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NC Strategic Transportation Corridors: Vision Plan

Master Plan Vision Report

NCDOT

November 13 2020

Corridor D: U.S. 321

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Client signature / date	

Contents

Figures

Acronyms

AADT	Annual Average Daily Traffic
CSC	Corridor Steering Committee
CTP	Comprehensive Transportation Plan
DCP	Data Collection Plan
FHWA	Federal Highway Administration
GCLMPO	Gaston-Cleveland-Lincoln Metropolitan Planning Organization
GHMPO	Greater Hickory Metropolitan Planning Organization
MAP-21	Moving Ahead for Progress in the 21st Century Act
MPO	Metropolitan Planning Organization
MTP	Metropolitan Transportation Plan
NCDOT	North Carolina Department of Transportation
NCSTM	North Carolina Statewide Travel Demand Model
NHS	National Highway System
PHED	Peak Hours of Excessive Delay
RPO	Rural Planning Organization
SIP	Stakeholder Involvement Plan
SOV	Single Occupancy Vehicle
STC	Strategic Transportation Corridor(s)
STIP	Statewide Transportation Improvement Program
STRACNET	Strategic Rail Corridor Network
V/C	Volume-to-Capacity Ratio
VHT	Vehicle Hours Traveled
VMT	Vehicle Miles Traveled

Executive Summary

The North Carolina Department of Transportation (NCDOT) initiated the development of a master plan vision for Strategic Transportation Corridor (STC) D – U.S. 321, which runs from the South Carolina state line to the Tennessee state line. This report summarizes the corridor vision study process and recommendations to inform subsequent sub-corridor implementation studies and statewide and regional planning studies as well as next steps for the corridor.

During the development of the master plan vision, transportation recommendations and project data was collected from all jurisdictions along the corridor. Eighteen current 2020-2029 State Transportation Improvement Plan (STIP) projects were identified along Corridor D, as well as three feasibility studies within the past ten years and twelve traffic forecasts within the past five years. The following Comprehensive Transportation Plan (CTP) and Metropolitan Transportation Plan (MTP) reports and maps were collected along Corridor D:

- Avery County CTP
- Watauga County CTP
- Greater Hickory Metropolitan Planning Organization (GHMPO) CTP – maps only
- Gaston-Cleveland-Lincoln MPO (GCLMPO) CTP – maps and project sheets only
- Greater Hickory MPO MTP
- Gaston-Cleveland-Lincoln MPO MTP

Transportation facilities data was also collected along the 105-mile-long Corridor D including access control, functional class, and number of travel lanes. The portion from I-85 in Gastonia to the Tennessee state line is included in the National Highway System (NHS), including U.S. 221 between Blowing Rock and Boone. The route is federally designated as a truck route from the South Carolina state line to I-85 and from I-40 in Hickory to U.S. 64 in Lenoir. Out of 67 bridges along the corridor, three bridges were classified as structurally deficient and twelve were classified as functionally obsolete.

National performance measures and the NCDOT targets for safety, infrastructure condition, system reliability, environmental sustainability, congestion reduction, freight movement, and economic vitality were reviewed to help track progress on the goals and objectives for Corridor D.

Freight mobility data for Corridor D was evaluated using the North Carolina Freight Flow tool. Freight flows to, from, and within the counties along U.S. 321 totaled an estimated 91.6 million tons worth $103.9 billion in 2015. Flows were projected to increase roughly 28 percent in volume and 61 percent in value in 2045. By mode, freight trucks accounted for over 87 percent of the volume and 95 percent of the total value for freight along Corridor D. Energy products and aggregates accounted for the largest volumes of commodities moving to, from, and within the corridor. Corridor D trades the largest volume and value of goods within the Southeast region of the U.S. compared to all other U.S. regions.

Highway mobility along Corridor D was analyzed for existing and future conditions based on travel speeds, congestion, and travel times. Future conditions analysis in 2040 was based on the NC Statewide Travel Model (NCSTM), Regional and Small Area Travel Demand Models, the STIP, and Transportation Plans for communities throughout the corridor. Future scenarios included a scenario with fiscally constrained STIP projects, a scenario that also included all recommended MTP and CTP projects, and a scenario that also included all improvements to Corridor D based on the master plan vision. In 2040, based on the highway mobility analysis, the MTP/CTP recommended scenario serves more travelers at a higher speed with less delay compared to the fiscally constrained scenario. The vision scenario would allow a typical trip through the corridor to take less than two hours – a 20 percent reduction in current travel time.

Resiliency along Corridor D was evaluated by assessing major incident data along the corridor. Three rockslide events, all in 2011, were noted. Full analysis of resiliency issues has been identified as an area for additional study.

A survey was developed to ask the members of the public questions about the type of facility envisioned for the corridor, what features of the corridor should be preserved, what features should be improved, and whether there are any circumstances the study team should be aware of as they develop the master plan. The survey was active for two months and received 253 responses. Results from participants included:

- 99% drive their own vehicles as a primary means of transportation
- Most people typically use the facility for shopping and dining, the second most popular use is commuting to work
- 41% use the facility daily with 56% commuting 1-20 miles to work or school
- The most popular response to what changes respondents would like to see along U.S. 321 in the next 20 years was fewer traffic signals. To see the breakout of responses please refer to the Stakeholder Outreach Summary Report
- From the South Carolina state line to Boone, most respondents support the preliminary vision of an expressway with 44% strongly agreeing
- 28% responded that they have been impacted by rockslides/mudslides

After evaluation of the public responses and completing corridor analysis, the recommended vision for Corridor D states:

> **From the Tennessee state line to U.S 70 north of Hickory, the long-term corridor vision is an expressway cross-section with a minimum of 4 lanes, a median, and limited access. The short-term corridor vision eliminates traffic signals outside of Blowing Rock town limits. From U.S 70 north of Hickory to the South Carolina state line, the corridor vision is a freeway cross-section with a minimum of 4 lanes, a median, and interchange-only access.**

Several areas for additional study were identified along Corridor D to allow appropriate and effective recommendations to be selected. These areas included:

- Expressway improvements northwest of Boone and the connection at the Tennessee state line
- Boone Bypass
- Expressway improvements around Boone and Blowing Rock
- Freeway improvements in Gastonia
- Existing corridor improvements in Lenoir
- Lenoir Bypass
- Freeway improvements south of Gastonia and the connection at the South Carolina state line
- Multimodal connections
- Resiliency Assessment
- Traffic Signal Study for Blowing Rock and Boone

The two-page Vision Summary for Corridor D is shown on the following pages.

CORRIDOR D

U.S. 321 - South Carolina state line to Tennessee state line

General Description

The 94-mile Corridor D provides access to the northwest North Carolina mountains around Boone from upper South Carolina, serving Gaston, Lincoln, Catawba, Caldwell, and Watauga counties, as part of a longer corridor providing access from external activity centers such as Columbia, South Carolina; Savannah, Georgia; and Johnson City, Tennessee. Corridor D carries high passenger and truck traffic between Corridor Q (I-40) in Hickory and Corridor I (I-85) in Gastonia. To the northwest the corridor overlaps Corridor E (U.S. 421W) for 7 miles.

Vision Plan Specifics

This corridor follows U.S. 321 within a 20-mile buffer on either side of the facility.

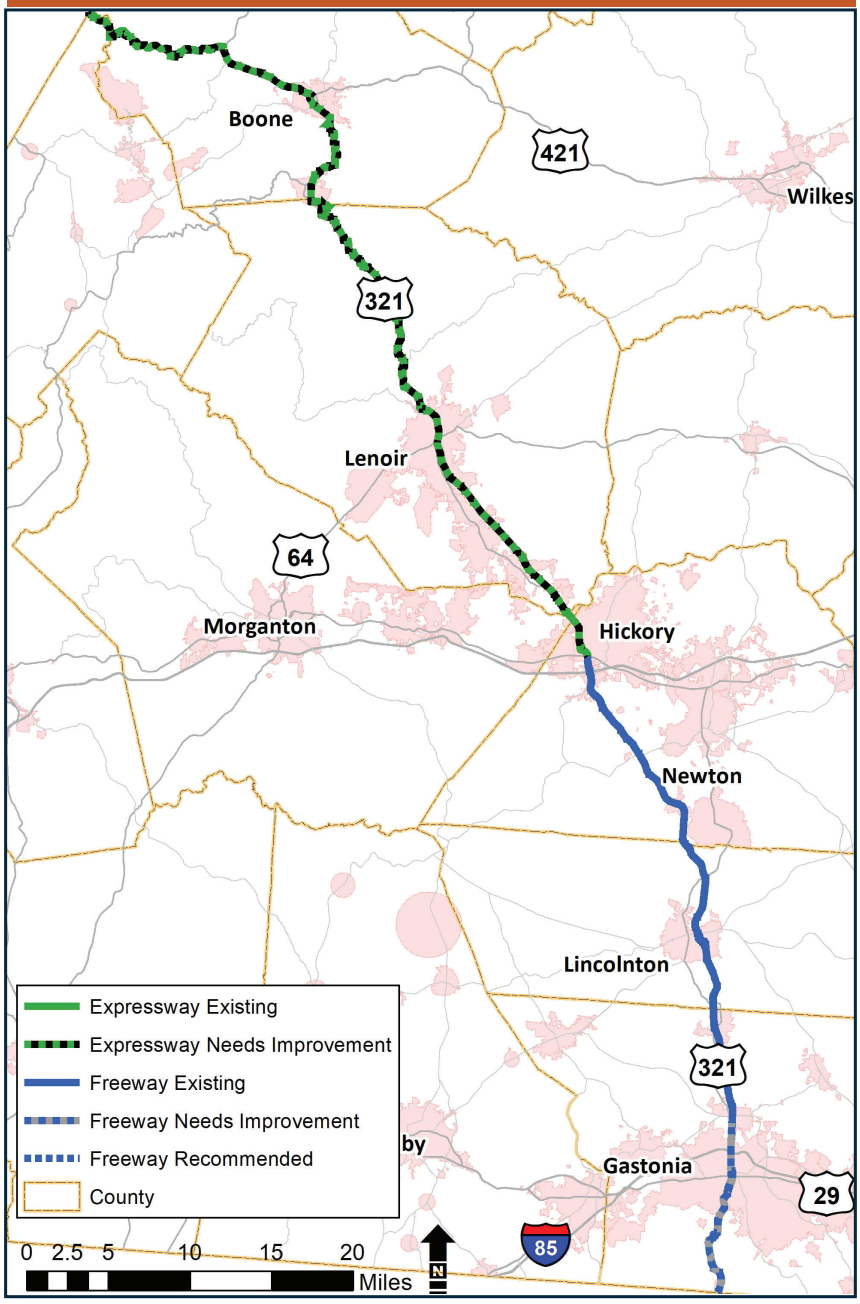
<u>Tennessee state line to U.S. 70 north of Hickory</u>

- Expressway cross-section
- AASHTO Design Classification of Arterial
- Minimum 4 lanes with a median
- Connections provided at interchanges for major cross streets and at-grade intersections for minor cross streets
- Limited access
- Short-term vision to eliminate traffic signals outside of Blowing Rock town limits

<u>U.S. 70 north of Hickory to the South Carolina state line</u>

- Freeway cross-section
- AASHTO Design Classification of Interstate or Freeway
- Minimum 4 lanes with a median
- Connections provided only at interchanges
- Traffic signals and driveways not allowed

Geographic Location



Areas Identified for Additional Study

- Expressway improvements northwest of Boone and the connection at the Tennessee state line
- Boone Bypass
- Expressway Improvements between Boone and Blowing Rock
- Freeway Improvements in Gastonia
- Existing corridor improvements in Lenoir
- Lenoir Bypass
- Freeway Improvements south of Gastonia and the connection at the South Carolina state line
- Multimodal connections
- Resiliency Assessment
- Traffic Signal Study for Blowing Rock and Boone

CORRIDOR D

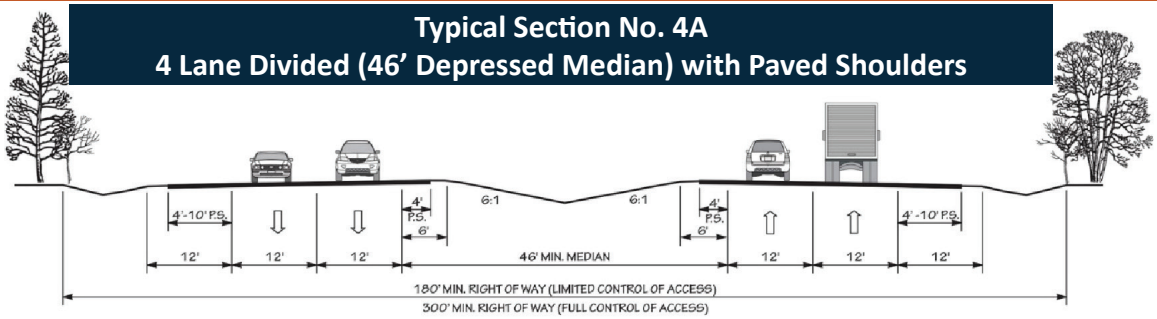
U.S. 321 - South Carolina state line to Tennessee state line

Key Functions and Expectations (Functions of corridor in contect of STC goals and criteria)

- Connectivity: Corridor D provides a connection to South Carolina strategic US 321 corridor and is the primary connection from the northern mountains into Tennessee.
- Mobility: This corridor connects northeast Tennessee with I-40 and I-85 providing passenger and freight mobility across western North Carolina.
- Economic Prosperity: Corridor D serves three of the state's top tourism counties (Gaston, Catawba, and Watauga) and is a key access route to the primary academic center at Appalachian State University.
- Expectation: As the most direct route between the Charlotte/Gastonia region and the tourism-rich northern mountains, Corridor D should provide safe, reliable travel for both passenger and freight movement, with reduced delays through intermediate communities along the corridor.

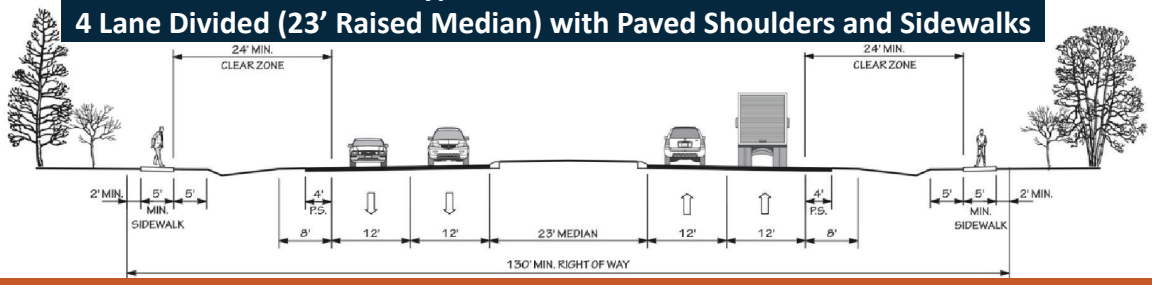
Cross-Section

Typical Section No. 4A
4 Lane Divided (46' Depressed Median) with Paved Shoulders



Posted Speed 45-70 mph

Typical Section No. 4B
4 Lane Divided (23' Raised Median) with Paved Shoulders and Sidewalks



Posted Speed 35-55 mph

Facility Information

State Transportation Improvement Program (STIP) Projects	Connections and Freight	Primary Activity Centers
2020-2029 STIP: • I-5000, I-85 interchange improvements • U-4700, U.S. 70 to Southwest Boulevard (SR 1933) widen to six lanes • R-2615, U.S. 421 to N.C. 105 Bypass widen to six lanes	• Part of the National Highway System from I-85 to Tennessee state line • Federal designated truck route from South Carolina state line to I-85 and I-40 to U.S. 64 • 67 bridges along the corridor: 3 are structurally deficient, 12 are functionally obsolete • US 321 carries high passenger volumes between I-40 in Hickory and I-85 in Gastonia • US 321 carries high truck traffic from I-40 in Hickory to I-85 in Gastonia	• Appalachian State University • Johnson City, Tennessee employment center • Watauga County tourism center • Gaston County tourism center • Gaston College (Dallas) • CaroMont Regional Medical Center (Gastonia) • Tweetsie Railroad

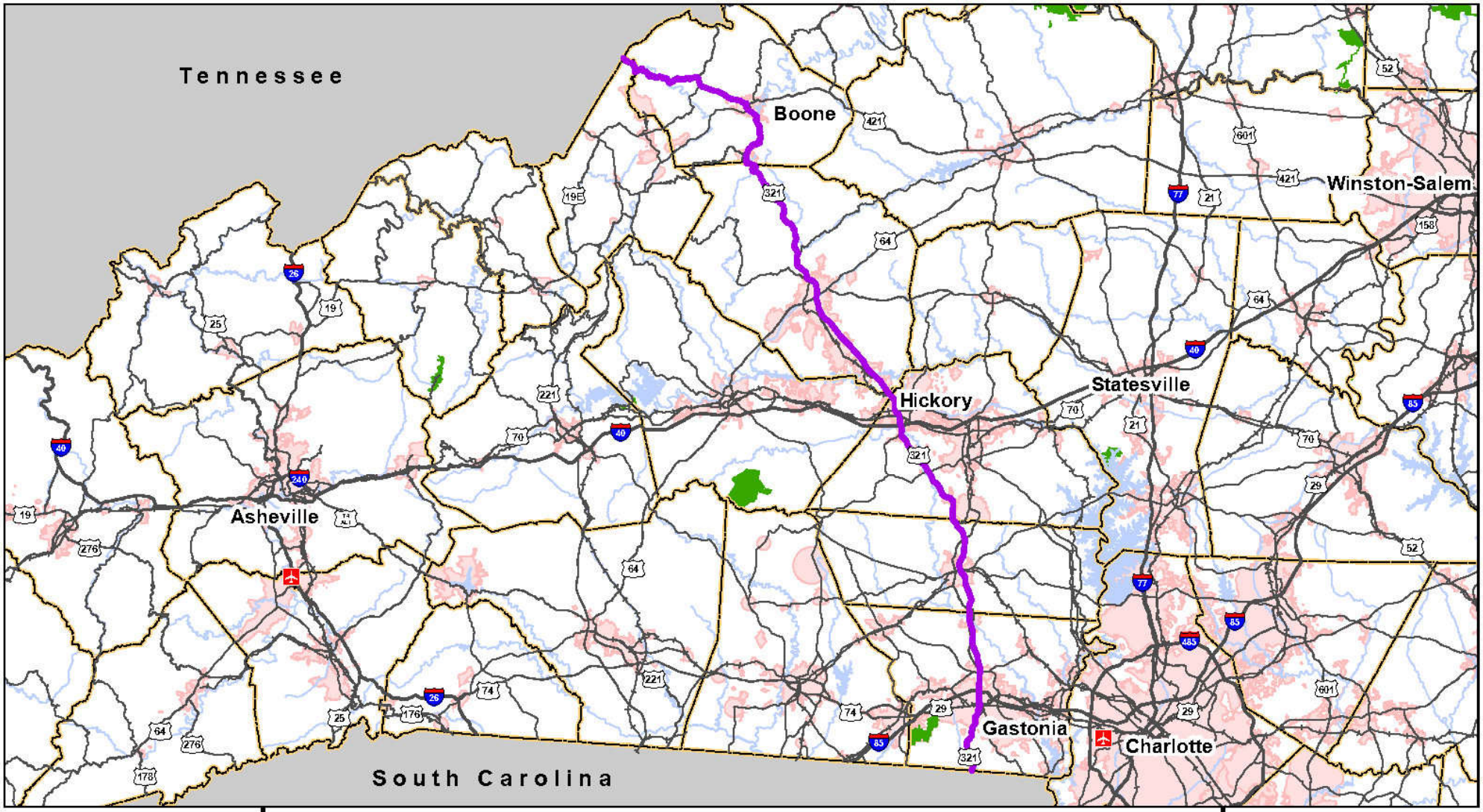
1. Introduction

In 2015, the North Carolina Department of Transportation (NCDOT) identified a network of key multimodal transportation corridors called Strategic Transportation Corridors (STC) to support smart planning, help set long-term investment decisions, and ensure that North Carolina's economic prosperity goals are achieved. The STCs are intended to promote transportation system connectivity, provide high levels of mobility, and improve access to important state and regional activity centers. A key element in the advancement of the STCs is the development of corridor master plans, to identify a high-level corridor mobility vision and associated corridor improvement action strategies.

The purpose of the master plan is to:

- identify a mobility vision and broad improvement strategies for an entire corridor,
- guide improvements and development in a manner that defines a long-term vision and performance level for the corridor, and
- help protect the corridor's key functions as defined in the corridor profiles

NCDOT has initiated the development of a master plan vision for STC D – U.S. 321 which runs from the South Carolina state line to the Tennessee state line as shown in **Figure 1**. This report summarizes the corridor vision study process and recommendations to inform subsequent sub-corridor implementation studies, statewide and regional planning studies, and next steps for the corridor.



NC STRATEGIC TRANSPORTATION CORRIDORS (STC)

APRIL 2020

Source: NCOneMap, NCDOT GIS, ESRI

Legend

- STC Highway Corridor D (US 321)
- Municipal Boundaries
- State Parks
- Interstate
- US Route
- NC Highway
- Rail
- Major Rivers/Streams
- Major Water Bodies
- Counties
- NC Int'l or Major Freight Airports

0 5 10 20 30 40 50 60 70 80 Miles

STRATEGIC TRANSPORTATION CORRIDORS

CORRIDOR D (US 321)

Figure 1

2. Data Collection

2.1. Data Collection Plan

To serve as the foundation for master plan vision developments, the Data Collection Plan (DCP) was developed to identify available data, how it should be collected, and how it should be applied for Corridor D. The collected data was used to identify current infrastructure and future improvements to the corridor and to evaluate the conditions in the corridor as well as existing and future freight activity/demands on the corridor including origins and destinations, routes, modes, and commodity types.

Collection of 'Transportation Recommendations and Projects' data identifies anticipated improvements and expansion of the transportation system. 'Transportation Facilities Inventory' data allows for the evaluation of the current infrastructure in the corridor. Remaining datasets are used to assess the conditions in the corridor as well as evaluate recommendations during the master plan vision development.

2.2. Transportation Recommendations and Projects

To identify anticipated improvements and expansion of the transportation system, transportation plans and recommended projects from all jurisdictions and Metropolitan Planning Organizations (MPOs) along Corridor D were compiled including projects from the 2020-2029 Statewide Transportation Improvement Program (STIP), the most recently adopted Comprehensive Transportation Plans (CTPs) and Metropolitan Transportation Plans (MTPs), feasibility studies from within the last ten years, and traffic forecasts from within the last five years.

The eighteen currently identified 2020-2029 STIP projects along Corridor D are shown in **Appendix A** in **Table A-1**, which includes right of way and construction status as well as a detailed project description. The three identified feasibility studies within the past ten years along Corridor D are shown in **Appendix A** in **Table A-2** including detailed descriptions of each study along with their recommendations. The twelve identified traffic forecasts within the past five years along Corridor D are shown in **Appendix A** in **Table A-3** including detailed descriptions of each forecast along with their associated project. A comprehensive list of recommendations along Corridor D from the CTPs is shown in **Appendix A** in **Table A-4**. Recommendations from the MTPs along Corridor D, including bicycle/pedestrian and transit, are shown in **Appendix A** in **Table A-5**.

The following CTP and MTP reports and maps were collected along Corridor D:

- Avery County CTP
- Watauga County CTP
- Greater Hickory MPO (GHMPO) CTP – maps only
- Gaston-Cleveland-Lincoln MPO (GCLMPO) CTP – maps and project sheets only
- GHMPO MTP
- GCLMPO MTP

Recommendation maps as shown in **Appendix B** were created to summarize current project proposal recommendations from the CTPs along Corridor D. Most of U.S. 321 north of Hickory is recommended to be classified as an expressway, while the portions of the corridor from Hickory to Gastonia and south of Gastonia are recommended to be classified as a freeway and a boulevard, respectively.

2.3. Transportation Facilities Inventory

Transportation facilities inventory data was collected along Corridor D using NCDOT GIS layers and shapefiles. For Corridor D, the U.S. 321 corridor is approximately 105 miles long. The portion from I-85 in Gastonia to the Tennessee state line is included in the National Highway System (NHS), including U.S. 221 between Blowing Rock and Boone. The route is federally designated as a truck route from the South Carolina state line to I-85 and from I-40 in Hickory to U.S. 64 in Lenoir.

Highway assets inventory data included the number of travel lanes, functional class, and access control for the corridor which were divided into logical segment breaks. The highway assets inventory for the U.S. 321 corridor is shown below in **Table 1** for the northbound direction and **Table 2** for the southbound direction. For functional class and access control definitions, refer to **Appendix C**.

Table 1. U.S. 321 Northbound Highway Assets Inventory

County	Route	Length (mi)	Access Control	Functional Class	Travel Lanes
Gaston	U.S. 321	7.7	Partial	Other Principal Arterial	2
	U.S. 321	0.4	Partial	Other Principal Arterial	3
	U.S. 321	1.3	Partial	Other Principal Arterial	2
	U.S. 321	0.7	Partial	Other Principal Arterial	3
	U.S. 321	0.8	Full	Other Freeway	2
	U.S. 321	0.8	Full	Other Freeway	3
	U.S. 321	6.7	Full	Other Freeway	2
Lincoln	U.S. 321	11.1	Full	Other Freeway	2
Catawba	U.S. 321	14.3	Full	Other Freeway	2
	U.S. 321	2.1	Partial	Other Principal Arterial	2
Burke	U.S. 321	0.3	Partial	Other Principal Arterial	2
Caldwell	U.S. 321	30.7	Partial	Other Principal Arterial	2
	U.S. 321	1.9	Partial	Other Principal Arterial	1
Watauga	U.S. 321	1.9	Partial	Other Principal Arterial	1
	U.S. 321	6.3	Partial	Other Principal Arterial	2
	U.S. 321	0.9	Partial	Minor Arterial	2
	U.S. 321	15.3	Partial	Other Principal Arterial	1
Avery	U.S. 321	2.4	Partial	Other Principal Arterial	1

Table 2. U.S. 321 Southbound Highway Assets Inventory

County	Route	Length (mi)	Access Control	Functional Class	Travel Lanes
Gaston	U.S. 321	7.8	Limited	Other Principal Arterial	2
	U.S. 321	0.4	Limited	Other Principal Arterial	3
	U.S. 321	1.2	Limited	Other Principal Arterial	2
	U.S. 321	0.4	Limited	Other Principal Arterial	3
	U.S. 321	8.5	Partial	Other Freeway	2
Lincoln	U.S. 321	11.1	Full	Other Freeway	2
Catawba	U.S. 321	14.3	Full	Other Freeway	2
	U.S. 321	2.1	Partial	Other Principal Arterial	2
Burke	U.S. 321	0.3	Partial	Other Principal Arterial	2
Caldwell	U.S. 321	30.7	Partial	Other Principal Arterial	2
	U.S. 321	1.9	Partial	Other Principal Arterial	1
Watauga	U.S. 321	1.9	Partial	Other Principal Arterial	1
	U.S. 321	6.3	Partial	Other Principal Arterial	2
	U.S. 321	0.9	Partial	Minor Arterial	2

County	Route	Length (mi)	Access Control	Functional Class	Travel Lanes
	U.S. 321	15.3	Partial	Other Principal Arterial	1
Avery	U.S. 321	2.4	Partial	Other Principal Arterial	1

Bridge inventory data included locations of all grade separations along the corridor as well as structurally deficient and functionally obsolete status. The bridges inventory for Corridor D is shown in **Appendix D** in **Table D-1**. There are 67 bridges along the corridor crossing other roadways, rail corridors, and bodies of water. Three bridges were classified as structurally deficient and twelve bridges were classified as functionally obsolete. For structurally deficient and functionally obsolete definitions, refer to **Appendix C**.

2.4. National Performance Measures

Consistent with the vision set for the STC network, it is in the public interest that the primary facilities on the STC network provide long-term, high-quality levels of service in terms of safety, travel speed, and reliability. To understand whether the STC goals and objectives are being met, it was necessary to define expectations and measure performance. NCDOT is strongly aligned with recent rulemaking by the Federal Highway Administration (FHWA) to adopt performance measures to assess system performance. National performance measures are included in **Table 3**.

Table 3. National Performance Measures

National Goal Area	Goal	Performance Measure	NCDOT Targets
Safety[1]	To achieve a significant reduction in traffic fatalities and serious injuries on all public roads Cut the fatalities and serious injuries in North Carolina in half based on the 2013 figures, reducing the total annual fatalities by 630 fatalities and the total injuries by 1,055 serious injuries before 2030	Number of Fatalities	1,207.3 (2018)
		Rate of Fatalities	1.114 (2018)
		Number of Serious Injuries	2,161.2 (2018)
		Rate of Serious Injuries	1.988 (2018)
		Number of Non-Motorized Fatalities and Non-Motorized Serious Injuries	In development
Infrastructure Condition	To maintain the highway infrastructure asset system in a state of good repair	Percentage of Pavements in Good Condition (Interstate)	>=37.0% (4 year)
		Percentage of Pavements in Poor Condition (Interstate)	<=2.2% (4 year)
		Percentage of Pavements in Good Condition (Non-Interstate National Highway System [NHS])	>=27.0% (2 year)
		Percentage of Pavements in Poor Condition (Non-Interstate NHS)	<=4.7% (4 year)
		Percentage of Bridges in Good Condition (NHS)	<=33.0% (2 year)
		Percentage of Bridges in Poor Condition (NHS)	<=9.0% (4 year)
System Reliability	To improve the efficiency of the surface transportation system	Percent of Reliable Person-Miles Traveled (Interstate)	>=80% (2 year) >=75.0% (4 year)
		Percent of Reliable Person-Miles Traveled (Non-Interstate NHS)	>=70.0% (4 year)

National Goal Area	Goal	Performance Measure	NCDOT Targets
Environmental Sustainability	To enhance the performance of the transportation system while protecting and enhancing the natural environment	Total Emissions Reduction (Charlotte Urbanized Area)	2-year target: VOC: 0.252 kg/day NOx: 2.360 kg/day 4-year target: VOC: 0.504 kg/day NOx: 4.720 kg/da
Congestion Reduction	To achieve a significant reduction in congestion on the NHS	Annual Hours of Peak Hour Excessive Delay (PHED) Per Capita on the NHS	<=34.0% (4 year)
		Percent of Non-Single Occupancy Vehicle (SOV) Travel	<=21.0% (4-year target)
Freight Movement & Economic Vitality	To improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development	Interstate Truck Travel Time Reliability	1.65 (2 year) 1.70 (4 year)

The NCDOT Targets for the Safety National Goal Area are five-year averages from 2014-2018. Performance measure evaluation for the Corridor D will be based on the national performance measures above.

2.5. Freight Mobility

Freight mobility into, out of, and within U.S. 321 was analyzed using freight flow data downloaded from the North Carolina Freight Flow tool. The freight flow data is presented as volume (tonnage) and value (dollars). It is based on the Federal Highway Administration's (FHWA) Freight Analysis Framework Version 4.1 (FAF4.1) with county-level disaggregation processed by Cambridge Systematics for 2012, 2015, and 2045, and it was forecasted to 2045 using FHWA's FAF4.1 origin-destination and commodity growth rates for rail flows[1].

Freight flow estimates for U.S. 321 include county totals for the 14 counties within the Gastonia, Hickory, Boone, Pisgah, and Southern Foothills regions. The counties included were: Alexander, Avery, Burke, Caldwell, Catawba, Cleveland, Gaston, Lincoln, McDowell, Mitchell, Polk, Rutherford, Watauga, and Yancey. Results are presented for 12 different commodity groups and associated trade partners. Results by trade partners are presented regionally for the United States, at the county level for trade between the corridor and the rest of North Carolina, and at the FAF regional level for all other trade which includes states, large metropolitan areas, the remainder of states with large metropolitan area(s), and international regions for foreign freight flows.

Freight flows to, from, and within the U.S. 321 counties (including domestic trade and the domestic leg of foreign trade) totaled an estimated 91.6 million tons worth $103.9 billion in 2015, shown in **Figure 2**. While inbound flows represent half of the corridor's volume, outbound flows account for over half of the value. Flows were forecasted to increase to 117.1 million tons worth $167.3 billion in 2045 (an increase of roughly 28 and 61 percent respectively) with a slight increase in outbound freight to 45 percent of volume and 55 percent of value.

[1] North Carolina Statewide Multimodal Freight Plan, Freight Flow Tool Reference Guide: https://connect.ncdot.gov/projects/planning/Statewide-Freight-Plan/Documents/Freight_Tool_User_Guide.pdf

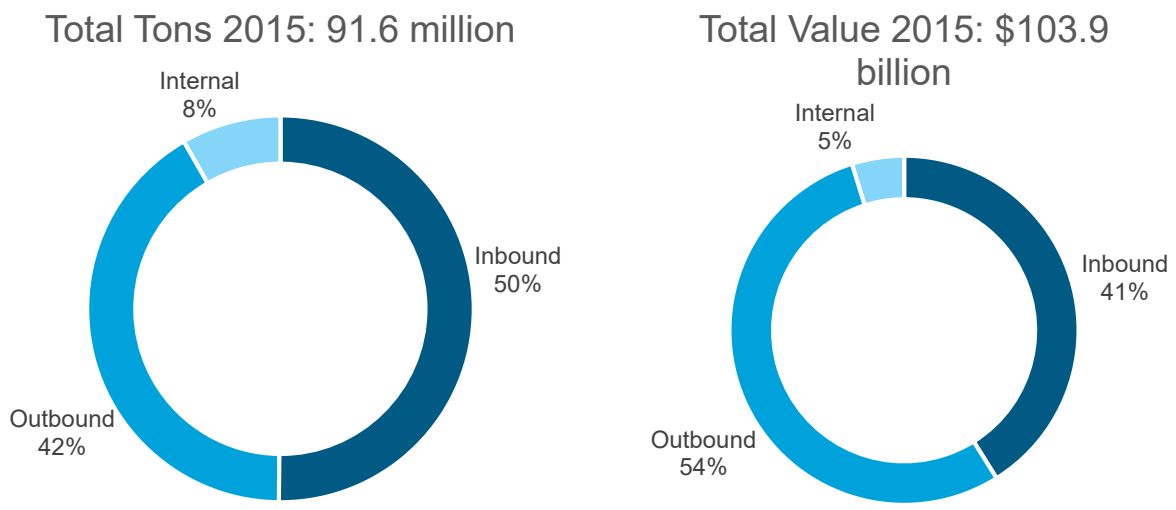


Figure 2. Freight Flow Totals, 2015

Trucking dominates the market, moving over 87 percent of the corridor's freight and accounting for almost 95 percent of the total value, shown in **Figure 3**. Carload rail's roughly nine percent of volume translated to one percent of the value in 2015, while pipelines carried almost three percent of the total volume. Air cargo's minimal volume represented three percent of the total value. Modal share forecasts for 2045 show truck volumes increasing to 91 percent with rail carload decreasing to six percent and truck capturing 97 percent of the total flows by value.

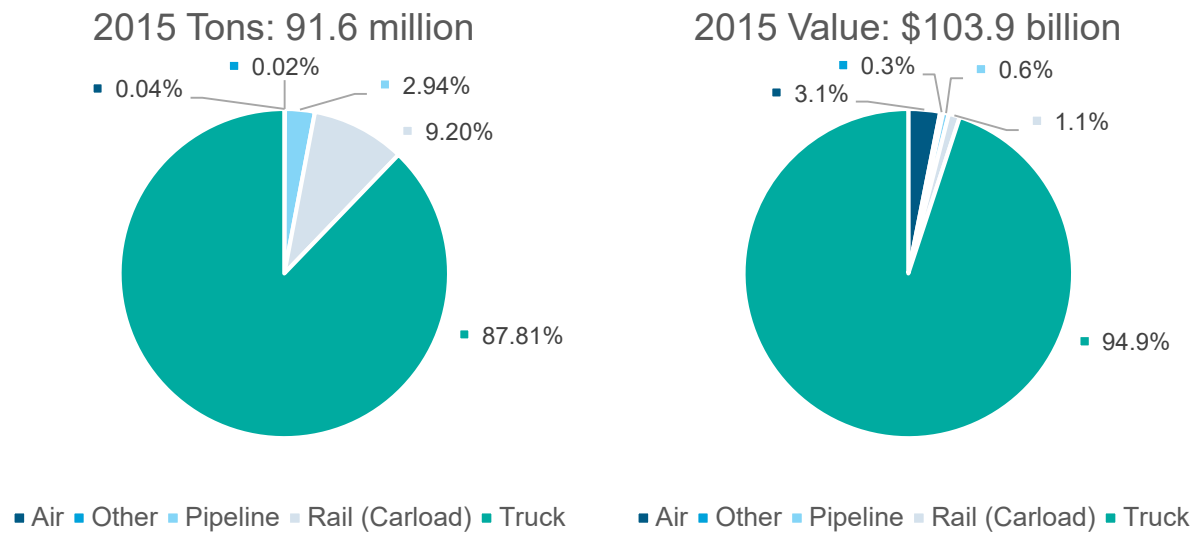


Figure 3. Modal Freight Flow Volume and Value Totals, 2015

Energy Products (over 18 million tons) accounted for the largest volume of commodities moving to, from, and within the corridor with the majority moving into the region, shown in **Figure 4**. While Aggregates were a close second with just under 18 million tons, forecasts out to 2045 show a nine percent increase in tonnage for Aggregates but over a 30 percent decrease for Energy Products. By 2045, forecasted flow increases of 45 percent in Nonmetallic Mineral and Base Metal Products and 30 percent in Raw and Finished Wood Products equate to almost 18 million tons for both commodity groups. Chemicals, Pharma, Plastics, and Rubber (89 percent), Waste (78 percent), Mixed Freight (65 percent), and Food, Alcohol, and Tobacco (62 percent) are all forecasted to experience significant percentage growth.

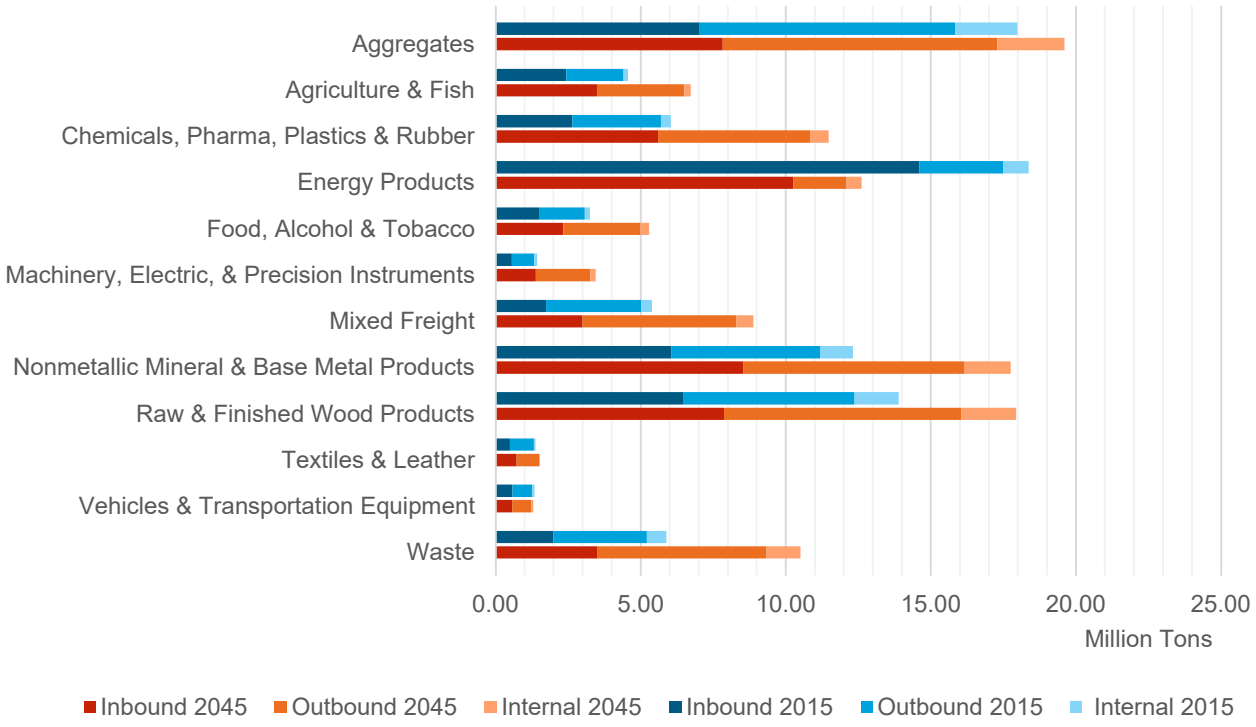


Figure 4. Commodity Volumes, 2015 and 2045

Mixed Freight's almost $24 billion accounted for the largest share of the flows by value in 2015, and its forecasted growth of 63 percent would increase its value to just under $39 billion by 2045. Machinery, Electric, and Precision Instruments are forecasted to experience a 123 percent increase from $17 to $37.8 billion by 2045. Chemicals, Pharmaceuticals, Plastics, and Rubber are expected to almost double in trade by value from $16.7 billion in 2015 to $33 billion in 2045, as shown in **Figure 5**.

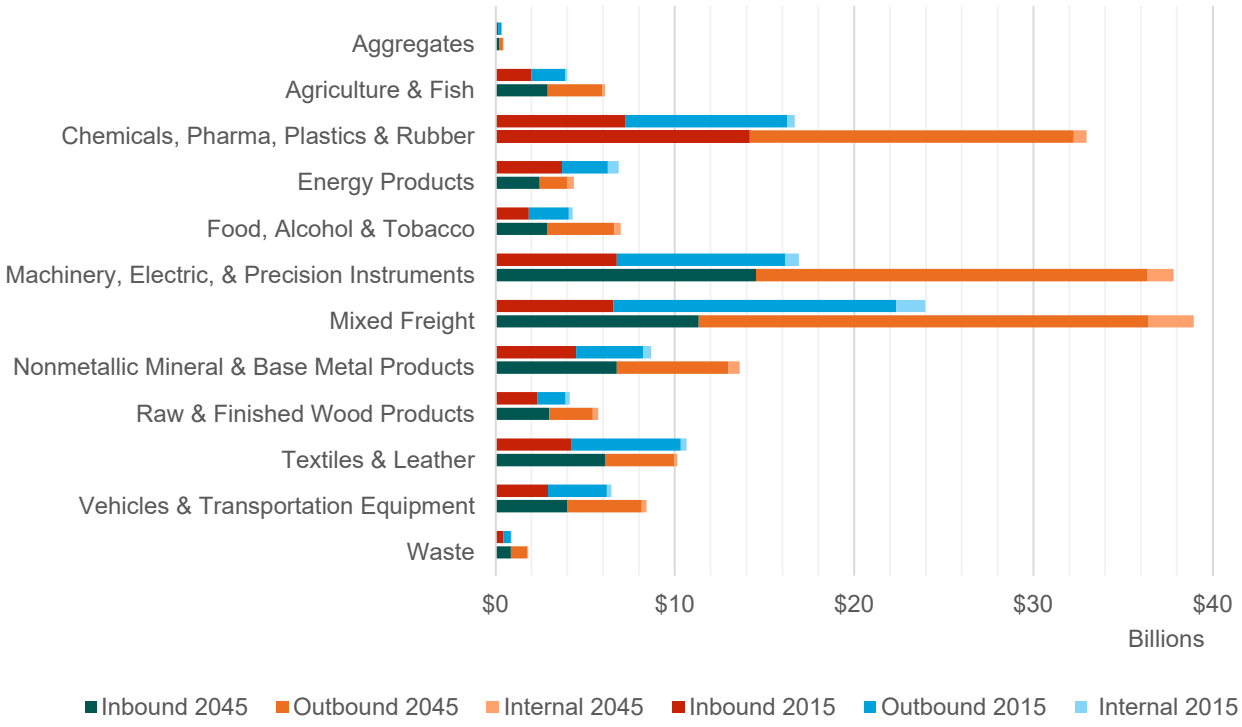


Figure 5. Commodity Values, 2015 and 2045

The counties through which U.S. 321 runs ship and receive the largest volume and value of goods within the Southeast region of the U.S. compared to all other U.S. regions. In 2015, this was estimated to be over 67 million tons valued at over $63 billion and forecasted to grow to over 86 million tons worth almost $100 billion by 2045, shown in **Table 4**. The Mideast region of the U.S. ranked second with just under 11 million tons and $11.5 billion. The counties within the corridor themselves traded 7.6 million tons worth over $5 billion in 2015. The internal tonnage was greater than the total tonnage of the states within the Great Lakes and those west of the Mississippi River combined.

Table 4. Top Regional Trading Partners

Region	Tonnage		Value	
	2015	2045	2015	2045
Internal (North Carolina)	7,639,283	9,495,823	$5,025,031,929	$6,970,970,081
Great Lakes	3,037,973	4,462,078	$8,351,619,665	$13,174,188,449
Mideast	10,995,877	11,523,056	$11,474,542,245	$19,109,941,571
New England/New York	716,206	1,414,571	$4,461,210,824	$7,762,149,025
Southeast	67,085,733	86,421,280	$63,348,073,564	$99,646,118,278
West of the Mississippi	2,151,959	3,809,690	$11,226,621,592	$20,641,317,659
TOTALS	**91,627,031**	**117,126,499**	**$103,887,099,819**	**$167,304,685,062**

2.6. Mobility Analysis

After compiling the necessary freight information for use in updating the North Carolina Statewide Travel Demand Model (NCSTM), highway mobility was analyzed for U.S. 321 for existing and future conditions based on the relationship of travel speed, congestion, and travel time. Existing conditions data was based on NCDOT traffic

count data, GIS data, and third-party data (Google Maps satellite and travel time data). Future conditions analysis was based on the NCSTM, Regional and Small Area Travel Demand Models, the STIP, and Transportation Plans for communities throughout the corridor.

To manage the analysis of the project corridor, the corridor was divided into mobility segments as shown in **Figure 6.** These segments represent sections that are generally homogenous and/or represent a uniform cross-section of roadway. The process of identifying segments included the review of the following attributes along the corridor:

- Major changes in roadway characteristics (cross-section, facility type, lanes)
- NCDOT Divisional Boundaries
- Interstate Crossings
- Metropolitan Planning Organization (MPO) Model boundaries
- Urban/rural transition

Segment breaks were not created for every occurrence of these characteristics; for example, small segments were avoided unless it was justified based on the uniqueness of the roadway attributes in that section. Although speed limits were a consideration, other factors were considered more heavily due to the frequency of speed limit changes.

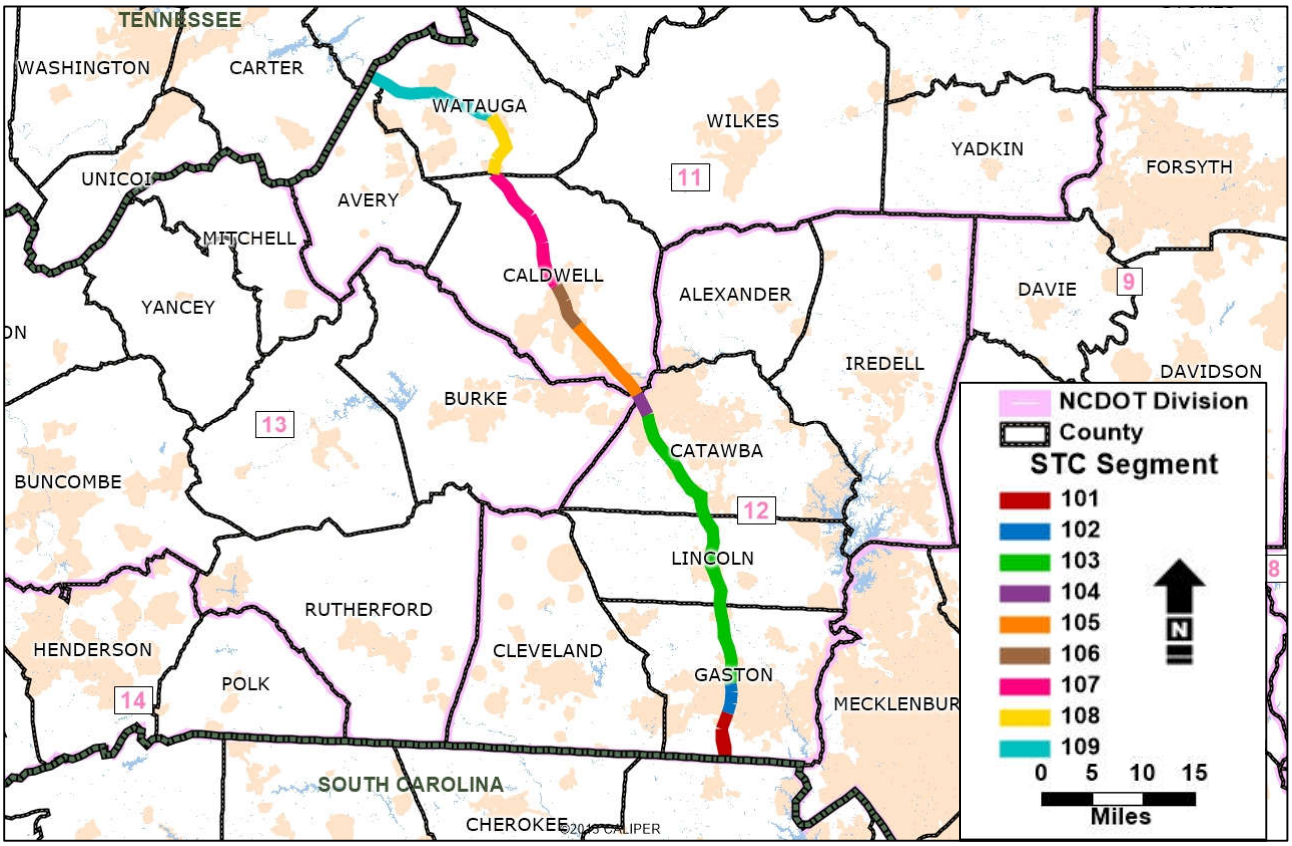


Figure 6. Corridor Segments

Typical planning-level highway capacity was developed for each segment along the corridor using the predominant cross-section representative of each segment. Capacities are based on NCDOT TPD's **Level of Service D Standards for Systems Level Planning**, updated 10/14/2011, as shown in **Appendix E**. Segment facility type, typical number of lanes, area type, percent trucks, terrain, and travel speed were used to identify the daily planning-level capacity for comparison against existing traffic. Segment capacities are shown in **Table 5**.

Travel times were calculated based on a weighted average of posted speeds for each segment (by length), existing volume-to-capacity ratios, and a volume-delay curve like what is used in the NCSTM. **Table 5** presents the travel

time needed to fully utilize each segment. As a point of comparison, Google Maps travel times were identified for each segment to provide "observed" ranges based on third party data.

Table 5. Segment Capacities and Travel Times

Segment	Facility Type	Typical Speed (miles per hour)	Lanes	Median Type	Area Type	Planning Capacity	2018 Travel Time (Estimated) (min.)	Travel Time (Google Maps) (min.)
101	Major Thoroughfare	45	4	CLTL[1]	Suburban	30,800	8	8-12
102	Major Thoroughfare	35	4	None	Urban	21,500	7	6-12
103	Freeway	65	4	Divided	Suburban	58,500	32	30-40
104	Boulevard	45	4	Divided	Urban	35,100	5	4-10
105	Boulevard	45	4	Divided	Suburban	36,600	18	12-20
106	Major Thoroughfare	45	4	CLTL	Suburban	26,700	10	7-12
107	Major Thoroughfare	55	4	None	Rural	29,200	20	20-24
108	Major Thoroughfare	40	4	None	Rural	28,300	15	12-22
109	Minor Thoroughfare	40	2	None	Rural	15,500	29	26-35

1. CLTL = Continuous Left-Turn Lane

Future conditions analysis was completed using growth rates developed for the corridor based on historical count data, the NCSTM, and relevant regional, MPO, and small area models. Two initial future scenarios were analyzed:

- 2040 Existing plus Committed (E+C): Existing network plus committed (in the 2020-2029 STIP with either Right-of-Way/Construction funding) corridor projects
- 2040 Recommended (Metropolitan Transportation Plan [MTP]/Comprehensive Transportation Plan [CTP]): E+C plus recommended MTP/CTP projects

Typically, these projects are on the corridor itself; however, if the project is on a parallel facility and is of regional significance, it was included in the future conditions analysis. For each scenario, annual growth rates for each segment were prepared to project 2018 Annual Average Daily Traffic (AADT) to 2040. Using this information, future volume-to-capacity (V/C), travel time, average speed, vehicle-miles traveled (VMT), and vehicle-hours traveled (VHT) were calculated for each segment and the entire corridor.

For the 2040 E+C scenario, committed projects are those which were programmed in the 2020-2029 STIP that are regional in nature. **Table 6** shows projects included in the 2040 E+C evaluation. In the 2040 NCSTM, these projects were included in the analysis, along with other projects statewide that were included in the 2040 E+C network.

Table 6. 2040 E+C Scenario Projects

STIP ID	Segment	Counties	Roadway	Location/Description
U-4700	104/105	Burke/Caldwell/ Catawba	U.S. 321	North of U.S. 70 in Hickory to SR 1933 (SW Blvd). Widen to Six Lanes.
R-3430	n/a	Burke/Caldwell	SR 1001	U.S. 70 to SR 1933 (SW Blvd) in Lenoir. Widen to Multi-lanes.
R-2615	109	Watauga	U.S. 421/U.S. 321	U.S. 321/U.S. 421 Junction near Vilas to SR 1107 (105 Bypass). Widen to Multi-Lanes
R-5903	n/a	Watauga	U.S. 421	Tennessee Line to U.S. 321/U.S. 421 Junction near Vilas. Widen to Multi-Lanes

For the 2040 Recommended scenario, projects from area MTPs and CTPs were included in the project analysis. **Table 7** shows projects included for the 2040 Recommended scenario.

Table 7. 2040 Recommended Scenario Projects

Plan	Segment	Counties	Roadway	Location/Description
MTP	101/102	Gaston	York Rd	From Beam St to Carolina Ave. Add Median.
MTP	101	Gaston	U.S. 321	From 19th Ave to Clyde St. Add Median.
MTP	107	Caldwell	U.S. 321	From Blackberry Rd to Watauga County Line. Widen to 4 Lanes.
MTP	105	Caldwell	U.S. 321	Dudley Shoals Rd (SR 1002). Add SB ramp to U.S. 321.
CTP	101	Gaston	U.S. 321	From SC State Line to south of W 10th Ave. Upgrade Access Management.
CTP	101	Gaston	U.S. 321	Proposed Gaston Parkway (near Davis Heights Dr). New facility/interchange with U.S. 321.
CTP	103	Gaston	U.S. 321	From I-85 to N.C. 275/279. Upgrade to Freeway.
CTP	n/a	Gaston	Northwest Bypass	New freeway bypass from I-85 near Bessemer City to U.S. 321 north of Dallas.
CTP	n/a	Gaston	Gaston Parkway	New freeway bypass from I-85 near Bessemer City to N.C. 279 (S New Hope Rd).
CTP	104/105/106	Caldwell	U.S. 321	U.S. 70 to U.S. 64. Upgrade to Expressway.
CTP	107	Watauga	U.S. 321	From Caldwell County Line to U.S. 221. Upgrade to Expressway, Widen to Multi-Lanes.
CTP	108	Watauga	U.S. 321/221	From U.S. 221 to Proposed U.S. 421 Bypass (near Fairway Dr). Upgrade to Expressway.
CTP	108	Watauga	U.S. 321	From proposed U.S. 421 Bypass to E King St. Convert to Boulevard.
CTP	108	Watauga	U.S. 321	Proposed U.S. 421 Bypass. New facility/interchanges.
CTP	109	Watauga	U.S. 321/421	From N.C. 105 Bypass to U.S. 421. Widen to 4 Lanes Divided.
CTP	109	Watauga	U.S. 321	From U.S. 421 to Avery County Line. Upgrade to Expressway.

Note: Some projects are consolidated/summarized where a group of individual grade separations/interchanges serve to convert a boulevard/expressway to interstate freeway standards. Based on the previous scenarios analyzed, a total of 9 segments were identified for the future vision scenario, mostly on U.S. 321, as shown in **Table 8**. These segments varied in length from 3 miles to 28 miles. Analysis was completed for these segments

based on Annual Average Daily Traffic (AADT) information, NCDOT systems level planning capacities, NCSTM analysis, and MPO model analysis.

Average 2018 AADT is based on NCDOT AADT segment data, which contains different segments than the mobility segments previously defined for Corridor U.S. 321. To determine the weighted mobility segment's AADT, the 2018 NCDOT AADT data was averaged based on length of the AADT segments within each mobility segment. 2018 AADT are presented in **Table 8** for existing segments.

Table 8. Corridor D Mobility Segments – Vision Scenario

Segment	Roadway	From	To	Length (miles)	Average 2018 AADT (Weighted)
101a	U.S. 321	SC State Line	Gastonia (Crowders Creek Rd)	3	9,400
102a	Proposed Western Gastonia Bypass	Gastonia (Crowders Creek Rd)	N of Gastonia (Cloninger Rd)	13	-
103a	U.S. 321	N of Gastonia (Cloninger Rd)	Hickory (U.S. 70)	28	35,550
104	U.S. 321	Hickory (U.S. 70)	Catawba River	3	38,120
105	U.S. 321	Catawba River	Lenoir (SW Blvd)	10	32,540
106	U.S. 321	Lenoir (SW Blvd)	N.C. 90/Main St	6	24,630
107	U.S. 321	N.C. 90/Main St	Blowing Rock (Alt 321)	17	8,970
108	U.S. 321	Blowing Rock (Alt 321)	U.S. 421/King St	9	20,140
109	U.S. 321	U.S. 421/King St	TN State Line	18	6,650

Future conditions analysis was completed using growth rates developed for the corridor based on historical count data, the NCSTM, and relevant regional, MPO, and small area models. For the vision scenario, corridors were reviewed using the NCSTM model for relevant CTP projects such as the Gastonia Bypass and Boone Bypass. Using this information, future AADT, volume-to-capacity (V/C), travel time, average speed, vehicle-miles traveled (VMT), and vehicle-hours traveled (VHT) were calculated for each segment and the entire corridor. **Table 7** lists all the MTP/CTP projects listed in the recommended scenario which are included in this analysis. **Table 9** presents the facility type, posted speed, lanes, and typical capacity for the vision scenario segments.

Table 9. Corridor D Mobility Segment Characteristics – Vision Scenario

Segment	Facility Type	Typical (Posted) Speed	Lanes	Typical Capacity
101a	Freeway	65	4	65,400
102a	Freeway	65	4	58,500
103a	Expressway	55	4	69,500
104	Expressway	65	6	57,100
105	Expressway	55	4	57,100
106	Expressway	55	4	57,400
107	Expressway	55	4	57,400
108	Expressway	55	4	57,400
109	Expressway	55	4	57,400

While there are many mobility measures that can be considered for each corridor based on quantitative and qualitative data, this mobility analysis is based on the relationship of travel speed, congestion, and travel time. For the vision scenario, a projected volume was compared against available capacity to estimate the travel time. VMT, VHT, and average speed are also calculated based on the projected future volume.

Table 10 presents a summary of mobility analysis for the Corridor D vision scenario. Based on the projected 2040 volume, average volume-to-capacity (V/C), average speed and travel time, VMT and VHT are calculated.

Table 10. Corridor D Mobility Analysis – 2040 Vision Scenario

Segment	Average Volume, 2040	Typical Capacity	Average V/C	Typical (Posted) Speed	Average Travel Speed	Average Travel Time (min)	Vehicle Miles Traveled	Vehicle Hours Traveled
101a	21,300	65,400	0.33	65	61	3.5	276,900	1,200
102a	49,260	58,500	0.84	65	63	32.6	1,379,300	26,800
103a	51,760	69,500	0.74	55	54	2.9	137,700	2,500
104	45,150	57,100	0.79	65	64	9.9	473,800	7,500
105	34,180	57,100	0.60	55	55	6.1	191,800	3,500
106	12,450	57,400	0.22	55	55	18.6	212,700	3,900
107	28,560	57,400	0.50	55	55	9.3	243,100	4,400
108	10,280	42,900	0.24	50	48	22.0	181,400	3,800
109	21,300	65,400	0.33	65	61	3.5	276,900	1,200

Table 11 presents a summary of highway mobility for the entire corridor. The table shows that in 2040, the Vision Scenario decreases the average travel time and increases the average speed compared to 2018. In the Vision scenario, a typical trip through the corridor can take less than two hours – a 20% reduction in travel time. **Figure 7** presents an infographic summary of key highway mobility measures.

Table 11. Highway Mobility Summary

Measure	2018 Existing	2040 E+C	2040 Recommended	2040 Vision
Average Travel Time (Hours)	2.4	2.5	1.9	1.9
Vehicle-Miles Traveled	2,398,600	3,041,700	3,355,100	3,138,500
Vehicle-Hours Traveled	50,900	68,400	59,000	55,500
Average Annual Daily Volume	22,700	28,800	31,800	29,600
Average Speed (Miles per hour)	47	44	57	57

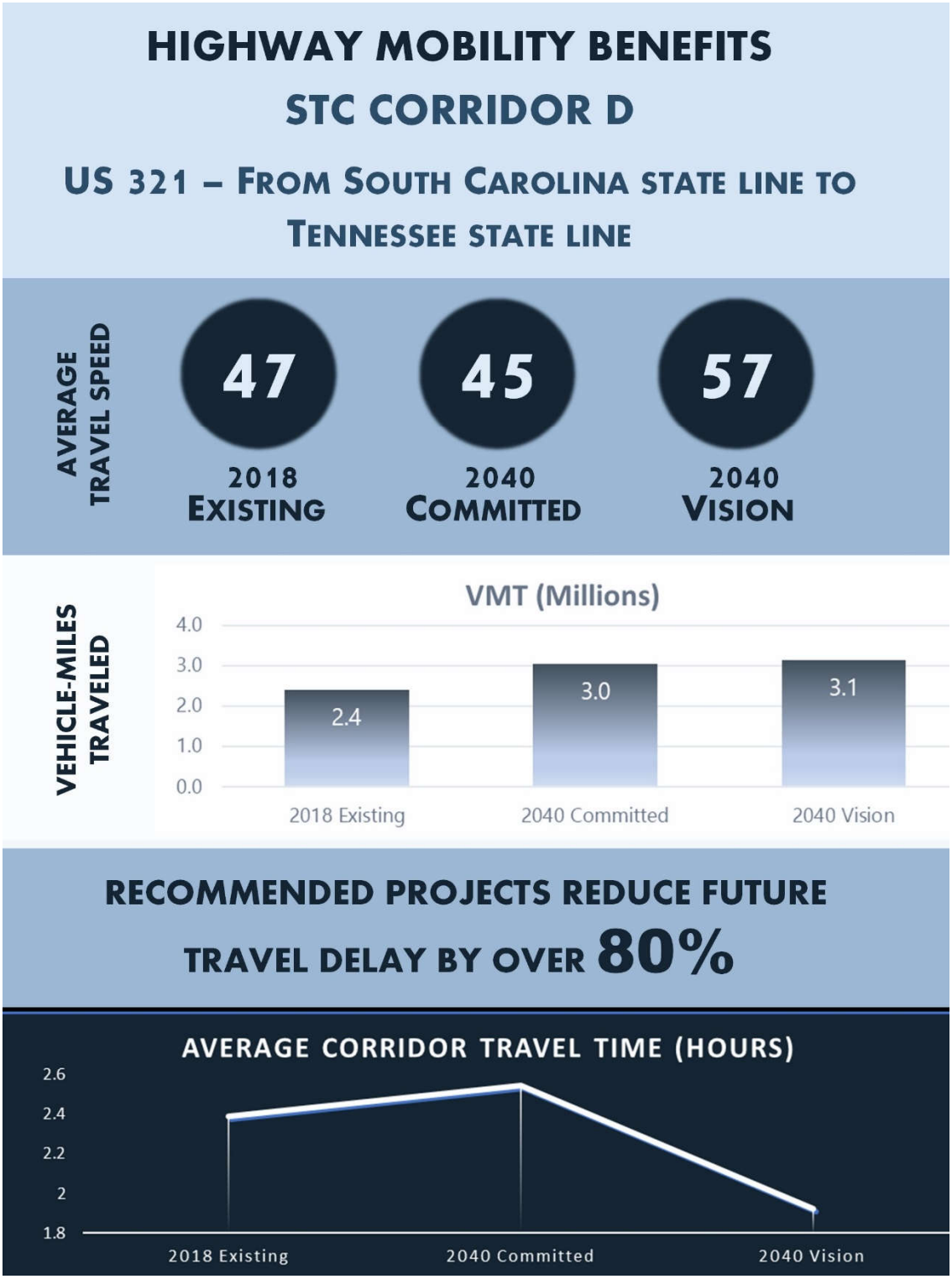


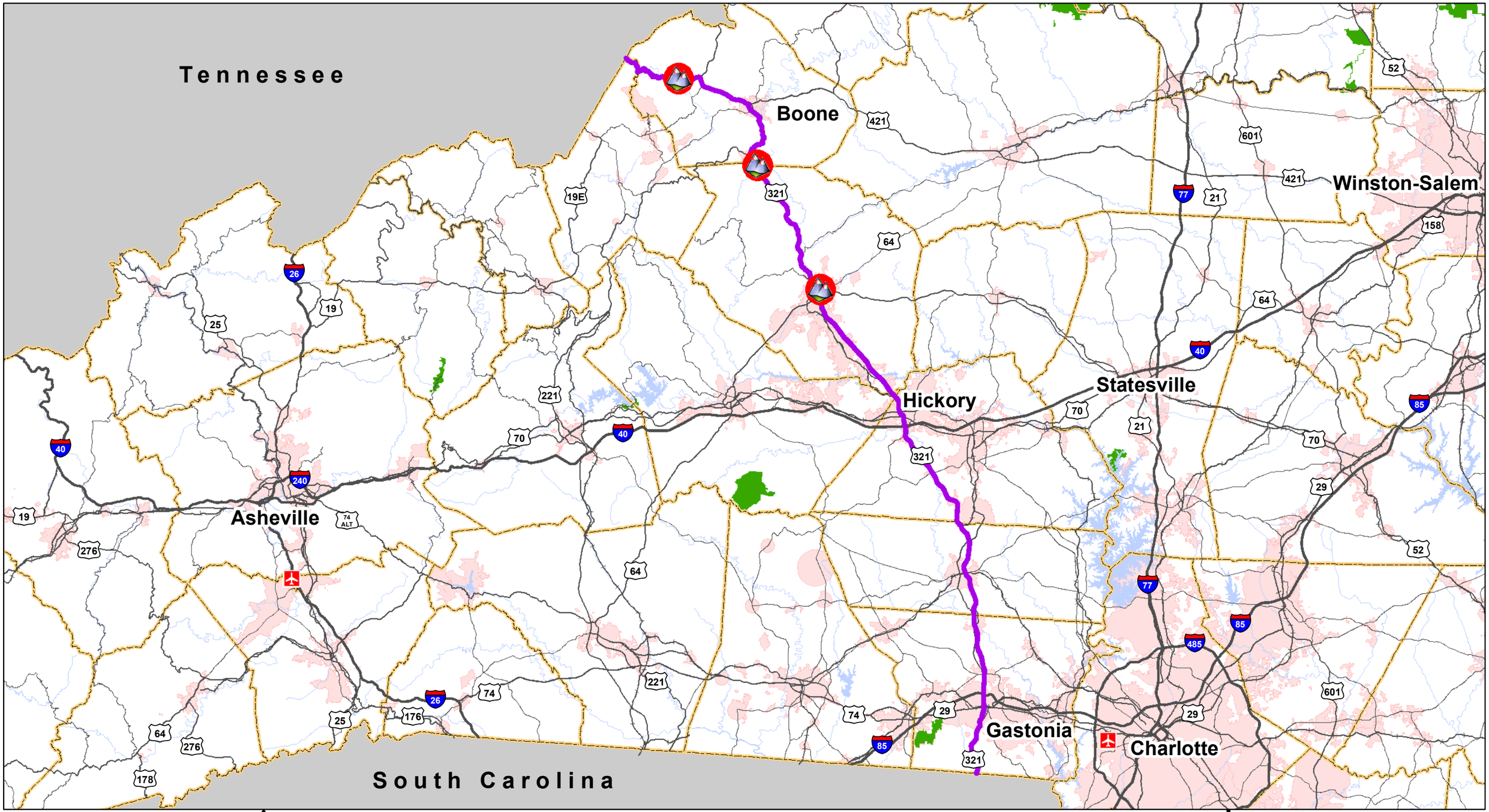
Figure 7. Highway Mobility Summary

2.7. Resiliency

To evaluate resiliency along Corridor D, major incident data along the corridor was assessed. Only events which were able to be categorized as floods, mudslides, or rockslides were included. Additionally, event locations were verified to ensure that they occurred along the corridor, and any duplicated events were combined. All incident data along Corridor D is summarized below in **Table 12** and depicted in **Figure 8**. Full analysis of resiliency issues has been identified as an Area for Additional Study.

Table 12. U.S. 321 Corridor Incident Summary

Type	Date	Duration (days)	Cross Street	County	Reason
Rockslide	8/3/2011	1	U.S. 64	Caldwell	N/A
Rockslide	8/3/2011	8	Blackberry Rd (SR 1500)	Caldwell	The road is closed between The Rock Road and Blackberry Road (SR 1500) due to a rockslide.
Rockslide	8/3/2011	1	U.S. 321 Bus/West View Dr	Watauga	A short section of U.S. 321 Bypass in Blowing Rock near the Cliff Dwellers Hotel and Food Lion is closed in both directions due to a rockslide that took place early this morning. The road was cleared earlier, however a large boulder above the road in this area has the potential to fall in the road, so the contractor is presently working to break up the boulder and remove it. The road could be closed most of the day, however all traffic can still get through Blowing Rock by using U.S.321 Business through town. All businesses and homes are accessible during this road closure.



NC STRATEGIC TRANSPORTATION CORRIDORS (STC)

APRIL 2020

Source: NCOneMap, NCDOT GIS, ESRI

Legend

- STC Highway Corridor D (US 321)
- Municipal Boundaries
- State Parks
- Rockslide
- Interstate
- US Route
- NC Highway
- Rail
- Major Rivers/Streams
- Major Water Bodies
- Counties
- NC Int'l or Major Freight Airports

0 5 10 20 30 40 50 60 70 80 Miles

STRATEGIC TRANSPORTATION CORRIDORS RESILIENCY MAP

CORRIDOR D (US 321)

Figure 8

3. Stakeholder Involvement

3.1. Stakeholder Involvement Plan

Primary components of the U.S. 321 master plan were the stakeholder involvement activities, which were initiated in March 2018 and included the finalization of the Stakeholder Involvement Plan (SIP) by the NCDOT in September 2019. The first Corridor Steering Committee meeting was a joint meeting with Atkins and Kimley-Horn held on March 27, 2018 and included stakeholders for five different corridors for which visioning would begin: U.S. 321 (Corridor D), Future I-42 (Corridor P), Future I-795 (Corridor S), U.S. 74 (Corridor U), and Jacksonville to Greenville (Corridor X). Three subsequent Corridor Steering Committee meetings were conducted in March and June of 2020. This was an opportunity to share information with Metropolitan Planning Organizations (MPO), Rural Planning Organizations (RPO), and additional stakeholders.

3.2. Corridor Steering Committee

The consultant team asked representatives from the STC internal and external steering committees to help distribute information to help garner input to the master plan process. Meetings were conducted, as follows:

- March 27, 2020 – Full Steering Committee, comprise of identified NCDOT individuals, associated agencies, MPOs and RPOs
  - Purpose: To introduce the stakeholders to the STC process
- March 9, 2020 – Internal Steering Committee, comprised of identified NCDOT individuals, as well as associated agencies
  - Purpose: To review master plan development and stakeholder deliverables
- March 30, 2020 – Full Steering Committee, comprised of identified NCDOT individuals, associated agencies, MPOs and RPOs
  - Purpose: To review master plan development, stakeholder deliverables, and to encourage MPOs and RPOs to share information and surveys with their constituencies
- June 10, 2020 – Full Steering Committee
  - Purpose: To review the recommended vision of the corridor and survey outcomes and to identify additional areas of study

3.3. Public Survey

A survey was developed in March 2020 to ask questions about the type of facility envisioned for the corridors, what features of the corridor should be preserved, what features should be improved, and whether there are any circumstances the study team should be aware of as they develop the master plan. A link to the survey was distributed to MPOs and RPOs, who also were asked to distribute the link to customers, members, clients, employees, constituents and any others who would be interested from the public. An email with a survey link was developed by the consultant and distributed to the NCDOT for distribution to Corridor Steering Committee (CSC) members, as well as any additional stakeholders identified by NCDOT. In addition, a flier was developed for each corridor survey.

The survey was launched on April 6, 2020 and remained open through June 6, 2020, garnering 253 responses. Specific details are in **Appendix F**. The following information is based on the number of participants for each question:

- 99% drive their own vehicles as a primary means of transportation
- Most people typically use the facility for shopping and dining, the second most popular use is commuting to work
- 41% use the facility daily with 56% commuting 1-20 miles to work or school
- The most popular response to what changes respondents would like to see along U.S. 321 in the next 20 years was fewer traffic signals. To see the breakout of responses please refer to the Stakeholder Outreach Summary Report

- From the South Carolina state line to Boone, most respondents support the preliminary vision of an expressway with 44% strongly agreeing
- 28% responded that they have been impacted by rockslides/mudslides

3.4. Interagency Coordination

Resource Agency review of long-range transportation planning activities is essential to the success of the process. For the Strategic Transportation Corridors Master Plan Visions to be both comprehensive and fully vetted, the two-page vision for Corridor D was provided to the resource agencies listed in the Interagency Coordination Protocol. The resource agencies and the contacts are shown below:

- Audubon NC, Curtis Smalling
- NC Center for Geographic Information and Analysis, Tim Johnson
- NC Department of Agriculture and Consumer Services – Plant Industry Division Plant Conservation Program, Lesley Starke
- NC Department of Commerce – Labor and Economic Analysis Division, Joshua Levy
- NC Department of Cultural Resources – Historic Preservation Office / Office of State Archaeology, Renee Gledhill-Earley
- NC Division of Energy, Mineral, and Land Resources – Land Resources / Stormwater Permitting, Annette Lucas
- NC Department of Agriculture and Consumer Services – NC Forest Service, Christian Vose
- NC Wildlife Resources Commission – Habitat Conservation Program, Travis Wilson / Marla Chambers
- NC Department of Environment and Natural Resources – Division of Marine Fisheries, Anne Deaton
- NC Department of Environment and Natural Resources – Division of Water Resources, Amy Chapman
- NC Department of Environment and Natural Resources – Division of Mitigation Services, Tim Baumgartner
- NC Department of Environment and Natural Resources – Division of Coastal Management, Cathy Brittingham
- NC Department of Cultural Resources – Natural Heritage Program, Suzanne Mason
- NC Department of Environment and Natural Resources – Parks and Recreation, John Amoroso
- NC Division of Public Health – Community and Clinical Connections for Prevention and Health Branch, Melissa Rockett
- Regional Land Use Advisory Commission, Pete Campbell
- US Army Corps of Engineers – Regulatory Division, Monte Matthews
- US Department of Agriculture – Forest Service, Amy Mathis
- US Fish and Wildlife Service, Kathy Matthews / Claire Ellwanger
- US Environmental Protection Agency – Region 4, Amanetta Somerville

These agencies were provided the two-page visions on July 30, 2020 by email and given three weeks to provide any comments or questions. The team did not receive any comments from any resource agency.

4. Vision

Corridor D provides a connection to the South Carolina strategic U.S. 321 corridor and is the primary connection from the northern mountains into Tennessee. This corridor connects northeast Tennessee with I-40 and I-85 providing passenger and freight mobility across western North Carolina. Corridor D also serves three of the state's top tourism counties (Gaston, Catawba, and Watauga) and is a key access route to the primary academic center at Appalachian State University. As the most direct route between the Charlotte/Gastonia region and the tourism-rich northern mountains, Corridor D will provide safe, reliable travel for both passenger and freight movement, with reduced delays through intermediate communities along the corridor. The vision for the corridor is below.

The corridor follows U.S. 321 within a 20-mile buffer on either side of the facility. From the Tennessee state line to U.S 70 north of Hickory, the long-term corridor vision is an expressway cross-section with a minimum of 4 lanes, a median, and limited access. The short-term corridor vision eliminates traffic signals outside of Blowing Rock town limits. From U.S 70 north of Hickory to the South Carolina state line, the corridor vision is a freeway cross-section with a minimum of 4 lanes, a median, and interchange-only access.

5. Next Steps

5.1. Sub-Corridor Areas for Additional Study

For long-range transportation planning and prioritization along the corridor, more detailed studies are crucial to ensure adequate review of the existing transportation system has been completed. An accurate picture of the existing facilities including evaluations of the challenges and opportunities related to safety, connectivity, operations, land use, multi-modal mobility, resiliency, and other barriers and constraints is needed to ensure the corridor will meet the needs of all types of users in the future.

Thorough analysis of the existing mobility needs and opportunities along the corridor including freight and multi-modal issues assisted in identifying potential additional areas for study. After discussion with NCDOT and external and internal stakeholders, several areas for additional study were identified along Corridor D.

5.1.1. Expressway improvements northwest of Boone and the connection at the Tennessee state line

Due to the less developed character of this section of the corridor, opportunities such as increased right-of-way available and challenges such as driveway access needs in a rural and mountainous setting will be present when considering the long-term vision for an expressway cross-section, as well as the roadway cross-section and capacity transition at the state line.

5.1.2. Boone Bypass

A bypass route around the developed area of Boone would allow Corridor D to follow the long-term vision for an expressway cross-section without requiring significant construction within a constrained area. Additional study will be important in determining the final location and design of the bypass route.

5.1.3. Expressway improvements between Boone and Blowing Rock

This section of the corridor has less development between the towns of Boone and Blowing Rock, presenting opportunities such as increased right-of-way that must be balanced with challenges such as driveway access needs in a rural and mountainous setting when considering the long-term vision for an expressway cross-section.

5.1.4. Freeway improvements in Gastonia

Due to the developed character of this section of the corridor within Gastonia, constraints related to right-of-way, existing transportation infrastructure, and other barriers must be considered, as well as different travel and connectivity needs related to being within an urban area. A freeway route has been identified on both existing and new location to the west of Gastonia.

5.1.5. Existing corridor improvements in Lenoir

Due to the developed character of this section of the corridor within Lenoir, constraints related to right-of-way, existing transportation infrastructure, and other barriers are prevalent. Additional study is needed to address these issues to provide efficiency through the town limits of Lenoir.

5.1.6. Lenoir Bypass

A potential bypass route around the developed area of Lenoir would allow Corridor D to follow the long-term vision for an expressway cross-section without requiring significant construction within a constrained area. Additional study will be important in determining the final location and design of the bypass route.

5.1.7. Freeway improvements south of Gastonia and the connection at the South Carolina state line

Due to the less developed character of this section of the corridor, opportunities such as increased right-of-way available and challenges such as driveway access needs will be present when considering the long-term vision for

a freeway cross-section, as well as the need for extensive coordination at the state line to ensure consistency and adequate transitions in areas such as roadway cross-section and capacity.

5.1.8. Multimodal connections

It is important to assess multimodal connections throughout the corridor, especially within and between the urban areas and towns the corridor connects. Public input and engagement will help inform current and future needs for multimodal connectivity.

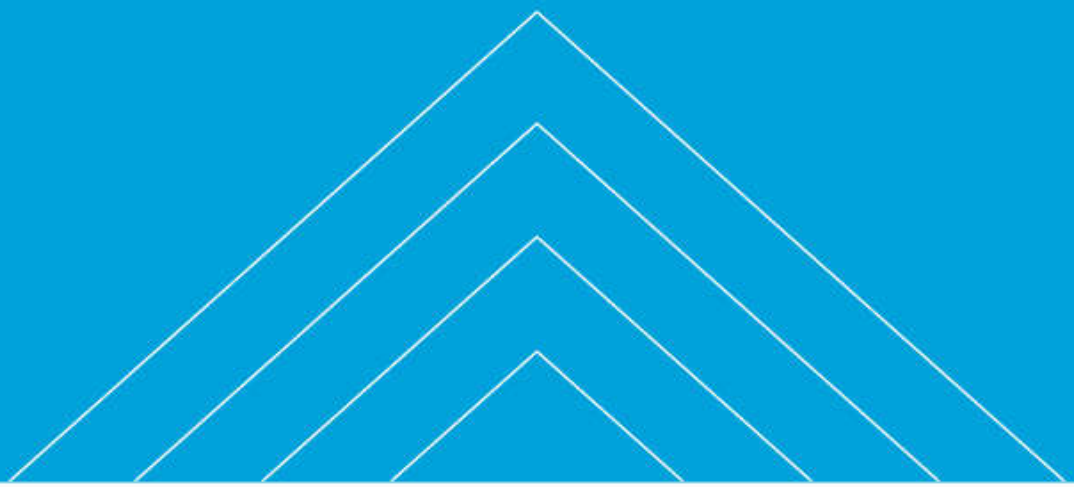
5.1.9. Resiliency Assessment

An assessment of resiliency along the entire corridor is essential to its long-term vitality, especially in sections that have recorded past incidents such as rockslides. Full assessment of additional resiliency issues is crucial to completely understanding resiliency strengths and needs along the corridor.

5.1.10. Traffic Signal Study for Blowing Rock and Boone

Consistent signal timing is an essential piece in improving traffic flow along U.S. 321. Full evaluation of signal timing through a Traffic Signal Study for Blowing Rock and Boone is supported by both municipalities, NCDOT Highway Division 11, and the High Country RPO.

Appendices



Appendix A. Corridor D Projects

Table A-1. U.S. 321 Corridor: Current STIP Projects

TIP ID	County	Route	Description	Status
W-5311	Gaston	U.S. 321	U.S. 321 at SR 2416 (Robinson Rd), and U.S. 321 just north of SR 2416. Replace overhead railroad bridge to allow for construction of two-lane, two-way road for SR 2416, construct right turn lane for U.S. 321 northbound approach and construct two limited movement crossovers, and revise existing flasher.	Under construction
U-5970	Gaston	U.S. 321	19th Ave to Clyde. Construct access management improvements.	ROW 2023; Construction 2025
I-5000	Gaston	I-85	I-85/U.S. 321. Geometric safety improvements to interchange.	Under construction
C-5622	Gaston	Highland Branch Greenway	Highland Branch Greenway, Phase 1. Construct Greenway.	Under construction
B-4450	Caldwell	U.S. 321	Replace bridge 130367 over Catawba River	To be constructed with U-4700
U-4700	Burke; Caldwell; Catawba	U.S. 321	North of U.S. 70 in Hickory to SR 1933 (Southwest Blvd). Widen to six lanes.	A: North of U.S. 70 in Hickory to U.S. 321A - ROW In Progress; Construction 2021 B, C: U.S. 321A TO SR 1933 - Unfunded
EB-6038	Caldwell	U.S. 321 Multi-Use Trail & Bridge Connector	Construct multi-use trail from Old Lenoir Rd multi-use to Hickory Regional Airport along Clement Blvd, 13th Ave Dr NW, and 19th St Ln NW (Includes construction of bicycle/ped bridge over U.S. 321), and construct multi-use trail from 9th St	ROW 2020, Construction 2020
U-5776	Caldwell	U.S. 321 Alt	Intersection of SR 1106 (Duke St) and U.S. 321A. Realign intersection.	Under construction
U-6034	Caldwell	U.S. 321 Alt	SR 1109 (Pinewood Rd) to SR 1106 (Duke St). Upgrade roadway.	ROW 2020; Construction 2022
U-6161	Caldwell	U.S. 321	SR 1002 (Dudley Shoals Rd) grade separation. Construct ramp onto U.S. 321 southbound.	ROW 2021; Construction 2023
R-5775	Caldwell	U.S. 321	Intersection of U.S. 321 and SR 1109 (Pinewoods Rd Extension). Construct intersection improvements.	Under construction
U-4700CC	Caldwell	U.S. 321	SR 1108 (Mission Rd). Upgrade intersection to superstreet design - within the limits of U-4700 C.	ROW 2020; Construction 2020

Table A-1. U.S. 321 Corridor: Current STIP Projects

TIP ID	County	Route	Description	Status
U-4700CB	Caldwell	U.S. 321	SR 1809/1952 (Pine Mountain Rd). Upgrade intersection to superstreet design - within the limits of U-4700 C.	ROW 2020; Construction 2020
U-4700CA	Caldwell	U.S. 321	SR 1160 (Mount Herman Rd). Upgrade intersection to superstreet design - within the limits of U-4700 C.	ROW 2020; Construction 2020
R-5874	Watauga	U.S. 321	Deerfield Rd and Meadowview Rd. Realign offset intersection.	ROW 2028; Construction Unfunded
U-5715	Watauga	U.S. 321 / U.S. 421, N.C. 194	College St intersection. Construct improvements.	Under construction
R-5872	Watauga	U.S. 421	SR 1180 (Poplar Grove Connector). Construct roundabout.	ROW 2025; Construction 2026
R-2615	Watauga	U.S. 421 / U.S. 321	U.S. 321/U.S. 421 junction near Vilas to SR 1107 (105 Bypass) - termini of proposed Boone Bypass (U-2703). Widen to multi-lanes.	ROW 2024; Construction 2026

Table A-2. U.S. 321 Corridor: Feasibility Studies

TIP ID	County	Route	Location	Recommendation	Year of Study
U-5970	Gaston	U.S. 321	From Clyde St to west of 19th Ave	Widen to include median to eliminate full movements at 3 cross streets, sidewalks on both sides, and wider outer lanes for bicycle access.	2018
U-6034	Caldwell	U.S. 321 Alt	From Duke St to Pinewood Rd	Widen from 2 lanes to 3 lanes. Includes sidewalks on north side, side street realignments and access management, intersection turn-lane improvements, and roundabout conversion.	2018
U-2543	Caldwell	U.S. 321 Alt	From Falls Ave to McLean Dr	Widen from 2 lanes to multi-lanes. (Either 4 lanes for entire length or combination of 4 and 3 lanes)	2014

Table A-3. U.S. 321 Corridor: Traffic Forecasts

TIP ID	County	Route	Location	Associated Project Description	Year of Study
U-5970	Gaston	U.S. 321	From south of Clyde St to north of Carolina Ave	Improve access management on U.S. 321 from Carolina Ave to Clyde St	2018
I-5000	Gaston	U.S. 321	From south of Radio St to north of Tulip Dr/Bulb Ave	Geometric safety improvements to the I-85 and U.S. 321 interchange	2015
I-5719	Gaston	U.S. 321	From south of Radio St to north of Tulip Dr/Bulb Ave	I-85 widening	2017
R-0617BB	Lincoln	U.S. 321 Bus	From south of N.C. 150 interchange to north of Georgetown Rd	Widen N.C. 150 from 2 lanes to 4 lanes divided	2018
BR-0027	Lincoln	U.S. 321 Bus	From south of Victory Grove Church Rd to south of Georgetown Rd	Replace U.S. 321/S Aspen St bridge over N.C. 150	2018
U-2530A	Catawba	U.S. 321	N.C. 127 interchange	Widen N.C. 127 to 4 lanes divided	2018
I-5716	Catawba	U.S. 321	I-40 interchange	Add clover ramp at the I-40 and Lenoir-Rhyne Blvd interchange	2015
		U.S. 321 Bus/U.S. 70	Lenoir-Rhyne Blvd intersection		
I-5991	Catawba	U.S. 321	From south of I-40 to north of U.S. 70	I-40 widening	2018
		U.S. 321 Bus/U.S. 70	From U.S. 321 to east of Fairgrove Church Rd SE		
U-4700	Catawba, Burke, Caldwell	U.S. 321	From south of U.S. 70 to north of Southwest Blvd	Widen U.S. 321 from 4 lanes divided to 6 lanes divided from U.S. 70 to Southwest Blvd	2017
	Caldwell	U.S. 321 Alt	U.S. 321/River Bend Dr intersection		
U-5705	Watauga	U.S. 321	From east of Winklers Creek Rd to west of U.S. 221/N.C. 105	Upgrade U.S. 321 and N.C. 105 intersection (add turn lanes)	2015
U-5603	Watauga	U.S. 321	U.S. 321/U.S. 221/N.C. 105 intersection	N.C. 105 traffic operations improvements	2015
R-5872	Watauga	U.S. 321	Old Bristol Rd intersection	Upgrade U.S. 421/U.S. 321 and Poplar Grove Connector/Old Bristol Rd intersection	2019

Table A-4. U.S. 321 Corridor: CTP Projects and Recommendations

County	Route	Location	Description
Highway Projects			
Gaston	U.S. 321	From SC State Line to south of W 10th Ave	Upgrade access management
Gaston	U.S. 321	Proposed Gaston Pkwy (near Davis Heights Dr)	Proposed interchange
Gaston	U.S. 321	From I-85 to N.C. 275/279	Upgrade to controlled-access freeway
Gaston	U.S. 321	Tulip Dr/Bulb Ave	Proposed grade separation
Gaston	U.S. 321	Ratchford Dr (SR 1804)	Proposed interchange
Gaston	U.S. 321	Proposed Northwest Bypass (near Cloninger Rd)	Proposed interchange
Gaston	U.S. 321 Bus	Proposed Northwest Bypass (near Dusty Hill Rd)	Proposed grade separation
Lincoln	U.S. 321 Bus (Gastonia Hwy)	From Gaston County Line to N.C. 150/Aspen St	Needs Improvement (widen to 12' lanes, shoulders)
Lincoln	U.S. 321 Bus/N.C. 150	From U.S. 321 Bus (Gastonia Hwy) to N.C. 27	Widen from 2 lanes to 4 lanes
Lincoln	U.S. 321 Bus (N Generals Blvd)	From N.C. 27 to N Aspen St	Widen from 2 lanes to 4 lanes (divided)
Lincoln	U.S. 321 Bus (N Aspen St)	From N Generals Blvd to Bethel Church Rd	Widen from 3 lanes to 4 lanes
Lincoln	U.S. 321 Bus	From Bethel Church Rd to Springs East Rd	Widen from 2 lanes to 4 lanes (divided)
Lincoln	U.S. 321 Bus (Gastonia Hwy)	Proposed N.C. 150 Bypass (near Lithia Park Dr)	Proposed interchange
Lincoln	U.S. 321	Proposed N.C. 150 Bypass	Proposed interchange
Lincoln	U.S. 321	Bethel Church Rd	Proposed interchange
Catawba	U.S. 321	Rocky Ford Rd	Proposed interchange
Catawba	U.S. 321	N.C. 10	Interchange needs improvement
Catawba; Burke; Caldwell	U.S. 321	From 7th Ave SW in Hickory to U.S. 64/N.C. 18 in Lenoir	Expressway needs improvement
Catawba	U.S. 321	2nd Ave SW	Proposed interchange
Burke	U.S. 321	Railroad crossing south of Lake Hickory	Proposed grade separation
Caldwell	U.S. 321	Grace Chapel Rd	Proposed interchange
Caldwell	U.S. 321	Alex Lee Blvd	Proposed interchange
Caldwell	U.S. 321	Falls Ave	Interchange needs improvement
Caldwell	U.S. 321	Dudley Shoals Rd	Proposed interchange
Caldwell	U.S. 321 Alt	From Duke St to Dry Ponds Rd	Needs improvement (other major thoroughfare)
Caldwell	U.S. 321	From near Caroline Cir to Watauga County Line	Expressway needs improvement

Table A-4. U.S. 321 Corridor: CTP Projects and Recommendations

County	Route	Location	Description
Watauga	U.S. 321	From Caldwell County Line to U.S. 221	Upgrade to expressway, widen to multi-lanes
Watauga	U.S. 321/221	From U.S. 221 to Proposed U.S. 421 Bypass (near Fairway Dr)	Upgrade to expressway
Watauga	U.S. 321	From Proposed U.S. 421 Bypass to E King St	Convert to boulevard (remove center turn lane, provide median and bicycle accommodations)
Watauga	U.S. 321/421	From N.C. 105 Bypass to U.S. 421	Widen from 2 lanes to 4 lanes (divided, partially controlled access, shoulders for bicycles)
Watauga	U.S. 321	From U.S. 421 to Avery County Line	Upgrade to expressway with bicycle accommodations
Watauga	U.S. 321	Proposed U.S. 421 Bypass (2 locations - south and west of Boone)	Proposed interchange
Avery	U.S. 321	From Watauga County Line to Tennessee State Line	Widen to a multilane expressway with bicycle accommodations
Bicycle/Pedestrian Projects			
Gaston	U.S. 321 (S York St)	From W Franklin Blvd (U.S. 29/74) to W Main Ave	Bicycle facility improvements recommended
Gaston	U.S. 321 (N Chester St)	From New Way Dr to Caldwell St	Bicycle facility improvements recommended
Gaston	U.S. 321 Bus (S Lincoln St)	From Miles Rd to Cherry St	Bicycle facility improvements recommended
Gaston	U.S. 321 Bus (N Lincoln St)	From Cherry St to Lincoln County Line	Bicycle facility improvements recommended (County Bicycle Route 2)
Gaston	U.S. 321 (S York St)	From existing sidewalk at Nassau Place to W Ruby Ave (east side)	Needs sidewalk improvements
Gaston	U.S. 321 (N Chester St)	From north of W Norment Ave to Caldwell St (east side)	Needs sidewalk improvements
Gaston	U.S. 321 Bus (N Lincoln St)	From Frye St to Thompkins St (east side)	Needs sidewalk improvements
Gaston	U.S. 321 Bus (N Lincoln St)	From Thompkins St to North St (west side)	Needs sidewalk improvements
Gaston	U.S. 321	Various new crossings - Crowders Creek, power line ROW near Gilmer St, Catawba Creek, W 3rd Ave, creek near Norment Ave, creek south of New Way Dr, Long Creek, South Fork Catawba River	New multi-use path recommended
Gaston	U.S. 321	Various existing roadway crossings - W 3rd Ave, W Franklin Blvd, W Main Ave, Ratchford Rd (SR 1804), Lincoln St (U.S. 321 Bus), Cherry St	Bicycle facility improvements recommended
Gaston	U.S. 321 Bus	New crossing - South Fork Catawba River	New multi-use path recommended

Table A-4. U.S. 321 Corridor: CTP Projects and Recommendations

County	Route	Location	Description
Gaston	U.S. 321 Bus	Existing roadway crossing - Ratchford Rd/Thornburg Rd	Bicycle facility improvements recommended
Lincoln	U.S. 321 Bus (Gastonia Hwy)	From Gaston County Line to N.C. 150/Aspen St	Bicycle facility improvements recommended
Lincoln	U.S. 321 Bus/N.C. 150	From S Aspen St to N.C. 27	Bicycle facility improvements recommended
Lincoln	U.S. 321 Bus (N Generals Blvd)	From N.C. 27 to N Aspen St	Bicycle facility improvements recommended
Lincoln	U.S. 321 Bus (N Aspen St)	From N Generals Blvd to Bethel Church Rd	Bicycle facility improvements recommended
Lincoln	U.S. 321 Bus (Maiden Hwy)	From Bethel Church Rd to Catawba County Line	Bicycle facility improvements recommended
Lincoln	U.S. 321 Bus/N.C. 150	From S Aspen St to N.C. 27	Needs sidewalk improvements
Lincoln	U.S. 321 Bus (N Generals Blvd)	From N.C. 27 to N Aspen St	Needs sidewalk improvements
Lincoln	U.S. 321 Bus (N Aspen St)	From N Generals Blvd to Bethel Church Rd	Needs sidewalk improvements
Lincoln	U.S. 321	New crossing - creek near Country Club Rd	New multi-use path recommended
Lincoln	U.S. 321	Various existing roadway crossings - Country Club Rd, Lithia Inn Rd, N.C. 27/150, Wilma Sigmon Rd, Bethel Church Rd, Maiden Hwy (U.S. 321 Bus)	Bicycle facility improvements recommended
Lincoln	U.S. 321 Bus	New crossing - creek north of Arbor Run Dr	New multi-use path recommended
Lincoln	U.S. 321 Bus	Various existing roadway crossings - Country Club Rd, N.C. 27, Wilma Sigmon Rd, Bethel Church Rd/Clarks Creek Rd	Bicycle facility improvements recommended
Catawba	U.S. 321 Bus (E Main St)	From U.S. 321 Bus (Island Ford Rd) to U.S. 321 Bus (North Carolina Ave)	Bicycle facility improvements recommended
Catawba	U.S. 321	Various existing roadway crossings - S Center St (near Henry Fork), 1st Ave SW	Bicycle facility improvements recommended
Catawba	U.S. 321 Bus	Various existing roadway crossings - W 15th St, S Center St	Bicycle facility improvements recommended
Caldwell	U.S. 321 Alt	From Duke St to Norwood St SW	Bicycle facility improvements recommended
Caldwell	U.S. 321	Various existing roadway crossings - Falls Ave, Harper Ave (U.S. 64), Greenhaven Dr NW/Nuway Cir	Bicycle facility improvements recommended
Watauga	U.S. 321	From Caldwell County Line to U.S. 221	Bicycle facility improvements recommended

Table A-4. U.S. 321 Corridor: CTP Projects and Recommendations

County	Route	Location	Description
Watauga	U.S. 321	From Chetola Lake/U.S. 221 (Blowing Rock) to Middle Fork South Fork New River/Meadowview Rd (Boone)	New multi-use path recommended (Middle Fork Greenway)
Watauga	U.S. 321	From Deerfield Rd to U.S. 421	Bicycle facility improvements recommended
Watauga	U.S. 321	From U.S. 421 to Avery County Line	Bicycle facility improvements recommended
Watauga	U.S. 321 Bus	From U.S. 321 to U.S. 221	Bicycle facility improvements recommended
Watauga	U.S. 321 Bus/U.S. 221	From U.S. 321 Bus to U.S. 321	Bicycle facility improvements recommended
Watauga	U.S. 321	Various existing roadway crossings - U.S. 221/N.C. 105, Water St	Bicycle facility improvements recommended/multi-use path connections
Watauga	U.S. 321	From Goforth Rd to U.S. 221	New sidewalks recommended
Watauga	U.S. 321	From Water St to Old Bristol Rd	Needs sidewalk improvements
Watauga	U.S. 321/421	From Old Bristol Rd to N.C. 105 Bypass	New sidewalks recommended
Watauga	U.S. 321 Bus/U.S. 221	From U.S. 321 Bus to Chetola Lake Dr	Needs sidewalk improvements
Avery	U.S. 321	From Watauga County Line to Tennessee State Line	Bicycle facility improvements recommended
Transit Projects			
Watauga	U.S. 321	From Blowing Rock (Caldwell County Line) to existing bus network in Boone	New bus route
Watauga	U.S. 321	From Blowing Rock (Caldwell County Line) to U.S. 221/N.C. 105	Operational Strategies need improvement
Watauga	U.S. 321	From Meadowview Dr to N.C. 105 Bypass	Existing bus route(s) needs improvement
Watauga	U.S. 321	U.S. 221 (Blowing Rock)	New park and ride lot
Watauga	U.S. 321/421	N.C. 105 Bypass	New park and ride lot
Watauga	U.S. 321	Near U.S. 321/U.S. 421 split (Vilas)	New park and ride lot

Table A-5. U.S. 321 Corridor: MTP Projects and Recommendations

TIP ID	County (MPO)	Route	Project Name	Location	Description	Year
Highway Projects						
I-5000	Gaston (GCLMPO)	U.S. 321	I-85 Interchange Upgrade	U.S. 321/I-85	Modify interchange	2025
	Lincoln (GCLMPO)	U.S. 321 Bus	Intersection Improvements	N.C. 27 (E Main St)/Generals Blvd (U.S. 321 Bus)	Add dual left turn lanes in all directions	2025
	Gaston (GCLMPO)	U.S. 321	York Rd	From Beam St to Carolina Ave	Add center median with turning lane and high-visibility pedestrian accommodations as needed. Address access management.	2035
U-5970	Gaston (GCLMPO)	U.S. 321	U.S. 321 Widening	From 19th Ave to Clyde St	Add center median with turning lane and high-visibility pedestrian accommodations as needed. Address access management.	2045
R-2237	Caldwell (GHMPO)	U.S. 321	U.S. 321 Widening	From Blackberry Rd to Watauga County Line	Widen U.S. 321 to multi-lanes	2025
U-4700A	Burke, Caldwell, Catawba (GHMPO)	U.S. 321	U.S. 321 Widening	From U.S. 70 in Hickory to Southwest Blvd (SR 1933) in Lenoir	Widen from 4 lanes to 6 lanes, divided facility with superstreet treatments at signalized intersections.	2025
U-4700CA	Caldwell (GHMPO)	U.S. 321	Intersection improvements	Mount Herman Rd (SR 1160)	Convert to superstreet design	2025
U-4700CB	Caldwell (GHMPO)	U.S. 321	Intersection improvements	Pine Mountain Rd (SR 1809/1952)	Convert to superstreet design	2025
U-4700CC	Caldwell (GHMPO)	U.S. 321	Intersection improvements	Mission Rd (SR 1108)	Convert to superstreet design	2025
	Caldwell (GHMPO)	U.S. 321	Interchange improvements	Dudley Shoals Rd (SR 1002)	Add southbound ramp onto U.S. 321	2025
U-5776	Caldwell (GHMPO)	U.S. 321 Alt	Intersection improvements	Duke St (SR 1106)	Realign intersection	2025
U-6034	Caldwell (GHMPO)	U.S. 321 Alt	Roadway improvements	From Pinewood Rd (SR 1109) to Duke St (SR 1106)	Upgrade roadway	2025
	Catawba (GHMPO)	U.S. 321 Bus	Intersection improvements	N Main Ave	Realign N Main Ave to connect with S Main Ave	2025

Table A-5. U.S. 321 Corridor: MTP Projects and Recommendations

TIP ID	County (MPO)	Route	Project Name	Location	Description	Year
U-4700B	Caldwell (GHMPO)	U.S. 321	U.S. 321 Widening	From U.S. 321 Alt to Mission Rd (SR 1108)	Widen from 4 lanes to 6 lanes, divided facility with superstreet treatments at signalized intersections.	2035
U-4700C	Caldwell (GHMPO)	U.S. 321	U.S. 321 Widening	From Mission Rd to Southwest Blvd (SR 1933)	Widen from 4 lanes to 6 lanes, divided facility with superstreet treatments at signalized intersections.	2035
Bicycle/Pedestrian Projects						
C-5508	Gaston (GCLMPO)	U.S. 321 Bus	Sidewalk	From Dallas Cherryville Hwy to Park Rd		2025
	Lincoln (GCLMPO)	U.S. 321 Bus	Pedestrian intersection improvements	Intersection with Main St	Both sides	2025
	Catawba (GHMPO)	U.S. 321 Bus	Proposed sidewalks	From W 27th St to Conover Blvd (U.S. 70)		
	Catawba (GHMPO)	U.S. 321 Bus/U.S. 70	Proposed sidewalks	From Northwest Blvd to Fairgrove Church Rd		
	Catawba (GHMPO)	U.S. 321 Bus/U.S. 70	Proposed sidewalks	From 21st St Dr SE to U.S. 321		
	Caldwell (GHMPO)	U.S. 321 Alt	Proposed sidewalks	From approximately Mt Herman Rd to approximately Swanson Rd		
	Caldwell (GHMPO)	U.S. 321 Alt	Proposed bicycle improvements	From Duke St in Granite Falls to U.S. 321 Alt/Norwood St split in Lenoir	Combination of 4-ft shoulders, sharrows, and bicycle lines	

Appendix B. Corridor D Recommendation Maps

Tennessee

North Carolina

Corridor Starts at State Line

321

Watauga County

Avery County

NC STRATEGIC TRANSPORTATION CORRIDORS (STC)

DECEMBER 2019

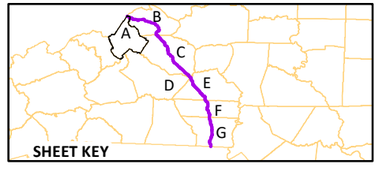
Source: NCOneMap, NCDOT GIS, ESRI

Legend

- Freeway Existing
- Freeway Needs Improvement
- Freeway Recommended
- Expressway Existing
- Expressway Needs Improvement
- Boulevard Existing
- Boulevard Needs Improvement
- Other Major Thoroughfare Existing
- Interstate
- US Route
- NC Highway
- Rail
- Counties
- Municipal Boundaries

0 0.125 0.25 0.5 Miles

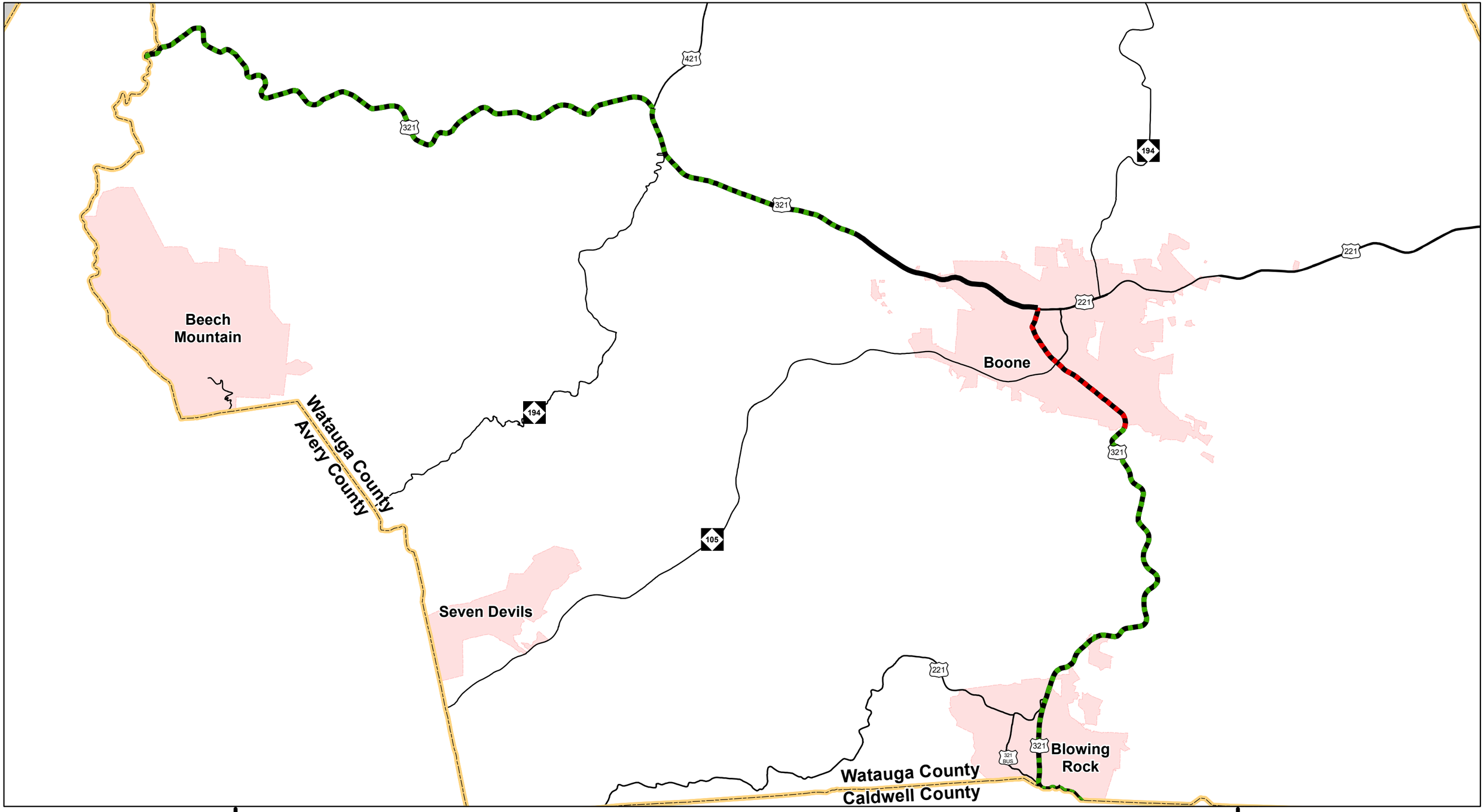
N



EXISTING MTP / CTP RECOMMENDATION MAP

CORRIDOR D (US 321)

FIGURE 9



NC STRATEGIC TRANSPORTATION CORRIDORS (STC)

DECEMBER 2019

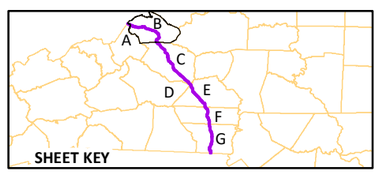
Source: NCOneMap, NCDOT GIS, ESRI

Legend

- Freeway Existing
- Freeway Needs Improvement
- Freeway Recommended
- Expressway Existing
- Expressway Needs Improvement
- Boulevard Existing
- Boulevard Needs Improvement
- Other Major Thoroughfare Existing
- Interstate
- US Route
- NC Highway
- Rail
- Counties
- Municipal Boundaries

0 0.5 1 2 Miles

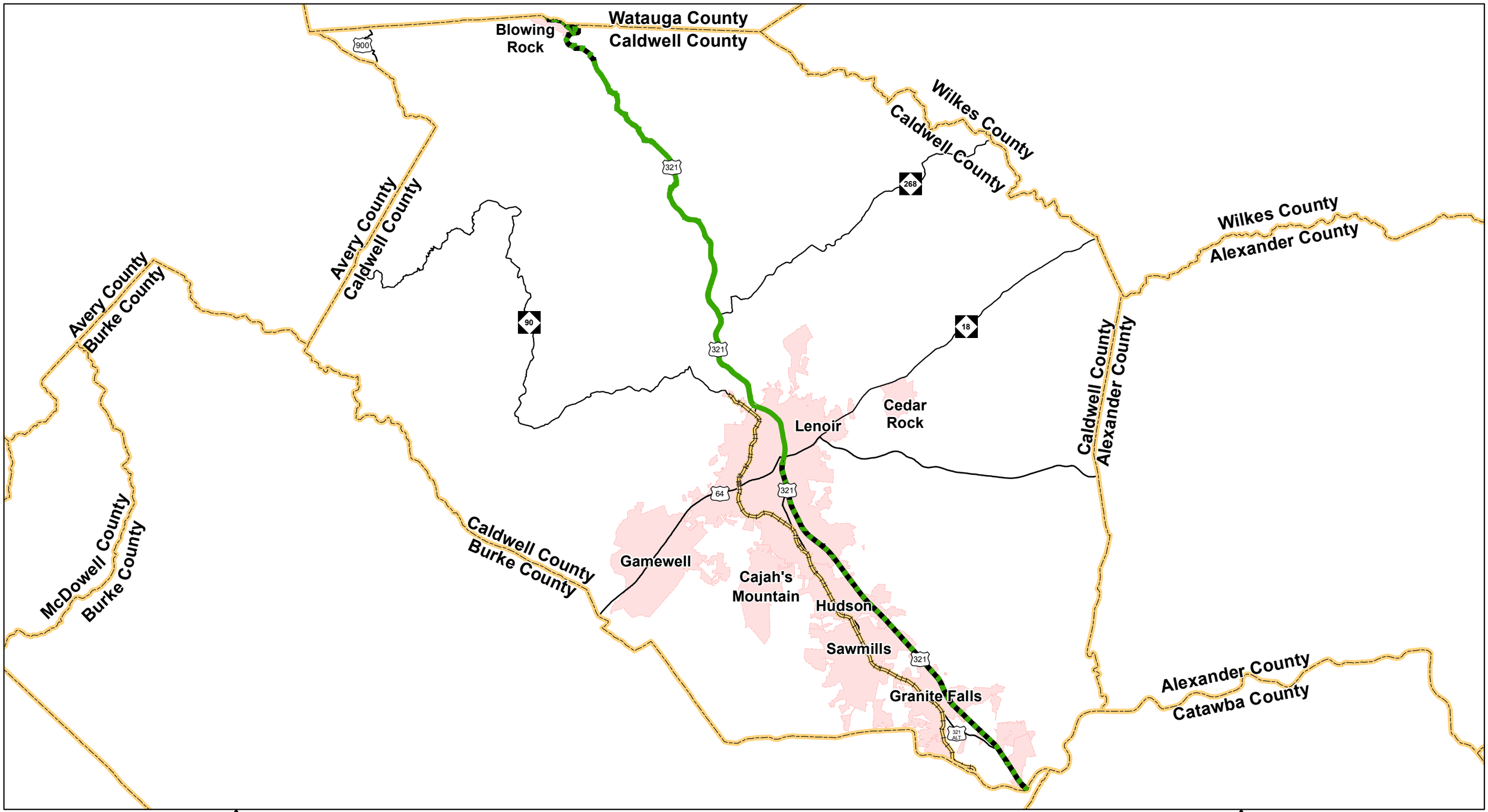
N



EXISTING MTP / CTP RECOMMENDATION MAP

CORRIDOR D (US 321)

FIGURE 10



NC STRATEGIC TRANSPORTATION CORRIDORS (STC)

DECEMBER 2019

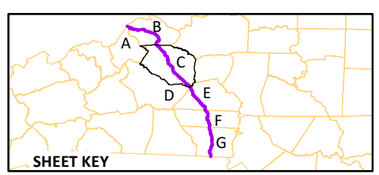
Source: NCOneMap, NCDOT GIS, ESRI

Legend

- Freeway Existing
- Freeway Needs Improvement
- Freeway Recommended
- Expressway Existing
- Expressway Needs Improvement
- Boulevard Existing
- Boulevard Needs Improvement
- Other Major Thoroughfare Existing
- Interstate
- US Route
- NC Highway
- Rail
- Counties
- Municipal Boundaries

0 1.5 3 6 Miles

N



EXISTING MTP / CTP RECOMMENDATION MAP

CORRIDOR D (US 321)

FIGURE 11

NC STRATEGIC TRANSPORTATION CORRIDORS (STC)

DECEMBER 2019

Source: NCOneMap, NCDOT GIS, ESRI

Legend

- Freeway Existing
- Freeway Needs Improvement
- Freeway Recommended
- Expressway Existing
- Expressway Needs Improvement
- Boulevard Existing
- Boulevard Needs Improvement
- Other Major Thoroughfare Existing
- Interstate
- US Route
- NC Highway
- Rail
- Counties
- Municipal Boundaries

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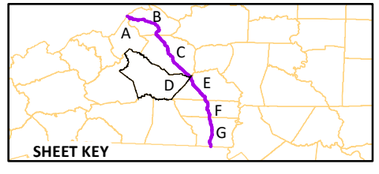
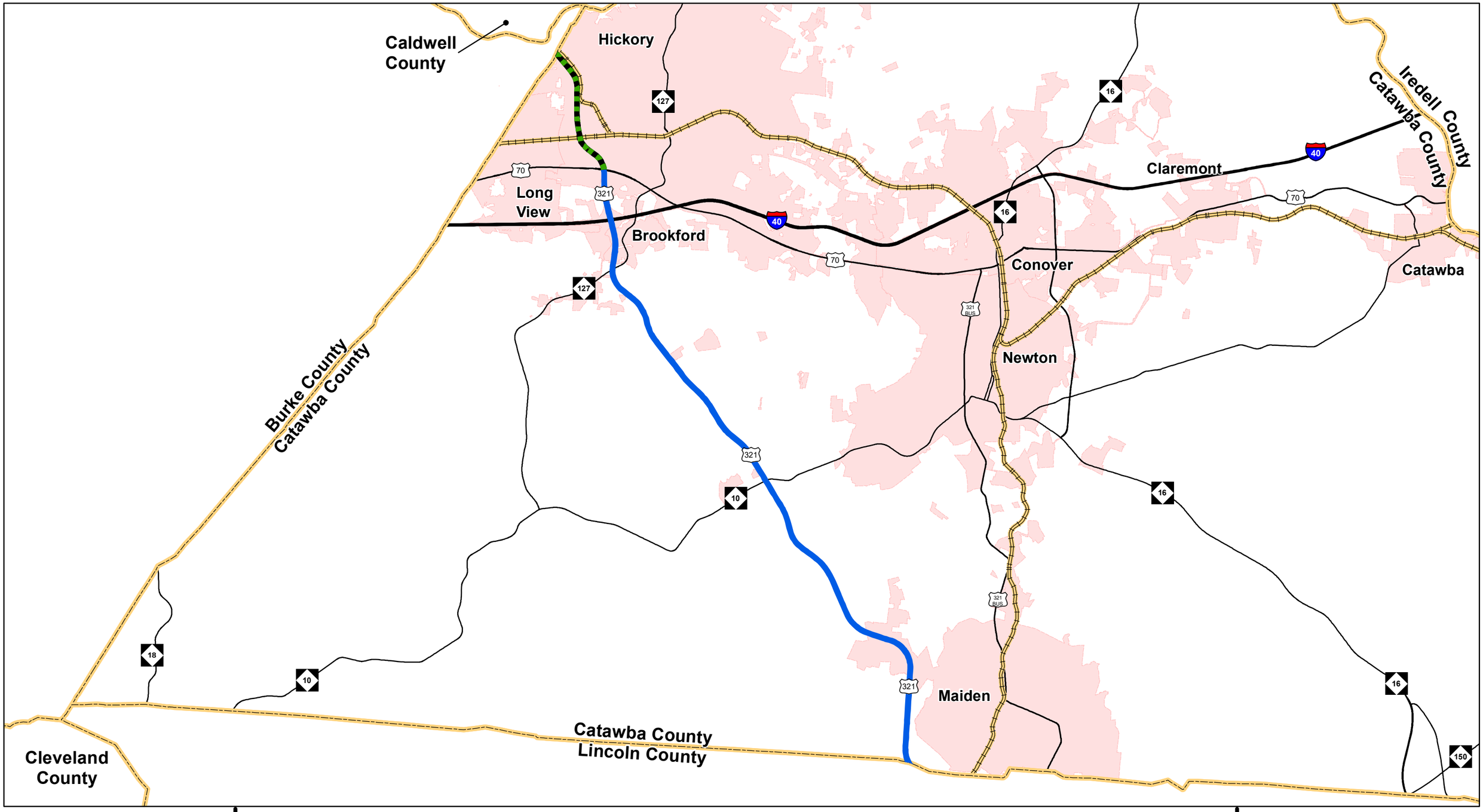
N



EXISTING MTP / CTP RECOMMENDATION MAP

CORRIDOR D (US 321)

FIGURE 12



NC STRATEGIC TRANSPORTATION CORRIDORS (STC)

DECEMBER 2019

Source: NCOneMap, NCDOT GIS, ESRI

Legend

- Freeway Existing
- Freeway Needs Improvement
- Freeway Recommended
- Expressway Existing
- Expressway Needs Improvement
- Boulevard Existing
- Boulevard Needs Improvement
- Other Major Thoroughfare Existing
- Interstate
- US Route
- NC Highway
- Rail
- Counties
- Municipal Boundaries

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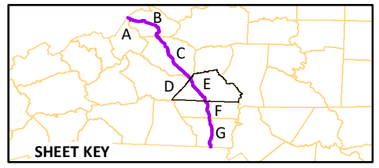


EXISTING MTP / CTP RECOMMENDATION MAP

CORRIDOR D (US 321)

FIGURE 13

Catawba County
Lincoln County

Lincolnton

321
321 BUS
16
150
27
73
182

Lincoln County
Gaston County

NC STRATEGIC TRANSPORTATION CORRIDORS (STC)

DECEMBER 2019

Source: NCOneMap, NCDOT GIS, ESRI

Legend

- Freeway Existing
- Freeway Needs Improvement
- Freeway Recommended
- Expressway Existing
- Expressway Needs Improvement
- Boulevard Existing
- Boulevard Needs Improvement
- Other Major Thoroughfare Existing
- Interstate
- US Route
- NC Highway
- Rail
- Counties
- Municipal Boundaries

0 0.75 1.5 3 Miles

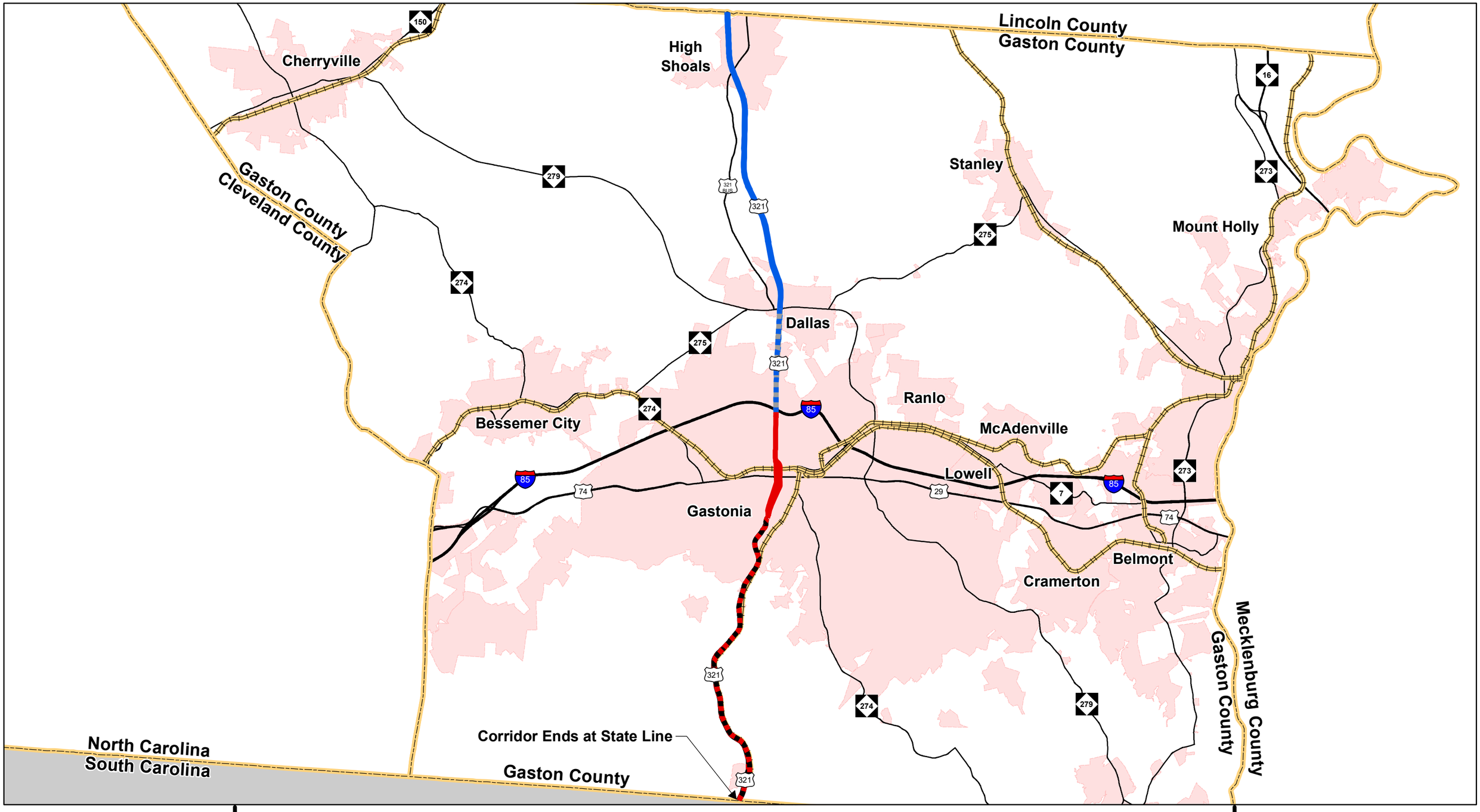
N

SHEET KEY: A B C D E F G

EXISTING MTP / CTP RECOMMENDATION MAP

CORRIDOR D (US 321)

FIGURE 14



NC STRATEGIC TRANSPORTATION CORRIDORS (STC)

DECEMBER 2019

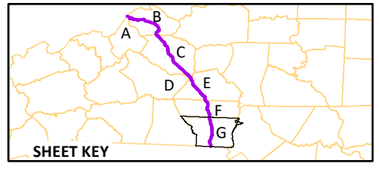
Source: NCOneMap, NCDOT GIS, ESRI

Legend

- Freeway Existing
- Freeway Needs Improvement
- Freeway Recommended
- Expressway Existing
- Expressway Needs Improvement
- Boulevard Existing
- Boulevard Needs Improvement
- Other Major Thoroughfare Existing
- Interstate
- US Route
- NC Highway
- Rail
- Counties
- Municipal Boundaries

0 1 2 4 Miles

N



EXISTING MTP / CTP RECOMMENDATION MAP

CORRIDOR D (US 321)

FIGURE 15

Appendix C. Transportation Facilities Inventory Terminology

Roadways are broken down into Federal functional classification categories to stratify the range of mobility and access functions that they can serve. These functional classes are listed below in **Table C-1**.

Table C-1. Highway Functional Class Definitions

Classification	Description	Access	Mobility
Interstate	Officially designated by the Secretary of Transportation, includes all routes that comprise the Dwight D. Eisenhower National System of Interstate and Defense Highways. Divided highways with access provided at on- and off-ramp locations. Designed and constructed with mobility and long-distance travel in mind, linking the major urban areas of the United States.	Low	High
Other Freeway (Expressway)	Very similar to Interstates. Directional travel lanes usually separated by a physical barrier, access and egress points are limited to on- and off-ramp locations or a very limited number of at-grade intersections. Designed and constructed to maximize mobility, abutting land uses not directly served.	Low	High
Other Principal Arterial	Provide a high degree of mobility while also providing access to adjacent land uses including driveways and at-grade intersections with other roadways. Serve major centers of metropolitan areas as well as major rural corridors.	Medium	High
Minor Arterial	Provide service for trips of moderate length, serve geographic areas smaller than higher Arterial classifications and offer connectivity to the higher arterial system. Provide intra-community continuity and may carry local bus routes. Provide more land access than Principal Arterials.	Medium	Medium
Major Collector	Gather traffic from Local Road network to funnel into Arterial network. Generally, longer in length, less land access, higher speeds, higher volumes, greater spacing, and more travel lanes than Minor Collectors.	Medium	Medium
Minor Collector	Gather traffic from Local Road network to funnel into Arterial network. Generally shorter in length, more land access, lower speeds, lower volumes, less spacing, and less travel lanes than Major Collectors.	Medium	Medium
Local Road	Account for the largest percentage of all roadways in terms of mileage. Not intended for long distance travel and often designed to discourage traffic, provide direct access to abutting land. Generally, do not carry bus routes. All roadways not classified as Arterials or Collectors are classified as Local Roads by default.	High	Low

Information taken from FHWA Highway Classification Concepts, Criteria, and Procedures
https://www.fhwa.dot.gov/planning/processes/statewide/related/highway_functional_classifications/section03.cfm

Roadways are categorized into different levels of control of access describing the amount of connectivity provided to adjacent land uses and other roadways. These levels are listed below in **Table C-2** in order of mobility function.

Table C-2. Control of Access Definitions

Classification	Description
Full Control	Connectivity provided only via ramps at interchanges. All cross-streets are grade separated and no driveway connections are allowed. A control of access fence is placed along the entire length of the facility and at a minimum of 1000 feet beyond the ramp intersections on the minor facility at interchanges if possible.
Limited Control	Connectivity provided only via ramps at interchanges for major crossings and at-grade intersections for minor crossings and service roads. No driveway connections allowed. A control of access fence is placed along the entire length of the facility, except at intersections, and at a minimum of 1000 feet beyond the ramp intersections on the minor facility at interchanges if possible.
Partial Control	Connectivity provided via ramps at interchanges, at-grade intersections, and driveways. Private driveway connections are generally at a maximum of one per parcel. The use of shared or consolidated connections is highly encouraged, and connections may be restricted or prohibited if alternate access is available through adjacent public facilities. A control of access fence is placed along the entire length of the facility, except at intersections and driveways, and at a minimum of 1000 feet beyond the ramp terminals on the minor facility at interchanges if possible.
No Control	Connectivity provided via ramps at interchanges, at-grade intersections, and driveways. No physical restrictions (i.e., a control of access fence) exist. Private driveway connections are generally at a maximum of one per parcel. Additional connections may be considered if they are justified and if such connections do not negatively impact traffic operations and public safety.

Information taken from NCDOT Facility Type & Control of Access Definitions
https://connect.ncdot.gov/projects/planning/TPB%20Documents/NCDOT%20Facility%20Types%20-%20Control%20of%20Access%20Definitions.pdf

A bridge is considered deficient if it is either Structurally Deficient or Functionally Obsolete. To be classified as Structurally Deficient or Functionally Obsolete, a bridge must be at least 10 years old and must be a highway bridge. A bridge cannot be classified as both categories – Structurally Deficient trumps Functionally Obsolete. These concepts are described below in **Table C-3**.

Table C-3. Structurally Deficient & Functionally Obsolete Definitions

Classification	Description	Required Condition (one or more)	Required Rating
Structurally Deficient	Bridge is in relatively poor condition or has insufficient load-carrying capacity due to original design or deterioration.	Deck Condition	4 or less
		Superstructure Condition	4 or less
		Substructure Condition	4 or less
		Culvert Condition	4 or less
		Structural Evaluation	2 or less
		Waterway Adequacy	2 or less
Functionally Obsolete	Bridge is narrow, has inadequate under-clearances, has insufficient load-carrying capacity, is poorly aligned with the roadway, and can no longer adequately service today's traffic.	Structural Evaluation	3
		Deck Geometry	3 or less
		Under-clearance, vertical & horizontal	3 or less
		Waterway Adequacy	3
		Approach Roadway Alignment	3 or less

Information taken from NCDOT Structurally Deficient and Functionally Obsolete Definitions
https://connect.ncdot.gov/resources/Environmental/PDEA%20Consultants/Structural%20Deficient%20and%20Functionally%20Obsolete%20Definitions.doc

Appendix D. Corridor D Bridges Inventory

Table D-1. U.S. 321 Bridges Inventory

County	Bridge ID	Feature Below	Feature Above	Structurally Deficient	Functionally Obsolete
Gaston	350032	Crowders Creek	U.S. 321 NB	No	Yes
Gaston	350033	Crowders Creek	U.S. 321 SB	No	No
Gaston	350068	Long Creek	U.S. 321 NB	No	No
Gaston	350070	Long Creek	U.S. 321 SB	No	No
Gaston	350120	U.S. 321	I-85	No	No
Gaston	350336	U.S. 321	SR 1336	No	No
Gaston	350337	U.S. 321	SR 1806	No	No
Gaston	350338	U.S. 321	U.S. 321 Bus, N.C. 275/279	No	No
Gaston	350339	SR 1848	U.S. 321 SB	No	No
Gaston	350340	SR 1848	U.S. 321 NB	No	No
Gaston	350341	U.S. 321	SR 1804	No	No
Gaston	350344	U.S. 321	SR 1607	No	No
Gaston	350345	U.S. 321	U.S. 321 Bus	No	No
Gaston	350347	U.S. 321	SR 1607	No	No
Gaston	350348	South Fork Catawba River	U.S. 321 NB	No	No
Gaston	350349	South Fork Catawba River	U.S. 321 SB	No	No
Gaston	350351	Southern Railway	U.S. 321 NB	No	Yes
Gaston	350381	Southern Railway	U.S. 321 SB	No	Yes
Lincoln	540264	U.S. 321	SR 1282	No	No
Lincoln	540265	U.S. 321	SR 1338	No	No
Lincoln	540266	U.S. 321	SR 1267	No	No
Lincoln	540267	U.S. 321	U.S. 321 Bus	No	No
Lincoln	540268	U.S. 321	SR 1294	No	No
Lincoln	540269	U.S. 321 Bus, N.C.155	U.S. 321 NB	No	No
Lincoln	540270	U.S. 321 Bus, N.C.155	U.S. 321 SB	No	No
Lincoln	540271	SR 1262	U.S. 321 NB	No	No
Lincoln	540272	SR 1262	U.S. 321 SB	No	No
Lincoln	540273	U.S. 321	SR 1274	No	No
Lincoln	540277	U.S. 321	N.C. 27 & N.C. 150	No	No
Catawba	170003	Henry Fork River	U.S. 321 NB	No	No
Catawba	170005	Henry Fork River	U.S. 321 SB	No	No
Catawba	170035	U.S. 321	U.S. 70, U.S. 321 Bus	No	No

Table D-1. U.S. 321 Bridges Inventory

County	Bridge ID	Feature Below	Feature Above	Structurally Deficient	Functionally Obsolete
Catawba	170066	U.S. 321	SR 2959	No	No
Catawba	170077	U.S. 321	I-40 EB	No	No
Catawba	170078	U.S. 321	I-40 WB	No	No
Catawba	170104	U.S. 321	I-40 Collector EB	No	No
Catawba	170106	U.S. 321	I-40 Collector WB	No	No
Catawba	170110	U.S. 321	7th Ave	No	Yes
Catawba	170133	U.S. 321	SR 2231,14th St	No	Yes
Catawba	170142	U.S. 321	SR 1692	No	Yes
Catawba	170315	U.S. 321	SR 1005	No	No
Catawba	170316	U.S. 321	SR 1143	No	No
Catawba	170317	Clarks Creek	U.S. 321 SB	No	No
Catawba	170318	Clarks Creek	U.S. 321 NB	No	No
Catawba	170319	U.S. 321	SR 2019	No	No
Catawba	170320	U.S. 321	SR 1144	No	No
Catawba	170321	U.S. 321	N.C. 127	No	No
Catawba	170322	N.C. 10	U.S. 321 SB	No	No
Catawba	170323	N.C. 10	U.S. 321 NB	No	No
Catawba	170324	Henry Fork River	U.S. 321 SB	No	No
Catawba	170325	Henry Fork River	U.S. 321 NB	No	No
Caldwell	130012	U.S. 321	SR 1107	No	No
Caldwell	130013	SR 1002	U.S. 321 NB	No	No
Caldwell	130014	SR 1002	U.S. 321 SB	No	Yes
Caldwell	130032	Gunpowder Creek	U.S. 321 NB	No	No
Caldwell	130033	Gunpowder Creek	U.S. 321 SB	No	Yes
Caldwell	130051	U.S. 321	SR 1178	No	No
Caldwell	130366	Lake Hickory	U.S. 321 NB	Yes	No
Caldwell	130367	Lake Hickory	U.S. 321 SB	Yes	Yes
Caldwell	130369	SR 1933	U.S. 321 NB	No	No
Caldwell	130370	SR 1933	U.S. 321 SB	No	No
Caldwell	130049	U.S. 321	Countryside Dr SW	No	No
Watauga	940029	Cove Creek	U.S. 321	No	No
Watauga	940061	Watauga River	U.S. 321	No	No
Watauga	940067	Winkler Creek	U.S. 221, U.S. 321	No	Yes
Watauga	940278	Middle Fork S. Fork New River	SR 1540	Yes	Yes
Watauga	940007	U.S. 221, U.S. 321	Blue Ridge Pkwy	No	Yes

Appendix E. NCDOT Level of Service D Standards for Systems Level Planning

Level of Service D Standards for Systems Level Planning

Updated 10/14/2011

Level of Service A

Driver Comfort: High

Maximum Density:

12 passenger cars per mile per lane

Level of Service B

Driver Comfort: High

Maximum Density:

20 passenger cars per mile per lane

Level of Service C

Driver Comfort: Some Tension

Maximum Density:

30 passenger cars per mile per lane

Level of Service D

Driver Comfort: Poor

Maximum Density:

42 passenger cars per mile per lane

Level of Service E

Driver Comfort: Extremely Poor

Maximum Density:

67 passenger cars per mile per lane

Level of Service F

Driver Comfort: The lowest

Maximum Density:

More than 67 passenger cars per mile per lane

General Disclaimer

The Level of Service D Standards for Systems Level Planning was derived from the 2005 North Carolina Level of Service (NCLOS) Version 2.1 Program developed by the Institute for Transportation Research and Education (ITRE) at North Carolina State University. The NCLOS Program is based on the 2000 Highway Capacity Manual, published by the Transportation Research Board (TRB).

These standards are intended for **systems level planning only**. Many assumptions are made and documented in the development of these standards.

CTP FACILITY TYPES

FREEWAYS represent a multi-lane divided facility with complete access control (interchanges only and no traffic signals).

EXPRESSWAYS represent a multi-lane divided facility with a high level of access control (interchanges, limited at-grade intersections, right-in/right out access, and no traffic signals).

BOULEVARDS represent a typically divided facility with moderate access control (at-grade intersections, right-in/right out access, and traffic signals at major intersections).

OTHER MAJOR THOROUGHFARES represent undivided facilities with four or more lanes (US and NC routes may have less than 4 lanes). These facilities typically have low access control (at-grade intersections, access to development, and traffic signals at major and some minor intersections).

MINOR THOROUGHFARES represent a 2-to-3 lane undivided facility that is not signed as a US or NC route. These facilities typically have low access control (at-grade intersections, access to development, and traffic signals at major and minor intersections).

NCLOS (HCM) FACILITY TYPES

FREEWAYS (Freeways) represent a multi-lane divided facility with complete access control (interchanges only and no traffic signals).

EXPRESSWAYS (Multi-lane Highways) represent a multi-lane divided facility with a high level of access control (interchanges, limited at-grade intersections, right-in/right out access, and no traffic signals).

BOULEVARDS (Arterials, 25-55 MPH) represent a typically divided facility with moderate access control (at-grade intersections, right-in/right out access, and traffic signals at major intersections).

OTHER MAJOR THOROUGHFARES (Arterials, 25-55 MPH) represent undivided facilities with four or more lanes (US and NC routes may have less than 4 lanes). These facilities typically have low access control (at-grade intersections, access to development, and traffic signals at major and some minor intersections). These facilities are typically within an urban or suburban area (e.g. within a municipality or ETJ).

MINOR THOROUGHFARES (Arterials 25-55 MPH) represent a 2-to-3 lane undivided facility that is not signed as a US or NC route. These facilities typically have low access control (at-grade intersections, access to development, and traffic signals at major and minor intersections). These facilities are typically within an urban or suburban area (e.g. within a municipality or ETJ).

RURAL 2-LANE HIGHWAY (Two-Lane Highway, 55 MPH ONLY) represents a 2-lane undivided facility outside of a municipality or ETJ. These facilities have a 55 MPH posted speed limit, have low access control with numerous driveways and no traffic signals. These facilities are classified in a CTP as **other major thoroughfares** if they are a **US or NC route** or **minor thoroughfares** if they are a **secondary or local** route.

AREA TYPE

RURAL represents an area outside a municipality or Extraterritorial Jurisdiction (ETJ).

SUBURBAN represents an area within a municipality or ETJ that is not within a Central Business District (CBD) or areas immediately surrounding a CBD.

URBAN represents an area that is within a CBD or areas immediately surrounding a CBD.

LEVEL OF SERVICE D VALUES

MINIMUM CAPACITY VALUES represents conditions/inputs that result in a worst-case Level of Service D for a given facility. This lower value represents worst-case conditions in available data for a given region (Higher K/D Factors, Lower Peak Hour Factor, poor road conditions, etc.).

STANDARD CAPACITY VALUES represents an average Level of Service D for a given facility. This default value is an average of available data for a given region.

MAXIMUM CAPACITY VALUES represents conditions/inputs that result in a best-case Level of Service D for a given facility. This higher value represents best-case conditions in available data for a given region (Lower K/D Factors, Higher Peak Hour Factor, etc.).

These assumptions may not pertain to all systems level planning work; therefore, separate analysis may need to be conducted on a case-by-case basis.

These standards are **not** intended for project specific or corridor analysis. Separate analysis would be required for these types of projects.

Volumes shown represent the point at which traffic transitions from LOS D to LOS E.

Level of Service D Standards for Freeways *

COASTAL	2 Lanes Per Direction			3 Lanes Per Direction			4 Lanes Per Direction		
	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural
0-5% Trucks	**67400**	**66900**	**67900**	**102000**	**101300**	**101800**	**137300**	**136200**	**135700**
6-10% Trucks	**65700**	**65400**	**66200**	**99600**	**98900**	**99400**	**134000**	**133000**	**132500**
11-15% Trucks	**64200**	**63800**	**64700**	**97300**	**96600**	**97100**	**130900**	**129900**	**129400**
16-20% Trucks	**62800**	**62400**	**63200**	**95100**	**94400**	**94900**	**127900**	**126900**	**126500**
21-25% Trucks	**61400**	**61000**	**61800**	**9300**	**92300**	**92700**	**125100**	**124100**	**123700**
26-30% Trucks	**60000**	**59700**	**60500**	**90900**	**90300**	**90700**	**122400**	**121400**	**121000**
31-35% Trucks	**58800**	**58400**	**59200**	**89000**	**88400**	**88800**	**119800**	**118800**	**118400**

PIEDMONT	2 Lanes Per Direction			3 Lanes Per Direction			4 Lanes Per Direction		
	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural
0-5% Trucks	**61700**	**61400**	**62200**	**93500**	**92900**	**93300**	**125800**	**124900**	**124400**
6-10% Trucks	**60300**	**59900**	**60700**	**91300**	**90700**	**91100**	**122800**	**121900**	**121500**
11-15% Trucks	**58900**	**58500**	**59300**	**89200**	**88600**	**89000**	**120000**	**119100**	**118600**
16-20% Trucks	**57500**	**57200**	**58000**	**87100**	**86500**	**87000**	**117300**	**116400**	**115900**
21-25% Trucks	**56300**	**55900**	**56700**	**85200**	**84600**	**85000**	**114700**	**113800**	**113400**
26-30% Trucks	**55000**	**54700**	**55400**	**83400**	**82800**	**83200**	**112200**	**111300**	**110900**
31-35% Trucks	**53900**	**53500**	**54300**	**81600**	**81000**	**81400**	**109800**	**108900**	**108500**

MOUNTAIN (Level Terrain)	2 Lanes Per Direction			3 Lanes Per Direction			4 Lanes Per Direction		
	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural
0-5% Trucks	**56100**	**61400**	**62200**	**85000**	**92900**	**93300**	**114400**	**124900**	**124400**
6-10% Trucks	**54800**	**59900**	**60700**	**83000**	**90700**	**91100**	**111700**	**121900**	**121500**
11-15% Trucks	**53500**	**58500**	**59300**	**81100**	**88600**	**89000**	**109100**	**119100**	**118600**
16-20% Trucks	**52300**	**57200**	**58000**	**79200**	**86500**	**87000**	**106600**	**116400**	**115900**
21-25% Trucks	**51100**	**55900**	**56700**	**77500**	**84600**	**85000**	**104200**	**113800**	**113400**
26-30% Trucks	**50000**	**54700**	**55400**	**75800**	**82800**	**83200**	**102000**	**111300**	**110900**
31-35% Trucks	**49000**	**53500**	**54300**	**74200**	**81000**	**81400**	**99800**	**108900**	**108500**

MOUNTAIN (Rolling Terrian)	2 Lanes Per Direction			3 Lanes Per Direction			4 Lanes Per Direction		
	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural
0-5% Trucks	**53500**	**58500**	**59300**	**81100**	**88600**	**89000**	**109100**	**119100**	**118600**
6-10% Trucks	**50000**	**54700**	**55400**	**75800**	**82800**	**83200**	**102000**	**111300**	**110900**
11-15% Trucks	**47000**	**51400**	**52100**	**71100**	**77700**	**78100**	**95700**	**104500**	**104100**
16-20% Trucks	**44300**	**48400**	**49000**	**67000**	**73200**	**73600**	**90200**	**98500**	**98100**
21-25% Trucks	**41800**	**45700**	**46400**	**63400**	**69200**	**69600**	**85300**	**93100**	**92700**
26-30% Trucks	**39700**	**43400**	**44000**	**60100**	**65700**	**66000**	**80900**	**88300**	**87900**
31-35% Trucks	**37700**	**41200**	**41800**	**57100**	**62400**	**62700**	**76900**	**83900**	**83600**

Uses "Freeways" Facility Type in NCLOS
*** Assumes Regional K and D Factor Averages**

See Appendix A1 for HCM 2000 Freeway Equations
Use Appendix A2: Coastal Freeway Inputs for adjustments
Use Appendix A3: Piedmont Freeway Inputs for adjustments
Use Appendix A4: Mountain (Level) Freeway Inputs for adjustments
Use Appendix A5: Mountain (Rolling) Freeway Inputs for adjustments

NOTE: Truck percentage occurs within the peak hour, not a daily truck percentage

Level of Service D Standards for Expressways *

COASTAL	2 Lanes Per Direction			3 Lanes Per Direction			4 Lanes Per Direction		
	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural
0-5% Trucks	**47500**	**58500**	**58800**	**71200**	**87700**	**88300**	**95000**	**117000**	**117700**
6-10% Trucks	**46400**	**57100**	**57400**	**69500**	**85600**	**86200**	**92700**	**114200**	**114900**
11-15% Trucks	**45300**	**55800**	**56100**	**67900**	**83700**	**84200**	**90600**	**111500**	**112200**
16-20% Trucks	**44200**	**54500**	**54800**	**66400**	**81800**	**82200**	**88500**	**109000**	**109700**
21-25% Trucks	**43300**	**53300**	**53600**	**64900**	**79900**	**80400**	**86500**	**106600**	**107200**
26-30% Trucks	**42300**	**52100**	**52400**	**63500**	**78200**	**78700**	**84700**	**104300**	**104900**
31-35% Trucks	**41400**	**51000**	**51300**	**62100**	**76500**	**77000**	**82900**	**102100**	**102700**

PIEDMONT	2 Lanes Per Direction			3 Lanes Per Direction			4 Lanes Per Direction		
	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural
0-5% Trucks	**47500**	**58500**	**58800**	**71200**	**87700**	**88300**	**95000**	**117000**	**117700**
6-10% Trucks	**46400**	**57100**	**57400**	**69500**	**85600**	**86200**	**92700**	**114200**	**114900**
11-15% Trucks	**45300**	**55800**	**56100**	**67900**	**83700**	**84200**	**90600**	**111500**	**112200**
16-20% Trucks	**44200**	**54500**	**54800**	**66400**	**81800**	**82200**	**88500**	**109000**	**109700**
21-25% Trucks	**43300**	**53300**	**53600**	**64900**	**79900**	**80400**	**86500**	**106600**	**107200**
26-30% Trucks	**42300**	**52100**	**52400**	**63500**	**78200**	**78700**	**84700**	**104300**	**104900**
31-35% Trucks	**41400**	**51000**	**51300**	**62100**	**76500**	**77000**	**82900**	**102100**	**102700**

MOUNTAIN (Level Terrain)	2 Lanes Per Direction			3 Lanes Per Direction			4 Lanes Per Direction		
	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural
0-5% Trucks	**47500**	**53200**	**58800**	**71200**	**79800**	**88300**	**95000**	**106400**	**117700**
6-10% Trucks	**46400**	**51900**	**57400**	**69500**	**77900**	**86200**	**92700**	**103800**	**114900**
11-15% Trucks	**45300**	**50700**	**56100**	**67900**	**76100**	**84200**	**90600**	**101400**	**112200**
16-20% Trucks	**44200**	**49500**	**54800**	**66400**	**74300**	**82200**	**88500**	**99100**	**109700**
21-25% Trucks	**43300**	**48400**	**53600**	**64900**	**72700**	**80400**	**86500**	**96900**	**107200**
26-30% Trucks	**42300**	**47400**	**52400**	**63500**	**71100**	**78700**	**84700**	**94800**	**104900**
31-35% Trucks	**41400**	**46400**	**51300**	**62100**	**69600**	**77000**	**82900**	**92800**	**102700**

MOUNTAIN (Rolling Terrian)	2 Lanes Per Direction			3 Lanes Per Direction			4 Lanes Per Direction		
	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural
0-5% Trucks	**41200**	**50700**	**56100**	**61700**	**76100**	**84200**	**82300**	**101400**	**112200**
6-10% Trucks	**38500**	**47400**	**52400**	**57700**	**71100**	**78700**	**77000**	**94800**	**110400**
11-15% Trucks	**36100**	**44500**	**49200**	**54200**	**66700**	**73900**	**72200**	**89000**	**98500**
16-20% Trucks	**34000**	**41900**	**46400**	**51100**	**62900**	**69600**	**68100**	**83900**	**92800**
21-25% Trucks	**32200**	**39600**	**43900**	**48300**	**59500**	**65800**	**64400**	**79300**	**87700**
26-30% Trucks	**30500**	**37600**	**41600**	**45800**	**56400**	**62400**	**61000**	**75200**	**83200**
31-35% Trucks	**29000**	**35700**	**39600**	**43500**	**53600**	**59300**	**58000**	**71500**	**79100**

Uses "Multi-lane Highways" Facility Type in NCLOS
*** Assumes Regional K and D Factor Averages**

See Appendix B1 for HCM 2000 Multi-lane Highway Equations
Use Appendix B2: Coastal Expressway Inputs for adjustments
Use Appendix B3: Piedmont Expressway Inputs for adjustments
Use Appendix B4: Mountain (Level) Expressway Inputs for adjustments
Use Appendix B5: Mountain (Rolling) Expressway Inputs for adjustments

NOTE: Truck percentage occurs within the peak hour, not a daily truck percentage

Level of Service D Standards for Boulevards *

COASTAL	1 Lane Per Direction				2 Lanes Per Direction				3 Lanes Per Direction		
	Urban	Suburban	Rural		Urban	Suburban	Rural		Urban	Suburban	Rural
55 MPH	**21600**	**21900**	**24500**		**43300**	**43900**	**49000**		**64900**	**65800**	**73500**
45 MPH	**18900**	**19800**	**23600**		**38100**	**39700**	**47200**		**57200**	**59600**	**70800**
35 MPH	**14000**	**16900**			**28100**	**34300**			**42200**	**51700**	
25 MPH	**12500**				**25400**				**38400**		

PIEDMONT	1 Lane Per Direction				2 Lanes Per Direction				3 Lanes Per Direction		
	Urban	Suburban	Rural		Urban	Suburban	Rural		Urban	Suburban	Rural
55 MPH	**19900**	**20200**	**22600**		**40000**	**40500**	**45200**		**59900**	**60700**	**67900**
45 MPH	**17500**	**18300**	**21800**		**35100**	**36600**	**43600**		**52800**	**55000**	**65400**
35 MPH	**14000**	**15600**			**28100**	**31600**			**42200**	**47700**	
25 MPH	**12500**				**25400**				**38400**		

MOUNTAIN	1 Lane Per Direction				2 Lanes Per Direction				3 Lanes Per Direction		
	Urban	Suburban	Rural		Urban	Suburban	Rural		Urban	Suburban	Rural
55 MPH	**21600**	**21900**	**22300**		**43300**	**43900**	**44500**		**64900**	**65800**	**66800**
45 MPH	**18900**	**20700**	**21400**		**38100**	**41400**	**42900**		**57200**	**62100**	**64400**
35 MPH	**14000**	**18500**			**28100**	**37400**			**42200**	**56400**	
25 MPH	**12500**				**25400**				**38400**		

Uses "Principal Arterials" Facility Type in NCLOS
*** Assumes Regional K and D Factor Averages**

See Appendix C1 for HCM Urban Arterial Equations
Use Appendix C2: Coastal Boulevard Inputs for adjustments
Use Appendix C3: Piedmont Boulevard Inputs for adjustments
Use Appendix C4: Mountain Boulevard Inputs for adjustments

NOTE: Inputs assume 12-foot lanes. To adjust lane-width downward, subtract 3.33% per foot of pavement and round to the nearest hundred

Coastal Level of Service D Standards for Other Major Thoroughfares *

55 MPH	1 Lane Per Direction				1 Lane Per Direction WCLTL		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	15100	15800	16400		16600	17200	17800
11 foot lanes	14600	15300	15900		16100	16600	17200
10 foot lanes	14100	14700	15300		15500	16100	16600
9 foot lanes	13600	14200	14800		15000	15500	16000
45 MPH	**1 Lane Per Direction**				**1 Lane Per Direction WCLTL**		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	13200	13800	14600		14500	14900	16000
11 foot lanes	12800	13300	14100		14000	14400	15500
10 foot lanes	12300	12900	13600		13500	13900	15000
9 foot lanes	11900	12420	13140		13050	13400	14400
35 MPH	**1 Lane Per Direction**				**1 Lane Per Direction WCLTL**		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	11100	12600			12700	14000	
11 foot lanes	10700	12200			12300	13500	
10 foot lanes	10400	11800			11900	13100	
9 foot lanes	10000	11300			11400	12600	
25 MPH	**1 Lane Per Direction**				**1 Lane Per Direction WCLTL**		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	11000				12700		
11 foot lanes	10600				12300		
10 foot lanes	10300				11900		
9 foot lanes	9900				11400		

Uses "Principal Arterials" Facility Type in NCLOS

*** Decrease in Lane Width Capacity calculated via 2000 Highway Capacity Manual lane-width adjustment factor for saturation flow rate**

See Appendix D1 for HCM 2000 Urban Arterial Equations
Use Appendix D2: Coastal Major Thoroughfare Inputs for adjustments

NOTE: Lane Width is adjusted downward by 3.33% per less foot of pavement and rounded to the nearest hundred

Coastal Level of Service D Standards for Other Major Thoroughfares *

55 MPH	2 Lanes Per Direction				2 Lanes Per Direction WCLTL		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	30400	31600	32800		33300	34500	35700
11 foot lanes	29400	30600	31700		32200	33400	34500
10 foot lanes	29400	29500	30600		31100	32200	33300
9 foot lanes	27400	28400	29500		30000	31100	32100
45 MPH	**2 Lanes Per Direction**				**2 Lanes Per Direction WCLTL**		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	26700	27600	29300		29000	29900	32000
11 foot lanes	25900	26700	28300		28000	28900	30900
10 foot lanes	25000	25800	27300		27100	27900	29900
9 foot lanes	24000	24800	26400		26100	26900	29000
35 MPH	**2 Lanes Per Direction**				**2 Lanes Per Direction WCLTL**		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	22200	25500			24300	28100	
11 foot lanes	21500	24700			23500	27200	
10 foot lanes	20700	23800			22700	26200	
9 foot lanes	20000	23000			21900	25300	
25 MPH	**2 Lanes Per Direction**				**2 Lanes Per Direction WCLTL**		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	22100				24200		
11 foot lanes	21400				23400		
10 foot lanes	20500				22600		
9 foot lanes	19900				21800		

Uses "Principal Arterials" Facility Type in NCLOS

*** Decrease in Lane Width Capacity calculated via 2000 Highway Capacity Manual lane-width adjustment factor for saturation flow rate**

See Appendix D1 for HCM 2000 Urban Arterial Equations
Use Appendix D2: Coastal Major Thoroughfare Inputs for adjustments

NOTE: Lane Width is adjusted downward by 3.33% per less foot of pavement and rounded to the nearest hundred

Piedmont Level of Service D Standards for Other Major Thoroughfares *

55 MPH	1 Lane Per Direction				1 Lane Per Direction WCLTL		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	12900	14600	15100		14200	15900	16500
11 foot lanes	12500	14100	14600		13700	15400	16000
10 foot lanes	12000	13600	14100		13300	14800	15400
9 foot lanes	11600	13100	13600		12800	14300	14900
45 MPH	**1 Lane Per Direction**				**1 Lane Per Direction WCLTL**		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	12200	12700	14600		13300	13800	16000
11 foot lanes	11800	12300	14100		12900	13300	15500
10 foot lanes	11400	11900	13600		12400	12900	14900
9 foot lanes	11000	11400	13100		12000	12400	14400
35 MPH	**1 Lane Per Direction**				**1 Lane Per Direction WCLTL**		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	11100	11600			12700	12900	
11 foot lanes	10700	11200			12300	12500	
10 foot lanes	10400	10800			11900	12000	
9 foot lanes	10000	10400			11400	11600	
25 MPH	**1 Lane Per Direction**				**1 Lane Per Direction WCLTL**		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	11000				12700		
11 foot lanes	10600				12300		
10 foot lanes	10300				11900		
9 foot lanes	9900				11400		

Uses "Principal Arterials" Facility Type in NCLOS

*** Decrease in Lane Width Capacity calculated via 2000 Highway Capacity Manual lane-width adjustment factor for saturation flow rate**

See Appendix D1 for HCM 2000 Urban Arterial Equations
Use Appendix D3: Piedmont Major Thoroughfare Inputs for adjustments

NOTE: Lane Width is adjusted downward by 3.33% per less foot of pavement

Piedmont Level of Service D Standards for Other Major Thoroughfares *

55 MPH	2 Lanes Per Direction				2 Lanes Per Direction WCLTL		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	25800	29100	30200		28400	31800	33000
11 foot lanes	24900	28100	29200		27500	30800	31900
10 foot lanes	24100	27200	28200		26500	29700	30800
9 foot lanes	23200	26200	27200		25600	28600	29700
45 MPH	**2 Lanes Per Direction**				**2 Lanes Per Direction WCLTL**		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	24600	25500	29300		26800	27600	32000
11 foot lanes	23800	24700	28300		25900	26700	31000
10 foot lanes	23000	23800	27300		25000	25800	29900
9 foot lanes	22100	23000	26400		24100	24800	28800
35 MPH	**2 Lanes Per Direction**				**2 Lanes Per Direction WCLTL**		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	22200	23500			24300	26000	
11 foot lanes	21500	22700			23500	25100	
10 foot lanes	20700	21900			22700	24300	
9 foot lanes	20000	21200			21900	23400	
25 MPH	**2 Lanes Per Direction**				**2 Lanes Per Direction WCLTL**		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	22100				24200		
11 foot lanes	21400				23400		
10 foot lanes	20600				22600		
9 foot lanes	19900				21800		

Uses "Principal Arterials" Facility Type in NCLOS

*** Decrease in Lane Width Capacity calculated via 2000 Highway Capacity Manual lane-width adjustment factor for saturation flow rate**

See Appendix D1 for HCM 2000 Urban Arterial Equations
Use Appendix D3: Piedmont Major Thoroughfare Inputs for adjustments

NOTE: Lane Width is adjusted downward by 3.33% per less foot of pavement and rounded to the nearest hundred

Mountain Level of Service D Standards for Other Major Thoroughfares *

55 MPH	1 Lane Per Direction				1 Lane Per Direction WCLTL		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	14000	14600	15100		15300	15900	16500
11 foot lanes	13500	14100	14600		14800	15400	16000
10 foot lanes	13100	13600	14100		14300	14800	15400
9 foot lanes	12600	13100	13600		13800	14300	14900
45 MPH	**1 Lane Per Direction**				**1 Lane Per Direction WCLTL**		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	12200	12700	14600		13300	13800	16000
11 foot lanes	11800	12300	14100		12900	13300	15500
10 foot lanes	11400	11900	13600		12400	12900	14900
9 foot lanes	11000	11400	13100		12000	12400	14400
35 MPH	**1 Lane Per Direction**				**1 Lane Per Direction WCLTL**		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	11000	11600			12700	12900	
11 foot lanes	10600	11200			12300	12500	
10 foot lanes	10300	10800			11900	12000	
9 foot lanes	9900	10400			11400	11600	
25 MPH	**1 Lane Per Direction**				**1 Lane Per Direction WCLTL**		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	11000				12700		
11 foot lanes	10600				12300		
10 foot lanes	10300				11900		
9 foot lanes	9900				11400		

Uses "Principal Arterials" Facility Type in NCLOS

*** Decrease in Lane Width Capacity calculated via 2000 Highway Capacity Manual lane-width adjustment factor for saturation flow rate**

See Appendix D1 for HCM 2000 Urban Arterial Equations
Use Appendix D4: Mountains Major Thoroughfare Inputs for adjustments

NOTE: Lane Width is adjusted downward by 3.33% per less foot of pavement and rounded to the nearest hundred

Mountain Level of Service D Standards for Other Major Thoroughfares *

55 MPH	2 Lanes Per Direction				2 Lanes Per Direction WCLTL		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	28000	29100	30200		30800	31800	33000
11 foot lanes	27100	28100	29200		29800	30800	31900
10 foot lanes	26100	27200	28200		28700	29700	30800
9 foot lanes	25200	26200	27200		27700	28600	29700
45 MPH	**2 Lanes Per Direction**				**2 Lanes Per Direction WCLTL**		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	24600	25500	29300		26800	27600	32000
11 foot lanes	23800	24700	28300		25900	26700	30900
10 foot lanes	23000	23800	27300		25000	25800	29900
9 foot lanes	22100	23000	26400		24100	24800	28800
35 MPH	**2 Lanes Per Direction**				**2 Lanes Per Direction WCLTL**		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	22200	23500			24300	26000	
11 foot lanes	21500	22700			23500	25400	
10 foot lanes	20700	21900			22700	24300	
9 foot lanes	20000	21200			21900	23400	
25 MPH	**2 Lanes Per Direction**				**2 Lanes Per Direction WCLTL**		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	22100				24200		
11 foot lanes	21400				23400		
10 foot lanes	20600				22600		
9 foot lanes	19900				21800		

Uses "Principal Arterials" Facility Type in NCLOS

*** Decrease in Lane Width Capacity calculated via 2000 Highway Capacity Manual lane-width adjustment factor for saturation flow rate**

See Appendix D1 for HCM 2000 Urban Arterial Equations
Use Appendix D4: Mountains Major Thoroughfare Inputs for adjustments

NOTE: Lane Width is adjusted downward by 3.33% per less foot of pavement

Coastal Level of Service D Standards for Minor Thoroughfares *

55 MPH	1 Lane Per Direction				1 Lane Per Direction WCLTL		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	15100	15800	16400		16600	17200	17800
11 foot lanes	14600	15300	15900		16100	16600	17200
10 foot lanes	14100	14700	15300		15500	16100	16600
9 foot lanes	13600	14200	14800		14900	15500	16000

45 MPH	1 Lane Per Direction				1 Lane Per Direction WCLTL		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	12700	13300	14600		14200	14300	16000
11 foot lanes	12300	12900	14100		13700	13800	15500
10 foot lanes	11900	12400	13600		13300	13300	14900
9 foot lanes	11400	12000	13100		12800	12900	14400

35 MPH	1 Lane Per Direction				1 Lane Per Direction WCLTL		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	10500	11000			11500	13700	
11 foot lanes	10200	10600			11100	13300	
10 foot lanes	9800	10300			10700	12800	
9 foot lanes	9500	9900			10400	12300	

25 MPH	1 Lane Per Direction				1 Lane Per Direction WCLTL		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	10000				11300		
11 foot lanes	9700				10900		
10 foot lanes	9300				10500		
9 foot lanes	9000				10200		

Uses "Principal Arterials" and "Minor Arterials" Facility Types in NCLOS

*** Decrease in Lane Width Capacity calculated via 2000 Highway Capacity Manual lane-width adjustment factor for saturation flow rate**

See Appendix E1 for HCM 2000 Urban Arterial Equations
Use Appendix E2: Coastal Minor Thoroughfare Inputs for adjustments

NOTE: Lane Width is adjusted downward by 3.33% per less foot of pavement

Piedmont Level of Service D Standards for Minor Thoroughfares *

55 MPH	1 Lane Per Direction				1 Lane Per Direction WCLTL		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	12900	14600	15100		14200	15900	16500
11 foot lanes	12500	14100	14600		13700	15400	16000
10 foot lanes	12000	13600	14100		13300	14800	15400
9 foot lanes	11600	13100	13600		12800	14300	14900

45 MPH	1 Lane Per Direction				1 Lane Per Direction WCLTL		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	11700	12200	14600		13100	13200	16000
11 foot lanes	11300	11800	14100		12700	12800	15500
10 foot lanes	10900	11400	13600		12200	12300	14900
9 foot lanes	10500	11000	13100		11800	11900	14400

35 MPH	1 Lane Per Direction				1 Lane Per Direction WCLTL		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	10200	10200			11700	12700	
11 foot lanes	9900	9900			11300	12300	
10 foot lanes	9500	9500			10900	11900	
9 foot lanes	9200	9200			10500	11400	

25 MPH	1 Lane Per Direction				1 Lane Per Direction WCLTL		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	10000				11300		
11 foot lanes	9700				10900		
10 foot lanes	9300				10500		
9 foot lanes	9000				10200		

Uses "Principal Arterials" and "Minor Arterials" Facility Types in NCLOS

*** Decrease in Lane Width Capacity calculated via 2000 Highway Capacity Manual lane-width adjustment factor for saturation flow rate**

See Appendix E1 for HCM 2000 Urban Arterial Equations
Use Appendix E3: Piedmont Minor Thoroughfare Inputs for adjustments

NOTE: Lane Width is adjusted downward by 3.33% per less foot of pavement

Mountain Level of Service D Standards for Minor Thoroughfares *

55 MPH	1 Lane Per Direction				1 Lane Per Direction WCLTL		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	14000	14600	15100		15300	15900	16500
11 foot lanes	13500	14100	14600		14800	15400	16000
10 foot lanes	13100	13600	14100		14300	14800	15400
9 foot lanes	12600	13100	13600		13800	14300	14900

45 MPH	1 Lane Per Direction				1 Lane Per Direction WCLTL		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	11700	12200	14600		13100	13200	16000
11 foot lanes	11300	11800	14100		12700	12800	15500
10 foot lanes	10900	11400	13600		12200	12300	14900
9 foot lanes	10500	11000	13100		11800	11900	14400

35 MPH	1 Lane Per Direction				1 Lane Per Direction WCLTL		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	10200	10200			11500	12700	
11 foot lanes	9900	9900			11100	12300	
10 foot lanes	9500	9500			10700	11900	
9 foot lanes	9200	9200			10400	11400	

25 MPH	1 Lane Per Direction				1 Lane Per Direction WCLTL		
	Urban	Suburban	Rural		Urban	Suburban	Rural
12 foot lanes	10000				11300		
11 foot lanes	9700				10900		
10 foot lanes	9300				10500		
9 foot lanes	9000				10200		

Uses "Principal Arterials" and "Minor Arterials" Facility Types in NCLOS

*** Decrease in Lane Width Capacity calculated via 2000 Highway Capacity Manual lane-width adjustment factor for saturation flow rate**

See Appendix E1 for HCM 2000 Urban Arterial Equations
Use Appendix E4: Mountain Minor Thoroughfare Inputs for adjustments

NOTE: Lane Width is adjusted downward by 3.33% per less foot of pavement

Level of Service D Standards for Rural 2-Lane Highways

Coastal 2-Lane Highway Standard	COASTAL		
	Minimum	Standard	Maximum
12-Foot Lanes	10500	12700*	14700*#
11-Foot Lanes	10000		
10-Foot Lanes	9200	12000	
9-Foot Lanes	7700	10700	

Piedmont 2-Lane Highway Standard	PIEDMONT		
	Minimum	Standard	Maximum
12-Foot Lanes	10300	12400*	14300*#
11-Foot Lanes	9900		
10-Foot Lanes	9000	11800	
9-Foot Lanes	7500	10500	

Mountain 2-Lane Highway Standard	MOUNTAINS (Level)		
	Minimum	Standard	Maximum
12-Foot Lanes	10200	12100*	14000*#
11-Foot Lanes	9800		
10-Foot Lanes	8800	11700	
9-Foot Lanes	7400	10300	

Mountain 2-Lane Highway Standard	MOUNTAINS (Rolling)		
	Minimum	Standard	Maximum
12-Foot Lanes	9600	12100*	14000*#
11-Foot Lanes	9100		
10-Foot Lanes	8200	11100	
9-Foot Lanes	6300	9800	

Uses "2-Lane Highways" Facility Type in NCLOS

*** All capacities calculated based on HCM 2000 procedures using HCS software. Under some conditions, two-lane highway capacity is not affected by lane width. This occurs where capacity is governed by Percent Time Spent Following rather than by Average Travel Speed.**

 # Best-case/Maximum conditions are less likely to occur where lane widths are below 11 feet. Use caution before selecting "Maximum" values for 9-ft or 10-ft lanes.

See Appendix F1 for HCM 2000 2-Lane Highway Equations
Use Appendix F2: Coastal Rural 2-Lane Highway Inputs for adjustments
Use Appendix F3: Piedmont Rural 2-Lane Highway Inputs for adjustments
Use Appendix F4: Mountain (Level) Rural 2-Lane Highway Inputs for adjustments
Use Appendix F5: Mountain (Rolling) Rural 2-Lane Highway Inputs for adjustments

Appendix F. Corridor D Survey Results

U.S. 321 – Public Survey Results

Views	Participants	Responses	Comments
609	253	3,734	44

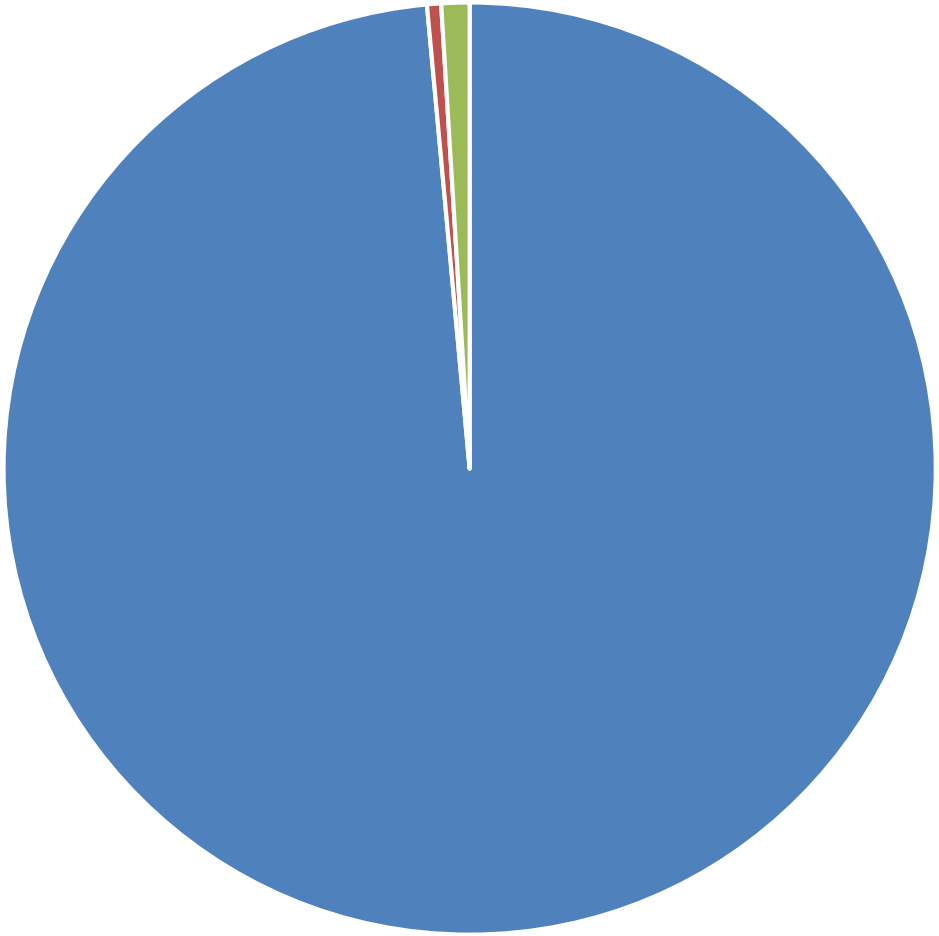
U.S. 321 – Public Survey Results

Gastonia, Hickory Area	Boone Area	Durham Area	Asheville Area
86%	8%	2%	2%

- Percentage of respondents providing zip codes
- 132 respondents provided zip codes

U.S. 321 – Public Survey Results

What is your primary mode of transportation?

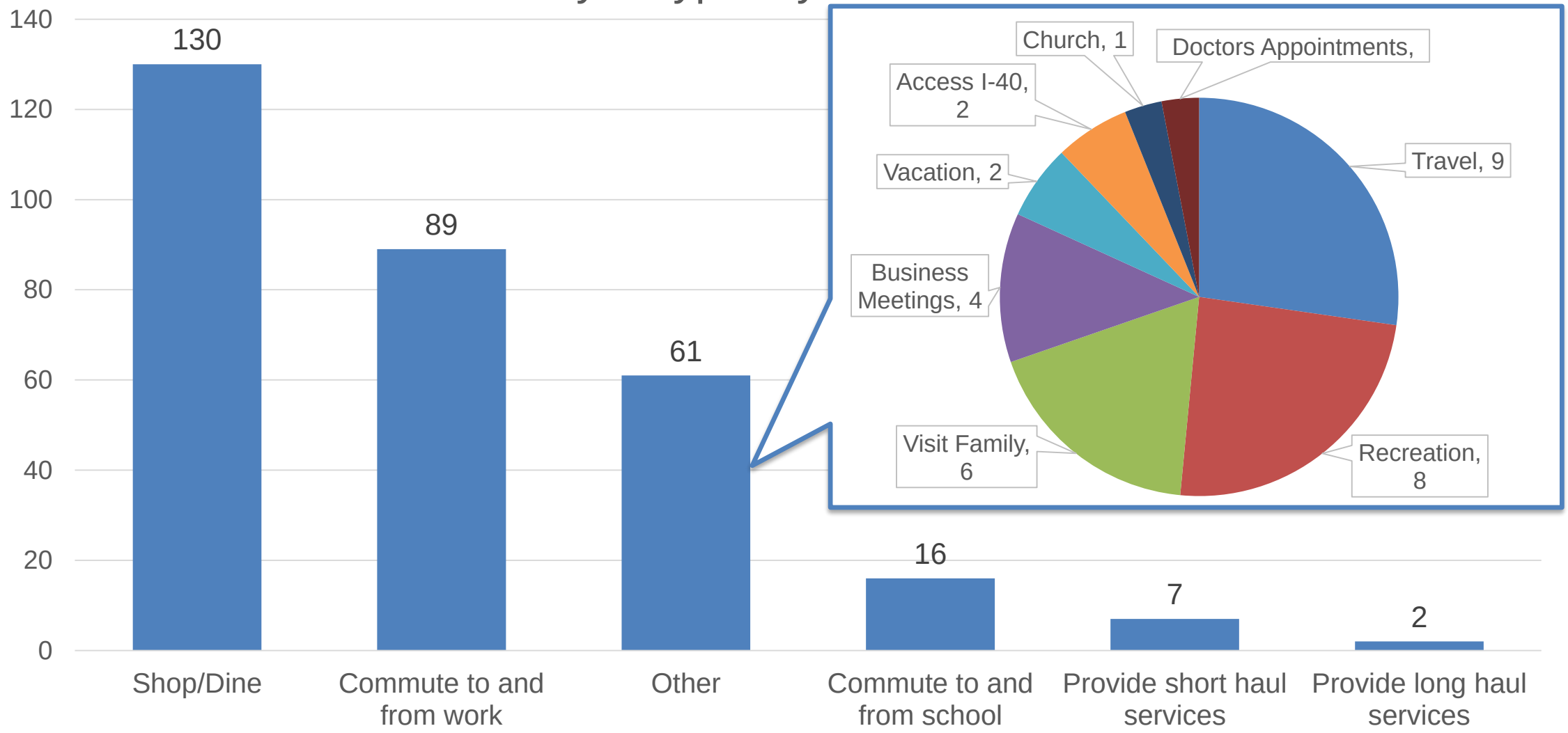


- 98.5%, I drive my own vehicle
- 0.5%, Other (Company Vehicle)
- 1.0%, I rely on public transportation

205 respondents

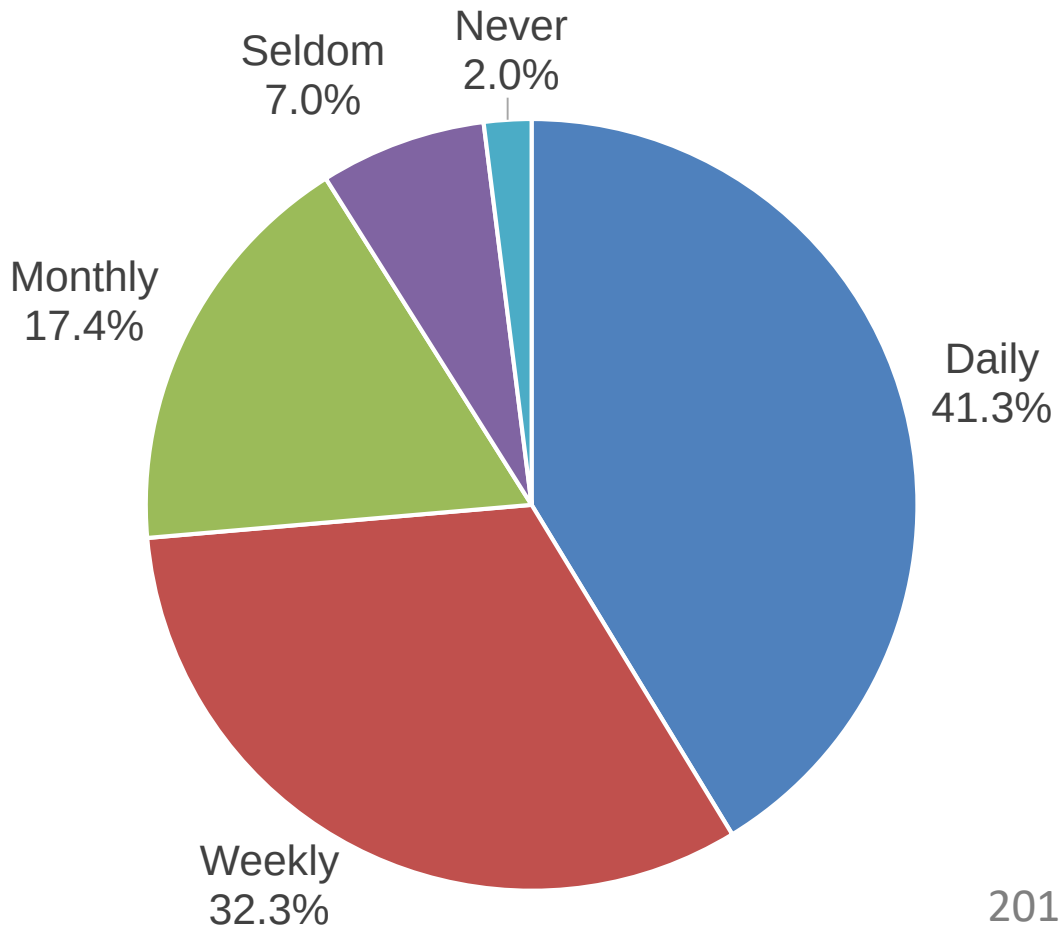
U.S. 321 – Public Survey Results

How do you typically use U.S. 321?



U.S. 321 – Public Survey Results

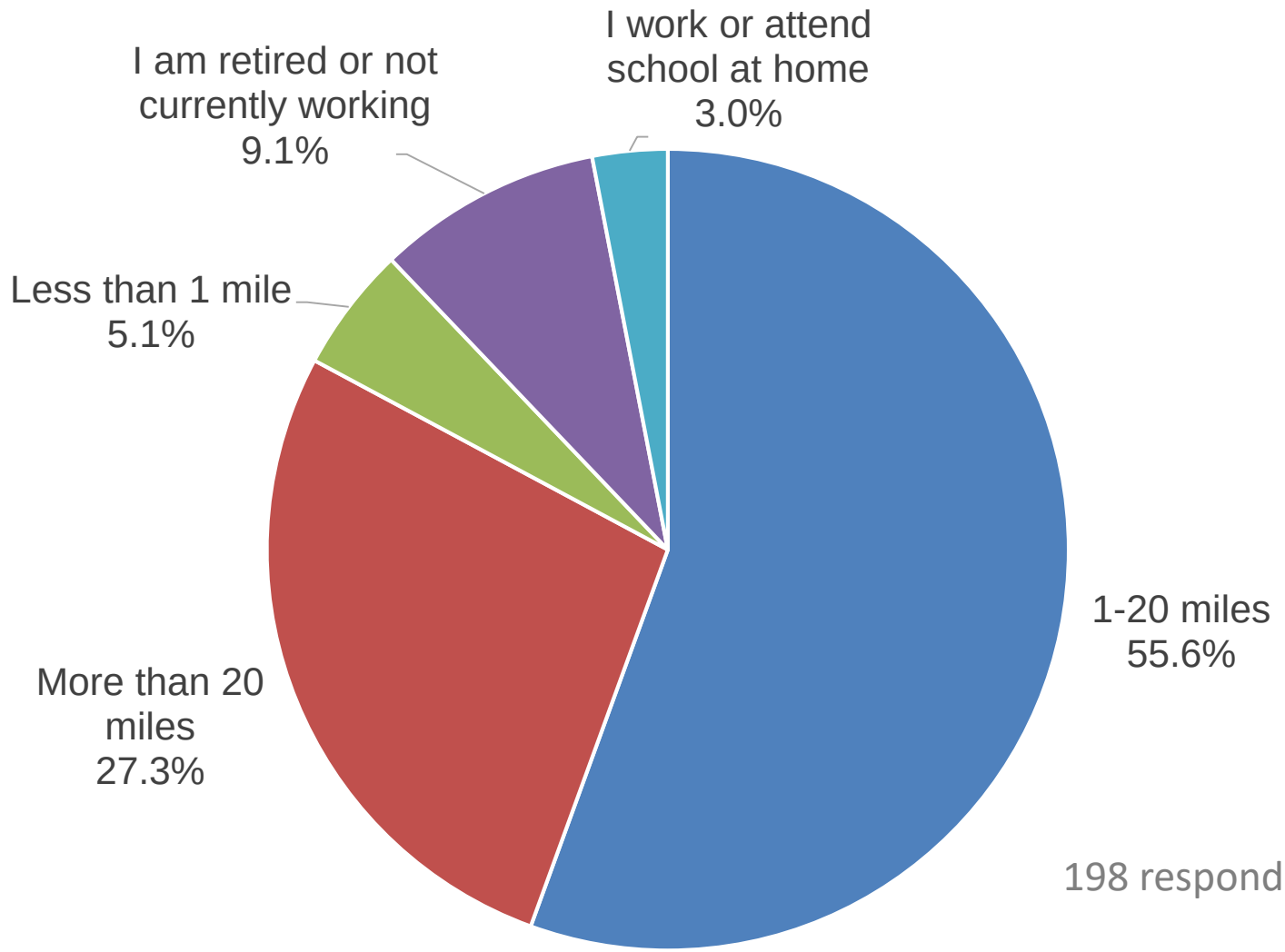
How often do you typically use U.S. 321?



201 respondents

U.S. 321 – Public Survey Results

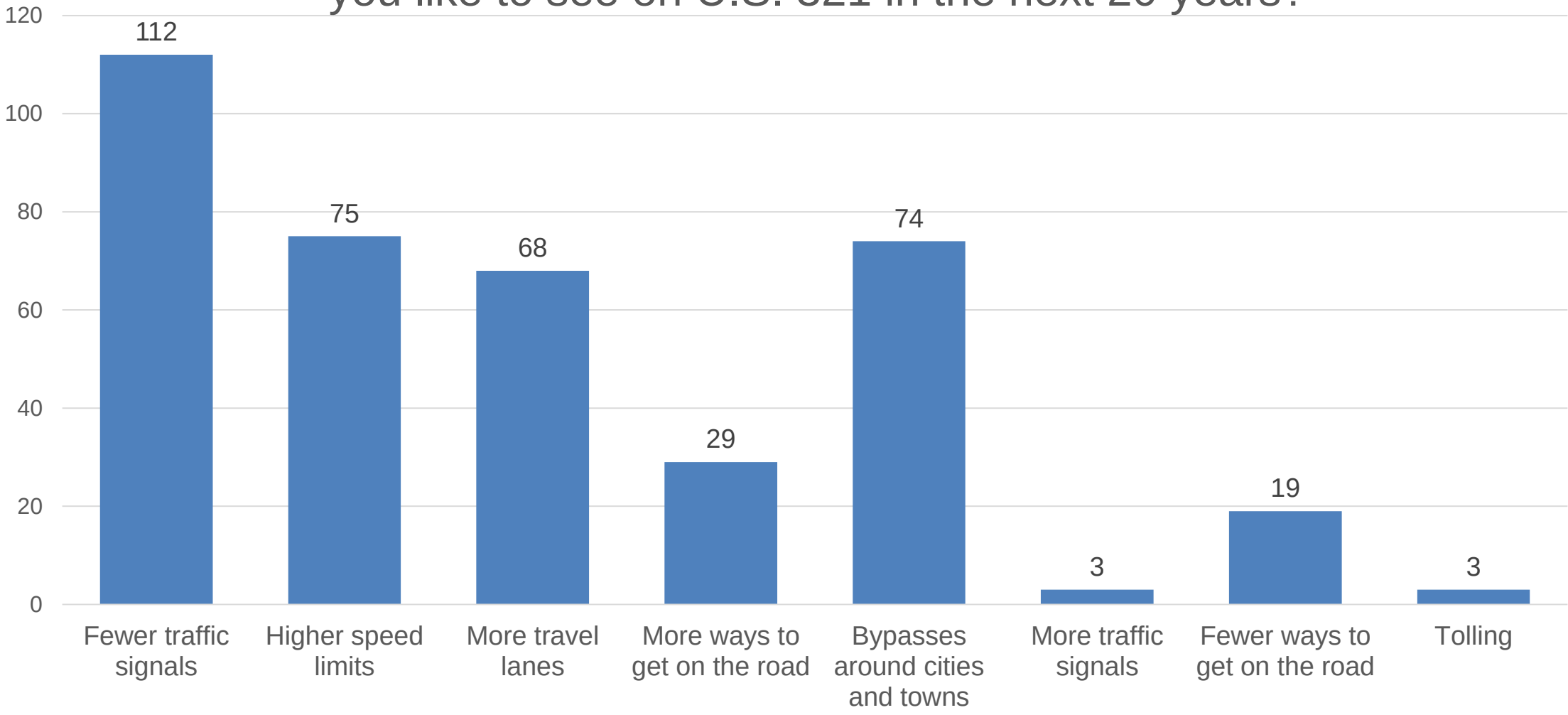
How far do you typically commute to your place of work or school?



198 respondents

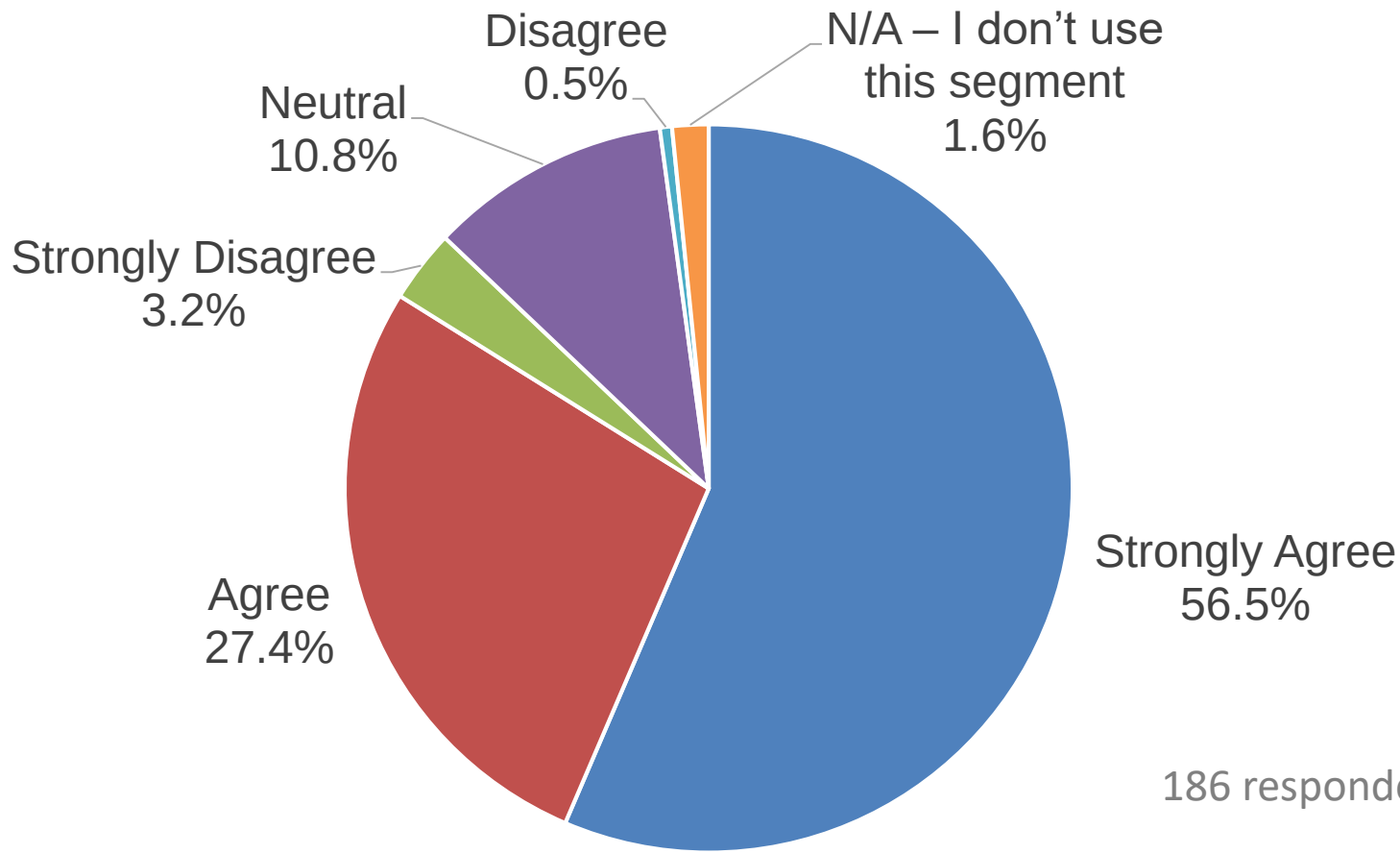
U.S. 321 – Public Survey Results

From the South Carolina state line to Hickory, what changes would you like to see on U.S. 321 in the next 20 years?



U.S. 321 – Public Survey Results

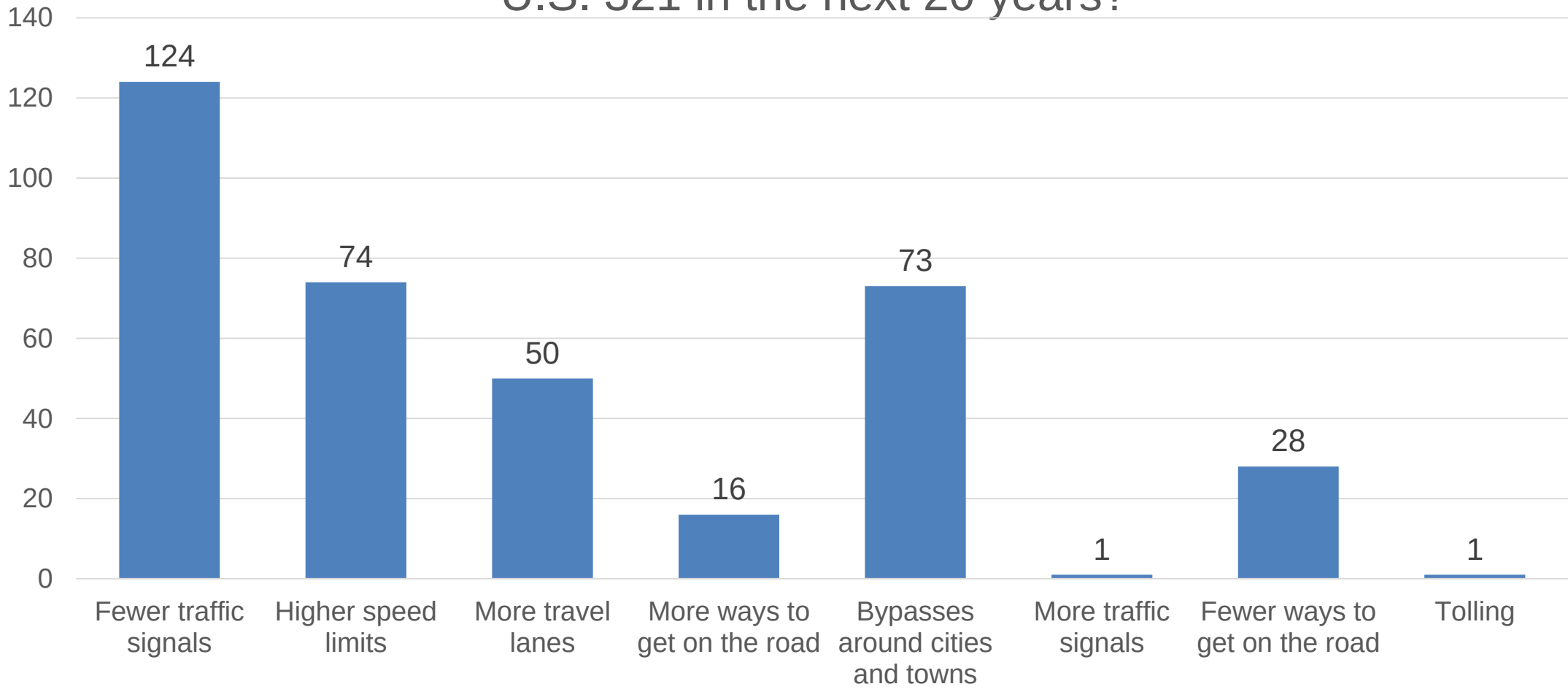
From the South Carolina state line to Hickory, do you support the preliminary vision of a freeway (access only at interchanges/ramps, speed limit 55 or greater, no traffic signals)?



186 respondents

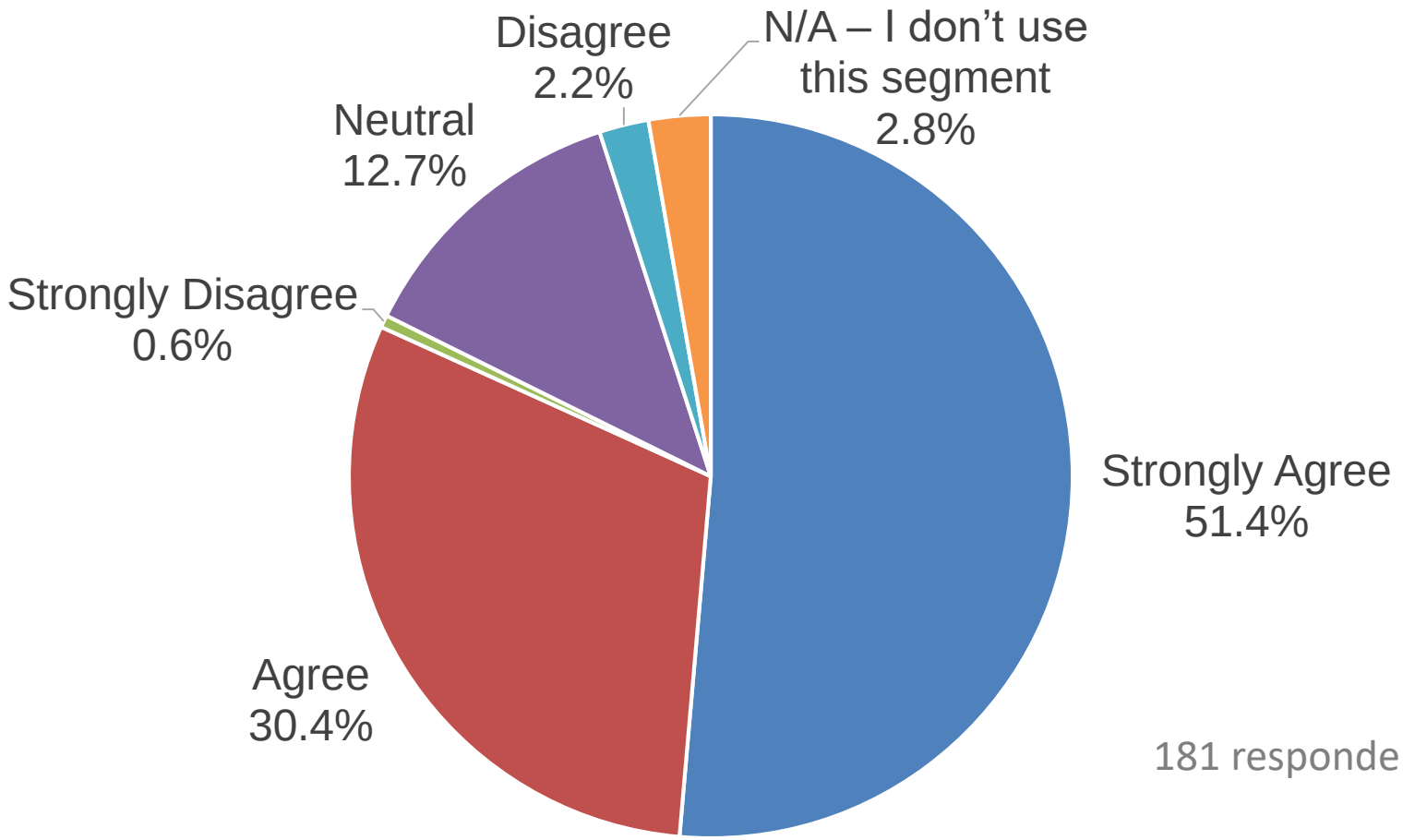
U.S. 321 – Public Survey Results

From the Hickory to Boone, what changes would you like to see on U.S. 321 in the next 20 years?



U.S. 321 – Public Survey Results

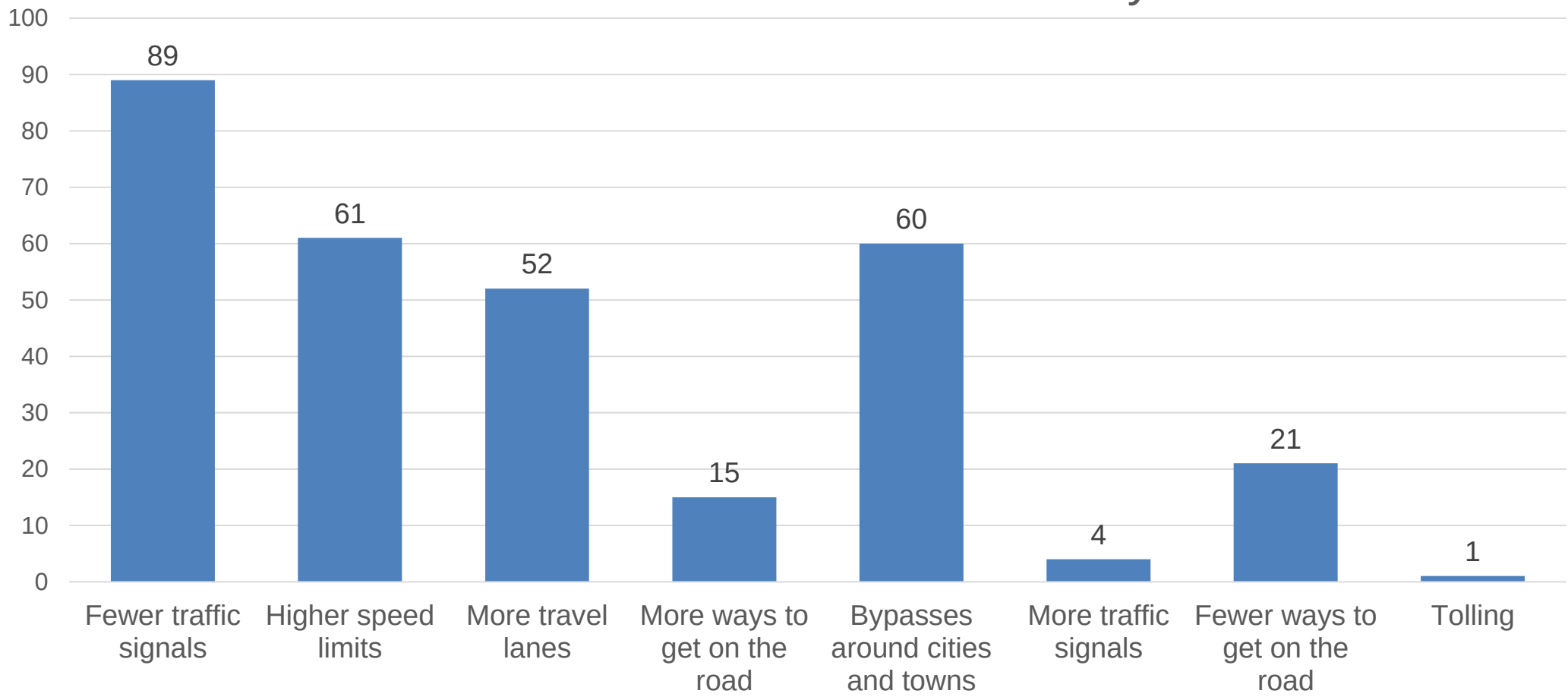
From Hickory to Boone, do you support the preliminary vision of an expressway (access at interchanges for major cross streets and at-grade intersections at minor cross streets, speed limit 45 to 60 mph, no traffic signals)?



181 respondents

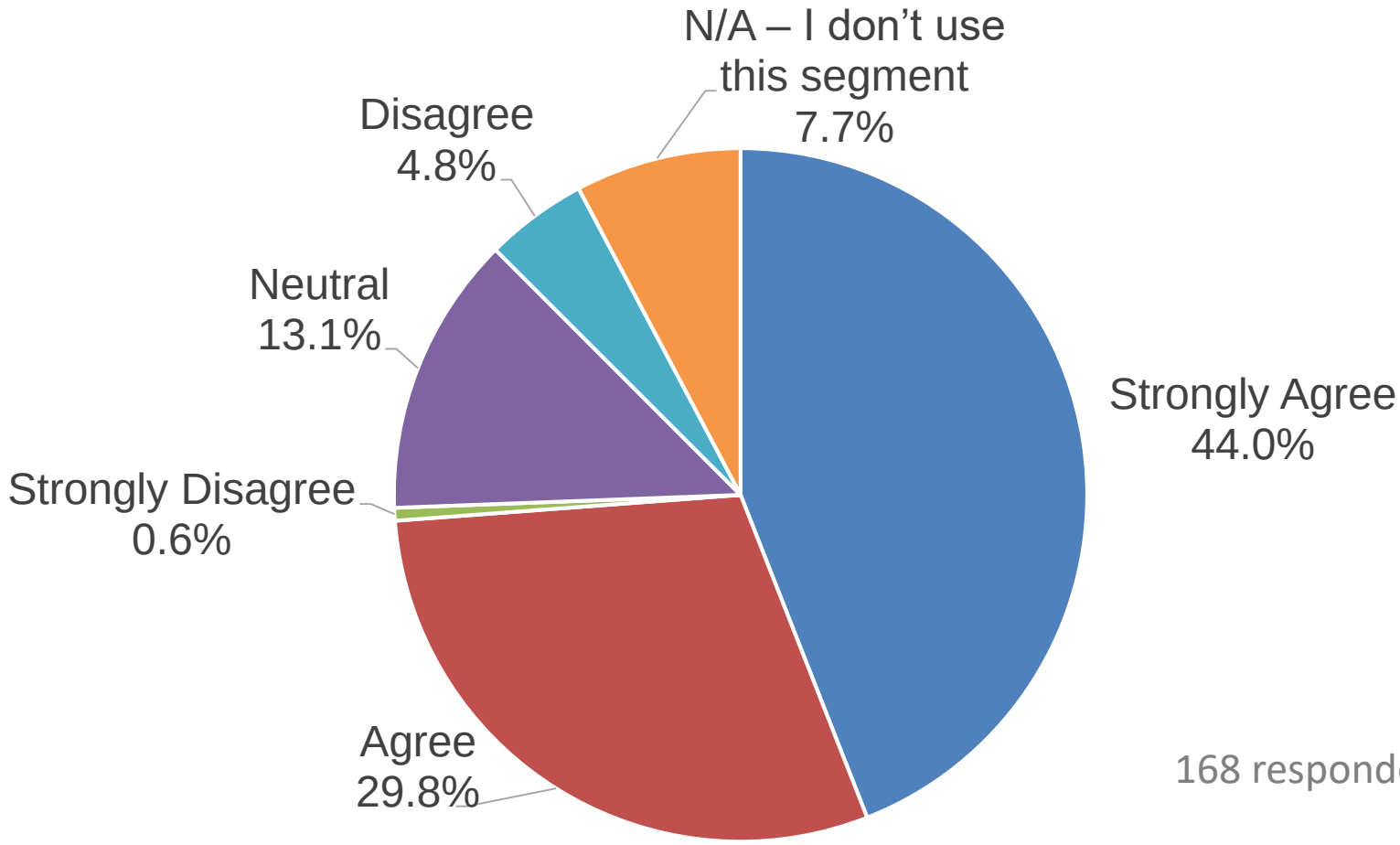
U.S. 321 – Public Survey Results

From Boone to the Tennessee state line, what changes would you like to see on U.S. 321 in the next 20 years?



U.S. 321 – Public Survey Results

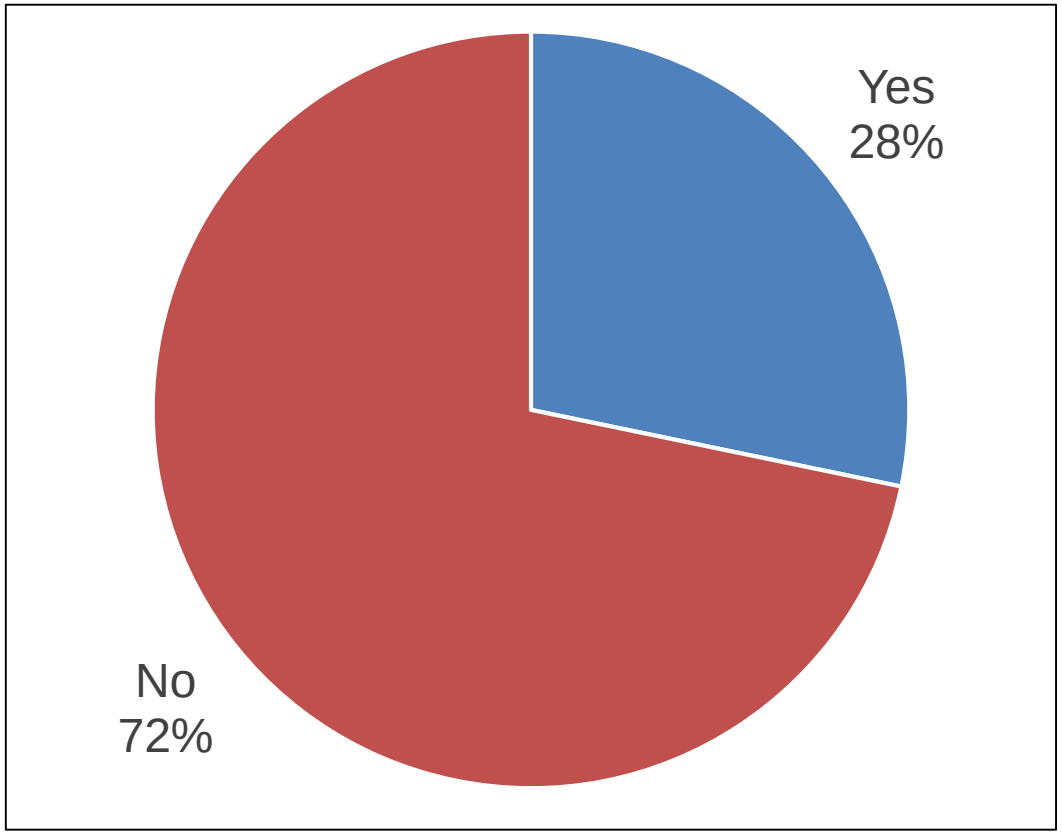
From Boone to Tennessee state line, do you support the preliminary vision of an expressway (access at interchanges for major cross streets and at-grade intersections at minor cross streets, speed limit 45 to 60 mph, no traffic signals)?



168 respondents

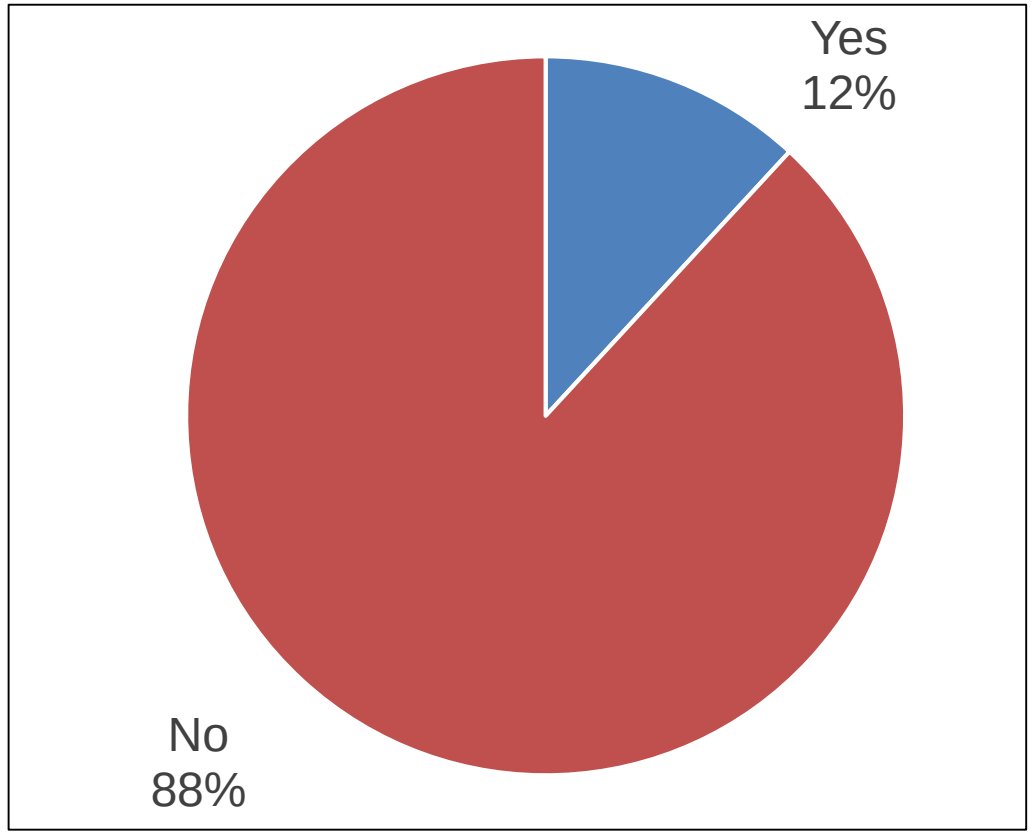
U.S. 321 – Public Survey Results

Have you ever been impacted by rockslides/mudslides on U.S. 321?



177 respondents

Have you ever been impacted by flooding on U.S. 321?



177 respondents

U.S. 321 – Public Survey Results

These are additional comments:

- Please clean up the garbage on the side of the roads
- Please do something about all the lights between Hickory and Blowing Rock
- Make the on and off Ramps at I-85 more seamless
- Repave
- Why is I- 85 named North and South but runs East and West!? Lived here 20 years and never understood the concept. I've gotten lost several times due to poorly named roads.
- I live in a neighborhood that is beside 321 in Gastonia and would not support turning that stretch into a freeway without a bypass
- Add more restaurants along the area. Possibly a rest stop
- While improving traffic flow on Hwy 321 is important, it is also important to consider potential impacts to local traffic that moves east/west and only interacts with 321 for a short distance or just to cross over it. Those pathways need to be maintained for local traffic.