



Moving North Carolina Forward: Providing a Modern, Reliable and Sustainable Transportation System in the Tar Heel State



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Founded in 1971, [TRIP](http://tripnet.org)® of Washington, DC, is a nonprofit organization that researches, evaluates and distributes economic and technical data on surface transportation issues. TRIP is sponsored by insurance companies, equipment manufacturers, distributors and suppliers; businesses involved in highway and transit engineering and construction; labor unions; and organizations concerned with efficient and safe surface transportation.

Executive Summary

Mobility, accessibility and connectivity are critical factors in a state's quality of life and economic competitiveness. The growth and development of a state or region hinges on efficient and safe access to employment, customers, commerce, recreation, education and healthcare via multiple transportation modes. The quality of life and the pace of a state's economic growth are directly tied to the condition, efficiency, safety and resiliency of its transportation system.

An adequate and reliable source of transportation funding is critical to providing a system of roads, highways, bridges, transit, pedestrian and bicycle facilities to support commerce within North Carolina and connect the state to markets around the globe, while providing safe, efficient mobility on a well-maintained transportation system. North Carolina transportation funding received a significant boost in 2022 when the legislature approved the use of a share of the state's sales tax for road and bridge projects. This followed the 2021 passage of the federal [Infrastructure Investment and Jobs Act](#) (IIJA), which increased federal highway, bridge and transit funding in North Carolina by approximately 25 percent. While this additional state and federal transportation investment will allow North Carolina to make progress in improving its transportation system, the erosion of motor fuel taxes -- a primary source of federal and state transportation funding -- due to inflation, improved fuel efficiency and the adoption of hybrid and electric vehicles, threatens North Carolina's ability to keep pace with the state's growing transportation needs.

TRIP's "Moving North Carolina Forward" report examines the condition, use, safety and efficiency of North Carolina's surface transportation system and the impact of additional transportation funding. The report also looks at the challenges North Carolina faces to accommodate future transportation growth, maintain the existing system, and sustain adequate state transportation investment despite the funding impacts of highway construction cost inflation, increasing fuel efficiency standards, and the adoption of electric vehicles. Sources of information for this report include the North Carolina Department of Transportation (NCDOT), the Federal Highway Administration (FHWA), the American Association of State Highway and Transportation Officials (AASHTO), the Bureau of Transportation Statistics (BTS), the U.S. Census Bureau, the Texas Transportation Institute (TTI), the American Road & Transportation Builders Association (ARTBA), and the National Highway Traffic Safety Administration (NHTSA).

NORTH CAROLINA'S TRANSPORTATION SYSTEM AND FUNDING

Investment in North Carolina's roads, highways and bridges is funded by local, state and federal governments. To address a lack of adequate transportation funding, the North Carolina legislature in 2022 approved [HB 103](#), which dedicated a portion of the state's sales tax revenue to road and highway projects. The bill transfers two percent of general sales tax dollars to two highway funds, with the transfer rising to four percent in fiscal year (FY) 2023-24 and to six percent of sales tax revenues in FY 2024-25. The sales tax revenue is expected to provide an additional \$193 million in highway funds in North Carolina in FY 2022-23, increasing to \$629 million in FY 2024-25 and to \$855 million in FY 2032-33, providing an additional \$7.2 billion in highway funds through FY 2032-33.

The additional state revenue for highways will complement a boost in federal transportation funds received in North Carolina from the [Infrastructure Investment and Jobs Act](#) (IIJA), signed into law by President Biden in November 2021. The IIJA will provide \$7.8 billion in state funds for highway and bridge investments in North Carolina over five years, including a 25 percent funding increase in FY 2022. Federal funds currently provide 33 percent of the revenue used by NCDOT to fund highway and bridge improvements.

The ability of NCDOT to adequately maintain the state's major roads, highways and bridges, depends on long-term, consistent, and sufficient funding that targets the assets in greatest need of repair. NCDOT's

current annual level of investment in roadway and bridge preservation falls short of the amount needed to adequately maintain the state's roads, highways and bridges. In 2022 NCDOT spent \$656 million on the preservation of roads and highways, \$341 million short of the \$997 million annual investment recommended by NCDOT. In 2022 NCDOT spent \$371 million on bridge preservation, \$39 million short of the \$410 million annual investment recommended.

Due to increased state and federal transportation revenue, NCDOT expects to increase its annual investment in roadway preservation and bridge preservation by 17 percent and 22 percent, respectively, from 2023 to 2032.

The ability of revenue from the North Carolina and the federal motor fuel tax -- as well as other sources of state and federal transportation funding -- to keep pace with North Carolina's future transportation needs is likely to erode as a result of increasing vehicle fuel efficiency, the increasing use of electric vehicles and inflation in highway construction costs.

The average fuel efficiency of U.S. passenger vehicles increased from 20 miles per gallon in 2010 to 24.5 miles per gallon in 2020. Average fuel efficiency is expected to increase another 31 percent by 2030, to 32 miles per gallon, and increase 51 percent by 2040, to 37 miles per gallon. The share of electric vehicles of total passenger vehicle sales in the U.S. is expected to increase to five percent in 2023 and to 60 percent by 2040, by which time electric vehicles will represent approximately 30 percent of the nation's passenger vehicle fleet.

The Federal Highway Administration's national highway construction cost index, which measures labor and materials cost, increased by 50 percent during the 21 months from the start of the first quarter in January 2021 to the end of the third quarter in September 2022.

ROAD CONDITIONS IN NORTH CAROLINA

Statewide, 33 percent of North Carolina's major roads are in poor or mediocre condition. Ten percent of North Carolina's major locally and state-maintained roads are in poor condition and 23 percent are in mediocre condition. Twenty-three percent of North Carolina's major roads are in fair condition and the remaining 44 percent are in good condition.

Location	Poor	Mediocre	Fair	Good
Asheville	11%	16%	19%	53%
Charlotte Metro	16%	28%	23%	33%
Raleigh-Durham	13%	25%	21%	42%
The Triad	12%	28%	20%	41%
Wilmington	16%	25%	21%	37%
North Carolina Statewide	10%	23%	23%	44%

TRIP has calculated the additional cost to North Carolina motorists of driving on roads in poor, mediocre or fair condition. When roads are in poor, mediocre or fair condition – which may include potholes, rutting or rough surfaces – the cost to operate and maintain a vehicle increases. These additional vehicle operating costs (VOC) include accelerated vehicle depreciation, additional vehicle repair costs, increased fuel consumption and increased tire wear. TRIP estimates that additional VOC borne by North Carolina motorists as a result of deteriorated road conditions is \$3.7 billion annually, an average of \$484 per driver statewide. The chart below details additional VOC per motorist in the state's largest urban areas and statewide.

Location	VOC
Asheville	\$390
Charlotte Metro	\$559
Raleigh-Durham	\$477
The Triad	\$477
Wilmington	\$544
NC Statewide Average	\$484

BRIDGE CONDITIONS IN NORTH CAROLINA

Seven percent of North Carolina's bridges are rated in poor/structurally deficient condition. Bridges that are rated poor/structurally deficient have significant deterioration of the bridge deck, supports or other major components. Fifty-two percent of the state's bridges are rated in fair condition and the remaining 41 percent are in good condition. Most bridges are designed to last 50 years before major overhaul or replacement, although many newer bridges are being designed to last 75 years or longer. In North Carolina, 32 percent of the state's bridges are 50 years or older.

The chart below details bridge conditions statewide and in the state's largest urban areas.

	POOR/STRUCTURALLY DEFICIENT		FAIR		GOOD		TOTAL BRIDGES
	Number	Share	Number	Share	Number	Share	
Asheville	35	6%	334	61%	180	33%	549
Charlotte Metro	94	5%	947	52%	769	42%	1,810
Raleigh-Durham	51	5%	529	51%	450	44%	1,030
The Triad	108	6%	957	51%	810	43%	1,875
Wilmington	3	3%	42	37%	70	61%	115
North Carolina Statewide	1,303	7%	9,728	52%	7,791	41%	18,822

TRAFFIC CONGESTION IN NORTH CAROLINA

Congested roads, highways and bottlenecks choke commuting and commerce and cost North Carolina drivers \$4 billion each year in the form of lost time and wasted fuel. From 2000 to 2019, vehicle travel in North Carolina increased by 37 percent, the fifth highest rate in the country. Due to the COVID-19 pandemic, vehicle travel in North Carolina dropped by as much as 38 percent in April 2020 (as compared to vehicle travel during the same month the previous year). By 2021, vehicle miles of travel (VMT) in North Carolina had rebounded to four percent below pre-pandemic levels in 2019.

The chart below details the annual hours lost to congestion, congestion costs per driver and the average amount of fuel per driver wasted annually due to congestion in the state's largest urban areas.

Urban Area	Hours Lost to Congestion	Annual Cost Per Driver	Gallons of Fuel Wasted Per Driver
Asheville	26	\$687	10
Charlotte Metro	47	\$1,342	19
Raleigh-Durham	36	\$897	14
The Triad	26	\$580	11
Wilmington	26	\$646	11



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Increasing congestion on North Carolina's major highways and roads hampers the state's ability to support economic development and quality of life by reducing the reliability and efficiency of personal and commercial travel, including the transport of goods and services. Traffic congestion robs commuters of time and money and imposes increased costs on businesses, shippers and manufacturers, which are often passed along to consumers. Increased levels of congestion can also reduce the attractiveness of a location when a company is considering expansion or deciding where to locate a new facility.

The chart below details the 15 least reliable North Carolina highway segments with the widest variability in travel times from day to day as measured by the Level of Travel Time Reliability (LOTTR) (a list of the 25 least reliable highway segments in the state is included in the report). The Level of Travel Time Reliability (LOTTR) index represents how a road performs on a congested day compared to an average day. For example, if a given trip takes a motorist 40 minutes on a congested day compared with 20 minutes to make the same trip on an average day, the LOTTR would be 2.0 (40/20). In addition to the trip taking longer than normal, this variability makes trip planning challenging for motorists.

Rank	Route	Direction	County	Route or Intersection	Length (Mi)	LOTTR
1	US-29	SOUTHBOUND	GUILFORD	I-85 BUS/I-40/US-421	0.5	3.35
2	I-485	EASTBOUND	MECKLENBURG	US-521/EXIT 61	0.6	3.28
3	I-485	EASTBOUND	MECKLENBURG	REA RD/EXIT 59	1.2	2.96
4	I-40	WESTBOUND	WAKE	US-70	0.8	2.84
5	I-40	EASTBOUND	WAKE	I-440/US-64/EXIT 301	0.8	2.79
6	US-74	EASTBOUND	MECKLENBURG	HAWTHORNE LN	0.4	2.7
7	US-74	WESTBOUND	MECKLENBURG	SAM WILSON RD	0.7	2.69
8	US-301-BR	SOUTHBOUND	NASH	KINGSTON AVE	1.4	2.64
9	I-77	NORTHBOUND	MECKLENBURG	I-485/EXIT 2	1.0	2.61
10	NC-172	EASTBOUND	ONSLow	NC-24/FREEDOM WAY	9.6	2.54
11	US-421	NORTHBOUND	HARNETT	S WILMINGTON AVE	0.4	2.53
12	US-64-BR	EASTBOUND	NASH	SUNSET AVE	0.5	2.52
13	NC-27	WESTBOUND	MECKLENBURG	HARRISBURG RD	1.0	2.51
14	I-77	SOUTHBOUND	MECKLENBURG	NC-73/EXIT 25	0.7	2.41
15	NC-55	WESTBOUND	CRAVEN	ALFRED A CUNNINGHAM BRG	0.4	2.41

TRAFFIC SAFETY IN NORTH CAROLINA

From 2017 to 2021, 7,387 people were killed in traffic crashes in North Carolina, an average of 1,477 fatalities per year. The state's 2021 traffic fatality rate of 1.38 fatalities for every 100 million miles traveled was higher than the national average of 1.35. The fatality rate on North Carolina's non-Interstate rural roads in 2020 was two-and-a-half times higher than on all other roads in the state (2.52 per 100 million vehicle miles of travel vs. 1.01). From 2017 to 2021, 17 percent of the state's 7,387 traffic fatalities in crashes involving motorized vehicles were of pedestrians or bicyclists, a total of 1,107 pedestrian fatalities and 113 bicyclist fatalities over the five-year period.

Improving safety on North Carolina's roadways can be achieved through further improvements in vehicle safety; improvements in driver, pedestrian, and bicyclist behavior; and, a variety of improvements in roadway safety features.

Nationwide, traffic fatalities began to increase dramatically in 2020 even as vehicle travel rates plummeted due to the COVID-19 pandemic, and the number of fatalities continued to increase in 2021. The number of fatalities in North Carolina increased 18 percent from 2019 to 2021, from 1,373 to 1,627, and the



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state's fatality rate per 100 million VMT increased 23 percent from 1.12 to 1.38 during that time. This increase in the number of fatalities and the rate of fatalities per 100 million VMT happened while vehicle travel in the state decreased by four percent overall from 2019 to 2021.

NORTH CAROLINA TRAFFIC FATALITY AND VEHICLE MILES OF TRAVEL (VMT) DATA				
	2019	2020	2021	2019-2021 Change
Traffic Fatalities	1,373	1,538	1,627	+18%
Fatalities per 100 Million VMT	1.12	1.45	1.38	+23%
VMT (Billions)	122.5	106.3	118	-4%

In early 2022 the U.S. Department of Transportation adopted a comprehensive [National Roadway Safety Strategy](#), a roadmap for addressing the nation's roadway safety crisis based on a [Safe System](#) approach. The Safe System approach, which is also being adopted by state and local transportation agencies has five objectives: [Safer People](#), [Safer Roads](#), [Safer Vehicles](#), [Safer Speeds](#), and improved [Post-Crash Care](#).

Traffic crashes in North Carolina imposed a total of \$11.4 billion in economic costs in 2021. TRIP estimates that roadway features, while not the primary factor, were likely a contributing factor in approximately one-third of all fatal traffic crashes, resulting in \$3.8 billion in economic costs in North Carolina in 2021. These costs include work and household productivity losses, property damage, medical costs, rehabilitation costs, legal and court costs, congestion costs, and emergency services.

FREIGHT TRANSPORTATION IN NORTH CAROLINA

The health and future growth of North Carolina's economy is riding on its surface transportation system. In 2022, \$795 billion dollars of freight were shipped to or from sites in North Carolina, an amount that is anticipated to grow by 67 percent in inflation-adjusted dollars by 2045. Eighty percent of the goods by value shipped in 2022 to and from sites in North Carolina were carried by truck and another 15 percent were carried by courier services or multiple-mode deliveries, which include trucking.

The amount of freight transported in North Carolina and the rest of the U.S. is expected to increase significantly as a result of economic growth, changing business and retail models, increasing international trade, and rapidly changing consumer expectations that place an emphasis on faster deliveries, often of smaller packages or payloads.

Accommodating the significant increase expected in the movement of truck freight in North Carolina will be further challenged by the significant number of freight routes in the state that are constrained because they have inadequate load carrying capacity to accommodate large trucks. The chart below lists North Carolina's top 10 truck bottlenecks, which cause the longest delays.

Rank	Top Freight Bottleneck Locations	Avg. Daily Delay
1	I-40 East at US-70, Exit 306 between Garner and Clayton	2 h 17 m
2	I-77 South at Nations Ford Rd., Exit 4 in South Charlotte	1 h 34 m
3	I-40 West at US-276, Exit 20 between Clyde & Waterville Lake	2 h 41 m
4	I-26 West at NC-146 Exit 37 south of Asheville	2 h 23 m
5	I-85 South at NC-273, Exit 27 between Charlotte and Belmont	1 h 9 m
6	I-485 East at NC-16, Providence Rd., Exit 57 in Charlotte	1 h 34 m
7	NC-150 East at I-77 west of Mooresville	1 h 18 m
8	I-77 North at Woodlawn Rd., Exit 6 in Charlotte	55 m
9	I-85 North at Graham St., Exit 40 in Charlotte	1 h 18 m
10	US-74 East at Sam Newell Rd. between Matthews & Charlotte	2 h 59 m



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PROGRESS IN IMPROVING TRAVEL RELIABILITY AND SAFETY IN NORTH CAROLINA

Using a combination of programs and projects, the North Carolina Department of Transportation is taking steps to address North Carolina's safety, traffic congestion and reliability challenges. These efforts are aimed at improving the efficiency and safety of the state's transportation system.

- NCDOT's efforts to improve travel reliability and safety include:
 - ✓ Four regional and one statewide Transportation Management Centers (TMC) in Charlotte, the Triad/Greensboro area, Asheville, and the Triangle/Raleigh area provide continuous, proactive traffic management across the state. The TMC's coordinate with DOT staff, law enforcement, emergency management, adjacent state DOT's and other stakeholders to manage daily freeway disruptions by clearing incidents and providing real time information.
 - ✓ Nearly 1,200 miles of safety service patrol serve freeways in Western North Carolina, the greater Charlotte metro area, the Triad, the Triangle, the Wilmington area, and I-95. The Incident Management Assistance Patrol (IMAP) provides emergency traffic control for emergency responders at crash scenes, works with emergency responders to clear crash scenes quickly, and provides services to stranded motorists. In 2021 IMAP responded to over 52,000 incidents and assisted more than 36,000 motorists across the state.
 - ✓ The traveler Information program includes more than 300 Dynamic Message Signs, 900 traffic cameras, the DriveNC.gov website and 511 phone line. About 35,000 phone calls are made to 511 each year, over 700,000 visits were made to DriveNC.gov in 2021, and over 30,000 incidents were entered into the system and shared with Waze, Google, Apple, etc.
 - ✓ In 2021 NCDOT retimed 49 systems (made up of 474 traffic signals), which yielded a 19 percent improvement in travel time, a 57 percent reduction in delays and a 62 percent reduction in the number of stops.
 - ✓ In 2022 NCDOT released [updated guidance](#) on its [Complete Streets policy](#) which requires all projects in the state to include appropriate multimodal facilities when bicycle, pedestrian and transit needs are identified. The new guidance establishes standards and procedures for project evaluation, facility selection, and cost share. NCDOT staff reviewed over 450 transportation projects in 2022 using the new Complete Streets guidance to identify multimodal needs and ensure projects are scoped properly to address those needs.
 - ✓ North Carolina is served by 25 urban transit systems that in 2021 provided approximately 31 million trips, and 80 rural transportation agencies which in 2022 provided approximately 4.7 million demand response rides.
 - ✓ Since 2018, NCDOT has invested approximately \$4.6 billion to increase the capacity of numerous highway segments in the state to improve reliability. These improvements include additional capacity being added to portions of the Fayetteville Outer Loop, the Greensboro Loop, the I-485 Charlotte Beltway, the Winston-Salem Bypass, the Wilmington Bypass, the I-85 corridor, the Goldsboro Bypass, the Salem Parkway and the Jamestown Bypass.

THE IMPACT OF TRANSPORTATION INVESTMENT ON ECONOMIC GROWTH IN NORTH CAROLINA

According to a [report by the American Road & Transportation Builders Association](#), the design, construction and maintenance of transportation infrastructure in North Carolina supports approximately 110,000 full-time jobs across all sectors of the economy. These workers earn \$3.7 billion annually. Approximately 1.9 million full-time jobs in North Carolina in key industries like tourism, retail sales, agriculture and manufacturing are completely dependent on the state's transportation network.

Highway and bridge spending multiplies through the economy by stimulating additional output. A 2021 macroeconomic [analysis](#) by [IHS Markit](#) found that that every dollar spent on highway and bridge improvements results in \$3.4 dollars in combined direct, indirect and induced output from industries throughout the economy, resulting in a multiplier for highway and bridge investment of 3.4.

Sources of information for this report include the Federal Highway Administration (FHWA), the North Carolina Department of Transportation, the American Road and Transportation Builders Association (ARTBA), the Bureau of Transportation Statistics (BTS), the U. S. Census Bureau, the Center for Transportation Studies, the Texas Transportation Institute (TTI) and the National Highway Traffic Safety Administration (NHTSA). All data used in the report are the most recent available.



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Introduction

North Carolina's system of roadways, bridges, transit, pedestrian and bicycle facilities provides a vital link for the state's residents, visitors and businesses, providing daily access to homes, jobs, shopping, natural resources and recreation. Supporting quality of life and a robust economy in North Carolina requires that the state provide an efficient, safe and well-maintained transportation system that allows for a high level of accessibility, connectivity and safety.

North Carolinians rely on a diverse economy including manufacturing, financial services, agriculture, healthcare, tourism and education. A safe, well-maintained and reliable transportation system is critical to each of these sectors and to the economic health of the state and the nation.

Adequate, sustained, long-term investment in North Carolina's transportation network will help enhance economic development opportunities, improve business productivity, and make it easier and more reliable for the public to get to and from destinations including work, home, school, shopping and social events.

Population, Travel and Economic Trends in North Carolina

North Carolina's residents and businesses require a high level of personal and commercial mobility. To foster quality of life and spur economic growth, it will be critical that North Carolina provide an efficient, safe and modern transportation system that can accommodate future growth in population, tourism, business, recreation and vehicle travel.

North Carolina's population reached 10.7 million residents in 2022, a 33 percent increase since 2000 and the ninth highest rate of population growth among states from 2000 to 2022.¹ North Carolina had approximately 7.6 million licensed drivers in 2020.² From 2000 to 2021, North Carolina's gross domestic product (GDP), a measure of the state's economic output, increased by 49 percent when adjusted for inflation.³ U.S. GDP, adjusted for inflation, increased 48 percent during this period.⁴

From 2000 to 2019, annual VMT in North Carolina increased by 37 percent, the fifth highest rate of growth in the U.S., from approximately 89 billion miles traveled annually to approximately 122 billion miles traveled annually.⁵ Due to the COVID-19 pandemic, vehicle travel in North Carolina dropped by as much as 38 percent in April 2020 (as compared to vehicle travel during the same month the previous year).⁶ By 2021, North Carolina's overall VMT levels had rebounded to four percent below 2019's pre-pandemic levels.⁷

Road Conditions in North Carolina

The life cycle of North Carolina's roads is greatly affected by state and local governments' ability to perform timely maintenance and upgrades to ensure that road and highway surfaces last as long as possible.

The pavement data in this report, which is for all arterial and collector roads and highways, is provided by the Federal Highway Administration (FHWA), based on data submitted annually by NCDOT on the condition of major state and locally maintained roads and highways. Pavement data for Interstate highways and other principal arterials is collected for all system mileage, whereas pavement data for minor arterial and all collector roads and highways is based on sampling portions of roadways as prescribed by FHWA to ensure the data collected is adequate to provide an accurate assessment of pavement conditions on these roads and highways.

Ten percent of North Carolina's major locally and state-maintained roads and highways have pavements rated in poor condition and 23 percent are in mediocre condition.⁸ Twenty-three percent of North Carolina's major roads are rated in fair condition and the remaining 44 percent are rated in good condition.⁹

Sixteen percent of North Carolina’s major locally and state-maintained urban roads and highways have pavements rated in poor condition and 29 percent are in mediocre condition.¹⁰ Twenty-three percent of North Carolina’s major urban roads are rated in fair condition and the remaining 32 percent are rated in good condition.¹¹

Six percent of North Carolina’s major locally and state-maintained rural roads and highways have pavements rated in poor condition and 18 percent are in mediocre condition.¹² Twenty-three percent of North Carolina’s major rural roads are rated in fair condition and the remaining 53 percent are rated in good condition.¹³

The chart below details pavement conditions on major roads in the state’s largest urban areas and statewide.¹⁴

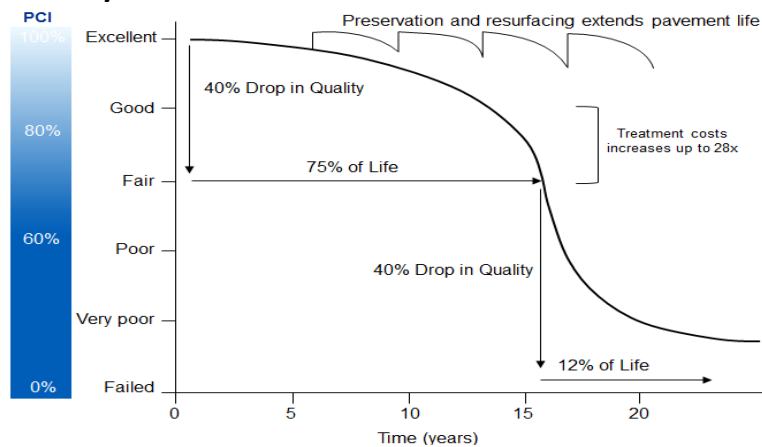
Chart 1. Pavement conditions on major roads in North Carolina’s largest urban areas and statewide.

Location	Poor	Mediocre	Fair	Good
Asheville	11%	16%	19%	53%
Charlotte Metro	16%	28%	23%	33%
Raleigh-Durham	13%	25%	21%	42%
The Triad	12%	28%	20%	41%
Wilmington	16%	25%	21%	37%
North Carolina Statewide	10%	23%	23%	44%

Source: TRIP analysis of Federal Highway Administration data.

Pavement failure is caused by a combination of traffic, moisture and climate. Moisture often works its way into road surfaces and the materials that form the road’s foundation. Road surfaces at intersections are more prone to deterioration because the slow-moving or standing loads occurring at these sites subject the pavement to higher levels of stress. It is critical that roads are fixed before they require major repairs because reconstructing roads costs approximately four times more than resurfacing them.¹⁵ As roads and highways continue to age, they will reach a point of deterioration where routine paving and maintenance will not be adequate to keep pavement surfaces in good condition and costly reconstruction of the roadway and its underlying surfaces will become necessary.

Chart 2. Pavement condition cycle time with treatment and cost



Source: North Carolina Department of Transportation (2016). [2016 Maintenance Operations and Performance Analysis Report](#)



Long-term repair costs increase significantly when road and bridge maintenance is deferred, as road and bridge deterioration accelerates later in the service life of a transportation facility and requires more costly repairs. A [report on maintaining pavements](#) found that every \$1 of deferred maintenance on roads and bridges costs an additional \$4 to \$5 in needed future repairs.¹⁶

The Cost of Inadequate Road Conditions in North Carolina

TRIP has calculated the additional cost to motorists of driving on roads in poor, mediocre or fair condition. When roads are in poor, mediocre or fair condition – which may include potholes, rutting or rough surfaces – the cost to operate and maintain a vehicle increases. These additional vehicle operating costs (VOC) include accelerated vehicle depreciation, additional vehicle repair costs, increased fuel consumption and increased tire wear. TRIP estimates that additional VOC borne by North Carolina motorists as a result of deteriorated road conditions is \$3.7 billion annually, an average of \$484 per driver statewide.¹⁷ The chart below details additional VOC per motorist in the state’s largest urban areas.

Chart 3. Annual vehicle operating costs per motorist as a result of driving on deteriorated roads.

Location	VOC
Asheville	\$390
Charlotte Metro	\$559
Raleigh-Durham	\$477
The Triad	\$477
Wilmington	\$544
NC Statewide Average	\$484

Source: TRIP estimates.

Additional vehicle operating costs have been calculated in the Highway Development and Management Model (HDM), which is recognized by the U.S. Department of Transportation and more than 100 other countries as the definitive analysis of the impact of road conditions on vehicle operating costs. The HDM report is based on numerous studies that have measured the impact of various factors, including road conditions, on vehicle operating costs.¹⁸ The HDM study found that road deterioration increases ownership, repair, fuel and tire costs. The report found that deteriorated roads accelerate the pace of depreciation of vehicles and the need for repairs because the stress on the vehicle increases in proportion to the level of roughness of the pavement surface. Similarly, tire wear and fuel consumption increase as roads deteriorate since there is less efficient transfer of power to the drive train and additional friction between the road and the tires.

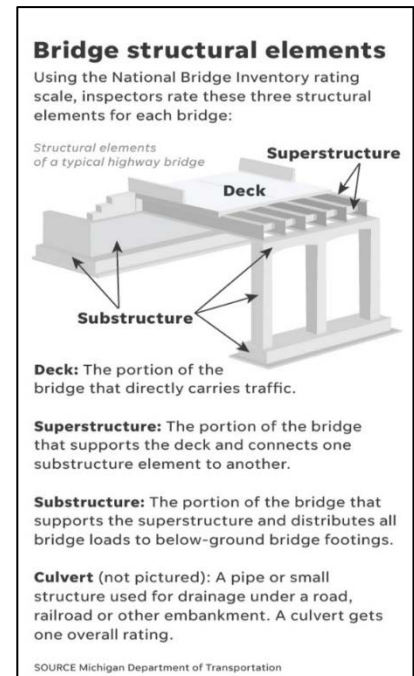
TRIP’s additional VOC estimate is based on taking the average number of miles driven annually by a motorist, calculating current VOC based on [AAA’s driving cost estimates](#) and then using the HDM model to estimate the additional VOC paid by drivers as a result of substandard roads.¹⁹ Additional research on the impact of road conditions on fuel consumption by the North Carolina Transportation Institute (TTI) is also factored into TRIP’s vehicle operating cost methodology.

Bridge Conditions in North Carolina

North Carolina’s bridges form key links in the state’s highway system, providing communities and individuals access to employment, schools, shopping and medical facilities, and facilitating commerce and access for emergency vehicles.

Seven percent (1,303 of 18,822) of North Carolina’s locally and state-maintained bridges are rated in poor/structurally deficient condition.²⁰ This includes all bridges that are 20 feet or more in length. A bridge is deemed poor/structurally deficient if there is significant deterioration of the bridge deck, supports or other major components.

Bridges that are poor/structurally deficient may be posted for lower weight limits or closed if their condition warrants such action. Deteriorated bridges can have a significant impact on daily life. Restrictions on vehicle weight may cause many vehicles – especially emergency vehicles, commercial trucks, school buses and farm equipment – to use alternate routes to avoid posted bridges. Redirected trips also lengthen travel time, waste fuel and reduce the efficiency of the local economy. Fifty-two percent of North Carolina’s locally and state-maintained bridges have been rated in fair condition.²¹ A fair rating indicates that a bridge’s structural elements are sound but minor deterioration has occurred to the bridge’s deck, substructure or superstructure. The remaining 41 percent of the state’s bridges are rated in good condition.²²



The chart below shows the condition of bridges statewide and in North Carolina’s largest urban areas.²³

Chart 4. Bridge conditions statewide and in North Carolina’s largest urban areas.

	POOR/STRUCTURALLY DEFICIENT		FAIR		GOOD		TOTAL BRIDGES
	Number	Share	Number	Share	Number	Share	
Asheville	35	6%	334	61%	180	33%	549
Charlotte Metro	94	5%	947	52%	769	42%	1,810
Raleigh-Durham	51	5%	529	51%	450	44%	1,030
The Triad	108	6%	957	51%	810	43%	1,875
Wilmington	3	3%	42	37%	70	61%	115
North Carolina Statewide	1,303	7%	9,728	52%	7,791	41%	18,822

Source: TRIP analysis of Federal Highway Administration National Bridge Inventory (2022).

Most bridges are designed to last 50 years before major overhaul or replacement, although many newer bridges are being designed to last 75 years or longer. In North Carolina, 32 percent of the state’s bridges are 50 years or older.²⁴ The service life of bridges can be extended by performing routine

maintenance such as resurfacing decks, painting surfaces, ensuring that a facility has good drainage and replacing deteriorating components. But most bridges will eventually require more costly reconstruction or major rehabilitation to remain operable.

Traffic Reliability in North Carolina

While traffic congestion is largely constrained to the state's urban areas, increasing congestion on North Carolina's major highways and roads hampers the state's ability to support economic development and quality of life by reducing the reliability and efficiency of personal and commercial travel, including the transport of goods and services. Traffic congestion robs commuters of time and money and imposes increased costs on businesses, shippers and manufacturers, which are often passed along to consumers. Increased levels of congestion can also reduce the attractiveness of a location when a company is considering expansion or deciding where to locate a new facility.

Based on a 2019 [report](#) on urban mobility by the [Texas Transportation Institute](#) that analyzes urban traffic congestion levels and provides estimates on the amount of time and the value of lost time and wasted fuel as a result of traffic congestion, TRIP has estimated in the following chart the average number of hours lost annually for each driver, the per-driver cost of lost time and wasted fuel due to congestion and the average amount of fuel per driver wasted annually in 2021 due to congestion in each of North Carolina's largest urban areas.

Chart 5. 2021 Annual hours and fuel lost to congestion and congestion costs per driver.

Urban Area	Hours Lost to Congestion	Annual Cost Per Driver	Gallons of Fuel Wasted Per Driver
Asheville	26	\$687	10
Charlotte Metro	47	\$1,342	19
Raleigh-Durham	36	\$897	14
The Triad	26	\$580	11
Wilmington	26	\$646	11

Source: TRIP estimate based on North Carolina Transportation Institute Analysis.

Based on the TTI report, TRIP estimates that the total cost of traffic congestion in North Carolina in 2021 in the form of lost time and wasted fuel is \$4 billion annually.²⁵ Increasing congestion on North Carolina's major highways and roads hampers the state's ability to support economic development and quality of life by reducing the reliability and efficiency of personal and commercial travel, including the transport of goods and services.

NCDOT assesses reliability on the state's major highways. The Level of Travel Time Reliability (LOTTR) index represents how a road performs on a congested day compared to an average day. For example, if a given trip takes a motorist 40 minutes on a congested day compared with 20 minutes to make the same trip on an average day, the LOTTR would be 2.0 (40/20). According to the Federal Highway Administration an LOTTR higher than 1.5 indicates the road was considered unreliable because of the wide variability in travel times from day to day. In addition to the trip taking longer than normal, this variability makes trip planning challenging for motorists. The chart below details the segments of roadways in the state that are the least reliable based on their LOTTR.

Chart 6. Least Reliable Locations on North Carolina's Major Highways.

Rank	Route	Direction	County	Route or Intersection	Length (Mi)	LOTR
1	US-29	SOUTHBOUND	GUILFORD	I-85 BUS/I-40/US-421	0.5	3.35
2	I-485	EASTBOUND	MECKLENBURG	US-521/EXIT 61	0.6	3.28
3	I-485	EASTBOUND	MECKLENBURG	REA RD/EXIT 59	1.2	2.96
4	I-40	WESTBOUND	WAKE	US-70	0.8	2.84
5	I-40	EASTBOUND	WAKE	I-440/US-64/EXIT 301	0.8	2.79
6	US-74	EASTBOUND	MECKLENBURG	HAWTHORNE LN	0.4	2.7
7	US-74	WESTBOUND	MECKLENBURG	SAM WILSON RD	0.7	2.69
8	US-301-BR	SOUTHBOUND	NASH	KINGSTON AVE	1.4	2.64
9	I-77	NORTHBOUND	MECKLENBURG	I-485/EXIT 2	1.0	2.61
10	NC-172	EASTBOUND	ONSLOW	NC-24/FREEDOM WAY	9.6	2.54
11	US-421	NORTHBOUND	HARNETT	S WILMINGTON AVE	0.4	2.53
12	US-64-BR	EASTBOUND	NASH	SUNSET AVE	0.5	2.52
13	NC-27	WESTBOUND	MECKLENBURG	HARRISBURG RD	1.0	2.51
14	I-77	SOUTHBOUND	MECKLENBURG	NC-73/EXIT 25	0.7	2.41
15	NC-55	WESTBOUND	CRAVEN	ALFRED A CUNNINGHAM BRG	0.4	2.41
16	I-40	EASTBOUND	WAKE	JONES SAUSAGE RD/EXIT 303	1.3	2.39
17	NC-96	NORTHBOUND	JOHNSTON	I-95/US-301/NC-1009	0.4	2.38
18	US-158	EASTBOUND	HALIFAX	HALIFAX-NORTHAMPTON BORDER	0.4	2.38
19	I-77	SOUTHBOUND	MECKLENBURG	I-277/US-74/EXIT 9	0.8	2.37
20	US-64	WESTBOUND	MARTIN	US-13/US-17	0.3	2.36
21	I-77	NORTHBOUND	MECKLENBURG	GILEAD RD/EXIT 23	0.6	2.34
22	US-521	SOUTHBOUND	MECKLENBURG	I-485/US-521	0.4	2.32
23	US-70	EASTBOUND	DURHAM	S MINERAL SPRINGS RD/S MIAMI BLVD	0.6	2.25
24	NC-115	NORTHBOUND	IREDELL	NC-150	1.5	2.25
25	US-70	WESTBOUND	BUNCOMBE	BROADWAY ST	0.6	2.22

Source: North Carolina Department of Transportation.

Freight Transportation in North Carolina

Today's culture of business demands that an area has well-maintained and efficient roads, highways and bridges if it is to remain economically competitive. Global communications and the impact of free trade in North America and elsewhere have resulted in a significant increase in freight movement, making the quality of a region's transportation system, including its highways, railroads, air and maritime ports, a key component in a business's ability to compete locally, nationally and internationally.

Businesses have responded to improved communications and the need to cut costs with a variety of innovations including just-in-time delivery, increased small package delivery, demand-side inventory management and e-commerce. The result of these changes has been a significant improvement in logistics efficiency as firms move from a push-style distribution system, which relies on large-scale warehousing of materials, to a pull-style distribution system, which relies on smaller, more strategic movement of goods. These improvements have made mobile inventories the norm, resulting in the nation's trucks literally becoming rolling warehouses.

Highways are vitally important to economic development in North Carolina. As the economy expands, creating more jobs and increasing consumer confidence, the demand for consumer and business

products grows. In turn, manufacturers ship greater quantities of goods to market to meet this demand, a process that adds to truck traffic on the state’s highways and major arterial roads.

The amount of freight transported in North Carolina and the rest of the U.S. is expected to increase significantly as a result of economic growth, changing business and retail models, increasing international trade, and rapidly changing consumer expectations that place an emphasis on faster deliveries, often of smaller packages or payloads.

In 2022, \$795 billion of freight was shipped to or from sites in North Carolina, an amount that is anticipated to grow by 67 percent in inflation-adjusted dollars by 2045.²⁶ Eighty percent of the goods by value shipped in 2022 to and from sites in North Carolina were carried by truck and another 15 percent were carried by courier services or multiple-mode deliveries, which include trucking.²⁷

The efficiency of freight movement in North Carolina is threatened by traffic bottlenecks, which reduces the reliability of goods movement to, from and through the state. The following chart details the highway segments in North Carolina that provide the worst travel reliability for commercial trucks as a result of traffic bottlenecks, traffic incidents, and active work zones.

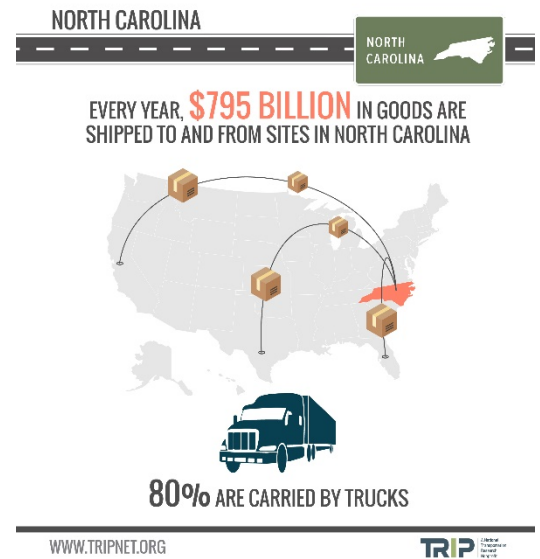


Chart 7. North Carolina’s top ten truck bottlenecks with the longest delays.

Rank	Top Freight Bottleneck Locations	Avg. Daily Delay
1	I-40 East at US-70, Exit 306 between Garner and Clayton	2 h 17 m
2	I-77 South at Nations Ford Rd., Exit 4 in South Charlotte	1 h 34 m
3	I-40 West at US-276, Exit 20 between Clyde & Waterville Lake	2 h 41 m
4	I-26 West at NC-146 Exit 37 south of Asheville	2 h 23 m
5	I-85 South at NC-273, Exit 27 between Charlotte and Belmont	1 h 9 m
6	I-485 East at NC-16, Providence Rd., Exit 57 in Charlotte	1 h 34 m
7	NC-150 East at I-77 west of Mooresville	1 h 18 m
8	I-77 North at Woodlawn Rd., Exit 6 in Charlotte	55 m
9	I-85 North at Graham St., Exit 40 in Charlotte	1 h 18 m
10	US-74 East at Sam Newell Rd. between Matthews & Charlotte	2 h 59 m

Source: NCDOT.

The ability of North Carolina’s and the nation’s freight transportation system to accommodate the growing demand for freight movement efficiently and safely could be hampered by inadequate transportation capacity, a lack of adequate safety features on some transportation facilities, institutional barriers to enhancing the nation’s freight facilities, a lack of adequate funding for needed improvements to the freight network, and a shortage of drivers.

The need to improve the U.S. freight network is occurring at a time when the nation’s freight delivery system is being transformed by advances in vehicle autonomy, manufacturing, warehousing and supply chain automation, increasing e-commerce, and the growing logistic networks being developed by Amazon and other retail organizations in response to the demand for a faster and more responsive delivery and logistics cycle.

Traffic Safety in North Carolina

A total of 7,387 people were killed in North Carolina traffic crashes from 2017 to 2021, an average of 1,477 fatalities per year.²⁸

Chart 8. North Carolina traffic fatalities 2017 – 2021.

Year	Fatalities
2017	1,412
2018	1,437
2019	1,373
2020	1,538
2021	1,627
TOTAL	7,387
AVERAGE	1,477

Source: National Highway Traffic Safety Administration.

From 2017 to 2021, 17 percent of the 7,387 people killed in crashes involving motorized vehicles were pedestrians or bicyclists, a total of 1,107 pedestrian fatalities and 113 bicyclist fatalities over the five-year period.²⁹

Chart 9. Non-motorized traffic fatalities in North Carolina 2017 – 2021.

Year	Total Fatalities	Pedestrian Fatalities	Bicyclist Fatalities	Share Bike and Ped.
2017	1,412	198	29	16%
2018	1,437	224	18	17%
2019	1,373	209	17	16%
2020	1,538	228	26	17%
2021	1,627	248	23	17%
TOTAL	7,387	1,107	113	17%
AVERAGE	1,477	221	23	17%

Source: National Highway Traffic Safety Administration.

North Carolina's 2021 traffic fatality rate of 1.38 fatalities per 100 million vehicle miles of travel in 2021 is slightly higher than the national average of 1.35.³⁰ The fatality rate in 2020 on North Carolina's non-interstate rural roads is two-and-a-half times greater than on all other roads in the state (2.52 fatalities per 100 million vehicle miles of travel vs. 1.01).³¹

The number of fatalities in North Carolina increased 18 percent from 2019 to 2021, from 1,373 to 1,627 and the state's fatality rate per 100 million VMT increased 23 percent during that time, from 1.12 to 1.38.³² Traffic fatalities began to increase in 2020 even as vehicle travel rates plummeted due to the COVID-19 pandemic. This increase in the number of fatalities and the rate of fatalities per 100 million VMT happened while vehicle travel in the state decreased by four percent overall from 2019 to 2021.



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Chart 10. North Carolina traffic fatality and VMT data, 2019-2021.

NORTH CAROLINA TRAFFIC FATALITY AND VEHICLE MILES OF TRAVEL (VMT) DATA				
	2019	2020	2021	2019-2021 Change
Traffic Fatalities	1,373	1,538	1,627	+18%
Fatalities per 100 Million VMT	1.12	1.45	1.38	+23%
VMT (Billions)	122.5	106.3	118	-4%

Source: National Highway Traffic Safety Administration and Federal Highway Administration.

The significant increase in traffic fatalities since the onset of the pandemic appears largely related to increased risks being taken by drivers. In an [October 2021 report](#), the National Highway Traffic Safety Administration found that “after the declaration of the public health emergency in March 2020, driving patterns and behaviors in the United States changed significantly. Of the drivers who remained on the roads, some engaged in riskier behavior, including speeding, failure to wear seat belts, and driving under the influence of alcohol or drugs.”³³The AAA Foundation for Traffic Safety (AAAFTS) drew similar conclusions about the role of increased risks being taken by drivers during the pandemic. A survey taken of drivers in October and November 2020 by the AAAFTS asked whether their level of driving had decreased, remained the same or increased since the beginning of COVID-19 related restrictions, and whether the motorist had engaged in a variety of risky driving behaviors in the previous 30 days.³⁴ In a February 2022 [brief](#) about the survey, the AAAFTS noted that drivers who maintained or increased their pre-COVID travel levels indicated that they were more likely to engage in risky driving behavior, including speeding, not wearing a seat belt, being impaired and driving aggressively. “It is possible that many of the individuals who were willing to travel—and even increase their travel—despite the health risks associated with the pandemic were already more willing than average to take other risks,” the AAAFTS report found.³⁵

In early 2022 the U.S. Department of Transportation adopted a comprehensive [National Roadway Safety Strategy](#), a roadmap for addressing the nation’s roadway safety crisis based on a [Safe System](#) approach that acknowledges the following: humans make mistakes and are physically vulnerable; traffic deaths and serious injuries are unacceptable; traffic deaths and serious injuries need to be reduced by the provision of a redundant transportation system that reduces or minimizes crashes and ensures that, if crashes do occur, they do not result in serious injury or death.³⁶

Chart 11. The Safe System Approach



Source: US Department of Transportation.

The Safe System approach, which is also being adopted by state and local transportation agencies has five objectives:

- [Safer People](#): Encourage safe, responsible behavior by people who use our roads, and create conditions that prioritize their ability to reach their destination unharmed.
- [Safer Roads](#): Design roadway environments to mitigate human mistakes and account for injury tolerances, to encourage safer behaviors, and to facilitate safe travel by the most vulnerable users.
- [Safer Vehicles](#): Expand the availability of vehicle systems and features that help to prevent crashes and minimize the impact of crashes on both occupants and non-occupants.
- [Safer Speeds](#): Promote safer speeds in all roadway environments through a combination of thoughtful, context-appropriate roadway design, targeted education and outreach campaigns, and enforcement.
- [Post-Crash Care](#): Enhance the survivability of crashes through expedient access to emergency medical care, while creating a safe working environment for vital first responders and preventing secondary crashes through robust traffic incident management practices.

Improving safety on the nation's roadways will require that additional steps are taken to make further progress in achieving the Safe System's objectives. NHTSA, which provides states with roadway safety grants, requires states to submit annually a [state highway safety plan](#). The state plans outline numerous steps states are taking to improve traffic safety. Elements of these state roadway safety plans aimed at addressing the Safe System objectives include:

- [Safer People](#): education on speeding, impaired or disadvantaged driving; education on safe pedestrian and bicycling behavior; education on driving safely around large commercial vehicles; enforcement of commercial driver license and vehicle weight requirements; extension of safety belt laws and their enforcement to include all passenger vehicle occupants; enhancing enforcement action of speeding, impaired, aggressive and distracted driving, particularly at high-risk locations; increase penalties, particularly for repeat offender drivers; and increased enforcement at work zones.
- [Safer Roads](#): converting intersections to roundabouts; removing or shielding roadside objects; the addition of left-turn lanes at intersections; improved signalization and lighting at intersections; adding or improving median barriers; improved roadway lighting; adding centerline or shoulder rumble strips; improving pedestrian and bicycle facilities, including sidewalks and bike lanes and providing pedestrian crossing islands; improved work zone safety measures; wider lanes and paved shoulders; upgrading roads from two lanes to four lanes; providing or improving lane markings; updating rail crossings; eliminating vertical pavement drop-offs; and providing large truck parking spaces.
- [Safer Vehicles](#): Support the development, testing and deployment of connected and autonomous vehicle technology such as collision avoidance, lane departure avoidance systems and turning detection systems.
- [Safer Speeds](#): Where appropriate, provide roadway features to encourage safer speeds, including traffic roundabouts and curb extensions; improved signage and dynamic speed signing at high-risk locations; education on the consequences of speeding; and increased speeding enforcement, particularly at high-risk locations.
- [Post-Crash Care](#): Reduce crash response time including the use of emergency vehicle preemption technology; improve emergency response to multi-vehicle or hazardous material

crashes; and increase access to level one or two trauma centers for seriously-injured crash victims.

Traffic crashes in North Carolina imposed a total of \$11.4 billion in economic costs in 2021.³⁷ TRIP estimates that roadway features, while not the primary factor, were likely a contributing factor in approximately one-third of all fatal traffic crashes, resulting in \$3.8 billion in economic costs in North Carolina in 2021.³⁸ According to a [2015 National Highway Traffic Safety Administration \(NHTSA\) report](#), the economic costs of traffic crashes includes work and household productivity losses, property damage, medical costs, rehabilitation costs, legal and court costs, congestion costs and emergency services.³⁹

The U.S. has a \$146 billion backlog in needed roadway safety improvements, according to a 2017 [report](#) from the AAA Foundation for Traffic Safety. The report found implementing these cost-effective and needed roadway safety improvements on U.S. roadways would save approximately 63,700 lives and reduce the number of serious injuries as a result of traffic crashes by approximately 350,000 over 20 years.

Transportation Funding in North Carolina

Investment in North Carolina's roads, highways and bridges is funded by local, state and federal governments.

The ability of NCDOT to adequately maintain the state's major roads, highways and bridges, depends on long-term, consistent, and sufficient funding that targets the assets in greatest need of repair and improvements. NCDOT's current annual level of investment in roadway and bridge preservation falls short of the amount needed to adequately maintain the state's roads, highways and bridges. In 2022 NCDOT spent \$656 million on the preservation of roads and highways, \$341 million short of the \$997 million annual investment recommended by NCDOT.⁴⁰ In 2022 NCDOT spent \$371 million on bridge preservation, \$39 million short of the \$410 million annual investment recommended.⁴¹

To address a lack of adequate transportation funding, the North Carolina legislature in 2022 approved [HB 103](#) which dedicated a portion of the state's sales tax revenue to road and highway projects. The bill transfers two percent of general sales tax dollars to two highway funds, with the transfer rising to four percent in fiscal year (FY) 2023-24 and to six percent of sales tax revenues starting in FY 2024-25.⁴² The sales tax revenue is expected to provide an additional \$193 million in highway funds in North Carolina in FY 2022-23, increasing to \$629 million in FY 2024-25 and rising to \$855 million in FY 2032-33, providing an additional \$7.2 billion in highway funds through FY 2032-33.

The additional state highway funding will enhance the increased federal highway and transit funding provided by the [Infrastructure Investment and Jobs Act](#) (IIJA), signed into law by President Biden in November 2021, will provide \$7.8 billion in state funds for highway and bridge investments in North Carolina over five years, including a 25 percent funding increase in FY 2022.⁴³ Federal funds currently provide 33 percent of the revenue used by NCDOT to fund highway and bridge improvements.⁴⁴

Due to increased state and federal transportation revenue, NCDOT expects to increase its annual investment in roadway preservation and bridge preservation by 17 percent and 22 percent, respectively, from 2023 to 2032.⁴⁵

Most federal funds for highway and transit improvements in North Carolina are provided by federal highway user fees, largely an 18.4 cents-per-gallon tax on gasoline and a 24.4 cents-per-gallon tax on diesel fuel (additional revenue is generated by fees on the sale of large trucks, a highway use tax levied on vehicles in excess of 55,000 pounds and a tax on the sale of large truck tires).

The ability of revenue from the North Carolina and the federal motor fuel tax -- as well as other sources of state and federal transportation funding -- to keep pace with North Carolina's future transportation needs is likely to erode as a result of increasing vehicle fuel efficiency, the increasing use of electric vehicles and inflation in highway construction costs.

The average fuel efficiency of U.S. passenger vehicles increased from 20 miles per gallon in 2010 to 24.5 miles per gallon in 2020. Average fuel efficiency is expected to increase another 31 percent by 2030, to 32 miles per gallon, and increase 51 percent by 2040, to 37 miles per gallon.⁴⁶ The share of electric vehicles of total passenger vehicle sales in the U.S. is expected to increase to five percent by 2023 and 60 percent by 2040, by which time electric vehicles will represent approximately 30 percent of the passenger vehicle fleet.⁴⁷

The Federal Highway Administration's national highway construction cost index, which measures labor and materials cost, increased by 50 percent during the 21 months from the start of the first quarter in January 2021 to the end of the third quarter in September 2022.⁴⁸

According to the [Status of the Nation's Highways, Bridges, and Transit, 24th Edition](#), submitted to Congress by the United States Department of Transportation (USDOT) in 2021, the nation faces a \$1 trillion backlog in needed repairs and improvements to the nation's roads, highways and bridges.⁴⁹ This backlog includes \$556 billion for highway rehabilitation; \$132 billion for bridge rehabilitation; \$181 billion for system expansion and \$143 billion for system enhancement.⁵⁰ The USDOT report found that the nation's current \$107 billion annual investment in roads, highways and bridges by all levels of government should be increased by 55 percent to \$166 billion annually to improve the conditions of roads, highways and bridges, relieve traffic congestion and improve traffic safety.⁵¹

The USDOT report also found that the nation faces a \$105 billion backlog in needed repairs and improvements to its transit systems.⁵² The USDOT report found that the nation's current \$18.8 billion annual investment in transit repairs and improvements by all levels of government should be increased by 30 percent to \$24.7 billion annually to improve the condition and expand the service of the nation's transit systems.⁵³

Highway and bridge spending multiplies through the economy by stimulating additional output. A 2021 macroeconomic [analysis](#) by [IHS Markit](#) found that that every dollar spent on highway and bridge improvements results in \$3.4 dollars in combined direct, indirect and induced output from industries throughout the economy, resulting in a multiplier for highway and bridge investment of 3.4.⁵⁴

The Importance of Transportation to Economic Growth in North Carolina

Investments in transportation improvements in North Carolina play a critical role in the state's economy. A [report by the American Road & Transportation Builders Association](#) found that the design, construction and maintenance of transportation infrastructure supports the equivalent of approximately 110,000 full-time jobs across all sectors of North Carolina's economy, earning these workers approximately \$3.7 billion annually.⁵⁵ These jobs include approximately 55,000 full-time jobs directly involved in transportation infrastructure construction and related activities. Spending by employees and companies in the transportation design and construction industry supports an additional 55,000 full-time jobs in North Carolina.⁵⁶ Transportation construction in North Carolina contributes an estimated \$674 million annually in state and local income, corporate and unemployment insurance taxes and the federal payroll tax.⁵⁷

Approximately 1.9 million full-time jobs in North Carolina in key industries like tourism, retail sales, agriculture and manufacturing are dependent on the quality, safety and reliability of the state's transportation infrastructure network. These workers earn approximately \$69 billion in wages and contribute an estimated \$12.6 billion in state and local income, corporate and unemployment insurance taxes and the federal payroll tax.⁵⁸

Local, regional and state economic performance is improved when a region's surface transportation system is expanded or repaired. This improvement comes as a result of the initial job creation and increased employment created over the long-term because of improved access, reduced transport costs and improved safety.

Increasingly, companies are looking at the quality of a region's transportation system when deciding where to re-locate or expand. Regions with congested or poorly maintained roads may see businesses relocate to areas with a smoother, more efficient and more modern transportation system. Highway access has a significant impact on the competitiveness of a region's economy. In a 2022 survey of corporate executives by [Area Development Magazine](#), highway accessibility was ranked fifth out of 28 selection factors in choosing a location.⁵⁹

Improving Transportation Safety, Resiliency and Efficiency

Recognizing that extreme weather, sea level change, and changes in environmental conditions may threaten the condition and longevity of the nation's transportation infrastructure, transportation agencies have begun to assess vulnerabilities and consider the resilience of their transportation assets during the transportation planning process. Weather-related events, including hurricanes, winter storms, heavy rainfalls and rockslides caused an average of \$106 million annually in damage to North Carolina roads and bridges from 2018 to 2022.⁶⁰ Transportation agencies across the country have begun to incorporate resilience in asset management plans, addressing resilience in project development and design and optimizing operations and maintenance practices.⁶¹

Based on the importance of maximizing the level and safety of mobility provided by its transportation system, transportation agencies are adopting Transportation Systems Management and Operations (TSMO) practices and incorporating improved resiliency into their transportation network. The NCDOT has begun to develop a [transportation resiliency plan](#) which will guide resilience awareness, policy amendments, practice enhancements and investment decisions to assist the state in preparing for and responding to natural hazards and extreme events.⁶² While a TSMO program does not eliminate the need for capacity expansions along some routes, it helps enhance the mobility of an existing corridor as much as possible.

A TSMO program adopts an integrated set of strategies to improve traffic flow and safety on a portion of a roadway, including work zone management, traffic incident management, freight management, traveler information, traffic signal coordination, ramp management, transit management and improved bicycle and pedestrian crossings.⁶³ The benefits of TSMO can include reduced traffic congestion, reduced fuel consumption and reduced emissions.

North Carolina Transit

North Carolina is served by 25 urban transit systems that provided approximately 31 million trips in 2021, and 80 rural transportation agencies that provided approximately 4.7 million demand-response rides in 2022.⁶⁴ After declines in ridership in 2020 and 2021 due to the COVID-19 pandemic, transit ridership in North Carolina has started to rebound. Community, or rural, transportation systems provide transportation for the general public and human service agency clients. There are around 80 community transportation systems in North Carolina, largely represented as rural single-county transit systems. Most community transit systems primarily provide demand-response transportation, prearranged by an individual, group or human service agency.

Progress in Improving Reliability and Safety in North Carolina

Using a combination of programs and projects, NCDOT is taking steps to address North Carolina's traffic reliability and safety challenges. These efforts are aimed at improving the efficiency and expanding the capacity of the state's transportation system and include the following:

Incident management: NCDOT provides nearly 1,200 miles of safety service patrols, serving freeways in Western North Carolina, the greater Charlotte metro area, the Triad, the Triangle, the Wilmington area, and I-95. The Incident Management Assistance Patrol (IMAP) provides emergency traffic control for first

responders at crash scenes, works with emergency responders to clear crash scenes quickly, and provides services to stranded motorists. In 2021 IMAP responded to over 52,000 incidents and assisted more than 36,000 motorists across the state.⁶⁵

Improved traffic signalization: In 2021 NCDOT re-timed 49 systems (made up to 474 traffic signals) yielding a 19 percent improvement in travel time, a 57 percent reduction in delays and a 62 percent reduction in the number of stops.⁶⁶

Traffic Management Centers: Four regional and one statewide Transportation Management Centers (TMC) in Charlotte, the Triad/Greensboro, Asheville, and the Triangle/Raleigh provide proactive continuous traffic management across the state. The TMC’s coordinate with NCDOT staff, law enforcement, emergency management, adjacent state transportation departments and other stakeholders to manage daily freeway disruptions by clearing incidents and providing real time information.⁶⁷

Traveler Information: NCDOT provides a traveler Information program that includes more than 300 Dynamic Message Signs, 900 traffic cameras, the DriveNC.gov website and 511 phone line. About 35,000 phone calls are made to 511 each year. Over 700,000 visits were made to DriveNC.gov in 2021 and over 30,000 incidents were entered into the system and shared with Waze, Google, Apple, etc.⁶⁸

Pedestrian and bike facilities: In 2022 NCDOT released [updated guidance](#) on its [Complete Streets policy](#) which requires all projects in the state to include appropriate multimodal facilities when bicycle, pedestrian and transit needs are identified.⁶⁹ NCDOT also facilitated programs to encourage bike helmet wearing and walking or biking to school in 2022, awarding nearly 20,000 bicycle helmets to over 260 North Carolina agencies.⁷⁰

Transit: North Carolina is served by 25 urban transit systems that provided approximately 31 million trips in 2021, and 80 rural transportation agencies that provided approximately 4.7 million demand-response rides in 2022. In August 2022, USDOT awarded two [RAISE](#) discretionary grants totaling nearly \$25 Million for multimodal projects. One project will transform a busy corridor in Rutherfordton and Spindale to more easily accommodate bicyclists, pedestrians and public transit. The other project will fund the planning and preliminary design of mobility hubs in seven communities in central North Carolina along the S-Line passenger rail corridor. The hubs will allow train passengers to catch a bus or walk to a local restaurant or bike to work. In December 2022, USDOT awarded a [Rural Surface Transportation Grant](#) to NCDOT to deploy on-demand microtransit services in up to eleven rural communities. This project will build on the success of existing on-demand services in communities across North Carolina, including the [award-winning Wilson RIDE](#) program that has increased access and mobility for many disadvantaged residents in Wilson.

Additional capacity: Since 2018, NCDOT has invested approximately \$4.6 billion to increase the capacity of numerous highway segments in the state to improve reliability. These improvements include additional capacity added to portions of the Fayetteville Outer Loop, the Greensboro Loop, the I-485 Charlotte Beltway, the Winston-Salem Bypass, the Wilmington Bypass, the I-85 corridor, the Goldsboro Bypass, the Salem Parkway and the Jamestown Bypass.

The following chart list significant capacity expansion projects competed in North Carolina since 2018.

Chart 12. Significant Highway Capacity Added in North Carolina Since 2018.

North Carolina Capacity Expansion Projects		
US 220, I-73 Corridor Guilford/Rockingham		
Widening US-220 from Horsepen Creek Rd to NC-68/US 220 Intersection	Oct-19	13.2 Miles
Constructing I-73 from Joseph M. Bryan Blvd/Airport Pkwy Int. to South of US-220	Dec-21	9.4 Miles
US-220/NC-68 interchange construction	Nov-19	1.3 Miles
Total Project Cost		\$304 Million

Fayetteville Outer Loop		
South of Cliffdale Rd. to East of All American Freeway	Jul-20	6.7 Miles
East of Yadkin Rd. to West of Bragg Blvd.	Mar-19	1.9 Miles
Total Project Cost		\$205 Million
Greensboro Loop		
Western Loop - Battleground Ave. to Lawndale Dr.	1-Nov	1.9 Miles
High Point Road/Jamestown Bypass - Vickery Chapel Rd. to Hilltop Rd.	Feb-18	4.8 Miles
Western Loop - South of Old Oak Ridge Rd. to North of Battleground Ave.	Jul-20	3.9 Miles
Eastern Loop - North of US-70 to US-29 North of Greensboro	Apr-20	5.5 Miles
Total Project Cost		\$407 Million
I-85 Corridor		
I-85 widening from North of Exit 55 to North of Exit 63	Nov-21	7.9 Miles
I-85 from North of Lane St. to North of US-29/601 Connector	May-21	5.9 Miles
I-85 from North of Dabney Ln. to VA State Line	Nov-21	20.6 Miles
Total Project Cost		\$568 Million
I-485 Charlotte Beltway		
Monroe Expressway from US-74 near I-485 to US-74 between Wingate & Marshville	Oct-20	20 Miles
Total Project Cost		\$490 Million
Winston-Salem Beltway		
Northern Beltway from US-311 to US-158	May-21	2 Miles
Northern Beltway from US-158 to I-40 Bus/US-421	May-21	4 Miles
Future I-74 from west of NC-66/University Pkwy to New Walkerton Rd.	Partially Open	
Total Project Cost		\$386 Million
Wilmington Bypass		
From Cedar Hill Rd. to West of US-421	Oct-18	2.9 Miles
From US-74/76 to Cedar Hill Rd.	May-19	4.6 Miles
Total Project Cost		\$202 Million
US-221		
From US-421 in Watauga Co. to North of South Fork of New River	May-22	4.6 Miles
From South of UC-194 to US-221 Bypass	Jan-21	4.1 Miles
From North of South Fork of New River to South of NC-194	Open	4 Miles
Total Project Cost		\$152 Million
I-40 Corridor		
I-40 and I-77 Interchange Upgrade	Dec-18	3.4 Miles
I-40 over Yadkin River - From West of NC-801 to East of SR-1101	Dec-21	3.3 Miles
I-40/US-64 from West of Jones Franklin Rd. along I-440/US-64 to North of US-64/US-264	Jun-19	11.4 Miles
Total Project Cost		\$373 Million



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Other Capacity Projects		
US-321 from Blackberry to US-221 at Blowing Rock	Oct-18	4 Miles
Goldsboro Bypass - from East of Wayne Memorial Dr. to East of Promise Land Rd.	Jun-18	12.5 Miles
Greenville Southwest Bypass from South of Old NC-11 to US-264	Jan-22	12.4 Miles
US-65 Asheboro Bypass	Dec-21	16.4 Miles
US-17 Pollocksville/Maysville Bypass	Oct-20	16 Miles
Peacehaven/Rural Hall Interchanges - US-421/SR-1891/US-52/NC-65	Apr-21	1.8 Miles
Salem Parkway - Business 40	Jun-21	1.2 Miles
Harvey Parkway - NC-148 from NC-58 to NC-11	Sep-22	5.8 Miles
I-95 rehab and median barrier work from South of Lizzie Mill Rd. to Wilson Co. Line	Dec-22	7.3 Miles
NC-16 four lane from North of Caldwell Rd. to Tower Rd.	Open	8 Miles
Jamestown Bypass - SR-1486/SR-4121 from US-311 Bypass to West of Vickrey Chapel Rd.	Open	3.8 Miles
I-77 Hot Lanes from I-277 Exit 36 and I-277 from I-77 to Exit 3A/B	Open	53 Miles
	Total Cost	\$1.5 Billion
Total Investment in Capacity Projects		\$4.6 Billion

Source: NCDOT.

Conclusion

As North Carolina strives to support ongoing population and economic growth, it is critical that the state can provide a well-maintained, safe, and efficient 21st-Century network of roads, highways, bridges, and transit to accommodate the mobility demands of modern society.

The combination of additional state and federal transportation funding has allowed North Carolina to move forward with numerous projects to improve the condition, use and efficiency of the surface transportation network. While this has allowed the state to undertake numerous, needed transportation projects, North Carolina still faces a funding shortfall to make needed improvements and repairs to ensure the safety, reliability and condition of its roadways, bridges, transit system and pedestrian and bike facilities.

A safe and reliable transportation system that is maintained in good condition and offers improved mobility and accessibility to meet the needs of North Carolina residents, businesses, and tourists alike, is critical to keeping North Carolina mobile and moving the state forward.

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ENDNOTES

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