35</i>
Historical Transportation Revenue and Finance Successes.....	36
<i>Study Commissions</i>	<i>37</i>
<i>Revenue and Finance Modifications</i>	<i>40</i>
NCDOT Is a Sound Investment.....	45
6. A Vision for Our Transportation Network	48
Economic Impact	49
7. Challenges and Opportunities	53
Transportation Disruptors	53

<i>Technology</i>	53
<i>Demographics</i>	60
<i>Severe Weather Events</i>	63
<i>Combined Effects of Transportation Disruptors</i>	68
Travel and Vehicle Trends	69
Federal Funding Gap	74
Public Perceptions of Transportation Infrastructure and Investment.....	76
Investment Opportunities Presented by Transformative Changes	79
8. North Carolina’s Transportation Investment Needs.....	83
Needs Analysis Overview.....	83
Highway Investment Needs.....	88
<i>Highway Maintenance</i>	88
<i>Highway Construction</i>	94
Multimodal Investment Needs.....	104
<i>Aviation Division</i>	105
<i>Rail Division</i>	111
<i>Ferry Division</i>	119
<i>Integrated Mobility Division</i>	124
9. Commission Recommendation and Options	129
Options Providing an Immediate Impact.....	130
<i>Highway Use Tax and Alternative Highway Use Tax</i>	130
<i>State Sales Tax</i>	131
<i>DMV Fees</i>	133
Options Providing for Long-term Modernization	135
<i>Mileage-Based User Fee</i>	135
<i>Highway Tolling</i>	136

<i>Public-Private Partnerships</i>	137
<i>State Infrastructure Bank</i>	137
<i>Value Capture</i>	138
Options for Local Governments.....	139
<i>Local Sales Tax</i>	139
<i>Local Road Impact Fee</i>	139
<i>Local Infrastructure Banks</i>	139
<i>Local Value Capture</i>	140
Additional Opportunities and Options	140
<i>Expand Broadband</i>	140
<i>Increase Debt Capacity</i>	140
<i>Chief Innovation Officer for NCDOT</i>	141
Acknowledgements	142
Appendices	147
Appendix A: Informational Resources	147
Appendix B: Revenue Options Advantages and Disadvantages Chart	152
Appendix C: Revenue Options Matrix	166

Figures

1. Change in Monthly Vehicle Miles Traveled (VMT)	20
2. 2010 and 2020 North Carolina Comparison Data.....	21
3. Interstate, Primary, and Secondary Route Pavement Condition.....	22
4. Annual Highway Congestion Cost per Auto Commuter.....	24
5. Annual Hours Delay per Auto Commuter	24
6. National Highway Construction Cost Index	25
7. State System Comparisons	26
8. State Spending Comparisons	27
9. State Roadway Comparisons	28
10. NCDOT Revenue Sources, FY 2020	30
11. NCDOT Expenditures, FY 2020.....	31
12. State-by-State Comparison of Taxes on Vehicle Sales.....	32
13. Distribution of NCDOT’s State and Federal Transportation Revenues.....	35
14. North Carolina Turnpike Authority Projects	36
15. Major NC Transportation Bond Authorizations.....	43
16. NCDOT GARVEE Issuances	44
17. Accelerating Project Delivery	47
18. Annual Industry Contributions to North Carolina’s Gross Domestic Product, 2018	50
19. State Economic Comparisons	52
20. Mobility-as-a-Service	54
21. Truck Platooning.....	56
22. North Carolina Electric Vehicle Forecast	58
23. E-Commerce Sales as Percentage of U.S. Retail Sales	59

24. North Carolina Population and Percentage of People Aged 65 and Older, 2010–2039	61
25. Projected State Population by Age in 2019 and 2038	62
26. Projected Population Change by County from 2019 to 2038	63
27. NCDOT Spending on Declared and Non-Declared Disasters, FY 2009 to FY 2019	65
28. NCDOT Emergency Expenditures and Federal Reimbursement	66
29. Annual Vehicle Miles Traveled in the United States, 1971–2019	70
30. Vehicle Miles Traveled Per Capita	70
31. Fuel Consumption by Fuel Type in North Carolina, FY 2010–FY 2020	71
32. Urban and Rural Miles Traveled in North Carolina, 2008–2018	71
33. North Carolina Vehicle Registrations with U.S. and North Carolina Fuel Economy, FY 2007– FY 2020	72
34. Average Age of Light Vehicles by U.S. Region	73
35. Average Age of Vehicles in North Carolina	73
36. Lost Gasoline Tax Buying Power, 1956–2017	75
37. Highway Trust Fund Projected Deficit	75
38. States Participating in Mileage-Based User Fee Studies, Pilots, and Programs	81
39. Comparison of Three Needs Analyses to Achieve a “Grade A” Transportation Network	83
40. NC Chamber/ITRE: System Condition per Level of Investment	84
41. NC Moves Estimate of Needs by Alternative Future through 2050	85
42. NC Moves Estimate of Investment Needs vs. Revenue Gap through 2032	86
43. Consolidated 10-Year Investment Needs, Cumulative	86
44. Highlights of Investing in Transportation by Investment Level	87
45. FY 2020 Actual State Highway Fund (HF) Revenues	88
46. FY 2020 Actual State Highway Fund (HF) Expenditures	89
47. Biennial MOPAR Findings	90
48. Highway Maintenance Investment Needs, Cumulative	91

49. Change in Pavement and Bridge Condition and Vehicle Operating Cost	93
50. FY 2020 Highway Trust Fund (HTF) Actual Revenues	94
51. FY 2020 Actual Highway Trust Fund (HTF) Expenditures.....	95
52. 10-Year Highway Construction Investment Needs	95
53. The STI Programming Process	96
54. Prioritization 5.0 Criteria used in Statewide, Regional, and Division Categories.....	97
55. Prioritization 5.0 Projects Funded in STIP.....	98
56. Completed Projects by Investment Scenario.....	99
57. Projects Potentially Funded by Highway Division.....	100
58. FY 2020 Actual Highway Fund (HF) Multimodal Expenditures	105
59. North Carolina Public Airports.....	106
60. Ten-Year Airport Investment Needs	107
61. Potential Aviation Highway Fund Projects by Investment Scenario, Cumulative.....	107
62. Potential Aviation STIP Projects by Investment Scenario, Cumulative.....	108
63. Freight Rail Network in North Carolina	112
64. Passenger Rail Services in North Carolina	112
65. Ten-Year Rail Investment Needs	113
66. Potential Passenger and Freight Rail Investments, Grade D	114
67. Potential Passenger and Freight Rail Investments, Grade C.....	116
68. Potential Passenger and Freight Rail Investments, Grade B.....	117
69. Potential Passenger and Freight Rail Investments, Grade A	118
70. NCDOT Ferry Routes.....	120
71. Ten-Year Ferry Investment Needs, Cumulative.....	121
72. Potential Ferry Projects by Investment Scenario, Cumulative	121
73. NC Public Transit Systems	125
74. Ten-Year Integrated Mobility Investment Needs, Cumulative	126

75. Potential Integrated Mobility STIP Projects by Investment Scenario, Cumulative.....	126
76. Fleet Modernization by Investment Scenario, Cumulative	126
77. Great Trails State Network by Investment Scenario, Cumulative	127
78. Summary of Options and Revenue Potential	129
79. Automotive Sales and Use Tax Collections, FY 2020	132
80. Percent Savings with RUC.....	135

1. Letter from the Co-Chairs

January 2021

Dear Secretary Boyette:

We are pleased to offer this final report of the NC FIRST Commission. Together with our fellow commissioners, we join a host of North Carolinians who extend our collective thanks to you and your predecessor, former Secretary Jim Trogdon, who formed and charged this Commission with its task. Your commitment is vital to help our state achieve a safe, forward-thinking, visionary, and durable infrastructure network that support the state's economic health, its competitive edge, its ambition, and the well-being of its people.

All that said, North Carolina is, literally, at a crossroads. Today, our transportation investments rely on just a few revenue sources, each of which is tied to long-standing assumptions about how many of us drive, how much we drive, what kinds of vehicles we drive, and how we purchase goods and services. Those historic assumptions are now quickly becoming obsolete. We are entering a new era characterized by dramatic population growth and seismic technological, social, and environmental disruptions to the transportation sector. As a result, traditional revenues are already inadequate to meet our state's increasingly growing needs; moreover, they will continue to decline. Thus, to provide a safe, efficient, connected, and reliable transportation system worthy of North Carolina's compelling future, our state will need a long-term, sustainable investment strategy that appropriately closes the gap between twentieth century funding models and twenty-first century investment needs. Our multimodal transportation network and those who depend on it daily deserve no less.

It is therefore with a sense of both duty and humility that we offer the findings in this report from the Commission's nearly two years of tireless work and analysis. Since the Commission's formation in March 2019, it has been our privilege to learn not only from dedicated public servants at NCDOT, but also from many subject matter experts across the nation and world regarding both the causes and the magnitude of our transportation and infrastructure challenges. More importantly, though, we have also carefully reviewed and considered possible policy options to address these notable challenges together with the attendant near- and longer-term impacts. Representing the culmination of our in-depth analysis and deliberations, this report recommends an additional investment of at least \$20 billion over the next 10 years. This commitment would improve our state's infrastructure rating from "mediocre" to "good." To accomplish that important goal, the Commission has also provided a menu of funding and financing options for your consideration.


We are honored to have had the opportunity to serve the people of North Carolina by dedicating our time, thought, and combined expertise to this endeavor. We sincerely hope that the findings,

recommendations, and possible fiscal options outlined in this report will have a lasting and positive impact by offering North Carolina a path forward for making sensible investments in our shared transportation system. Please know that we are available to answer your questions and address any thoughts or concerns as you consider the NC FIRST Commission's final report over the coming months.

Respectfully,



Nancy L. McFarlane
Former Mayor – City of Raleigh
NC FIRST Commission Co-Chair



C. Howard Nye
Chairman, President & CEO
Martin Marietta
NC FIRST Commission Co-Chair

2. Executive Summary

The NC FIRST Commission was formed to advise the Secretary of Transportation in the formation of a sustainable long-range transportation investment strategy. Both the recommendations and the associated funding and financing options included in this report are the result of extensive research and analysis conducted over an 18-month period. During the investigative phase, the Commission defined investment goals that will both replace revenue losses and enhance investment levels to ensure North Carolina remains competitive and attractive from an economic, quality of life, and safety perspective.

Currently, North Carolina's annual transportation investment level will equal an estimated \$50 billion over the next decade (roughly \$5 billion annually). The Commission's consensus recommendation is to increase the total investment level over the next decade by at least an additional \$20 billion.

For North Carolina to reach this level of investment, new investment strategies must be implemented to both offset declining gas tax revenue and provide for the additional investment levels recommended. The Commission has identified a menu of potential options that could be utilized to reach this goal. Implementation of multiple investment strategies will allow North Carolina to modernize and increase total transportation investments, create a safer and more resilient transportation network, better connect rural areas, and support technological advancements. This will ensure the state's continued economic vitality and quality of life as well as future competitiveness.

The Commission found the strategies listed here to be viable options for meeting the investment recommendation set forth in this report:

Options Providing an Immediate Impact

Highway Use Tax and Alternative Highway Use Tax

- Increase the HUT by 2 percentage points
- Eliminate the net-of-trade exemption for dealerships
- Transfer proceeds from short-term vehicle rentals, vehicle subscription services, and car sharing from the General Fund to NCDOT

State Sales Tax

- Increase the state Sales Tax rate

- Transfer existing Sales Tax revenues from transportation-related goods and services to NCDOT
- Tax Transportation Network Companies (TNCs)

DMV Fees

- Increase the Electric Vehicle (EV) Fee and enact a Hybrid Vehicle Fee
- Amend DMV registration fees for heavy vehicles
- Automatically adjust fees for inflation every two years
- Authorize a Road Impact Fee for e-commerce deliveries

Options Providing for Long-term Modernization

Mileage-Based User Fee

- Authorize a pilot Mileage-Based User Fee program for electric and plug-in hybrid vehicles and for Transportation Network Companies
- Adopt a permanent fee to fully replace the Motor Fuels Tax by 2030

Highway Tolling

- Increase highway tolling by raising or removing the statutory cap on toll projects
- Pursue projects that may relieve freight congestion and high-cost road and bridge projects

Public-Private Partnerships

- Increase the use of public-private partnerships by removing the statutory cap on partnership projects
- Conduct a holistic evaluation of state-owned infrastructure for monetization potential

State Infrastructure Bank

- Re-authorize and recapitalize the state-funded State Infrastructure Bank to offer low interest loans for the construction of infrastructure improvements

Value Capture

- Authorize value capture techniques, such as the ability to monetize air rights and rights-of-way associated with transportation infrastructure

Options for Local Governments

Local Sales Tax

- Authorize additional local option Sales Taxes for transportation purposes

Local Road Impact Fee

- Authorize a local Road Impact Fee for e-commerce deliveries, such as Amazon or other online retailers

Local Infrastructure Banks

- Authorize, establish, and fund local infrastructure banks to offer low interest loans to local governments for the construction of infrastructure improvements

Local Value Capture

- Authorize local use of value capture techniques, such as the ability to monetize air rights and rights-of-way associated with transportation infrastructure

Additional Opportunities and Options

Expand Broadband

- Use transportation maintenance, renovation, and construction projects as an opportunity to lay fiber to local communities and thereby facilitate broadband expansion across the state
- Integrate broadband installation into highway projects, especially in rural areas
- Explore public-private partnerships

Increase Debt Capacity

- Raise NCDOT's allowable debt-to-revenue ratio to compare with other states that have an AAA bond rating

Chief Innovation Officer for NCDOT

- Establish the position of and appoint a Chief Innovation Officer within NCDOT so that NC is at the forefront of changes in technologies

3. The NC FIRST Commission

Mission

The NC FIRST Commission's mission is to utilize the research of national and international trends to advise the Secretary of Transportation of the potential components of a **sustainable long-range transportation investment strategy** that will provide the critical and necessary resources to build and maintain North Carolina's future transportation system to ensure the state's **economic vitality** and **competitiveness** in the future.

About the Commission

The NC FIRST Commission was established by former NCDOT Secretary James Trogdon in March 2019. The Commission consisted of 14 members and two advisory members. In forming its recommendations, the Commission adopted five guiding principles:

- Avoid near-term harm
- Develop durable revenue and finance options
- Diversify and broaden funding streams
- Support user pays principle
- Adhere to principles of fundamental fairness

The full Commission met 10 times from May 2019 to January 2021. A local government workgroup met once in September 2020 and a finance workgroup met twice in August and September 2020. All meetings were held at the NCDOT headquarters in Raleigh until April 2020 when the meetings shifted to a virtual format due to COVID-19 pandemic restrictions on in-person gatherings. The Commission's educational process included over 26 state and national speakers, 14 briefing papers, two internal and three external surveys, and participation in a Mileage-Based User Fee pilot. In addition, the CRAFTS (Creating Revenue and Finding Transportation Solutions) investment calculator tool was developed for commissioners to run simulations to demonstrate the amount of investment needed to make transportation improvements and identify revenue changes to fund the improvements. All meetings were broadcast live and recordings of each meeting were made available on the Commission's website (www.ncdot.gov/ncfirst) along with presentation slides and other meeting materials. Meeting summaries are in Appendix A.

How Recommendations and Related Options Were Chosen

The Commission’s recommendation for a 10-year level of investment was formed by consensus; funding and finance options were offered summarily. In addition to the official Commission meetings, the co-chairs liaised with each commissioner individually to gather input. Two workgroups—one on local government issues and one on finance—met separately and provided recommendations for the full Commission’s consideration for inclusion in the final report.

Members

The Honorable Nancy McFarlane, Former Mayor, Raleigh

N.C. FIRST Commission Co-Chair

Chair of the Local Government Workgroup

Ward Nye, Chairman, President, and Chief Executive Officer of Martin Marietta

N.C. FIRST Commission Co-Chair

Chair of the Finance Workgroup

Aaron Chatterji, Ph.D., Professor, Duke University

Member of the Finance Workgroup

The Honorable Janet Cowell, Chief Executive Officer, Girls Who Invest

Member of the Finance and Local Government Workgroups

Jesse Cureton, Executive Vice President and Chief Consumer Officer, Novant Health

Stephen De May, North Carolina President, Duke Energy

The Honorable Julie Eiselt, Mayor Pro Tem, City of Charlotte

Member of the Finance and Local Government Workgroups

Peter Hans, former President, North Carolina Community College System

Resigned in July 2020 upon appointment as President of the UNC University System

The Honorable William G. Lapsley, P.E., Chairman, Henderson County Board of Directors

Member of the Local Government Workgroup

Resigned in November 2020

The Honorable Brenda Lyerly, Mayor, Town of Banner Elk

Member of the Local Government Workgroup

Kim Saunders, President and Chief Executive Officer, National Bankers Association

Member of the Finance Workgroup

Sallie Shuping-Russell, Managing Director (Retired), BlackRock

Member of the Finance Workgroup

Michael Walden, Ph.D., Professor, North Carolina State University

Member of the Local Government Workgroup

Patrick Woodie, President, North Carolina Rural Center

Advisory Members

Eric Boyette, Secretary of NCDOT

Joined in February 2020 upon appointment as Secretary

Jim Trogdon, Former Secretary of NCDOT

Resigned in February 2020 upon Secretary Boyette's appointment

Tony Lathrop, Member, NCDOT Board of Transportation; Chair, NCDOT Board Finance Committee; Partner, Moore & Van Allen PLLC

Member of the Finance and Local Government Workgroups

North Carolina Department of Transportation: Vision, Mission, Goals, Values

Vision

A global leader in providing innovative transportation solutions

Mission

Connecting people, products, and places safely and efficiently with customer focus, accountability and environmental sensitivity to enhance the economy and vitality of North Carolina

Goals

- Make transportation safer
- Provide great customer service
- Deliver and maintain our infrastructure effectively and efficiently
- Improve the reliability and connectivity of the transportation system
- Promote economic growth through better use of our infrastructure
- Make our organization a great place to work

Values

Seven core values guide the N.C. Department of Transportation in its everyday decision-making. Adhering or not adhering to them directly affects the Department's achievements and success.

- **Safety** - We are dedicated to providing a safe transportation network and work environment.
- **Customer Service** - We serve our customers in a respectful, professional and timely manner.
- **Diversity** - We respect one another while drawing strength from our diverse opinions, ideas and experiences.
- **Integrity** - We earn and maintain trust through accountability, transparency and data-driven decisions.
- **Quality** - We pursue excellence in delivering our projects, programs, services and initiatives.
- **Teamwork** - We work together using our diverse strengths and skills, collaborating to solve problems and serve our communities.
- **Innovation** - We promote the development and use of new and better solutions.

4. Introduction

North Carolina is facing a trifecta of transportation investment crises: determining the appropriate investment amount, identifying and securing viable revenue options to meet short-term infrastructure needs, and creating a long-term, sustainable investment strategy to replace an eroding 20th century revenue model. This report includes the Commission’s recommendation regarding the 10-year level of investment required to address North Carolina’s growing and evolving transportation needs with an aim of improving North Carolinians’ quality of life now and in the future. The recommendation, together with the associated funding and financing options, reflect the importance of all types of transportation infrastructure—roadways, passenger and freight rail, public transit services, airports, ports, and ferries.

Like many other states, North Carolina’s transportation infrastructure is aging and needs repair and modernization. While the backlog of highway and other projects **grows due to lack of financial resources, North Carolina is experiencing dramatic growth and worsening congestion**. The state’s economic health relies on an efficient, connected, and reliable transportation network but increased freight costs, shipment delays, and limited Interstate access in some rural areas is constraining North Carolina’s economic growth and competitiveness.

The NC FIRST Commission finds that immediate and meaningful action is required to prevent further decline. Members of the Commission examined an array of options to support the state’s economy through greater transportation investments. In exploring the available solutions, commissioners were guided by a set of principles that included fundamental fairness and ensuring funding stability through inevitable economic cycles. Throughout, **commissioners affirmed the importance of maintaining a competitive edge with peer and neighboring states.**

Today, North Carolina relies too heavily on just a few revenue sources to pay for transportation investments, with state and federal motor fuels taxes accounting for about 61 percent of all transportation funding. This report finds that motor fuel tax revenues will decline. Higher vehicle fuel efficiencies, electric and hybrid vehicle sales, and changes in mobility and travel will reduce the number of gallons sold and worsen disparities concerning who pays a fair share to use the state’s roads. Diversifying the tax base will aid in stabilizing revenues so that North Carolina can continue to provide a robust, multimodal transportation network that supports the state’s economic vitality and competitiveness in the years to come.

5. Where We Are Now

This section overviews the components of North Carolina's transportation network, its condition, and how it is funded. It includes multiple metrics from eight peer states to compare the state's transportation network, spending, and roadway condition. It also includes a historical review of previous transportation commissions and details the evolution of revenue and finance changes through time. Lastly, the report highlights NCDOT's process improvements.

North Carolina's Transportation Network

North Carolina's transportation network is as diverse as its geography. Since the highway system was unified under state control in 1931, the state's infrastructure has drastically expanded in scope and size. Operating the second largest state-maintained highway and ferry systems in the United States, NCDOT is responsible for more than 80,000 miles of roadway, maintaining 18,279 bridges and culverts, and operating two ports, eight ferry routes, and two train routes offering four daily trips each. In addition, local and regional partners operate 72 public airports, 98 public transit systems, and nearly 3,300 miles of railroad track.

Deteriorated and congested roads cost North Carolina drivers \$3.4 billion each year.

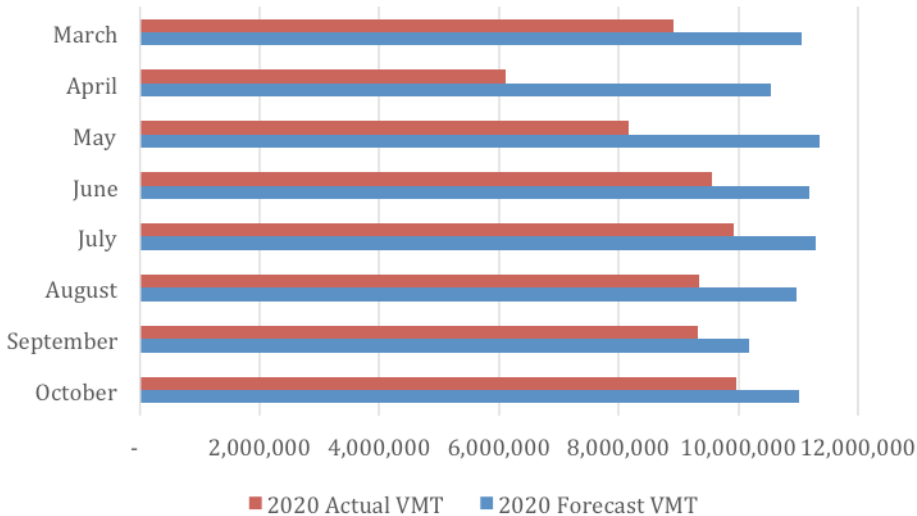
This multimodal network creates economic vitality through the movement of people and goods. In 2019, nearly 850,000 tons of cargo moved through the state's airports, 58 million tons over rail, and 592 million tons over highways, while close to 460,000 Amtrak passengers, 62 million flyers, 68 million public transit passengers, and 7.5 million licensed drivers traveled to their destinations on North Carolina's multimodal transportation network.

Overseen by the Board of Transportation, NCDOT has 14 highway divisions and divisions dedicated to aviation, rail, ferries, and integrated mobility, along with the Division of Motor Vehicles. From highway litter pickup to medical reviews for driver licenses, NCDOT is responsible for numerous functions. The North Carolina Turnpike Authority, North Carolina Ports Authority, and North Carolina Global TransPark Authority are also under the NCDOT umbrella and are overseen by three separate boards.

However, the COVID-19 pandemic dramatically impacted the state's transportation network and economic health. The unemployment rate, consistently 3.6 percent in the four months before the pandemic, climbed to 12.9 percent in April. The October 2020 unemployment rate

was 6.3 percent.¹ While highway volume is approaching pre-pandemic levels (**Figure 1**), air travel and public transit use continue to experience low ridership numbers.

Figure 1: Change in Monthly Vehicle Miles Traveled (VMT) (in Thousands)



During the week ending Oct. 25, 2020, airport passenger volume was down 64 percent nationwide and down 69 percent at Raleigh-Durham International Airport compared to the same week in 2019.² The Charlotte Area Transit System's (CATS) ridership fell almost 65 percent comparing May 2019 and May 2020.³ **As the state's economy continues to be impacted by the pandemic, lawmakers should consider an additional investment in transportation to mobilize the economy.** A 2014 study demonstrates that each additional \$1 billion invested in transportation generates 14,300 jobs, \$10.3 billion in wages, and \$10.8 billion in gross state product.⁴

While the transportation budget has grown 34 percent in the last 10 years, it has not kept pace with a growing state (**Figure 2**). Compared to 2010, the NCDOT workforce is much smaller, but the volume of freight and personal travel has sharply risen along with the cost to maintain, resurface, and preserve roadways.

¹ files.nc.gov/nccommerce/documents/LEAD/Labor-Market-Conditions-State/2020_10_LMCstate.pdf

² www.rdu.com/covid19/

³ ui.uncc.edu/story/charlotte-transit-coronavirus-changes

⁴ ncchamber.com/wp-content/uploads/NCCFEconomicStudy_ITRE_20150120.pdf

Figure 2: 2010 and 2020 North Carolina Comparison Data (All Dollar Values Are Expressed in 2020 Purchasing Power for Highway Construction)⁵

	2010	2020	% Change
Enacted transportation budget	\$3,724,896,000	\$3,564,300,000	-4.3%
Certified federal funding	\$1,281,651,280	\$1,232,990,000	-3.8%
State population	10,042,802	10,630,691	5.9%
Positions	13,531	11,348	-16.1%
Road miles	79,185	80,187	1.3%
Bridges and culverts	18,205	18,407	1.1%
NC gross domestic product (GDP) ⁶	\$490 billion	\$556 billion	13.0%
Average cost per lane mile (interstates)	\$99,400	\$284,041	185.8%
Cost per lane mile (secondary roads)	\$56,000	\$76,434	36.5%
Freight movement (2010-2017)	435 million tons	651 million tons	49.7%
Vehicle miles traveled (2010-2019)	102,385,011,000	122,505,928,000	19.7%
Vehicle registrations	5,634,760	8,251,423	46.4%
Driver licenses	6,536,601	7,560,719	15.7%

The Condition of the Transportation Network

The state maintains three types of roads: Interstate, primary, and secondary routes. Primary routes are designated as US or NC routes. These routes often have four or more lanes, medians, limited traffic signals and stop signs, and adequate shouldering. Secondary routes are often identified by a street name but are technically referred to as SR routes. Often located in rural areas, secondary roads may have two or more lanes that are narrower than primary routes and may lack adequate shoulders.

The state's inability to consistently meet routine maintenance obligations or make timely investments in capital infrastructure improvements positions the state at a competitive disadvantage and places an undue economic burden on the average person.

According to NCDOT data, the Interstate System has the best pavement condition ratings, but the rating has fallen approximately 5 percent in two years (**Figure 3**). Nearly 81 percent of the state's pavement on primary roads is in good condition. Primary route pavement conditions have improved for the last three

North Carolina maintains the second highest state-owned highway mileage in the nation, yet it invests far less than nearly any other state.

⁵ Inflation adjustment uses National Highway Construction Cost Index

⁶ US Bureau of Labor Statistics, with the estimated 2020 based on forecasts from the Federal Reserve.

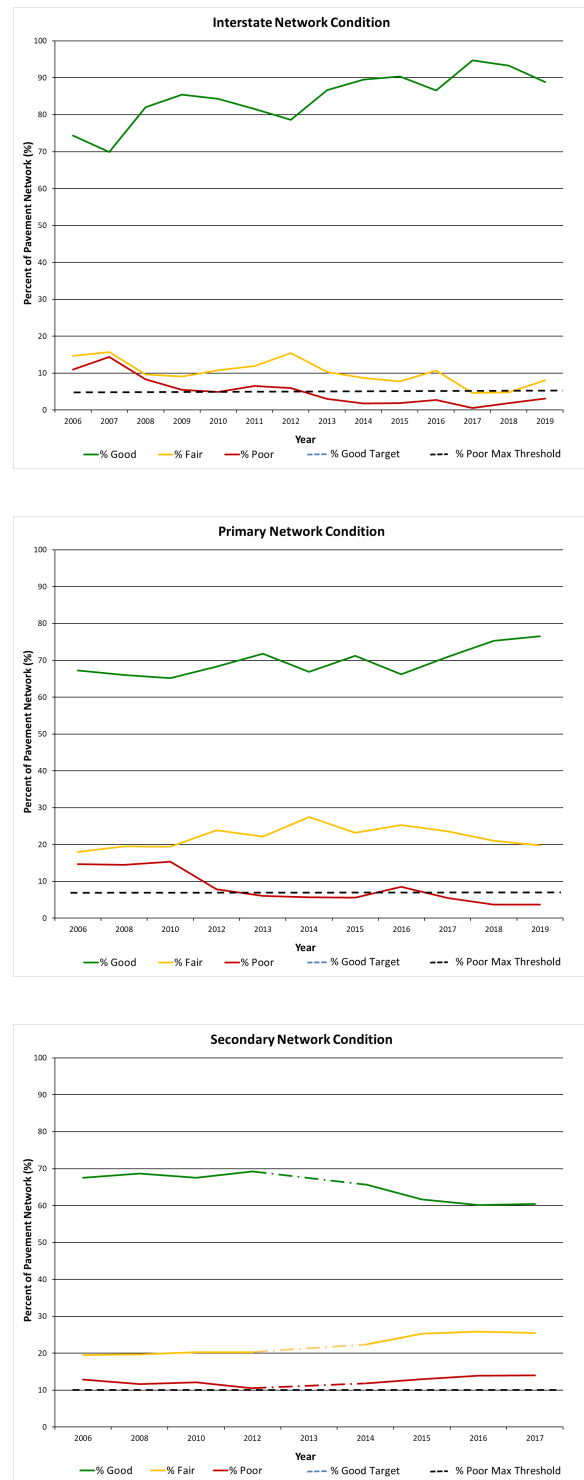
years. The number of “good” primary routes has risen by approximately 10 percent in three years. The pavement condition on secondary routes, which total 81 percent of roads, has declined 10 percent since 2012. In addition, the percentage of secondary routes in poor condition has consistently failed to meet the target since 2012.⁷

It will require increased financial resources simply to maintain current standards. Notably, NCDOT cannot meet national industry recommendations for highway treatment cycles due to inadequate funding. In North Carolina, while the primary system is resurfaced at the recommended intervals,⁸ secondary road resurfacing occurs every 29 years on average—far less often than the national standard of every 12 to 15 years. At 25 years, the cycle time on pavement preservation treatments is nearing four times the national recommendation of 4 to 7 years. Investing more in preventative maintenance activities, such as pavement preservation, will be far less costly than rehabilitation projects.

Increased Investments Produce Results

Through a series of legislative increases, funding to the Highway Fund Bridge Program increased from \$150 million in 2015 to \$273 million in 2021. As a result, the state has reduced its inventory of structurally deficient bridges from 16 percent to 8.6 percent. However, bridge funding needs will grow as the system ages. The state has almost 5,000 bridges aged 50 years or older, which leads to a high volume of bridges becoming deficient each year. Like pavement conditions, bridge conditions are also worse on secondary roads.

Figure 3: Interstate, Primary, and Secondary Route Pavement Condition



⁷ connect.ncdot.gov/resources/Asset-Management/MOPAR%20Docs/2020-MOPR-Report.pdf

⁸ Ibid.

The 10.9 percent of secondary road bridges that are deficient may require weight limits or other restrictions for safety, restricting the flow of goods from farms, industries, and other forms of commerce.⁹

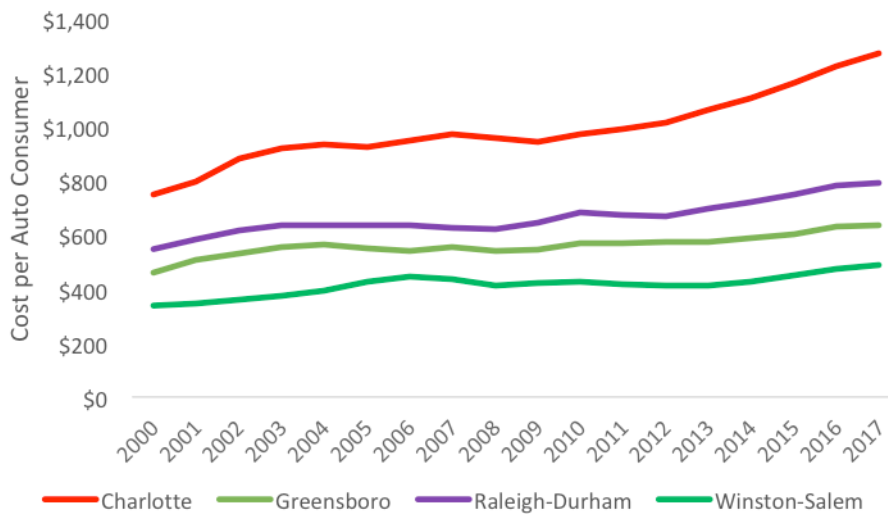
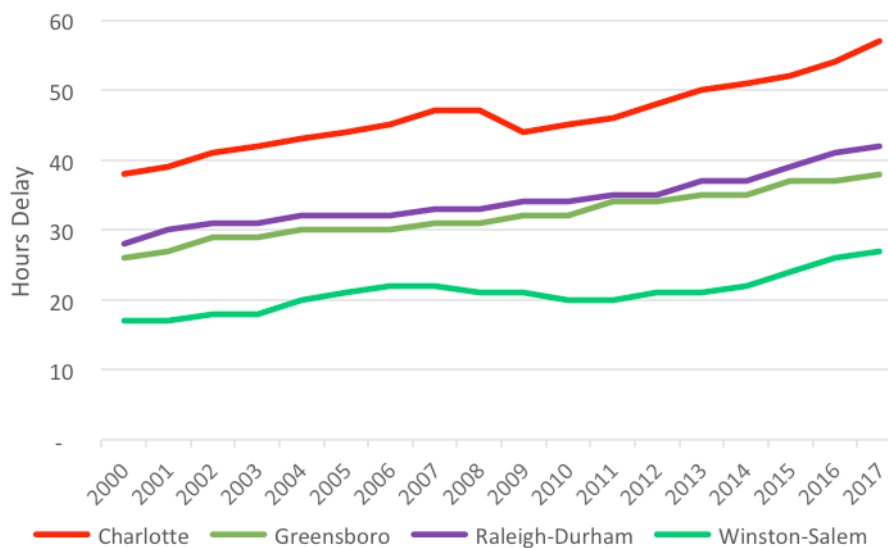
Poorly maintained roads require drivers to repair their vehicles more frequently, replace their tires and brakes earlier, and buy more gas as fuel efficiency declines. According to a recent analysis, **deteriorated and congested roads cost North Carolina drivers \$3.4 billion each year in higher vehicle ownership costs.** This comes from accelerated vehicle depreciation, increased vehicle maintenance repair costs, and increased fuel use, and a further \$3.3 billion from inadequate roadway safety features that contribute to crashes.¹⁰ The Texas Transportation Institute evaluated how congestion impacts drivers in four North Carolina cities (**Figure 4**).¹¹ Congestion cost Charlotte drivers \$1,269 in 2017, rising by \$521 since 2000. Greensboro, Raleigh-Durham, and Winston-Salem drivers pay \$175, \$247, and \$149 more, respectively, since 2000. Drivers are paying more because their commutes are getting longer (**Figure 5**).¹² Charlotte, Greensboro, Raleigh-Durham, and Winston-Salem drivers are spending an extra 19, 12, 14, and 10 hours in traffic, respectively, compared to 2000.

⁹ Ibid.

¹⁰ tripnet.org/reports/key-facts-about-north-carolinas-surface-transportation-system-and-federal-funding/

¹¹ mobility.tamu.edu/umr/report/

¹² Ibid.

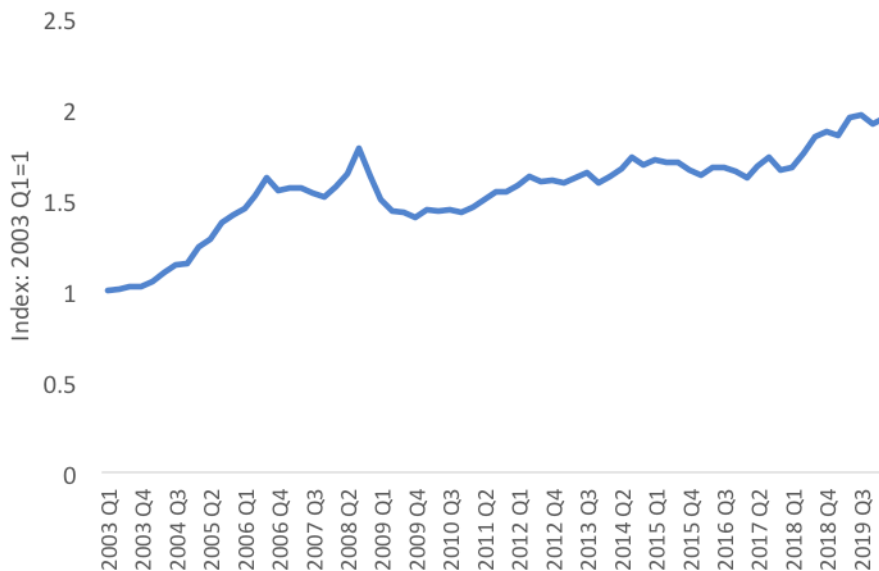
Figure 4: Annual Highway Congestion Cost per Auto Commuter¹³**Figure 5: Annual Hours Delay per Auto Commuter**

Improving the state's transportation network is hampered by rising input costs. The *National Highway Cost Construction Index*, produced by the U.S. Department of Transportation's Federal Highway Administration, measures change in the prices paid by state transportation departments for roadway construction materials and services over time (**Figure 6**).¹⁴ This inflationary measure indicates that a \$1 million bridge replacement project in 2020 would have cost \$514,609 in 2003 and \$744,383 in 2010.

¹³ Costs in Figure 4 are not adjusted for inflation.

¹⁴ www.fhwa.dot.gov/policy/otps/nhcci/pt1.cfm

Figure 6: National Highway Construction Cost Index



How North Carolina Compares to Peer States

North Carolina's multimodal network is diverse and expansive. **North Carolina is the ninth most populous state and it maintains the second highest state-owned highway mileage in the nation, yet it invests far less than nearly any other state, ranking 44th for per-mile investment in state-maintained roads.**¹⁵ The following analyses of multiple metrics from eight peer states reveal that North Carolina comparatively underfunds transportation.

State Transportation Networks

A comparison of state-by-state road ownership reveals that North Carolina is atypical. As shown in **Figure 7**,¹⁶ the average state DOT owns and maintains around 15,600 miles, or about 19 percent, of the public roads within their borders. In fact, only five states own more than 50 percent of their roadways. **In contrast, NCDOT maintains over 80,000 miles of roadway—more than any state but Texas—making the agency responsible for close to 75 percent of the road miles in the state.** This disparity dates back to the 1931 shift that transferred all county roads to the state; in most other states, the majority of roads are owned by counties and municipalities.

¹⁵ Ranking for per-mile investment calculated using data from FHWA's Highway Statistics 2018, Tables HM-10 and SF-4: www.fhwa.dot.gov/policyinformation/statistics/2018/

¹⁶ Sources: FHWA, Highway Statistics 2018, Table HM-10 (www.fhwa.dot.gov/policyinformation/statistics/2018/); Bureau of Transportation Statistics, State Transportation Infrastructure (www.bts.gov/state-transportation-infrastructure), State Highway Travel (www.bts.gov/state-highway-travel), U.S. Airline Traffic By Airport (www.bts.gov/us-airline-traffic-airport), and Freight Flows By State (www.bts.gov/freight-flows-state)

In terms of other transportation modes, North Carolina's transit ridership numbers, as in our neighboring states, are low compared to much of the nation because bus-oriented systems are relatively lacking in the state's mass transit options. North Carolina ranks 23rd in the number of linked passenger trips and 19th in the number of transit trips per capita in 2018.¹⁷ As a hub for American Airlines, North Carolina also has a vibrant aviation system.

Figure 7: State System Comparisons

State System Comparisons							
STATE	Total State Owned Mileage, 2018	% of DOT Ownership, 2018	State Owned Bridges Structures, 2019	VMТ per capita (in millions), 2018	Transit Ridership, 2018	Airport Passengers, 2018	Inbound and Outbound Freight Ton Miles (in millions), 2017
Florida	12,104	9.8%	12,518	11,798	227,424,998	81,636,694	18,392
Georgia	17,946	14.0%	14,940	13,569	144,907,302	52,555,543	15,458
Illinois	15,900	10.9%	26,825	8,414	603,890,436	46,282,833	7,540
North Carolina	80,011	74.5%	18,407	12,703	68,765,597	30,308,135	2,800
Ohio	19,249	15.6%	27,167	9,923	96,600,569	9,825,644	5,278
South Carolina	41,296	52.9%	9,419	12,280	11,020,045	4,903,394	2,443
Tennessee	13,920	14.5%	20,226	12,814	30,660,379	11,423,375	6,205
Texas	80,455	25.6%	54,432	11,216	274,565,632	83,399,001	10,790
Virginia	59,020	78.3%	13,933	10,666	66,656,676	23,495,388	1,186

State Transportation Spending

Figure 8¹⁸ includes metrics that are commonly used to analyze spending levels. An examination of these key metrics reveals that **North Carolina's comparative spending on transportation is low. Based on the total size of the state budget, North Carolina spends a relatively high**

¹⁷ Data compared USDOT Federal Transit Administration 2018 data for unlinked passenger trips (from the National Transit Database: www.transit.dot.gov/ntd) to U.S. Census Bureau data as of July 1, 2018 (www.census.gov)

¹⁸ Sources: FHWA, Highway Statistics 2018, Tables HM-10 and VM-2 (www.fhwa.dot.gov/policyinformation/statistics/2018/); Tax Policy Center, *State and Local General Expenditures, Per Capita, 2004 to 2017* (www.taxpolicycenter.org/statistics/state-and-local-general-expenditures-capita); National Association of State Budget Officers, *State Expenditure Report, FY 2017-2019*, Tables A-5 and 39 (www.nasbo.org/mainsite/reports-data/state-expenditure-report)

percentage on transportation; however, it is inadequate to accommodate the needs of the state's large and growing population or its unusually vast roadway network. The metrics below compare spending based on a per capita basis, by the number of vehicle miles traveled, and by mile. Most strikingly, North Carolina spends significantly less per state-owned mile than any peer state but South Carolina. North Carolina would need to invest an additional \$7.4 billion per year to bring its spending to the national average of \$142,461 per mile. The state has the fourth lowest spending per capita among peer states and third lowest based on miles traveled.

*North Carolina would need to invest an additional **\$7.4 billion per year** to bring its spending to the national per-mile average.*

Figure 8: State Spending Comparisons

State DOT Spending Comparisons					
STATE	Transportation Fund Revenue Sources (in millions), FY2019	Transportation Expenditures as % of Total State Expenditures, FY 2019	Highway Spending Per Capita, FY2017	Transportation Spending per VMT, FY2019	Transportation Spending per State Owned Mile, FY2019
Florida	\$8,889	12.1	\$537	\$0.04	\$734,404
Georgia	\$2,086	7.1	\$418	\$0.07	\$116,238
Illinois	\$4,142	6.5	\$731	\$0.08	\$260,510
North Carolina	\$3,942	13.3	\$474	\$0.07	\$49,268
Ohio	\$3,231	4.8	\$520	\$0.08	\$167,851
South Carolina	\$1,996	8.6	\$457	\$0.16	\$48,334
Tennessee	\$963	6.1	\$334	\$0.11	\$69,182
Texas	\$10,515	11.1	\$554	\$0.03	\$130,693
Virginia	\$3,555	12.6	\$582	\$0.10	\$60,234

State Transportation Outcomes

The implications of this funding disparity are best understood by comparing system performance and condition standards. For the fourth consecutive year, North Carolina has appeared on a top 10 list of states with the most dangerous highways. The state scored poorly on the number of fatalities, deficient bridges, and federal funding levels to earn the second worst ranking.¹⁹ North Carolina has made significant improvements to pavement condition, especially on the Interstates and primary system, but it lags behind leading indicators on lower volume roads. The majority of the state's roads—81 percent—are on the secondary system where the percentage of poor roads has been growing steadily since 2013.²⁰ This secondary road disparity causes rural roads to have lower condition and safety rankings than those in urban areas. **A recent report ranked North Carolina 49th for its rural fatality rate.²¹ In 2018, 59 percent of vehicle crash deaths occurred on rural roads.²²** The high volume of secondary roads also constrains the statewide average for traffic congestion compared to peer states (**Figure 9**),²³ despite Charlotte, Raleigh, Greensboro, and Winston-Salem all ranking among the nation's 100 most congested cities in 2019.²⁴

While some metrics have shown improvements, bridge condition rankings continue to be comparatively low. Although North Carolina reduced the number of structurally deficient bridges by 5 percent over the last seven years, nearly one out of every 10 bridges in North Carolina is in poor condition—a higher percentage than in any comparison state but Illinois and nearly double the national average.

¹⁹ www.carinsurancecomparison.com/which-states-have-the-most-dangerous-highways/

²⁰ NCDOT Maintenance and Operation Performance Analysis Report, December 2018, www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/mopar.pdf

²¹ reason.org/policy-study/24th-annual-highway-report/

²² www.iihs.org/topics/fatality-statistics/detail/state-by-state#rural-versus-urban

²³ Sources: FHWA, Highway Statistics 2018, Table HM-47 (www.fhwa.dot.gov/policyinformation/statistics/2018/); FHWA, Bridge Condition by Owner 2019 (www.fhwa.dot.gov/bridge/nbi/no10/owner19b.cfm); reason.org/policy-study/24th-annual-highway-report/; National Highway Traffic Safety Administration, 2018 Ranking of State Pedestrian Fatalities (crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812826)

²⁴ mobility.tamu.edu/umr/report/

Figure 9: State Roadway Comparisons

State Roadway Comparisons						
STATES	% Urban NHS Pavement Roughness, 2018	% Rural NHS Pavement Roughness, 2018	% State Owned Bridges in Poor Condition, 2019	Annual Peak Hours Spent in Congestion per Auto Commuter, 2019	Rank: Fatality Rate per 100 Million Rural Vehicle-Miles (Fewest=1), 2019	Pedestrian Fatality Rate per 100,000 Population, 2018
Florida	3.6%	1.7%	0.93%	33.87	48	3.31
Georgia	2.9%	1.5%	0.68%	51.55	28	2.48
Illinois	2.1%	4.8%	9.54%	44.11	15	1.30
North Carolina	3.2%	2.1%	9.23%	14.80	49	2.17
Ohio	1.7%	2.0%	2.08%	19.19	5	1.09
South Carolina	4.3%	4.0%	8.46%	13.52	43	3.25
Tennessee	2.5%	1.6%	2.87%	21.29	17	2.01
Texas	1.5%	1.7%	0.65%	38.73	37	2.13
Virginia	4.8%	1.4%	4.09%	32.56	12	1.39

As can be seen from these comparisons, North Carolina manages one of the nation's largest state-owned transportation networks, yet its relative investment is small. The results of this chronic underinvestment are clear: The state's secondary system, especially in rural areas, continues to deteriorate while only modest gains are made on the primary system. **To remain regionally, nationally and, increasingly, globally competitive, the solution is simple: North Carolina must increase its investment in transportation infrastructure.**

To remain regionally, nationally, and globally competitive, North Carolina must increase its investment in transportation infrastructure.

How State and Federal Transportation Funding Work Now

"Investing in a robust transportation network will improve strategic connections to smaller communities. The NC FIRST Commission recommendation of \$20 billion over 10 years will improve the state's economic vitality and competitiveness and create safer, more resilient roadways, especially in rural areas."

– Patrick Woodie

In the United States, transportation funding has long been rooted in a "user pay" principle, which asserts that those who use and benefit most from a public service, such as transportation infrastructure, should bear much of the associated costs. Consistent with this idea, states have tended to rely heavily on fuel taxes when paying for transportation projects, supplemented by vehicle-related fees, taxes, and tolls—all

of which generally link how much you use the system to how much you pay toward its upkeep. To keep the connection clear, these revenues are typically dedicated in law so that they can only be used for transportation purposes.

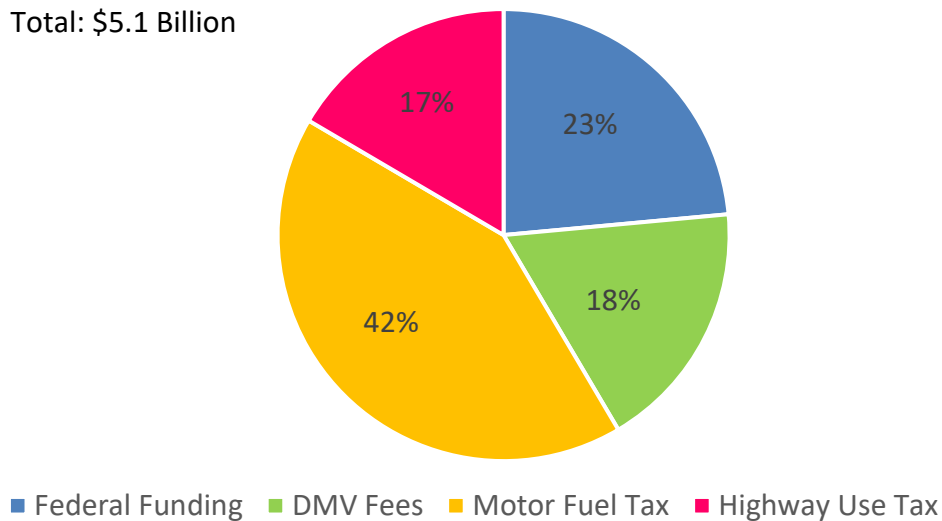
North Carolina has retained a user fee-based funding structure for transportation. Like many states, North Carolina depends primarily on state fuel taxes, state vehicle taxes and fees, and federal funds to support its transportation needs (**Figure 10**). **NCDOT currently manages an annual budget of about \$5.1 billion, 77 percent of which comes from just three state revenue sources: the Motor Fuels Tax, the Highway Use Tax, and Division of Motor Vehicles (DMV) fees. The remaining 23 percent is federal funding, which is mostly derived from federal fuel taxes.** This funding

North Carolina is overly dependent on motor fuels taxes, which make up 61 percent of total NCDOT revenues.

structure makes the state exceedingly dependent on motor fuels revenue, with 61 percent of total NCDOT revenues coming from state or federal fuel taxes.²⁵ In addition, the North Carolina Turnpike Authority—a separate business unit within NCDOT—collects tolls, which by law must be used on the road where they were collected or a contiguous toll facility.²⁶

Figure 10: NCDOT Revenue Sources, FY 2020

Total: \$5.1 Billion



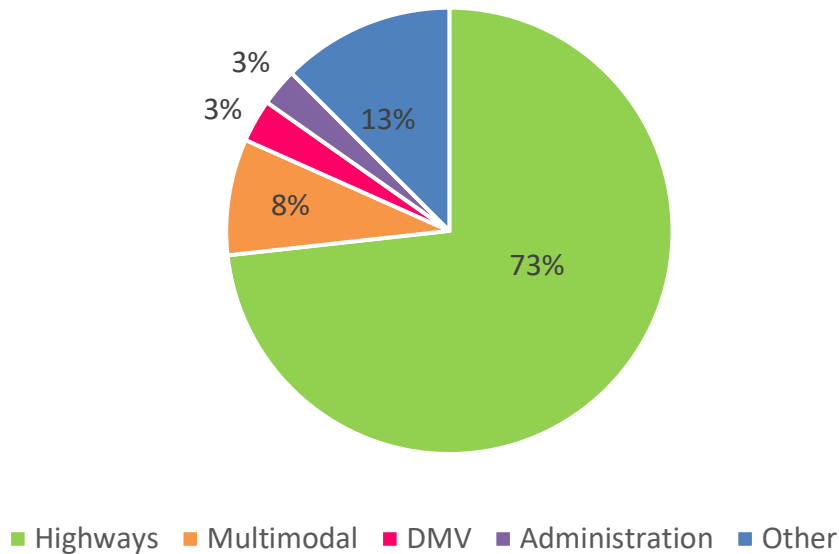
Note: Excludes receipt supported funding of \$0.1 billion

²⁵ According to the Congressional Budget Office, of the revenues credited to the federal Highway Trust Fund in 2019, 82 percent stemmed from excise taxes on gasoline, diesel, and other motor fuels: www.cbo.gov/publication/56346

²⁶ N.C. Gen. Stat. §136-89.188

Seventy-three percent of NCDOT's budget is spent on maintenance activities, Highway Fund and Highway Trust Fund construction activities, and to support the Turnpike Authority's gap funding. The four multimodal divisions and the State Ports expend 8 percent, along with 3 percent each for DMV and for administrative expenses. The other category represents reserves, transfers, debt service, and Aid to Municipalities (**Figure 11**).

Figure 11: NCDOT Expenditures, FY 2020



NCDOT Budget

State Transportation Revenue Sources

Motor Fuels Tax.²⁷ Enacted in 1921, the state Motor Fuels Tax remains NCDOT's largest funding source, accounting for 42 percent of all state revenues.²⁸ The state assesses a \$0.361 tax on each gallon of gasoline or diesel, plus a \$0.0025 per gallon inspection fee.²⁹ As of July 2020, North Carolina's total fuel tax rate was the 13th highest in the nation and higher than in neighboring states, but just below the national average.³⁰ Since 2017, the tax rate has been updated annually based on changes in population and the Consumer Price Index for energy costs, which allows the revenues to track with the economy. These adjustments will not,

²⁷ For more about the Motor Fuels Tax, see the NC FIRST Commission Brief 1: Motor Fuels Tax (Updated for FY 2020), September 2020, www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-brief-edition-1.pdf.

²⁸ Motor Fuels Taxes are about 61 percent of revenues if federal funds are included.

²⁹ N.C. Gen. Stat. §§105-449.80 et seq.

³⁰ www.api.org/oil-and-natural-gas/consumer-information/motor-fuel-taxes

however, make up for rising vehicle fuel economy and broader societal shifts that are already affecting personal gasoline consumption, all of which threaten to erode future fuel tax revenues.

Highway Use Tax.³¹ Since passage of the historic 1989 law that established the state’s Highway Trust Fund, North Carolina has assessed a Highway Use Tax (HUT) on vehicle purchases rather than a Sales Tax. Today, the HUT provides 17 percent of all NCDOT revenues and is the primary funding source for the Highway Trust Fund’s capital construction account. The HUT is a one-time, 3 percent tax on a vehicle’s purchase price, less any trade-in value if the sale took place at a dealership.³² The tax is capped at \$2,000 for commercial and recreational vehicles. The tax rate has never been raised and is now the lowest in the nation. Neither is it regionally competitive: Based on FY 2020 transaction data, vehicle buyers in North Carolina on average pay far less tax on vehicle sales than in all surrounding states (**Figure 12**). North Carolina also collects a 3 percent Alternative Highway Use Tax (AHUT) on long-term vehicle rentals and leases, which supports the Highway Trust Fund. However, revenues from an 8 percent AHUT on short-term leases, rentals, and car sharing services and a 5 percent AHUT on vehicle subscription services are directed to the General Fund,³³ as is a 2 percent sales tax on motor homes.

Figure 12: State-by-State Comparison of Taxes on Vehicle Sales³⁴

	North Carolina	Georgia	South Carolina	Tennessee	Virginia
Rate	3% less net of trade	6.6% less net of trade	5% less net of trade (\$500 cap)	7% less net of trade	4.15%
Tax	\$450	\$990	\$500	\$1,050	\$830

DMV Fees.³⁵ The North Carolina DMV collects numerous fees, such as driver license fees, vehicle titling fees, and annual vehicle registration and inspection fees. These payments make

³¹ For more about the HUT, see the NC FIRST Commission Brief 3: Highway Use Tax (Updated for FY 2020), September 2020, www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-brief-edition-3.pdf.

³² N.C. Gen. Stat. §105-187.3

³³ All revenues from the 5 percent and 8 percent AHUT go to the General Fund, except for a \$10 million annual transfer to the Highway Fund for airport improvements (N.C. Gen. Stat. §105-187.5 and §105-187.9).

³⁴ This figure assumes a vehicle value of \$20,000 with a \$500 trade-in allowance. Rates as of July 1, 2020.

³⁵ For more about DMV fees, see the NC FIRST Commission Brief 6: N.C. Division of Motor Vehicle Fees (Updated for FY 2020), October 2020, www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-briefs-edition-6.pdf.

up 18 percent of the state’s total transportation revenues. In 2015, the legislature raised most DMV fees by 30 percent, including the additional registration fee for electric vehicles (currently \$140.25), and authorized DMV to apply an inflationary increase to most of its fees every four years, beginning on July 1, 2020.³⁶ DMV fee revenue will likely continue to grow in the near term due to the ongoing inflationary adjustments, but its long-term stability is in question as technological and demographic changes are expected to lower overall driving and car ownership.

How much a North Carolina resident contributes to the state transportation network via these taxes and fees depends on their driving habits and vehicle type. An average driver who travels 12,000 miles per year in a vehicle that gets 22 miles to the gallon pays about \$16.41 per month in state gas taxes, or \$200 annually—about enough to repair a single pothole.³⁷ Combined with DMV fees, the total monthly cost for an average driver comes to about \$21.³⁸ In addition, if a driver chooses to buy a car, they will pay an amount of HUT that depends on the vehicle’s purchase price less any trade-in value. In FY 2020, the average HUT paid per transaction was \$379, with a lower average of \$283 per transaction for used vehicles. As vehicles become more durable, owners tend to replace them less often and thus pay the HUT less frequently.

The average driver pays about \$16 per month in gas taxes, about enough over the course of a year to repair one pothole.

Federal Transportation Funding

Federal funding accounts for 23 percent of NCDOT’s total transportation revenues. In general, federal funding for highways comes to states in the form of grants that are limited to certain kinds of projects and a certain share of costs. **Only about 28 percent of North Carolina’s state-maintained road miles are eligible for any federal aid.** Even then, federal dollars are devoted almost exclusively to capital spending and cannot be used for day-to-day maintenance such as pothole repair. Like other states, North Carolina is therefore responsible for paying its share on federal-aid projects, plus substantial other road and highway investments.

³⁶ 2015 N.C. Sess. Laws, Chap. 2015-241 (N.C. Gen. Stat. §20-4.02)

³⁷ Unlike sales taxes, fuel taxes are not paid directly by customers at the time of purchase. However, the fuel suppliers and importers that are responsible for the tax then include it in the product price, so that the tax is ultimately, if indirectly, paid by the consumers who purchase and consume the fuel.

³⁸ Includes, at FY 2020 rates, a regular driver license fee (\$44 for an eight-year renewal), a registration fee for a private passenger vehicle (\$38.75 annually), and an allocation to the Highway Fund from vehicle safety and emissions inspection fees (\$6.25; in counties that do not require emissions inspections, the allocation is \$0.85).

Historically, federal highway and transit programs were funded almost entirely by motor fuels taxes that were credited to the federal Highway Trust Fund, plus other user fees such as truck-related taxes. However, due largely to the effects of inflation on fixed-rate, cents-per-gallon federal fuel taxes that have not been raised in 27 years, the federal Highway Trust Fund has required more than \$153 billion³⁹ in transfers from general revenues since 2008 in order to remain solvent.

Federal funding remains a vitally important component of North Carolina’s transportation investment strategy, especially for capital projects. And while the United States Congress has taken actions to secure the federal Highway Trust Fund in the short term, it has failed to address the fund’s long-term stability. As concerns grow regarding the federal role in surface transportation, states are increasingly fashioning their own plans for revenue generation to close the gap.

Distribution of State and Federal Transportation Revenues

All of NCDOT’s revenue sources, both state and federal, are directed to two state funds: the Highway Fund, which primarily supports maintenance and operations, and the Highway Trust Fund, which is used for the Department’s capital program.⁴⁰ The distribution of these revenues is shown in **Figure 13**.

³⁹ Includes \$140 billion in transfers from 2008 through 2020 (see www.cbo.gov/publication/56346), plus a \$13.6 billion transfer that was authorized by the Continuing Appropriations Act, 2021 and Other Extensions Act (P.L. 116-159), enacted on Oct. 1, 2020.

⁴⁰ For state statutes that address the distribution of state revenues and the use of state funds, see N.C. Gen. Stat. §105-449.125 and 2020 N.C. Sess. Laws, Chap. 2020-91, §4.6 (Motor Fuels Tax); N.C. Gen. Stat. §105-187.9 (HUT); N.C. Gen. Stat. §20-85 and §20-183.7 (DMV fees); N.C. Gen. Stat. §136-44.3A, §105-449.126, and §136-44.2 (use of Highway Fund); and N.C. Gen. Stat. §136-176 and §136-189.11 (use of Highway Trust Fund). Note, however, that although the allocation of the Highway Trust Fund is determined by statute, the General Assembly sometimes overrides the statutes during the appropriations process.

Figure 13: Distribution of NCDOT's State and Federal Transportation Revenues

	Highway Fund (HF)	Highway Trust Fund (HTF)
Uses	Operations Maintenance Modes <ul style="list-style-type: none"> • Integrated Mobility (Transit and Bicycle/Pedestrian) • Ferries • Rail • Aviation DMV Administration	Capital Construction Debt Service “Gap” Funds for Turnpike Projects NC Ports Administration
Revenue Sources	Motor Fuels Tax <ul style="list-style-type: none"> • 71% of revenues in FY 2020, 81% in FY 2021, 80% in FY 2022, and 75% in FY 2023 and after DMV Fees <ul style="list-style-type: none"> • About 85% of total fee revenues • Driver license, vehicle registration, safety and emissions inspections, motor carrier, and other fees Investment Income	Federal Funding Highway Use Tax Motor Fuels Tax <ul style="list-style-type: none"> • 29% of revenues in FY 2020, 19% in FY 2021, 20% in FY 2022, and 25% in FY 2023 and after DMV Fees <ul style="list-style-type: none"> • About 15% of total fee revenues • Vehicle title, miscellaneous registration, and lien recording fees Investment Income

North Carolina Turnpike Authority⁴¹

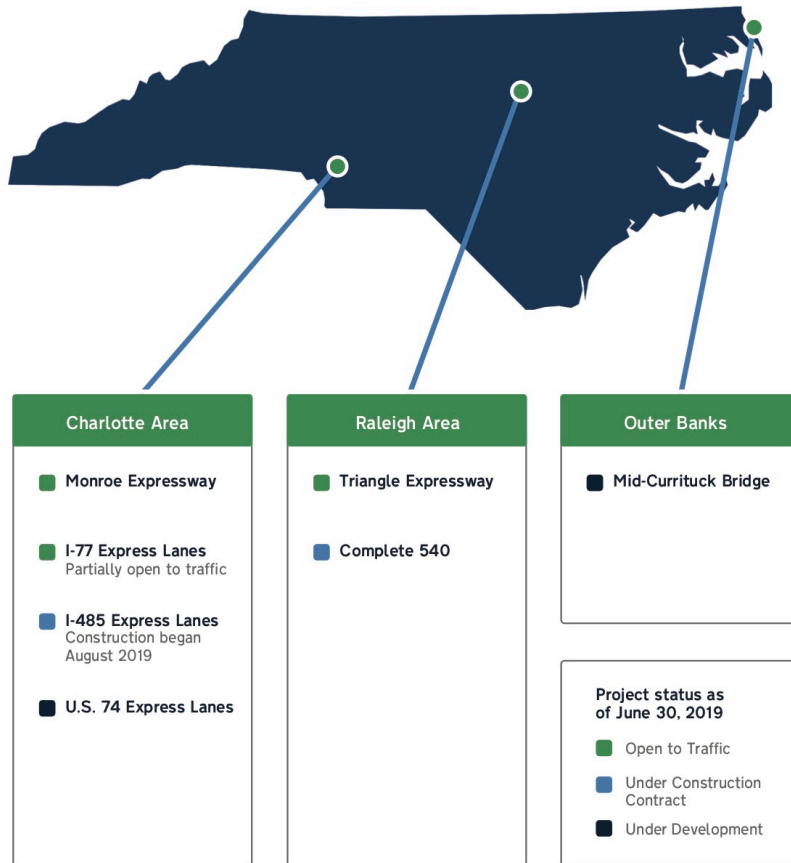
In addition to the revenues that support North Carolina’s transportation network overall, the North Carolina Turnpike Authority—a separate business unit within NCDOT—collects tolls from a limited system of toll roads. The Turnpike Authority operates with a project-level financial structure, in which projects are financed as individual systems and all toll revenues, in accordance with state statutory requirements,⁴² are used only on the project where they were collected or a contiguous toll facility. To maintain the mandated project-level financial structure, the Turnpike Authority must have separate operating and capital budgets for each turnpike project. Three toll facilities are currently in operation: The Triangle Expressway, the

⁴¹ For more about tolling, see the NC FIRST Commission Brief 10: The Future of Tolling, June 2020, www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-brief-edition-10.pdf.

⁴² N.C. Gen. Stat. §136-89.188

Monroe Expressway, and the I-77 Express Lanes (**Figure 14**).⁴³ Four more toll projects are underway, and several others are under consideration. State statute authorizes up to 11 toll projects in total.⁴⁴

Figure 14: North Carolina Turnpike Authority Projects



Historical Transportation Revenue and Finance Successes

Throughout its history, NCDOT has received strong support from the legislative and executive branches to improve the state's transportation network. Numerous study commissions have successfully recommended major changes that improved the state's infrastructure. The legislature has continually acted to stabilize revenues and support new financing options. This section reviews the work of prior transportation study commissions and outlines major legislative actions. These actions have kept the condition of North Carolina's transportation network stable but escalating project costs, declining fuel taxes, and stagnant federal funding have nevertheless left a persistent and growing funding gap.

⁴³ www.ncdot.gov/divisions/turnpike/investor/Documents/ncta-annual-report-fy-2019.pdf

⁴⁴ N.C. Gen. Stat. §136-89.183(a)(2)

Study Commissions

The NC FIRST Commission is charged with finding investment solutions to provide sustainable and growing revenues to support a modernized transportation network. Like prior North Carolina funding studies, proposed options generally fall into two categories: revenue enhancements and finance tools. The creation of seven transportation funding commissions illustrates the perpetual funding shortfall to meet the needs of a growing state. These past commissions had various levels of success, and often duplicated recommendations, but the enacted changes often fell short of meeting the state’s transportation funding needs.

1968 Governor's Highway Study Commission.⁴⁵ Governor Dan Moore established the Governor’s Highway Study Commission to find revenue solutions to meet the state’s growing transportation needs from 1970 to 1989.

Recommendations: The commission’s recommendations, which sought an average of \$233 million per year in new revenues, were to raise annual fees for car registrations by \$15 per year, truck registrations by \$50 per year, and driver licenses by \$5. In a precursor to the 1987 Highway Study Commission, the 1968 commission also recommended the establishment of a trust fund, a 3 percent special Sales Tax on vehicle sales, and a 3 cent per gallon increase in the Motor Fuels Tax.

Impact: After 19 years without a rate change, the Motor Fuels Tax rate increased 2 cents per gallon on July 1, 1969. It was 12 more years, and after the 1980 commission, until the rate was raised again.⁴⁶ DMV fees were raised an average of 20 to 35 percent over the course of the next few years.

1980 Governor’s Blue-Ribbon Commission on Transportation Needs and Financing.⁴⁷ Formed by Governor Jim Hunt, the commission concluded in its final report that the state’s deteriorating conditions “are totally unacceptable for North Carolina.” The report advocated for a short-term funding increase to improve current conditions followed by future increases to address long-term needs.

Recommendations: The report included two funding alternatives—“basic” and “desirable”—to indicate the level of need but recommended a minimal quick infusion at first. The minimum,

⁴⁵ Available in the North Carolina General Assembly’s legislative library. A hard copy of the final report is filed under HE 356 .N8 A43 1968.

⁴⁶ www.ncdor.gov/taxes/motor-fuels-tax-information/motor-fuels-tax-rates

⁴⁷ Report of Governor’s Blue-Ribbon Commission on Transportation Needs and Financing, December 1980. Available at the NCDOT library under DOT HE 213.N8 N67 1980.

basic, and desirable plans would have increased funding in FY 1982 by \$159 million, \$586 million, and \$921 million, respectively, with larger sums in future years. The commission recommended that non-highway programs receive additional General Fund support. To support Highway Fund needs, it recommended raising the Motor Fuels Tax rate by 5 cents per gallon and creating a 4 percent Sales Tax on the wholesale price of gas.

Impact: The Motor Fuels Tax was increased from 9 cents per gallon to 12 cents per gallon on July 1, 1981.

1985 Transportation Task Force.⁴⁸ Appointed by NCDOT Secretary James Harrington in June 1985, the goal of the Transportation Task Force was “defining North Carolina’s transportation problems” and presenting options to address funding needs. The report found that a minimum of \$200 million more was needed per year.

Recommendations: The task force recommended adding a Sales Tax on fuel with inflationary increases and transferring General Fund Sales Tax revenues collected from transportation goods and vehicle sales to the Highway Fund. Among a wide range of options, it also asked that consideration be given to weight-distance fees, a transportation bond, and transferring the responsibility for the State Highway Patrol and driver’s education to the General Fund.

Impact: The 1986 legislature passed a \$200 million highway bill that included a 3.5 cent per gallon Motor Fuels Tax increase⁴⁹ and transferred the driver’s education program to the General Fund.⁵⁰

1987 Highway Study Commission.⁵¹ This commission was authorized by the 1987 Study Commissions and Committees Act.⁵²

Recommendations: The Highway Study Commission’s final report to the 1989 General Session recommended the creation of a Highway Trust Fund and the codification of the list of roads included in the Interstate Highway System that were eligible for funding. Other recommendations included raising a minimum of \$8.6 billion over 12 years through a 3 cent per gallon increase in the Motor Fuels Tax, a 4 percent tax on the wholesale price of motor fuel, and a 2 percent title transfer tax. The report also recommended that NCDOT determine on which

⁴⁸ North Carolina Highway Needs for Growth, Opportunity, and Progress: The Report of the Transportation Task Force, March 1986. Available at the NCDOT library under DOT HE 356.N8 N675 1986.

⁴⁹ Paving Tobacco Road: A Century of Progress by the North Carolina Department of Transportation

⁵⁰ Harrington, James E., Planks, Pavement & Progress, sections published from 1987–1989

⁵¹ Available in the North Carolina General Assembly’s legislative library. A hard copy of the final report is filed under TE 183 .N65 1989.

⁵² 1987 N.C. Sess. Laws, Chap. 1987-873, Part 29

roads it would be “legally and economically feasible” to collect tolls.

Impact: The creation of the Highway Trust Fund (HTF) and its associated revenue changes are often cited as the most important single piece of legislation affecting NCDOT. Created in 1989, the HTF was partially funded by a 3 percent Highway Use Tax on the purchase of new and used vehicles. Vehicle purchases were previously levied a 2 percent Sales Tax with proceeds directed to the state’s General Fund. Other major tax and fee increases included raising the Motor Fuels Tax by 5.2 cents per gallon, the short-term vehicle rental tax from 2 percent to 8 percent, the certificate of title fee from \$5 to \$35, and all other title fees to \$10 (previously ranging from \$3 to \$9).

2004 Blue Ribbon Commission to Study Solutions to North Carolina's Urban Transportation Needs.⁵³ This commission was authorized by S.L. 2003-383.⁵⁴

Recommendations: The commission recommended eliminating General Fund transfers, authorizing the issuance of GARVEE bonds, and increasing the use of tolling and high-occupancy vehicle (HOV) lanes.

Impact: NCDOT was granted authority to issue GARVEE bonds in 2005. The I-77 HOV lanes project opened in 2004 and was later converted to high-occupancy toll (HOT) lanes, but no further HOV or HOT lanes projects were completed.

2007 21st Century Transportation Committee.⁵⁵ Formed at the request of the President Pro Tem and Speaker of the House, the committee’s intent was to move North Carolina’s roads from a “D” rating to a “B” rating and to put in place an effective multimodal transportation network that would reduce congestion, improve efficiency and productivity, increase safety, improve the environment, and support economic development throughout the state.

Recommendations: The committee recommended increasing the Highway Use Tax from 3 percent to 4 percent; raising vehicle registration fees; and eliminating all remaining transfers from the Highway Trust Fund and the Highway Fund to the General Fund, including transfers for the Highway Patrol, driver’s education, and reimbursement for a Sales Tax exemption. The committee also recommended that the legislature consider a state and local Mileage-Based User Fee and varying vehicle registration fees by weight. Other recommendations included a

⁵³ Blue Ribbon Commission to Study Solutions to North Carolina's Urban Transportation Needs Final Report, Dec. 6, 2005

⁵⁴ 2003 N.C. Sess. Laws, Chap. 2003-383, §5

⁵⁵ 21st Century Transportation Committee Final Report, Dec. 10, 2008, www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/north-carolina-report.pdf

voter-approved bond, a local option Sales Tax, indexed DMV fees, an increase in highway tolling, and adopting differential tax rates for diesel and gasoline.

Impact: While many of the recommendations were enacted in later years, the legislative changes cannot be directly tied to the report’s recommendations. The General Fund transfers were gradually eliminated beginning in 2011, most DMV fees were indexed to inflation in 2015, vehicle registration fees were increased in 2015, and the number of allowable toll projects has grown to 11.

2015–2021 House Select Committee (HSC) on Strategic Transportation Planning and Long-Term Funding Solutions.⁵⁶ Representative John Torbett’s HSC held its first meeting on Dec. 15, 2015. The Committee has been reappointed during the 2017-2019 Biennium and 2019-2021 Biennium.

Recommendations: Proposed legislation has included a megaproject fund, expanding the State Infrastructure Bank, creating a Blue-Ribbon Commission on Transportation Infrastructure Funding, authorizing the Build NC Bond, and approving a new project delivery method.

Impact: The Build NC Bond is the largest bond in NCDOT’s history. The bill authorized an annual issuance of up to \$300 million of special indebtedness for the next 10 years to finance Build NC Projects. The bond’s net proceeds must be used as evenly as possible to finance Division Needs Projects and Regional Impact Projects, in accordance with current Strategic Transportation Investments (STI) law.⁵⁷ Additionally, the 2018 budget authorized the “construction manager-general contractor” project delivery method as a five-project pilot program.⁵⁸

Revenue and Finance Modifications

This section overviews significant achievements that have increased revenues or expanded the state’s authority to finance transportation projects. For the last 100 years, North Carolina has benefited from routine increases in transportation investments. Funding and finance efforts have expanded from early bond efforts to incremental tax and fee changes, tolling authority, and other finance mechanisms. In fact, North Carolina first introduced a 1 cent Motor Fuels Tax in 1921 and that tax has been the predominant transportation funding source ever since.

⁵⁶ www.ncleg.gov/Committees/CommitteeInfo/HouseSelect/198#Documents

⁵⁷ 2018 N.C. Sess. Laws, Chap. 2018-16

⁵⁸ 2018 N.C. Sess. Laws, Chap. 2018-5, §34.13

Revenue Enhancements

Like most states, North Carolina relies on a simplistic user-pay revenue model to support transportation improvements. The three state revenue sources that support NCDOT's budget are the Motor Fuels Tax, Highway Use Tax, and DMV fees. These sources have been altered to varying degrees to increase revenues.

Motor Fuels Tax.⁵⁹ The Motor Fuels Tax rate has been raised 62 times in its 100-year history. The tax rate was amended through legislation until 1986. A formula based on the average wholesale price of motor fuel was developed to automatically change the rate twice annually. The original formula was modified three times, leading to revenue increases in 1986, 1989, and 1992.⁶⁰ To stabilize the Motor Fuels Tax rate, a variable formula was developed to increase revenues without legislative action. In addition to a flat rate, the formula relied on the wholesale price of motor fuels.⁶¹ However, the formula produced significant fluctuations in the tax rate, which led to a series of legislatively-enacted caps and floors to stabilize the rate. In 2015, the legislature enacted a new formula that was designed to make small, incremental changes. This formula, which is currently in effect, uses a base rate plus the annual percentage change in state population for the applicable calendar year, multiplied by 75 percent, and the annual percentage change in the Consumer Price Index for All Urban Consumers for energy costs, multiplied by 25 percent.⁶²

Highway Use Tax.⁶³ Unlike the Motor Fuels Tax and DMV fees, the Highway Use Tax (HUT) has undergone little transformation. The tax on vehicle purchases shifted from a 2 percent Sales Tax to a 3 percent use tax in 1989 upon the creation of the Highway Trust Fund. The original 1989 legislation capped the tax at \$1,000 for all vehicles, but the cap was changed in 1993 to apply only to commercial and recreational vehicles while the maximum tax on all other vehicles was raised to \$1,500.⁶⁴ The cap on all other vehicles was removed in 2001.⁶⁵ The cap on

⁵⁹ For more about the Motor Fuels Tax, see the NC FIRST Commission Brief 1: Motor Fuels Tax (Updated for FY 2020), September 2020, www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-brief-edition-1.pdf.

⁶⁰ www.ncdor.gov/taxes/motor-fuels-tax-information/motor-fuels-tax-rates

⁶¹ 1995 N.C. Sess. Laws, Chap. 1995-390, §3, Part 3

⁶² 2015 N.C. Sess. Laws, Chap. 2015-2, §2.2

⁶³ For more about the HUT, see the NC FIRST Commission Brief 3: Highway Use Tax (Updated for FY 2020), September 2020, www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-brief-edition-3.pdf.

⁶⁴ 1989 N.C. Sess. Laws, Chap. 692, Part 4; 1993 N.C. Sess. Laws, Chap. 1993-467, §3

⁶⁵ 2001 N.C. Sess. Laws, Chap. 2001-424, §34.24(a)

commercial and recreational vehicles was raised to \$2,000 in 2015.⁶⁶

License and Automobile Fees.⁶⁷ While the first vehicle registration fees were enacted in 1909 to support county-owned roads, the first state fee for registration and licensing of vehicles was enacted in 1921⁶⁸ and set based on horsepower.⁶⁹ Major fee increases have occurred three times. Licenses and vehicle fees were raised by 20 to 35 percent under Governor Robert Scott (1969–1973), by 20 to 50 percent in 2005,⁷⁰ and by an average of 30 percent (for most fees) in 2015.⁷¹ The 2015 law also established an automatic quadrennial inflationary adjustment of certain DMV fees. The July 1, 2020, adjustment raised most DMV fees by 7.86 percent.

Highway Tolling⁷²

Created as an independent agency in 2002, the North Carolina Turnpike Authority was originally authorized to construct, operate, and maintain up to three toll road or bridge projects and to plan for up to three additional toll road or bridge projects.⁷³ The authority was restructured as a business unit within NCDOT in 2009 to improve efficiency.⁷⁴ North Carolina has used tolling sparingly compared to peer states. Beginning with high-occupancy vehicle (HOV) lanes on I-77 in 2004, which were converted to high-occupancy toll (HOT) lanes, North Carolina has three toll roads in operation, four more that are underway, and several others under consideration.⁷⁵ The number of authorized toll projects was expanded to 9 projects in 2005,⁷⁶ lowered to 8 projects in 2011,⁷⁷ raised back to 9 projects in 2013⁷⁸ and to 11 projects in 2015.⁷⁹

⁶⁶ 2015 N.C. Sess. Laws, Chap. 2015-241, §29.34A(a). The maximum recreational vehicle tax had previously been raised to \$1,500 by 2001 N.C. Sess. Laws, Chap. 2001-497.

⁶⁷ For more about DMV fees, see the NC FIRST Commission Brief 6: N.C. Division of Motor Vehicle Fees (Updated for FY 2020), October 2020, www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-briefs-edition-6.pdf.

⁶⁸ 1921 N.C. Sess. Laws Chap. 2

⁶⁹ Ibid.; Biennial report of the State Highway Commission of North Carolina [1921-1922], digital.ncdcr.gov/digital/collection/p249901coll22/id/622635/rec/4

⁷⁰ 2005 N.C. Sess. Laws, Chap. 2005-276, §44.1

⁷¹ 2015 N.C. Sess. Laws, Chaps. 2015-241

⁷² For more about tolling, see the NC FIRST Commission Brief 10: The Future of Tolling, June 2020, www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-brief-edition-10.pdf.

⁷³ 2002 N.C. Sess. Laws, Chap. 2002-133

⁷⁴ 2009 N.C. Sess. Laws, Chap. 2009-343

⁷⁵ NC FIRST Commission Brief 10: The Future of Tolling, June 2020, www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-brief-edition-10.pdf

⁷⁶ 2005 N.C. Sess. Laws, Chap. 2005-275, §2

⁷⁷ 2011 N.C. Sess. Laws, Chap. 2011-145, §28.32(e)

⁷⁸ 2013 N.C. Sess. Laws, Chap. 2013-183, §5.1

⁷⁹ 2015 N.C. Sess. Laws, Chap. 2015-241, §29.15A

Debt Authorizations⁸⁰

Transportation bonds have been used judiciously since 1921 to improve highway conditions. Bonds leverage future revenues to raise upfront capital so infrastructure can be delivered when and where it is needed. Bonds must always be paid back through tolls, dedicated revenue streams, or from existing revenues.

Highway Bonds. Since the State Highway Commission’s responsibilities were expanded in 1919, North Carolina legislators have relied on highway bonds to make transportation improvements (**Figure 15**). The first bond, authorized in 1921 at \$50 million, was backed by the state’s first penny-per-gallon gasoline tax and its first annual vehicle license fee of \$10.50 for automobiles with 24 or less horsepower.⁸¹ Subsequently, other bonds were also issued alongside revenue increases that covered the bond’s principal and interest charges. An additional one-penny Motor Fuels Tax enacted in association with the 1949 bond was extended to support the 1965 and 1977 bonds, but the proceeds were transferred for general transportation use in 1987. Recent bonds, including the Highway Bond Act of 1996⁸² and the Build NC Bond Act of 2018,⁸³ deplete existing revenues to repay the bond rather than attach a new funding source to the bond authorizations.

Figure 15: Major NC Transportation Bond Authorizations⁸⁴

	Bond Authorization		
	Nominal Dollars	Inflation Adjusted	Per Capita, Inflation Adjusted
1921	\$50,000,000	\$730,000,000	\$275
1923	\$15,000,000	\$226,500,000	\$82
1925	\$20,000,000	\$292,000,000	\$101
1927	\$30,000,000	\$450,000,000	\$149
1949	\$200,000,000	\$2,180,000,000	\$557
1965	\$300,000,000	\$2,460,000,000	\$506
1977	\$300,000,000	\$1,260,000,000	\$222
1996	\$950,000,000	\$1,615,000,000	\$215
2018	\$3,000,000,000	\$3,000,000,000	\$289

⁸⁰ For more about financing tools, see the NC FIRST Commission Brief 13: Transportation Finance, September 2020, www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-brief-edition-13.pdf.

⁸¹ 1921 N.C. Sess. Laws, Chap. 2; Biennial Report of the State Highway Commission of North Carolina [1921-1922], digital.ncdcr.gov/digital/collection/p249901coll22/id/622635/rec/4

⁸² 1995 N.C. Sess. Laws, Chap. 1995-590

⁸³ 2018 N.C. Sess. Laws, Chap. 2018-16

⁸⁴ Inflation adjusted dollar values are expressed in 2020 purchasing power based on the national Consumer Price Index for July of each relevant year: beta.bls.gov/dataViewer/view/timeseries/CUUR0000SA0. Per capita numbers were calculated using population estimates from the U.S. Census Bureau: www.census.gov/programs-surveys/popest/data/tables.All.html.

Due to North Carolina's conservative bonding practices, including a low 6 percent debt-to-revenue ceiling, the staggered Build NC Bond issuances are scheduled to exceed debt capacity in 2027.⁸⁵ Unless the legislature chooses to increase transportation revenues to add new debt capacity, the Debt Affordability Advisory Committee (DAAC) raises the debt ceiling, or the legislature opts to change or exceed the DAAC recommendation with additional bonding authorizations, future bonding will be prohibited for over a decade.

Grant Anticipation Revenue Vehicles (GARVEE).⁸⁶ NCDOT was granted the authority to issue GARVEE bonds in 2005 (see **Figure 16** for all issuances since then). GARVEEs allow states to borrow against future federal-aid funding to finance highway projects, most frequently by issuing bonds that are secured with a pledge of federal-aid assistance. GARVEE bonds are used to accelerate the receipt of federal revenues for strategic transportation projects; the bonds are authorized by federal law to finance projects on federal-aid highways.⁸⁷ State law specifies that GARVEE bonds do not constitute a debt or liability of the state and, therefore, do not count towards DAAC debt capacity.

Figure 16: NCDOT GARVEE Issuances⁸⁸

Date of Issue	Issues (Millions)	Bond Type	Final Maturity	Rating Moody's/S&P/Fitch	Projects
Oct. 2007	\$287.57	New Money	2019	Aa3/AA-/AA-	38 Construction Projects
Jul. 2009	\$242.50	New Money	2021	Aa3/AA-/AA-	44 Construction Projects
Dec. 2011	\$145.54	New Money	2023	Aa2/AA/AA-	Monroe Connector System
Jan. 2012	\$179.54	New Money	2019	Aa2/AA/AA-	49 Construction Projects
May 2015	\$264.93	New Money	2030	A2/AA/A+	60 Construction Projects
Aug. 2017	\$224.64	Refunding	2023	A2/AA/A+	Advance Refunded Series 2007, 2009, and 2011
Jun. 2019	\$600.00	New Money	2034	A2/AA/A+	Number of Projects Not Specified

Public-Private Partnerships (PPPs or P3s)

Since 2006, NCDOT has been authorized to pursue public-private partnerships (PPPs) to finance transportation infrastructure.⁸⁹ This authority was expanded in 2008 to enable a partnership to construct infrastructure projects.⁹⁰ Until 2013, NCDOT was authorized to pursue an unlimited number of PPPs, but a cap of three PPPs was included in the Strategic Transportation

⁸⁵ NC Department of State Treasurer, 2020 Debt Affordability Study, files.nc.gov/nctreasurer/documents/files/daac-2020_final.pdf

⁸⁶ 2005 N.C. Sess. Laws, Chap. 2005-403

⁸⁷ www.fhwa.dot.gov/ipd/finance/tools_programs/federal_debt_financing/garvees/

⁸⁸ www.fhwa.dot.gov/ipd/finance/tools_programs/federal_debt_financing/garvees/garvee_state_by_state.aspx

⁸⁹ 2006 N.C. Sess. Laws, Chap. 2006-230, §1(a)

⁹⁰ 2008 N.C. Sess. Laws, Chap. 2008-164

Improvements Act.⁹¹ The I-77 Express Lanes project is the first of three eligible PPP projects under this law.

NCDOT Is a Sound Investment

With a shared vision of progress, the legislature has made significant investments over the last decade to improve the state's transportation network, and in return, NCDOT has evolved to ensure funds are invested wisely. It is the hope of this Commission that the next ten years will be equally as positively transformative. The commissioners commend the legislature for its decisive actions to stabilize future revenues. In 2015, the legislature avoided a \$1 billion biennial funding shortfall by restructuring the Motor Fuels Tax formula and it addressed a backlog of needs by increasing DMV fees and adopting an inflationary factor to DMV fees. The legislature has also taken the first steps to modernize transportation revenues by adding an additional registration fee on electric vehicles and by taxing new mobility options including vehicle sharing and vehicle subscription services.

And while NCDOT has experienced episodic challenges, it has nonetheless proven itself to be an efficient agency that spends its revenues judiciously, and it continually seeks to make process improvements that save time, money, and lives. Over the past decade, NCDOT has become a leader in efficient management by adopting a series of fundamental process improvements that have restored the public's trust by removing politics from project selection, streamlining project delivery, increasing transparency, and improving data collection. These changes have included:

“My late father used to say, ‘If you’re waiting on me you’re backing up.’ The transportation funding recommendations of the NC First Commission will help our state advance economic mobility, connect rural and urban areas, adapt to changing technologies, and remain competitive. These measures will prevent us from backing up, compared to other states that are innovating.”

– Tony Lathrop

Advanced Financial Management

Procedures. NCDOT has adopted numerous financial management practices to improve transparency and to assist with the Board of Transportation's increased fiduciary responsibilities. Weekly cash reports, monthly financial reporting, and an annual spend plan is available online. The Department has also enacted tighter internal controls and increased management oversight. As a result, cash and spending decisions are at the forefront of daily operations throughout the Department.

⁹¹ 2013 N.C. Sess. Laws, Chap. 2013-183, §5.2

Adopting a Strategic Prioritization Process. The adoption of a nationally recognized, data-driven project prioritization process has allowed NCDOT to use its funding more efficiently to enhance the state’s infrastructure, while supporting economic growth, job creation, and a higher quality of life. This “strategic prioritization process,” which NCDOT first started developing in 2009 in response to an executive order,⁹² was enacted into law in 2013 with the passage of the Strategic Transportation Improvement Act (STI).⁹³ Every other year, proposed projects are evaluated based on existing and future conditions, expected benefits, multimodal characteristics, and how they fit in with local priorities. Local projects are selected by Metropolitan Planning Organizations (MPOs) and Rural Transportation Planning Organizations (RPOs) through the development of short-term and long-range transportation plans. Today, North Carolina has 19 MPOs and 18 RPOs. The prioritization process encourages collaboration while maintaining flexibility to address local needs.

Streamlining Project Delivery. In response to concerns over the amount of time it took to complete highway projects, NCDOT undertook a major effort beginning in 2015 to evaluate best practices used in other states and determine which project stages were causing the most delays. NCDOT established performance objectives to expedite project delivery, including various efficiency processes such as finding activities that could be completed concurrently. The agency also increased the outsourcing of work, improved multi-agency coordination and rights-of-way processes, and expedited environmental reviews.

The Department’s goal to expedite project delivery has been aided by its efforts to achieve a leaner workforce, decentralized project control, and increased collaboration with its private partners. NCDOT’s workforce is 25 percent smaller compared to 10 years ago. It decentralized project control by shifting ownership of most highway projects from the central office to division control. It also moved more preconstruction work to the private sector. It established monthly division meetings with utility companies to improve coordination and added utility scheduling to the overall project schedule. These changes have produced a more defined ownership structure and improved oversight to ensure projects are on budget and on time.

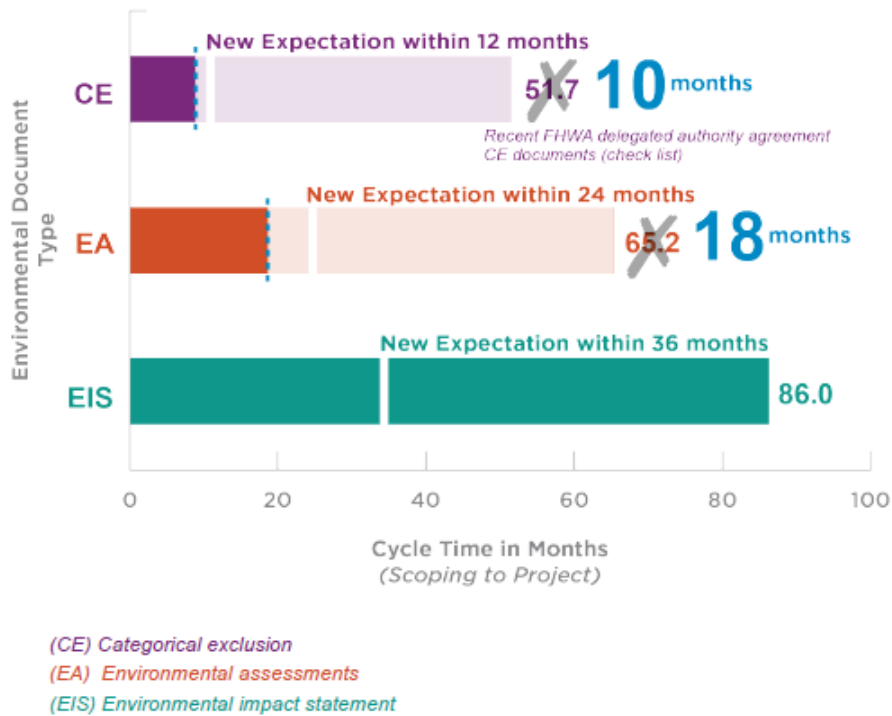
Perhaps most notably, NCDOT worked with federal and state partners to expedite the environmental review process. Accelerating the amount of time to complete environmental review approvals is delivering projects faster and more efficiently (see **Figure 17**). For example, NCDOT established internal processes that matched federal review standards. The Department was therefore delegated the authority to approve projects that, because they fall into categories that have been determined to pose no significant environmental impact, qualify for

⁹² 2009 Executive Order No. 02

⁹³ 2013 N.C. Sess. Laws, Chap. 2013-183; N.C. Gen. Stat. §§136-189.10 et seq.

“categorical exclusion” rather than requiring a full environmental assessment or environmental impact statement.

Figure 17: Accelerating Project Delivery



Refining Data Collection and Transparency. NCDOT has made progress in standardizing metrics to evaluate road condition, estimating cash flow, improving project cost estimates, and publishing data for public consumption. The Performance Dashboard⁹⁴ includes eight measures that serve as indicators of how the Department is performing on its strategic goals. The Project Progress reports⁹⁵ allow the public to track the progress of all active construction projects. The Department has also streamlined project development by utilizing Geographic Information System (GIS) tools and data to improve program delivery through Project ATLAS.

⁹⁴ www.ncdot.gov/about-us/our-mission/Performance/Pages/default.aspx

⁹⁵ www.ncdot.gov/about-us/our-mission/Pages/project-progress.aspx

6. A Vision for Our Transportation Network

“Opportunity, in almost any form, cannot be fully realized without a safe, vibrant, and visionary infrastructure network. It provides the vital threads to our state’s tapestry. This report offers a roadmap to assure that North Carolina is positioned to succeed. Our remedies aren’t easy – but North Carolina doesn’t shrink from doing the hard, but right, thing. And this is it.”

– Ward Nye

The transportation network serves as a vital link to improve our quality of life and build a strong economy, but it is a deteriorating and underperforming system. Roads are becoming more congested. Crash rates are increasing along with the number of roadway fatalities for motorists, bicyclists, and pedestrians. The time to act is now to make improvements and prepare for a coming wave of technological, demographic, societal, and environmental disruptions.

By adopting a fair, reliable, diverse, and growing revenue portfolio, North Carolina can transform its transportation network to meet current and future challenges. Weather events are increasingly damaging, washing out roads and bridges and triggering rockslides. The network must become more resilient when severe weather strikes. Industries must be able to rely on rail and road freight networks to transport goods safely and efficiently. Our infrastructure needs to be modernized to accommodate and safely integrate electric, connected, and autonomous vehicles and alternative delivery methods, such as drones, and adapt to new mobility patterns being generated through shared platforms and sensor technologies.

North Carolina’s vision is that its transportation system will ensure the state’s economic vitality, competitiveness, and overall safety and welfare for many years to come.

Until recently, North Carolina has been called the “Good Roads State”, but our deteriorated conditions have made us fall behind other states. More important -- being “the Good Roads State” is becoming outdated as a 21st century transportation network must move beyond roads and capitalize on our essential non-highway modes of mobility. We must move beyond the concept that transportation is an *asset*, because the new economy and new mobility patterns are transforming the system into a *service* in which vehicle ownership shifts to a pay-by-the-trip

structure. The system must expand with more dynamic transit options to accommodate urban and suburban population growth. An aging population and residents living in rural areas will need more on-demand transit services. Urban residents will also benefit from expanded transit services. Commuter rail services can alleviate highway congestion and provide a critical link to

“An increase in transportation investments will support economic growth and job creation. The NC FIRST Commission's recommendation of \$20 billion over 10 years will enable commerce to move more efficiently, ensuring North Carolina remains competitive nationally and globally.”

– The Honorable Janet Cowell

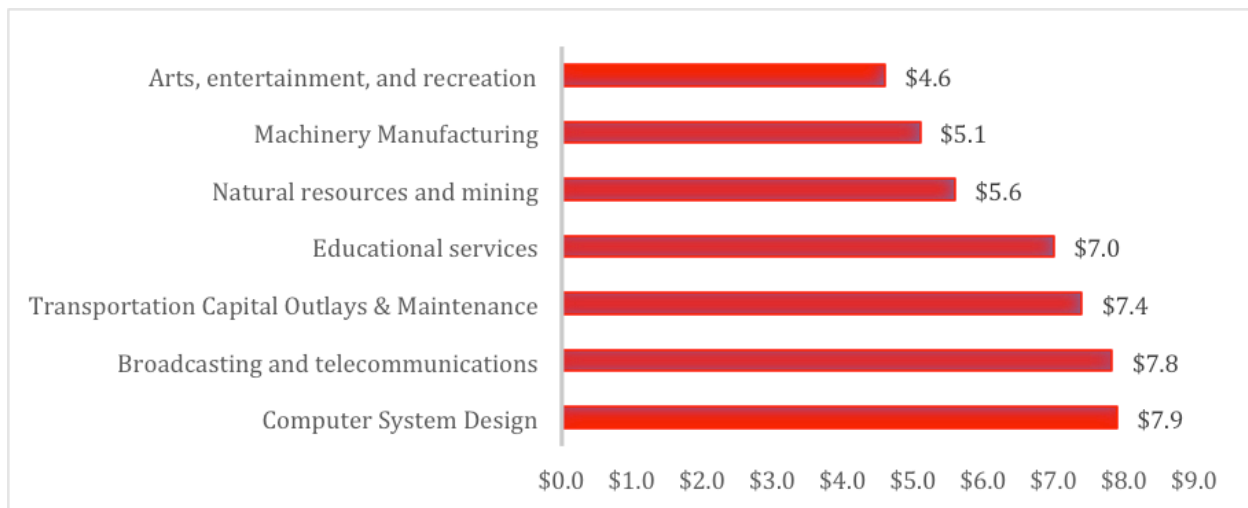
jobs for suburban and rural residents. The economy will benefit from increased air travel, with North Carolina's airports expanding capacity and supporting more domestic and international destinations. Ferries will provide faster service to more passengers, and potentially to more places. In summary, **this 21st century model connects all modes of transportation into a seamless system. Thinking out of the box to solve these issues will be key in seeing North Carolina moving forward as a leader in the global economy.**

Economic Impact

At the heart of North Carolina's vision for the future of its transportation network is that it will ensure the state's economic vitality, competitiveness, and overall safety and welfare for many years to come. **A safe, reliable, and efficient transportation network is the backbone to the state's economy.** The system moves goods to markets and people to school, work, medical appointments, or anywhere they need to be. According to Dr. Alison Premo Black of the American Road & Transportation Builders Association, a leading construction economist, North Carolina's transportation construction industry is the third largest industry contributing to the state's Gross Domestic Product (GDP). Transportation capital outlays and maintenance expenditures totaled \$7.4 billion in 2018 (**Figure 18**).⁹⁶

⁹⁶ www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/2019-08-30-premo-black-presentation.pdf

Figure 18: Annual Industry Contributions to North Carolina's Gross Domestic Product, 2018 (in \$ Billions)



Among other things, increasing transportation investment will strengthen the state's economy in at least three ways. First, transportation construction is an engine of economic growth. Every dollar of capital investment in North Carolina produces at least \$2.04 in increased output and business activity.⁹⁷ Second, long-term benefits are achieved by maintaining good roads that mitigate congestion, enable commerce to move more efficiently, reduce vehicle operating costs, and improve safety and air quality. Studies indicate that long-run returns on transportation investments is between \$4 and \$5 dollars for every \$1 invested.⁹⁸ A U.S.

*Every dollar of capital investment in North Carolina produces **at least \$2.04** in increased output and business activity.*

Treasury Department study of 40 national and regionally significant projects found that the return on investment for some projects can range as high as \$8 or \$10 in net economic benefits for every \$1 invested.⁹⁹ Third, the economy benefits from the multiplier effect of being in proximity to a road project. A 2020 report indicates that the number of businesses within one mile of a road project increased 69 percent for Interstates, 41 percent for US routes, and 73 percent for NC routes. State and local communities also realize significant economic benefits after infrastructure investment. From 2001 to 2016, locations within proximity to NC highways

⁹⁷ U.S. Bureau of Economic Analysis data cited by Dr. Alison Premo Black during her NC FIRST presentation on August 30, 2019; www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/2019-08-30-premo-black-remarks.pdf

⁹⁸ www.apta.com/wp-content/uploads/Resources/resources/reportsandpublications/Documents/healthy_returns.pdf;

www.treasury.gov/connect/blog/Pages/Importance-of-Infrastructure-Investment-for-Spurring-Growth-.aspx

⁹⁹ www.treasury.gov/connect/blog/Pages/Importance-of-Infrastructure-Investment-for-Spurring-Growth-.aspx

experienced a 35 percent increase in employment, 16 percent more than other NC highways that were not improved.¹⁰⁰

“Adequate and efficient transportation is vital for a prosperous and growing economy. North Carolina is at an inflection point where revenue sources for transportation need to be re-worked to accommodate a new economy, new fuels, and new ways people and products move. The NC FIRST report provides important and detailed analysis and options for decision makers to consider for funding transportation in the decades ahead. It has been my absolute pleasure to serve on the NC FIRST Commission.”

– Michael Walden, Ph.D.

In comparison to peer and neighboring states, North Carolina’s share of transportation expenditures is a relatively low percentage of the state’s GDP (Figure 19).¹⁰¹ It matches South Carolina for the lowest share among the comparison states, at 2.5 percent of GDP. North Carolina also has a relatively small transportation workforce. Of the eight states examined, North Carolina has the lowest percentage of employee workforce serving in the transportation field, tying with

Virginia. Using total lane mileage from all sources, North Carolina has 0.62 employees per lane mile, which is less than all other states except for South Carolina. These indicators point to an underinvestment in transportation compared to other states.

¹⁰⁰ ncchamber.com/wp-content/uploads/NC-Chamber-Foundation-Study_Modernizing-NCs-Infrastructure-Through-Diversified-and-Sustainable-Revenue-Streams.pdf

¹⁰¹ Sources: FHWA, Highway Statistics 2018, Table HM-60 (www.fhwa.dot.gov/policyinformation/statistics/2018/); BTS, Transportation Economics by Mode Industries (cms.bts.gov/transportation-economics) and Contribution of Transportation to the Economy (data.bts.gov/stories/s/smrm-36nv/)

Figure 19: State Economic Comparisons

Economic Comparisons						
	GDP (in millions), 2019	Transportation Expenditures as % of State GDP, 2018	Transportation Workforce, 2019	Annual Transportation Payroll (in thousands), 2019	% of Employed Workforce in Transportation, 2019	Number of Transportation Employees, 2019, per Lane Mile, 2018
Florida	\$1,093,351	3.4%	315,102	\$16,760,896	3.5%	1.15
Georgia	\$616,333	4.3%	205,646	\$11,574,856	4.6%	0.76
Illinois	\$897,124	4.1%	281,336	\$15,641,025	4.7%	0.92
North Carolina	\$587,711	2.4%	142,676	\$7,060,808	3.2%	0.62
Ohio	\$698,458	3.4%	210,923	\$10,775,214	3.9%	0.80
South Carolina	\$246,309	2.4%	70,005	\$3,118,392	3.3%	0.43
Tennessee	\$380,138	4.6%	175,419	\$9,805,125	5.8%	0.86
Texas	\$1,886,956	3.7%	512,675	\$31,931,352	4.1%	0.75
Virginia	\$554,211	2.7%	124,875	\$6,452,176	3.2%	0.76

According to numerous economic contribution studies, the state's non-highway transportation sector also significantly contributes to the state's economy. Recent studies indicate:

- The North Carolina Ports Authority contributed approximately \$15.4 billion to the economy in 2018. It supports 87,700 jobs paying \$4.3 billion in employee compensation.¹⁰²
- North Carolina's 72 public airports contributed \$52 billion to the state's economy in 2019. The airports support 307,000 jobs paying \$12.6 billion in employee compensation.¹⁰³
- Freight rail networks contributed \$1.75 billion to the economy in 2015.¹⁰⁴

¹⁰² ncports.com/wp-content/uploads/2019/01/2018-NC-Ports-Economic-Contribution-Study.pdf

¹⁰³ www.ncdot.gov/divisions/aviation/Documents/state-of-aviation.pdf

¹⁰⁴ connect.ncdot.gov/resources/Rail-Division-Resources/Documents/Benefits%20of%20State-Supported%20Passenger%20Rail%20Services%20in%20NC%20Study%20-%20202015.pdf

7. Challenges and Opportunities

Transportation Disruptors

Transportation is in the midst of its greatest revolution since the rise of the automobile a century ago. Although no one knows exactly what the future of transportation will look like, transformative technologies, demographic shifts, and weather events are already presenting enormous challenges to the transportation network and how it is funded.

Technology¹⁰⁵

In recent years, stakeholders have identified four technology-driven, mutually reinforcing trends that are poised to radically transform the transportation sector: sharing, automation, connectivity, and electrification.¹⁰⁶ Critical developments are also underway in the world of e-commerce and last-mile delivery. **These approaching changes are likely to diminish current revenue sources, while requiring significant additional infrastructure investment.**

“A comprehensive and diverse transportation system is the foundation of a strong economy. Investing in our transportation network is critical if we are to attract and maintain the industries of the future. New technologies and shifting demographics are changing the transportation industry. North Carolina has always been a leader in embracing change. Now is the time to plan for and embrace the changes of tomorrow in order for North Carolina to be ahead of the curve. The time is now for us to create our future.”

– The Honorable Nancy McFarlane

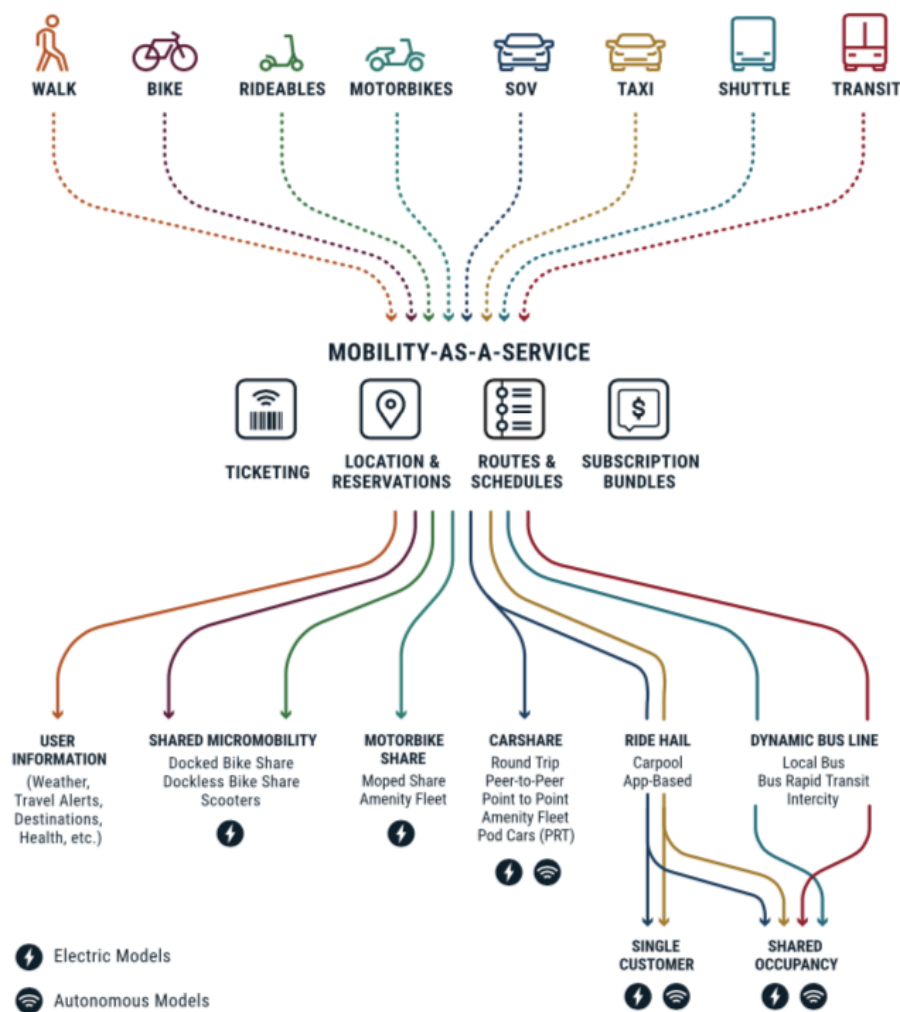
Sharing. Around the world, a host of shared mobility options have emerged as part of a larger trend known as “Mobility-as-a-Service” (MaaS). This trend describes a shift away from buying vehicles and towards buying trips. Shared mobility already represents more than \$60 billion in value across China, Europe, and the United States, its three largest markets. Services that are widely used include car sharing (e.g., Zipcar, Car2Go), ride-hailing (e.g., Uber, Lyft), micromobility options such as

¹⁰⁵ For more about the effects of technological disruptors on the transportation network, see the NC FIRST Commission Brief 14: Technology and the Future of Transportation, November 2020, www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-briefs-edition-14.pdf.

¹⁰⁶ See, for example, www.mckinsey.com/industries/automotive-and-assembly/our-insights/disruptive-trends-that-will-transform-the-auto-industry, www.iea.org/reports/digitalisation-and-energy, and www.cbinsights.com/research/facebook-amazon-microsoft-google-apple-auto-mobility/. These four trends are sometimes referred to together by the acronyms “ACES” or “CASE.”

bikeshares and e-scooters (e.g., Bird, Lime),¹⁰⁷ integrated, multimodal travel apps (e.g., Citymapper, TransLoc), and flexible “microtransit” such as on-demand vanpools and shuttles (**Figure 20**).¹⁰⁸ As innovations continue, the annual growth rate for shared mobility is forecast to exceed 20 percent for the next decade. By 2030, up to one out of ten new cars sold may be a shared vehicle.¹⁰⁹

Figure 20: Mobility-as-a-Service



¹⁰⁷ For more about shared micromobility, see the NC FIRST Commission Brief 7: The Rise of Micromobility and its Potential Impacts for North Carolina, March 2020, www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-briefs-edition-7.pdf, and Commission meeting materials from April 24, 2020, www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Pages/meeting-dates.aspx.

¹⁰⁸ Crowther (2018), The Rise of Micromobility, Alta Innovation Lab, as cited in NCDOT’s NC Moves 2050 Drivers and Opportunities Fact Sheet: Technology, July 2019, www.ncdot.gov/initiatives-policies/Transportation/nc-2050-plan/Pages/drivers-opportunities-fact-sheets.aspx

¹⁰⁹ www.mckinsey.com/features/mckinsey-center-for-future-mobility/overview/shared-mobility; www.mckinsey.com/industries/automotive-and-assembly/our-insights/disruptive-trends-that-will-transform-the-auto-industry

By providing alternatives to personally owned vehicles, these new mobility options may erode key state revenue sources for transportation, such as motor fuels taxes, driver licensing and vehicle registration fees, and the Highway Use Tax on vehicle sales. Currently, some services—such as car sharing and car subscriptions—are taxed by the state, but nearly all of the revenues go to the General Fund.¹¹⁰ Transportation Network Companies (TNCs) such as Uber and Lyft pay annual permit fees to the DMV, corporate taxes if nexus is established, and pick-up and drop-off fees at some airports; however, state law prohibits all other state and local fees.¹¹¹ In comparison, fifteen other states levy per-ride or percentage-based fees on these companies.¹¹² Although some local governments in North Carolina assess fees on shared micromobility services, the state does not.

Automation. In the past decade, innovations in vehicle technologies have introduced higher levels of automation into the cars we already drive and moved us toward the possibility of fully autonomous or “driverless” vehicles. Dozens of companies are working to develop driverless cars, and testing is already taking place on public roads across the U.S. and globally. In North Carolina, the Turnpike Authority’s NC-540 Triangle Expressway has served as a pilot site for the testing of automated vehicle technologies since 2017.¹¹³ In February 2020, NCDOT partnered with NC State University to test North Carolina’s first electric, self-driving transit shuttle along a one-mile fixed route on Centennial Campus.¹¹⁴ There is much speculation but no certainty about when fully autonomous vehicles might become commercially available. Some predict that as soon as 2030, fully autonomous vehicles will represent up to 30 percent of light vehicle sales and a small but growing share of the trucking industry.¹¹⁵

Given the tremendous disruption that widespread adoption of self-driving vehicles could present, North Carolina and other states are already preparing. Many relevant issues fall under state jurisdiction, including driver licensing, vehicle registration, traffic laws and their enforcement, insurance, liability, and vehicle safety inspections. As of February 2020, at least 40 states including North Carolina had enacted legislation or issued executive orders related to

¹¹⁰ All revenues from the Alternative Highway Use Tax on car sharing and vehicle subscription services go to the General Fund, except for a \$10 million annual transfer to the Highway Fund for airport improvements (N.C. Gen. Stat. §105-187.5 and §105-187.9).

¹¹¹ N.C. Gen. Stat. §20-280.10

¹¹² See Commission meeting materials from April 24, 2020: www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Pages/meeting-dates.aspx

¹¹³ www.ncdot.gov/news/press-releases/Pages/2017/USDOT-Picks-NC-Turnpike-Authority-for-Dr.aspx

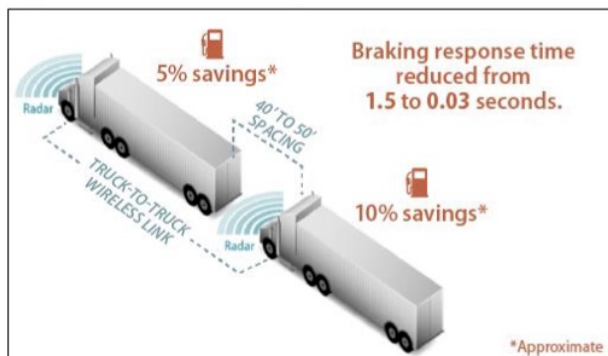
¹¹⁴ news.ncsu.edu/2020/02/driverless-shuttle-a-smart-move-for-centennial-campus/

¹¹⁵ www.spglobal.com/en/research-insights/articles/The-Road-Ahead-for-Autonomous-Vehicles; www.cbinsights.com/research/autonomous-driverless-vehicles-corporations-list/; techcrunch.com/2019/06/11/over-1400-self-driving-vehicles-are-now-in-testing-by-80-companies-across-the-u-s/; www.mckinsey.com/industries/travel-logistics-and-transport-infrastructure/our-insights/distracted-or-disruption-autonomous-trucks-gain-ground-in-us-logistics

autonomous vehicles.¹¹⁶ Further, our roads were designed for humans, not computers. To facilitate the adoption of fully autonomous vehicles, states would need to make significant investments in upgraded road markings, signs, signaling, mapping, sensors, and other infrastructure accommodations that such vehicles would be able to recognize and navigate.

Connectivity. Connected vehicles use wireless technologies to communicate with each other (vehicle-to-vehicle or V2V), with roadside infrastructure (vehicle-to-infrastructure or V2I), or with any other connected user or device, including personal devices such as smartphones (vehicle-to-everything or V2X). The National Highway Traffic Safety Administration (NHTSA) has estimated that V2V and V2I safety applications could eliminate or mitigate 80 percent of non-impaired crashes.¹¹⁷ Other applications—such as optimized traffic signals, dynamically coordinated cruise control, and driver alerts about traffic conditions—could help reduce congestion and fuel consumption. Connectivity could also enable truck “platooning” (**Figure 21**),¹¹⁸ in which two or more trucks are wirelessly linked into a convoy that can automatically accelerate and brake together, while following closely enough to significantly lessen wind resistance. Early studies have shown that 65 percent of current long-haul truck miles could potentially be platooned, lowering total truck fuel use by 4 percent.¹¹⁹

Figure 21: Truck Platooning



Connected vehicles would increase state transportation costs while decreasing revenues. Needed investments to facilitate vehicle connectivity could include the widespread installation of V2I technologies in roadside infrastructure and reliable, universal broadband coverage.¹²⁰

¹¹⁶ 2017 N.C. Sess. Laws, Chap. 2017-166 (N.C. Gen. Stat. §§20-400 et seq.); 2017 N.C. Sess. Laws., Chap. 2017-169 (N.C. Gen. Stat. §20-152); www.ncsl.org/research/transportation/autonomous-vehicles-self-driving-vehicles-enacted-legislation.aspx; www.ncsl.org/research/transportation/autonomous-vehicles-legislative-database.aspx

¹¹⁷ one.nhtsa.gov/About-NHTSA/Press-Releases/ci.nhtsa_v2v_proposed_rule_12132016.print

¹¹⁸ crsreports.congress.gov/product/pdf/IF/IF10737/2

¹¹⁹ www.energy.gov/eere/articles/platooning-trucks-cut-cost-and-improve-efficiency

¹²⁰ For more about broadband deployment challenges and efforts in North Carolina, see the NC FIRST Commission Brief 4: Rural Transportation Issues in North Carolina, November 2019, www.ncdot.gov/about-us/how-we-

Meanwhile, applications that reduce fuel consumption, such as truck platooning and coordinated cruise control, would continue to erode fuel tax revenues.

Electrification.¹²¹ Although electric vehicles (EVs) make up a relatively small share of the fleet today, analysts predict that their popularity will quickly escalate as the technology improves. As soon as 2026, IHS Markit predicts that 7.6 percent of vehicle sales in the U.S. will be electric and hybrid vehicles.¹²² Commercial adoption is aggressive, with retail giants like Walmart and Amazon investing in hundreds of electric semi-trucks and thousands of electric delivery vans.¹²³

“The challenge for North Carolina, indeed for each state, is to find a sustainable funding source for infrastructure investment while accelerating the critical decarbonization of the transportation sector, which is now the leading sector for carbon emissions in North Carolina. The work of this Commission is innovative, long-range, and helps to achieve the financial and climate objectives so critical to our future.”

– Stephen De May

Although North Carolina now has just a small share of the nearly 1.5 million EVs operating in the United States, in-state sales of these vehicles grew 38.3 percent over the last fiscal year and sales of hybrid vehicles grew by 1.1 percent. As of September 2020, more than 13,740 EVs and 135,740 hybrids were registered in the state, making up 1.8 percent of all vehicles. Under Executive Order 80, issued by Governor Roy Cooper in October 2018, North Carolina created a plan to increase the number of zero emission vehicles (ZEVs) to at least 80,000 by 2025. The plan forecasts a presence of 200,000 or more EVs in the state by 2030 (**Figure 22**).¹²⁴

operate/finance-budget/nc-first/Documents/nc-first-brief-edition-4.pdf, and www.ncbroadband.gov/broadband-nc/state-broadband-plan.

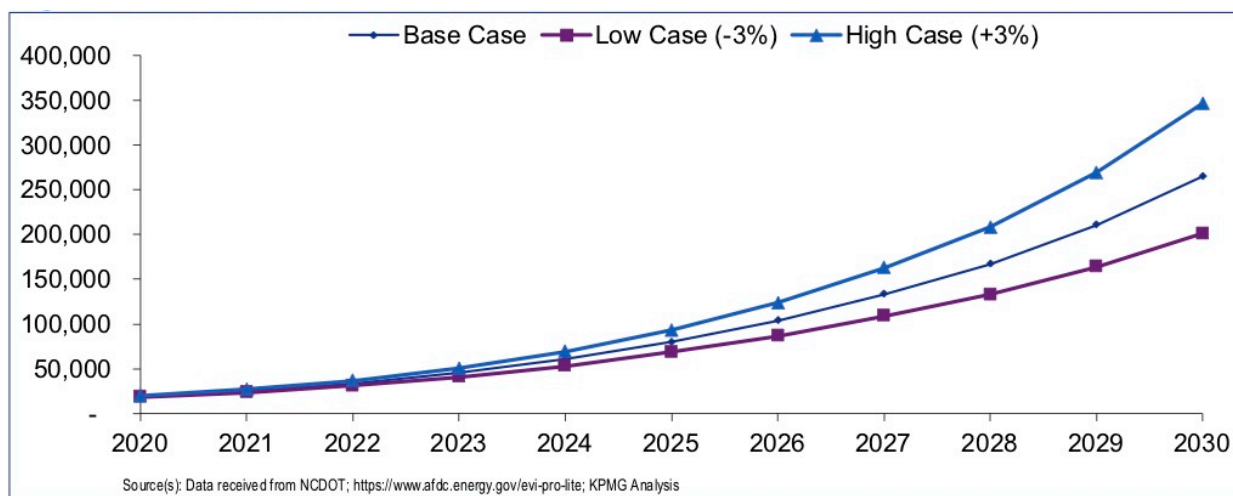
¹²¹ For more about electric and hybrid vehicles, see the NC FIRST Commission Brief 8: Revenue Impact from Electric and Hybrid Vehicles, May 2020, www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-brief-edition-8.pdf.

¹²² www.reuters.com/article/us-autos-electric-forecast/outside-of-tesla-future-ev-sales-in-u-s-may-be-thin-for-most-brands-study-idUSKCN1S220I

¹²³ www.greenbiz.com/article/8-electric-truck-and-van-companies-watch-2020

¹²⁴ www.ncdot.gov/initiatives-policies/environmental/climate-change/Documents/nc-zev-plan.pdf

Figure 22: North Carolina Electric Vehicle Forecast



If fuel taxes remain the primary funding mechanism for transportation, electric and hybrid vehicles will present a challenge. In general, North Carolina drivers contribute to state infrastructure investments through a combination of fuel taxes, DMV fees, and highway use taxes on vehicle sales and long-term leases or rentals. For the average driver, fuel taxes make up nearly 80 percent of their annual contribution. Even considering the additional EV registration fee of \$140.25, North Carolina’s electric vehicle owners pay about \$50 less per year in state transportation taxes and fees than owners of conventional gas-powered vehicles. Hybrid vehicle owners, who use some fuel but have no additional registration fee, pay about \$80 less per year today; with expected improvements in fuel efficiency, they are predicted to pay about \$130 less per year by 2030. By 2030, electric and hybrid vehicles combined could lead to a total annual revenue loss of \$35.7 million to \$46.4 million, a very small portion of the total estimated budget shortfall.

E-Commerce and Last-Mile Delivery.¹²⁵ The rapid growth of e-commerce—the buying and selling of goods over the Internet—has fundamentally changed the movement of freight. As of the third quarter of 2020, e-commerce accounted for more than 13 percent of all U.S. retail sales,¹²⁶ with 39 percent of those sales due to Amazon alone¹²⁷ (**Figure 23**). As more consumers have opted to have online purchases delivered directly to their homes or workplaces, truck traffic has increasingly become concentrated on “last mile” trips that get items to their final

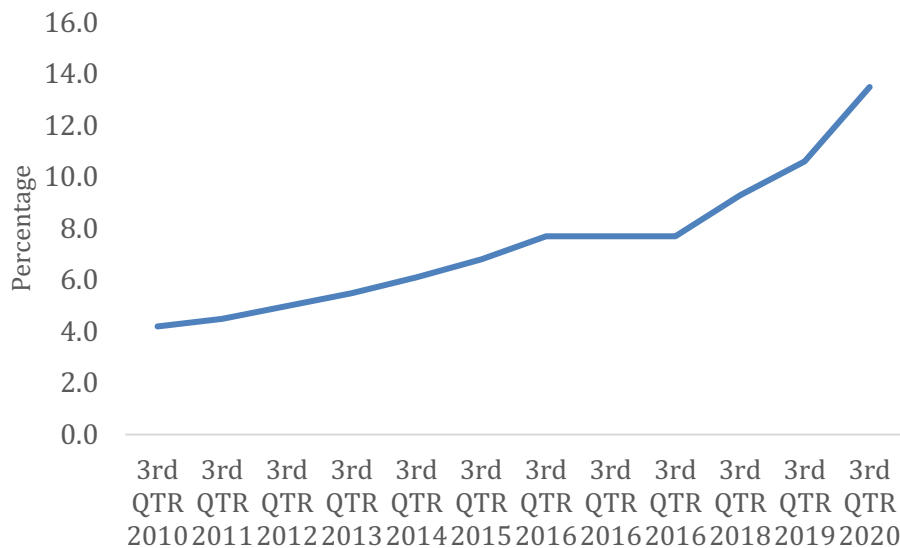
¹²⁵ For more about disruptions to freight transportation, see the NC FIRST Commission Brief 5: Transportation, Distribution, and Logistics in the Future, January 2020, www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-briefs-edition-5.pdf.

¹²⁶ www.census.gov/retail/mrts/www/data/pdf/ec_current.pdf

¹²⁷ www.emarketer.com/content/us-ecommerce-growth-jumps-more-than-30-accelerating-online-shopping-shift-by-nearly-2-years

destination. E-commerce has thus shifted trucking patterns toward more frequent, shorter trips in denser urban and suburban neighborhoods. Higher truck activity in these areas strains capacity and worsens traffic congestion on local roads, especially during peak hours. Meanwhile, the common use of smaller, more fuel-efficient vehicles for last-mile deliveries may counter the increase in fuel taxes that might have been expected from the ongoing rise in total truck travel.¹²⁸

Figure 23: E-Commerce Sales as Percentage of U.S. Retail Sales¹²⁹



Several technological developments are being pursued to address the last-mile transportation challenges of e-commerce. One possible alternative is the use of unmanned aircraft systems, or “drones,” to deliver packages. Although federal authorization is still pending,¹³⁰ companies including Amazon, Alphabet, UPS, Walmart, and DHL are all exploring drone delivery. In North Carolina, authorized pilot projects have delivered take-out food in Holly Springs, groceries in Fayetteville, prescription drugs in Cary, and medical supplies to WakeMed, Novant Health, and Wake Forest Baptist hospitals. A 2018 NASA study estimated that by 2030, drones could be

¹²⁸ truckingresearch.org/wp-content/uploads/2019/02/ATRI-Impacts-of-E-Commerce-on-Trucking-02-2019.pdf; see also the North Carolina Statewide Multimodal Freight Plan, November 2017, connect.ncdot.gov/projects/planning/Statewide-Freight-Plan/Documents/NCDOT_SWFrPln_FinalReport_180209.pdf

¹²⁹ Data obtained from the Latest Quarterly E-Commerce Report, Time Series for Not Adjusted Sales, accessed at www.census.gov/retail/index.html

¹³⁰ The FAA Reauthorization Act of 2018 directed the Federal Aviation Administration to develop, within one year, a rule to authorize “the carriage of property by small unmanned aircraft systems for compensation or hire” (P.L. 115-254, §348). As of July 2020, FAA was still working on a regulatory framework for delivery drones but had issued a few drone operator certificates under existing charter flight regulations to carry out demonstration projects (crsreports.congress.gov/product/pdf/R/R42781).

making around 500 million deliveries each year with a fleet of 40,000.¹³¹ **By offering an alternative to trucks, however, drones could further erode fuel taxes and other transportation revenues.** While North Carolina’s sales and use taxes apply to delivery costs¹³²—which would include the costs of drone deliveries or other last-mile options currently being tested such as sidewalk delivery robots—the proceeds are directed to the General Fund.

*Demographics*¹³³

North Carolina’s population is growing, aging, shifting, and becoming more diverse. These changes are also transforming the future of the state’s transportation network, both in terms of how people travel and how the state secures critical funding for transportation investments.

Growth. With a population of 10.6 million, North Carolina’s population is the ninth largest in the nation. The population is growing quickly, with an additional 1.2 million people expected over the next 10 years and 2.3 million more by 2039. This means North Carolina will likely move from the nation’s ninth most populous state to the nation’s seventh most populous state by 2040.¹³⁴ Most of this growth is due to people moving here from other states for school, jobs, and retirement.¹³⁵ Rapid population growth means more drivers on the road as well as more demand on other modes of transportation such as public transit and air travel (**Figure 24**).

North Carolina is projected to move from the 9th to the 7th most populous state by 2040.

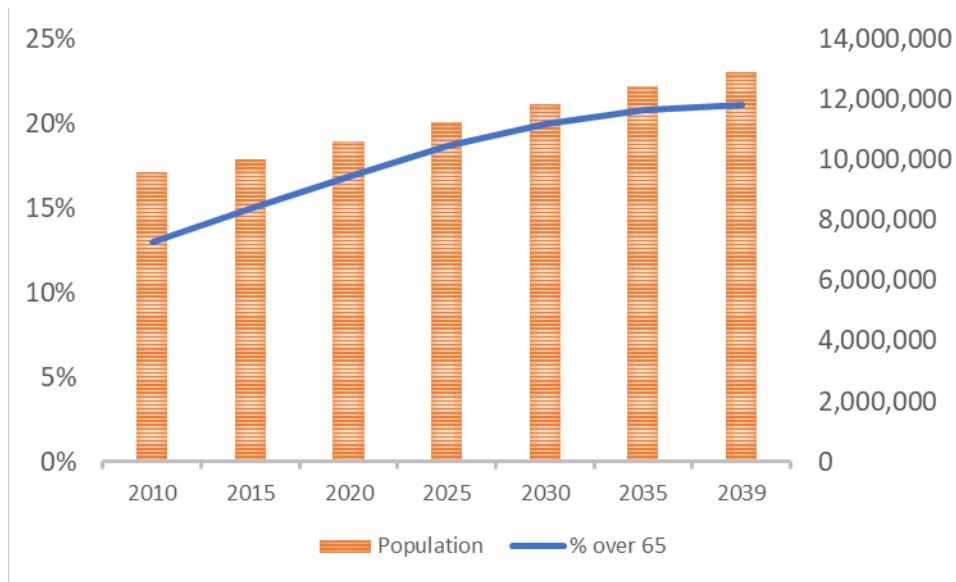
¹³¹ www.nasa.gov/sites/default/files/atoms/files/uam-market-study-executive-summary-pr.pdf

¹³² N.C. Gen. Stat. §105-164.3(203)

¹³³ For more about population changes, see the NC FIRST Commission Brief 2: Changing Demographics and the Future of Transportation in North Carolina, August 2019, www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-brief-edition-2.pdf and Commission meeting materials from July 12, 2019, www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Pages/meeting-dates.aspx.

¹³⁴ www.demographics.coopercenter.org

¹³⁵ files.nc.gov/ncosbm/documents/files/Population-Dyanmic-2020Report.pdf; www.ncdemography.org/2017/07/12/past-present-or-future-net-migration-is-the-main-driver-of-nc-growth/

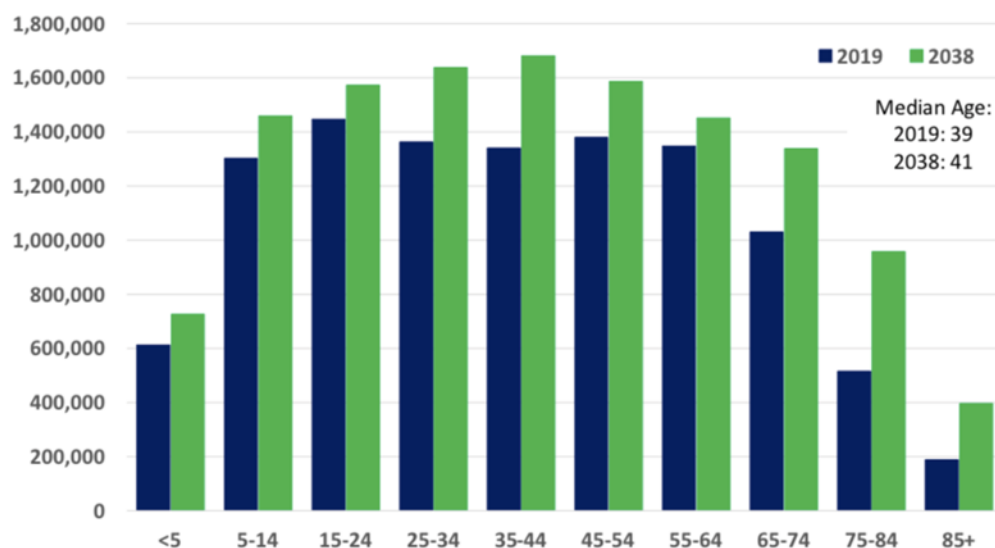
Figure 24: North Carolina Population and Percentage of People Aged 65 and Older, 2010–2039¹³⁶

Aging. The population is also aging, with the average age increasing two years, from 39 years of age to 41 years of age, by 2038. Adults 65 and older will see the greatest increases, followed by a growing middle-aged population (**Figure 25**). By 2030, one in five North Carolinians will be at least 65 years old. These changes could place new and complex demands on existing state and local transportation networks. Adults over 65 are more likely to have disabilities and to need medical transportation, paratransit, and other accessible alternatives to driving. Meanwhile, Millennials—soon to be the nation’s largest living adult generation—want more mobility options. Members of this rising generation, who in 2021 will be roughly 25 to 40 years old, are comparatively more inclined to live in urban areas, to use alternative transportation solutions, and to see driving a vehicle as just one option among many.¹³⁷ These tendencies may be influencing a national trend toward less driving overall, although the long-term effects are uncertain.

¹³⁶ Data obtained from the NC Office of State Budget and Management using the Population Projections (By Sex and Age) – Vintage 2019 dataset available through the State Demographer’s webpage.

¹³⁷ www.apta.com/research-technical-resources/research-reports/the-transformation-of-the-american-commuter/

Figure 25: Projected State Population by Age in 2019 and 2038

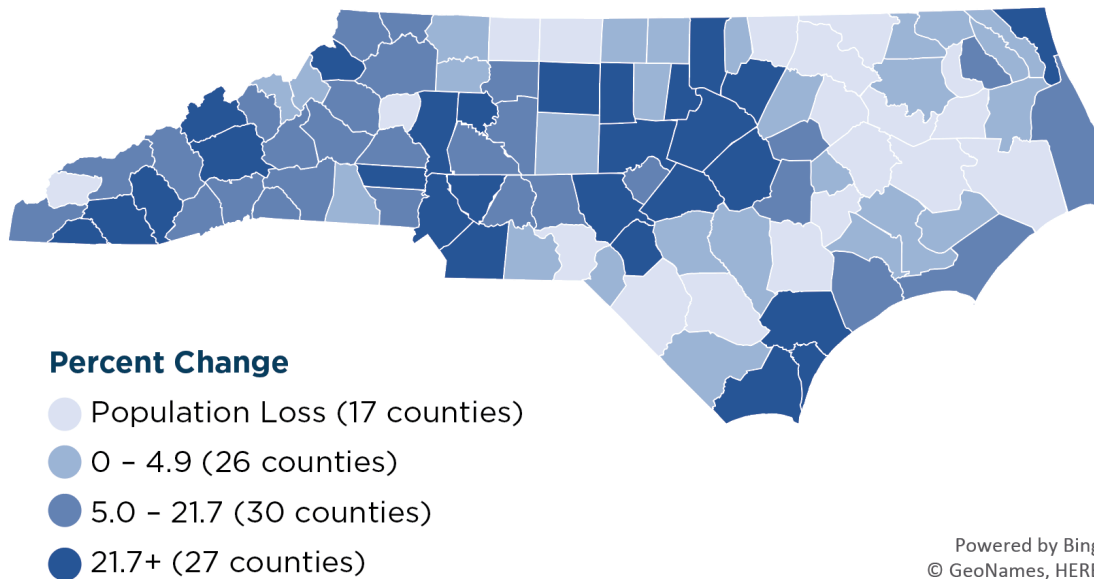


Urbanization. North Carolina’s rural population is significant, accounting for 40 percent of the state’s total population, but most growth is occurring in or around larger cities. Indeed, as is the case nationally, some rural areas are losing population. Nationwide, almost 35 percent of rural counties are undergoing protracted population loss.¹³⁸ In North Carolina, 17 mostly rural counties are expected to lose population over the next 20 years while all major urban counties will expand their populations by at least 20 percent (**Figure 26**).¹³⁹ In the next two decades, more than half the state’s growth will be in Charlotte and the Triangle, and by 2050, 82 percent of our residents will be urban.¹⁴⁰ Continued urbanization is likely to worsen traffic congestion along major corridors and spark greater demand for public transit and other travel alternatives.

¹³⁸ carsey.unh.edu/publication/rural-depopulation

¹³⁹ www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/2019-07-12-cline-presentation.pdf

¹⁴⁰ Ibid.; connect.ncdot.gov/projects/planning/nc-moves-2050-plan/Documents/NC%20Moves%202050_Drivers%20and%20Opportunities_Funding.pdf

Figure 26: Projected Population Change by County from 2019 to 2038¹⁴¹

Diversity. North Carolina is continuing to become more racially and ethnically diverse. In the next two decades, minorities will account for 63 percent of the state’s population growth. By 2038, 29 of North Carolina’s 100 counties are expected to be “majority minority” and 43 percent of the state’s total population will be people of color.¹⁴² This affects travel trends as studies indicate that among urban dwellers, people of color and foreign-born residents are more likely to use public transit on a regular basis.¹⁴³

Severe Weather Events

According to the Federal Highway Administration, environmental conditions are changing faster than at any point in the history of modern civilization.¹⁴⁴ The effects of this rapid change—including climbing temperatures, rising sea levels, and catastrophic storms—are already being felt and will accelerate in the future.¹⁴⁵ Environmental hazards that pose increasing risks to North Carolina include floods, winter storms, tornadoes, wildfires, hurricanes, and sea level

¹⁴¹ www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/2019-07-12-cline-presentation.pdf

¹⁴² www.ncdot.gov/initiatives-policies/Transportation/nc-2050-plan/Pages/drivers-opportunities-fact-sheets.aspx; files.nc.gov/ncosbm/documents/files/Population-Dyanmic-2020Report.pdf

¹⁴³ www.pewresearch.org/fact-tank/2016/04/07/who-relies-on-public-transit-in-the-u-s/

¹⁴⁴ onlinepubs.trb.org/onlinepubs/circulars/ec265.pdf

¹⁴⁵ www.fhwa.dot.gov/environment/sustainability/resilience/publications/infographic/index.cfm

rise.¹⁴⁶ Tropical storms, in particular, hit North Carolina more often than any other southeastern state but Florida, and are expected to grow in intensity due to changing air and ocean temperatures and the erosion of the state's barrier islands that have historically helped protect inland areas.¹⁴⁷ **These incidents affect our eastern, often rural, counties in particular. Current poor conditions on many of our secondary roads compound the effects of the storms on these communities.** As weather-related events worsen, North Carolina can expect rising costs for infrastructure repair, resiliency measures, and the possible relocation of transportation facilities.

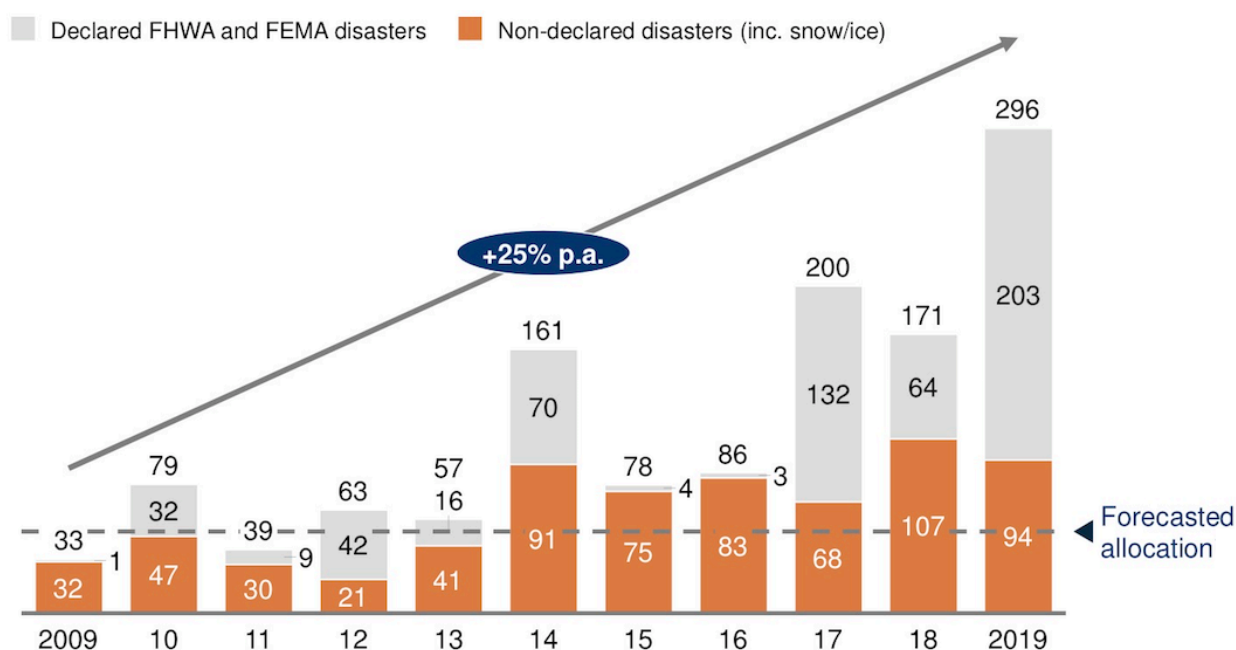
Repair. In recent years, more frequent and severe weather events have ravaged infrastructure nationwide, adding burdensome repair and cleanup costs for transportation agencies. Like its peers, NCDOT has seen its disaster-related costs rise sharply in the past decade. **Historically, the Department has set aside about \$50 million per year for weather-related disasters.** From FY 2009 to FY 2013, the set-aside roughly matched costs, which averaged \$54 million per year. However, beginning in FY 2014, the pace and scale of these events increased and from FY 2014 to FY 2019, costs jumped to an average of \$165 million per year. **Hurricane Florence and other severe storms made FY 2019 a particularly challenging year, with \$296 million in disaster-related spending, nearly six times the usual set-aside (Figure 27).**¹⁴⁸ As a result of Hurricane Matthew in FY 2017 and Hurricane Florence in FY 2019—two 500-year storms that struck North Carolina within 23 months of each other—a total of 3,100 sites across the state, including portions of I-95 and I-40, needed repairs for washouts or other damage.¹⁴⁹ Thus these storms affect not only North Carolina citizens but also impede interstate commerce.

¹⁴⁶ www.ncdot.gov/initiatives-policies/Transportation/nc-2050-plan/Documents/drivers-opportunities-environment-eng.pdf

¹⁴⁷ connect.ncdot.gov/resources/BUILD2019-I95/Documents/Narrative%20I-95%20Resiliency%20NCDOT.pdf

¹⁴⁸ www.ncdot.gov/about-us/how-we-operate/finance-budget/Documents/shaping-ncdot-future-september-2019.pdf

¹⁴⁹ connect.ncdot.gov/resources/BUILD2019-I95/Documents/Narrative%20I-95%20Resiliency%20NCDOT.pdf

Figure 27: NCDOT Spending on Declared and Non-Declared Disasters, FY 2009 to FY 2019¹⁵⁰

Severe weather events place serious strain on NCDOT's operations and maintenance budget. The impact is twofold: the cost of immediate response reduces funds available for other maintenance activities, including routine planned maintenance, and weather-related events accelerate system degradation, accruing more maintenance needs for years to come.¹⁵¹ Although NCDOT can receive federal reimbursement for repairs and reconstruction that are needed due to officially "declared" emergencies, **federal funds only cover a portion of costs.**¹⁵² Unlike other state DOTs with a high percentage of their highway systems qualifying for federal assistance, NCDOT's disaster spending on its vast secondary road network is eligible for reimbursement from the Federal Emergency Management Agency (FEMA), which typically takes three to five years to arrive in full, rather than the Federal Highway Administration, whose reimbursements are typically processed in 12 to 18 months. The delay in reimbursement proves challenging for cash management purposes.

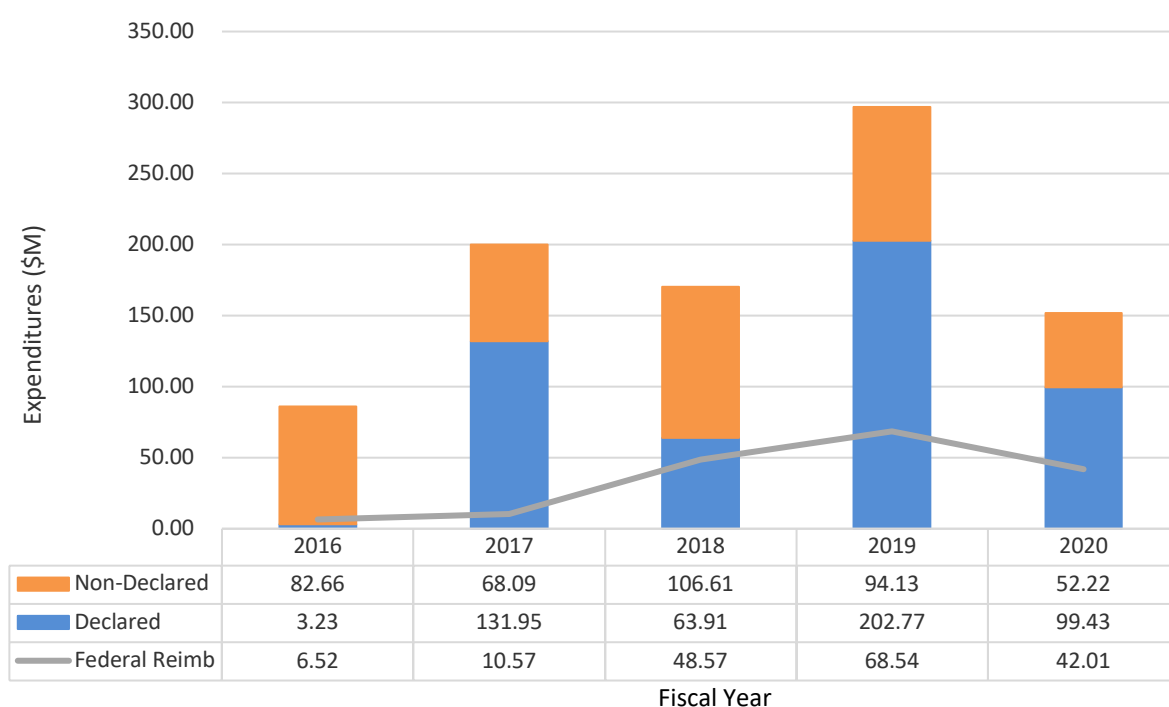
¹⁵⁰ www.ncdot.gov/about-us/how-we-operate/finance-budget/Documents/mckinsey-ncdot-review-presentation.pdf. Dollars not adjusted for inflation.

¹⁵¹ connect.ncdot.gov/resources/Asset-Management/MOPAR%20Docs/2020-MOPR-Report.pdf

¹⁵² The Federal Highway Administration (FHWA) Emergency Relief program reimburses 80 percent of eligible expenditures for most federal-aid highways, 90 percent for Interstates, and up to 100 percent for certain essential repair work in the first 180 days after a disaster occurs. The reimbursement rate for the Federal Emergency Management Agency (FEMA) Public Assistance grant program is at least 75 percent of eligible expenditures. Neither program is intended to reimburse state DOTs fully. See www.transportation.gov/highlights/disaster-recovery/funding/federal and www.nap.edu/catalog/22164/.

Further, most weather-related events (including snow, ice, and landslides) are “non-declared” and no reimbursement is available. For example, both Hurricane Matthew in FY 2017 and Hurricane Florence in FY 2019 were declared by the president as federal emergencies, but Winter Storm Inga in FY 2018 and Hurricane Michael in FY 2019 were not.¹⁵³ In general, only about half of total emergency expenditures are eligible for federal reimbursement.¹⁵⁴ **Figure 28** illustrates the upward trend in both declared and non-declared disaster spending, as well as the lag time in federal reimbursements for declared events.

Figure 28: NCDOT Emergency Expenditures and Federal Reimbursement¹⁵⁵



Resiliency. Resiliency has been defined at the federal level as “...the ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions.”¹⁵⁶ The work of making the state’s transportation infrastructure more resilient to future weather events will include assessing the network’s risks and vulnerabilities, improving prediction and response systems, retrofitting existing facilities where needed, and integrating resiliency practices into the planning, design, and construction of new projects.

¹⁵³ www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/mopar.pdf

¹⁵⁴ connect.ncdot.gov/resources/Asset-Management/MOPAR%20Docs/2020-MOPR-Report.pdf

¹⁵⁵ Ibid. Dollars not adjusted for inflation.

¹⁵⁶ www.fhwa.dot.gov/legisregs/directives/orders/5520.cfm

Some of this critical work is already underway. Executive Order 80, issued by Governor Roy Cooper in October 2018, directed all cabinet agencies to integrate resiliency planning into their activities and called for the preparation of the North Carolina Climate Risk Assessment and Resilience Plan. In that plan,¹⁵⁷ NCDOT identified how climate-related stressors including tropical storms, extreme rainfall, sea level rise, elevated temperatures, and drought could impact transportation assets across all modes. In addition, with funding provided by Session

“Small communities like the Town of Banner Elk will benefit greatly from the added investment of \$20 billion over the next 10 years, as recommended in the NC FIRST Commission final report. Improving access and connectivity, building roads resilient to weather events, mitigating seasonal congestion patterns, and expanding broadband will enhance the quality of life for citizens living in rural areas.”

– The Honorable Brenda Lyerly

Law 2019-251,¹⁵⁸ NCDOT has begun a statewide flood risk and vulnerability assessment, starting with the Strategic Transportation Corridor system,¹⁵⁹ and has developed a web tool that builds on the award-winning NC Flood Inundation Mapping and Alert Network (FIMAN)¹⁶⁰ to provide real-time and forecasted flood risk information for roads and bridges. Along with other new research efforts and infrastructure monitoring systems, these activities will help with emergency response as well as prioritizing projects to improve the resiliency of the network.

Making North Carolina’s transportation assets more climate-resilient will return significant benefits for public safety, mobility, and reduced future repair costs, with some benefit-cost analyses suggesting a net benefit of 4:1 or more for resiliency investments.¹⁶¹ However, large upfront costs will further strain the state’s limited transportation budget. For example, after flooding from both Hurricane Matthew and Hurricane Florence closed I-95 and I-40 for several days, an NCDOT-commissioned feasibility study found that reducing flood risks on vulnerable sections of just those two highways would cost \$320 million for I-95 (\$128 million if done with other projects) and \$155 million for I-40.¹⁶² Although NCDOT has taken a number of actions to improve the resiliency of existing and new infrastructure—including incorporating relevant design features into some highway projects and installing nature-based retrofits to protect

¹⁵⁷ deq.nc.gov/energy-climate/climate-change/nc-climate-change-interagency-council/climate-change-clean-energy-17

¹⁵⁸ 2019 N.C. Sess. Laws, Chap. 2019-251, §1.7

¹⁵⁹ North Carolina’s Strategic Transportation Corridors comprise a designated core network of transportation facilities and services, including major airports and seaports, that move most of the state’s freight and people. For more details, see www.ncdot.gov/initiatives-policies/Transportation/strategic-corridors/Pages/default.aspx.

¹⁶⁰ fiman.nc.gov

¹⁶¹ onlinepubs.trb.org/onlinepubs/circulars/ec265.pdf; connect.ncdot.gov/resources/BUILD2019-I95/Documents/BCA%20Technical%20Memo.pdf

¹⁶² NCDOT Division of Highways

2,100 feet of coastal roadways—these are only a small part of what will be needed to safeguard the state’s extensive transportation network against worsening weather-related hazards.

Relocation. As weather conditions worsen, an option that is being increasingly discussed nationwide is the relocation of critical infrastructure away from highly vulnerable areas—a strategy sometimes known as “managed retreat.” Some coastal states have used this approach in limited contexts to protect road segments that are increasingly threatened by erosion and floods.¹⁶³ For example, after spending over \$75 million on maintenance and repair costs in the last 10 years, NCDOT has successfully relocated portions of NC 12 to reduce future maintenance and repair costs from road damage and washouts. Moving forward, because extreme weather events could drive communities and development to lower-risk areas,¹⁶⁴ the relocation of travel routes may also need to be considered as part of a holistic response to those migratory shifts.

Asset relocation can reduce future risk and thereby minimize recurring repair costs. It can also offer a longer-term solution in situations where in-place resiliency measures are not feasible or cannot provide adequate protection. However, moving infrastructure is cost-intensive. Relocating a road, bridge, or other facility incurs the substantial planning, design, right-of-way, and construction costs associated with any new transportation project. If climate conditions do ultimately require North Carolina to further pursue this strategy, even in a very limited way, it is likely to place a heavy additional burden on the state’s transportation budget.

Combined Effects of Transportation Disruptors

Taken together, technological, demographic, and environmental disruptors are likely to present two kinds of challenges to transportation funding in North Carolina. The first is an increased burden on the state’s already constrained transportation budget. New, technology-enabled travel options such as autonomous vehicles, connected vehicles, and shared mobility options will require upgrades to existing infrastructure. A shift in trucking patterns toward delivery trips in more densely populated areas will add wear-and-tear and congestion to those roadways. A growing, aging, and urbanizing population will place new and complex demands on the system. Worsening weather events will incur heavy costs for facility repairs, upgrades, or relocations.

¹⁶³ www.georgetownclimate.org/adaptation/toolkits/managed-retreat-toolkit/asset-relocation-and-realignment.html; onlinepubs.trb.org/onlinepubs/circulars/ec265.pdf

¹⁶⁴ www.ncdot.gov/initiatives-policies/Transportation/nc-2050-plan/Documents/drivers-opportunities-demographic-eng.pdf

At the same time, these disruptions will also affect how much funding is available for transportation investments. Today, North Carolina's state transportation revenues come from fuel taxes, driver and vehicle fees, and the Highway Use Tax on vehicle sales. **Each of these revenues is tied to long-standing assumptions about how many of us drive, how much we drive, what kinds of vehicles we drive, and how we buy goods and services. Those assumptions are now crumbling.** Emerging travel options that lower fuel consumption or bypass personal vehicle ownership promise to erode traditional funding sources. Yet today, many of these alternatives contribute little or no revenue to the state's transportation program. To secure critical financial resources for the future, North Carolina will need to close the gap between 20th century funding models and 21st century investment needs.

To secure critical financing resources, North Carolina will need to close the gap between 20th century funding models and 21st century investment needs.

Travel and Vehicle Trends

Trends in how much people travel and the kinds of vehicles they buy are having a significant impact on transportation funding in North Carolina. Although motorists are currently expected to continue to drive an equal or greater number of miles per year, they will do so in increasingly fuel-efficient and long-lasting vehicles. Over time, this combination will place a greater demand on state roadways while generating fewer tax revenues to maintain and improve them.

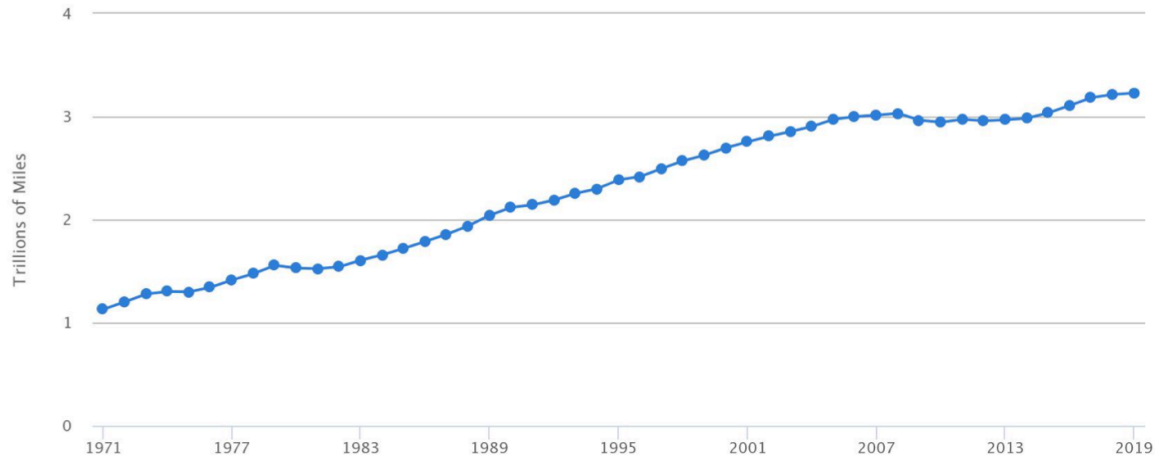
"The way people and goods move from point A to B is changing rapidly, yet the current model for funding underlying infrastructure does not come close to meeting the needs of the transportation and transit evolution. If North Carolina can pivot its funding model and invest meaningfully in the transportation of tomorrow, we can lead the nation in providing cleaner, safer, and more efficient access to economic mobility."

—The Honorable Julie Eiselt

Vehicle miles traveled. While population growth and the number of miles traveled is trending higher, signs point to trouble ahead. First, while people are driving more, the annual percentage growth in travel is shrinking. Over the last four years, the growth in miles traveled in the state has fallen annually, from 4.1 percent in 2016, to 2.3 in 2017, 1.7 in 2018, and 1.2 percent in 2019. This reflects larger trends: Nationwide, vehicle miles traveled flattened

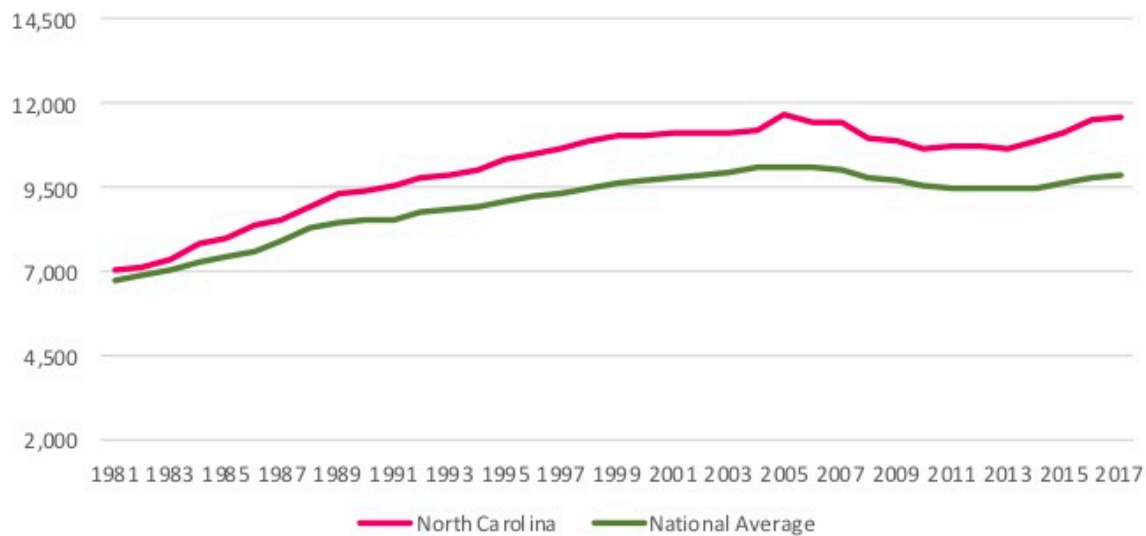
starting in 2008 due to the economic recession, and although they have been rising again since 2012, the rate of increase has been lessening over the last three years (**Figure 29**).¹⁶⁵

Figure 29: Annual Vehicle Miles Traveled in the United States, 1971–2019



A second warning sign is that, although gasoline consumption has increased in recent years, that modest increase may be due mainly to population growth. More people are driving, but per capita measures of vehicle miles traveled (**Figure 30**) indicate that how much each person drives is leveling off or even declining. Factors such as increased urban mobility, technology-enabled travel alternatives, and rising use of public transit are expected to continue this trend, thereby decreasing fuel consumption and related taxes.

Figure 30: Vehicle Miles Traveled Per Capita



¹⁶⁵ afdc.energy.gov/data/10315

Studies disagree as to whether the number of miles traveled will continue to slow or actually decrease in the longer term, but a few likely trends have emerged. It is probable, for example, that commercial traffic will increase while personal travel moderates. This trend is reflected in recent fuel consumption patterns. While consumption of both gasoline and diesel typically increases each year, diesel sales have grown more than gasoline sales in seven of the last 10 years (**Figure 31**). In addition, vehicle miles traveled have risen more quickly and consistently in urban areas in the last decade (**Figure 32**), another trend that is expected to continue.

Figure 31: Fuel Consumption by Fuel Type in North Carolina, FY 2010–FY 2020

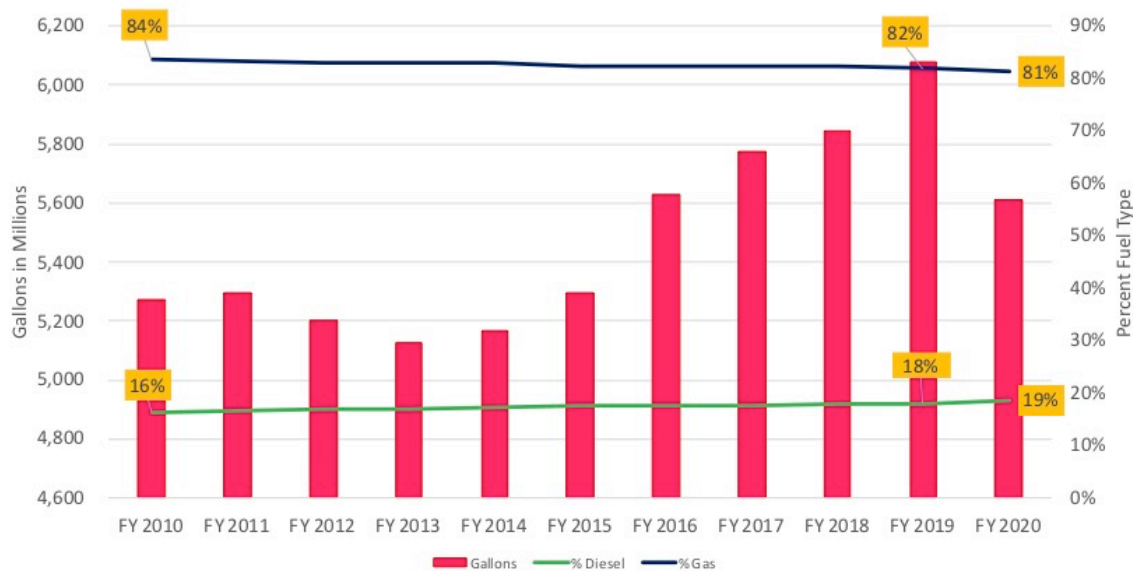
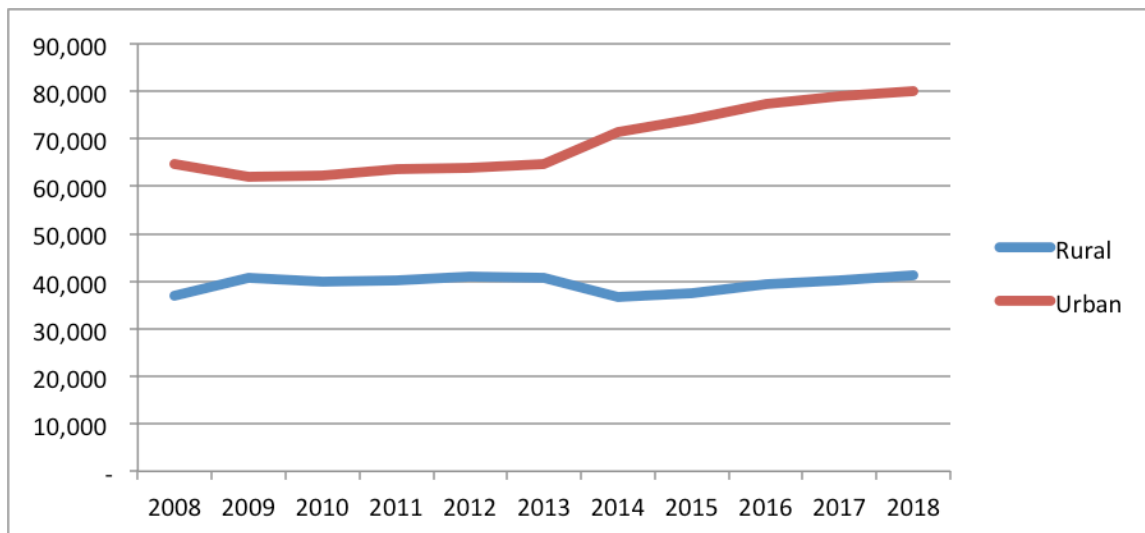


Figure 32: Urban and Rural Miles Traveled in North Carolina, 2008–2018¹⁶⁶

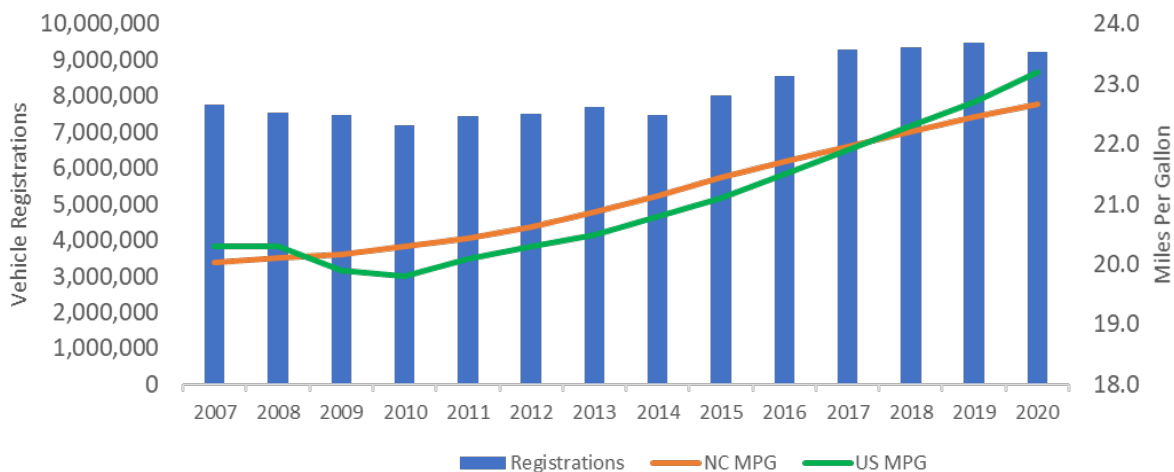


¹⁶⁶ Data from Table VM-2, FHWA Highway Statistics series: www.fhwa.dot.gov/policyinformation/statistics/

Vehicle fuel efficiency. Vehicle fuel efficiency has risen over the past decade, reaching an all-time high in 2020. For now, population growth and higher vehicle miles traveled, combined with inflationary increases in the motor fuel tax rate, are offsetting higher vehicle fuel efficiencies to maintain stable motor fuel tax revenues. However, as drivers trade in older vehicles for newer, more efficient models, the amount of tax collected per vehicle will decline.

Compared to 2007, North Carolina drivers can drive 2.9 miles further on a gallon of gasoline in 2020 (**Figure 33**).¹⁶⁷ This means that, all else being equal,¹⁶⁸ the average driver is now paying about \$30 less per year in state gas taxes based on improved fuel economy alone—a drop of about 15 percent. Under the federal Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule, issued in March 2020, Corporate Average Fuel Economy (CAFE) standards will increase by 1.5 percent annually over model years 2021 to 2026. As a result, new cars will reach an estimated average of 47.7 miles per gallon, and light trucks 34.1 miles per gallon, by 2026.¹⁶⁹ Increasing fuel efficiency not only affects state revenues, but also erodes federal aid that relies heavily on federal gas taxes.¹⁷⁰ In addition to more efficient gasoline-powered vehicles, the growing use of electric and hybrid vehicles (see **Technology** section, above) will exacerbate these effects.

Figure 33: North Carolina Vehicle Registrations with U.S. and North Carolina Fuel Economy, FY 2007–FY 2020



Vehicle durability. Due to advances in materials and technologies, vehicles are lasting longer. In 1970, automobiles lasted 5.6 years;¹⁷¹ now, according to IHS Markit, the average age of light

¹⁶⁷ NCDOT; 2020 N.C. Sess. Laws, Chap. 2020-3, §4.7(b)2; 2020 N.C. Sess. Laws, Chap. 2020-91, §4.7(b); 2020 N.C. Sess. Laws, Chap. 2020-97, §3.14(b)

¹⁶⁸ Assumes today's gasoline tax rate and an average of 12,000 miles driven per year

¹⁶⁹ www.federalregister.gov/documents/2020/04/30/2020-06967/the-safer-affordable-fuel-efficient-safe-vehicles-rule-for-model-years-2021-2026-passenger-cars-and

¹⁷⁰ See, for example, www.cbo.gov/publication/56346 and www.cbo.gov/publication/43036. Note, however, that both were published before the final SAFE Vehicles Rule was released in March 2020.

¹⁷¹ www.fhwa.dot.gov/ohim/onh00/line3.htm

vehicles in operation in the U.S. is 11.8 years.¹⁷² As shown in **Figure 34**, average vehicle age is rising in every region in the country.¹⁷³ Reflecting national trends, North Carolina’s average vehicle age increased from nine years in 2007 to 10.9 years in 2019 (**Figure 35**).¹⁷⁴ As owners keep their vehicles longer and buy new ones less frequently, this affects another key revenue source for transportation investments, the one-time Highway Use Tax (HUT) on vehicle sales.

Figure 34: Average Age of Light Vehicles by U.S. Region

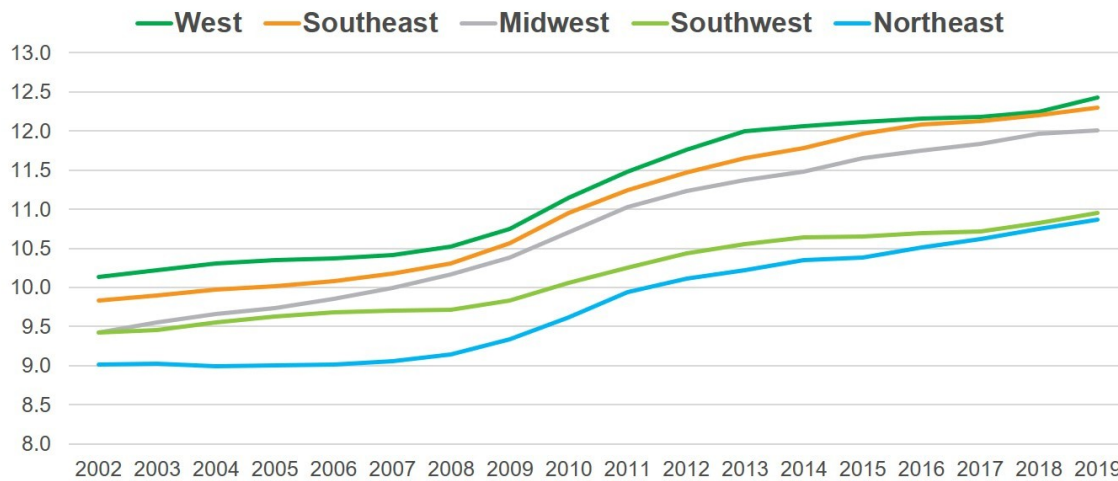
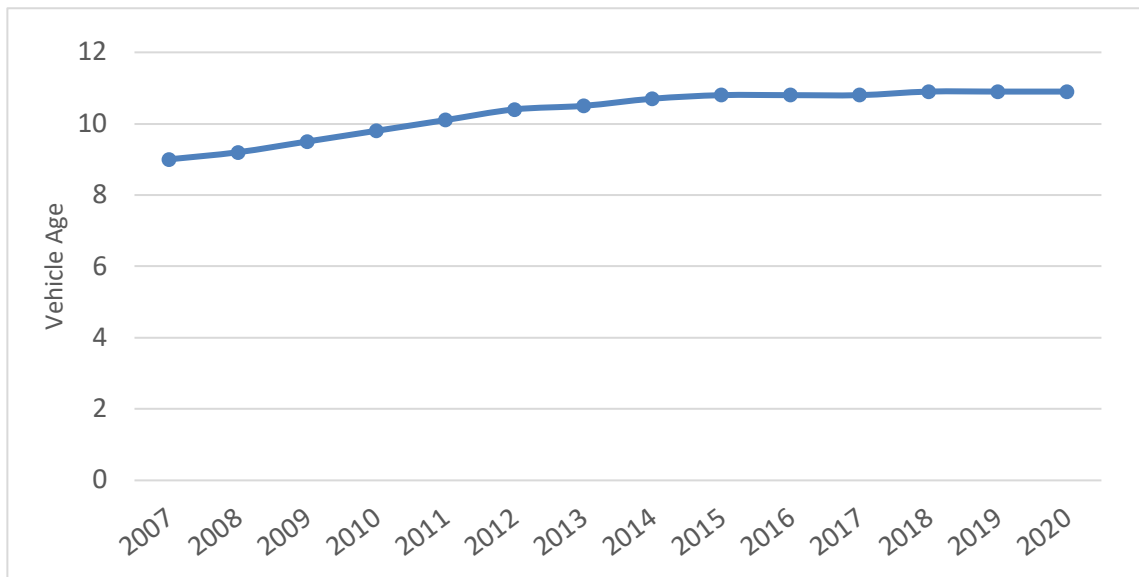


Figure 35: Average Age of Vehicles in North Carolina



¹⁷² news.ihsmarket.com/press-release/automotive/average-age-cars-and-light-trucks-us-rises-again-2019-118-years-ihs-markit-

¹⁷³ Ibid. Based on a snapshot taken January 1 of each year shown.

¹⁷⁴ NCDOT

Federal Funding Gap

North Carolina receives approximately \$1.2 billion annually, approximately 25 percent of NCDOT's budget, in federal transportation revenues to support critical surface transportation projects and other eligible programs. Only 28 percent of the state's roads, mostly located on Interstates and the primary system, are eligible to receive federal funding. While federal funding has remained stable, without congressional action, the federal Highway Trust Fund's insolvency may lead to future state funding reductions.

Monies are transferred to states from the federal Highway Trust Fund, which is supported by an excise tax on motor fuel and heavy vehicle taxes, including a tax on certain tires for heavy trucks. The federal gasoline and diesel fuel taxes, unchanged since 1993, are 18.4 and 24.4 cents per gallon, respectively. Along with most state transportation departments, including NCDOT, the federal Highway Trust Fund is overly reliant on motor fuel tax revenues. According to the Congressional Budget Office, 82 percent of federal Highway Trust Fund receipts are generated from excise taxes on gasoline, diesel, and other motor fuels.¹⁷⁵

As a result of general inflation, the purchasing power of the state and federal gasoline taxes are sharply declining (**Figure 36**). As a result, for more than a decade, revenues have generated less than the amount spent (**Figure 37**).¹⁷⁶ In testimony to the NC FIRST Commission, Jeff Davis, Senior Fellow with the Eno Center for Transportation, stated that "North Carolina's gas tax rate in 1956 was the equivalent of 93 cents per gallon in 2017 and has lost value ever since. The federal tax rate peaked at the 2017 equivalent of 49 cents per gallon in 1960. In both cases, the real buying power of the gas tax is now about what it was in the early 1980s, before the big 1982 tax increases."¹⁷⁷ Combined with the impacts from rising fuel economy in gasoline-powered vehicles and an increase in electric vehicles, Highway Trust Fund revenues have required additional funding to maintain current spending levels.¹⁷⁸ Since 2008, Congress has supplemented the Highway Trust Fund with more than \$153 billion in General Fund transfers.¹⁷⁹

¹⁷⁵ www.cbo.gov/publication/56373

¹⁷⁶ www.federalbudgetinpictures.com/highway-trust-fund-runs-deficits/

¹⁷⁷ Presentation and remarks by Jeff Davis, Eno Foundation, to the NC FIRST Commission on July 12, 2019, www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/2019-07-12-davis-presentation.pdf and www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/2019-07-12-davis-remarks.pdf

¹⁷⁸ The Congressional Budget Office estimates the federal Highway Trust Fund will require, on average, an additional \$4 billion annually over baseline revenue projections to maintain the current conditions and performance of the highway system: www.cbo.gov/publication/56373#_idTextAnchor026

¹⁷⁹ Includes \$140 billion in transfers from 2008 through 2020, plus a \$13.6 billion transfer that was authorized by the Continuing Appropriations Act, 2021 and Other Extensions Act (P.L. 116-159), enacted on Oct. 1, 2020.

Figure 36: Lost Gasoline Tax Buying Power, 1956–2017

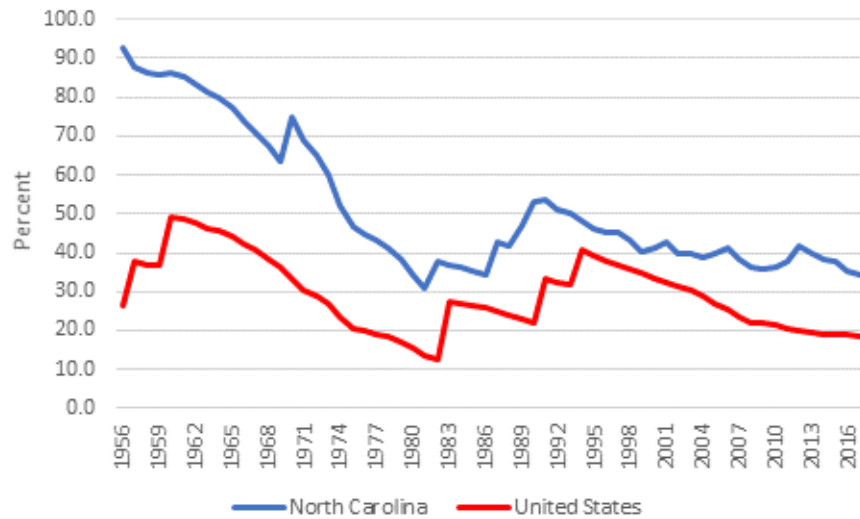
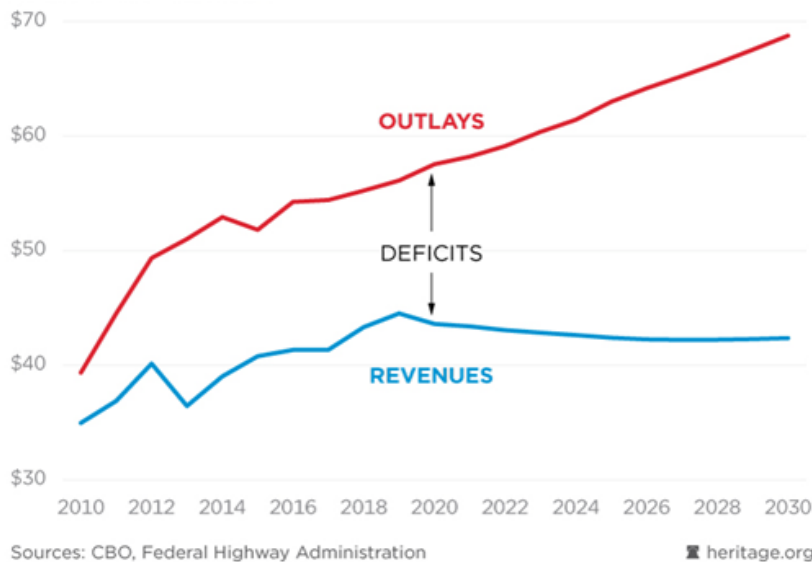


Figure 37: Highway Trust Fund Projected Deficit (in \$ Billions)



The amount of federal funding is established in multi-year authorization bills and an annual appropriation bill. The Fixing America's Surface Transportation (FAST) Act, the current authorization bill, received a one-year extension at 2020 contract authority limits through Sept. 30, 2021. Congress also approved a \$13.6 billion transfer from the General Fund to the Highway Trust Fund to meet short-term FFY 2021 funding needs.¹⁸⁰ The transfers have stabilized funding

¹⁸⁰ Continuing Appropriations Act, 2021 and Other Extensions Act (P.L. 116-159), enacted on Oct. 1, 2020, www.congress.gov/bills/116/congressional-legislation/8337/text

levels, but the stagnant growth has created a backlog of needs. As of 2017, the American Society of Civil Engineers estimated it would cost an additional \$1.7 trillion to raise the condition of America's infrastructure from a Grade D+ to a Grade B.¹⁸¹

The upcoming 2021 congressional session will face an expiring authorization bill, a funding shortfall, and calls for increased funding. Regardless of whether Congress chooses to replace the FAST Act or pass a second extension, an additional infusion of funding will be needed to maintain current spending levels. Based on Congressional Budget Office (CBO) projections, Congress will need to transfer an additional \$176 billion to address the shortfall through 2030. Without these funds, transfers to state DOTs will be reduced by approximately 38 percent by 2030.¹⁸²

Congressional leaders may also seek to modernize how transportation is funded and evaluate funding levels to meet future infrastructure needs, but there is no clear path to sustain revenues, much less increase them. CBO presented several options to Congress to maintain federal spending levels through 2030, but it is important to note that current spending is not sufficient to maintain current highway conditions. One option is to immediately raise federal taxes on motor fuels by 15 cents per gallon and authorize an inflationary factor in subsequent years.¹⁸³ Since increasing the federal gas tax is currently viewed as politically infeasible, members of Congress are actively seeking new revenue sources. The 2015 FAST Act included \$15 million for FY 2016 and \$20 million for each FY from 2017 to 2020 in state grants to demonstrate alternative user fee revenue mechanisms, like a Mileage-Based User Fee,¹⁸⁴ that could help maintain the long-term solvency of the Highway Trust Fund.¹⁸⁵ These grants have been awarded to 10 states and two multi-state efforts including the Eastern Transportation Coalition, in which North Carolina participates.

Public Perceptions of Transportation Infrastructure and Investment

Public support is often key to seeking revenue modifications. Recent studies indicate both challenges and opportunities concerning public perceptions about transportation infrastructure and additional investments for it.

¹⁸¹ www.infrastructurereportcard.org/

¹⁸² www.cbo.gov/publication/56346. Note: The \$13.6 billion transfer included in the October 2020 continuing resolution (P.L. 116-159) was deducted from CBO's May 2020 projection of a \$189 billion shortfall by 2030.

¹⁸³ Ibid.

¹⁸⁴ For more about Mileage-Based User Fees, see the NC FIRST Commission Brief 12: Mileage-Based User Fees, July 2020, www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-brief-edition-12.pdf.

¹⁸⁵ highways.dot.gov/research/technology-innovation-deployment/grant-programs; www.fhwa.dot.gov/fastact/factsheets/surftransfundaltfs.cfm

Two recent in-state surveys indicate that people consider the transportation network to be important. Respondents to a 2020 DHM survey ranked transportation as their third most important issue, lagging only one to two percentage points behind education and the economy, respectively. A separate ITRE survey found that 71 percent cited transportation issues as either somewhat important or very important.¹⁸⁶

In addition, both national and state surveys have identified broad support for maintenance activities but varying support for other investments. A national Mineta Transportation Institute study indicated satisfaction with road condition, yet the top goal of respondents was maintaining and improving roads, followed by reducing crashes and improving safety, then reducing traffic congestion. In North Carolina, the DHM study found that respondents supported additional investment in maintenance activities and public transit over new road construction projects. The ITRE study favored highway maintenance over reducing traffic congestion and expanding public transit systems, but it is worth noting that 84.5 percent reported never having used public transit.

Survey results indicate that more public education may be necessary to convince residents of the need for additional investments, especially because respondents have tended to report satisfaction with road conditions. Tellingly, in a split question on the DHM survey, where all respondents were asked if they felt more funding was needed but only half were provided further information about the exact amounts to be levied, support for more funding increased from 41.8 percent to 55 percent by adding the educational component. **This finding presents a substantial opportunity to build public support for infrastructure investment through educational outreach.**

The public may also benefit from more education about the existing tax structure. For example, 27 percent of DHM respondents did not know that the combined federal and state gas taxes are included in the price of gas at the pump and 58 percent underestimated the amount of federal and state tax paid per gallon. In another example, changing how the same information was presented varied the results. The ITRE survey asked some respondents if paying \$200 annually in gas taxes was a fair price, while other respondents were asked about an equivalent \$15 monthly. More than 12 percent reacted more positively to the monthly amount. In both questions, however, most respondents thought the amount paid was fair.

¹⁸⁶ This section uses the results of three surveys. (1) I-95 MBUF North Carolina Baseline Survey, conducted in April 2020 by DHM Research; (2) NC Citizen Perceptions, conducted in July 2020 by the Institute for Transportation Research and Education (ITRE) at NC State University; and (3) What Do Americans Think About Federal Tax Options to Support Transportation? Results from Year Eleven of a National Survey, released in June 2020 by the Mineta Transportation Institute and San Jose University available at transweb.sjsu.edu/sites/default/files/2007-Agrawal-Public-Opinion-Federal-Tax-Options-Transportation.pdf.

Finally, both challenges and opportunities exist in terms of the public's attitudes toward alternative revenue options. In another example showing how additional educational material influences the outcome, the ITRE survey asked another split question about which revenue option should be used to increase revenues. Those respondents receiving no further information preferred gas taxes (44.3 percent), general Sales Tax (35.1 percent), and a Mileage-Based User Fee (20.6 percent), but for respondents who were told the equivalent amount each tax would need to increase to raise an additional \$500 million, the results shifted in preference of a Sales Tax (49.5 percent), then gas taxes (27.6 percent) and a Mileage-Based User Fee (22.9 percent). Other ITRE results indicate the majority of respondents oppose electric and hybrid vehicle owners paying less than gasoline vehicle owners, support a weight-based fee for heavy vehicles, and highly oppose a tax on electricity.

Survey questions about the specific option of a mileage-based fee revealed some additional challenges and opportunities. While only 44 percent of Mineta respondents supported replacing the gas tax with a Mileage-Based User Fee, if the user fee applied only to commercial vehicles (such as delivery and freight trucks, taxis, and ride sharing vehicles) the majority of responses supported it. **According to the DHM results, North Carolina residents are close to evenly split on their support for Mileage-Based User Fees** (42 percent support, 44 percent oppose). Reasons to oppose the fee included privacy concerns, the impact to rural drivers, and ensuring out-of-state drivers paid their fair share. At the same time, respondents felt that the main advantage of a Mileage-Based User Fee was that those who used the highways more, regardless of vehicle fuel type or vehicle model, would pay more. Indeed, more than half—53 percent—thought a Mileage-Based User Fee would be equal to or more fair compared to the gas tax. Respondents also thought that, if North Carolina were to roll out an MBUF program, participation should first be voluntary or consist of commercial truckers.

Increasing public education around these five topics may be most beneficial.

1. **Existing Revenue System.** How much and what types of revenues fund transportation currently? How much does the average citizen pay in transportation revenues? Is the current revenue structure fair? Is it competitive?
2. **Revenue Solvency.** Why are existing taxes and fees expected to decline? How will technology innovations, new mobility options, and demographic changes impact revenues?
3. **Investment Scope.** What types of improvements are being funded now? Are funds being spent efficiently? Why are transportation improvements so expensive?

4. **Alternative Revenue Sources.** What are other revenue options and how will these options affect how much is paid by the average citizen? For Mileage-Based User Fees in particular, how would this option affect privacy, out-of-state drivers, and urban/rural equity?
5. **Investment Benefits.** How do transportation investments improve the quality of life and create economic growth? What happens if the state does not increase transportation funding?

Investment Opportunities Presented by Transformative Changes

The transformative changes confronting the transportation sector present many challenges to the system and how it is funded, but they also provide significant opportunities for the people of North Carolina. Electric and hybrid vehicles promise to reduce air emissions, helping the state meet its environmental policy goals. New mobility services could improve public safety and provide alternatives for people who cannot or choose not to drive. Proponents claim that autonomous and connected vehicles could reduce traffic accidents, lower energy usage, reduce shipping costs, and increase access and mobility. A growing and diverse population means vibrant communities, a vital workforce, and increased opportunities for economic development.

“This is a very timely report. There are tremendous technological advancements occurring globally that affect transportation. At the same time North Carolina’s robust transportation system has been challenged by extreme weather, which has significantly damaged the transportation infrastructure, along with a never-ending need to maintain and update the array of transportation modals in the state. In rebuilding, it’s an opportunity to renovate. North Carolina has been known as an innovation hub across the country. We also are known as one of the states with the greatest connectivity of roadways, ferries, flight, and rail. Through this report we hopefully will blend those concepts together to support the very dynamic future that’s available for the state of North Carolina.”

– Sallie Shuping-Russell

In the area of transportation funding specifically, these disruptions have created an opportune moment for meaningful change. As a host of current trends threaten traditional transportation revenue sources and funding gaps widen, recognition has been growing nationwide that new and better ways of paying for infrastructure investments are needed.

At the federal level, this recognition has manifested with initiatives such as the Surface Transportation System Funding Alternatives (STSFA) grant program, which since 2016 has awarded \$40 million to states for projects that test the design, implementation, and acceptance of user-based alternative revenue tools—such as a Mileage-Based User Fee—that could help supplement the federal gas tax and provide long-term support for the Highway Trust Fund.¹⁸⁷ These grants have been awarded to 10 states (California, Colorado, Delaware, Hawaii, Minnesota, Missouri, New Hampshire, Oregon, Utah, and Washington) and two multi-state efforts by the Western Road User Charge Consortium and the Eastern Transportation Coalition, in which North Carolina participates. The state may wish to apply for an independent STSFA grant to pilot a Mileage-Based User Fee program or other user-based revenue tools.

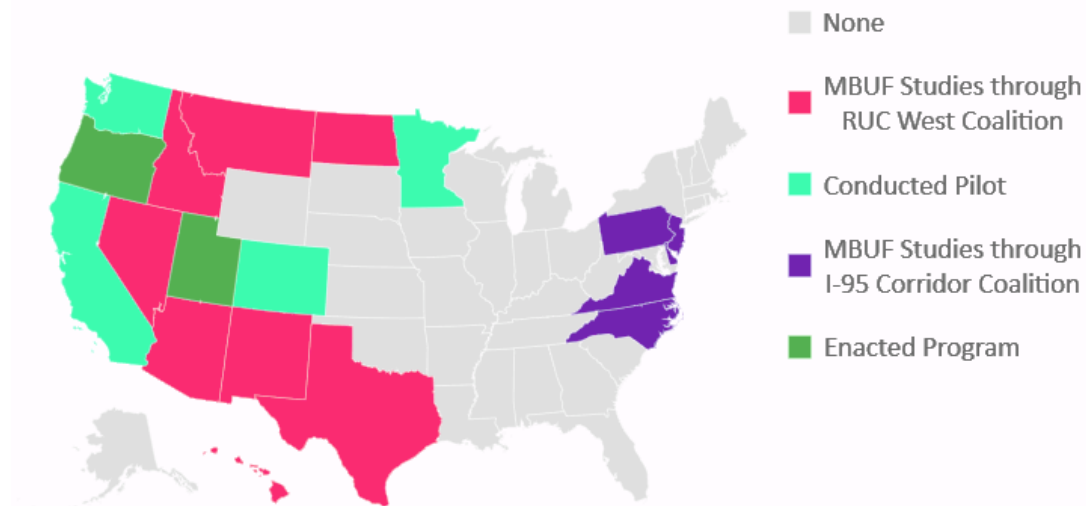
As federal fuel taxes stagnate and the Highway Trust Fund continues to face looming insolvency, however, it is the states that have responded most emphatically and creatively to the transportation funding crisis. Since 2013, 31 states have enacted legislation to increase or index their fuel taxes.¹⁸⁸ In addition, at least 19 states have evaluated Mileage-Based User Fees, with Oregon and Utah having implemented their own voluntary programs (**Figure 38**), and 28 states now assess fees on electric or hybrid vehicles.¹⁸⁹ Today, states use more than 80 different revenue sources for transportation investments, including dedicated sales taxes, special fees and tolls for heavy vehicles, and taxes on electricity that is used to charge vehicles.¹⁹⁰ As funding shortfalls have sparked state innovations, those efforts in turn have offered their own opportunity in the form of an array of possibilities for other states to consider.

¹⁸⁷ cms8.fhwa.dot.gov/newsroom/federal-highway-administration-awards-151-million-seven-pilot-projects-advance-new-highway

¹⁸⁸ www.ncsl.org/research/transportation/2013-and-2014-legislative-actions-likely-to-change-gas-taxes.aspx

¹⁸⁹ For more about Mileage-Based User Fees and Electric Vehicle Fees, see the NC FIRST Commission Brief 12: s, July 2020, www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-brief-edition-12.pdf and the NC FIRST Commission Brief 8: Revenue Impact from Electric and Hybrid Vehicles, May 2020, www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-brief-edition-8.pdf.

¹⁹⁰ For more about how other states and countries pay for transportation investments, see the NC FIRST Brief 9: Other Jurisdictions, May 2020, www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-brief-edition-9.pdf. A full list of state transportation revenue sources that were in use as of 2016 is available at www.financingtransportation.org/pdf/50_state_review_nov16.pdf.

Figure 38: States Participating in Mileage-Based User Fee Studies, Pilots, and Programs

In addition, some of the developments that are affecting the mobility sector have introduced new possibilities for diversifying transportation revenues. Currently, emerging trends such as car sharing, vehicle subscription services, Transportation Network Companies (e.g., Uber and Lyft), shared micromobility, e-commerce, and drones or other last-mile delivery devices are either not taxed by North Carolina at all or, if they are, provide little or no support to the state's transportation program. These trends have the potential to generate substantial revenues that would help offset the demands they place on the transportation network, thus maintaining the logical "user pay" nexus between using the system and contributing to its upkeep.

Lastly, as states have been looking for ways to stretch limited public dollars, interest has grown in opportunities to involve the private sector in infrastructure improvements.¹⁹¹ At least 38 states including North Carolina now have statutes that allow the state to enter into public-private partnerships (PPPs or P3s) for transportation projects.¹⁹² In some PPPs, private investors have provided upfront capital to expedite a new project. In others, existing toll roads have been leased to private operators in return for sizable upfront payments, thus allowing public agencies to leverage existing infrastructure to help pay for other projects.

¹⁹¹ For more about PPPs and other financing tools, see the NC FIRST Commission Brief 13: Transportation Finance, September 2020, www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-brief-edition-13.pdf.

¹⁹² www.ncsl.org/research/transportation/ncsl-p3-update.aspx

"This report provides a pathway to create a safe and efficient multimodal transportation network that supports the mobility needs of all North Carolinians. A modernized and diversified revenue portfolio will transform the economic mobility and opportunity, especially in our low-income and rural communities."

– Kim Saunders

PPPs are not a panacea and, because any private investment must be repaid, cannot solve funding shortfalls in the long run. For the right project, however, access to private capital can make all the difference—and the private sector is poised to invest. The amount of private equity allocated for infrastructure but not yet deployed is reported to be unprecedentedly high. As of June 2020, an estimated \$217 billion sat dormant in infrastructure-focused private equity funds.¹⁹³ The strong level of private interest in infrastructure presents a valuable opportunity for those states that are positioning themselves to take advantage of it.

¹⁹³ www.ey.com/en_us/private-equity/how-pe-infrastructure-funds-are-getting-new-options. For more about private interest in infrastructure investment, see also www.pwc.com/gx/en/industries/assets/pwc-giia-global-infrastructure-investment-2017-web.pdf, and reason.org/privatization-report/annual-privatization-report-2020-transportation-finance/.

8. North Carolina’s Transportation Investment Needs

Needs Analysis Overview

This section is broken into three parts. The first section includes a comparison of three analyses performed in 2020 that seek to estimate NCDOT investment needs. The second section is divided into two sections for maintenance and construction activities. It overviews the Highway Fund and Highway Trust Fund budgets, highlights the recommended levels of maintenance investment identified in the 2020 Maintenance Operations and Performance Analysis Report,¹⁹⁴ and displays the results from a detailed analysis of the Highway Division’s investment needs. Needs are categorized into four grades, ranging from “A” to “D.” The third section overviews the budgets of the four multimodal divisions and includes a similar needs analysis for each division.

A backlog of investment needs exists throughout the state and in every NCDOT modal division. This section examines the results of two recent studies containing state transportation investment analyses and a separate needs analysis prepared for the NC FIRST Commission that details each modal division’s needs. Each analysis included an estimate of need to achieve an “excellent” or “Grade A” transportation network. As shown in **Figure 39**, these three analyses produce remarkably similar findings.

Figure 39: Comparison of Three Needs Analyses to Achieve a “Grade A” Transportation Network¹⁹⁵

Ten-Year Investment Needs in Billions (Inflation Adjusted)			
	ITRE	NC Moves	NC FIRST
Grade A	\$32.0 (\$42.9)	\$43.0 (\$55.0) (system condition not specified)	\$41.5 (\$52.7)
Grade B	\$13.0-32.0 (\$16.6-40.9)		\$30.2 (\$38.3)
Grade C	\$0-13.0 (\$0-16.6)		\$13.7 (\$17.4)
Grade D	\$0		\$4.4 (\$5.6)

¹⁹⁴ connect.ncdot.gov/resources/Asset-Management/MOPAR%20Docs/2020-MOPR-Report.pdf

¹⁹⁵ The ITRE report provided an annual estimate of needs. The 10-year analysis was computed for purposes of comparison. The NC Moves report included one estimate based on future scenarios rather than system condition. The NC Moves analysis included an inflationary factor that was applied to the ITRE and NC FIRST estimates.

NC Chamber and ITRE. The NC Chamber Foundation, in collaboration with the Institute of Transportation Research and Education (ITRE) at NC State University, issued a recent report that outlines NCDOT’s transportation needs.¹⁹⁶ The ITRE analysis estimates how much it costs to achieve different condition levels (**Figure 40**). Since the combined state and federal funding is \$5 billion annually, the report indicates NCDOT’s infrastructure condition is “mediocre.” To improve the transportation network’s condition, ITRE finds that a minimum annual additional investment of \$1.3 billion is needed to achieve “good” condition and \$3.2 billion for “excellent” condition.

Figure 40: NC Chamber/ITRE: System Condition per Level of Investment

Infrastructure Condition	Annual Systems Needs in Billions
Very Poor (F)	<\$3.8
Poor (D)	\$3.8-\$4.8
Mediocre (C)	\$4.8-\$6.3
Good (B)	\$6.3-\$8.2
Excellent (A)	>\$8.2

NC Moves 2050. The NC Moves 2050 plan is NCDOT’s strategic transportation plan connecting communities across North Carolina.¹⁹⁷ The plan explores four alternative future transportation scenarios and illustrates funding needs through 2050 for each scenario.

- The “Innovative” scenario focuses on technology in transportation. It envisions a future where technology drives new development patterns and economic growth, resulting in a low-carbon, low-cost, shared, and more accessible multimodal system.
- The “Renewed” scenario focuses on community growth. It envisions a future where small towns and rural communities grow and are more connected to each other and urban centers by a variety of transportation modes.
- The “Globally Connected” scenario focuses on economic growth while envisioning a future where economic growth in manufacturing, technology, automation, and services positions North Carolina as a leading market for a skilled workforce, connected to the world by international gateways and an efficient freight system.

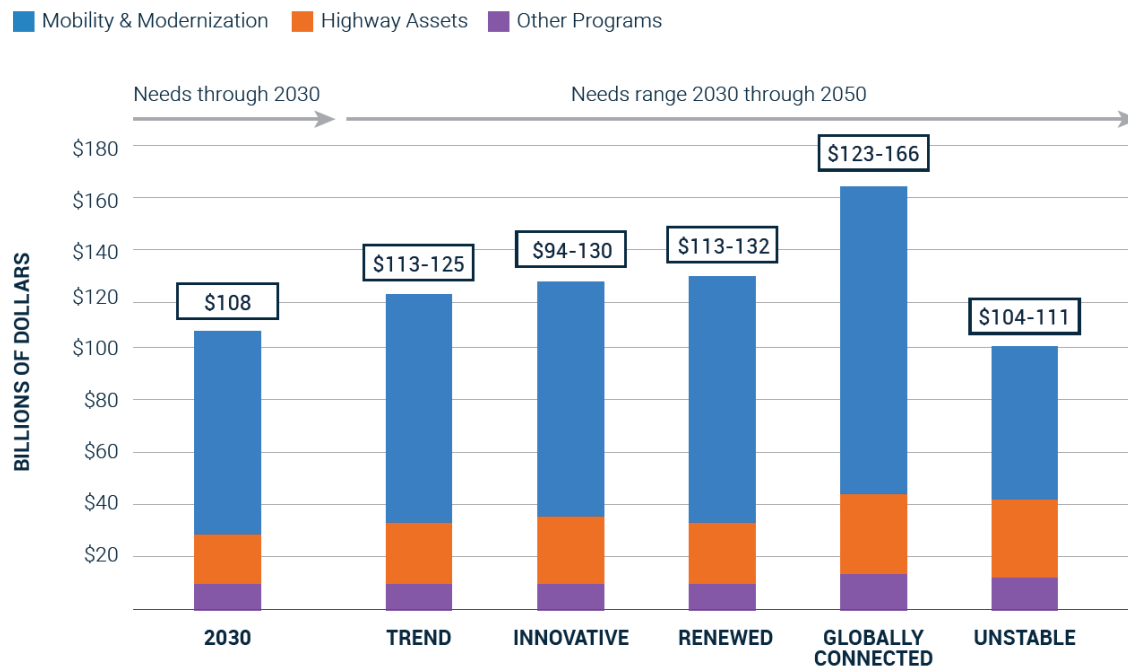
¹⁹⁶ Modernizing North Carolina’s Infrastructure Through Sustainable and Diversified Revenue Streams, 2020 Report, NC Chamber Foundation and ITRE.

¹⁹⁷ NC Moves 2050 report, unpublished draft

- The “Unstable” scenario presents an uncertain future where funding instability, political and social events, environmental threats, and energy uncertainty stall tourism and stagnate the economy. This creates a transportation network where travel costs are high, and mobility is unreliable.

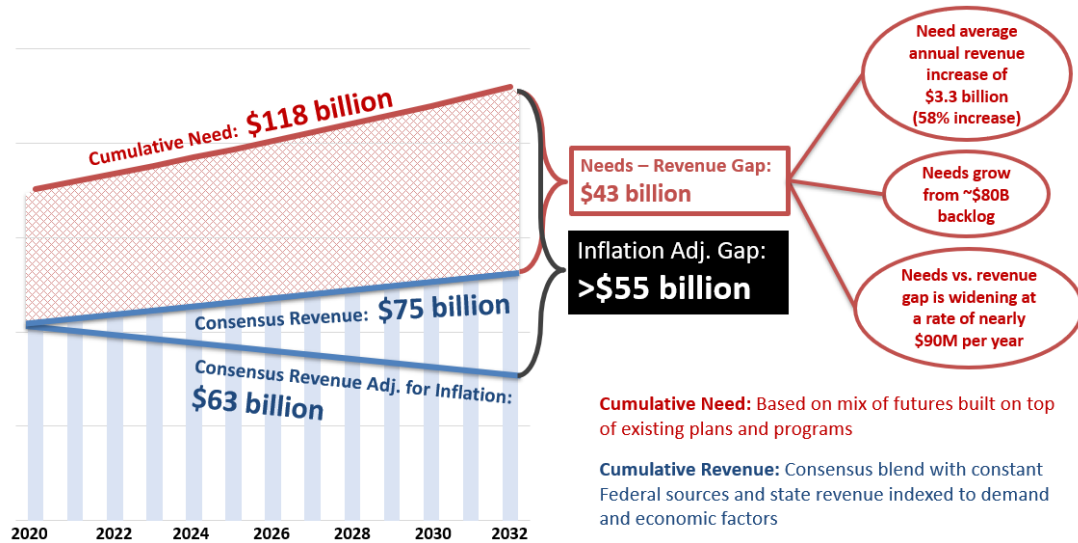
The report indicates NCDOT will need \$108 billion in total funding through 2030 and between \$104 billion to \$166 billion total from 2030 to 2050 (**Figure 41**).

Figure 41: NC Moves Estimate of Needs by Alternative Future through 2050



The NC Moves 2050, NCDOT’s strategic transportation plan, produced a separate analysis for the NC FIRST Commission that compared the revenue gap to the estimated investment need (**Figure 42**). After adjusting the funding gap to account for inflation, the report indicates NCDOT needs an additional cumulative investment of \$55 billion through 2032 to achieve an excellent transportation network. This level of investment will require a 58 percent increase in funding each year, without meeting inflationary demands.

Figure 42: NC Moves Estimate of Investment Needs vs. Revenue Gap through 2032



NCDOT Analysis. The following analysis provides a detailed examination of each modal unit to estimate the 10-year investment need and illustrates how the changes improve the transportation network through four investment scenarios (**Figure 43**). A Grade D investment of \$4.4 billion produces a minimal impact. The scope of improvement increases in Grades C and B. Grade A investments of \$41.5 billion, which include all improvements from previous grades, will make substantial improvements to all travel modes and will transform the state into a vibrant and connected transportation network.

Figure 43: Consolidated 10-Year Investment Needs, Cumulative

Investment Need (Billions)	Grade D	Grade C	Grade B	Grade A
Highway Maintenance-Roads	\$0.00	\$1.03	\$1.64	\$2.25
Highway Maintenance-Bridges	\$0.00	\$0.45	\$0.61	\$0.75
Highway Construction	\$1.60	\$7.00	\$19.80	\$27.60
Airports HTF Construction	\$0.02	\$0.02	\$0.04	\$0.07
Airports HF Construction	\$0.22	\$0.31	\$0.65	\$0.81
Ferry	\$0.20	\$0.22	\$0.23	\$0.27
Integrated Mobility	\$1.33	\$2.52	\$3.73	\$5.09
Rail	\$1.03	\$2.23	\$3.54	\$4.67
Total	\$4.40	\$13.78	\$30.24	\$41.51

Suggested investments in North Carolina's transportation network are transformational and will create a transportation network for the 21st century. The economic impacts will be felt across the state by citizens saving time and money on costly repairs. Industries will benefit from lower shipping costs, reduced fuel use, and less wear and tear on their fleets. The economy will grow with the transportation workforce, encouraging in-state businesses to expand and attracting other businesses to relocate to North Carolina. Rural areas will prosper with quicker access to four-lane roads. But most importantly, the transportation network will become safer to the traveling public. Highlights of these metamorphic changes are featured in **Figure 44**.

The recommended investments are transformational and will create a transportation system for the 21st century.

Figure 44: Highlights of Investing in Transportation by Investment Level

10-Year Investment	Grade D	Grade C	Grade B	Grade A
Annual vehicle operating costs from road condition (per person)	\$122	\$115	\$83	\$50
Pavement Condition	74% "Good"	79% "Good"	85% "Good"	90% "Good"
Bridge Condition	42% "Good"	42% "Good"	70% "Good"	98% "Good"
Highway Construction STIP Projects	Projects score 80 - 100 points	Projects score 70 - 80 points	Projects score 60 - 70 points	Projects score 50-60 points
Aviation	Safety and Condition Improvements	Navigation aid and runway lighting improvements	Taxiway and apron improvements, IT upgrades	Capital building improvements, equipment, fencing
Passenger Rail	New stations Southeast Corridor (Raleigh to Wake Forest)	Expand rail service Expand to Henderson	Expand rail service Expand to Ridgeway and Norlina	Expand rail service Raleigh to Richmond completed
Freight Rail	Short line railroad improvements			
	Highway grade separations (25%)	50%	75%	100%
	Corridor and facility improvements (25%)	50%	75%	100%
Ferry	Dock repairs, vessel rehabs	Pilings, shipyard improvements	Ramps, bulkheads, and pilings	Ramps and Gantries
Integrated Mobility	Electrifies the transit fleet in four equal stages	50%	75%	100%
	Projects score 80 - 100 points	Projects score 70 - 80 points	Projects score 60 - 70 points	Projects score 50-60 points

Highway Investment Needs

This section contains two analyses: an assessment of highway maintenance needs, such as pavement and bridge improvements, and construction needs generated from the projects submitted but not funded through the STI prioritization process.

Highway Maintenance

[Highway Maintenance Overview](#)

The state highway program has several components. The Highway Fund supports maintenance and small discretionary construction activities. State revenues are largely derived from the Motor Fuel Tax, DMV fees, and a \$10 million transfer from taxes on short-term vehicle rentals (**Figure 45**). Maintenance activities are 55 percent of Highway Fund expenditures (**Figure 46**). The Highway Trust Fund, covered in the next section, supports prioritized construction projects.

Figure 45: FY 2020 Actual State Highway Fund (HF) Revenues

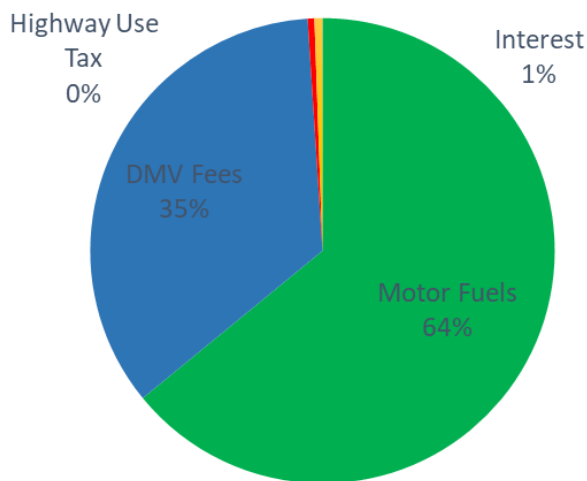
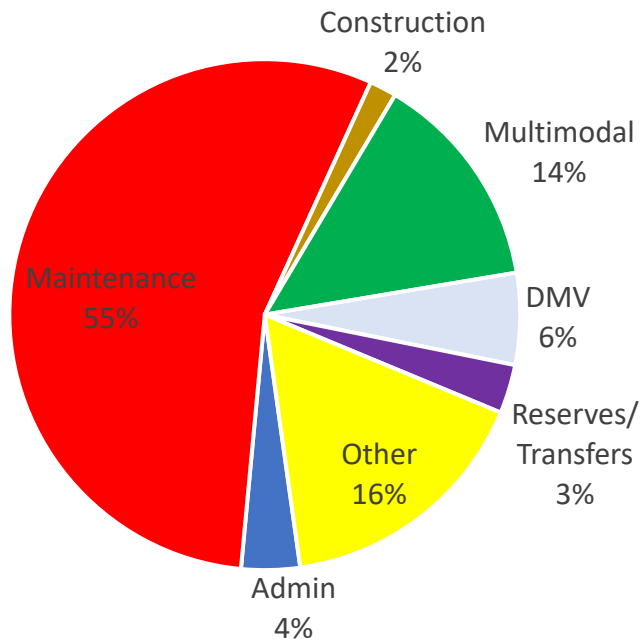


Figure 46: FY 2020 Actual State Highway Fund (HF) Expenditures



No single activity is more critical than highway maintenance. General maintenance includes bridge maintenance and replacement, activities such as filling potholes and replacing street signs, baseline funding for weather events, and statewide programs, such as the Incident Management Assistance Program and intelligent traffic control systems. The need for additional funding exists in every maintenance category. According to the 2020 biennial Maintenance Operations and Performance Analysis Report (MOPAR),¹⁹⁸ NCDOT requires an additional \$498 million annually to address unmet need (**Figure 47**). The report recommends a minimum investment of at least \$295 million per year. General maintenance activities, which have been consistently underfunded, represent 75 percent of the additional needs per year.

¹⁹⁸ connect.ncdot.gov/resources/Asset-Management/MOPAR%20Docs/2020-MOPR-Report.pdf

Figure 47: Biennial MOPAR Findings

Fund	FY 2020 Appropriation (\$ Million)	Activity	Need Per Year (\$ Million)	Recommended Investment Per Year (\$ Million)
Pavement Preservation	85.36	Preservation	182.0	120.0
Contract Resurfacing	558.67	Resurfacing	640.0	600.0
Bridge Program	273.94	Bridge Replacement	286.6	287.0
Bridge Preservation	69.69	Bridge Preservation	80.0	90.0
General Maintenance Reserve (GMR)	517.38	GMR Total	783.1	669.0
		Bridge Maintenance (Planned + Unplanned)	45.6	50.0
		Routine Maintenance Activities (Planned + Unplanned)	572.5	450.0
		Snow and Ice/ Non-Declared Emergencies	90.0	94.0
		Statewide Programs	75.0	75.0
Roadside Environmental	101.33	Roadside Activities (Planned + Unplanned)	134.4	135.0

Note: Resurfacing and Pavement Preservation need is based on the total funding amount needed to meet pavement condition targets, spread over a 5-year period

[Highway Maintenance Investment Needs](#)

This analysis, developed by the Division of Highways, provides four investment scenarios to improve highway condition. The goals range from Grade A, which represents the investment needed to maintain pavement and bridges at an overall “excellent” level, to Grade D, which represents the investment needed to maintain pavements and bridges at their existing conditions.

As shown in **Figure 48**, the four investment scenarios range between no additional investment to maintain current conditions to \$3 billion over the next ten years and deliver a range of

highway pavement and bridge conditions can be classified as “good,” “fair,” and “poor” condition. “Good” represents assets with overall few deficiencies and “poor” represents assets with deficiencies including cracking, roughness, rutting, and spalling. Condition is influenced by maintenance activities including pavement preservation, contract resurfacing, and bridge maintenance and preservation.

Pavements and bridges in “fair” and “poor” conditions negatively impact the public’s vehicle operating costs. Driving over rough, cracked, or poorly maintained pavements and bridges causes wear on vehicles that the user pays in additional maintenance costs, lower fuel efficiency, and increased wear on brakes and tires. Each investment scenario reduces the vehicle operating cost, with the Grade A scenario representing the highest reduction in those costs.

An increased investment in routine bridge maintenance activities will reduce the need for more extensive bridge repairs and rehabilitations. Proactive bridge maintenance will prevent and delay deterioration and will lower the total lifetime cost. Failing to adequately fund bridge maintenance may increase the number of weight restrictions and bridge closures and impact bridge safety.

Figure 48: Highway Maintenance Investment Needs, Cumulative

Investment Need (Billions)	Grade D	Grade C	Grade B	Grade A
Highway Maintenance-Roads	\$0.00	\$1.03	\$1.64	\$2.25
Highway Maintenance-Bridges	\$0.00	\$0.45	\$0.61	\$0.75
Total:	\$0.00	\$1.48	\$2.25	\$3.00

Highway Maintenance: Grade D Investment

No additional investment is necessary over the next 10 years to maintain existing road and bridge conditions.

- Approximately 74 percent of pavements and 42 percent of bridges are in "good" condition under this scenario. The analysis maintains bridge funding to continue the focus on repairing lower cost bridges on the secondary system.
- Additional vehicle operating costs from bridge and pavement conditions would be approximately \$122 per household per year.

Highway Maintenance: Grade C Investment

The Grade C investment of an additional \$1.5 billion over 10 years would result in pavements and bridges being maintained within their target ratings.

- Additional \$1.5 billion investment over 10 years.
- Approximately 79 percent of pavements are in "good" condition under this scenario. The bridge condition remains stable at 42 percent due to the allocation of funding that distributes funding to repair high-cost bridges on the primary system. A small percentage of bridges are on the primary system, but the bridges on the primary system require more funds to maintain due to the larger size of bridge deck area. An increased investment is needed for Grade C to repair the higher cost primary bridges while maintaining the percent that are "good" and "poor."
- Additional vehicle operating costs from bridge and pavement conditions would be reduced to \$115 per household per year, representing a \$7 annual household savings from Grade D.

Highway Maintenance: Grade B Investment

As shown in **Figure 49**, the greatest impact to maintenance condition occurs in Grades B and A. The Grade B investment requests an additional \$2.2 billion over 10 years to improve 11 percent of pavements and 28 of bridges to a "good" rating.

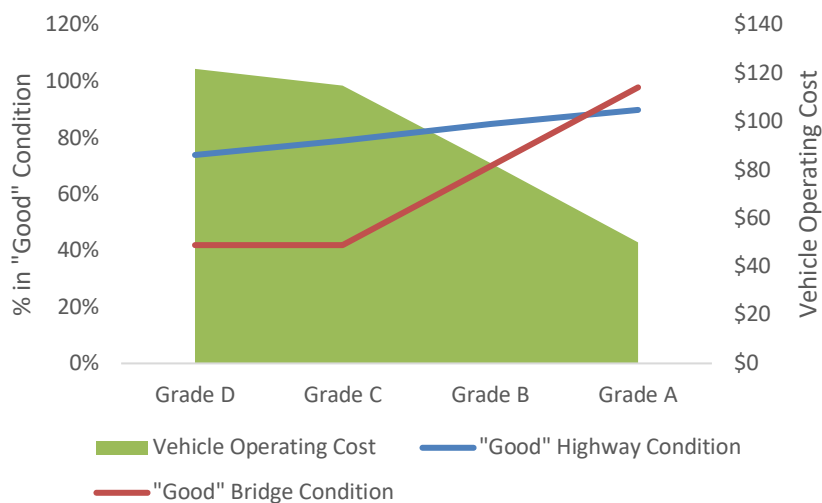
- Additional \$2.2 billion investment over 10 years.
- Approximately 85 percent of pavements and 70 percent of bridges would be in "good" condition.
- Additional vehicle operating costs from bridge and pavement conditions would be reduced to \$83 per household per year, representing a \$39 annual household savings from Grade D.

Highway Maintenance: Grade A Investment

Representing the highest level of investment, the Grade A investment of an additional \$3.0 billion will the greatest improvements in pavement and bridge condition.

- Additional \$3.0 billion investment over 10 years.
- Approximately 90 percent of pavements and 98 percent of bridges would be in “good” condition.
- Additional vehicle operating costs from bridge and pavement conditions would be reduced to \$50 per household per year, representing a \$72 annual household savings from Grade D.

Figure 49: Change in Pavement and Bridge Condition and Vehicle Operating Cost



Highway Construction

Highway Construction Overview

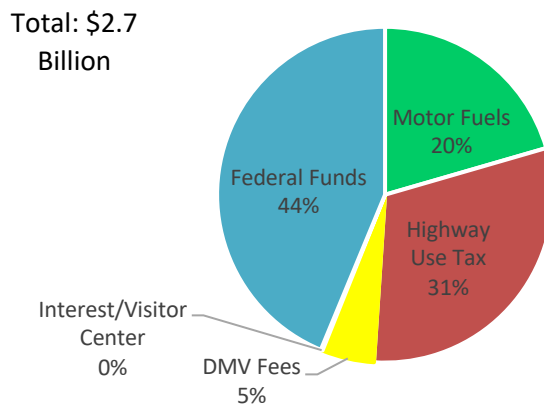
This section examines the state’s unmet Highway Trust Fund (HTF) construction needs. HTF

“The NC First Commission recommendation of increased investment of \$20 billion over 10 years not only improves transportation access, economic growth, and social access for North Carolinians, but can improve upward mobility for underinvested groups for generations.”

– Jesse Cureton

revenues are generated from 29 percent of the state Motor Fuels Tax,¹⁹⁹ the 3 percent use tax on vehicle purchases, DMV titles and other fees, interest income, and federal funding (**Figure 50**).²⁰⁰ In addition to the State Transportation Improvement Program (STIP), the HTF supports an annual appropriation of \$45 million to the North Carolina Ports Authority, \$49 million annually in gap funding for the Monroe Expressway and Triangle Expressway projects, NCDOT administrative costs, visitor centers, and debt service payments (**Figure 51**).²⁰¹

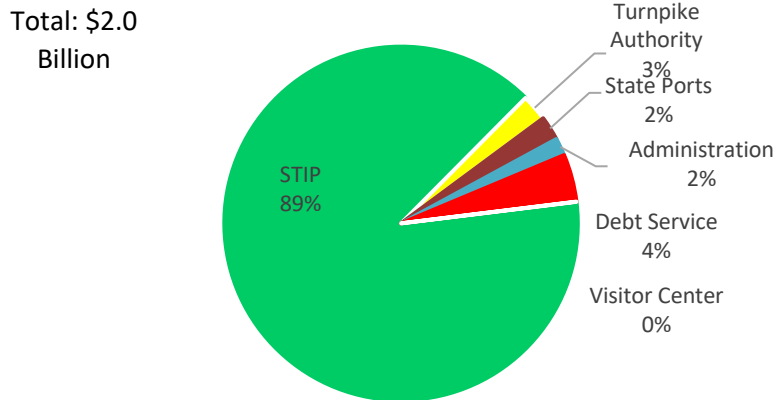
Figure 50: FY 2020 Highway Trust Fund (HTF) Actual Revenues



¹⁹⁹ Per 2019 N.C. Sess. Laws, Chap. 2019-91, §4.2, beginning in FY 2021, the distribution of Motor Fuels Tax proceeds shifts from the 71/29 percentage split used in FY 2020. The Highway Fund will receive 81 percent in FY 2021, 80 percent in FY 2022, and 75 percent in future years. The Highway Trust Fund will receive 19 percent in FY 2021, 20 percent in FY 2022, and 25 percent in future years.

²⁰⁰ NCDOT June 2020 Financial Statement

²⁰¹ Ibid. Expenditures were constrained due to cash flow and the COVID-19 pandemic.

Figure 51: FY 2020 Actual Highway Trust Fund (HTF) Expenditures

The state has a large backlog of construction projects, many that are ready for immediate award. NCDOT has been limited to improving small sections of highways or constructing new location projects in segments. The lack of adequate funding is limiting the state's ability to improve safety and enhance mobility. Like the prior section on maintenance needs, high ranking projects are categorized among four investment levels that range from Grade A, which represents all projects scoring higher than 50 points through the Strategic Transportation Investments (STI) prioritization process, to Grade D, which includes the lowest investment needed to complete the highest scoring projects (**Figure 52**).

Figure 52: 10-Year Highway Construction Investment Needs

Investment Need (Billions)	Grade D	Grade C	Grade B	Grade A
Highway Construction Projects	\$1.60	\$7.00	\$19.80	\$27.60

The STI Scoring Process

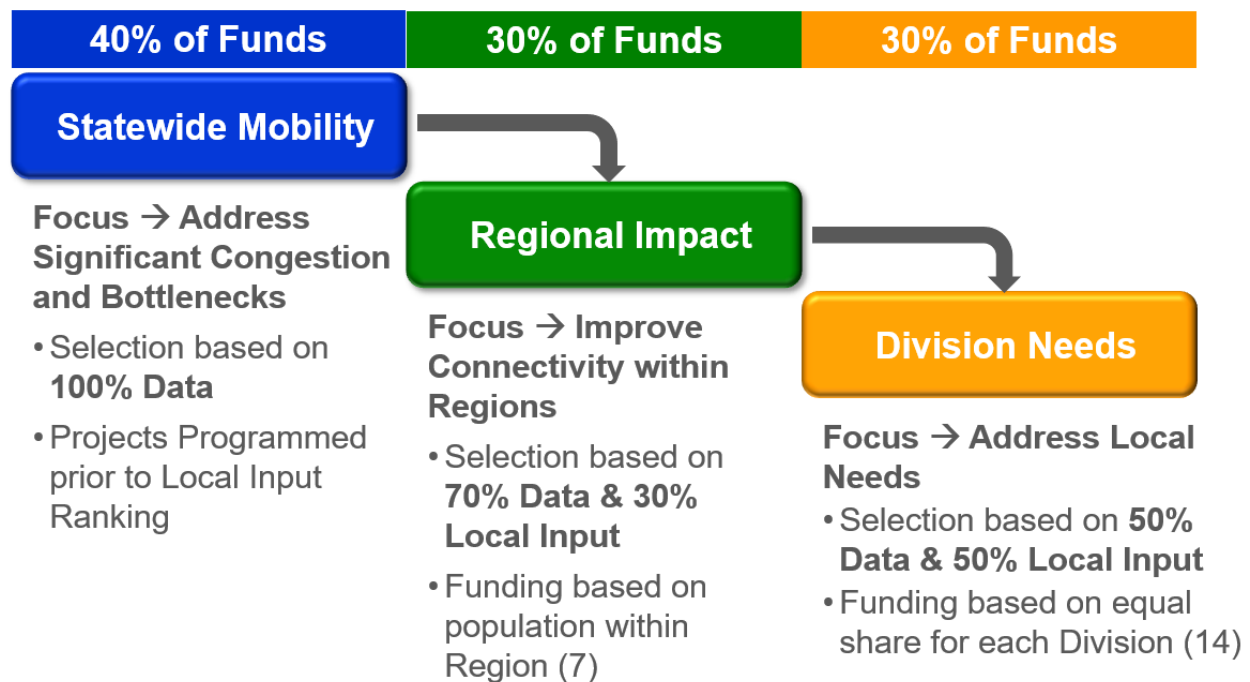
The 2013 STI law directs the Department to select and fund transportation construction projects using a data-driven approach to make the best use of existing revenues from the HTF and federal aid. A collaborative, transparent workgroup develops a systematic process for prioritizing construction projects to use limited resources most efficiently. As statutorily required, this workgroup, consisting of rural and metropolitan planning organization professionals, along with NCDOT staff and local advocacy groups, determine the methodology and criteria used to score highway and non-highway projects.²⁰² The scoring methodology is then approved by the Board of Transportation. Upon completion, the planning organizations approve a constrained list of their most critical construction projects and submit these projects along with local input scores.

²⁰² N.C. Gen. Stat. §136-189.11(h)

The STIP Programming Process

NCDOT assigns a score, ranging from 0 to 100, based on the approved methodology for each submitted project. The Division of Planning and Programming staff uses these scores along with other factors, such as project readiness and available funding, to create the federally required State Transportation Improvement Program (STIP). As shown in **Figure 53**, the STIP has three programming categories: The Statewide Mobility category receives 40 percent of funding and the Regional Impact and Division Needs categories each receive 30 percent of the funding. Projects eligible in the statewide category include all Interstates, National Highway System and Appalachian Development Highway routes, toll facilities, and other strategic routes. Project eligibility cascades down to the lower categories. The regional category adjoins two highway divisions to form seven regions. Other US and NC routes are eligible in the regional category. All other secondary routes and any federal-aid eligible local roads can be programmed in the division category.

Figure 53: The STI Programming Process

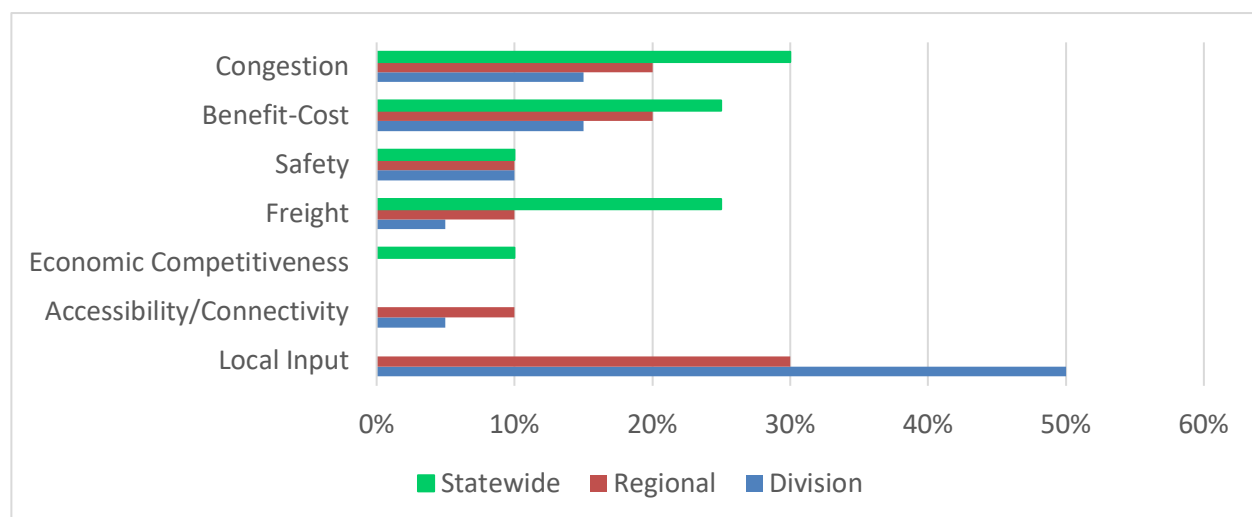


In the Prioritization 5.0 process, projects were scored based on the following methodology. Statewide Mobility projects are scored using five factors:

- The congestion factor (30 percent) measures the existing travel volume compared to the existing capacity of the roadway.
- The benefit-cost factor (25 percent) measures the expected travel time and safety benefits over a ten-year period against the estimated cost of the project to the state-funded portion of the project cost.
- The safety factor (10 percent) measures existing crash rates along the project corridor and the future safety benefits.
- The freight factor (25 percent) measures truck volumes on freight corridors to expedite freight movements.
- The economic competitiveness factor (10 percent) measures the project's estimated economic benefits to produce economic activity and increase employment over the next ten years, relative to the county where the project is located.

The Regional Impact and Division Needs categories use similar criteria, except for one additional quantitative criterion, but assign different weightings. The additional criterion measures accessibility and connectivity. The accessibility and connectivity factor measures economic distress factors and travel-time savings to rank projects that will improve access and interconnectivity in rural and less affluent areas (**Figure 54**).

Figure 54: Prioritization 5.0 Criteria used in Statewide, Regional, and Division Categories



To give a greater voice to local officials to determine which projects should be completed, the legislature authorized local governments to determine a portion of the final score in the regional and division categories. NCDOT developed a process for standardizing and publicizing the methodologies used by planning organizations and NCDOT highway engineers to develop local input scores.²⁰³ The scores must include two criteria, of which one must be based on qualitative criteria; the public must be given the opportunity to comment on the proposed methodology; and the results must be published on the planning organization’s and NCDOT’s websites.

Programming the Prioritization 5.0 Project List

The 2020–2029 STIP uses projects submitted in the Prioritization 5.0 process. The STIP was approved by the NCDOT Board of Transportation in September 2019. It included 1,319 highway, 86 aviation, 234 bicycle and pedestrian, six ferry, 23 public transit, and 50 rail projects. Funds available for programming the 10-year STIP total \$23.7 billion. However, only 24 percent of the cost of projects submitted through prioritization were originally funded, and due to cash flow constraints and COVID-19 revenue impacts, approximately 700 projects included in the September 2019 STIP have since been delayed or removed (**Figure 55**).

Figure 55: Prioritization 5.0 Projects Funded in STIP

	Evaluated Projects	Cost (\$ Billion)	Projects Funded	% of Projects Funded	Funded (\$ Billion)	% of Cost Funded
Highway	1,204	\$54.05	333	27.7%	\$12.76	23.6%

What does it mean to North Carolina that \$41.3 billion in highway projects remain unfunded? Without additional funding for North Carolina’s transportation program, a stagnant capital construction program will worsen congestion; the essential contracting, engineering, and supply chains will atrophy; road conditions will deteriorate; and safety will be further compromised. Without an efficient and modernized highway network, the state will experience productivity losses, drivers will pay more to operate their vehicles due to wasted fuel and greater wear and tear, and the number of roadway crashes, escalating in severity, will increase.

Highway Construction Investment Needs

This analysis, developed by the NCDOT Strategic Prioritization Office of Transportation (SPOT), provides four investment scenarios to address a portion of the Prioritization 5.0 backlog of unfunded projects. The projects in the exercise include those funded in the last four years of

²⁰³ 2012 N.C. Sess. Laws, Chap. 2012-84

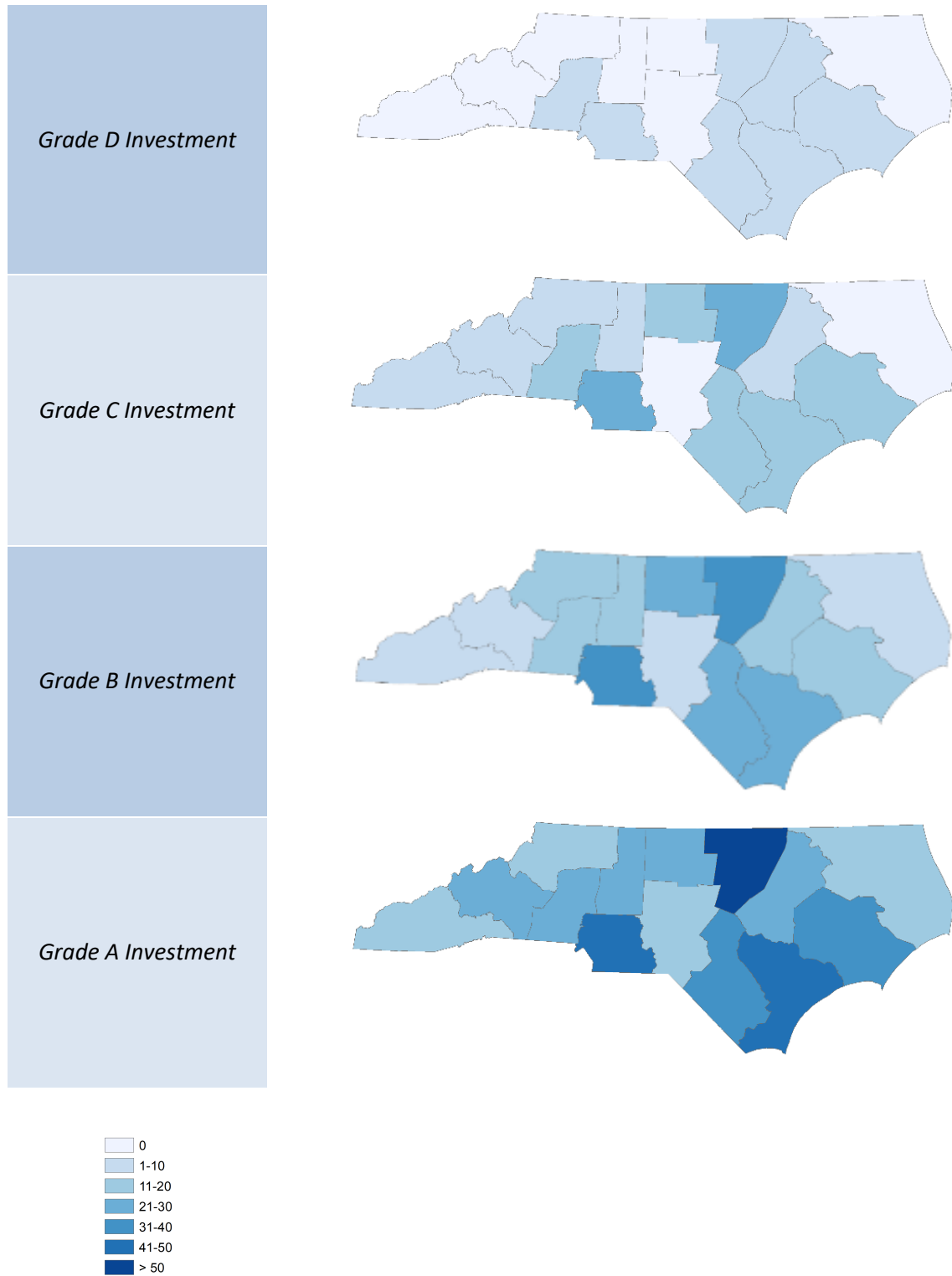
the STIP (2026–2029) and those noted as selected for funding in the 2020–2029 STIP. Projects were selected from the three funding categories based on the final project score. Every selected project received at least a total score of 50 points. Projects scoring less than 50 points, representing almost 48 percent of unfunded projects, were omitted because the funding requirements far exceeds what could be reasonably funded in a 10-year time frame. No preference was given based on the type or location of projects. The results of this analysis are for demonstration purposes only. It is not intended to represent a true programming process. It does not consider such things as funding limitations within the STI categories or delivery schedules.

As shown in **Figure 56**, the four investment scenarios cost between \$1.6 billion and \$27.6 billion over the next ten years and deliver a range of highway projects throughout the state (**Figure 57**). Many of the construction projects will enhance mobility by widening highways or improving intersections or interchanges. Travel time savings can be achieved with new location projects. Access management projects, expanding intelligent transportation systems (ITS), and modernization projects will improve highway safety and mobility. Some examples of modernization projects include widening and paving shoulders, adding curb and gutters, or adding bicycle and pedestrian enhancements. Access management projects can improve safety by adding turn lanes and sidewalks, constructing medians in the center lane, and improving public transit stops. ITS projects, like traffic signals, ramp metering, broadband connectivity, and traveler information systems will be critical in the future as the state upgrades technologies to meet the needs of autonomous and connected vehicles.

Figure 56: Completed Projects by Investment Scenario

	Grade D	Grade C	Grade B	Grade A
Investment Need (Billions)	\$1.6	\$7.0	\$19.8	\$27.6
Widening/Superstreet	13	64	125	189
Intersection/Interchange	3	40	70	110
New Location	7	14	33	50
Modernization	0	3	15	39
Access Management	7	16	18	25
ITS/Signal Systems	2	3	4	5
Total Number of Projects	32	140	265	418

Figure 57: Projects Potentially Funded by Highway Division



Highway Construction: Grade D Investment

Representing the lowest level of investment but the highest scoring projects, the 28 projects with scores over 80 points that qualify for the regional or division categories are largely concentrated in urban areas. Only three projects are located within Rural Transportation Planning Organization boundaries. Six of the 14 highway divisions, including the most rural (Divisions 1, 11, and 14), have no projects.

With an investment of \$1.6 billion, potential projects include:

- Widen I-77 from NC 150 in Mooresville to I-40 in Statesville (Division 12), NC 120 from I-95 to Covington Farm Road (Division 6), US 321 from Mission Road to Southwest Boulevard (Division 11), I-40 between Morganton (Exit 103) and Hickory (Exit 123) (Division 13), I-26 from US 25 to US 64 (Division 14), and SR 1509 (Queens Creek Road) from Jones Road to Smallwood Road (Division 3).
- Improve the intersection of McKnight Mill Road/Minorwood Road (Division 7) and the interchange at I-485/NC 51 (Pineville-Matthews Road) (Division 10).
- Construct new location projects the Spring Lake Bypass in Cumberland County (Division 6) and the Carowinds Boulevard Extension in Charlotte (Division 10).
- Fund access management project to construct medians with turn lanes, sidewalks, and protected bike lanes on SR 1200-Stantonsburg Road (Division 2).
- Improve the Town of Apex ITS signaling system (Division 5) and add ramp metering to I-40/I-440/I-87/US-1 highways (Division 5).

Highway Construction: Grade C Investment

In addition to the 32 Grade D projects, by funding projects that score over 70 points, an additional 108 projects can be delivered. However, 80 percent of new projects continue to be in urban areas and Divisions 1 and 8 have no projects.

These new potential projects, totaling \$7.0 billion, include:

- Widen US 421 between the Winston-Salem Beltway and I-40 (Division 9), US 321 from Mission Road to Southwest Boulevard (Division 11), I-26 from US 25 to US 64 (Division 14), NC 133 from I-140 to Holly Shelter Road (Division 3), Widen Cleveland Road from NC 42 to Barber Mill Road (Division 4).
- Improve intersections at McConnell Road/Gorrell Street (Division 7), at NC 54/Old Fayetteville Road (Division 7), and at Franklin Boulevard/Redbud Road (Division 12).
- Construct new location projects, including the Winston-Salem Beltway from US 158 to I-40 (Division 9), the Waxhaw Parkway (Division 10), and completing the Wadesboro Bypass (Division 10).
- Modernize both SR 2439 (Beaty Road) and SR 2439 (Lowell Bethesda Road) (Division 12).
- Improve access management along US 401 in Fuquay Varina (Division 5).

Highway Construction: Grade B Investment

An investment of \$19.8 billion over the next ten years can deliver an estimated 265 projects, with 30 percent located in rural areas. With this level of investment, all divisions are expected to have multiple projects. Projects scored higher than 60 points.

In addition to the projects listed for Grade C and D, new potential projects include:

- Widen I-40 between Harrison Avenue and US 1-64 (Division 5), I-40 west of Asheville (Liberty Road to Monte Vista Road) (Division 13) and between Exit 27 and Exit 31 (Division 14), NC 48 between Halifax County and Northampton County (Division 1), US 158 from Lewisville-Clemmons Road to Baltimore Road (Division 9), US 421 from Tennessee State Line to US 321 near Vilas (Division 11) and Poplar Tent Road between Kannapolis Parkway and US 29-601 (Division 10).
- Upgrade sections of Future I-87 (Division 1) and Future I-42 (Division 2).
- Improve the interchange at US 70 Business/ NC 42 (Division 4) and the intersection at NC 273/ South Point Road (Division 12).

- Construct new location projects, including the Carolina Bays Parkway (Division 3), the Cape Fear Crossing (Division 3), the Boone Bypass (Division 11), the NC 111 Catherine Lake Road Extension (Division 3) and the East-West Connector between Langtree Road and NC 115 (Division 12).
- Modernize SR 2500 (Blue Ridge Road) from NC 9 to White Pine Drive (Division 13).
- Improve ITS signaling systems in Holly Springs (Division 5).

Highway Construction: Grade A Investment

Investing \$27.6 billion will create the greatest economic impact and spread improvements throughout rural and urban areas. In fact, 40.2 percent of projects are located within Rural Transportation Planning Organization boundaries. Every highway division has multiple projects, ranging from 16 projects in Division 14 to 54 projects in Division 5.

The 418 Grade A highway projects scored between 50 and 100 points (see **Figure 56**).

Along with the projects identified previously, the potential 153 new projects include:

- Widen Poplar Tent Road between Kannapolis Parkway and US 29-601 (Division 10), I-95 from Halifax County to Virginia State Line (Division 1), and US 15-501 between US 401 and US 1 (Division 8).
- Upgrade sections of US 74 from I-26 to Shelby Bypass (Division 13).
- Improve the interchanges at NC 54/US 15-501 (Division 7) and NC 54/Aviation Parkway (Division 5).
- Construct new location projects, including the New Bern Bypass from US 70 to River Road (Division 2), new sections of Corridor K (Division 14), a new bridge on Brick Landing Road (Division 3), the Northern Durham Parkway (Division 5) and Winston-Salem's Stratford-Ebert Connector (Division 9).
- Improve access management along US 158 and NC 168 in Currituck County (Division 1) and on Fairview Road between Swannanoa River Road and Cedar Street (Division 13).

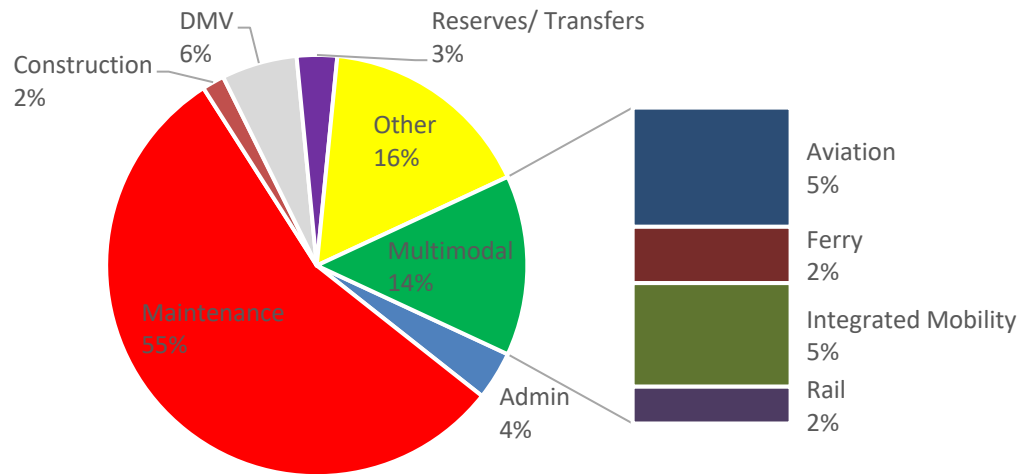
Multimodal Investment Needs

NCDOT has four non-highway divisions representing multimodal transportation options: Aviation, Rail, Ferry, and Integrated Mobility. These divisions represent 14 percent of NCDOT's Highway Fund budget (**Figure 58**). The Aviation Division has the largest multimodal budget, expending \$121.8 million in FY 2020 largely on grants to the state's 72 publicly operating airports. The Rail and Ferry Divisions receive partial support from passenger fares and federal grants. The Rail Division sponsors the operation of eight daily passenger trains, supports 16 passenger stations, oversees infrastructure, safety, and operations programs on over 3,300 miles of track, and awards grants to short-line railroads. The Rail Division expended \$37.4 million in FY 2020. The Ferry Division expended \$57.1 million in FY 2020 to operate seven year-round routes, one seasonal route, and provides emergency services, such as evacuations and delivery of response groups and materials, during weather events. Ferry toll revenues support vessel replacement projects. The Integrated Mobility Division was created in 2019 by combining the Public Transportation and Bicycle/Pedestrian Divisions. Like the Aviation Division, its large budget includes numerous grant programs to support local transit systems. The Integrated Mobility Division's actual FY 2020 expenditures total \$105.2 million.

While highway and non-highway projects compete for STI funding using data-driven prioritization processes, the STI law includes several funding limitations for non-highway projects. These include:

- The prohibition of state funds from being spent on independent bicycle and pedestrian projects
- The limitation that no more than 10 percent of a region's funds can be spent on public transportation projects, including commuter rail, light rail, or intercity rail
- The limitation that state funding shall not exceed 10 percent of the total cost for commuter rail or light rail projects
- The limitation that no more than \$500,000 can be spent per project, per year on funded Statewide Mobility aviation projects; no more than \$300,000 per project, per year on funded Regional Impact aviation projects; and no more than \$18,500,000 total per year on funded Division Needs aviation projects

These restrictions lessen the ability of non-highway projects to receive adequate funding for capital needs.

Figure 58: FY 2020 Actual Highway Fund (HF) Multimodal Expenditures

Aviation Division

Aviation Division Overview

North Carolina is home to 72 public airports (**Figure 59**), enabling 94 percent of the public to live within a 30-minute drive of one of these airports. A total of 68 of the state's 100 counties have a public airport. The 10 commercial service airports support 14 commercial airlines, and prior to COVID-19 restrictions, more than 50 million passengers benefited from flights to 187 cities. Along with 62 general aviation airports and over 300 private airports, heliports, and landing areas, airports contributed \$52 billion to the state's economy. In addition to passengers, airlines moved more than 850,000 tons of cargo in 2019. Combined with a large military aviation and aerospace manufacturing presence, the state's aviation sector supports 307,000 jobs.²⁰⁴

²⁰⁴ www.ncdot.gov/divisions/aviation/Documents/state-of-aviation.pdf

Figure 59: North Carolina Public Airports



The 30 permanent staff in the Aviation Division have five key functions: (1) develop and manage state and federal grant programs to commercial service and general aviation airports; (2) promote business development in aviation/aerospace industry statewide; (3) lead the state's efforts to safely integrate drone use in the state; (4) develop, maintain, and promote a safe and effective statewide aviation system through education and professional development; and (5) provide air transportation and photogrammetry services for state agencies.

The FY 2021 Highway Fund budget is \$157.2 million. It provides operating support and grant funds for public airports. Capital construction projects at public airports are also funded through the data-driven STI process on a competitive basis. The Aviation Division receives \$2.2 million in operating support, \$71.2 million for commercial airports, and \$45.8 million for general aviation airports.

Airport Investment Needs

This analysis, developed by the Aviation Division, provides four investment scenarios to address a portion of the Prioritization 5.0 backlog of unfunded projects and fund additional maintenance and capital airport projects in the Highway Fund. The analysis for both the STIP projects and Highway Fund projects range from a minimum of Grade D cost of \$270 million to \$890 million for the most extensive improvements in Grade A (**Figure 60**). Using the same STI methodology as the Highway Construction section, projects were selected from the three funding categories based on the final project score. Grade D projects received at least a total score of 80 points, Grade C scored from 70 to 80 points, Grade B scored between 60 and 70

points, and Grade A projects scored between 50 and 60 points. The results of this analysis are for demonstration purposes only. It is not intended to represent a true programming process. It does not consider such things as funding limitations within the STI categories or delivery schedules.

Figure 60: Ten-Year Airport Investment Needs

Investment Need (Billions)	Grade D	Grade C	Grade B	Grade A
Airports HF Construction	\$0.22	\$0.31	\$0.65	\$0.81
Airports HTF Construction	\$0.02	\$0.02	\$0.04	\$0.07
Total	\$0.24	\$0.33	\$0.69	\$0.88

Highway Fund projects include similar STIP projects and other maintenance and construction needs, such as ground communication improvements, fencing, signage, and navigation aids (**Figure 61**). Project costs range from \$223.6 million to \$811.1 million. The projects are arranged by general aviation airport types. No commercial service airport projects are included but these projects have eligibility in STI. Commercial service airports also receive direct allocations in the appropriations process. The groupings of general aviation airports include 16 regional, 26 community, and 20 small community airports. The projects are ranked based on priorities identified by the Aviation Division.

Figure 61: Potential Aviation Highway Fund Projects by Investment Scenario, Cumulative

	Grade D	Grade C	Grade B	Grade A
Investment Need (Millions)	\$223.6	\$314.6	\$653.9	\$811.1
Regional/Business Airports	45	68	100	129
Community/Business Airports (small to medium aircraft)	39	55	115	173
Small Community Airports (basic general aviation needs)	26	34	75	102
Total Number of Projects	110	157	290	404

As shown in **Figure 62**, the four investment scenarios cost between \$20.3 million and \$74.6 million over the next ten years. STIP projects include various improvements to buildings and grounds, including airport hangar and runway improvements, lighting and other safety upgrades, and terminal upgrades.

Figure 62: Potential Aviation STIP Projects by Investment Scenario, Cumulative

	Grade D	Grade C	Grade B	Grade A
Investment Need (Millions)	\$20.3	\$23.0	\$41.8	\$74.6
Statewide	4	8	13	13
Regional	2	2	4	9
Division	4	5	7	16
Total Number of Projects	10	25	49	63

Airport: Grade D Investment

Grade D Highway Fund construction projects focus on safety and condition. The 110 projects, costing \$223.6 million, include improvements to runway approaches, ensuring runway safety areas and protection zones, developing airport layout plans, and improving pavement condition.

Potential Highway Fund projects include:

- Airport layout plans at various airports, including Smith Reynolds and Tri-County airports.
- Improving runway approaches at the Anson County, Mount Olive, Currituck County, Siler City, Lincolnton-Lincoln, and Warren Field (Washington) airports.
- Improving runway safety area at Smith Reynolds, Burlington-Alamance, Dare County, and other airports.
- Resurfacing projects and other rehabilitation activities to improve pavement conditions are needed at Cape Fear Regional, Johnson County, Burlington-Alamance, Hickory Regional, and Michael J. Smith (Beaufort) airports, among others.

STIP projects that score over 80 points cost \$20.3 million. The projects include:

- Rehabilitating the runway and making taxiway improvements at Wilmington International Airport.
- Extending the main runway at Coastal Carolina Regional Airport.
- Preparing and environmental assessment for the construction of an apron expansion.

Airport: Grade C Investment

The 47 Grade C Highway Fund projects include additional projects to improve pavement condition, expand runways, strengthen pavements, fund visual navigation aids, and runway lighting. The cumulative sum of the Grade D and C project lists is \$314.6 million.

Projects cascade down through the grades. Additional Highway Fund potential projects include:

- Various runway extension or widening projects at Curtis L Brown, Jr., Macon County, and Harnett Regional airports, among others.
- Projects to strengthen pavements are located throughout the state, including the Stanly County airport which serves as a training ground for the NC Air National Guard.
- Replace runway lighting at various airports, including Davidson County, Moore County, Henderson Field, and Asheboro Municipal airports.

In addition to Grade D STIP projects, the \$2.7 million funds four statewide projects and one highway division project. Scoring between 70 and 80 points, the potential projects include:

- A runway extension at Tri-County Airport and multiple hangar taxi lanes at Wilmington International Airport.

Airport: Grade B Investment

The additional 133 Grade B Highway Fund projects, costing \$339.3 million, also include navigational aids and runway lighting projects. This category will also invest in weather report technologies, standard navigational instruments, taxiway requirements, airport apron requirements, terminal buildings, taxiway and apron lighting, and airfield signage. Cumulatively, if Grade B is funded, 290 projects at a cost of \$653.9 million will be funded.

In addition to Grade D and C projects, potential projects include:

- Replace, relocate, or add new navigational instruments at the Foothills Regional, Lumberton Regional, and Johnston County airports, among others.
- Several taxiway extension or improvement projects at Dare County, Hickory Regional, Raleigh Executive, Siler City, Mount Airy, Kinston Regional, Odell Williamson, and Lumberton Regional airports, among others.
- Add or expand aprons and helipads at Person County, Stanly County, Wayne Executive, and Western Carolina airports, among others.
- Terminal building expansions and additions at the Avery County and Elkin airports, among others. Terminal upgrades requires the local airport to provide 50 percent in matching funds.

In addition to the projects included in Grades D and C, 24 more STIP projects totaling \$18.8 million and scoring between 60 and 70 points can be funded. Five statewide projects, one highway region, and two highway divisions can be funded. The potential projects include:

- Improvements to the Smith Reynolds Airport terminal building and construct a new hangar.
- New hangar taxi lanes at Wilmington International Airport.
- Construct or expand terminal buildings at the Asheville Regional Airport and Charlotte Douglas International Airport.

Airport: Grade A Investment

An additional 114 Grade A Highway Fund projects will fund ground communications equipment, approach lighting, aircraft rescue and firefighting equipment, airfield maintenance and storage buildings, and perimeter fencing. In total, 404 projects can be funded at a cost of \$811.1 million.

In addition to projects included in Grades D, C, and B, potential Highway Fund projects include:

- Construction on new hangars and associated taxiways at various airports, including Moore County, Cape Fear, Harnett Regional, and Burlington-Alamance airports.
- Add or replace perimeter fencing at Siler City, Davidson County, Gastonia Municipal, Moore County, Rockingham County, and Wayne Executive airports, among others.
- Other airfield maintenance projects, such as maintenance facilities at Currituck County and Johnston Regional airports, and airfield maintenance equipment projects, such as the ones located at Shelby Municipal and Rockingham County airports.

The remaining 14 STIP projects, scoring between 50 and 60 points, total \$32.8 million. Projects are located in one highway region and seven highway divisions. Cumulatively across the four funding levels, two highway regions and nine highway divisions have projects. New projects include:

- Extending the runways at Elkin Municipal Airport and Harnett Regional Jetport.
- Construct a new entrance access road at Albert J. Ellis Airport.
- Strengthening the runway pavement at Michael J. Smith Field.

Rail Division

Rail Division Overview

Established in 1977, the Rail Division’s 48 permanent employees perform numerous responsibilities to maintain a safe and efficient passenger and freight statewide rail network. The division partners with freight and passenger railroads to enhance the state’s 3,300 miles of track across 86 of the state’s 100 counties. It owns passenger train equipment and financially supports Amtrak’s operation of eight daily intercity passenger trips through the *Carolinian* and *Piedmont* train services, in accordance with state-supported route provisions of Section 209 of the Passenger Rail Investment and Improvement Act of 2008 (PRIIA). The *Piedmont* provides three round trips between Charlotte and Raleigh, and the *Carolinian* provides a fourth-round trip between Charlotte and Raleigh with continuing service to New York City. The *Piedmont* and *Carolinian* transported 453,867 passengers in FY 2019, and ridership in early 2020 was trending higher prior to the COVID-19 pandemic. The rail network also includes eight daily long-distance Amtrak trains and 16 train stations.

The Rail Division's mission is the safe and efficient movement of people and goods on North Carolina's railroads through freight, passenger, and safety programs, supporting job creation and economic growth. The division oversees strategic rail initiatives and coordinates with the state's two Class 1 freight railroads, 24 short line operators, the North Carolina Railroad Company, Amtrak, regional and local government organizations, and the North Carolina Ports Authority. The division also manages the Freight Rail & Rail Crossing Safety Fund (FRRCSI) to award competitive grant funds to short line railroads, make crossing and signal improvements, improve industrial access, and preserve and reactivate rail corridors. **Figures 63 and 64** show the freight rail network and passenger services in North Carolina, respectively.

Figure 63: Freight Rail Network in North Carolina

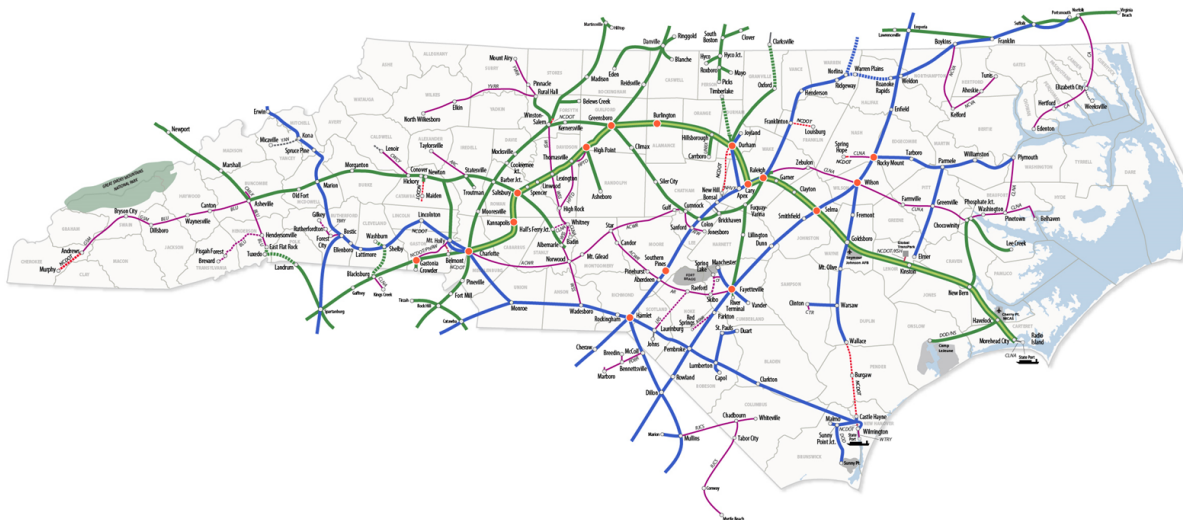
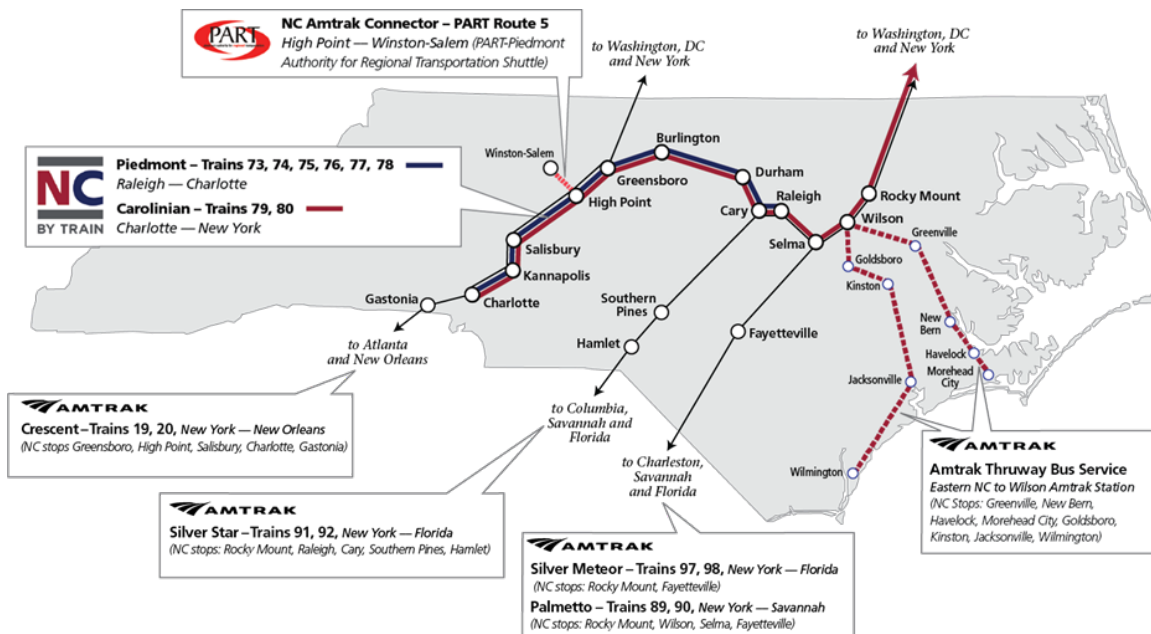


Figure 64: Passenger Rail Services in North Carolina



The rail network is a critical economic development asset for business recruitment and expansion efforts. The FRRCSI program has committed \$78 million of state funds for short line (\$38 million), industrial access (\$6 million), and crossing improvement projects (\$34 million) to date. The efficient movement of freight movement also alleviates highway congestion. According to the Association of American Railroads, freight lines moved 93.6 million tons of freight in 2017 that offset the need for 5.2 million additional trucks.²⁰⁵ The rail network also provides a vital link to the state’s military installations and agricultural sector.

The FY 2021 Highway Fund budget is \$38.9 million. This includes, but is not limited to, \$10.1 million for the FRRCSI program and \$13.8 million to operate train services. Capital projects are also supported through the competitive prioritization process within the Highway Trust Fund. The FRRCSI budget reflects a one-time FY 2021 reduction of \$11 million and is not reflective of ongoing appropriations or needs for this program.²⁰⁶ Division staff also provides engineering design and construction support, conducts environmental studies, oversees corridor protection efforts, and conducts public education and outreach campaigns.

Rail Investment Needs

This analysis, developed by the Rail Division, represent a ten-year estimate of unmet infrastructure needs for passenger rail, freight rail, and rail safety programs. Investment needs are generated from the existing STIP, the Five-Year FRRCSI Plan, stakeholder involvement, projects identified for the CRAFTS tool prepared in support of the NC FIRST Commission, and projects submitted through the STI Prioritization process. Needs range from \$1.0 billion for Grade D to \$4.7 billion for Grade A (**Figure 65**). This analysis does not include committed STI projects.

Figure 65: Ten-Year Rail Investment Needs

Investment Need (Billions)	Grade D	Grade C	Grade B	Grade A
Rail Projects	\$1.03	\$2.23	\$3.54	\$4.67

Information compiled for the Draft State Rail Plan includes \$1.6 billion needed to leverage federal funds²⁰⁷ to construct \$7.6 billion in passenger rail improvements, \$3 billion in freight and safety needs on the Class 1 system, and \$600 million in freight and safety needs on the short line rail system. As the passenger rail network expands, additional recurring state funds

²⁰⁵ www.aar.org/data-center/railroads-states/

²⁰⁶ 2020 N.C. Sess. Laws, Chap. 2020-91, §3.2

²⁰⁷ Federal funding estimates are based on assumed discretionary grant awards levels for passenger projects and freight projects on the Class 1 system. State funds through FRRCSI are used to leverage private short line railroad funding at approximately 50:50 levels.

for operations will be needed to supplement revenue from ridership and federal Congestion Management and Air Quality (CMAQ) funding.

Recognizing that funding availability is limited, rail funding needs are divided into four grades, with Grade D identifying the lowest level of funding and Grade A representing full funding of the identified investment needs. Each subsequent tier includes the projects in previous grades and adds new improvements. The results of this analysis are for demonstration purposes only. It is not intended to represent a true programming process. It does not consider such things as funding limitations within the STI categories or delivery schedules.

Rail: Grade D Investment

Grade D projects include new passenger rail stations, an extension of the Southeast Corridor, freight rail grade separations, freight rail corridor and facility improvements, and short-line railroad improvements. The annual estimated capital cost is \$102 million, and the operating need is \$1.4 million. The estimated 10-year cost is 1.0 billion (see **Figure 66**).

Figure 66: Potential Passenger and Freight Rail Investments, Grade D

(\$ in millions)	Passenger Projects	Freight & Safety Projects		
		Class 1	Short Line	Total
Project Capital Costs	\$468	\$739	\$435	\$1,642
Federal Funding Need	\$310	\$92	N/A	\$402
State Funding Need	\$158	\$647	\$218	\$1,022
State Funding Share	34%	88%	50%	62%
State Capital Funding per Year	\$16	\$65	\$22	\$102
Annual State Operations Need	\$1.4	\$0	\$0	\$1.4
10-Year State Funding Need	\$170	\$650	\$220	\$1,030.4

For Grade D, the passenger rail investments include:

- **New stations.** Funding new stations along existing service routes will increase ridership and associated revenue without substantially increasing operating costs. A new station in Weldon has been submitted in STI but is currently unfunded. A Weldon station will provide passenger rail access to rural northeastern North Carolina generating revenue for the *Carolinian*.
- **Southeast Corridor.** The Southeast Corridor expands from Washington, D.C., to Jacksonville, FL. North Carolina's share from Raleigh to Richmond needs additional funding to provide better connections to Virginia, D.C., and the Northeast Corridor.

Once fully implemented, the corridor will add riders to the state's entire state-supported passenger rail system. The corridor will better connect suburban and rural communities like Wake Forest and Henderson to the Triangle. North Carolina funds will be used to leverage funds from Virginia and USDOT. The full Southeast Corridor would also provide freight network resiliency, allowing north-south freight to continue moving when parallel routes are temporarily closed due to storm flooding or extended maintenance periods. The first section will connect to Wake Forest.

- **Carolinian Equipment Replacement.** Amtrak equipment used for the *Carolinian* must be replaced in the next few years. Amtrak is currently procuring new equipment and will request states share in those equipment costs as part of PRIIA Section 209 cost-sharing methodology. Alternatively, NCDOT could purchase its own equipment for the *Carolinian* service as it is currently doing for the *Piedmont*. In either case, new equipment should help reduce annual maintenance expenditures, whether they are direct state expenditures or paid through Amtrak.

For Grade D, the freight rail investments include:

- **Class 1 Freight Rail: Highway Grade Separations.** The STI prioritization process includes 103 unfunded grade separation projects. Each grade includes 25 percent of projects. For planning purposes, it is assumed that projects can compete for 50 percent of funding from federal discretionary grant programs funds.
- **Class 1 Freight Rail: Corridor and Facility Improvements.** Approximately \$1.7 billion in freight corridor and facility improvements have been submitted in STI. Unfunded projects include, but are not limited to, the CSX connection to GTP, rail improvements to provide access to industrial parks like those in Pender County, Robeson County, Hamlet, and Maxton, relocating the rail yard out of downtown Apex, restoring Wallace to Castle Hayne to enhance rail access to the Port of Wilmington, restoring the connection between CSX and the RJ Corman railroad in southeast North Carolina, and the Wilmington Rail Realignment project. Each grade includes 25 percent of projects. For planning purposes, it is assumed that projects can compete for 50 percent of funding from federal discretionary grant programs funds.
- **Short Line Freight Improvements.** The FRRCSI five-year plan was used to estimate annual funding level needs for short line railroad operators. Often these projects provide access to transload facilities and last-mile connections to industries moving their goods to the Class 1 system. Crossing improvements and rail connections that support the state's ports are also funded in part through FRRCSI. Grade D includes

restoring FRRCSI funding levels to \$20.75 million per year. Additional needs not included in the five-year plan, like improvements at the north and south gates at the Port of Wilmington require raising the annual funding level, up to \$30 million per year in the Grade A investment level. Though exact leverage potential varies across individual programs within FRRCSI, it is assumed that the appropriated state funds can leverage the same amount of private railroad funds.

Rail: Grade C Investment

Grade D projects cascade down to Grade C. Grade C projects are expanded the project scope for some Grade D projects and include new passenger rail services, a sixth passenger train service, and speed improvements. The annual estimated capital cost is \$220 million, and the operating need is \$7.2 million. The estimated 10-year cost is \$2.3 billion (see **Figure 67**).

Figure 67: Potential Passenger and Freight Rail Investments, Grade C

(\$ in millions)	Passenger Projects	Freight & Safety Projects		
		Class 1	Short Line	Total
Project Capital Costs	\$2,313	\$1,478	\$483	\$4,274
Federal Funding Need	\$1,644	\$185	N/A	\$1,829
State Funding Need	\$669	\$1,294	\$241	\$2,204
State Funding Share	29%	88%	50%	52%
State Capital Funding per Year	\$67	\$129	\$24	\$220
Annual State Operations Need	\$7.2	\$0	\$0	\$7.2
10-Year State Funding Need	\$740	\$1,290	\$240	\$2,270.2

For Grade C, the passenger rail investments include:

- **Southeast Corridor.** See Grade D for explanation. The corridor is expanded to Henderson.
- **Gastonia to Charlotte Passenger Rail.** A new passenger service could be established along the P&N rail corridor. The service could provide an alternative to congested highways for trips between Gastonia and Charlotte.
- **Piedmont Service to Selma.** An extension of *Piedmont* service to Selma would provide access for that community to Raleigh, Charlotte, and points in-between. The extension would help connect suburban and rural areas with urban centers.

- **S-Line Passenger Service.** A passenger service along the S-Line could connect Southern Pines-Sanford-Raleigh to better connect communities along the US 1 corridor with the Triangle.
- **6th Frequency and Speed Improvements.** Additional infrastructure improvements to the NCRR/Norfolk Southern H-Line between Cary and Greensboro would allow NCDOT to run a sixth frequency between Raleigh and Charlotte. Adding frequencies helps increase ridership and associated revenue that would help contribute toward operating costs. Additional infrastructure like curve realignments and grade separations would also help increase the average speed along the segment closer to the maximum authorized speed of 79 mph allowed by Norfolk Southern's passenger policy on shared tracks. Increasing speeds along this segment could reduce the Charlotte to Raleigh travel times.

For Grade C, the freight rail investments include:

- **Class 1 Freight Rail: Highway Grade Separations.** See Grade D for explanation. Fifty percent of projects are funded.
- **Class 1 Freight Rail: Corridor and Facility Improvements.** See Grade D for explanation. Fifty percent of projects are funded.

Rail: Grade B Investment

Grade C projects cascade down to Grade B. Some projects are expanded, and new passenger rail services are included. The annual estimated capital cost is \$340 million, and the operating need is \$13.5 million. The estimated 10-year cost is \$3.5 billion (see **Figure 68**).

Figure 68: Potential Passenger and Freight Rail Investments, Grade B

(\$ in millions)	Passenger Projects	Freight & Safety Projects		
		Class 1	Short Line	Total
Project Capital Costs	\$3,465	\$2,218	\$543	\$6,226
Federal Funding Need	\$2,275	\$277	N/A	\$2,552
State Funding Need	\$1,190	\$1,941	\$272	\$3,402
State Funding Share	34%	88%	50%	55%
State Capital Funding per Year	\$119	\$194	\$27	\$340
Annual State Operations Need	\$13.5	\$0	\$0	\$13.5
10-Year State Funding Need	\$1,330	\$1,940	\$270	\$3,530.5

For Grade B, the passenger rail investments include:

- **Southeast Corridor.** See Grade D for explanation. The corridor is expanded to Ridgeway and Norlina in Warren County.
- **New Services.** The 10-year plan includes connecting more communities in North Carolina to the existing services running between Charlotte and Raleigh. Service connections may be established to Fayetteville, Goldsboro, Wilmington, and Asheville and western North Carolina. In addition, infrastructure to extend passenger service to Gastonia and Kings Mountain could provide connections between those communities and Charlotte. The funding could also be used as the North Carolina share for incremental development of the Atlanta to Charlotte high performance passenger rail service that is currently in the planning phase. This analysis assumes that Grade B and Grade A each fund half of the new services.

For Grade B, the freight rail investments include:

- **Class 1 Freight Rail: Highway Grade Separations.** See Grade D for explanation. Seventy-five percent of grade separations are funded.
- **Class 1 Freight Rail: Corridor and Facility Improvements.** See Grade D for explanation. Seventy-five percent of corridor and facility improvements are funded.

Rail: Grade A Investment

Grade A includes expansions of prior projects. The annual estimated capital cost is \$450 million, and the operating need is \$17.2 million. The estimated 10-year cost is \$4.7 billion (see **Figure 69**).

Figure 69: Potential Passenger and Freight Rail Investments, Grade A

(\$ in millions)	Passenger Projects	Freight & Safety Projects		
		Class 1	Short Line	Total
Project Capital Costs	\$7,583	\$2,957	\$603	\$11,143
Federal Funding Need	\$5,976	\$370	N/A	\$6,346
State Funding Need	\$1,607	\$2,587	\$302	\$4,496
State Funding Share	21%	87%	50%	40%
State Capital Funding per Year	\$161	\$259	\$30	\$450
Annual State Operations Need	\$17.2	\$0	\$0	\$17.2
10-Year State Funding Need	\$1,780	\$2,590	\$300	\$4,670.2

For Grade A, the passenger rail investments include:

- **Southeast Corridor.** See Grade D for explanation. The Raleigh to Richmond corridor is fully funded.
- **New Services.** See Grade B for explanation. This analysis assumes that Grade B and Grade A each fund half of the new services.

For Grade A, the freight rail investments include:

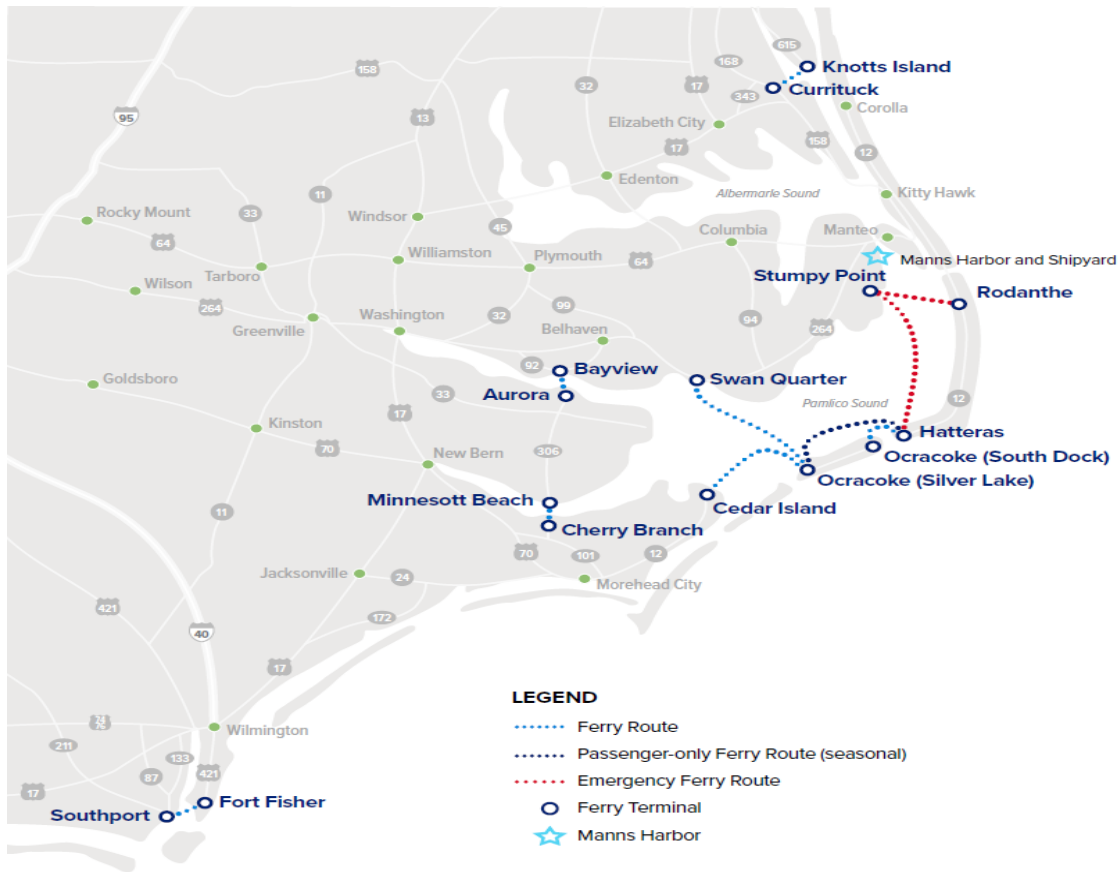
- **Class 1 Freight Rail: Highway Grade Separations.** See Grade D for explanation. The grade separations are fully funded.
- **Class 1 Freight Rail: Corridor and Facility Improvements.** See Grade D for explanation. The corridor and facility improvements are fully funded.

Ferry Division

Ferry Division Overview

The Ferry Division operates the second largest publicly owned ferry system in the United States. Thirteen ferry terminals spread throughout eastern North Carolina provide support for seven year-round ferry routes and one seasonal passenger-only ferry which travels from Hatteras to Ocracoke (**Figure 70**). The Ferry Division owns and operates more than 20 ferry vessels and in 2019 carried over 800,000 vehicles and nearly 2 million passengers. Ferry tolls are collected on three routes: Ocracoke-Cedar Island, Ocracoke-Swan Quarter, and Southport-Fort Fisher. Approximately \$2.5 million in receipts are deposited into a Ferry Vessel Replacement Fund but the toll revenues are insufficient to meet ferry replacement needs.

Figure 70: NCDOT Ferry Routes



The FY 2021 Highway Fund Budget is \$53.3 million. Added capital support is available through the Highway Trust Fund's STI prioritization process. In addition to 506 permanent staff (405 are currently filled), the division hires approximately 100 temporary employees to ensure summer departure schedules can be met. The budget includes \$1.2 million for administrative support. Staff is responsible for operating the ferry fleet and terminals. Staff also maintains the ferry fleet and nine support fleet vessels at the State Shipyard and at three field maintenance yards.

[Ferry Investment Needs](#)

This analysis, developed by the Ferry Division, provides four investment scenarios to address unfunded capital needs. Investing an additional \$198 million to \$265 million over the next ten years is an investment in Eastern North Carolina (**Figure 71**). Several projects will produce significant savings and extend life cycle. The ferry system is also unique in having more limited access to STI funding. For example, rehabilitating ferry vessels in Grade D could potentially extend vessel life by 15 or more years, but this project is not eligible for STI funding. Although there are several federal non-discretionary funding sources available, most of these sources

have specific restrictions or exclusions, making the funding ineligible for the Ferry Division's greatest needs. The Ferry Division also has several critical vessel infrastructure projects and Information Technology (IT) projects that currently do not have identified funding sources. Investing in these projects will secure safe, efficient, and reliable operations on all routes.

Figure 71: Ten-Year Ferry Investment Needs, Cumulative

Investment Need (Billions)	Grade D	Grade C	Grade B	Grade A
Ferry Projects	\$0.20	\$0.22	\$0.23	\$0.27

The Ferry Division's unmet needs include 63 maintenance, capital construction, and IT projects (**Figure 72**). Projects range from vessel replacement, rehabilitation, and expansion to ferry terminal improvements. Grade D represents the highest priority needs and projects that require immediate funding. Projects will cascade down. Grade C represent the second highest priority projects plus Grade D projects. Grade B includes the third highest priority projects plus Grade D and C projects. Investing in Grade A projects produce the best-case scenario for making improvements at all ferry routes. The results of this analysis are for demonstration purposes only. It is not intended to represent a true programming process. It does not consider such things as funding limitations within the STI categories or delivery schedules.

Figure 72: Potential Ferry Projects by Investment Scenario, Cumulative

	Grade D	Grade C	Grade B	Grade A
Investment Need (Millions)	\$198.1	\$218.0	\$230.3	\$265.3
Marine Infrastructure Ramps and Gantries	0	0	1	21
Marine Infrastructure Piling Clusters	3	6	10	10
Marine Infrastructure Terminal Expansion	2	2	2	2
Marine Infrastructure Bulkheads and Seawalls	0	0	2	2
Facilities	1	7	11	11
Vessel Replacement	6	6	6	6
Vessel Rehabilitation	7	7	7	7
Vessel Fleet Expansion	0	1	1	1
Terminal Stacking Lanes	1	1	1	1
Information Technology	0	0	2	2
Total Number of Projects	20	30	43	63

Ferry: Grade D Investment

Grade D represents the lowest level of investment but the highest scoring projects.

With an investment of \$198.1 million, potential projects include:

- The repair and replacement of broken and damaged piling clusters at South Dock, Hatteras, and Silver Lake. These repairs will allow for the safe operation and mooring of vessels.
- Expanding terminals at both Hatteras and the Manns Harbor Shipyard. The Hatteras expansion project will allow for larger and additional vessels to fit and be docked safely in the basin while an additional work platen at the shipyard will increase the current haul out capacity and provide accommodation for vessels that are longer in length compared to current vessels.
- New septic system (including lines and drain field) at the Aurora terminal to replace the non-functioning system.
- The replacement of six aging vessels in the current vessel fleet. Four of the replacement projects will replace smaller Hatteras class vessels for larger River class to allow for more vehicles to be carried.
- Major rehabilitation projects for six ferry vessels and the crane barge Skyco. Rehabilitation projects could extend the life of a vessel by at least 15 years.
- South Dock stacking lane reconstruction as the lanes have deteriorated and fallen into the adjacent waterway. Currently traffic stacks down NC 12 creating unsafe conditions.

Ferry: Grade C Investment

In addition to the 20 Grade D projects, an additional 10 projects can be delivered for a total of 30 projects.

These 10 new potential projects, totaling \$19.9 million, include:

- The repair and replacement of broken and damages piling clusters at Southport, Fort Fisher, and Swan Quarter. These repairs will allow for the safe operation and mooring of vessels.

- Of the ten projects, six are related to facility improvement projects at the Manns Harbor Shipyard. Projects include the removal of the current decrepit water tower and installing of ground storage tanks, an air compressor replacement, restroom remodel and upgrades, dorm remodel and upgrades, and a new oil and water separator system.
- A fleet expansion project for the Southport-Fort Fisher route, adding one new vessel to increase carrying capacity.

Ferry: Grade B Investment

There are 13 new projects introduced at Grade B for an additional \$12.31 million. Including Grade C and D, Grade B equates to 43 projects and \$230.3 million over the next ten years.

- New ramp and gantry at the Southport-Fort Fisher route to accommodate the new vessel identified in Grade C.
- Repair and replace broken and damaged piling clusters at Hatteras and Cherry Branch. These repairs will allow for the safe operation and mooring of vessels.
- Repair and replace the bulkheads and seawall at South Dock and Cherry Branch, both of which are beyond repair due to erosion, corrosion, and storm impacts.
- Replace Manns Harbor Syncrolift to ensure the safe and efficient transfer of ferry vessels to perform needed corrective and preventative maintenance.
- Two facility projects: a new ticket booth at Cedar Island that has structural and electrical issues, along with a new reverse osmosis skid at Cedar Island to keep providing water to the main building and vessels.
- Two Information Technology projects, including digital messaging system and self-service kiosks. The messaging system will notify travelers of arrivals, departures, and schedule status while the kiosks will reduce congestion and promote a quick ticket purchase and check-in option.

Ferry: Grade A Investment

Investing \$265.3 million will create the greatest economic impact and will support improvements throughout the ferry division. Grade A adds an additional 20 projects at \$35 million for a total of 63 projects at \$265.3 million.

Along with the projects identified previously, the 20 new projects identified include:

- The ramp rehabilitation for each of the ramp and gantry systems throughout the Ferry Division. The new design to be implemented will reduce long-term maintenance costs, increase reliability, and extend the life of the structure.

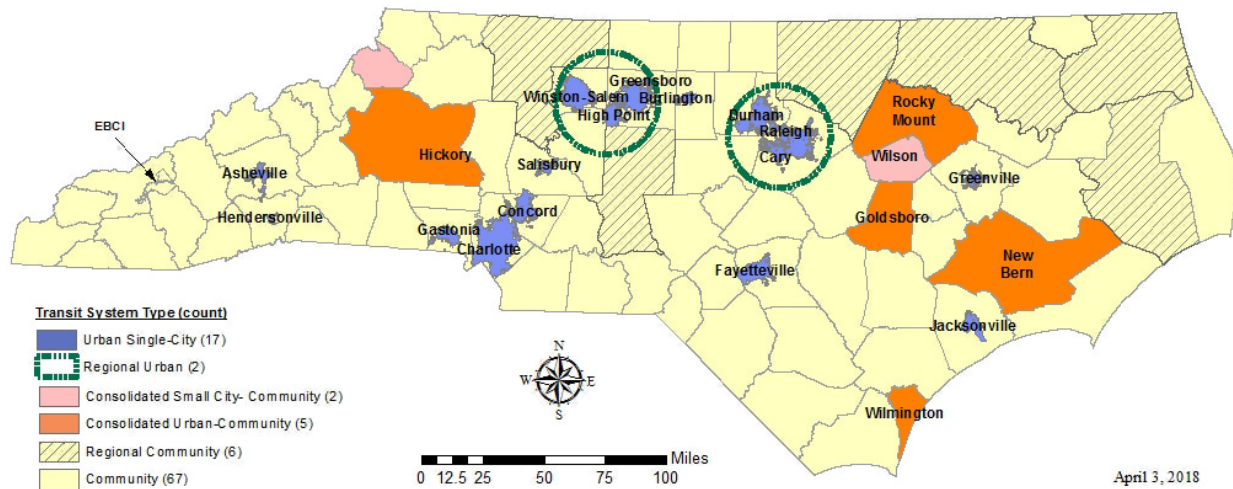
Integrated Mobility Division

Integrated Mobility Division Overview

In 2019, the Public Transportation and Bicycle and Pedestrian Divisions began the merger to form the Integrated Mobility Division (IMD). The merger reflects an evolving mobility network that will provide more efficient coordination and planning for transit and active transportation while seeking innovative solutions for multimodal transportation in North Carolina.

North Carolina has a large public transportation network with 99 public transit systems (**Figure 73**) that transported more than 70 million passengers in 2019. The public transit systems support over 11,000 jobs. The division oversees the State Maintenance Assistance Program (SMAP), which provides state funding to 12 large, urbanized areas and to eight small, urbanized areas for transit services while also providing funding to match Federal Transit Administration (FTA) grants. These areas also receive grants through FTA's Section 5307 program and IMD oversees distribution to the small urban systems that are not direct recipients of FTA funding. The division also administers the state Rural Operating Assistance Program (ROAP) and FTA's Section 5311 program for the rural transit systems. ROAP provides state funds to all 100 counties for elderly and disabled transportation assistance, employment transportation, and general public transit services in rural areas. These funds can also be used as local match for other FTA grants. The division further administers bicycle, pedestrian, and transit planning, programming, policy, and safety programs and initiatives. This is highlighted by managing the Bicycle and Pedestrian Planning Grant Initiative resulting in over 200 funded plans across the state, administration of NCDOT's Complete Streets Policy, and direction of Safe Routes to School and similar initiatives.

Figure 73: NC Public Transit Systems



The FY 2021 Highway Fund budget is \$59.1 million (\$58.37 million for traditional public transportation programs and \$0.8 million for traditional bicycle and pedestrian programs) after non-recurring budgetary reductions were made to matching grant programs.²⁰⁸ The FY 2022 base budget will increase to \$135.2 million once the one-time reductions are restored. The budget includes \$1.1 million in administrative funding, \$56.8 million in grant funding, and \$1.2 million for the High Point Furniture Market. The division's 34 staff members assist with the development of local transit and bicycle/pedestrian planning, support safety and compliance programs, and manage multiple grant programs. Rural and metropolitan planning organizations may also compete for capital funding for integrated mobility projects in the Highway Trust Fund's STI prioritization process.

Integrated Mobility Investment Needs

This analysis includes three parts: unfunded STIP needs, electrifying buses, and building the Great Trails State Network. The STIP section, developed by the NCDOT Strategic Prioritization Office of Transportation (SPOT), uses the same analysis as the Highway Construction and Aviation STIP sections. The remaining sections were developed by the Integrated Mobility Division. The investment scenarios range from a minimum of Grade D at a cost of \$1.3 billion to \$5.1 billion for the most extensive improvements in Grade A (**Figure 74**).

²⁰⁸ 2020 N.C. Sess. Laws, Chap. 2020-91, §3.2

Figure 74: Ten-Year Integrated Mobility Investment Needs, Cumulative

Investment Need (Billions)	Grade D	Grade C	Grade B	Grade A
All Projects	\$1.33	\$2.52	\$3.73	\$5.09

Public transportation projects are not eligible for STI's Statewide Mobility category. Systems that spans two or more counties and that serves more than one municipality qualify for regional funding and all other transit systems are eligible for division funding. Typical transit projects include new or renovated facilities, new or expanded service routes, and bus shelters.

Bicycle and pedestrian projects are not eligible in the statewide or regional categories. Only bicycle and pedestrian projects associated with a highway project, not independent projects, are eligible for division funding. New sidewalks and multi-use paths are commonly funded bicycle and pedestrian projects.

Fully funding the transit projects through a Grade A investment is expected to deliver projects to Region C and six highway divisions. Thirteen of the 14 divisions potentially receive bicycle and pedestrian projects (**Figure 75**).

Figure 75: Potential Integrated Mobility STIP Projects by Investment Scenario, Cumulative

	Grade D	Grade C	Grade B	Grade A
Investment Need (Millions)	\$147.5	\$149.7	\$177.4	\$344.9
Statewide (Transit/Bike/Ped)	n/a	n/a	n/a	n/a
Regional (Bike/Pedestrian)	n/a	n/a	n/a	n/a
Regional (Transit)	1	1	2	4
Division (Bike/Pedestrian)	12	15	26	79
Division (Transit)	4	5	6	12
Total Number of Projects	17	21	34	95

This section also fully funds the electrification of the public transit fleet of 3,313 vehicles at a cost of \$1.1 billion, with each grade improving one-fourth of the upgrades (**Figure 76**).

Figure 76: Fleet Modernization by Investment Scenario, Cumulative

Investment Need (Millions)	Grade D	Grade C	Grade B	Grade A
Vehicle Electrification	\$275.0	\$550.0	\$825.0	\$1,100.0

The third component of this section funds the primary infrastructure necessary to complete the Great Trails State Network. This network will connect shared-use paths and trails across the state. Each grade funds 25 percent of the total project cost (**Figure 77**).

Figure 77: Great Trails State Network by Investment Scenario, Cumulative

Investment Need (Millions)	Grade D	Grade C	Grade B	Grade A
Great Trails Network	\$911.2	1,822.5	\$2,733.7	\$3,645.0

Integrated Mobility: Grade D Investment

Grade D represents the projects scoring above 80 points.

With an investment of \$147.5 million, potential projects include:

- Construct sidewalks along NC 711 in Robeson County and near Sampson Regional Medical Center.
- Public transit projects, including adding bus rapid transit between Morrisville to Clayton, increasing bus frequency on Fayetteville Route 6, adding a park and ride lot at Wake County's Triangle Town Center Transit Center, and adding a new demand response vehicle in Johnston County.
- Construct multiple greenways, including the High Point Railroad Esplanade Greenway and multiple greenways around the Triangle in Swift Creek, Big Branch, Atlantic Avenue, White Oak, and Higgins Phase III.

Twenty-five percent of the transit fleet will be electrified, at a cost of \$275 million, and 25 percent of the Great Trails State Program, at a cost of \$911 million, will be completed under this scenario.

Integrated Mobility: Grade C Investment

Grade C represents the projects scoring between 70 and 80 points.

With an investment of \$149.7 million, potential projects include:

- Construct the Anson County Transit Administrative Building.
- Greenways around Durham's American Tobacco Trail and Brevard High School.
- Pedestrian improvements in downtown Aberdeen.

Fifty percent of the transit fleet will be electrified, at a cost of \$550 million, and 50 percent of the Great Trails State Program, at a cost of \$1.8 billion, will be completed under this scenario.

Integrated Mobility: Grade B Investment

Grade B represents the projects scoring between 60 and 70 points.

With an investment of \$177.4 million, potential projects include:

- Expansion vehicle for KARTS transit service in Vance County.
- Bus shelters (with solar panels) throughout the Winston-Salem Transit Area system.

Seventy-five percent of the fleet will be electrified, at a cumulative cost of \$825 million, and 75 percent of the Great Trails State Program, at a cost of \$2.7 billion, will be completed under this scenario.

Integrated Mobility: Grade A Investment

Grade A represents the projects scoring between 50 and 60 points.

With an investment of \$344.9 million, potential projects include:

- Commuter rail from Durham to Garner.
- I-540 Corridor service (GoTriangle) with Transit Center and park-ride lots.
- Construct multi-use paths at Brevard College and at US-158 in Nags Head with sidewalks along NC 12.
- Construct multiple greenways near the Western NC Farmers Market, the Yadkin River Bridge, South Tar River (Phase 3B), and in Goldsboro.
- Construct sidewalk and make crosswalk improvements around Gaston County.

The public transit fleet is fully converted to electric vehicles at a cost of \$1.1 billion and the Great Trails State Program is fully funded at a cost of \$3.6 billion.

9. Commission Recommendations and Options

The NC FIRST Commission respectfully offers the following options to stabilize and increase transportation investments. The Commission recommends a minimum investment of \$20 billion over the next 10 years to bring North Carolina’s infrastructure closer to a Grade B rating (**Figure 78**). These options are put forth as the potential components of a sustainable, long-range investment strategy that will provide the critical and necessary resources to build and maintain North Carolina’s future transportation network to ensure the state’s economic vitality, competitiveness, and safety of the traveling public. The order of options is not indicative of preference. The options do not represent consensus decisions. The menu of options considered by the Commission is articulated in greater detail in Appendix B and Appendix C.

Figure 78: Summary of Options and Revenue Potential

Option		Revenue Generated for Transportation Over 10 Years
<i>Options Providing an Immediate Impact</i>		
Highway Use Tax and Alternative Highway Use Tax	Increase the HUT by 2 percentage points	\$5.8 billion
	Eliminate the net-of-trade exemption	\$1 billion
	Transfer proceeds from short-term vehicle rentals, vehicle subscription services, and car sharing from the General Fund to NCDOT	Over \$800 million
State Sales Tax	Raise the state Sales Tax rate and reduce the Motor Fuels Tax rate	0.5 percent Sales Tax, offset by a 9 cents per gallon Motor Fuels Tax decrease: \$4.2 billion net 0.75 percent Sales Tax, offset by a 14 cents per gallon Motor Fuels Tax decrease: \$6.3 billion net
	Transfer existing Sales Tax revenues from transportation-related goods and services to NCDOT	Over \$4.7 billion
	Tax Transportation Network Companies (TNCs)	Over \$350 million

DMV Fees	Increase the Electric Vehicle (EV) Fee and enact a Hybrid Vehicle Fee	\$20 million
	Amend DMV registration fees for heavy vehicles	N/A
	Automatically adjust fees for inflation every two years	No change to total revenues
	Authorize a Road Impact Fee for e-commerce deliveries	\$600 million for NCDOT \$290 million for municipalities
Options Providing for Long-term Modernization		
Mileage-Based User Fee		No net change
Highway Tolling		Projections vary
Public-Private Partnerships		N/A
State Infrastructure Bank		N/A
Value Capture	Franchise air space	Variable
	Monetize rights of way	Variable
Options for Local Governments		
Local Sales Tax		\$940 million
Local Road Impact Fee		\$290 million for municipalities
Local Infrastructure Banks		N/A
Local Value Capture		Variable
Additional Opportunities and Options		
Expand Broadband		N/A
Increase Debt Capacity		N/A
Chief Innovation Officer for NCDOT		N/A

Options Providing an Immediate Impact

Highway Use Tax and Alternative Highway Use Tax

Increase the HUT by 2 percentage points. The HUT is a one-time, 3 percent tax on a vehicle's purchase price, less any trade-in value if the sale took place at a dealership. The rate also applies to long-term vehicle leases. The HUT rate has never been raised since it was converted from a 2 percent Sales Tax upon the creation of the Highway Trust Fund in 1989. The rate is the lowest in the nation and is 1.15 to 3.3 percentage points lower than surrounding states (see Figure 12). Since low-income purchasers are anticipated to predominately buy lower-cost used vehicles while middle- and upper-income purchasers are more likely to buy newer or more expensive used vehicles, the tax burden will fall more on economically secure purchasers. A HUT increase from 3 percent to 5 percent can be implemented with minimal administrative and collection costs. *Estimated revenues over 10 years from a tax increase of 2 percentage points: \$5.8 billion.*

Eliminate the net-of-trade exemption. When computing the amount of HUT due, some states deduct the trade-in value if the vehicle purchase and the vehicle sale are made in one transaction. Some states authorize this “net-of-trade” exemption for all joint transactions while other states, like North Carolina, limit the deduction to transactions at car dealerships. Eight states do not authorize the exemption. This proposal can be easily administered with minimal collection costs. Consumers with high trade-in values will pay the greatest share. *Estimated revenues over 10 years from eliminating this exemption: an additional \$1 billion.*

Transfer proceeds from short-term vehicle rentals, vehicle subscription services, and car sharing from the General Fund to NCDOT. An Alternative Highway Use Tax (AHUT) is collected on three types of short-term vehicle leases. Short-term leases or rentals, such as a car rental at an airport, and car sharing services are charged an 8 percent rate on the gross receipts. A 5 percent AHUT applies to vehicle subscription services. The Commission finds that these transactions are directly related to use of the highway system. Transferring all vehicle lease proceeds to either the Highway Fund or Highway Trust Fund is broadly consistent with traditional user pay principles. Short-term leases and subscriptions generated \$74.2 million in FY 2020, falling \$10.2 million since the prior year due to the pandemic. *Estimated revenues over 10 years from AHUT levied at current rates: over \$800 million.*

State Sales Tax

Raise the state Sales Tax rate and reduce the Motor Fuels Tax rate. For 100 years, the Motor Fuels Tax was the most appropriate mechanism to ensure road users paid for their use of the road. This user pay philosophy is a fundamental tenet of transportation taxes. However, increases in fuel efficiency, electric and hybrid vehicles, and shared mobility options will erode the tax base. By shifting a portion of the state’s investment needs to the Sales Tax, transportation revenues can both grow with the economy and ensure that all residents pay for using the transportation network. Further, a Motor Fuels Tax reduction will make North Carolina more competitive with the tax rates charged by neighboring states. While both the Sales Tax and Motor Fuels Tax are regressive, the Sales Tax offers a broader base and is a reasonable and efficient revenue collection mechanism on untaxed mobility activities, such as Transportation Network Companies, micromobility companies, and e-commerce vehicle and drone deliveries.

All revenues from the Sales Tax increase could be restricted for use on the state’s transportation network. Currently, at least 11 states including Texas and Virginia dedicate a portion of state’s general Sales Taxes to transportation purposes. A Sales Tax increase of 0.5 or 0.75 percentage points would have generated \$941.6 million and \$1.4 billion, respectively, in FY 2020. Half of the proceeds derived from raising the state Sales Tax rate by 0.5 to 0.75 percentage points would

enable the tax rates on gasoline and diesel fuel to be reduced by approximately 9 or 14 cents per gallon, respectively. *Estimated additional revenues over 10 years from half of a state Sales Tax increase of 0.5 percentage points, assuming the remaining half is offset by a 9 cents per gallon Motor Fuels Tax decrease: \$4.2 billion. Estimated additional revenues over 10 years from half of a state Sales Tax increase of 0.75 percentage points, assuming the remaining half is offset by a 14 cents per gallon Motor Fuels Tax decrease: \$6.3 billion.*

Transfer existing Sales Tax revenues from transportation-related goods and services to NCDOT. A statutory transfer from the General Fund of revenues gained from the sale of transportation-related goods and services is also consistent with user pay principles. The amount of revenues gained from transportation goods, such as purchases made at an auto parts store, and services, such as labor charges during automobile repairs, was \$470 million in FY 2020, but the funds were diverted away from transportation needs (**Figure 79**).²⁰⁹ *Estimated revenues over 10 years from the existing 4.75 percent state Sales Tax on transportation goods: over \$4.7 billion.*

Figure 79: Automotive Sales and Use Tax Collections, FY 2020

Type of Business	Gross Collections	Taxable Sales and Purchases
Motor vehicle dealers	\$99,892,481	\$2,099,536,809
Service stations	\$41,846,505	\$876,740,321
Garages	\$79,094,683	\$1,638,645,598
Motorcycle and bicycle dealers	\$16,147,718	\$338,172,774
Automotive supply stores	\$124,873,661	\$2,615,572,687
Others	\$17,862,107	\$370,097,243
Oil and petroleum products dealers	\$34,474,958	\$725,537,951
Tire dealers, recappers and repairers	\$52,446,047	\$1,099,786,869
Manufactured home (mobile home) dealers	\$3,500,635	\$73,039,558
Automotive Group: 4.75%	\$470,138,796	\$9,837,129,810

Tax Transportation Network Companies (TNCs). The state Sales Tax rate could be applied to TNCs. TNCs such as Uber and Lyft pay annual permit fees to the DMV, corporate taxes if nexus is established, and pick-up and drop-off fees at some airports; however, state law prohibits all other state and local fees. In contrast, 15 other states levy per-ride or percentage-based fees on

²⁰⁹ www.ncdor.gov/documents/annual-state-sales-and-use-tax-statistics-fy-2020

these companies. Again, a clear relationship exists between this revenue source and use of the transportation network, especially because trip pricing is typically based in part on distance traveled. Such a tax would be responsive to inflation because revenues rise with prices of relevant services. The tax will have relatively low implementation and administrative costs because the tax would be collected from a small number of companies. *Estimated revenues over 10 years from applying the 4.75 percent state Sales Tax rate to the gross receipts generated from ride-sharing services: over \$350 million*

DMV Fees

Increase the Electric Vehicle (EV) Fee and enact a Hybrid Vehicle Fee. Consistent with notions of fundamental fairness, the users of the transportation network should pay comparable amounts based on usage rates. As of FY 2021, electric vehicle owners are charged an additional annual registration fee of \$140.25. Hybrid vehicle owners pay no additional fee. These fees have low implementation and administrative costs and are less regressive than some other options because the fee mainly affects people who can afford to invest in a vehicle purchase.

An analysis of DMV data indicates that electric vehicles pay approximately \$50 less, and hybrid vehicle owners pay \$80 less, in transportation-related fees and taxes than the comparable average driver. The Commission examined two proposals for applying an additional fee: stagger the fee or raise the fee. First, the registration fees can be graduated based on the vehicle price so that more expensive vehicles incur a higher fee. Second, the fees may be raised to produce an equitable tax burden. Using the second approach, with a \$190.25 EV fee and an \$80 fee for plug-in hybrid vehicles, the state would have collected an additional \$10.4 million this fiscal year if these fees were in place. *Estimated revenues over 10 years, assuming EV sales grow by 25 percent annually and plug-in hybrid sales grow by 1.1 percent annually: an additional \$20 million.*

Amend DMV registration fees for heavy vehicles. Vehicle weight is the largest determinant in the amount of road damage. Long-standing research indicates that road damage and associated costs increase exponentially with the weight of a vehicle's axle load.²¹⁰ One federal study concluded that 9,600 midsize cars cause the same amount of damage as one 40-ton, 18-wheel truck²¹¹ and another found that in general, lighter vehicles pay more than their share of highway costs while heavier vehicles pay less than their share.²¹² While North Carolina graduates DMV registration fees based on weight, the Commission was unable to determine if these rates fairly distribute the tax burden. NCDOT should examine rates used in other states to

²¹⁰ www.gao.gov/products/GAO-13-77, citing AASHTO data

²¹¹ www.gao.gov/products/CED-79-94, citing AASHTO data

²¹² FHWA, Highway Cost Allocation Study, 2000, cited in www.gao.gov/products/GAO-13-77

establish competitive trucking fees along with a cost allocation study to determine if the share of tax paid by trucks is commensurate to the amount of damage caused. *Estimated revenues over 10 years: N/A.*

Automatically adjust fees for inflation every two years. In 2015, the legislature enacted an automatic inflationary adjustment for most DMV fees every four years. Accelerating the adjustment to every two years to keep pace with rising construction costs is advisable. *Estimated revenues over 10 years: no change to total revenues, but roughly half of the proceeds would be received two years earlier.*

Authorize a Road Impact Fee for e-commerce deliveries. The rapid growth of e-commerce—the buying and selling of goods over the Internet—has fundamentally changed the movement of freight. This trend, accelerated by the COVID-19 pandemic, is increasing congestion and worsening pavement conditions, especially at the local level. More truck traffic has become concentrated on “last mile” trips that get items to their final destination resulting in more frequent, shorter trips in denser urban and suburban neighborhoods. For example, an Amazon driver can make as many as 180 stops in a single shift, equating to one delivery every 2.6 minutes.²¹³ The pandemic has also increased delivery services for everyday items, like grocery orders and take-out deliveries. While the state collects sales tax proceeds on shipping and handling, transportation, and delivery charges, additional fees dedicated to road maintenance, is again consistent with user pay principles. A Road Impact Fee could be assessed as a surcharge on the gross receipts of purchases of retail goods that are delivered from various forms of transportation, including autonomous and manual delivery vehicles and drones.

The option exists for an additional fee that matches the existing state and local Sales Tax rates (4.75 percent and 2.25 percent, respectively). Based on the U.S. Census data, e-commerce sales are growing rapidly, totaling 13.5 percent of total retail sales in the third quarter of 2020 (**Figure 23**).²¹⁴ Based on this estimate, e-commerce sales totaled \$1.2 billion of North Carolina’s \$9.0 billion FY 2020 Sales Tax collections, which would generate approximately \$58 million for NCDOT and \$27.4 million for municipalities. *Estimated revenues over 10 years, assuming a modest 1 percent annual growth rate in e-commerce sales: approximately \$600 million for NCDOT and \$290 million for municipalities.*

²¹³ www.bizjournals.com/triangle/news/2020/11/29/amazons-warehouse-expansion-packs-a-punch.html

²¹⁴ www.census.gov/retail/mrts/www/data/pdf/ec_current.pdf

Options Providing for Long-term Modernization

Mileage-Based User Fee

Increased fuel efficiency standards, the expected rise in electric and hybrid vehicles, and changes in driver behavior will impact the sustainability of motor fuels tax revenues. A Mileage-Based User Fee (MBUF) is viewed by many as the most viable and durable alternative to the Motor Fuels Tax. Under an MBUF system, the driver pays a fee based on the number of miles driven.

In the U.S., Oregon and Utah operate the only permanent programs for light vehicles but several states have conducted various studies and pilots (see **Figure 38**). Oregon's program is open to any passenger vehicle that has a rating of at least 20 miles per gallon.²¹⁵ Electric vehicle drivers who participate are exempt from special registration fees and fuel-powered vehicle drivers can receive a credit for fuel tax and for emissions testing.²¹⁶ Utah's voluntary program for electric and hybrid vehicles guarantees participants they will pay no more in per-mile charges than they would otherwise pay in special registration fees.²¹⁷ Through the Eastern Transportation Coalition (ETC), NCDOT is currently studying the feasibility of an MBUF. In addition to participating in ETC demonstration-only pilot programs, North Carolina registration data has been analyzed to learn how MBUF and gas tax payments will compare. Study results show positive outcomes that alleviate or disprove several public concerns. These studies have shown that electronic data collection can accurately determine geographic boundaries, protect user privacy, and do not increase the tax burden on rural drivers (**Figure 80**).

Figure 80: Percent Savings with RUC²¹⁸

	Urban	Mixed	Rural
Arizona	-0.7%	1.7%	6.1%
California	-0.3%	2.4%	6.3%
Idaho	-1.0%	0.9%	3.1%
Montana	-1.4%	-0.4%	1.9%
North Carolina	-1.7%	0.9%	0.8%
Oregon	-1.0%	2.9%	4.8%
Texas	-0.5%	1.6%	3.1%
Utah	-0.6%	3.4%	5.5%
Washington	-1.0%	3.6%	4.8%
Positive Numbers show a savings with RUC in Rural and Mixed columns.			

²¹⁵ Or. Rev. Stat. §§319.883 et seq.

²¹⁶ www.myorego.org

²¹⁷ roadusagecharge.utah.gov

²¹⁸ www.rucwest.org/wp-content/uploads/2018/07/RUC_RuralDrivers_folio_final-LTR.pdf; The Eastern Transportation Coalition MBUF Study: Financial Impacts and Spatial Equity Implications of Shifting from Fuel Tax to MBUF, EBP, June 1, 2020, unpublished

The Commission supports the concept of a Mileage-Based User Fee (MBUF) one day replacing the Motor Fuels Tax if it can be incorporated equitably and not create a disproportionate burden, especially to low-income citizens. However, additional studies and pilot programs should be conducted to determine the most appropriate mechanism to collect mileage data, transmit payments, and ensure privacy. NCDOT has committed to ETC studies in 2021 and 2022. The future studies will expand upon the scope of existing studies to include new reporting approaches, like electronic license plates and manual mileage collection, variable rate structures, and multi-state collection processes.

Upon review of the advantages and disadvantages, the Commission supports consideration for an MBUF implementation by 2030. To accomplish this goal, the Commission suggests that NCDOT seek legislative approval in 2022 to conduct a live pilot involving electric or hybrid vehicles and Transportation Network Companies beginning in 2023–2024. The Commission also recommends the Department seek authority to collect odometer readings during the annual vehicle inspection process, which may offer an option for participation in an MBUF program that does not rely on location data and is thus sensitive to stated privacy concerns. The Commission supports adopting a rate that is equivalent to revenues generated by the Motor Fuels Tax. *Estimated revenues over 10 years: no net change.*

Highway Tolling

Tolling is a proven and effective strategy that can address growing infrastructure needs, free up existing revenues for other needed projects, and improve travel times and safety. However, in comparison to peer states, North Carolina's use of tolling is more restricted, minimally used, and lacking in vision. Dynamic toll networks are successfully integrated in Texas and Virginia, each having a combination of public, private, and regional toll partners, while Florida's expansive network is managed by its turnpike enterprise. By adopting innovative tolling strategies such as dedicated reversible lanes, widely using private partners that finance and operate facilities, and tolling structures like bridges and tunnels, these states offer valuable lessons that can advance the state's tolling policies.

State and federal statutory impediments should be addressed. First, NCDOT is authorized to study, plan, develop, and undertake preliminary design work on an unlimited number of turnpike projects but the number of projects that can proceed to design, right-of-way, and construction is limited to 11 projects.²¹⁹ Unless the statutory cap is raised or removed, NCDOT will be unable to proceed beyond preliminary engineering on future toll projects. Second,

²¹⁹ N.C. Gen. Stat. §136-89.183(a)(2)

Congress authorizes states to toll new highways, but limitations exist on existing highways. New interstate toll lanes may be added only if the number of non-tolled lanes is not reduced.

Tolling can generate substantial revenues for specific projects, create equity between the amount of paid by users, and it captures revenue from out-of-state users. Implementing a more dynamic and visionary tolling strategy will enable the state to remain economically competitive by improving the flow of commerce. **The Commission proposes expanding the use of tolling on roads and bridges in North Carolina by raising or removing the statutory limit on toll projects. The Commission further encourages NCDOT to pursue toll projects that may relieve freight congestion, such as truck-only toll lanes on high traveled roads like I-95, and high-cost road and bridge projects.** In addition to much needed revenue generation, such projects would have attractive corollary safety effects. *Estimated revenues over 10 years: projections vary based on facilities to be tolled and toll rates.*

Public-Private Partnerships

State law currently restricts NCDOT and the Turnpike Authority to a maximum of three public-private partnership (PPP or P3) projects in which private entities may “finance, ... plan, design, develop, acquire, construct, equip, maintain, and operate transportation infrastructure in this state.”²²⁰ The first project under this law, the I-77 Express Lanes, has been completed. The Commission finds that the statutory limit will constrain the state’s ability to leverage private capital and pursue alternative financing arrangements for infrastructure projects in the future, and recommends that the project cap be removed. In addition, the Commission proposes a holistic evaluation of state-owned infrastructure assets, including ports and rail systems, for their potential to be leased to the private sector or otherwise monetized to support other capital investments. *Estimated revenues over 10 years: N/A (finance option only).*

State Infrastructure Bank

A State Infrastructure Bank (SIB) is a state-administered revolving fund that offers low-interest loans and other financial assistance for transportation facilities and projects that contribute to meeting the state’s transportation goals. As loans are repaid, the initial capital is replenished and can be used to support a new cycle of projects. SIB loan programs provide needed support for local transportation projects. SIBs may also be structured to cover cost overruns and funding gaps in both state and local projects, and can be used to incent local governments to better optimize their debt capacity.

²²⁰ N.C. Gen. Stat. §136-18(39a)(a)

SIBs offer flexible financing options and reasonable interest rates. Unlike bond financing, there are no underwriting fees or rating agency costs, and states may choose to forego loan application costs. SIBs can also be structured to give economically distressed areas a reduced interest rate. SIB loans are often used to accelerate the completion of projects, but the financing may be used to secure funds quickly to advance an economic development project.

NCDOT has operated three SIBs: a federal SIB (established in 1997 and capitalized primarily with federal funds), a state SIB (established in 2004 and capitalized with state revenues only), and an aviation SIB (established in 2014 and capitalized with state airport development appropriations). The SIBs loaned funds to airports and to local governments for capital transit and rail depot improvements. To help meet the state's transportation goals and facilitate local projects, the Commission proposes re-authorizing and capitalizing the state-funded SIB, which as a result of the 2017 budget bill²²¹ is currently slated to be closed as soon as the last repayment is made. *Estimated revenues over 10 years: N/A (finance option only).*

Value Capture

Value capture refers to a range of approaches that aim to recover some of the value that is created as a result of transportation infrastructure investment—including increases in property values, economic activity, and growth—to help fund current or future needed improvements. In reviewing best practices from across the country,²²² the Commission found that state and local agencies nationwide have used various value capture techniques to complement traditional funding sources for transportation projects, but these approaches have rarely been used in North Carolina. Value capture presents an opportunity for NCDOT and local governments to leverage the value created by infrastructure to generate funds that can be invested back into it.

To give our public agencies more flexibility in their revenue portfolios, the Commission proposes expanding state and local authority to use value capture techniques. The Commission particularly encourages the General Assembly to consider tools that can generate revenues from private sector use of the valuable air space above transportation facilities, or from private development of the prime real estate adjacent to key infrastructure. In addition to providing a funding source for public agencies, above- or at-grade development projects can increase the impact of transportation improvements, offer beneficial investment opportunities for the private sector, drive further economic growth, generate ongoing property taxes, create jobs, and revitalize neighborhoods at a limited cost to government.

²²¹ 2017 N.C. Sess. Laws, Chap. 2017-57, §34.16A

²²² See, for example, www.fhwa.dot.gov/ipd/value_capture/resources/value_capture_resources/value_capture_implementation_manual/

Franchise air space. The Commission proposes authorizing state and local entities to enter into agreements with the private sector to franchise air space or otherwise transfer development rights above publicly owned infrastructure, such as highway rights-of-way or transit stations.

Estimated revenues over 10 years: variable depending on available opportunities.

Monetize rights-of-way. The Commission proposes authorizing state and local entities to enter into financial agreements with the private sector for development projects within existing rights-of-way of publicly owned transportation infrastructure, including highways, railways, and the North Carolina Global TransPark. *Estimated revenues over 10 years: variable depending on available opportunities.*

Options for Local Governments

Local Sales Tax

The Commission proposes authorizing counties to levy an additional, 0.5 percent local option Sales Tax for transportation purposes. Similar to the suggested approach for the state Sales Tax (see “State Sales Tax” under Immediate Impact Solutions, above), it is recommended that the proceeds be dedicated to infrastructure and protected from diversion to other uses. The Sales Tax offers a broad base and is the most reasonable taxing mechanism to levy on untaxed mobility activities that impact local as well as state roads, such as Transportation Network Companies and e-commerce vehicle deliveries. *Estimated revenues over 10 years if adopted by all 100 counties: nearly \$940 million.*

Local Road Impact Fee

See “Road Impact Fee” under Immediate Impact Solutions, above. *Estimated revenues over 10 years: approximately \$290 million for municipalities.*

Local Infrastructure Banks

The Commission proposes authorizing, establishing, and funding local infrastructure banks. Similar to a state bank (see “State Infrastructure Bank” under Long-Term Modernization Solutions, above), local infrastructure banks offer revolving loans and other needed assistance for transportation facilities and projects that contribute to broader transportation goals. *Estimated revenues over 10 years: N/A (finance option only).*

Local Value Capture

See “Value Capture” under Long-Term Modernization Solutions, above. *Estimated revenues over 10 years: variable depending on available opportunities.*

Additional Opportunities and Options

Expand Broadband

Access to reliable, high-speed internet is both an economic development and a quality of life issue for North Carolina residents, especially in rural areas. However, the majority of the state’s unconnected homes and businesses are in rural and economically challenged counties with low population density.²²³ The COVID-19 pandemic has highlighted these existing disparities.²²⁴

Universal broadband coverage is also becoming more essential to emerging transportation technologies such as autonomous and connected vehicles and “smart” roadways that interface with each other using wireless communications. As North Carolina prepares for widespread adoption of these technologies, consistent, high-speed digital connectivity will be critical. Expanded internet service will also help the state realize the promise of connected vehicles and infrastructure to prevent crashes, reduce traffic congestion, and lower fuel consumption.

The Commission supports additional investments in broadband expansion as a component of transportation project delivery and encourages the use of transportation maintenance, renovation, and renewal projects as an opportunity to lay fiber to local communities, thereby facilitating broadband deployment across North Carolina. In particular, the Commission proposes the routine integration of broadband installation into highway projects, especially those that can reach underserved rural areas. Further, the Commission recommends the exploration of public-private partnerships that could expedite broadband expansion and the adoption of intelligent transportation systems throughout the state, while potentially offering financial benefit to NCDOT. *Estimated revenues over 10 years: N/A.*

Increase Debt Capacity

North Carolina has conservative debt practices that place stricter limitations on debt issuance compared to many other states. Among these practices is a low debt-to-revenue ratio that limits NCDOT’s ability to act on low interest rates or expedite infrastructure projects. Since

²²³ www.ncbroadband.gov/technical-assistance/playbook

²²⁴ www.ncruralcenter.org/advocacy-and-research/advocacy/rural-broadband/

2016, the Debt Affordability Advisory Committee in the Department of the State Treasurer—which is required by law to establish annual debt guidelines for the Highway Fund and the Highway Trust Fund²²⁵—has limited total transportation-related debt service to 6 percent of total state transportation revenues. The Commission proposes reasonably increasing this debt capacity so it is comparable to other states with a AAA bond rating, which will improve the state’s flexibility to pursue opportunities for lower-cost financing and faster project delivery. *Estimated revenues over 10 years: N/A (finance option only).*

Chief Innovation Officer for NCDOT

The transportation sector is in the midst of enormous changes. States are facing unprecedented challenges not only concerning how to pay for infrastructure projects, but also in how to meet new demands shaped by shifting travel and vehicle trends and a host of technological, demographic, and environmental disruptors. To proactively address these challenges, the Commission recommends establishing the position of and appointing a Chief Innovation Officer within NCDOT to coordinate new innovations across the Department. The aim will be to ensure that North Carolina’s transportation programs remain forward-thinking and competitive in terms of funding and finance opportunities (federal, state, local, and private), multimodal investments, technological advances, and the integration of leading-edge research and best practices into project planning, design, and delivery. *Estimated revenues over 10 years: N/A.*

²²⁵ N.C. Gen. Stat. §142-101

Acknowledgements

The NC FIRST Commission is grateful for the input and assistance provided by the following individuals. The Commission's work and this final report would not have been possible without their time, advice, and program expertise.

Commission Staff

Amna Cameron

Deputy Director, Strategic Initiatives and Program Support, North Carolina Department of Transportation

Blake King

Special Projects Coordinator, North Carolina Department of Transportation

Jaime Rall

Commission Consultant, Rall Consulting

Burt Tasaico

Director, Strategic Initiatives and Program Support, North Carolina Department of Transportation

Guest and NCDOT Presenters

Kevin Baughman

Analytical Consultant, SAS Advanced Analytics Lab

Shailen Bhatt

President and CEO, ITS America

Mandy Bishop

Program Manager, Smart Columbus, City of Columbus, Ohio

Alison Premo Black, Ph D.

*Senior Vice President and Chief Economist
American Road & Transportation Builders Association*

Carlos Braceras

Executive Director, Utah Department of Transportation

Eric Boyette

Secretary, North Carolina Department of Transportation

Michael Cline, Ph.D.

State Demographer, Office of State Budget and Management

Joe Coletti

Senior Fellow, John Locke Foundation

Michael Connolly

Assistant Director, Local Government Division, North Carolina Department of Revenue

Jeff Davis

Senior Fellow and Editor, Eno Transportation Weekly

Matt Day

Principal Planner, Triangle Area RPO

Daniel Findley, Ph.D.

Senior Research Associate, ITRE, North Carolina State University

Alex Gibson

Director of Mobility Strategy, TransLoc

Patricia Hendren, Ph.D.

Executive Director, Eastern Transportation Coalition

David Jackson

Principal, Cambridge Systematics

Taiwo Jaiyeoba

Director, Planning, Design & Development Department, City of Charlotte

Carolyn Kramer

*Director, Transportation Investment Advocacy Center
American Road and Transportation Builders Association*

Harry Lightsey

Principal, Hawksbill Advisors

Chris Lukasina

Executive Director, Capital Area MPO

Jim McCleskey

Director, Washington Office, North Carolina Governor's Office

Patrick McHugh, Ph.D.

Senior Policy Analysis, Budget and Tax Center, NC Justice Center

Sasha Page

Principal, IMG Rebel

Alpesh Patel

Senior Associate/ Office Director, Integrated Planning and Policy, Cambridge Systematics

Billy Pizer, Ph.D.

Professor, Sanford School of Public Policy and Fellow, Nicholas Institute for Environmental Policy Solutions, Duke University

Bob Poole

Director of Transportation Policy, Reason Foundation

Jaime Rall

Commission Consultant, Rall Consulting

David Roy

Finance Director, NC Turnpike Authority

Rana Sen

Managing Director, Transportation and Smart City Initiative Lead, Deloitte Consulting

Johnny Stover

Senior Associate Analytical Consultant, SAS Global Hosting and U.S. Professional Services

Burt Tasaico

Director, Strategic Initiatives and Program Support, North Carolina Department of Transportation

Jim Trogdon

Former Secretary, North Carolina Department of Transportation

Mike Walden, Ph.D.

Economist, North Carolina State University

Julie White

Deputy Secretary for Multi-Modal Transportation, North Carolina Department of Transportation

Erin Wynia

Chief Legislative Counsel, North Carolina League of Municipalities

North Carolina Department of Transportation Staff Providing Assistance

Jamal Alavi

Van Argabright

Billy Barrier

Greer Beaty

Rebecca Boone

James Bridges

Ryan Brumfield

Reba Calvert

Austin Chamberlain

Chuck Church

Camille Coombes

Justin DeLancey

Ann Dishong

Nastasha Earle-Young

J.J. Eden

Rebecca Gallas

Steven Hairston

Brian Hanks

Heather Hildebrandt

Srinivasarao Kandimalla

Jennifer Keel

Alec Lamb

Matthew Lauffer

Dana Maglioni

Edward McFalls

Emily McGraw

Kasey McKelvy

Ray McIntyre

Brandon McLamb

Colin Mellor

Todd Meyer

Todd Morgan

Patrick Norman

Beshad Norowzi

Jason Orthner

Kimberly Padfield

Catherine Peele

Stephanie Pratt

Johanna Reese

David Roy

Aaron Schoonmaker

Jason Schronce

ACKNOWLEDGEMENTS

Michael Spears
Cheryl Stanfield
Kent Taylor
Michael Thomas
Marcus Thompson
Katie Trout
John Vine-Hodge
Bobby Walston
Katy Warner

David Wasserman
Chris Werner
Julie White
Matthew Whitley
Lamara Williams
Paula Windley
Cynthia Winningham
Subrahmanyam Vasa
Kathryn Zeringue

Appendices

Appendix A: Informational Resources

I. Meeting Materials

All meeting materials including agendas, videos, presentations, and minutes can be accessed online at www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Pages/meeting-dates.aspx

Friday, May 3, 2019

Overview of NCDOT and disruptors that are affecting the future of transportation

- NCDOT Overview
- Transportation Disruptors
- The Future of Mobility in North Carolina
- Municipal Planning for Transportation Disruptors
- Regional Planning for Transportation Disruptors

Friday, July 12, 2019

Focused primarily on existing revenue streams supporting transportation agencies

- North Carolina Demographic Trends
- NCDOT Finance Overview
- Federal Revenues: Insolvent, Uncertain, and In Need of Modernization
- Paying for Vibrant Transportation Systems: An International Perspective
- Transportation Funding Solutions in Other States

Friday, Aug. 30, 2019

Contextual information to help guide commissioners as they formulate recommendations

- Tax Principles to Consider when Developing Revenue Recommendations
- SAS Investment Calculator: Presentation and Demonstration
- Economic Impact of Transportation Investments

- Citizen Survey Results
- NC FIRST Commission Public Comments

Friday, Nov. 22, 2019

Alternative futures for mobility and how Utah is preparing for those possibilities

- Lessons Learned in Utah (Road Usage Charge Program)
- The Movement of People in the Future
- Creating Smart Cities: Adoption of Technological Innovations and Infrastructure Improvements
- NC Moves 2050 Plan

Friday, Feb. 28, 2020

Deep dive into transportation funding options, Part 1

- NC Moves Financial Model
- Highway Tolling
- Energy Taxes
 - Carbon Tax
 - Electricity/Electric Vehicle Taxes
- Real and Personal Property Taxes
 - County Assessments
 - Potential State Applications
- Value Capture Options
- Weight-Based Taxes and Fees
- Occupancy Taxes
- CRAFTS Dashboard (SAS Investment Calculator): Hands-On Demo

Friday, April 24, 2020

Deep dive into transportation funding options, Part 2

- COVID-19 Update
- Survey Results
 - NC FIRST Web Survey
 - I-95 Corridor Coalition Survey

- Mileage-Based User Fees
- Micromobility Impacts and Revenue Options
- Shared Vehicles (Car Sharing / Transportation Network Companies) and Revenue Options
- Taxing Data

Friday, July 31, 2020

Remaining revenue options and start of deliberations

- Modifying Existing Revenue Sources
- Mileage-Based User Survey Results
- Commission Discussion

Friday, September 25, 2020

Focused on Commissioner feedback of various investment options

- NC MOVES 10-Year Needs Analysis
- CRAFTS Demonstration
- Recommendations from Local Government and Finance Workgroups
- Commission Discussion

Friday, November 20, 2020

Focus on developing consensus

- Charlotte Moves
- Results from Citizen Perception Survey
- Investment Needs Analysis
- Commission Discussion

II. NC FIRST Commission Briefs

Brief 1: The Motor Fuels Tax (Updated for FY 2020)

www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-brief-edition-1.pdf

Brief 2: Changing Demographics and the Future of Transportation in North Carolina
www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-brief-edition-2.pdf

Brief 3: The North Carolina Highway Use Tax (Updated for FY 2020)
www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-brief-edition-3.pdf

Brief 4: Rural Transportation Issues in North Carolina
www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-brief-edition-4.pdf

Brief 5: Transportation, Distribution, and Logistics in the Future
www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-briefs-edition-5.pdf

Brief 6: DMV Fees (Updated for FY 2020)
www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-briefs-edition-6.pdf

Brief 7: The Rise of Micromobility and its Potential Impacts for North Carolina
www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-briefs-edition-7.pdf

Brief 8: Revenue Impact from Electric and Hybrid Vehicles
www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-brief-edition-8.pdf

Brief 9: How Other States and Countries Are Paying for Transportation Investments
www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-brief-edition-9.pdf

Brief 10: The Future of Tolling in North Carolina
www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-brief-edition-10.pdf

Brief 11: The Top Ten Myths about Transportation Funding
www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-brief-edition-11.pdf

Brief 12: Mileage-Based User Fees

www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-brief-edition-12.pdf

Brief 13: Transportation Finance

www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-brief-edition-13.pdf

Brief 14: Technology and the Future of Transportation

www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Documents/nc-first-brief-edition-14.pdf

Appendix B: Revenue Options

Advantages and Disadvantages Chart

This chart describes various state revenue options for transportation funding, both existing mechanisms and some new concepts, and outlines some of their advantages and disadvantages. This material is educational in aim and is not intended as endorsement or rejection of any particular option.

User fee options	
Existing state user fees and taxes	<p>Increase motor fuel tax</p> <ul style="list-style-type: none"> • Description: Raise existing per-gallon taxes on gasoline and diesel. These taxes are adjusted annually based on changes to population and the Consumer Price Index for energy costs (N.C. Gen. Stat. §105-449.80). • Advantages: Substantial revenue yield with small rate change; as structured, directly responsive to changes in population and inflation; historically clear relationship between revenue source and use of transportation system; relatively low implementation and administrative costs because tax mechanism is already in place; paid by both in-state and out-of-state residents • Disadvantages: Long-term sustainability issues due to increases in vehicle fuel efficiency and other factors; CPI does not necessarily keep pace with rising costs of transportation facility building materials; relationship between revenue source and use of transportation system is diminishing with the rollout of electric and other highly fuel efficient vehicles; regressive; likely public opposition; rate is already higher than, and therefore not competitive with, those of surrounding states

	<p>Increase DMV fees</p> <ul style="list-style-type: none"> • Description: Raise existing fees on driver licenses, passenger or commercial vehicle registrations, vehicle titles, vehicle inspections, or other DMV services. These fees are adjusted every four years based on changes in the Consumer Price Index (N.C. Gen. Stat. §20-4.02). • Advantages: Stable and predictable revenue source; some connection to use of transportation system because paid by motorists; as structured, directly responsive to inflation; low potential for evasion; relatively low implementation and administrative costs because fee mechanisms are already in place <ul style="list-style-type: none"> ○ If commercial vehicle registrations: Reflects heavy vehicles' greater wear-and-tear on roadways; substantial revenue yield with small rate change • Disadvantages: Except for commercial vehicle fees, only paid by in-state residents; weaker relationship to use of the transportation system because insensitive to miles traveled and associated impact to roadways; CPI does not necessarily keep pace with rising costs of transportation facility building materials; likely public opposition <ul style="list-style-type: none"> ○ If passenger vehicle registrations: As structured, even more regressive than gas taxes because the same flat rate is paid across income groups regardless of vehicle value or use; large annual fees are more difficult for low-income households than revenues that are collected incrementally
	<p>Adjust formula for passenger vehicle registration fees</p> <ul style="list-style-type: none"> • Description: Adjust existing fee schedules for passenger vehicle registrations while retaining quadrennial adjustment based on changes to the Consumer Price Index (N.C. Gen. Stat. §20-4.02). Currently, North Carolina assesses a flat registration fee for cars and fees that vary by weight for private trucks (N.C. Gen. Stat. §20-87). These fee schedules could be revised to include factors such as vehicle weight (for cars), age, type, horsepower, value, or fuel efficiency. • Advantages: Could be incorporated into existing vehicle registration process; could capture revenues from vehicles that pay less in motor fuel taxes, reduce disparities, or achieve other policy goals; see also <i>Increase DMV fees</i>, above <ul style="list-style-type: none"> ○ If based on vehicle value: More equitable across income groups than other adjustments; if vehicle fleet increases in size and value, could have greater revenue-generating potential over time than a flat fee ○ If based on fuel efficiency: Helps restore financial equity by capturing revenues from vehicles that pay less in motor fuel taxes • Disadvantages: More complex and costly to implement and administer than a flat fee; may be harder for customers to understand; see also <i>Increase DMV fees</i>, above <ul style="list-style-type: none"> ○ If based on vehicle value: Possible opposition from vehicle owners impacted by higher fees; could affect vehicle buying choices; possible issues with private resale or vehicles bought at a lower price than MSRP ○ If based on fuel efficiency: Could discourage purchase of highly fuel efficient vehicles, at cross-purposes with state policy goal to reduce emissions

	<p>Increase electric vehicle fee</p> <ul style="list-style-type: none"> • Description: Raise existing additional registration fees for plug-in electric vehicles. As with other DMV fees, these fees are adjusted every four years based on changes in the Consumer Price Index (N.C. Gen. Stat. §20-4.02). Based on N.C. Division of Motor Vehicles data, electric and hybrid vehicle owners currently pay about \$50 less per year in state transportation taxes than gasoline vehicle owners. • Advantages: Relatively low implementation and administrative costs because fee mechanism is already in place; helps restore financial equity by capturing revenues from vehicles that pay no motor fuel tax; helps make overall transportation revenues more stable and predictable by offsetting the loss of motor fuel taxes due to electric vehicles; less regressive than some other options because fee mainly affects people who can afford to invest in electric vehicles; see also <i>Increase DMV fees</i>, above • Disadvantages: Does not increase overall transportation funding because fee revenue would be offset by corresponding decline in motor fuel taxes; no additional cost imposed on highly fuel efficient gas-powered or hybrid vehicles that also pay less in motor fuel taxes; could discourage purchase of electric vehicles, at cross-purposes with state policy goal to increase their use; likely opposition on environmental basis and from vehicle owners impacted by higher fees; see also <i>Increase DMV fees</i>, above
	<p>Increase highway use tax</p> <ul style="list-style-type: none"> • Description: Raise existing highway use tax on vehicle purchases. North Carolina's tax rate of 3% has never been adjusted, is the lowest among neighboring states, and is among the lowest in the nation. • Advantages: Substantial revenue yield with small rate change; relatively low implementation and administrative costs because tax mechanism is already in place; responsive to inflation because revenues rise with vehicle prices; makes North Carolina's tax rate more comparable to those of other states; captures revenues from all vehicles regardless of type, including electric and other vehicles that pay little or no motor fuel tax; less regressive than many other options because tax mainly affects people who can afford new vehicles, with rates that reflect the purchased vehicle's value • Disadvantages: Weaker relationship to use of the transportation system because insensitive to miles traveled and associated impact to roadways; stability of revenues may be impacted by trends toward the purchase of smaller, more fuel efficient cars that cost less than larger vehicles, and by changes in consumer behavior due to vehicle technology innovations; revenues closely tied to economic condition

	<p>Eliminate highway use tax “net-of-trade” exemption</p> <ul style="list-style-type: none"> • Description: Assess the highway use tax on the total purchase price of a vehicle. Currently, North Carolina’s tax is only applied to a vehicle’s sales price after subtracting any allowance that the retailer gives for a trade-in vehicle that is taken as full or partial payment for the purchased vehicle (N.C. Gen. Stat. §105-187.3). • Advantages: Relatively low implementation and administrative costs because tax mechanism is already in place; substantial revenue yield; relatively low tax rate applied to low dollar value trade-in results in minimal tax increase to consumers with older, low value motor vehicles • Disadvantages: Weaker relationship to use of the transportation system because insensitive to miles traveled and associated impact to roadways; increased overall vehicle cost to consumer could potentially affect the retail market for new and used motor vehicles; reduced incentive for trade-ins could impact growth of highway use tax collections for vehicle sales
	<p>Dedicate alternative highway use tax on short-term vehicle leases, rentals, and car sharing services</p> <ul style="list-style-type: none"> • Description: Dedicate all revenues from the 8% alternative highway use tax on short-term vehicle leases, vehicle rentals, and car sharing services to transportation purposes. Currently, these revenues and taxes on vehicle subscription services are directed to the General Fund, minus a \$10 million transfer to NCDOT for airport improvements (N.C. Gen. Stat. §105-187.5). • Advantages: Substantial revenue yield; stable and predictable revenue source; some connection to use of transportation system because paid by motorists; responsive to inflation because revenues rise with prices of relevant services; no additional implementation or administrative costs because tax mechanism is already in place; rate remains constant, resulting in no additional tax burden for motorists; paid by both in-state and out-of-state residents, especially (for rentals) out-of-state travelers • Disadvantages: Weaker relationship to use of the transportation system because insensitive to miles traveled and associated impact to roadways; possible opposition to transferring revenues from General Fund to transportation purposes

	<p>Dedicate alternative highway use tax on vehicle subscription services</p> <ul style="list-style-type: none"> • Description: Dedicate all revenues from the 5% alternative highway use tax on vehicle subscription services to transportation purposes. Currently, these revenues and taxes on short-term vehicle leases, vehicle rentals, and car sharing services are directed to the General Fund, minus a \$10 million transfer to NCDOT for airport improvements (N.C. Gen. Stat. §105-187.5). • Advantages: Some connection to use of transportation system because paid by motorists; responsive to inflation because revenues rise with prices of relevant services; no additional implementation or administrative costs because tax mechanism is already in place; rate remains constant, resulting in no additional tax burden for motorists; less regressive than many other options because tax only affects consumers of a luxury service, with rates that reflect price of service • Disadvantages: Ongoing growth is predicted, but this is still a volatile market, which could affect stability and predictability of revenues; possible opposition to transferring revenues from General Fund to transportation purposes
	<p>Expand road and bridge tolls</p> <ul style="list-style-type: none"> • Description: Expand the use of tolling to more roads, bridges, or managed lanes. NCDOT is currently limited to 11 toll projects and revenues can only be used on the tolled facilities and associated costs (N.C. Gen. Stat. §136-89.183 and §136-89.188). The Turnpike Authority annually adjusts toll rates for each facility based on rate schedules that are designed to meet the project's financing obligations and adopted before it opens to traffic (N.C. Turnpike Authority Toll Rate Policy, 2008). • Advantages: Can generate substantial revenues for specific tolled projects; clear relationship between revenue source and use of transportation system; captures revenues from all vehicles that use the tolled facility, including electric and other vehicles that pay little or no motor fuel tax; paid by both in-state and out-of-state residents; toll rates rise over time to cover project costs <ul style="list-style-type: none"> ○ If managed lanes or dynamic pricing: Can offer other benefits such as congestion management and faster travel times ○ If truck-only: Reflects heavy vehicles' greater wear-and-tear on roadways • Disadvantages: As structured, cannot generate revenues for other projects or support the transportation system as a whole; high implementation and administrative costs (somewhat mitigated because North Carolina exclusively uses electronic toll collection); revenues can be volatile due to changes in travel patterns or economic downturns; changes in driver behavior due to tolling, such as evasion or re-routing, can significant impact nearby "free" alternative routes; annual toll increases are based on factors other than inflation; highly regressive; likely public opposition and concerns about "double taxation" for roadway use; likely opposition from trucking industry, especially against truck-only tolls <ul style="list-style-type: none"> ○ If electronic toll collection is widely used: Additional privacy concerns

	<p>Expand ferry tolls</p> <ul style="list-style-type: none"> • Description: Expand the use of ferry tolling to additional routes. State statute allows the tolling of three of the state's seven permanent ferry routes, authorizes the Board of Transportation to modify existing toll rates, and prohibits the tolling of untolled routes. The proceeds can only be used to fund approved ferry projects in the Highway Division in which they are earned (N.C. Gen. Stat. §136-82). Ferry tolls are currently structured as flat per-vehicle, per-trip fees that vary by vehicle size, with no indexing or regularly scheduled rate increases. • Advantages: Can generate sufficient revenues to cover ferry operating costs and capital needs; clear relationship between revenue source and use of transportation system; captures revenues from all vehicles that use the tolled facility, including electric and other vehicles that pay little or no motor fuel tax; paid by both in-state and out-of-state residents; resident annual passes can offset frequent resident use • Disadvantages: One route has no highway alternative; as structured, cannot generate revenues for non-ferry projects or support the transportation system as a whole; some additional implementation and administrative costs (somewhat mitigated because overall collection system is already in place); if not indexed, revenues will decline in purchasing power due to inflation; revenues can be volatile due to changes in travel patterns or economic downturns; highly regressive; likely opposition from tourism community and from industries with impacted employees
--	--

New state user fees and taxes	<p>Mileage-based user fee (flat rate or indexed)</p> <ul style="list-style-type: none"> • Description: Implement a cents-per-mile fee. A range of approaches are possible for reporting mileage and paying the fee, from self-reported odometer readings to high-tech, GPS-enabled, in-vehicle devices. A mileage-based fee could either be assessed at a flat rate or indexed to population and inflation using the same annual adjustment formula as the current motor fuels tax (N.C. Gen. Stat. §105-449.80). • Advantages: Clear relationship between revenue source and use of transportation system; depending on the rate set and the approach taken, could generate substantial revenues that match or exceed current motor fuel taxes; more equitable (and, if set at revenue-neutral rates, less costly) for rural and low-income residents than motor fuel taxes; rates could be adjusted to reduce inequity among income groups or achieve other policy goals; could be collected incrementally, making it easier for low-income households than large annual fees <ul style="list-style-type: none"> ○ If using odometer readings: Few privacy concerns; could be incorporated into existing vehicle registration process; least costly per-mile approach ○ If using in-vehicle devices: Could assess fee on in-state miles or public roads only; could use dynamic pricing to manage congestion ○ If replacing the gas tax: Solves the problem of lost motor fuel tax revenues due to vehicle fuel efficiency and electric vehicles by charging all users regardless of vehicle type ○ If only for high-efficiency or electric vehicles: Helps restore financial equity by capturing revenues from vehicles that pay little or no motor fuel tax ○ If indexed: Directly responsive to changes in population and inflation • Disadvantages: Only paid by in-state residents unless a multi-state collection system is adopted; substantial implementation costs and challenges, including interstate travel; limited real-world experience with implementation; likely public opposition; not a viable short-term option <ul style="list-style-type: none"> ○ If based on odometer readings: Enforcement challenges; concerns about in-state versus out-of-state miles ○ If using in-vehicle devices: Privacy concerns; most costly per-mile approach; accessibility issues for unbanked users ○ If replacing the gas tax: Approach not yet proven at this large of a scale ○ If not indexed: Revenues will decline in purchasing power due to inflation
-------------------------------	--

	<p>Hybrid vehicle fee (indexed)</p> <ul style="list-style-type: none"> • Description: Assess additional registration fees for hybrid vehicles. As with other DMV fees, these fees would be adjusted every four years based on changes in the Consumer Price Index (N.C. Gen. Stat. §20-4.02). Based on N.C. Division of Motor Vehicles data, electric and hybrid vehicle owners currently pay about \$50 less per year in state transportation taxes than gasoline vehicle owners. • Advantages: Moderate implementation and administrative costs because basic registration fee mechanism is already in place; if indexed, directly responsive to inflation; low potential for evasion; helps restore financial equity by capturing revenues from vehicles that pay less in motor fuel taxes • Disadvantages: Only paid by in-state residents; CPI does not necessarily keep pace with rising costs of transportation facility building materials; no additional cost imposed on highly fuel efficient gas-powered vehicles that also pay less in motor fuel taxes; weaker relationship to use of the transportation system because insensitive to miles traveled and associated impact to roadways; could discourage purchase of hybrid vehicles, at cross-purposes with state policy goal to reduce emissions; could be inequitable given the large range of fuel efficiencies among hybrid vehicles; large annual fees are more difficult for low-income households than revenues that are collected incrementally; likely public opposition <p>Statewide vehicle property tax</p> <ul style="list-style-type: none"> • Description: Assess a statewide property tax on motor vehicles. In North Carolina, vehicle property taxes are currently levied at the local level only. The N.C. Division of Motor Vehicles collects these taxes on behalf of counties at the same time as annual vehicle registration fees (N.C. Gen. Stat. §§105-330 et seq.). • Advantages: Stable and predictable revenue source; relatively low implementation and administrative costs because tax mechanism is already in place and administered by a state agency; some connection to use of transportation system because paid by motorists; somewhat responsive to inflation because revenues rise with assessed value of vehicles; captures revenues from all vehicles regardless of type, including electric and other vehicles that pay little or no motor fuel tax; less regressive than some other options because rates reflect vehicle value • Disadvantages: Weaker relationship to use of the transportation system because insensitive to miles traveled and associated impact to roadways; possible opposition from vehicle owners impacted by higher taxes
--	--

	<p>Tax on electricity for vehicles (indexed)</p> <ul style="list-style-type: none"> • Description: Assess per-kilowatt-hour taxes on electricity used to charge electric and plug-in hybrid vehicles. As a tax on vehicle fuel, the assumption is that this tax would be indexed to population and inflation using the same annual adjustment formula as the current motor fuels tax (N.C. Gen. Stat. §105-449.80). • Advantages: Mirrors the logic of existing motor fuel taxes; clear relationship between revenue source and use of transportation system; if indexed, directly responsive to changes in population and inflation; helps restore financial equity by capturing revenues from vehicles that pay no motor fuel tax; helps make overall transportation revenues more stable and predictable by offsetting the loss of motor fuel taxes due to electric vehicles; less regressive than some other options because tax mainly affects people who can afford to invest in electric vehicles; could be collected incrementally, making it easier for low-income households than large annual fees • Disadvantages: Does not increase overall transportation funding because tax revenue would be offset by corresponding decline in motor fuel taxes; as with motor fuel taxes, improvements or variations in the efficiency of electric vehicles could affect revenue stability as well as the relationship between revenue source and actual use of the system; substantial implementation costs and challenges, including identifying where, when, and how much a vehicle is being charged; no additional cost imposed on highly fuel efficient gas-powered or non-plug-in hybrid vehicles that also pay less in motor fuel taxes; could discourage purchase of electric vehicles, at cross-purposes with state policy goal to increase their use; possible opposition on environmental basis and from vehicle owners impacted by new tax
--	---

	<p>Carbon tax (indexed)</p> <ul style="list-style-type: none"> • Description: Assess a new statewide tax, to be collected at the wholesale level, on each metric ton of carbon (or carbon equivalent) emissions generated by the combustion of fossil fuels. As conceptualized here, the carbon taxes on all fuels used to propel vehicles—including gasoline, diesel, natural gas, and electricity—would be dedicated to transportation purposes and, as taxes on vehicle fuels, would be indexed to population and inflation using the same annual adjustment formula as the current motor fuels tax (N.C. Gen. Stat. §105-449.80). Given these assumptions, each dollar levied on a metric ton of carbon would be approximately equivalent to a one-cent-per-gallon increase in the gasoline tax in terms of transportation funding. • Advantages: Clear relationship between revenue source and use of transportation system; could help achieve state policy goal to reduce emissions; depending on the rate set, could generate substantial revenues that match or exceed current motor fuel taxes; if indexed, directly responsive to changes in population and inflation; more stable than motor fuel taxes because emissions from the electric and natural gas sectors are also priced, ensuring ongoing revenues from alternative fuel vehicles; low administrative costs once implemented if assessed at wholesale level • Disadvantages: Revenues would likely still decline as vehicles become more fuel efficient and electric vehicles increase their market share; regressive, similar to motor fuel taxes; approach not yet proven in the United States; likely public opposition <p>Tax on TNCs</p> <ul style="list-style-type: none"> • Description: Assess a new statewide, percentage-based tax on transportation network companies, defined in law as “any person that uses an online-enabled application or platform to connect passengers with TNC drivers who provide prearranged transportation services” (N.C. Gen. Stat. § 20-280.1). Examples of TNCs include Uber and Lyft. In North Carolina, these companies currently pay annual permit fees to the DMV, corporate taxes if nexus is established, and pick-up and drop-off fees at some airports; all other fees are prohibited by state law (N.C. Gen. Stat. §20-280.9). • Advantages: Clear relationship between revenue source and use of transportation system, especially because trip pricing is typically based in part on distance traveled; revenue potential from taxation of an active and growing industry; responsive to inflation because revenues rise with prices of relevant services; relatively low implementation and administrative costs because tax would be collected from a small number of companies <ul style="list-style-type: none"> ○ If tax is passed on to customers: Less regressive than some other options because tax only affects users of an optional service, with rates that reflect price of service • Disadvantages: Ongoing growth is predicted, but this is still a volatile market, which could affect stability and predictability of revenues <ul style="list-style-type: none"> ○ If tax is passed on to customers: Still somewhat regressive
--	--

	<p>Fee on micromobility services</p> <ul style="list-style-type: none"> • Description: Assess per-trip fees on shared-use micromobility services such as bikeshares and e-scooters. As conceptualized, this revenue option would be structured as a flat per-trip fee, with no indexing. • Advantages: Some connection to use of transportation system because paid by roadway users; revenue potential from fees on an active and growing industry; could help offset the loss of motor fuel taxes due to micromobility as an alternative to driving; relatively low implementation and administrative costs because tax would be collected from a small number of companies <ul style="list-style-type: none"> ○ If tax is passed on to customers: Less regressive than some other options because tax only affects users of an optional service • Disadvantages: Ongoing growth is predicted, but this is still a volatile market, which could affect stability and predictability of revenues; weaker relationship to use of the transportation system because insensitive to miles traveled and lightweight devices cause minimal impact to roadways; if not indexed, revenues will decline in purchasing power due to inflation <ul style="list-style-type: none"> ○ If tax is passed on to customers: Still somewhat regressive <p>Dedicated sales tax from auto parts, accessories, and related services</p> <ul style="list-style-type: none"> • Description: Dedicate to transportation purposes the portion of the existing sales and use tax that is collected from the sale of auto parts, accessories, and related services such as vehicle warranties and repairs. • Advantages: Substantial revenue yield; stable and predictable revenue source; captures revenues from parts and accessories for all types of passenger vehicles, including electric and other vehicles that pay little or no motor fuel tax; some connection to use of transportation system because paid by motorists; responsive to inflation because revenues rise with prices of auto parts and accessories; relatively low implementation or administrative costs because sales tax mechanism is already in place; rate remains constant, resulting in no additional tax burden for motorists • Disadvantages: Weaker relationship to use of the transportation system because insensitive to miles traveled and associated impact to roadways; possible opposition to transferring revenues from General Fund to transportation purposes; sales tax is a regressive tax
--	--

Non-user-fee options	
	<p>Statewide real property tax</p> <ul style="list-style-type: none"> • Description: Assess a statewide property tax on real property. In North Carolina, property taxes are currently levied at the local level only. • Advantages: Substantial revenue yield with small rate change; stable and predictable revenue source; somewhat responsive to inflation because revenues rise with assessed value of real property; revenue source acknowledges overall economic and other benefits of transportation investments for property owners; less regressive than many other options because tax only affects property owners, with rates that reflect assessed property value • Disadvantages: No direct relationship to actual use of the transportation system or associated impacts; some additional implementation and administrative costs for a new statewide tax; likely public opposition
	<p>Hotel / occupancy tax</p> <ul style="list-style-type: none"> • Description: Assess a statewide, percentage-based occupancy tax on temporary lodging including hotels, motels, and other short-term rental options such as Airbnb. In North Carolina, local occupancy taxes are currently levied at the local level only, including taxes that are assessed by 83 of the state's 100 counties and some cities. • Advantages: Revenue source acknowledges overall economic and other benefits of transportation investments for providers of temporary lodging; stable and predictable revenue source, especially by including growing markets such as Airbnb; responsive to inflation because revenues rise with prices of relevant services; paid by both in-state and out-of-state residents, especially out-of-state travelers • Disadvantages: No direct relationship to actual use of the transportation system or associated impacts; some additional implementation and administrative costs for a new statewide tax; likely opposition from tourism community <ul style="list-style-type: none"> ○ If passed on to customers: Would create additional burden for people who rely on low-cost accommodations as a semi-permanent housing solution

	<p>Dedicated general sales tax</p> <ul style="list-style-type: none"> • Description: Assess an additional surcharge on top of the existing statewide sales and use tax, with all revenues dedicated to transportation purposes. • Advantages: Substantial revenue yield with small rate change; stable and predictable revenue source; responsive to inflation because revenues rise with prices of goods and services; revenue source acknowledges the overall economic and other benefits of transportation investments, especially in getting goods to market; relatively low implementation and administrative costs because sales tax mechanism is already in place; paid by both in-state and out-of-state residents who purchase goods in state • Disadvantages: No direct relationship to actual use of the transportation system or associated impacts, except for any sales taxes collected on transportation-related services; possible opposition to using sales tax revenues for transportation purposes rather than General Fund; sales tax is a regressive tax <p>Dedication of sales tax collected on remote sales</p> <ul style="list-style-type: none"> • Description: Dedicate to transportation purposes the portion of the existing sales and use tax that is collected from remote sales. Most remote sales are online, but also included are sales made by catalog, mail order, call center, or television shopping channel retail companies (N.C. Gen. Stat. §105-164.3 and §105-164.8). • Advantages: Substantial revenue yield; revenue source acknowledges increased use of transportation system due to delivery of remotely purchased goods; relatively low implementation or administrative costs because sales tax mechanism is already in place; rate remains constant, resulting in no additional tax burden for purchasers; see <i>Dedicated general sales tax</i>, above • Disadvantages: see <i>Dedicated general sales tax</i>, above <p>Dedicated tax on electricity</p> <ul style="list-style-type: none"> • Description: Assess an additional surcharge on top of the existing statewide sales and use tax on electricity, with all revenues dedicated to transportation purposes. • Advantages: Substantial revenue yield with small rate change; stable and predictable revenue source; responsive to inflation because revenues rise with price of electricity; revenue source acknowledges the overall economic and other benefits of transportation investments for all state residents; captures revenues from electric vehicles that pay no motor fuel tax, among other uses of electricity; relatively low implementation and administrative costs because tax mechanism is already in place • Disadvantages: No direct relationship to actual use of the transportation system or associated impacts; possible opposition to using sales tax revenues for transportation purposes rather than General Fund; sales tax is a regressive tax, especially when assessed on a critical service such as electricity
--	---

	<p>General Fund appropriations</p> <ul style="list-style-type: none"> • Description: Appropriations from the General Fund to transportation purposes. Appropriations could be structured as one-time, multi-year, or recurring allocations. If recurring allocations, the amount could be indexed to changes in population or inflation. North Carolina's General Fund is currently supported by various regressive and non-regressive revenue sources including individual income tax (53%), state sales tax (31%), corporate income and franchise taxes (6.4%), excise taxes on alcohol and tobacco products (2.7%), insurance premium tax (2.1%), and non-tax revenues (4%) (OSBM, 2017). • Advantages: Revenue source acknowledges overall economic and other benefits of transportation investments for all state residents; specific advantages would depend on the ultimate source of the funds and how the allocation was structured (for example, many other countries rely on general revenues for transportation funding, with mechanisms in place to ensure stable, predictable funding levels) • Disadvantages: No direct relationship to actual use of the transportation system; possible opposition to transferring revenues from General Fund to transportation purposes; revenue transfers could be reduced during economic downturns; specific disadvantages would depend on the ultimate source of the funds and how the allocation was structured (for example, relying on discretionary appropriations through the state budgetary process could result in competition with other funding priorities)
--	--

Appendix C: Revenue Options Matrix

This matrix evaluates and compares transportation funding options using a series of criteria. This material is educational in aim and is not intended as endorsement or rejection of any particular option. The ratings of “good,” “fair,” and “poor” are somewhat subjective but are based on current information. Further details can be found in the accompanying chart of advantages and disadvantages.

		10-year revenue projections (2021–30)	Responsiveness to inflation	Revenue stability and predictability	Adherence to “user pay” principle	Administrative costs relative to revenue	Equity by income group	Where in use for transportation funding	Relevant NC FIRST Commission resources
User fee options									
Existing state user fees and taxes	Increase motor fuel tax	Gasoline: \$527m per \$0.01 / gallon increase ²²⁶ ; Diesel: \$153m per \$0.01 / gallon increase ²²⁶	Good ²²⁷	Fair	Good	Good	Poor	<ul style="list-style-type: none"> Fuel taxes: all states, federal Variable rate: at least 22 states International models 	<ul style="list-style-type: none"> Meeting materials 7-12-19, 7-31-20 Issue Briefs #1, #9, #11

²²⁶ Assumes that each \$0.01 increase is enacted in FY 2021 and thereafter subject to the same annual adjustment as the existing motor fuels tax, based on changes to population and the Consumer Price Index for energy costs (N.C. Gen. Stat. §105-449.80)

²²⁷ Revenue stream is already indexed to inflation

		10-year revenue projections (2021–30)	Responsiveness to inflation	Revenue stability and predictability	Adherence to “user pay” principle	Administrative costs relative to revenue	Equity by income group	Where in use for transportation funding	Relevant NCFIRST Commission resources
	Increase DMV fees ²²⁸	Driver license: \$89m per \$1 increase ²²⁹ ; Passenger vehicle registration: \$89m per \$1 increase ²²⁹ ; Commercial vehicle registration: \$1.77b per \$1 increase ²²⁹	Good ²²⁷	Good			Poor	<ul style="list-style-type: none"> DMV fees: at least 47 states Indexed: NC, PA International models 	<ul style="list-style-type: none"> Meeting materials 7-12-19, 2-28-20 Issue Briefs #6, #9
	Adjust formula for passenger vehicle registration fees ²³⁰	Projections vary based on specific adjustments	Good ²³¹	Good	Fair	Good	Poor ²³²	<ul style="list-style-type: none"> Passenger vehicle registration fees: at least 42 states Factors used to calculate fees vary 	<ul style="list-style-type: none"> Meeting materials 7-31-20

²²⁸ Includes fees for driver licenses, passenger and commercial vehicle registrations, vehicle titles, vehicle inspections, and other DMV services

²²⁹ Assumes that each \$1 increase is enacted in FY 2021 and thereafter subject to the same quadrennial adjustment as existing DMV fees, based on changes to the Consumer Price Index and rounded to the nearest \$0.25 (N.C. Gen. Stat. §20-4.02)

²³⁰ Currently, North Carolina assesses a flat registration fee for cars and fees that vary by weight for private trucks (N.C. Gen. Stat. §20-87). These fee schedules could be revised to include factors such as vehicle weight (for cars), age, type, horsepower, value, or fuel efficiency.

²³¹ Revenue stream is already indexed to inflation

²³² Of the available options, an adjustment that takes vehicle value into account would be somewhat more equitable by income group.

		10-year revenue projections (2021–30)	Responsiveness to inflation	Revenue stability and predictability	Adherence to “user pay” principle	Administrative costs relative to revenue	Equity by income group	Where in use for transportation funding	Relevant NC FIRST Commission resources
	Increase electric vehicle fee	\$172,000 per \$1 increase ²³³	Good ²³¹	Good	Good	Good	Fair	<ul style="list-style-type: none"> EV fees: 28 states 	<ul style="list-style-type: none"> Meeting materials 7-12-19, 2-28-20 Issue Briefs #8, #9
	Increase highway use tax	\$291m per 0.1% increase	Good	Fair	Fair	Good	Good	<ul style="list-style-type: none"> Taxes on vehicle sales: at least 14 states 	<ul style="list-style-type: none"> Meeting materials 7-12-19, 7-31-20 Issue Briefs #3, #9
	Eliminate highway use tax “net-of-trade” exemption	\$1.21b	Good	Fair	Fair	Good	Good	<ul style="list-style-type: none"> Highway use tax without net-of-trade exemption: at least 8 states 	<ul style="list-style-type: none"> Meeting materials 7-31-20 Issue Brief #3
	Dedicate alternative highway use tax on short-term vehicle leases, rentals, and car sharing services ²³⁴	\$2.85b ²³⁵	Good	Fair	Fair	Good	Fair	<ul style="list-style-type: none"> Taxes or fees on vehicle rentals: at least 18 states Taxes or fees on car sharing services: none found at state level 	<ul style="list-style-type: none"> Meeting materials 4-24-20, 7-31-20 Issue Brief #3

²³³ Assumes that each \$1 increase is enacted in FY 2021 and thereafter subject to the same quadrennial adjustment as existing DMV fees, based on CPI and rounded to the nearest \$0.25 (N.C. Gen. Stat. §20-4.02)

²³⁴ Assumes current tax rate of 8% (N.C. Gen. Stat. §105-187.5). These revenues and taxes on vehicle subscription services are currently directed to the General Fund, minus a \$10 million transfer to NCDOT for airport improvements.

²³⁵ Total revenues generated by tax, including the portion that is currently transferred to NCDOT for airport improvements

		10-year revenue projections (2021–30)	Responsiveness to inflation	Revenue stability and predictability	Adherence to “user pay” principle	Administrative costs relative to revenue	Equity by income group	Where in use for transportation funding	Relevant NCFIRST Commission resources
	Dedicate alternative highway use tax on vehicle subscription services ²³⁶	\$484m ²³⁵	Good	Fair	Fair	Good	Good	<ul style="list-style-type: none"> None found at state level 	<ul style="list-style-type: none"> Meeting materials 4-24-20, 7-31-20
	Expand road and bridge tolls	Projections vary based on facilities to be tolled and toll rates	Fair	Fair	Good	Poor	Poor	<ul style="list-style-type: none"> Tolls charged by state or quasi-state agency: at least 27 states International models 	<ul style="list-style-type: none"> Meeting materials 7-12-19, 2-28-20 Issue Briefs #9, #10
	Expand ferry tolls	Projections vary based on facilities to be tolled and toll rates	Poor	Fair	Good	Fair	Poor	<ul style="list-style-type: none"> Ferry fares: AK, ME, WA 	<ul style="list-style-type: none"> Meeting materials 7-31-20

²³⁶ Assumes current tax rate of 5% (N.C. Gen. Stat. §105-187.5). These revenues and taxes on short-term vehicle leases, rentals, and car sharing services are currently directed to the General Fund, minus a \$10 million transfer to NCDOT for airport improvements.

			10-year revenue projections (2021–30)	Responsiveness to inflation	Revenue stability and predictability	Adherence to “user pay” principle	Administrative costs relative to revenue	Equity by income group	Where in use for transportation funding	Relevant NC FIRST Commission resources
New state user fees and taxes	Mileage- based user fee	(flat rate)	\$13.97b per each \$0.01 / mile of fee	Poor	Good	Good	Fair	Fair	<ul style="list-style-type: none"> For passenger vehicles: OR, UT Weight-distance fees for heavy trucks: KY, NM, NY, OR International models 	<ul style="list-style-type: none"> Meeting materials 7-12-19, 4-24-20, 7-31-20 Issue Briefs #8, #9, #11, #12
		(indexed)	\$14.83b per each \$0.01 / mile of fee ²³⁷	Good	Good	Good	Fair	Fair		
	Hybrid vehicle fee (indexed)		\$176m per each \$100 of fee ²³⁸	Good	Good	Good	Good	Fair	<ul style="list-style-type: none"> Hybrid fees: at least 16 states 	<ul style="list-style-type: none"> Issue Briefs #8, #9
	Statewide vehicle property tax		\$124m per each \$0.01 / \$100 valuation	Good	Good	Fair	Good	Fair	<ul style="list-style-type: none"> None found at state level 	<ul style="list-style-type: none"> Meeting materials 2-28-20
	Tax on electricity for vehicles (indexed)		\$12m per each \$0.01 / kWh of tax ²³⁷	Good	Fair	Good	Poor	Fair	<ul style="list-style-type: none"> IA (starting 2023), PA 	<ul style="list-style-type: none"> Meeting materials 2-28-20 Issue Briefs #8, #9
	Carbon tax (indexed) ²³⁹		\$599m per each \$1 / metric ton of tax ²³⁷	Good	Fair	Good	Good	Poor	<ul style="list-style-type: none"> None found at state level International models 	<ul style="list-style-type: none"> Meeting materials 2-28-20

²³⁷ Assumes this revenue source would be annually indexed to population and inflation, using the same formula as the current motor fuels tax (N.C. Gen. Stat. §105-449.80)

²³⁸ Assumes this revenue source would be quadrennially indexed to inflation and rounded to the nearest \$0.25, using the same formula as current DMV fees and electric vehicle fees (N.C. Gen. Stat. §20-4.02)

²³⁹ Assumes that the proceeds from carbon taxes on all fuels used to propel vehicles—including gasoline, diesel, natural gas, and electricity—would be dedicated to transportation purposes

		10-year revenue projections (2021–30)	Responsiveness to inflation	Revenue stability and predictability	Adherence to “user pay” principle	Administrative costs relative to revenue	Equity by income group	Where in use for transportation funding	Relevant NC FIRST Commission resources
	Tax on TNCs ²⁴⁰	\$76m per each 1% of tax	Good	Fair	Good	Good	Fair	<ul style="list-style-type: none"> Percentage-based tax: 11 states Per ride fee: 7 states Flat annual fee: AK, KY, NJ 	<ul style="list-style-type: none"> Meeting materials 4-24-20
	Fee on micromobility services ²⁴¹	\$45m per each \$1 / trip fee	Poor ²⁴²	Fair	Fair	Good	Fair	<ul style="list-style-type: none"> None found at state level 	<ul style="list-style-type: none"> Meeting materials 4-24-20 Issue Brief #7
	Dedicated sales tax from auto parts, accessories, and related services ²⁴³	\$5.00b ²⁴⁴	Good	Good	Fair	Good	Poor	<ul style="list-style-type: none"> MI, MN 	<ul style="list-style-type: none"> Meeting materials 7-31-20 Issue Brief #9

²⁴⁰ Transportation Network Companies such as Uber and Lyft

²⁴¹ Micromobility includes trips taken on shared-use micromobility services such as bikeshares and e-scooters

²⁴² Assumes a flat rate with no indexing to inflation

²⁴³ Related services include, for example, vehicle warranties and repairs

²⁴⁴ Assumes current state sales and use tax rate of 4.75%

		10-year revenue projections (2021–30)	Responsiveness to inflation	Revenue stability and predictability	Adherence to “user pay” principle	Administrative costs relative to revenue	Equity by income group	Where in use for transportation funding	Relevant NCFIRST Commission resources
Non-user-fee options									
	Statewide real property tax	\$1.2b per each \$0.0001 / \$100 valuation	Good	Good	Fair	Fair	Good	<ul style="list-style-type: none"> Statewide real property tax: KS, RI, WA, WI Used for transportation: none found at state level²⁴⁵ 	<ul style="list-style-type: none"> Meeting materials 2-28-20
	Hotel / occupancy tax	\$610m per 1% of tax	Good	Good ²⁴⁶	Fair	Fair	Fair	<ul style="list-style-type: none"> State lodging tax: 26 states Used for transportation: GA²⁴⁷ 	<ul style="list-style-type: none"> Meeting materials 2-28-20 Issue Brief #9
	Dedicated general sales tax	\$16.8b per 1% of tax	Good	Good	Fair	Good	Poor	<ul style="list-style-type: none"> At least 13 states 	<ul style="list-style-type: none"> Meeting materials 7-31-20 Issue Brief #9
	Dedication of sales tax collected on remote sales ²⁴⁸	\$2.23b to \$3.58b	Good	Good	Fair	Good	Poor	<ul style="list-style-type: none"> None found at state level 	<ul style="list-style-type: none"> Meeting materials 7-31-20

²⁴⁵ Although not an ad valorem property tax, Florida does assess an excise “documentary stamp” tax on certain documents, including deeds and other documents that transfer an interest in Florida real property. A portion of the proceeds goes to the State Transportation Trust Fund (Fla. Stat. Ann. §201.15).

²⁴⁶ Assumes that, like local occupancy taxes, a state occupancy tax would apply to hotels, motels, and other short-term rental options such as Airbnb

²⁴⁷ All of the 26 states that are known to levy a statewide lodging tax do so on a percentage basis except for Georgia, which charges a flat \$5 per-night fee (see www.ncsl.org/research/fiscal-policy/state-lodging-taxes.aspx). Georgia, however, is also the only state known to use those revenues for transportation purposes (O.C.G.A. §48-13- 50.3).

²⁴⁸ Most remote sales are online, but also included are sales made by catalog, mail order, call center, or television shopping channel retail companies (N.C. Gen. Stat. §105-164.3 and §105-164.8; www.gao.gov/products/GAO-18-114).

		10-year revenue projections (2021–30)	Responsiveness to inflation	Revenue stability and predictability	Adherence to “user pay” principle	Administrative costs relative to revenue	Equity by income group	Where in use for transportation funding	Relevant NCFIRST Commission resources
	Dedicated tax on electricity ²⁴⁹	\$260m per 0.25% of tax	Good	Good	Fair	Good	Poor	<ul style="list-style-type: none"> None found at state level 	<ul style="list-style-type: none"> Meeting materials 2-28-20
	General Fund appropriations	Amounts as legislated	See note ²⁵⁰	See note ²⁵⁰	See note ²⁵⁰	See note ²⁵⁰	See note ²⁵⁰	<ul style="list-style-type: none"> To supplement user-pay revenues: at least 25 states, federal As primary funding approach: most international models 	<ul style="list-style-type: none"> Meeting materials 7-12-19, 7-31-20 Issue Brief #9

²⁴⁹ Assumes that a 0.25% tax, dedicated to transportation, would be added to the existing 7% sales and use tax on electricity

²⁵⁰ The evaluation for General Fund appropriations according to these five criteria would depend on the ultimate source of the funds and how the allocation was structured. North Carolina’s General Fund is supported by various revenue sources including individual income tax (53%), state sales tax (31%), corporate income and franchise taxes (6.4%), excise taxes on alcohol and tobacco products (2.7%), insurance premium tax (2.1%), and non-tax revenues (4%) (www.osbm.nc.gov/facts-figures/revenue). These sources vary in their advantages and disadvantages. The structure of the allocation, such as whether it was a recurring allocation or indexed to inflation, would also affect these ratings. See www.enotrans.org/eno-resources/the-life-and-death-of-the-highway-trust-fund/ for how other countries rely on general revenues for transportation funding, with mechanisms in place to ensure stable, predictable funding levels.