

KEEPING NORTH CAROLINA MOBILE:

Progress and Challenges in Providing an Efficient, Safe and Well-Maintained Transportation System

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Founded in 1971, TRIP® 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

An efficient, safe and well-maintained transportation system is critical to a region's economic growth and quality of life. North Carolina has taken positive steps in increasing the level and effectiveness of its transportation investment, but must go further to ensure that the Tar Heel State gains the benefit of a modern 21st Century transportation system.

North Carolina's transportation system provides economic and social benefits by affording individuals access to employment, housing, healthcare, education, goods and services, recreation, entertainment, family, and social activities. It also provides businesses with access to suppliers, markets and employees, all critical to a business' level of productivity and ability to expand. Reduced accessibility and mobility - as a result of traffic congestion, a lack of adequate capacity, or deteriorated roads, highways, bridges and transit facilities - diminishes a region's quality of life by reducing economic productivity and limiting opportunities for economic, health or social transactions and activities.

With population and employment growing steadily, North Carolina must continue to improve its transportation system to foster economic growth and maintain and attract business. In addition to economic growth, transportation improvements are needed to ensure safe, reliable mobility. Meeting North Carolina's need to further modernize its transportation system will require significant local, state and federal funding.

While the state's transportation funding will experience modest increases in future years as a result of additional state and federal funds, numerous transportation projects in the state -- which are needed to improve conditions, relieve traffic congestion, improve roadway safety and enhance economic development opportunities -- remain unfunded, threatening North Carolina's future progress in providing a safe, efficient, well-maintained transportation system.

NORTH CAROLINA POPULATION, ECONOMIC AND TRAVEL GROWTH

Population and economic growth have placed increased demands on North Carolina's major roads and highways, leading to mounting wear and tear on the state's extensive transportation system.

- From 2000 to 2016, North Carolina's population increased by 26 percent, from approximately 8 million residents to approximately 10.1 million. North Carolina had approximately 7.2 million licensed drivers in 2015, a 26 percent increase since 2000.
- By 2035, the state's population is expected to increase by another 2 million people to 12.1 million.
- Vehicle miles traveled (VMT) in North Carolina increased 29 percent from 2000 to 2016 – from 89.5 billion VMT in 2000 to 115.4 billion VMT in 2016 – the ninth highest rate of increase in the U.S. during this period.
- Vehicle miles traveled (VMT) in North Carolina increased 10 percent –from 2013 to 2016, the twelfth highest rate of increase in the U.S. during this period.
- From 2000 to 2015, North Carolina's gross domestic product (GDP), a measure of the state's economic output, increased by 30 percent, when adjusted for inflation. The national level of increase during this period was 27 percent.

- Based on population and other lifestyle trends, TRIP projects that travel on North Carolina's roads and highways will increase by another 25 percent by 2030.
- The current value of the 163,000 lane miles and 13,455 bridges maintained by the North Carolina Department of Transportation (NCDOT) is \$575 billion.

TRANSPORTATION FUNDING IN NORTH CAROLINA

While 2015 legislation provided a modest increase in state transportation funding and legislation approved in 2013 improved project selection criteria to insure that the most needed projects are funded, the state faces significant challenges in providing a safe, well-maintained transportation system in North Carolina.

- Approval of the 2013 State Transportation Investment law improved project selection criteria by implementing a data-driven selection process that insures that the most needed and beneficial projects are chosen.
- The passage of HB 97 by the state legislature in September of 2015 provided approximately an additional \$1.6 billion over 10 years for transportation improvements.
- The 2015 funding increase was achieved by eliminating transfers from the Highway Fund to the General Fund, raising Division of Motor Vehicle fees (with quadrennial adjustments for inflation on certain fees), increasing the state Highway Use Tax on out-of-state motor vehicle purchases, eliminating an environmental cleanup fund, and allowing municipalities to increase their vehicle sales tax.
- Further increases in vehicle fuel efficiency and hybrid and electric vehicle use may reduce the ability of federal and state motor fuel taxes to raise future transportation revenues.
- Over the next decade, the North Carolina Department of Transportation is only able to fund 17 percent of the transportation projects needed to relieve traffic congestion, support economic development, improve traffic safety and improve the conditions of state roads, highways and bridges.
- NCDOT received requests from state and regional transportation agencies for \$53 billion in needed road, highway and bridge projects for inclusion in their 2018-2027 State Transportation Improvement Program (STIP) but only had funding available to include \$9 billion (17 percent) of projects in their 2018-2027 STIP.
- NCDOT's annual [2016 maintenance and performance report](#) found that the Department is currently spending \$1.3 billion annually on repairing its roads, highways and bridges, but should be spending a minimum of \$1.6 billion annually. Ideally NCDOT should be spending \$1.9 billion annually to improve the condition of its roads, highway and bridges.

PAVEMENT CONDITIONS IN NORTH CAROLINA

A lack of adequate state and local funding has resulted in 44 percent of locally and state-maintained urban roads in North Carolina having pavement surfaces in poor or mediocre condition, providing a rough ride and costing motorists in the form of additional vehicle operating costs.

- 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 that the data collected is adequate to provide an accurate assessment of pavement conditions on these roads and highways.
- Eighteen percent of North Carolina’s major locally and state-maintained urban roads and highways have pavements in poor condition and 26 percent are rated in mediocre condition. Twenty-two percent of major urban roads are in fair condition and the remaining 34 percent are rated in good condition.
- Overall, 13 percent of North Carolina’s major locally and state-maintained roads and highways have pavements in poor condition and 23 percent are rated in mediocre condition. Twenty-one percent of the state’s major roads are rated in fair condition and the remaining 43 percent are rated in good condition.
- Roads rated in poor condition may show signs of deterioration, including rutting, cracks and potholes. In some cases, poor roads can be resurfaced, but often are too deteriorated and must be reconstructed.
- The chart below details pavement conditions on major, locally and state-maintained roads and highways in the state’s largest urban areas:

| | Poor | Mediocre | Fair | Good |
|----------------|-------------|-----------------|-------------|-------------|
| Asheville | 16% | 19% | 18% | 47% |
| Charlotte | 20% | 29% | 22% | 30% |
| Raleigh-Durham | 13% | 20% | 23% | 44% |
| The Triad | 14% | 27% | 21% | 38% |
| Wilmington | 18% | 26% | 22% | 34% |

- 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.

CONGESTION LEVELS IN NORTH CAROLINA

Increasing levels of traffic congestion cause significant delays in North Carolina, particularly in the state’s larger urban areas, choking commuting and commerce. Traffic congestion robs commuters of time and money and imposes increased costs on businesses, shippers and manufacturers, which are often passed along to the consumer.

- Increasing levels of congestion add significant costs to consumers, transportation companies, manufacturers, distributors and wholesalers and can reduce the attractiveness of a location to a company to consider expansion or even to locate a new facility. Congestion costs can also increase overall operating costs for trucking and shipping companies, leading to revenue losses, lower pay for drivers and employees, and higher consumer costs.
- The chart below details the number of hours the average driver loses annually and the total amount of fuel wasted annually due to congestion in the state’s largest urban areas.

| | Annual Hours Lost Due to Congestion | Total Gallons of Fuel Wasted Annually |
|----------------|--------------------------------------------|----------------------------------------------|
| Asheville | 26 | 3.2 million |
| Charlotte | 40 | 13.8 million |
| Raleigh-Durham | 31 | 9.2 million |
| The Triad | 25 | 5.9 million |
| Wilmington | 20 | 1.9 million |

NORTH CAROLINA BRIDGE CONDITIONS

One in ten locally and state-maintained bridges in North Carolina show significant deterioration and are in need of repair. This includes all bridges that are 20 feet or more in length.

- Ten percent of North Carolina’s locally and state-maintained bridges are structurally deficient. A bridge is structurally deficient if there is significant deterioration of the bridge deck, supports or other major components. Structurally deficient bridges are often posted for lower weight or closed to traffic, restricting or redirecting large vehicles, including commercial trucks and emergency services vehicles.
- The chart below details the total number of bridges and share of structurally deficient bridges in North Carolina’s largest urban areas.

| | Total Bridges | Structurally Deficient Number | Structurally Deficient Share |
|----------------|--------------------------|----------------------------------------------|---------------------------------------------|
| Asheville | 539 | 32 | 6% |
| Charlotte | 639 | 25 | 4% |
| Raleigh-Durham | 996 | 50 | 5% |
| The Triad | 1,768 | 198 | 11% |
| Wilmington | 102 | 6 | 6% |

TRAFFIC SAFETY IN NORTH CAROLINA

Improving safety features on the state’s roads and highways would likely result in a decrease in traffic fatalities and serious crashes.

- Between 2012 and 2016, 6,668 people were killed in traffic crashes in North Carolina, an average of 1,334 fatalities per year.
- The number of traffic fatalities in North Carolina in 2016 increased by four percent from the previous year, increasing from 1,387 traffic fatalities in 2015 to 1,440 in 2016.
- North Carolina’s overall traffic fatality rate of 1.23 fatalities per 100 million vehicle miles of travel in 2015 is significantly higher than the national average of 1.13.
- The traffic fatality rate on North Carolina’s non-Interstate rural roads in 2015 was more than four times higher than on all other roads and highways in the state – 2.69 fatalities per 100 million vehicle miles of travel compared to 0.65. The 2015 national rural non-Interstate fatality rate per 100 million vehicle miles of travel is 2.14.
- The chart below details the average number of fatalities from 2013 to 2015 in the state’s largest urban areas.

| | Average Annual Fatalities |
|----------------|------------------------------------------|
| Asheville | 33 |
| Charlotte | 68 |
| Raleigh-Durham | 92 |
| The Triad | 138 |
| Wilmington | 19 |

- Several factors are associated with vehicle crashes that result in fatalities, including driver behavior, vehicle characteristics and roadway features.

- Where appropriate, highway improvements can reduce traffic fatalities and crashes while improving traffic flow to help relieve congestion. Such improvements include removing or shielding obstacles; adding or improving medians; improved lighting; adding rumble strips, wider lanes, wider and paved shoulders; upgrading roads from two lanes to four lanes; and better road markings and traffic signals.
- Investments in rural traffic safety have been found to result in significant reductions in serious traffic crashes. A 2012 report by the [Texas Transportation Institute](#) (TTI) found that improvements completed recently by the Texas Department of Transportation that widened lanes, improved shoulders and made other safety improvements on 1,159 miles of rural state roadways resulted in 133 fewer fatalities on these roads in the first three years after the improvements were completed (as compared to the three years prior). TTI estimates that the improvements on these roads are likely to save 880 lives over 20 years.

TRANSPORTATION AND ECONOMIC GROWTH IN NORTH CAROLINA

The efficiency of North Carolina’s transportation system, particularly its highways, is critical to the state’s economy. Businesses are increasingly reliant on an efficient and reliable transportation system to move products and services. A key component in business efficiency and success is the level and ease of access to customers, markets, materials and workers.

- Annually, \$704 billion in goods are shipped to and from sites in North Carolina, with 84 percent of the freight tonnage being shipped by trucks.
- Businesses have responded to improved communications and greater competition by moving from a push-style distribution system, which relies on low-cost movement of bulk commodities and large-scale warehousing, to a pull-style distribution system, which relies on smaller, more strategic and time-sensitive movement of goods.
- 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.
- An [analysis](#) of the planned completion of the Winston-Salem Northern Beltway to form part of I-74 found that it would result in an additional \$135 million annually in additional economic output in Forsyth County and an additional \$135 million annually in additional economic output in Davidson, Davie, Guilford, Randolph, Stokes, Surry and Yadkin counties.
- Highway accessibility was ranked the number two site selection factor behind only the availability of skilled labor in a 2015 survey of corporate executives by [Area Development Magazine](#).

- The [Federal Highway Administration](#) estimates that each dollar spent on road, highway and bridge improvements results in an average benefit of \$5.20 in the form of reduced vehicle maintenance costs, reduced delays, reduced fuel consumption, improved safety, reduced road and bridge maintenance costs and reduced emissions as a result of improved traffic flow.

BENEFITS OF TRANSPORTATION IMPROVEMENTS

According to a 2012 national report, improved access as a result of capacity expansions provides numerous regional economic benefits. Those benefits include higher employment rates, higher land value, additional tax revenue, increased intensity of economic activity, increased land prices and additional construction as a result of the intensified use.

- The report, [“Interactions Between Transportation Capacity, Economic Systems and Land Use,”](#) prepared by the Strategic Highway Research Program for the Transportation Research Board, reviewed 100 projects, costing a minimum of \$10 million, which expanded transportation capacity either to relieve congestion or enhance access.
- The projects analyzed in the report were completed no later than 2005 and included a wide variety of urban and rural projects, including the expansion or addition of major highways, beltways, connectors, bypasses, bridges, interchanges, industrial access roads, intermodal freight terminals and intermodal passenger terminals.
- The expanded capacity provided by the projects resulted in improved access, which contributed to reduced travel-related costs, faster and more reliable travel, and increased travel volume.
- The report found that improved transportation access benefits a region by: enhancing the desirability of an area for living, working or recreating, thus increasing its land value; increasing building construction in a region due to increased desirability for homes and businesses; increasing employment as a result of increased private and commercial land use; and, increasing tax revenue as a result of increased property taxes, increased employment and increased consumption, which increases sales tax collection.
- The report found that benefits of transportation capacity expansion unfolded over several years and that the extent of the benefits were impacted by other factors including: the presence of complementary infrastructure such as water, sewer and telecommunications; local land use policy; the local economic and business climate; and, whether the expanded capacity was integrated with other public investment and development efforts.
- For every \$1 million spent on urban highway or intermodal expansion, the report estimated that an average of 7.2 local, long-term jobs were created at nearby locations as a result of improved access. An additional 4.4 jobs were created outside the local area, including businesses that supplied local businesses or otherwise benefited from the increased regional economic activity.

- For every \$1 million spent on rural highway or intermodal expansion, the report estimated that an average of 2.9 local, long-term jobs were created at nearby locations as a result of improved access. An additional 1.6 jobs were created outside the local area, including businesses that supplied local businesses or otherwise benefited from the increased regional economic activity.
- The report found that highway and intermodal capacity projects in urban areas created a greater number of long-term jobs than in rural areas, largely due to the more robust economic environment and greater density in urban communities.
- In addition to state funding, federal funding also plays a critical role in allowing North Carolina to make improvements to its transportation system. Signed into law in December 2015, the [Fixing America's Surface Transportation \(FAST Act\)](#), provides modest increases in federal highway and transit spending, allows states greater long-term funding certainty and streamlines the federal project approval process. But the FAST Act does not provide adequate funding to meet the nation's need for highway and transit improvements and does not include a long-term and sustainable funding source.
- According to the [2015 Status of the Nation's Highways, Bridges and Transit: Conditions and Performance](#) report submitted by the United States Department of Transportation (USDOT) to Congress, the nation faces an \$836 billion backlog in needed repairs and improvements to the nation's roads, highways and bridges.
- The USDOT [report](#) found that the nation's current \$105 billion investment in roads, highways and bridges by all levels of government should be increased by 35 percent to \$142.5 billion annually to improve the conditions of roads, highways and bridges, relieve traffic congestion and improve traffic safety.

Sources of information for this report include the Federal Highway Administration (FHWA), the North Carolina Department of Transportation (NCDOT), the Bureau of Transportation Statistics (BTS), the U. S. Census Bureau, the Congressional Budget Office (CBO), the Texas Transportation Institute (TTI), the American Association of State Highway and Transportation Officials (AASHTO) and the National Highway Traffic Safety Administration (NHTSA). All data used in the report are the most recent available.

Introduction

North Carolina's transportation system provides vital links for the state's residents, visitors and businesses, providing daily access to homes, jobs, schools, shopping, natural resources and recreation. To foster quality of life and to support economic competitiveness in the Tar Heel State, it is critical that North Carolina's roads, highways, bridges, transit systems and bicycle and pedestrian facilities continue to be improved and modernized.

As North Carolina faces the challenge of making further progress in preserving, modernizing and improving its transportation system, the future level of federal, state and local funding will be a critical factor in whether the state's residents, businesses and visitors reap the benefit of a well-maintained, efficient and safe transportation system.

This report examines the condition, use and safety of North Carolina's roads, highways and bridges as well as recent improvements in the state's transportation system. Sources of information for this report include the Federal Highway Administration (FHWA), the North Carolina Department of Transportation, the U. S. Census Bureau, the Texas Transportation Institute (TTI), the Congressional Budget Office (CBO), the Bureau of Transportation Statistics (BTS), the American Association of State Highway and Transportation Officials (AASHTO) and the National Highway Traffic Safety Administration (NHTSA).

Population, Travel and Economic Trends

North Carolina residents and businesses require a high level of personal and commercial mobility. Population and economic growth results in an increased demand for mobility and an increase in vehicle miles of travel. To foster quality of life and continued economic development

in North Carolina, it will be critical that the state provide a safe and modern transportation system that can accommodate future growth in population, tourism, recreation and vehicle travel.

North Carolina's population grew to approximately 10.1 million in 2016, a 26 percent increase since 2000, when the state's population was approximately 8 million.¹ North Carolina had approximately 7.2 million licensed drivers in 2015, a 26 percent increase since 2000.² By 2035, the state's population is projected to increase to approximately 12.1 million.³ There were 7.2 million licensed drivers in the state in 2015.⁴ From 2000 to 2015, North Carolina's gross domestic product, a measure of the state's economic output, increased by 30 percent, when adjusted for inflation, compared to a national increase of 27 percent.⁵

Population and economic growth in North Carolina have resulted in an increase in vehicle travel in the state. From 2000 to 2016, annual vehicle miles of travel in North Carolina increased by 29 percent, from 89.5 billion miles traveled annually to 115.4 billion miles traveled annually – the ninth highest rate of increase in the U.S. during this period.⁶ Vehicle miles traveled (VMT) in North Carolina increased 10 percent from 2013 to 2016, the twelfth highest rate of increase in the U.S. during this period.⁷ Based on population and other lifestyle trends, TRIP estimates that travel on North Carolina's roads and highways will increase by another 25 percent by 2030.⁸

Road Conditions

The life cycle of North Carolina's roads is greatly affected by the ability of state and local governments 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 the North Carolina Department of Transportation 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 that the data collected is adequate to provide an accurate assessment of pavement conditions on these roads and highways.

Statewide, 13 percent of North Carolina’s major locally and state-maintained roads are in poor condition, while 23 percent are in mediocre condition.⁹ Twenty-one percent are in fair condition and the remaining 43 percent are in good condition.¹⁰

Eighteen percent of North Carolina’s major locally and state-maintained urban roads and highways have pavements rated in poor condition, while 26 percent are in mediocre condition.¹¹ Twenty-two percent of North Carolina’s major urban roads are rated in fair condition and the remaining 34 percent are rated in good condition.¹²

The chart below details pavement conditions on major, state and locally-maintained urban roads and highways in the state’s largest urban areas.

Chart 1. Pavement conditions in North Carolina’s largest urban areas.

| | Poor | Mediocre | Fair | Good |
|----------------|------|----------|------|------|
| Asheville | 16% | 19% | 18% | 47% |
| Charlotte | 20% | 29% | 22% | 30% |
| Raleigh-Durham | 13% | 20% | 23% | 44% |
| The Triad | 14% | 27% | 21% | 38% |
| Wilmington | 18% | 26% | 22% | 34% |

Source: TRIP analysis of FHWA pavement condition data, 2015.

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 even 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.¹³ 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.

Roads rated in poor condition may show signs of deterioration, including rutting, cracks and potholes. In some cases, poor or mediocre roads can be resurfaced, but often are too deteriorated and must be reconstructed.

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.¹⁴

Bridge Conditions

Ten percent of North Carolina's locally and state-maintained bridges are structurally deficient.¹⁵ A bridge is structurally deficient if there is significant deterioration of the bridge deck, supports or other major components. Structurally deficient bridges are often posted for

lower weight or closed to traffic, restricting or redirecting large vehicles, including commercial trucks and emergency services vehicles.

A bridge is considered structurally deficient if: 1) any of its significant load carrying elements are found to be in a poor condition due to deterioration and/or damage; 2) it has a low weight restriction; or 3) the adequacy of the waterway opening provided by the bridge is determined to be extremely insufficient to the point that roadway flooding causes intolerable traffic interruptions.

The structurally deficient rating, which is the result of an in-depth hands-on bridge inspection, is an early warning sign for engineers to use to prioritize funding and to initiate repairs or to begin the process to rehabilitate or replace the bridge. The rating applies to three main elements of a bridge: the deck (riding surface); the superstructure (main supporting element of the deck, usually beams, girders, trusses, etc.); and the substructure (supports that hold up the superstructure and deck, usually abutments and piers). These elements are rated on a scale from zero (closed to traffic) to nine (relatively new). If any of the three elements is rated as a four or less, the bridge is categorized as structurally deficient by federal standards. Being categorized as structurally deficient does not mean that the bridge is unsafe. If a bridge becomes unsafe, it will be closed.

The chart below details the number and percentage of structurally deficient bridges in North Carolina's largest urban areas.

Chart 2. Number and share of deficient bridges in North Carolina’s largest urban areas.

| | Total Bridges | Structurally Deficient Number | Structurally Deficient Share |
|----------------|--------------------------|----------------------------------------------|---------------------------------------------|
| Asheville | 539 | 32 | 6% |
| Charlotte | 639 | 25 | 4% |
| Raleigh-Durham | 996 | 50 | 5% |
| The Triad | 1,768 | 198 | 11% |
| Wilmington | 102 | 6 | 6% |

Source: Federal Highway Administration National Bridge Inventory, 2016.

The service life of bridges can be extended by performing routine maintenance and minor rehabilitation, 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 Safety

A total of 6,668 people were killed in motor vehicle crashes in North Carolina from 2012 through 2016, an average of 1,334 fatalities per year.¹⁶

Chart 3. North Carolina Traffic fatalities 2012 – 2016.

| <i>Year</i> | <i>Fatalities</i> |
|--------------|-------------------|
| 2012 | 1,275 |
| 2013 | 1,283 |
| 2014 | 1,283 |
| 2015 | 1,387 |
| 2016 | 1,440 |
| Total | 6,668 |

Source: National Highway Traffic Safety Administration

North Carolina’s overall traffic fatality rate of 1.23 fatalities per 100 million vehicle miles of travel in 2015 is significantly higher than the national average of 1.13 fatalities per 100 million vehicle miles of travel.¹⁷ The traffic fatality rate on North Carolina’s non-Interstate rural roads in 2015 was more than four times higher than on all other roads and highways in the state – 2.69 fatalities per 100 million vehicle miles of travel versus 0.65.¹⁸

The chart below details the average number of people killed annually in traffic crashes in the state’s largest urban areas between 2013 and 2015.

Chart 4. Average fatalities between 2013 and 2015.

| | Average Annual Fatalities |
|----------------|----------------------------------|
| Asheville | 33 |
| Charlotte | 68 |
| Raleigh-Durham | 92 |
| The Triad | 138 |
| Wilmington | 19 |

Source: TRIP analysis of National Highway Traffic Safety Administration data

Three major factors are associated with fatal vehicle crashes: driver behavior, vehicle characteristics and roadway features. Roadway features that impact safety include the number of lanes, lane widths, lighting, lane markings, rumble strips, shoulders, guard rails, other shielding devices, median barriers and intersection design.

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.

The severity of serious traffic crashes could be reduced through roadway improvements such as adding turn lanes, removing or shielding obstacles, adding or improving medians,

widening lanes, widening and paving shoulders, improving intersection layout, and providing better road markings and upgrading or installing traffic signals where appropriate.

Roads with poor geometry, with insufficient clear distances, without turn lanes, inadequate shoulders for the posted speed limits, or poorly laid out intersections or interchanges, pose greater risks to motorists, pedestrians and bicyclists.

Investments in rural traffic safety have been found to result in significant reductions in serious traffic crashes. A 2012 report by the [Texas Transportation Institute](#) (TTI) found that improvements completed recently by the Texas Department of Transportation that widened lanes, improved shoulders and made other safety improvements on 1,159 miles of rural state roadways resulted in 133 fewer fatalities on these roads in the first three years after the improvements were completed (as compared to the three years prior). TTI estimates that the improvements on these roads are likely to save 880 lives over 20 years.¹⁹

Traffic Congestion in North Carolina

Increasing levels of traffic congestion cause significant delays in North Carolina, particularly in larger urban areas, choking commuting and commerce. Traffic congestion robs commuters of time and money and imposes increased costs on businesses, shippers and manufacturers, which are often passed along to the consumer.

Increasing levels of congestion add significant costs to consumers, transportation companies, manufacturers, distributors and wholesalers. The increased levels of congestion can reduce the attractiveness of a location to a company considering expansion or relocation.

Congestion costs can also increase overall operating costs for trucking and shipping companies, leading to revenue losses, lower pay for employees, and higher consumer costs.

The chart below details the number of hours the average driver loses annually and the total amount of fuel wasted annually due to congestion in the state’s largest urban areas.

Chart 5. Annual hours lost per driver and total fuel wasted in North Carolina’s largest urban areas due to traffic congestion.

| | Annual Hours Lost Due to Congestion | Total Gallons of Fuel Wasted Annually |
|----------------|--------------------------------------------|----------------------------------------------|
| Asheville | 26 | 3.2 million |
| Charlotte | 40 | 13.8 million |
| Raleigh-Durham | 31 | 9.2 million |
| The Triad | 25 | 5.9 million |
| Wilmington | 20 | 1.9 million |

Source: Texas Transportation Institute Urban Mobility Report, 2015.

Importance of Transportation to Economic Growth

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. Highway accessibility was ranked the number two site selection factor behind only the availability of skilled labor in a 2015 survey of corporate executives by [Area Development Magazine](#).²⁰

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 continued economic development in North Carolina, particularly to the state's tourism, agriculture, energy and manufacturing sectors. 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.

An [analysis](#) of the planned completion of the Winston-Salem Northern Beltway to form part of I-74 found that it would result in an additional \$135 million annually in additional economic output in Forsyth County and an additional \$135 million annually in additional economic output in Davidson, Davie, Guilford, Randolph, Stokes, Surry and Yadkin counties.²¹

Annually, \$704 billion in goods are shipped to and from sites in North Carolina, with 84 percent of the freight tonnage being shipped by trucks.²²

The cost of road and bridge improvements is more than offset by the reduction of user costs associated with driving on rough roads, the improvement in business productivity, the reduction in delays and the improvement in traffic safety. The [Federal Highway Administration estimates](#) that each dollar spent on road, highway and bridge improvements results in an average benefit of \$5.20 in the form of reduced vehicle maintenance costs, reduced delays, reduced fuel consumption, improved safety, reduced road and bridge maintenance costs and reduced emissions as a result of improved traffic flow.²³

Study on Impact of U.S. Highway Capacity Additions

A national report that studied the economic results of 100 highway capacity expansion projects provides significant new insights into how enhancing regional mobility provides long-term economic benefits. The 2012 report, [“Interactions Between Transportation Capacity, Economic Systems and Land Use,”](#) was prepared by the Strategic Highway Research Program for the Transportation Research Board, which is a program of the National Academy of Sciences. The report reviewed 100 projects, costing a minimum of \$10 million, which expanded transportation capacity either to relieve congestion or enhance access.

The projects were carefully selected to ensure a wide range of project types and land use settings. The projects, completed no later than 2005, included a wide variety of urban and rural projects, including the provision or expansion of intercity highways, local access roads, interchanges, bridges, bypasses and intermodal facilities. The projects expanded or added major highways, beltways, connectors, bypasses, bridges, interchanges, industrial access roads, intermodal freight terminals and intermodal passenger terminals. The expanded capacity provided by the projects resulted in improved access, which resulted in reduced travel-related costs, faster and more reliable travel, and increased travel volume.

The report found that the improved access as a result of capacity expansions provided numerous regional economic benefits, including increased employment, increased land value, increased tax revenue, increased intensity of economic activity, increased land prices and additional construction as a result of the intensified use.²⁴

The report further noted that improved transportation access benefits a region by: enhancing the desirability of an area for living, working or recreating, thus increasing its land

value; increasing building construction in a region due to increased desirability for homes and businesses; increasing employment as a result of increased private and commercial land use; and, increasing tax revenue as a result of increased property taxes, increased employment and increased consumption, which increases sales tax collection.²⁵

According to the report, “transportation projects lead to multifaceted forms of economic development impact, which may include effects on employment, income, land use, property values or business construction.”²⁶

The benefits of a transportation capacity expansion unfolded over several years and that the extent of the benefits were impacted by other factors, including: the presence of complimentary infrastructure such as water, sewer and telecommunications; local land use policy; the local economic and business climate; and, whether the expanded capacity was integrated with other public investment and development efforts. “In some cases, an area with a higher growth trend may tend to be better positioned to take advantage of new highway connections or capacity,” the report found.²⁷

The report provided estimates on the average number of long-term jobs created as a result of increased transportation capacity, both within the local area and outside of the immediate area of the improved access. For every \$1 million spent on increased transportation capacity, the report estimated that an average of seven local, long-term jobs were created at nearby locations as a result of improved access. An additional 4.2 jobs outside the local area were created, including businesses that supplied local businesses or otherwise benefited from the increased regional economic activity.²⁸

Highway and other intermodal capacity projects in urban areas created a greater number of long-term jobs than in rural areas, largely due to the more robust economic environment and

greater density in urban communities.²⁹ Every \$1 million spent on urban highway or intermodal expansion projects was found to result in an additional 7.2 local long-term jobs and an additional 4.4 non-local, long-term jobs, while every \$1 million spent on rural highway or intermodal expansion projects was found to result in an additional 2.9 local, long-term jobs and an additional 1.6 non-local, long-term jobs.³⁰

Transportation Funding in North Carolina

Investment in North Carolina's roads, highways and bridges is funded by local, state and federal governments. The introduction of a qualitative project selection process and increased funding from recent boosts in state and federal funding will allow modest increases in funding for road, highway and bridge repairs and improvements in North Carolina and should insure that the projects that provide the greatest transportation benefits are selected. But, with North Carolina experiencing significant travel growth, the state will continue to face a significant challenge in providing a safe, smooth and efficient network of roads and bridges.

With the passage of HB97 by the state legislature in September of 2015, North Carolina's state budget will provide an additional \$1.6 billion in transportation-related funding over 10 years.³¹

The funding increase provided by HB97 is achieved by eliminating transfers from the Highway Fund to the General Fund, raising Division of Motor Vehicle fees (with quadrennial adjustments for inflation on certain fees), increasing the state Highway Use Tax on out-of-state motor vehicle purchases, eliminating an environmental cleanup fund, and allowing municipalities to increase their vehicle sales tax. Future increases in vehicle fuel efficiency and

hybrid and electric vehicle use may reduce the ability of federal and state motor fuel taxes to raise transportation revenues.

Yet despite this additional funding, over the next decade, the North Carolina Department of Transportation is only able to fund 17 percent of the transportation projects needed to relieve traffic congestion, support economic development, improve traffic safety and improve the conditions of state roads, highways and bridges.

NCDOT received requests from state and regional transportation agencies for \$53 billion in needed road, highway and bridge projects for inclusion in their 2018-2027 State Transportation Improvement Program (STIP) but only had funding available to proceed with \$9 billion (17 percent) of the projects.³²

The [North Carolina Department of Transportation's annual 2016 maintenance and performance report](#) found that the Department is currently spending \$1.3 billion annually on repairing its roads, highways and bridges, but should be spending a minimum of \$1.6 billion annually to maintain its roads, highways and bridges. NCDOT ideally should be spending \$1.9 billion annually to improve the condition of its roads, highway and bridges.³³

In addition to state funding, federal funding also plays a critical role in allowing North Carolina to make improvements to its transportation system. Federal funds for highway and transit improvements in North Carolina are provided through the federal Highway Trust Fund (HTF), which raises revenue through federal user fees, including an 18.4 cents-per-gallon tax on gasoline and a 24.4 cents-per-gallon tax on diesel fuel. Since 2008, revenue into the federal Highway Trust Fund has been inadequate to support legislatively set funding levels. As a result, Congress has transferred approximately \$53 billion in general funds and an additional \$2 billion from a related trust fund into the federal Highway Trust Fund.³⁴

Signed into law in December 2015, the [Fixing America's Surface Transportation \(FAST\) Act](#), provides modest increases in federal highway and transit spending. The five-year bill also provides states with greater funding certainty and streamlines the federal project approval process. But, the FAST Act does not provide adequate funding to meet the nation's need for highway and transit improvements and does not include a long-term and sustainable funding source.

Nationally, the five-year, \$305 billion FAST Act will provide approximately a 15 percent boost in highway funding and an 18 percent boost in transit funding over the duration of the program, which expires in 2020.³⁵

In addition to federal motor fuel tax revenues, the FAST Act will also be funded by \$70 billion in U.S. general funds, which will rely on offsets from several unrelated federal programs including the Strategic Petroleum Reserve, the Federal Reserve and U.S. Customs.

According to the [2015 Status of the Nation's Highways, Bridges and Transit: Conditions and Performance](#) report submitted by the United States Department of Transportation (USDOT) to Congress, the nation faces an \$836 billion backlog in needed repairs and improvements to the nation's roads, highways and bridges.³⁶

The USDOT [report](#) found that the nation's current \$105 billion investment in roads, highways and bridges by all levels of government should be increased by 35 percent to \$142.5 billion annually to improve the conditions of roads, highways and bridges, relieve traffic congestion and improve traffic safety.

Conclusion

While the state's transportation funding will increase modestly in future years as a result of additional state and federal funds, allowing for needed improvements to the surface transportation system, significant challenges still remain in providing a safe, smooth and efficient network of roads, highways and bridges in North Carolina.

The boost in state transportation funding, as well as the modest increase in federal surface transportation funding, is supporting some increased investment in road, highway and bridge repairs in North Carolina yet the state still falls far short of the level of funding needed to move forward with numerous needed projects to expand the capacity and/or efficient operations of its transportation system. This increase in transportation capacity and efficient operations will further economic development opportunities and improve quality of life.

While increased funding is a helpful first step towards addressing the state's transportation challenges, insuring that the Tar Heel State has a modern transportation system that is efficient, safe and well-maintained will require additional funding from local, state and federal governments.

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Endnotes

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- ¹ U.S. Census Bureau (2016). <http://www.census.gov/popest/data/state/totals/2012/index.html>
- ² Highway Statistics (2010 and 2015). Federal Highway Administration. DL-1C
- ³ North Carolina Office of Budget and Management (2017). County/State Population Projections. <https://www.osbm.nc.gov/demog/county-projections>
- ⁴ U.S. Department of Transportation- Federal Highway Administration: Highway Statistics 2015.
- ⁵ TRIP analysis of Bureau of Economic Analysis data.
- ⁶ U.S. Department of Transportation - Federal Highway Administration: Highway Statistics 2000 and analysis of FHWA monthly Traffic Volume Trends (2016). https://www.fhwa.dot.gov/policyinformation/travel_monitoring/tvt.cfm
- ⁷ Ibid.
- ⁸ TRIP estimate based on U.S. Census and Federal Highway Administration data.
- ⁹ Federal Highway Administration (2016). Pavement condition data is for 2015.
- ¹⁰ Ibid.
- ¹¹ Ibid.
- ¹² Ibid.
- ¹³ Selecting a Preventative Maintenance Treatment for Flexible Pavements. R. Hicks, J. Moulthrop. Transportation Research Board. 1999. Figure 1.
- ¹⁴ Pavement Maintenance, by David P. Orr, PE Senior Engineer, Cornell Local Roads Program, March 2006.
- ¹⁵ Federal Highway Administration (2016). National Bridge Inventory.
- ¹⁶ North Carolina Department of Transportation (2017). <https://www.ncdot.gov/performance/FatalityRate.html>
- ¹⁷ TRIP analysis of National Highway Traffic Safety Administration and Federal Highway Administration data (2016).
- ¹⁸ Ibid.
- ¹⁹ Adding Highway Shoulders, Width, Reduce Crash Numbers and Save Lives (August 9, 2012). Texas Department of Transportation. <http://tti.tamu.edu/2012/08/09/tti-study-analyzes-roadway-improvements/>
- ²⁰ Area Development Magazine (2016). 30th Annual Survey of Corporate Executives: Availability of Skilled Labor New Top Priority. <http://www.areadevelopment.com/Corporate-Consultants-Survey-Results/Q1-2016/corporate-executive-site-selection-facility-plans-441729.shtml>
- ²¹ Z. Madjd-Sadjadi; C. Richardson; J. Kinkaid (2014). Economic Impact of I-74 on the Triad.
- ²² TRIP analysis of Bureau of Transportation Statistics data, 2012.
- ²³ FHWA estimate based on its analysis of 2006 data. For more information on FHWA’s cost-benefit analysis of highway investment, see the 2008 Status of the Nation’s Highways, Bridges, and Transit: Conditions and Performance.
- ²⁴ Strategic Highway Research Program (2012). Transportation Research Board. “Interactions Between Transportation Capacity, Economic Systems and Land Use.” P. 6
- ²⁵ Ibid. P. 17.
- ²⁶ Strategic Highway Research Program (2012). Transportation Research Board. “Interactions Between Transportation Capacity, Economic Systems and Land Use.” P. 1.
- ²⁷ Strategic Highway Research Program (2012). Transportation Research Board. “Interactions Between Transportation Capacity, Economic Systems and Land Use.” P. 11.
- ²⁸ Strategic Highway Research Program (2012). Transportation Research Board. “Interactions Between Transportation Capacity, Economic Systems and Land Use.” P. 22. Additional employment estimates were provided in response to a TRIP request.

²⁹ Strategic Highway Research Program (2012). Transportation Research Board. “Interactions Between Transportation Capacity, Economic Systems and Land Use.” P. 8.

³⁰ Strategic Highway Research Program (2012). Transportation Research Board. “Interactions Between Transportation Capacity, Economic Systems and Land Use.” P. 22. Additional employment estimates were provided in response to a TRIP request.

³¹ North Carolina Department of Transportation (2017). 2016 Annual Report. P. 10.
https://www.ncdot.gov/download/performance/2016_NCDOT_AnnualReport.pdf

³² Secretary Jim Trogdon, North Carolina Department of Transportation (2017). Transportation Priorities.

³³ North Carolina Department of Transportation (2017). 2016 Maintenance Operations and Performance Analysis Report (MOPAR). http://www.ncleg.net/documentsites/committees/JLTOC/2015-16_Biennium/1-6-17_Meeting/3.MOPAR_report.PDF

³⁴ “Surface Transportation Reauthorization and the Solvency of the Highway Trust Fund,” presentation by Jim Tyson, American Association of State Highway and Transportation Officials (2014).

³⁵ 2015 “Fixing America’s Surface Transportation Act.” (2015) American Road and Transportation Builders Association. <http://www.artba.org/newsline/wp-content/uploads/2015/12/ANALYSIS-FINAL.pdf>

³⁶ United States Department of Transportation (2015). 2015 Status of the Nation’s Highways, Bridges, and Transit: Conditions and Performance. Executive Summary, Chapter 8.
<https://www.fhwa.dot.gov/policy/2015cpr/es.cfm#8h>