Chapter 1
Purpose and Need for I-95 Improvements

This chapter summarizes the purpose of the proposed action and why the proposed action is needed. This chapter is a summary of the *I-95 Corridor Planning and Finance Study (STIP Project I-5133) Purpose and Need Report* (April 2011) (referred to as the *I-95 Purpose and Need Report*), incorporated by reference into this EA. The *I-95 Purpose and Need Report* identifies existing conditions and future infrastructure and traffic operations needs along the I-95 corridor. Information from this report was used to guide discussion of transportation needs and to identify alternatives. The proposed action includes the implementation of tolls on Interstate 95 (I-95) for the purpose of generating revenues to be used to upgrade the I-95 corridor’s capacity, safety, and infrastructure.

1.1 PROPOSED ACTION

This project is identified in the 2012-2018 State Transportation Improvement Program (STIP) as Project I-5133, and is identified for a corridor planning and financing study. This Environmental Assessment (EA) is the result of the North Carolina Department of Transportation (NCDOT) initiative to perform planning, engineering and financial analyses for improvements to the I-95 corridor in North Carolina between the South Carolina and the Virginia state lines. These analyses have identified a need for improvements to the I-95 corridor, evaluated alternative improvement and preservation strategies, and assessed funding requirements and financing options. Implicit in the examination of funding options has been the consideration of the use of tolling of vehicles using I-95 to generate needed financial resources. This EA has been prepared by the NCDOT in coordination with the Federal Highway Administration (FHWA). It is intended to satisfy the requirements of both the National Environmental Policy Act of 1969, as amended (NEPA), and the North Carolina Environmental Policy Act. The document conforms to the Council on Environmental Quality (CEQ) guidelines, which implement the procedural provisions of NEPA, and the FHWA guidance for Preparing and Processing Environmental documents. FHWA is the lead federal agency in the NEPA process.

The NCDOT is proposing to implement improvements along I-95 through the state, from the South Carolina state line to the Virginia state line, through an improvement program that will include tolling as a component of the funding strategy. Tolling has been identified as the most feasible financing option to fund the proposed improvements within a reasonable timeframe. The authority for tolling the existing interstate is being pursued by NCDOT under the provisions of the Interstate System Reconstruction and Rehabilitation Pilot Program (ISRRPP), as authorized by Congress in the Safe, Accountable, Flexible, Efficient Transportation Act: a Legacy for Users (SAFETEA-LU) in 2005. The design concept and scope used to evaluate the feasibility of financing options includes widening I-95 to six or eight lanes. The design concept also includes replacing the existing pavement and many of the existing bridges.

1.2 EXISTING CONDITIONS

1.2.1 The Role of I-95 in the Transportation Network

I-95 is an important part of the local, regional, state, and national transportation system. I-95 traverses 182 miles through eight counties in North Carolina (Robeson, Cumberland, Harnett, Johnston, Wilson, Nash, Halifax, and Northampton) and, at the local level, functions as a major arterial that provides access to work and school, parks and other recreational facilities, shopping venues, medical facilities, and other destinations. Regionally, I-95 serves as an important route for commuters by connecting highways that carry traffic into the Raleigh-Durham and Fayetteville metropolitan areas.

I-95 serves as a transportation facility with statewide significance by connecting major roadways such as I-40, US 74, US 70, US 64, US 264, US 158, and US 301. Because of its statewide and regional importance, I-95 has been designated as a Strategic Highway Corridor (SHC) by NCDOT. The SHC initiative represents a timely effort to preserve and maximize the mobility and connectivity on a core set of highway corridors, while promoting environmental stewardship through maximizing the use of existing facilities to the extent possible, and fostering economic prosperity through the quick and efficient movement of people and goods. Additionally, it is a vital statewide corridor for hurricane evacuation. There are ten designated hurricane evacuation routes that intersect I-95 (North Carolina Hurricane Evacuation Routes, 2010). During periods of evacuation, I-95 must be able to accommodate traffic from the Outer Banks and southern beaches by serving as a conduit to distribute this traffic to other area roadways and points inland.

Nationally, I-95 is the East Coast's main north-south highway linking the nation's populous Northeast with the South Atlantic states and tourist centers of Florida. I-95 passes through the major East Coast metropolitan areas of Boston, New York, Philadelphia, Baltimore, Washington DC, Richmond, Jacksonville, and Miami. It is a nationally-significant corridor for freight trucks which currently account for approximately 23 percent of the daily traffic on I-95 in North Carolina (*Study Area Needs Assessment,* September 2010). Additionally, the I-95 corridor is designated as part of the National Highway Systems (NHS) Strategic Highway Network (STRAHNET). STRAHNET sets to establish a system of public highways providing access, continuity, and emergency transportation of personnel and equipment in times of peace and war. The I-95 corridor links Fort Bragg, located just off the corridor in the Fayetteville area, and the many other military facilities located along the nation's east coast.

1.2.2 Roadway Geometric Deficiencies

Since construction of I-95 began in the 1950s, American Association of State Highway and Transportation Officials (AASHTO) interstate roadway design standards have changed. The existing geometric conditions of I-95 throughout North Carolina were evaluated in terms of horizontal and vertical alignments, horizontal clearances, stopping and decision sight distances, exit and entrance ramp designs, and interchange spacing, in order to determine whether or not they meet current design standards. Certain portions of I-95, as shown in **Figure 1-1**, do not meet the current requirements.

<u>Horizontal and Vertical Alignments</u>: The existing horizontal alignment throughout the I-95 corridor is adequate for a 70+ mile per hour (mph) design speed, with no curves that would require speed reductions.

The vertical alignment is adequate for a 70+ mph design speed, with the exception of two locations where the grade exceeds three percent. These locations are in Johnston County near mile marker 97 on I-95 at SR 1927 (E. Anderson Street), and near mile marker 107 on I-95 at the US 301 interchange.

Horizontal Clearances: The horizontal clearance meets current standards for the majority of the I-95 corridor, with 30 feet or more of clearance between the edge of the travel lanes and roadside hazards. However, there are two locations where there are less than 24 feet clear of roadside hazards. One is at the US 301/SR 1003 (Chicken Road) interchange in Robeson County near mile marker 10 where there is an unprotected sign along the northbound lane, and the other is at the NC 4 interchange in Nash County near mile marker 145. In this location, there are breakaway light poles in both directions.

Sight Distances: The stopping sight distance is adequate for a design speed of 70+ mph for most of the I-95 corridor. However, there are three locations where the design speed is reduced to 65 – 70 mph to accommodate a shorter stopping sight distance due to vertical curves (i.e., hills). The three locations are between NC 72 (Caton Road) and SR 1536 (W. Carthage Road) in Robeson County near mile marker 17, the SR 1927 (E. Anderson Street) interchange in Johnston County near mile marker 98, and north of the US 301 interchange in Johnston County near mile marker 107.

There are 35 locations on the I-95 corridor where a motorist has less than the optimal 2,000 feet for decision sight distance, defined as the distance that a motorist needs to visually identify an exit and then make a decision about whether or not to get off the interstate. Of these 35 locations, six have less than 1,000 feet of decision sight distance and 29 have between 1,000 and 2,000 feet. The six locations with less than 1,000 feet of decision sight distance are listed below:

- Northbound I-95 south of the US 301 (N. 5th Street) interchange at mile marker 33 in Robeson County
- Northbound I-95 south of the NC 87 interchange at mile marker 46 in Cumberland County
- Northbound I-95 at the SR 1927 (E. Anderson Street) interchange at mile marker 98 in Johnston County
- Northbound I-95 south of the US 301 (S. Church Street) interchange at mile marker 107 in Johnston County
- Southbound I-95 north of the I-795/US 264 interchange at mile marker 119 in Wilson County
- Southbound I-95 north of the US 158 interchange at mile marker 173 in Halifax County

Interchange Ramp Designs: There are 45 ramps on the 56 interchanges on the corridor (approximately 20 percent of ramps) where a motorist has less than the optimal distance for accelerating onto or decelerating off of I-95. Six of these have been rated as Poor and the other 39 as Fair. The six locations rated as Poor are listed below:

- NC 211 (N. Roberts Avenue) northbound loop-on ramp at mile marker 20 in Robeson County
- SR 1811 (Bud Hawkins Road) southbound loop off-ramp at mile marker 70 in Harnett County
- NC 210 northbound loop on-ramp at mile marker 95 in Johnston County

- US 70 northbound loop on-ramp at mile marker 97 in Johnston County
- SR 1927 (E. Anderson Street) southbound loop on-ramp at mile marker 98 in Johnson County
- SR 2339 (Bagley Road) northbound on-ramp at mile marker 105 in Johnston County

These interchange locations have deficient ramp distances primarily because they were constructed prior to the adoption of the current standards.

Interchange Spacing: Interchange spacing plays a considerable role in the traffic operations of a freeway. The general rule of thumb regarding minimum interchange spacing is one mile in urban areas and three miles in rural areas (*A Policy on Geometric Design of Highways and Streets [AASHTO Green Book]*, 2004). Of the 56 freeway segments between interchanges in North Carolina on the I-95 corridor, 22 do not meet the minimum interchange spacing requirements. Of the 22 locations that do not meet the minimum interchange spacing requirements, one is located in Robeson County, six are in Cumberland County, five are in Harnett County, one spans Harnett and Johnston Counties, eight are in Johnston County, and one is in Wilson County.

1.2.3 Bridge and Pavement Deficiencies

Throughout the I-95 corridor, there are locations where bridges cross over the interstate and areas where I-95 crosses over streams, railroads, or other roadways. Many of these structures are substandard or have a remaining life of less than 20 years. There are also areas of I-95 that are in need of resurfacing or more extensive pavement reconstruction.

Bridges: There are currently 73 bridges on I-95 in North Carolina and 119 bridges over I-95. The bridge general condition ratings from NCDOT Bridge Inspection Reports assess the state of the individual bridge components (deck, superstructure, substructure, etc.) and are summarized in **Table 1-1**. The general condition ratings range from 0 (failed condition) to 9 (excellent). Current NCDOT bridge survey reports (completed by trained structural staff) translate this numbered rating to an overall present condition of each bridge reported as Good, Fair, or Poor. As shown in the table, approximately three quarters of the bridges on and over I-95 are rated Fair to Poor. Existing bridges on I-95 and over I-95 with a Poor/Average general condition rating are shown in **Figure 1-2**.

Table 1-1: Existing Bridge Condition

Condition	Bridges On I-95		Bridges Over I-95	
Good	15	21%	20	17%
Fair	52	71%	88	74%
Poor	2	3%	8	7%
No Data	4	5%	3	3%
Total	73	100%	119	100%

Source: NCDOT Bridge Inspection Reports, various dates.

A summary of remaining life and deficiencies of I-95 bridges is contained in **Table 1-2**.The average estimated remaining life of all the bridges in the I-95 corridor is 22 years. Similar to the general condition ratings listed in **Table 1-1**, estimated remaining life data from the Bridge Inspection Report was only provided for 69 of the 73 bridges on I-95 and 116 of the 119 bridges over I-95. In addition, many bridges do not meet current vertical clearance standards or are categorized as structurally deficient or functionally obsolete.

Bridges are classified as structurally deficient if the bridge has wear conditions or flaws that have led to a major defect in a support structure or a deteriorating deck, or if the road approaches regularly overtop due to flooding. The fact that a bridge is structurally deficient does not imply that it is unsafe. A structurally deficient bridge typically needs maintenance and repair and eventual rehabilitation or replacement to address deficiencies. A functionally obsolete bridge is one that was not built to modern standards and has sub-standard geometric features such as heights below minimum clearance, narrow lanes, narrow shoulders, or poor approach alignment. A functionally obsolete bridge can still carry traffic safely without major repairs, just not as efficiently as a modern bridge."

Table 1-2: Existing Bridge Remaining Life and Deficiencies

Bridge Condition[1]	Bridges On I-95		Bridges Over I-95	
Remaining Life < 10 Years	9	12%	21	18%
Remaining Life < 20 Years	35	48%	57	48%
Substandard Vertical Clearance	6	8%	26	22%
Structurally Deficient	6	8%	20	17%
Functionally Obsolete	12	16%	32	27%

1. Bridges along I-95 and over I-95 may have none, one, or more of these conditions
Source: NCDOT Bridge Inspection Reports, various dates.

Pavement: Most of the pavement along the I-95 corridor has been rehabilitated to asphalt pavement, with the exception in Nash County and a small segment in Halifax County. NCDOT's 2008 Pavement Condition Ratings data were used to evaluate the existing condition of the mainline pavement along I-95. The provided data is a manual and visual survey conducted by trained professionals driving at low speed and recording the severity and extent of various distresses common to pavement. Their assessment is used to compute a numerical value that indicates the overall condition of the pavement. Pavement sections with a rating of 75 or more are considered to be in Good condition, between 50 to 74 in Fair condition, and less than 50 in Poor condition. Current I-95 pavement conditions are shown in **Figure 1-2**. Pavement conditions are generally Fair to Good, with the exception of 45 miles in Nash County and Halifax County, which are rated in Poor condition. This represents approximately 12 percent of the pavement miles along the corridor (the northbound and southbound pavement are considered separately). In 2003, NCDOT formed a committee to evaluate the condition of the pavement structure (*I-95 Reconstruction Pavement Design Memo*, 2003). They determined the I-95 corridor has excess needs and substandard conditions need to be brought up to an adequate level until reconstruction can take place. In areas where the foundation of the pavement structure is in need of reconstruction, the effective life of subsequent pavement overlays is shortened (Rough Roads Ahead: Fix Them Now or Pay for it Later, 2009).

1.2.4 Safety Issues

A review of historic crash data from 1990 to 2008 (Historical Interstate Data by Route, 2007) shows I-95 had a lower total crash rate and injury crash rate than other interstates in North Carolina, including I-85, I-77, I-40 and I-26. However, I-95 has had a higher rate of fatal crashes over the same time period.

A safety analysis of the I-95 corridor using crash data from 2006 to 2009 (I-95 Crash Rates, by County, for Reporting Period of September 1, 2006 to August 31, 2009, 2009) was performed to establish general crash trends and identify specific crash hot spots. A county-level crash analysis indicates that fatal crashes are an issue in Robeson and Nash Counties, which have safety ratios of 0.58 and 0.79, respectively. A safety ratio less than 1.0 indicates that fatal crash rates in these counties are statistically greater than average. For non-fatal crashes, the I-95 safety ratio is above 1.0 in all counties.

In order to determine more specific safety concerns, a detailed analysis of the 2006 to 2009 crash data (NCDOT Traffic Engineering Accident Analysis System Strip Analysis Report, by County, for Reporting Period of September 1, 2006 to August 31, 2009, 2009) was performed for the I-95 mainline. The safety ratio, which is defined as the critical crash rate divided by the actual crash rate, was used to determine segments with Good, Fair or Poor Ratings. A Good segment was defined as having a safety ratio greater than 1.5, Fair between 1.0 and 1.5, and Poor less than 1.0. The analysis split I-95 into segments between interchanges (referred to as basic freeway segments) and within the interchange influence area (defined by 1,500 feet upstream of interchange off-ramp and 1,500 feet downstream of interchange on-ramp). A total of 115 segments were evaluated, including 57 segments within interchanges and 58 basic freeway segments between interchanges in North Carolina and between the southernmost interchange and the South Carolina border and the northernmost interchange and the Virginia border. The safety analysis of the total crashes on the I-95 mainline shows that of the 115 segments, 85 (74 percent) had a Good safety ratio, 21(18 percent) had a Fair safety ratio and nine (8 percent) had a Poor safety ratio. All of the nine segments with a Poor safety ratio were located within an interchange influence area. The total crash rates for the I-95 mainline by segment are shown in **Figure 1-3**.

1.2.5 Existing Traffic Conditions

The average annual daily traffic (AADT) volumes on I-95 in 2008 varied by county between 30,800 and 44,700 vehicles per day (vpd), with Wilson County having the lowest average and Harnett County having the highest. The segment with the highest AADT (50,000 vpd) is in Johnston County between exits 79 and 81. Exit 81 is the I-95 interchange with I-40, and there are heavy traffic volumes northbound I-95 to westbound I-40 and eastbound I-40 to southbound I-95. I-40 provides a primary link from the Raleigh area to southbound I-95. Johnston County also includes a portion of one of the segments with the lowest AADT of 29,000 vpd, which stretches between exit 107 in Johnston County to exit 119 in Wilson County (NCDOT 2008 Freeway AADT Volumes, May 2009).

I-95 experiences a relatively wide range of seasonal and daily traffic variation due to the high percentage of recreational traffic. The summer months of July and August experience the highest volumes. The months of April and December, when schools typically have spring and winter breaks, also experience higher volumes. The winter months of January and February experience the lowest volumes. Typically, the busiest days of the week are Friday, Saturday, and Sunday, while Tuesday and Wednesday are the least busy days of the week (Continuous Count Program – Volume Monitoring System ATR Seasonal Groups, 2009).

Large trucks constitute a substantial percentage of the traffic on I-95 within North Carolina. NCDOT traffic count data from 2008 show that trucks comprise between 16 and 30 percent of the daily traffic. On average, large trucks comprise 23 percent of the daily traffic (Manual Classification Reports, various dates).

The effectiveness of a roadway segment in serving traffic demand is measured in terms of level of service (LOS). The LOS is defined with letter designations from A through F, with LOS A representing the best operating conditions and LOS F representing the worst. **Table 1-3** describes the traffic conditions generally associated with each LOS designation.

Table 1-3: LOS Classifications and Conditions

LOS	Traffic Flow Conditions
A	Free flow operations. Vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream. The general level of physical and psychological comfort provided to the driver is still high.
B	Reasonably free flow operations. The ability to maneuver within the traffic stream is only slightly restricted and the general level of physical and psychological comfort provided to the driver is still high.
C	Flow with speeds at or near free flow speeds. Freedom to maneuver within the traffic stream is noticeably restricted and lane changes require more vigilance on the part of the driver. The driver notices an increase in tension because of the additional vigilance required for safe operation.
D	Speeds decline with increasing traffic. Freedom to maneuver within the traffic stream is more noticeably limited. The driver experiences reduced physical and psychological comfort levels.
E	At lower boundary, the facility is at capacity. Operations are volatile because there are virtually no gaps in the traffic stream. There is little room to maneuver. The driver experiences poor levels of physical and psychological comfort.
F	Breakdowns in traffic flow. The number of vehicles entering the highway section exceeds the capacity or ability of the highway to accommodate that number of vehicles. There is little or no room to maneuver. The driver experiences poor levels of physical and psychological comfort.

Source: Highway Capacity Manual (HCM), 2000

Analysis of 2008 traffic operations was performed and documented in the *Study Area Needs Assessment* (September 2010), incorporated by reference. In 2008, most of the segments of I-95 experienced acceptable traffic flow. Acceptable traffic flow for freeway segments is defined as LOS C or better in rural areas and LOS D or better in urban and developing areas. The traffic operations analysis of the 58 basic freeway segments between interchanges in North Carolina, including the segments between the southernmost interchange and the South Carolina border and the northernmost interchange and the Virginia border, showed that 51 of the segments operated at LOS C or better (88 percent), seven operated at LOS D (12 percent), and none operated at LOS E or F (0 percent). Five of the seven basic freeway segments operating at LOS D are located in rural areas and thus do not meet the NCDOT minimum LOS standard. Three of these are in Harnett County, one straddles Harnett and Johnston Counties, and one is in Cumberland County. Existing condition LOS designations for the I-95 mainline (FY 2008) are shown in **Figure 1-4**.

On I-95 interchange crossroads, most of the interchange crossroad segments currently experience acceptable traffic flow, but with some unsatisfactory exceptions. Acceptable traffic flow for interchange crossroads is defined as LOS D or better. The analysis showed that in 2008, 82 of the crossroad segments operated at LOS C or better (79 percent), 18 operated at LOS D (17 percent), 4 operated at LOS E (4 percent), and none operated at LOS F (0 percent). Robeson County contains eight of the segments operating at LOS D or LOS E, Johnston County contains five, Cumberland County contains three, and Harnett, Nash and Halifax Counties each contain two.

US 301 is the primary relief route for I-95, running parallel for the entire 182.5 miles except from Exit 10 to Exit 22 where the two facilities run on the same alignment. Most of US 301 currently experiences acceptable traffic flow. Acceptable traffic flow for the alternative route analysis of US 301 is defined as LOS D or better. The analysis of US 301 and US 301 Bypass showed that 146.7 miles operate at LOS C or better (80.4 percent), 34.1 miles operate at LOS D (18.7 percent), 0.8 miles operate at LOS E (0.4 percent), and 0.9 miles operate at LOS F (0.5 percent). The most congested sections of US 301 are in the vicinity of Smithfield/Selma and Rocky Mount.

1.3 FUTURE NEEDS

1.3.1 Future Bridge and Pavement Needs

Based on NCDOT assessments of bridges on or over I-95, significant structural rehabilitated or replacement will be necessary over the next 20 years due to their short remaining life. In the next five years, three bridges over or along I-95 will need to be replaced or rehabilitated, and the numbers sharply increase in subsequent years. Of the 192 bridges on or over I-95, there are 27 bridges that need to be replaced or rehabilitated in the next 5 to 10 years, 26 in the next 10 to15 years, 36 in the next 15 to 20 years, and 93 in 20 or more years. Data was not available for 7 of the bridges.

In addition, the foundation of the pavement structure is in need of reconstruction throughout the corridor, reflecting that much of the corridor is over 30 years old, and to date, little reconstruction has taken place. As a result, the expected life cycle of new pavement in the future will decrease over time if the foundation issues are not addressed.

1.3.2 Future Traffic Conditions

As a result of future traffic growth and few programmed improvements to I-95, traffic operations are predicted to deteriorate in the future as well. Traffic projections were developed, and traffic analysis was performed, for the design year 2040 No Action Alternative using the methodologies described in **Section 1.6.1**. The projected No Action AADT volumes are presented in **Section 1.6.2**.

The No Action traffic analysis indicates that most of the I-95 mainline, ramp merge, ramp diverge, and weave segments will experience unacceptable traffic flow by 2040. In contrast, the majority of the I-95 interchange crossroads and US 301/US 301 Bypass Alternative Route are projected to experience acceptable traffic flow. More detailed No Action traffic analysis results are shown in **Section 1.6.3**.

1.3.3 Funding Issues

Based on NCDOT's most recent adopted statewide long-range plan, *North Carolina's Long-Range Statewide Multimodal Transportation Plan* (NCDOT, 2004), the total funding available for statewide transportation improvements and maintenance over the study's 25-year planning period is $55 billion (in constant 2001 dollars). The same plan also estimates that over the same time period NCDOT has approximately $85 billion in multimodal transportation needs. Clearly, projected statewide transportation needs far exceed the funding available from existing sources, which will make it difficult to receive the funds needed for I-95.

The 2009-2015 STIP only has funding to address a portion of the needs described above for I-95. The 2009-2015 STIP lists 34 improvement projects on I-95, consisting of capacity, pavement, infrastructure, and maintenance projects. These projects are estimated to cost approximately $1billion. Thirteen of the projects received funding in years previous to 2009, amounting to $110 million. Just under $365 million in funding has been programmed in the STIP to cover some of the remaining costs for these projects, leaving an unfunded backlog of $546 million, or 53 percent of the total costs. Without additional funding, the I-95 projects in the 2009-2015 STIP could not be completed before 2025 at the current rate that projects have been funded. Funding for the remaining improvements on I-95 has no identified source.

1.4 I-95 PROJECT PURPOSE AND NEED

Based on the evaluation of existing and future conditions along I-95 summarized above, the project's needs and purpose are identified below:

Project Need:

- Capacity deficiencies
- Structural deficiencies
- Geometric deficiencies
- Higher than statewide average fatal crash rate for Interstates
- Funding deficiencies

Project Purpose:

- Improve capacity
- Improve infrastructure
- Reduce fatal crash rate along I-95 corridor
- Develop a feasible funding strategy

The goals and objectives of the project are listed below. These goals and objectives will be used to evaluate the ability of project alternatives to meet the project's purpose.

- Upgrade interstate to meet current design standards

- Provide additional capacity for predicted future traffic volumes at a Level of Service (LOS) C or better for the entire corridor, with the possible exception of limited spot locations with urbanized areas where LOS D may be considered acceptable.
- Identify a plan for realistic and reliable funding options that will meet the long-term funding needs of the corridor
- Utilize existing roadway right-of-way to the extent possible
- Minimize environmental impacts
- Ensure consistency with local transportation plans
- Obtain informed consent from study participants (federal, state and local agencies, members of the public) on project Purpose and Need and Alternatives to be Considered
- Incorporate the NCDOT Complete Streets Policy on overpasses, where appropriate
- Maintain evacuation routes

The project purpose and need and goals and objectives were developed in consultation with environmental resource and regulatory agencies through an Agency Steering Committee. Details regarding the role of the Agency Steering Committee and its members are included in **Section 4.1**. The Agency Steering Committee members concurred on May 19, 2011, with the project purpose and need and goals and objectives. This concurrence form is included in **Appendix A**. The general public and local officials also were afforded an opportunity to comment on the project's purpose and analysis of existing and future conditions. **Chapter 4** provides details regarding agency coordination and public involvement.

1.5 ALTERNATIVES EVALUATION PROCESS

A three step alternatives screening process was used to develop and evaluate a range of alternatives and ultimately determine the refined preferred design concept and scope evaluated in this EA. Details of the alternatives screening process are included in **Appendix B**. In the Level 1 screening, a broad range of alternatives were evaluated based on their ability to meet the project's purpose and need and to determine if they had a fatal flaw. In Level 2, alternatives that appeared to be able to meet the project's purpose and need were qualitatively assessed in more detail to eliminate flawed alternatives and alternatives were then compared to identify the preferred design concept and scope. In Level 3, the preferred design concept and scope was refined.

1.6 TRAFFIC OPERATIONS UNDER NO ACTION AND IMPROVED I-95 SCENARIOS

This section provides an assessment of the future traffic conditions, and the lane requirements of the I-95 corridor. Year 2040 traffic operations analysis of the No Action, Build Non-Toll and Build Toll Scenarios was performed for the I-95 mainline, ramp merge/diverge, and weave locations, along with the interchange crossroads and alternative route (US 301). **Table 1-4** below shows local jurisdiction and year 2009-2015 NCDOT STIP projects included in the year 2040 traffic operations analysis. The 2009-2015 NCDOT STIP was the most current at the time of the analysis.

Table 1-4: Programmed Roadway Projects

County	Roadway Description	Improvement Type	Source
Robeson	NC 20, from SR 1729 (Shaw Road) to Bladen County Line	Widen - 2 to 4 lanes	Robeson County CTP
Robeson	NC 211, from Lumberton to Red Springs	Widen - 2 to 4 lanes	Robeson County CTP
Robeson	US 301, from NC 20 to I-95 (Exit 33)	Widen - 2 to 4 lanes	Robeson County CTP
Robeson	I-95 and US 301, from Jackson Court to SR 1791 (Dawn Drive)	Revise Interchange / Widen - 2 to 4 lanes	NCDOT STIP I-4413
Cumberland	NC 53-210 (Cedar Creek Road), from I-95 (Exit 49) to NC 53/210 Junction	Widen - 2 to 4 lanes	NCDOT STIP U-4415
Johnston	US 301 / NC 96, from NC 96 to SR 1007 (Brogden Road)	Widen - 2 to 4 lanes	NCDOT STIP U-3464
Nash	I-95, New Interchange at SR 1770 (Sunset Avenue)	New Facility	NCDOT STIP U-5026
Nash	NC 43 (Benvenue Road / Dortches Boulevard), from SR 1616 (County Club Road) to I-95 (Exit 141)	Widen - 2 to 4 lanes	NCDOT STIP U-2561
Nash	US 301 Bypass, from NC 43 (Benvenue Road) to SR 1836 (May Drive)	Widen - 4 to 6 lanes	NCDOT STIP U-3330
Northampton	US 158 / NC 46, from I-95 (Exit 176) to SR 1333 (Lynch Road)	Widen - 2 to 4 lanes	NCDOT STIP R-2582

Source: *Robeson County Comprehensive Transportation Plan Study* (Robeson County, NCDOT, Lumber River RPO, April 2011) & *2009-1015 North Carolina Statewide Transportation Improvement Program* (NCDOT, July 2008)

1.6.1 Traffic Forecast and Operations Analysis Methodology

Traffic forecasts were developed for the design year 2040 No Action Alternative and the preferred design concept and scope Build Non-Toll and Build Toll Scenarios using the methodology described in the *I-95 Corridor Planning and Finance Study TIP No. I-5133 – Draft Model Design Memo* (Revised January 2010), incorporated by reference. Design year traffic volumes were developed from these forecasts using traffic factors and methodology described in the *Design Year Traffic Operations Technical Memorandum* (December 2011), incorporated by reference.

The traffic operations analysis methodology is in accordance with the NCDOT Congestion Management's Capacity Analysis Guidelines (February 2006) and the Highway Capacity Manual (HCM 2000). A detailed description of the traffic operations analysis methodology is documented in the *Design Year Traffic Operations Technical Memorandum* (December 2011), incorporated by reference. Traffic operations analyses were performed for the following three scenarios:

- **Design Year 2040 No Action** – to determine deficiencies and needs.
- **Design Year 2040 Build Non-Toll** – to confirm ability of refined preferred design concept and scope to provide acceptable traffic operations in the design year with non-toll traffic.
- **Design Year 2040 Build Toll** – to confirm ability of refined preferred design concept and scope to provide acceptable traffic operations in the design year with toll traffic.

1.6.2 Traffic Volumes

With no improvements to the I-95 corridor, the traffic volume average annualized growth rate (AGR) by county varied between 0.69 percent and 1.76 percent, with Halifax County having the lowest average, and Cumberland County having the highest. The Build Non-Toll forecasts of the I-95 mainline showed higher average AGRs by county, varying between 0.76 percent and 2.52 percent, with Halifax County having the lowest average, and Cumberland County having the highest. Due to diversion, the Build Toll forecasts of the I-95 mainline showed lower average AGRs by county, varying between -0.18 percent and 1.93 percent, with Wilson County having the lowest average, and Cumberland County having the highest. However, the differences between the Build Non-Toll and Build Toll scenarios are relatively small. **Table 1-5** below shows the county average AGRs and traffic volumes along with the highest and lowest AADTs for each county. As described in **Section 1.6.1,** traffic forecasts for the year 2040 AADT were developed for the No Action, Build Non-Toll and Build Toll Scenarios.

Table 1-5: I-95 Mainline AADT Volumes by County

County	Volume Measure of Effectiveness	Year 2009 Existing	Year 2040 No Action	Year 2040 Build Non-Toll	Year 2040 Build Toll
Robeson	Minimum AADT	31,000	44,800	44,900	34,200
	Maximum AADT	47,000	73,800	84,900	78,900
	Average AADT	38,300	57,100	60,300	50,100
	Average AGR[1]	-	1.28%	1.43%	0.80%
Cumberland	Minimum AADT	33,000	61,900	73,300	51,700
	Maximum AADT	48,000	89,800	108,500	89,300
	Average AADT	41,300	70,600	89,000	74,800
	Average AGR[1]	-	1.76%	2.52%	1.93%
Harnett	Minimum AADT	47,000	67,900	73,300	50,100
	Maximum AADT	49,000	88,600	84,200	74,200
	Average AADT	48,300	78,700	79,300	65,500
	Average AGR[1]	-	1.58%	1.61%	0.95%
Johnston	Minimum AADT	31,000	42,500	44,800	28,900
	Maximum AADT	53,000	88,600	81,300	72,400
	Average AADT	38,100	57,000	58,700	45,100
	Average AGR[1]	-	1.25%	1.38%	0.47%
Wilson	Minimum AADT	31,000	33,900	35,600	23,200
	Maximum AADT	36,000	49,800	53,300	39,200
	Average AADT	33,300	43,400	46,000	32,100
	Average AGR[1]	-	0.84%	1.02%	-0.18%
Nash	Minimum AADT	35,000	45,200	45,700	38,200
	Maximum AADT	43,000	66,200	67,800	60,800
	Average AADT	38,500	51,700	54,300	42,100
	Average AGR[1]	-	0.95%	1.11%	0.26%
Halifax	Minimum AADT	38,000	45,600	46,600	35,900
	Maximum AADT	40,000	50,000	51,700	46,500
	Average AADT	39,200	48,500	49,600	40,100
	Average AGR[1]	-	0.69%	0.76%	0.06%

Table 1-5: I-95 Mainline AADT Volumes by County

County	Volume Measure of Effectiveness	Year 2009 Existing	Year 2040 No Action	Year 2040 Build Non-Toll	Year 2040 Build Toll
Northampton	Minimum AADT	34,000	43,400	43,400	43,000
	Maximum AADT	39,000	48,500	49,000	45,500
	Average AADT	36,000	45,500	45,700	44,600
	Average AGR[1]	-	0.76%	0.77%	0.70%
Statewide	Minimum AADT	31,000	33,900	35,600	23,200
	Maximum AADT	53,000	89,800	108,500	89,300
	Average AADT	39,500	58,900	64,100	52,100
	Average AGR[1]	-	1.25%	1.50%	0.77%

Source: *2008 Freeway AADT Volumes* (NCDOT, May 2009), 2040 Average Annual Daily Traffic Alternative 2 – No-Build (October 2011), 2040 Average Annual Daily Traffic Alternative 2 – Build No Toll (September 2011), 2040 Average Annual Daily Traffic Alternative 2 – Build 3$ Phased-Toll w/ Ramp Tolls (November 2011)

1. AGR – Annualized Growth Rate for traffic volumes

1.6.3 No Action Alternative

The design year 2040 traffic forecasts for the No Action Alternative was analyzed to determine deficiencies and needs of the I-95 corridor. The No Action Alternative would include no capacity improvements to address current or future congestion, and would fund safety, maintenance, or modernization needs only to the level that can be accomplished by current funding levels.

A summary of the year 2040 No Action Alternative traffic operations results is shown in **Table 1-6**. LOS for the I-95 mainline, merge/diverge/weave, and interchange crossroads represents the number of individual elements with LOS A to F. The US 301 alternative route LOS represents the numbers of miles with LOS A to F.

Table 1-6: Year 2040 No Action Traffic Operations

Facility Type	LOS A	LOS B	LOS C	LOS D	LOS E	LOS F
I-95 Mainline	0 (0%)	1 (2%)	17 (29%)	10 (17%)	9 (15%)	22 (37%)
I-95 Ramp Merge/Diverge/Weave	0 (0%)	2 (1%)	41 (18%)	85 (36%)	12 (5%)	93 (40%)
I-95 Interchange Crossroads[1]	31 (28%)	20 (18%)	24 (21%)	20 (18%)	10 (9%)	7 (6%)
US 301 Alternate Route (miles)	11 (6%)	48 (26%)	37 (20%)	47 (26%)	12 (7%)	27 (15%)

Source: *Design Year Traffic Operations Technical Memorandum* (December 2011)

1. One interchange crossroad segment (SR 2341) was not included in the traffic model. SR 2341 is dead end road that does not provide access to I-95 from any of the model loading points. In addition, negligible growth is anticipated on this link. Therefore, it was decided not to include SR 2341 in the model.

Based on the LOS analysis for the I-95 mainline using 2040 AADTs, with no improvements to I-95, the majority of the basic freeway segments are projected to experience unacceptable traffic operations. The traffic operations analysis of the 59 basic freeway segments showed that eighteen of the segments are projected to operate at LOS C or better (31 percent), ten projected at LOS D (17 percent), and thirty-one projected at LOS E or F (52 percent). Six of the ten basic freeway segments forecasted to operate at LOS D are located in rural areas and thus do not meet the NCDOT minimum LOS C standard. Thirty of the thirty-one basic freeway segments projected to operate at LOS E or F are located between Exit 17 and Exit 97 in Robeson, Cumberland, Harnett and Johnston Counties. The I-95 Year 2040 No Action Alternative mainline LOS is also shown in **Figure 1-5**.

In addition to the basic freeway segments, a capacity analysis of the interchange ramp merge and diverge areas was performed. Similar to the basic freeway segments, using 2040 AADTs the LOS analysis of the I-95 interchange ramp merge and diverge areas showed that the majority are projected to experience unacceptable traffic operations. The traffic operations analysis of the 233 ramp merge, diverge, or weave segments showed that 43of the segments are projected to operate at LOS C or better (19 percent), 85 projected at LOS D (36 percent), and 105 projected at LOS E or F (45 percent). Fifty-six of the 85 ramp merge, diverge or weave segments forecasted to operate at LOS D are located in rural areas and thus do not meet the NCDOT minimum LOS C standard. Similar to the basic freeway segments, most of the ramp merge, diverge, or weave areas projected to operate at LOS E or F are located between Exit 17 and Exit 97 in Robeson, Cumberland, Harnett and Johnston Counties.

According to the LOS analysis of the I-95 interchange crossroads for 2040, most interchange crossroad segments are projected to experience acceptable traffic operations. The analysis showed that 75 crossroad segments are projected to operate at LOS C or better (67 percent), 20 projected at LOS D (18 percent), and 17 projected at LOS E or F (15 percent). Seven Cumberland County crossroad segments are projected to operate at LOS E or F, with five so rated in Johnston County, two each in Harnett and Nash Counties, and one in Robeson County.

During congested periods on I-95, US 301 would continue to act as an alternative route. US 301 parallels the I-95 corridor within North Carolina except from Exit 10 to Exit 22 where the two facilities run on the same alignment. According to the LOS analysis for US 301 and US 301 Bypass for 2040, most of the alternative route segments are projected to experience acceptable traffic operations. The analysis of the 182 miles of US 301 and US 301 Bypass showed that approximately 96 miles are projected to operate at LOS C or better (52 percent), 47 miles projected at LOS D (26 percent), and 39 miles projected at LOS E or F (22 percent). The most congested sections of the alternative route are in the vicinity of Fayetteville, Smithfield/Selma, and Rocky Mount.

1.6.4 Build Preferred Design Concept and Scope - Non-Toll Scenario

The design year 2040 Build Preferred Design Concept and Scope - Non-Toll Scenario (Build Non-Toll Scenario) would reconstruct the existing alignment of I-95, adding additional lanes to I-95 and evaluating interchange forms to improve traffic operations and safety conditions. I-95 would remain as a non-tolled facility.

A summary of the Build Non-Toll Scenario traffic operations results is shown in **Table 1-7**. I-95 mainline, merge/diverge/weave, and interchange crossroads LOS represents the number of individual elements with LOS A to F. The US 301 alternative route LOS represents the numbers of miles with LOS A to F.

Table 1-7: Year 2040 Build Non-Toll Traffic Operations

Facility Type	LOS A	LOS B	LOS C	LOS D	LOS E	LOS F
I-95 Mainline	0 (0%)	24 (40%)	33 (55%)	3 (5%)	0 (0%)	0 (0%)
I-95 Ramp Merge/Diverge/Weave	8 (4%)	72 (31%)	124[1] (53%)	26 (11%)	0 (0%)	3 (1%)
I-95 Interchange Crossroads[2]	31 (28%)	28 (25%)	23 (21%)	19 (17%)	5 (4%)	6 (5%)
US 301 Alternative Route (miles)	30 (17%)	67 (37%)	19 (10%)	53 (29%)	8 (4%)	5 (3%)

Source: *Design Year Traffic Operations Technical Memorandum* (December 2011)

1. The conceptual design had one ramp segment, the SR 1815 (Wade Stedman Road) (Exit 61) northbound loop off-ramp, that was projected to operate at LOS E. A two-lane loop off-ramp would provide LOS D and meet the NCDOT minimum LOS standard. This modification to the design concept was evaluated and it was determined that it would not affect the project cost estimate nor required right-of-way. Therefore, it is considered to be included in the preferred design concept and scope.
2. One interchange crossroad segment (SR 2341) was not included in the traffic model. SR 2341 is dead end road that does not provide access to I-95 from any of the model loading points. In addition, negligible growth is anticipated on this link. Therefore, it was decided not to include SR 2341 in the model.

Based on the LOS analysis for the I-95 mainline using 2040 AADTs and an improved I-95, all of the basic freeway segments are projected to experience acceptable traffic operations. The traffic operations analysis of the 60 basic freeway segments showed that 57 of the segments are projected to operate at LOS C or better (95 percent), three projected at LOS D (5 percent), and none projected at LOS E or F. None of the three basic freeway segments forecasted to operate at LOS D are located in rural areas and thus all meet the NCDOT minimum LOS standard. The I-95 Build Non-Toll mainline LOS is shown in **Figure 1-6**.

In addition to the basic freeway segments, a capacity analysis of the interchange ramp merge and diverge areas was performed. Similar to the basic freeway segments, using 2040 AADTs, the LOS analysis of the I-95 interchange ramp merge and diverge areas showed that all but a few segments are projected to experience acceptable traffic operations. The traffic operations analysis of the 233 ramp merge, diverge, or weave segments showed that 204 of the segments are projected to operate at LOS C or better (88 percent), 26 projected at LOS D (11 percent), and three projected at LOS E or F (1 percent). None of the 26 ramp merge, diverge or weave segments forecasted to operate at LOS D are located in rural areas and thus meet the NCDOT minimum LOS standard.

The Highway Capacity Software (HCS) analysis showed that three I-95 loop on-ramp merge locations are projected to operate at LOS F due to the total traffic flow entering the ramp influence area exceeding its maximum desirable level. The three locations are the NC 53/210 (Exit 49) northbound loop on-ramp, I-295/US 13 (Exit 58) southbound loop on-ramp, and US 421 (Exit 73) southbound loop on-ramp. In each location the total freeway flow does not exceed the capacity of the downstream freeway segment. In this case, locally high densities are expected, but no queuing is anticipated on the freeway. The actual lane distribution of the entering vehicles is likely to consist of more vehicles in the outer lanes than is indicated by this analysis of the ramp influence area. Overall, the operation will remain stable, and LOS F is not expected to occur (HCM 2000, Page 25-8).

According to LOS analysis of the I-95 interchange crossroads for design year 2040, most interchange crossroad segments are projected to experience acceptable traffic operations. The analysis showed that 82 crossroad segments are projected to operate at LOS C or better (73 percent), 19 projected at LOS D (17 percent), 11 projected at LOS E or F (10 percent). Four crossroad segments in each of Cumberland and Johnston Counties are projected to operate at LOS E or F, with two so rated in Nash County, and one in Robeson County.

As mentioned previously, US 301 would act as an alternative route to I-95 since it parallels the corridor within North Carolina except from Exit 10 to Exit 22 where the two facilities run on same alignment. According to the LOS analysis for US 301 and US 301 Bypass for year 2040, most of the alternative route segments are projected to experience acceptable traffic operations. The analysis of the 182 miles of US 301 and US 301 Bypass showed that approximately 116 miles are projected to operate at LOS C or better (64 percent), 53 miles projected at LOS D (29 percent), and 13 miles projected at LOS E or F (7 percent). The most congested sections of the alternative route are in the vicinity of Fayetteville, Smithfield/Selma, Wilson and Rocky Mount.

1.6.5 Build Preferred Design Concept and Scope - Toll Scenario

The design year 2040 Build Preferred Design Concept and Scope – Toll Scenario (Build Toll Scenario) would reconstruct the existing alignment of I-95, adding additional lanes to I-95 and modifying interchange forms to improve traffic operations and safety conditions. I-95 would become a tolled facility as part of this alternative to provide funding for the improvements. The proposed tolling plan, described in **Chapter 2**, would implement all electronic tolling at toll zone locations with approximately 20 mile spacing and at select ramps. The Year 2040 Build Preferred Design Concept and Scope – Toll Scenario traffic was developed based on a model which assumes an improved I-95 and takes into account changes in traffic resulting from conversion to a toll facility. This model was used to develop revised traffic estimates for I-95 mainline, ramps, interchange crossroads, alternative route, and diversion routes.

Level of Service Evaluation. A summary of the year 2040 Build Preferred Design Concept and Scope – Toll Scenario traffic operations results is shown in **Table 1-8**. LOS for the I-95 mainline, merge/diverge/weave, and interchange crossroads represents number of individual elements with LOS A to F. The US 301 alternative route LOS represents the numbers of miles with LOS A to F.

Table 1-8: Year 2040 Build Toll Traffic Operations

Facility Type	LOS A	LOS B	LOS C	LOS D	LOS E	LOS F
I-95 Mainline	3 (5%)	33 (55%)	24 (40%)	0 (0%)	0 (0%)	0 (0%)
I-95 Merge / Diverge / Weave	24 (10%)	130 (56%)	71[1] (31%)	5 (2%)	0 (0%)	3 (1%)
I-95 Interchange Crossroads[2]	26 (23%)	27 (24%)	21 (19%)	22 (20%	9 (8%)	7 (6%)
US 301 Alternative Route (miles)	5 (3%)	35 (19%)	27 (15%)	54 (30%)	31 (17%)	30 (16%)

Source: *Design Year Traffic Operations Technical Memorandum* (December 2011)

1. The conceptual design had one ramp segment, the SR 1815 (Wade Stedman Road) (Exit 61) northbound loop off-ramp, that was projected to operate at LOS F. A two-lane loop off-ramp would provide LOS D and meet the NCDOT minimum LOS standard. This modification to the design concept was evaluated and it was determined that it would not affect the project cost estimate nor required right-of-way. Therefore, it is considered to be included in the preferred design concept and scope.
2. One interchange crossroad segment (SR 2341) was not included in the traffic model. SR 2341 is dead end road that does not provide access to I-95 from any of the model loading points. In addition, negligible growth is anticipated on this link. Therefore, it was decided not to include SR 2341 in the model.

Based on the LOS analysis for the I-95 mainline using 2040 AADTs and an improved I-95 toll facility, all of the basic freeway segments are projected to experience acceptable traffic operations. The traffic operations analysis of the 60 basic freeway segments showed that all 60 of the segments are projected to operate at LOS C or better. The I-95 Build Toll mainline LOS is also shown in **Figure 1-7**.

In addition to the basic freeway segments, a capacity analysis of the interchange ramp merge and diverge areas was performed. Similar to the basic freeway segments, using 2040 AADTs the LOS analysis of the I-95 interchange ramp merge and diverge areas showed that all but a few segments are projected to experience good traffic operations. The traffic operations analysis of the 233 ramp merge, diverge, or weave segments showed that 225 of the segments are projected to operate at LOS C or better (97 percent), five projected at LOS D (2 percent), and three projected at LOS E or F (1 percent). None of the five ramp merge, diverge or weave segments forecasted to operate at LOS D are located in rural areas and thus these segments meet the NCDOT minimum LOS standard.

The HCS analysis showed three I-95 loop on-ramp merge locations are projected to operate at LOS F due to the total traffic flow entering the ramp influence area exceeding its maximum desirable level. The three locations are the NC 53/210 (Exit 49) northbound loop on-ramp, I-295 / US 13 (Exit 58) southbound loop on-ramp, and US 421 (Exit 73) southbound loop on-ramp. In each location the total freeway flow does not exceed the capacity of the downstream freeway segment. In this case, locally high densities are expected, but no queuing is expected on the freeway. The actual lane distribution of the entering vehicles is likely to consist of more vehicles in the outer lanes than is indicated by this analysis of the ramp influence area. Overall, the operation will remain stable, and LOS F is not expected to occur (HCM 2000, Page 25-8).

According to LOS analysis of the I-95 interchange crossroads for design year 2040, most interchange crossroad segments are projected to experience acceptable traffic operations. The analysis showed that 74 crossroad segments are projected to operate at LOS C or better (66 percent), 22 projected at LOS D (20 percent), 16 projected at LOS E or F (14 percent). Five crossroad segments each in Cumberland and Johnston Counties are projected to operate at LOS E or F, with three so rated in Nash County, two in Harnett County and one in Robeson County.

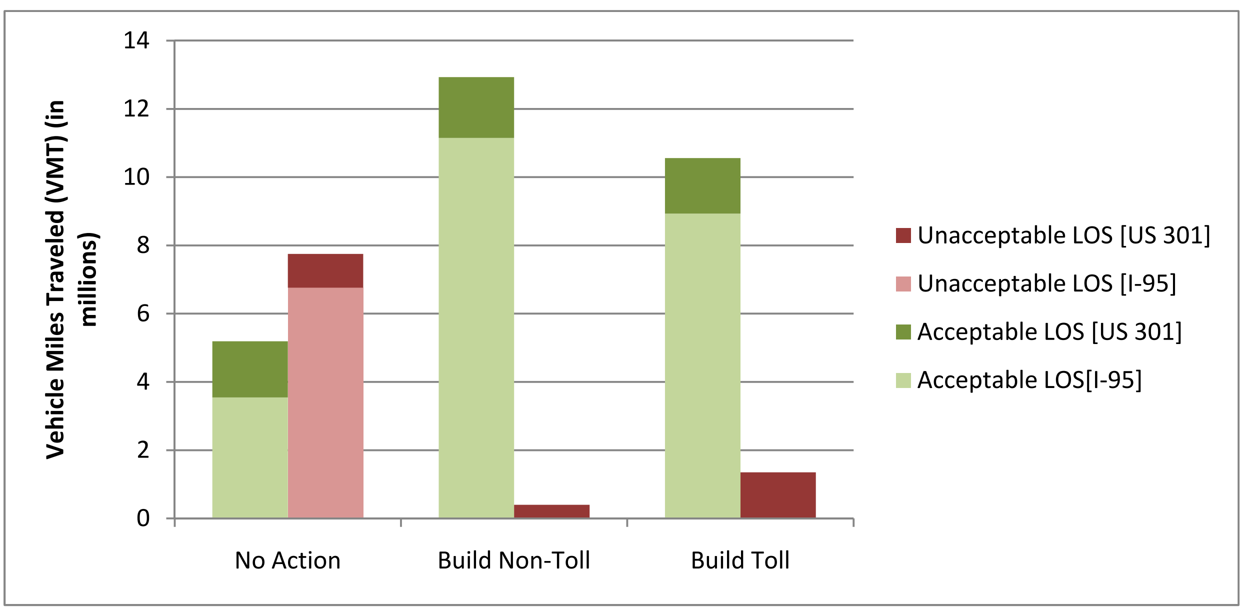
As mentioned previously, US 301 may act as an alternative route to I-95 as it parallels the corridor within North Carolina except from Exit 10 to Exit 22 where the two facilities run on same alignment. According to the LOS analysis for US 301 and US 301 Bypass for year 2040, the majority of the alternative route segments are projected to experience good traffic operations. The analysis of the 182 miles of US 301 and US 301 Bypass showed that approximately 67 miles are projected to operate at LOS C or better (37 percent), 54 miles projected at LOS D (30 percent), and 61 miles projected at LOS E or F (33 percent). The most congested sections of the alternative route are in the vicinity of Fayetteville, Smithfield/Selma and Wilson.

1.6.6 Comparison of Anticipated Traffic Operating Conditions

This section provides a comparison of the projected design year 2040 traffic operations between the No Action Alternative and the Build Toll and Build Non-Toll Scenarios.

I-95/US 301 LOS Comparison. A comparison of the aggregate levels of service on I-95 and US 301 for the No Action Alternative, Build Non-Toll Scenario, and Build Toll Scenario based on vehicle miles traveled (VMT) for the I-95 mainline and US 301 and US 301 Bypass alternative route is presented in **Exhibit 1-1**. For the No Action Alternative, 40 percent of the total VMT would operate under acceptable LOS conditions, which is considered LOS A to LOS D for US 301 and for I-95 LOS C or better in rural areas and LOS D or better in urban areas. In comparison, for the Build Non-Toll and Build Toll Scenarios, 97 percent and 89 percent, respectively, of the total VMT would operate under acceptable LOS conditions.

Exhibit 1-1: Comparison of Vehicle Miles Traveled by LOS

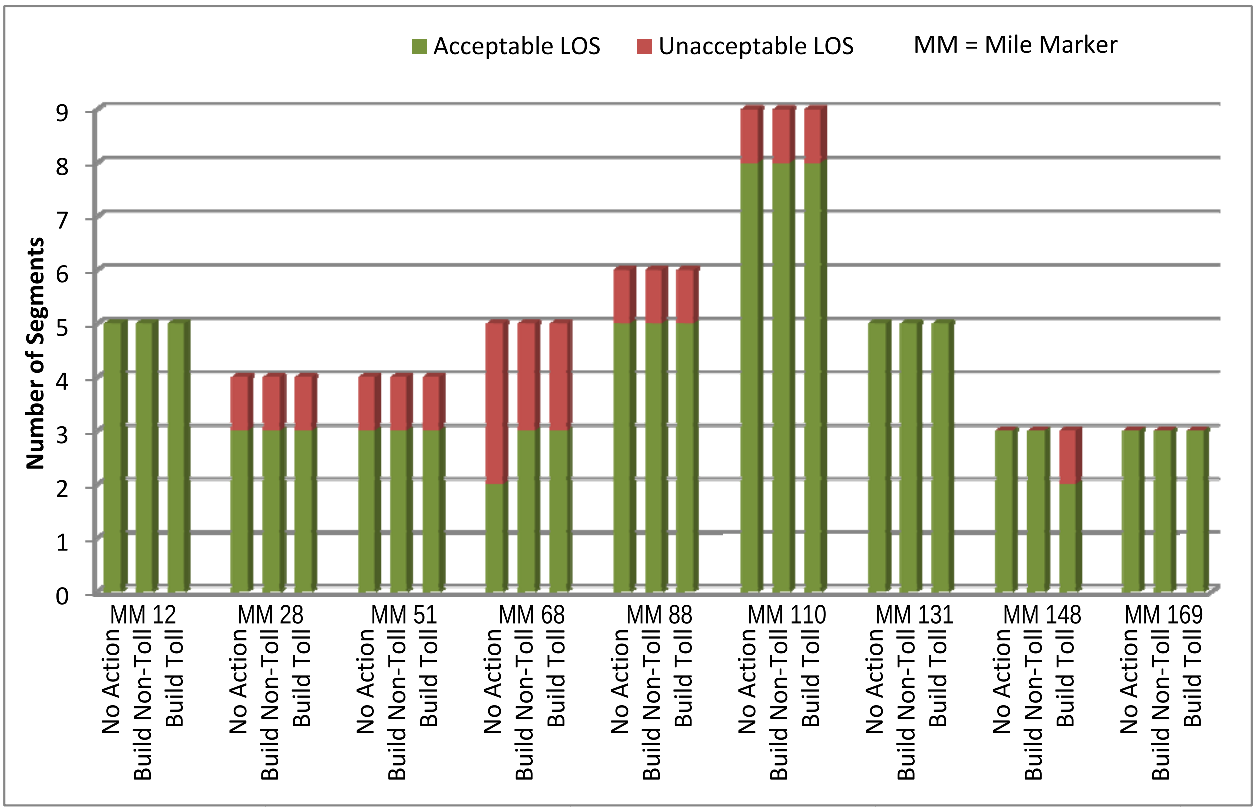


Source: *Design Year Traffic Operations Technical Memorandum* (December 2011)

<u>Toll Zone Diversion Route Analysis</u>. Tolling of I-95 would likely lead some traffic to divert in order to avoid paying a toll. The impact of this diversion was evaluated using a cutline diversion route analysis. The cutline diversion route analysis was performed at each of the nine mainline toll zone locations that define the tolling scheme as described in **Chapter 2**, since traffic projections indicate that diversion would be the highest at these locations. The analysis included all parallel routes to I-95 that are likely to carry traffic diverted from I-95. To conduct the analysis, a perpendicular line (or cutline) was drawn at each toll zone location. The traffic volumes projected at the locations where the cutline crossed parallel routes were analyzed to calculate LOS at those parallel route locations. The 2040 No Action Alternative, Build Non-Toll Scenario, and Build Toll Scenario were evaluated for each location identified along a cutline.

The traffic operations analysis results presented in **Exhibit 1-2** show the composite roadway segment LOS where the cutline crosses the diversion routes for the No Action Alternative, Build Non-Toll Scenario and Build Toll Scenario. For the diversion route analysis, LOS A to LOS D is considered acceptable and LOS E or LOS F is considered unacceptable.

Exhibit 1-2: Comparison of Toll Zone Diversion Routes by LOS



Source: *Design Year Traffic Operations Technical Memorandum* (December 2011)

The year 2040 No Action alternative LOS analysis of the diversion routes shows that composite operations along diversion routes crossed by most of the cutlines are projected to experience acceptable traffic flow with no tolls in place on I-95 and no improvements to I-95. The analysis shows that of the 44 total diversion route segments analyzed, 27 segments are projected to operate at LOS C or better

(61 percent), ten are projected to operate at LOS D (23 percent), and seven are projected to operate at LOS E or F (16 percent). Three diversion route segments associated with the toll zone at mile marker 68 are projected to operate at LOS E or F, with other single segments also operating at LOS E or F at mile markers 28, 51, 88 and 110.

The year 2040 Build Non-Toll alternative LOS analysis of the diversion routes shows that composite operations along diversion routes crossed by most of the cutlines are projected to experience acceptable traffic flow with no tolls in place on I-95. The analysis shows that of the 44 total diversion route segments analyzed, 34 segments are projected to operate at LOS C or better (78 percent), four are projected to operate at LOS D (9 percent), and six are projected to operate at LOS E or F (13 percent). Two diversion route segments associated with the toll zone at mile marker 68 are projected to operate at LOS E or F, with other single segments also operating at LOS E or F at mile markers 28, 51, 88 and 110. As compared to the No Action Alternative, the Build Non-Toll Alternative has one less diversion route segment projected to operate at LOS E or F.

The year 2040 Build Toll alternative LOS analysis of the diversion routes shows that most are projected to experience acceptable traffic flow. The analysis shows that of the 44 total diversion route segments analyzed, 25 diversion route segments are projected to operate at LOS C or better (57 percent), 12 projected to operate at LOS D (27 percent), and seven projected to operate at LOS E or F (16 percent). Two diversion route segments associated with the toll zone at mile marker 68 are projected to operate at LOS E or F, with other single segments also operating at LOS E or F at mile markers 28, 51, 88, 110 and 148. As compared to the No Action Alternative, the Build Toll Alternative has the same number of diversion route segments projected to operate at LOS E or F.

1.7 CAPITAL COST ESTIMATE FOR THE REFINED PREFERRED DESIGN CONCEPT AND SCOPE

In this section, a capital cost estimate for the refined preferred design concept and scope – Toll and Non-Toll Scenarios is presented. The construction cost estimation methodology is detailed in the *Cost Estimating Methodology Tech Memo* (March 2010), incorporated by reference.

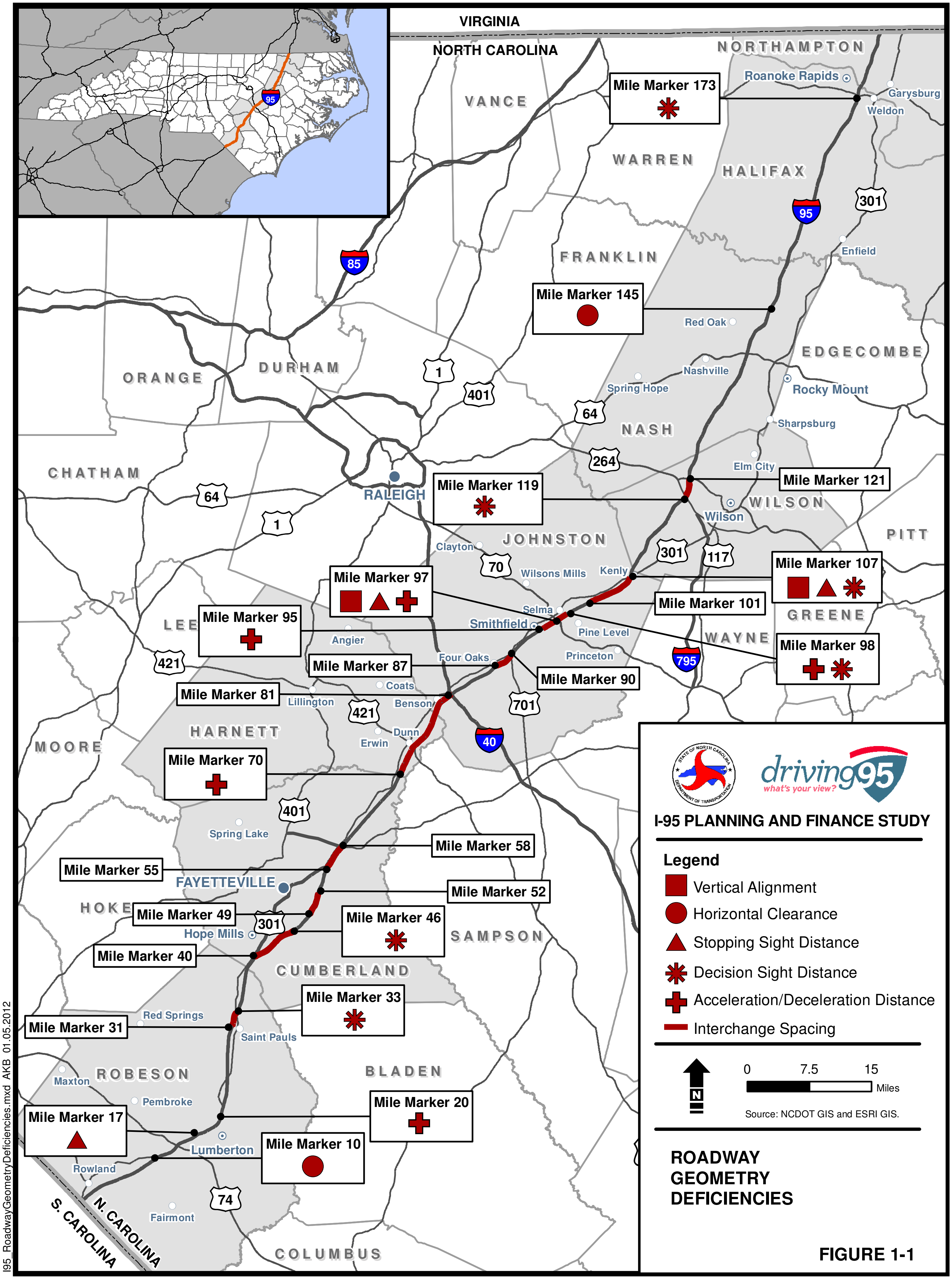
The total capital cost of the refined preferred design concept and scope is estimated to be approximately $4.4 billion. The cost estimate includes preliminary engineering, construction, utility relocation, right of way, construction engineering and toll equipment costs. The capital cost estimate summary is presented in **Table 1-9** and the detailed estimate is documented in **Appendix C**.

Table 1-9: Capital Cost Estimate

Item	Cost Estimate (2011$ in millions)
Preliminary Engineering	$301
Construction[1]	$3,328
Utility Relocation[2]	$13
Right of Way	$322
Construction Engineering	$401
Total, Non-Toll	$4,364
Toll Equipment	$78
Total, Toll	$4,442

Source: Capital Cost Estimate (Appendix C)

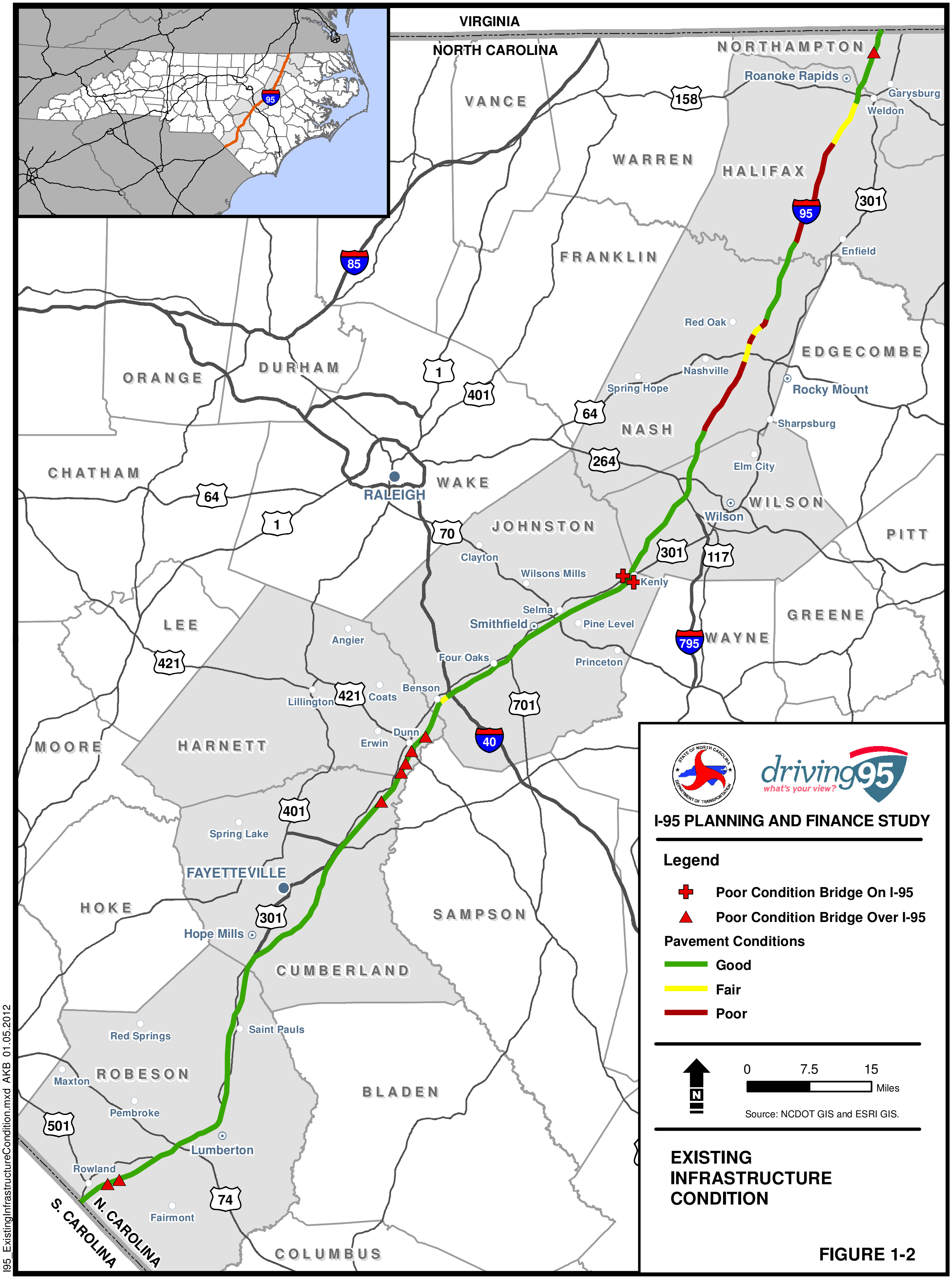
Notes:
1. Construction cost includes roadway and structures, water and sewer utility construction, Intelligent Transportation Systems (ITS), miscellaneous items and mobilization, and contingencies. The cost estimate assumes concrete pavement.
2. Includes costs to relocate power, communication, and gas utilities.



ROADWAY GEOMETRY DEFICIENCIES

FIGURE 1-1

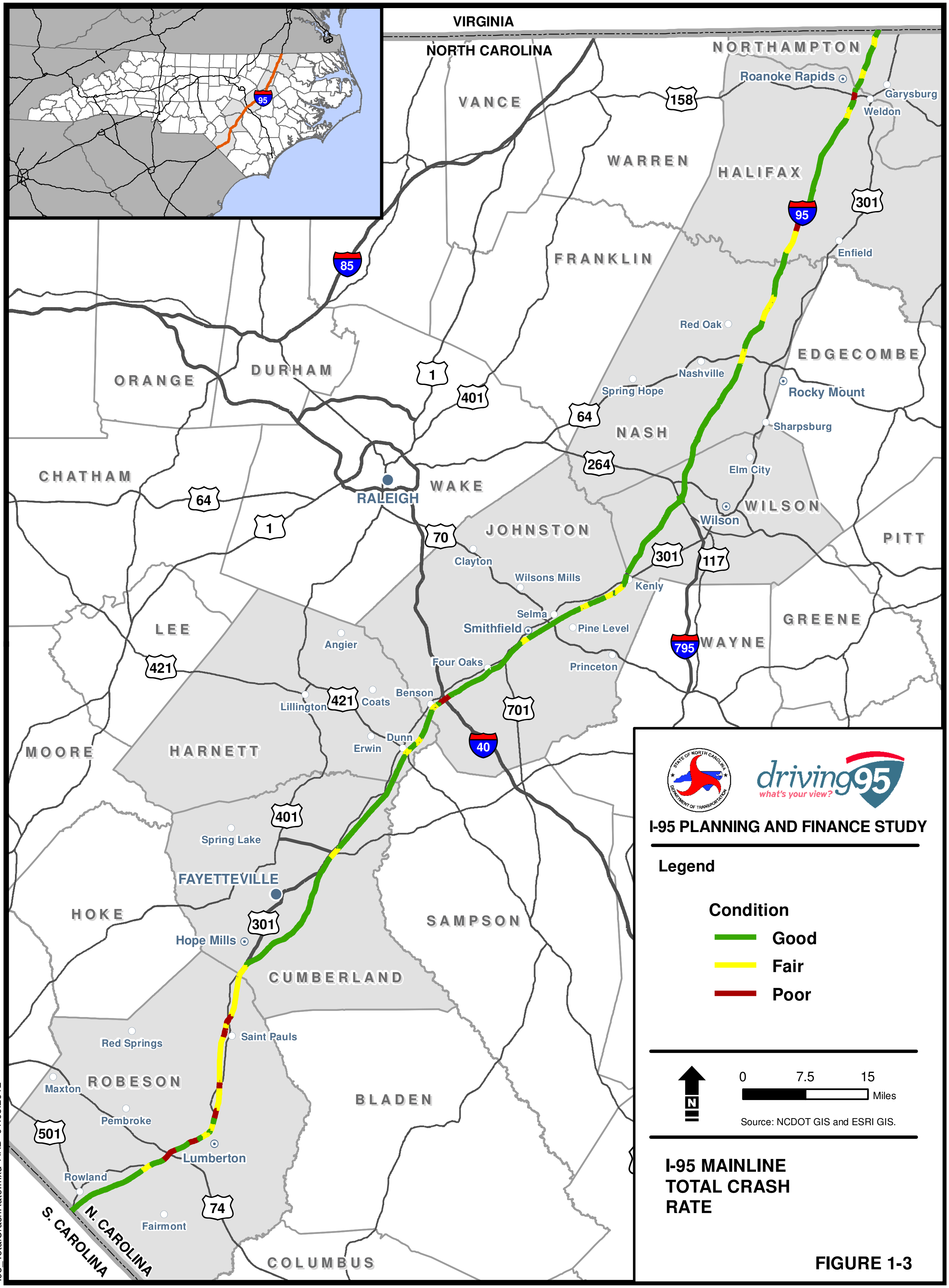
I95_RoadwayGeometryDeficiencies.mxd AKB 01.05.2012



EXISTING INFRASTRUCTURE CONDITION

FIGURE 1-2

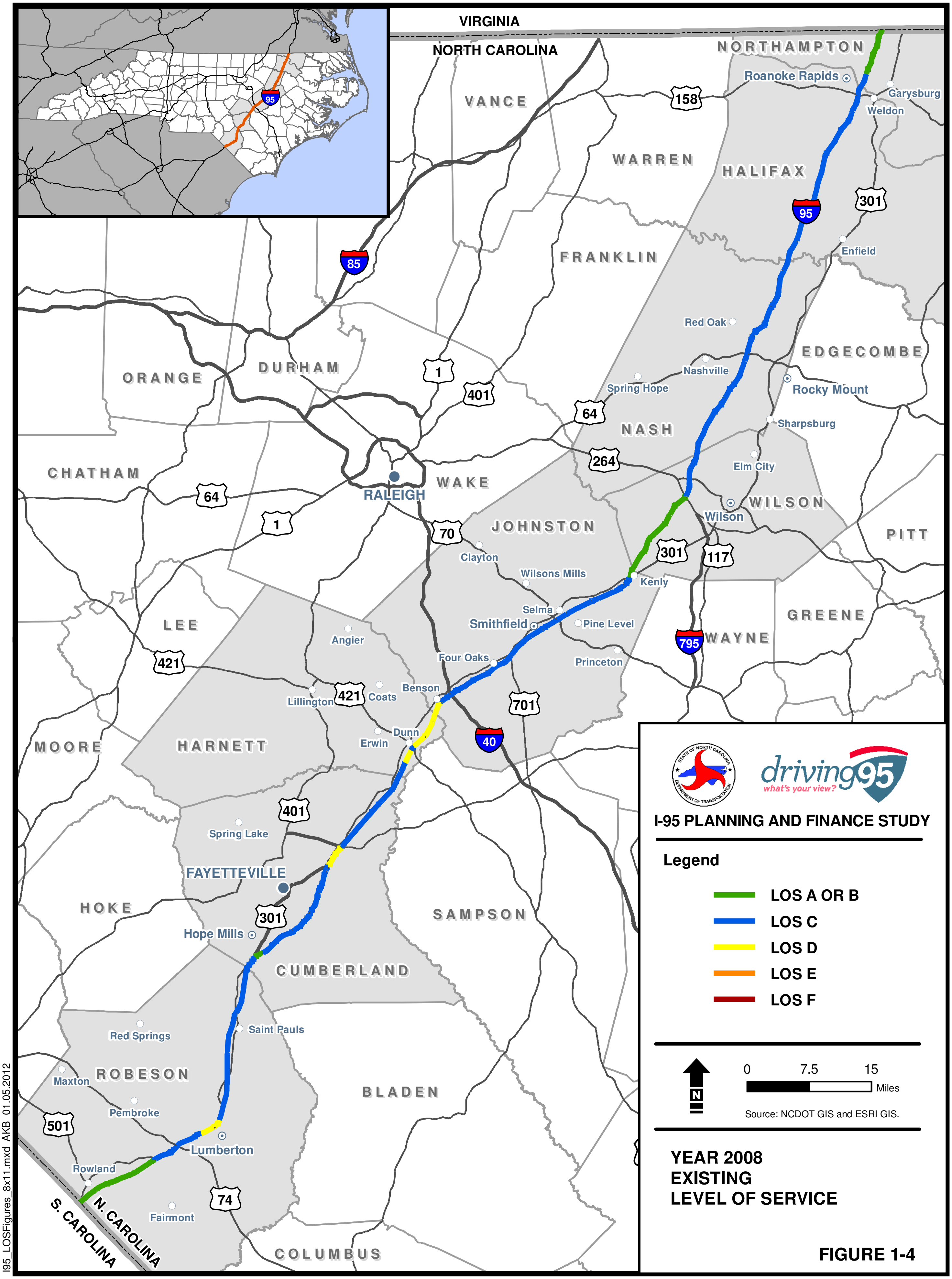
I95_ExistingInfrastructureCondition.mxd AKB 01.05.2012



I-95 MAINLINE TOTAL CRASH RATE

FIGURE 1-3

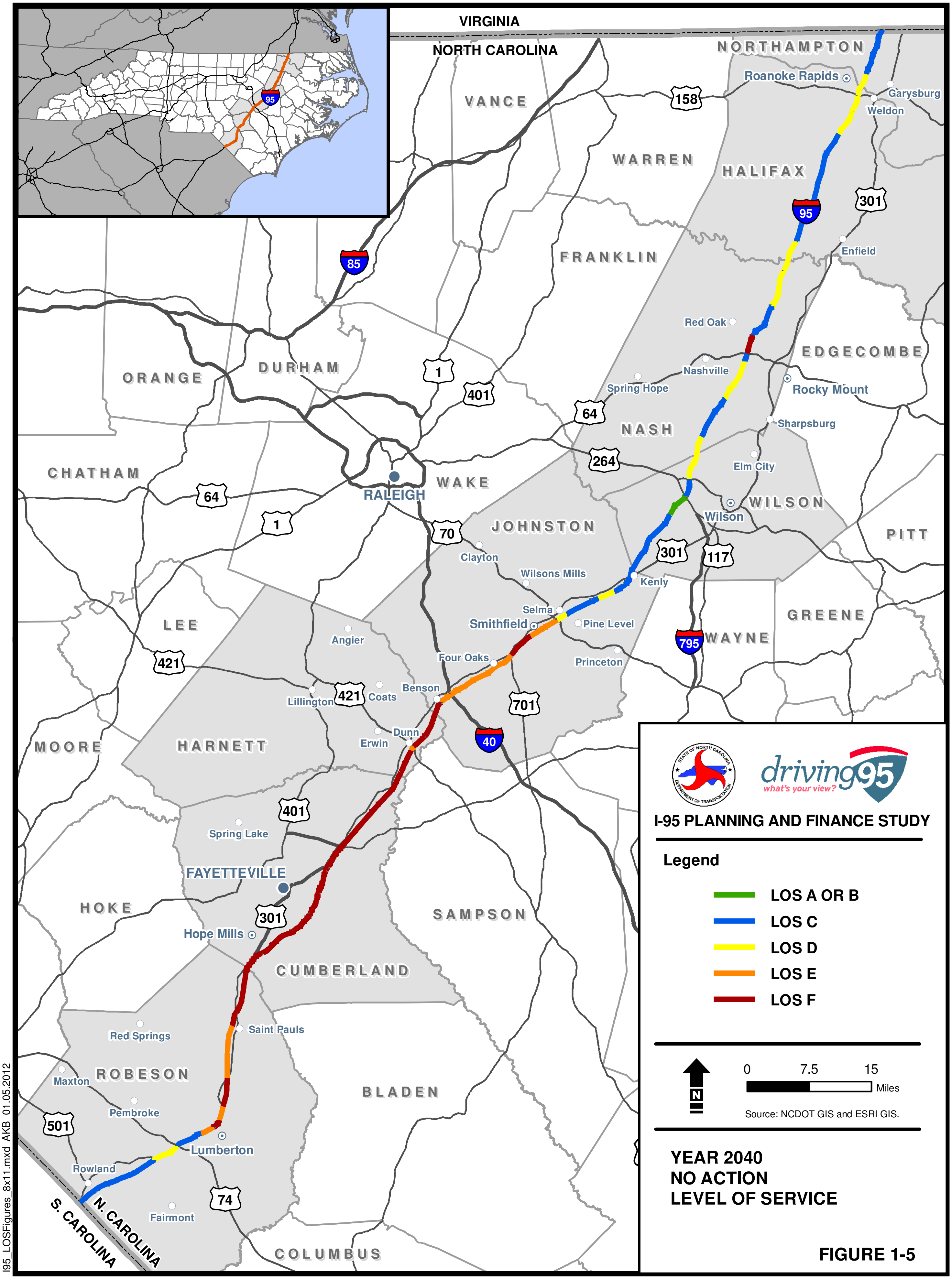
I95_TotalCrashRate.mxd AKB 01.05.2012



YEAR 2008
EXISTING
LEVEL OF SERVICE

FIGURE 1-4

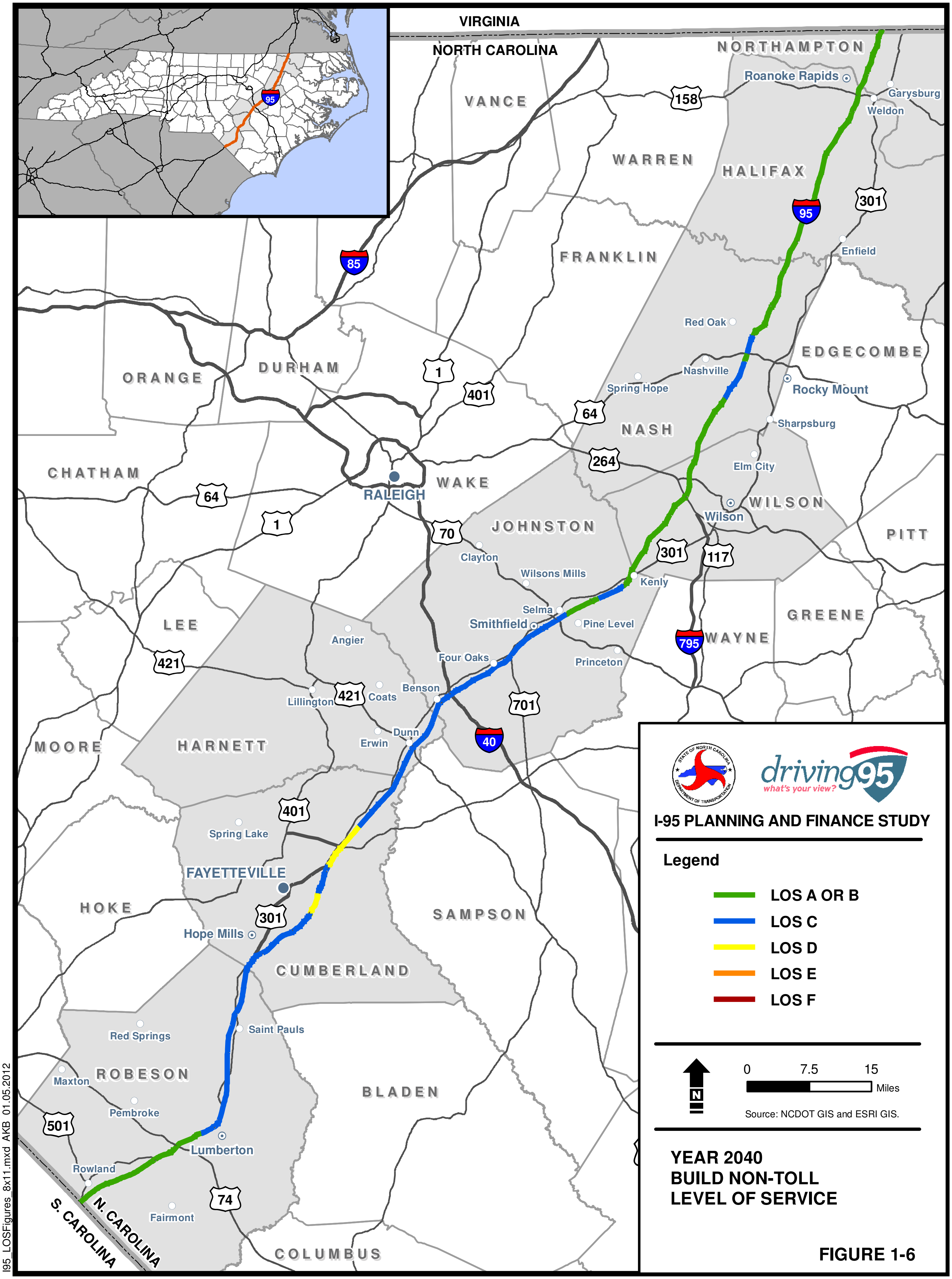
I95_LOSFigures_8x11.mxd AKB 01.05.2012



YEAR 2040
NO ACTION
LEVEL OF SERVICE

FIGURE 1-5

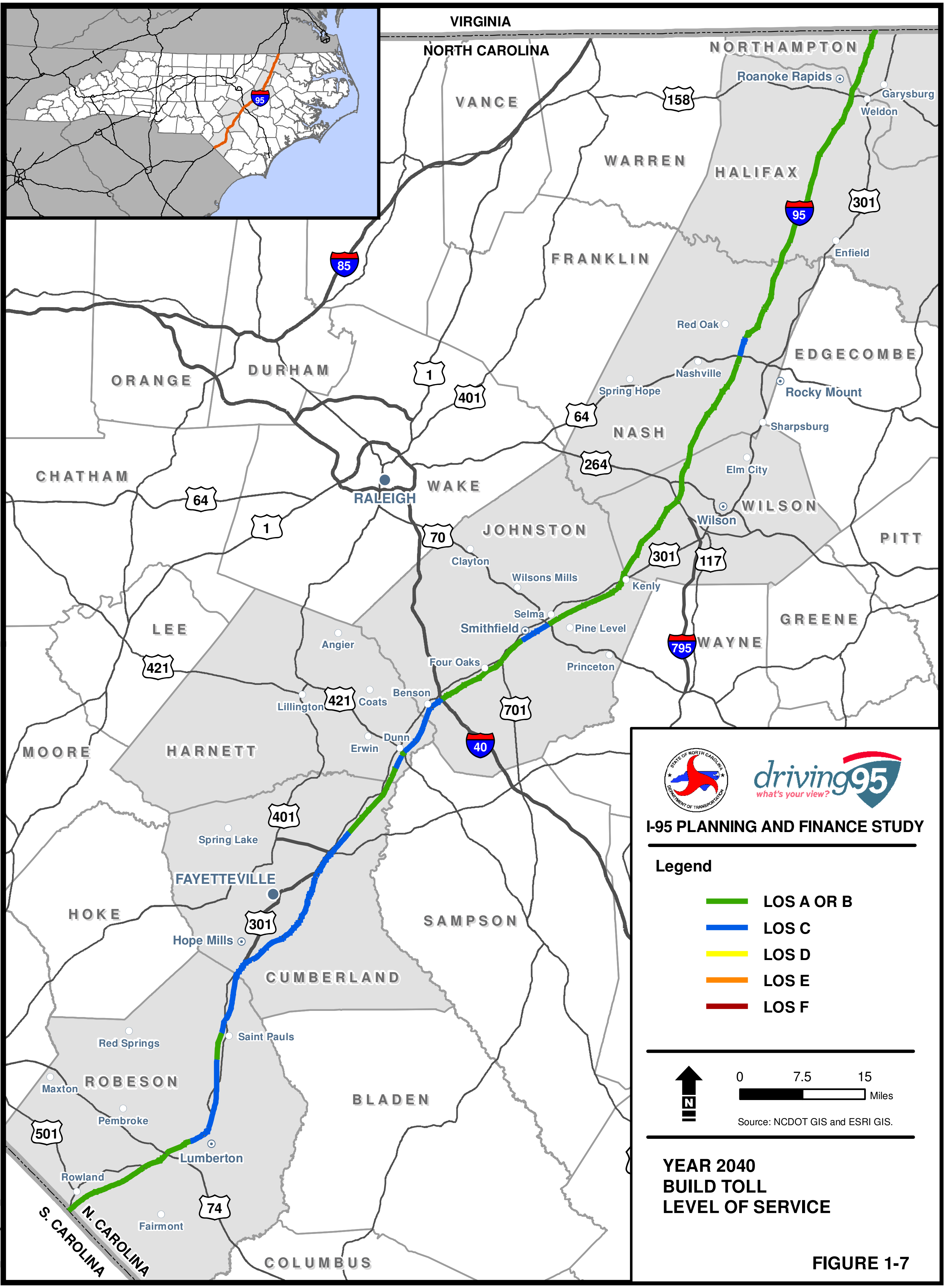
I95_LOSFigures_8x11.mxd AKB 01.05.2012



YEAR 2040
BUILD NON-TOLL
LEVEL OF SERVICE

FIGURE 1-6

I95_LOSFigures_8x11.mxd AKB 01.05.2012



YEAR 2040
BUILD TOLL
LEVEL OF SERVICE

FIGURE 1-7

I95_LOSFigures_8x11.mxd AKB 01.05.2012