I-95
Planning and Finance Study

Study Area Needs Assessment

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Section 1
Introduction

The I-95 Planning and Finance Study Project (I-95 Study) was initiated by the North Carolina Department of Transportation (NCDOT) to perform planning, engineering and financial analyses on I-95 in North Carolina between the South Carolina and the Virginia state lines. These analyses are intended to identify the need for I-95 improvements in the corridor, to identify and evaluate alternative I-95 improvement and preservation strategies, and to assess funding requirements and financing options. Implicit in the examination of funding options will be consideration of the use of tolling of vehicles using I-95 to generate needed financial resources.

The project will follow guidance from Federal Highway Administration (FHWA) for "Planning and Environmental Linkages" (PEL) as defined in the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). PEL represents an approach to transportation decision-making that considers environmental, community, and economic goals early in the planning stage, and carries them through project development, design, and construction. PEL is intended to streamline later National Environmental Policy Act (NEPA) processes by conducting analysis and preparing documentation such that decisions made will have regulatory standing once any viable I-95 programs identified reach the NEPA stage of development. In particular, it is intended that the Purpose and Need for corridor improvements can be demonstrated and accepted, that alternatives can be evaluated and certain of those alternatives can be dismissed from further consideration, and that I-95 improvement financing decisions can be made.

In addition to the PEL guidance, this study is being conducted under FHWA guidelines for tolling of Interstate highways and an agreement between NCDOT and FHWA to examine the feasibility of tolling as a corridor financing policy. In May 2009, NCDOT and FHWA entered into an agreement allowing NCDOT to prepare a proposal for tolling of I-95 under the Value Pricing Pilot Program established by Section 1012(b) of the Intermodal Surface Transportation Efficiency Act (ISTEA) in 1991. While not authorizing NCDOT to proceed with actual I-95 tolling, this agreement is an important first step if the I-95 Planning and Finance Study does demonstrate the feasibility of tolling as an acceptable financing strategy.

1.1 STUDY OBJECTIVES

Working within the PEL and tolling pilot program guidance, NCDOT has established the following mobility, safety, and preservation objectives for this study:

- **Identify corridor needs** – Determine the transportation problems in the I-95 corridor that need to be addressed, including funding.
- **Identify potential solutions** – Identify a range of mobility, safety, and preservation options (e.g., transit, TSM, upgrade existing, tolling) that will address the problems identified in assessing the project needs. This could be one project or a program of projects based on funding or project needs.
- **Narrow to reasonable alternatives** – Screen the range of potential solutions to identify reasonable alternatives for future NEPA phase(s). This should be a smaller number than those identified while determining solutions, and should also assess the limits of

proposed project(s) for logical termini and independent utility. Selection of a feasible financing strategy could be part of this process.

- **Solicit agency and public involvement** – Solicit input on project needs and solutions from federal, state and local agencies, as well as from the public and corridor stakeholders.
- **Determine funding strategies** – Identify and evaluate financing options that will meet the long-term funding needs of the corridor.
- **Identify projects for the Transportation Improvement Program (TIP)** – Recommend project(s) that address corridor needs to begin the process of updating state and local transportation plans.

1.2 PURPOSE OF THE STUDY AREA NEEDS ASSESSMENT

This report presents an overview of existing safety, traffic operations and design elements (e.g., geometric, structures, traffic, drainage) within the corridor. The overview was prepared to identify areas of concern and assess the existing condition of the corridor infrastructure. Information from this report will be used to guide discussion and presentation of design, maintenance and funding issues at both formal and informal public and agency scoping meetings.

This report also briefly characterizes the setting of the I-95 corridor, describing general land use and environmental conditions that surround the I-95. Results of the Study Area Needs Assessment will inform the purpose and need for the project and the development and screening of potential alternatives. This report provides assessment methodologies and descriptions of conditions in the corridor, based on the best available data provided by the NCDOT.

1.3 ANALYSIS METHODOLOGY AND GUIDANCE

The assessment of design, maintenance and funding issues consisted of field reconnaissance site visits, discussion with knowledgeable individuals, and review of available data, such as inspection reports, maintenance records and state transportation budgets. In certain instances, the existing design elements were compared against current project design standards established for the corridor.

Several guidance and methodology tools were used in analyzing existing conditions in the I-95 corridor. These include guidance and policies from NCDOT and FHWA on roadway design standards, operation standards, policy directives, and funding rules. The methodologies used include the Transportation Research Board's (TRB) Highway Capacity Manual (HCM), the NCLOS software from NCDOT, and the latest edition of the American Association of State Transportation and Highway Officials (AASTHO) "A Policy on Geometric Design of Highways and Streets" (AASHTO Green Book).

Data for the analysis of existing conditions came from the NCDOT and included technical reports, various types of traffic counts, strip analysis reports, bridge and pavement inspection reports, contour files and aerial photography. No new data was collected in the field for this report.

For each of the infrastructure, safety, and operating measures addressed in this report, a subjective rating scale has been developed that reflects standards or recommended practice. This scale is then used in tabular and graphic presentation of data. The following ratings are used:

- Good (green): exceeds accepted standards
- Fair (yellow): meets accepted standards
- Poor (red): falls below accepted standards

1.4 REPORT ORGANIZATION

This report provides assessment methodologies and descriptions of conditions in the corridor, based on the best available data provided by the NCDOT. The report is organized as follows.

- Section 1 provides an overview of the study process and methodology
- Section 2 reports on the physical condition of the highway infrastructure
- Section 3 reviews traffic operating conditions
- Section 4 reviews safety conditions
- Section 5 provides a description of socioeconomic and environmental resources that surround the highway
- Section 6 reviews the predicted future infrastructure, traffic and safety conditions of the corridor
- Section 7 reviews current and anticipated funding for the I-95 corridor
- Section 8 provides a short summary including conclusions regarding corridor conditions and needs.
- Appendix A contains the Existing Conditions Survey, which graphically displays the existing corridor conditions at the 58 interchanges on I-95 with an aerial photo reference.
- Appendix B contains maps that display the existing corridor conditions along the entire I-95 corridor.

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Section 2

Infrastructure Conditions

The East Coast's main north-south highway, Interstate 95 is an important factor in commerce and tourism, linking the nation's populous Northeast with the South Atlantic and tourist centers of Florida. It passes through more states than any other Interstate highway, connecting some of the most densely populated regions in the United States (www.interstate-guide.com/i-095.html). Because I-95 stretches all the way from the Canadian border south to Miami, much of the traffic on the portion in North Carolina is through travel, carrying motorists and freight traveling between origins and destinations to the north and south of North Carolina.

Interstate 95 crosses 182 miles of North Carolina, from South Carolina to Virginia. The highway is located in the eastern portion of the state, at the transition between the Piedmont region and the Sandhills and coastal plains, as shown in **Figure 1**. From south to north, I-95 passes through the following North Carolina counties:

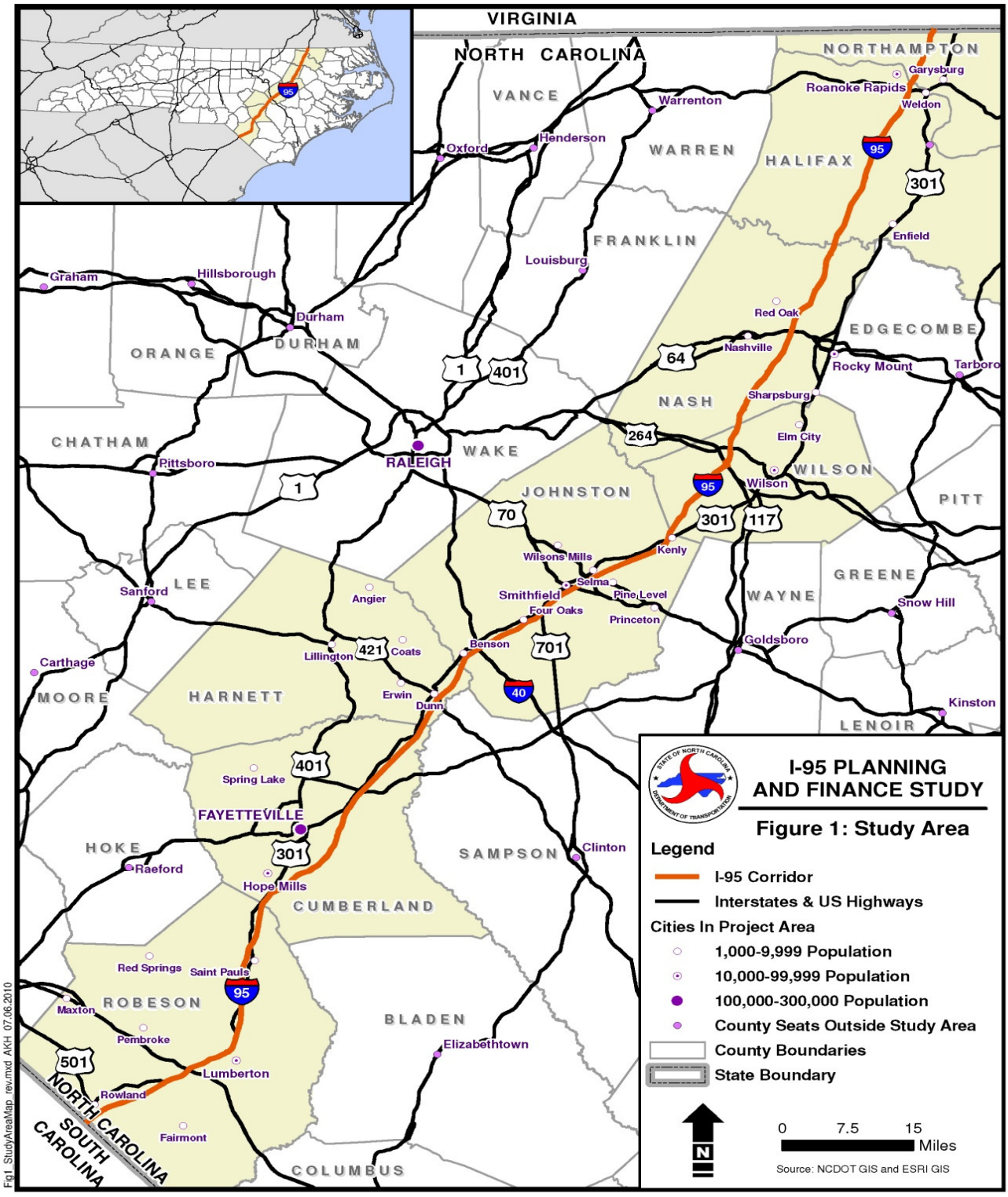
- Robeson
- Cumberland
- Harnett
- Johnston
- Wilson
- Nash
- Halifax
- Northampton

The freeway passes through the cities of Lumberton, Smithfield, and Roanoke Rapids, and avoids going through other cities of consequence along the corridor, including Fayetteville, Goldsboro, Wilson and Rocky Mount. The largest city within the corridor, Fayetteville, represents the only community with over 100,000 residents along I-95; Rocky Mount ranks second along the route in terms of population.

Roadway construction was initiated in the mid-1950s, with final sections constructed in 1980. Much of the corridor remains basically the same four-lane divided highway as when it was built. Sections in Lumberton, at the I-74/US 74, I-40, US 264, and US 64 interchanges, and the bypass near Fayetteville are places where the interstate has been improved since the original construction.

Between 1998 and 2008, the NCDOT spent $110 million on rehabilitation and preservation projects on approximately 35 miles of I-95 outside of the urban areas (NCDOT, *Future of North Carolina's Transportation System*, March 2010). I-95 is currently signed for 65 mph throughout its length.

Figure 1: 1-95 Study Area



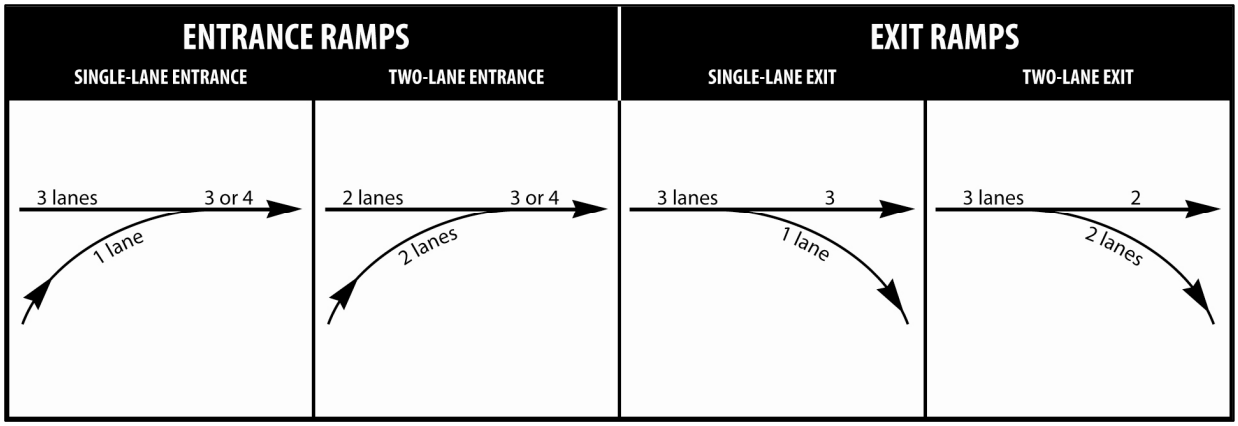
2.1 DESIGN OPERATIONS

This section summarizes the existing conditions of the I-95 corridor in terms of the design principles of lane and route continuity, lane balance and ramp spacing. These design principles allow roadways to achieve better operations by creating clearly defined paths for drivers so that merging and diverging traffic does not create congestion. Lane and route continuity refers to the provision of a clear directional path along and throughout the length of a roadway corridor. The principle of route continuity is to simplify the driving task so that it reduces lane changes, delineates the through route, and reduces the driver's search for directional signing. The driver should be provided a continuous route where changing lanes is not necessary to continue on the through route

.

The theory of lane balance follows three basic principles (see **Figure 2**). The first principle is that at entrance ramps, the number of lanes beyond the merging of two traffic streams should not be less than the sum of all traffic lanes on the merging roadways minus one. The second principle is that at exit ramps, the number of approach lanes on the highway should be equal to the number of lanes on the highway beyond the exit, plus the number of lanes on the exit, minus one. The final principle involves lane reduction. The traveled way of the highway should be reduced by not more than one traffic lane at a time.

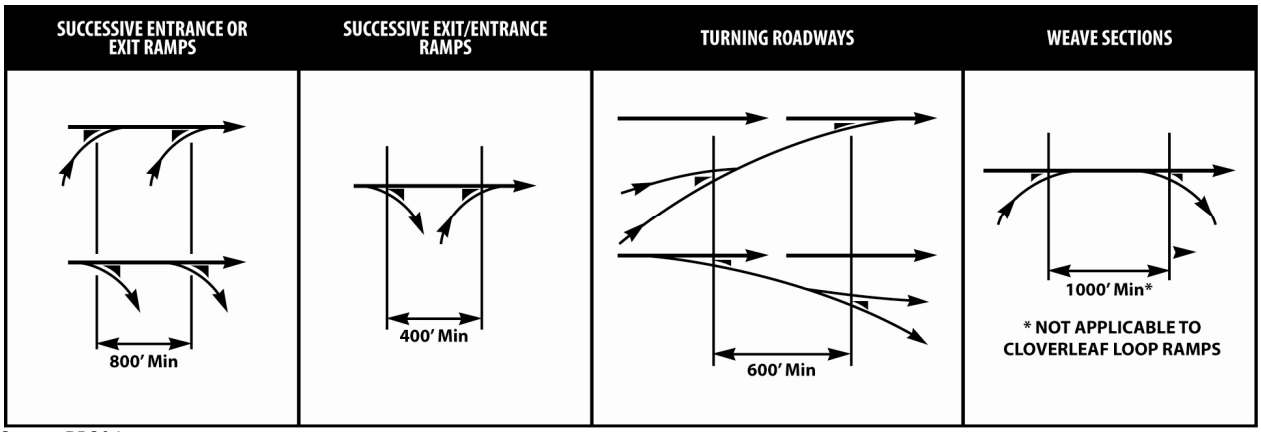
Figure 2: Examples of Lane Balance



Source: PBS&J

On freeways, two or more ramps, either entering or exiting, are often located in close succession. To provide sufficient weaving length and adequate space for signing, a reasonable distance should be provided between successive ramps (see **Figure 3**). The AASTHO Green Book suggests that ramp spacing should be at least 800 feet between successive entrance or exit ramps, at least 400 feet between successive exit/entrance ramps, at least 600 feet between turning roadways, and at least 1000 feet between weave sections. When these conditions involve freeway to freeway movements the spacing requirements are slightly higher.

Figure 3: Ramp Spacing Guidelines



Source: PBS&J

2.1.1 Assessment Methodology

To evaluate the existing design operations along I-95 the study used aerial photography of the eight counties through which the I-95 corridor passes. A visual inspection of the photography determined lane and route continuity, lane balance, ramp sequence, and acceleration/deceleration lane length sufficiency along the corridor. Sight distances and horizontal clearances were measured using county contour data provided by the NCDOT. The existing design conditions are shown on the Existing Conditions Survey, in the Design Operations section, which is included in **Appendix A** and on the maps in **Appendix B**.

2.1.2 Design Operations Assessment

Lane and route continuity has been met throughout the entire I-95 corridor. I-95 is clearly identified through signing, pavement markings, and interchange design as the primary through route, with all intersecting roadways clearly merging with or diverging from I-95. The existing conditions for lane and route continuity on all of I-95 are Good and meet current standards.

The same is true for lane balance. All entrance and exit ramps and lane reductions on I-95 have the minimum number of lanes required, according to the three lane balance principles described above. The existing conditions for lane balance on all of I-95 are Good and meet current standards.

The ramp sequencing standards have also been met along the entire I-95 corridor. The minimum spacing distances between interchanges, depending on their type, have been met along all of I-95, according the AASHTO Green Book suggestions. The existing conditions for interchange spacing on all of I-95 are Good and meet current standards.

An example of lane and route continuity on I-95.

2.2 ROADWAY GEOMETRY

This section summarizes the geometric conditions of the I-95 corridor in terms of horizontal and vertical alignment, stopping and decision sight distance, horizontal clearance, and ramp design.

2.2.1 Assessment Methodology

Aerial photography of I-95 was used to evaluate the existing condition of the horizontal and vertical alignment, horizontal clearance, and the exit and entrance ramp designs. In addition to the aerial photography, county contour files were converted into a digital terrain model for extraction of the existing vertical alignment and assessment of stopping and decision sight distances. The existing roadway geometry conditions are shown in the Geometric Features section on the Existing Conditions Survey, which is included in **Appendix A** and on the maps in **Appendix B**.

2.2.2 Horizontal Geometry

According to the AASHTO Green Book, the minimum horizontal curvature for Interstate highways is 1,630 feet (radius) to provide a roadway design speed of 70 mph. Using this standard, an assessment was made of each horizontal curve using the following rating scale for design speeds:

- Good: Radius > 1630 feet (> 70 mph)
- Fair: Radius between 1340 and 1630 feet (65 to 70 mph)
- Poor: Radius < 1340 feet (< 65 mph)

Analysis indicates that the horizontal alignment is Good, or adequate for a 70+ mph design speed throughout the entire I-95 corridor.

2.2.3 Vertical Geometry

The terrain along I-95 is relatively level throughout the corridor. On such terrain, the maximum vertical grades at a design speed of 70 mph are 3% for rural and urban freeways, according to the AASTHO Green Book. The measurement of the vertical grade was taken in the median of I-95. The vertical grade along I-95 is rated according to the following scale:

- Good: less than 3%
- Fair: 3 – 3.5%
- Poor: greater than 3.5%

The vertical alignment is Good, or adequate for a 70+mph design speed through most of the I-95 corridor. There are two sections that are below the standard for this type of highway. The grade near mile marker 97 on I-95 at SR 1927 (E. Anderson St.) in Johnston County is "Fair," with a 3.2 percent grade north of the interchange, and an approximate 3.1 percent south of the interchange. The grade is the same for both the northbound and southbound travel lanes. The other location that does not meet the desired design speed is south of the I-95/US 301 interchange in Johnston County near mile marker 107. The grade on I-95 at this location is Fair, with a 3.2 percent grade on both the northbound and southbound sides.

2.2.4 Horizontal Clearance

A visual assessment of the horizontal clearance along I-95 was conducted with attention to identifying road safety hazards along the corridor. Curbs, walls, barriers, piers, sign and signal supports, mature trees, landscaping items, and power poles are primary examples of the type of features that can affect a driver's speed or lane position if located too close to the roadway edge. The current AASTHO "Roadside Design Guide" provides guidance on the desired distance that should be free of roadside hazards. For a facility like I-95, 30 to 34 feet should be clear of roadside hazards. Any roadside hazard closer than 30 feet should be protected by some type of crash barrier (guardrail, attenuator, earth berms, etc.). To evaluate potential horizontal clearance problem spots along the I-95 corridor, the following distances are used:

- Good: 30 feet or greater
- Fair: 24 – 30 feet
- Poor: below 24 feet

The horizontal clearance is Good for most of theI-95 corridor, with 30 feet or more clear of roadside hazards. However, there are two locations where the clearance is Poor, where there less than 24 feet clear of roadside hazards. One is at the US 301/SR 1003 (Chicken Rd.) 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 both directions where there are breakaway light poles. It should be made clear, however, that a poor rating here does not equate to unsafe conditions in the corridor. Fixtures such as light poles and signs are constructed so that they break away from their footing in the event of a collision with a vehicle.

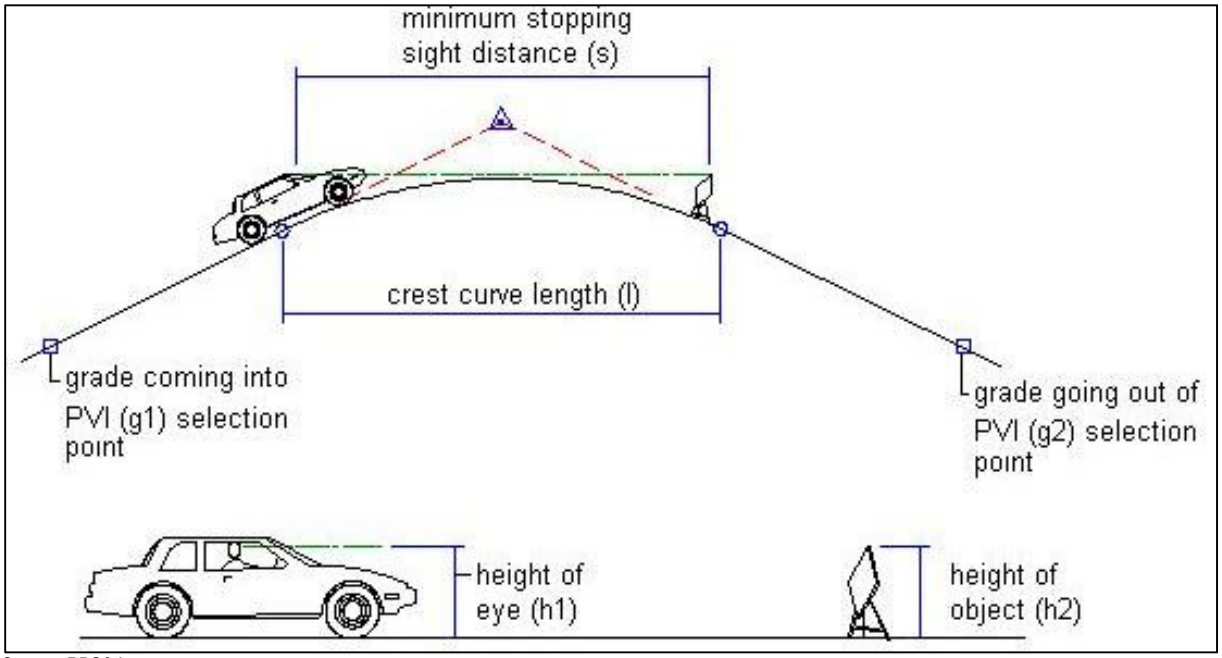
2.2.5 Stopping Sight Distances

The AASTHO Green Book defines stopping sight distance as the minimum length of vertical curve to provide a vehicle with adequate stopping distance at a specific design speed before a potential collision with a 2 foot object in its travel path (see **Figure 4**).

Stopping sight distance is the length of roadway ahead that is visible to the motorist. This distance should be of sufficient length to enable a motorist to stop before reaching a stationary object in their path. The higher the traveling speed, the greater is the distance needed to stop safely. On relatively flat terrain, the motorist can see quite far and an adequate stopping sight distance is easily achieved. However, on hilly terrain, the motorist's view is restricted. In these situations the crest of the vertical curve should be of a minimum length, flattening the curve, and allowing the motorist to see over the crest in order to stop safely. The minimum length of curve required to achieve a safe sight distance is determined by the rate of vertical curvature (K value). For this analysis, the K values represent the stopping sight distances, and are rated on the following scale:

- Good: K values appropriate for speeds of 70 mph or greater
- Fair: K values appropriate for speeds of 65 – 70 mph
- Poor: K values appropriate for speeds of less than 65 mph

Figure 4: Stopping Sight Distance



Source: PBS&J

The stopping sight distances are Good, or adequate for a design speed of 70 mph or greater, for the majority of the I-95 corridor. There are three locations on the corridor that have K values that are Fair, where the curves are appropriate for a design speed of 65 – 70 mph.

- NC 72 (Caton Rd.) and SR 1536 (W. Carthage Rd.) in Robeson County near mile marker 17
- SR 1927 (E. Anderson St.) interchange in Johnston County near mile marker 97
- North of the US 301 interchange in Johnston County near mile marker 107.

Their locations are shown on the Existing Conditions Survey in **Appendix A** and on the maps in **Appendix B**.

2.2.6 Decision Sight Distances

Decision sight distance is defined as the distance that a motorist has to visually identify an exit ramp and then make a decision on what action to take, while traveling at highway speed. The decision sight distance is identified by an analysis of both the horizontal and vertical sight lines and how they affect a motorist's ability to identify the ramp locations. The decision sight distances are rated at the following scale:

- Good: 2,000 feet or greater
- Fair: 1,999 – 1,000 feet
- Poor: less than 1,000 feet

These ratings are strictly based on the ability of the motorist to see the exit ramp. There are 35 locations on the I-95 corridor where a motorist has less than the optimal 2000 feet for decision

sight distance. Of these 35 locations, six are Poor and 29 are Fair. The six rated Poor are included in **Table 1**, and the location of all 35 is shown on the Existing Conditions Survey in **Appendix A** and on the maps in **Appendix B**.

Table 1: Locations with Poor Decision Sight Distance

Location	County	Mile marker	Direction	Distance
South of the US 301 (N. 5th St.) interchange	Robeson	33	northbound	900 feet
South of the NC 87 interchange	Cumberland	46	northbound	600 feet
At the SR 1927 interchange	Johnston	98	northbound	800 feet
South of the US 301 (S. Church St.) interchange	Johnston	107	northbound	800 feet
North of the I-795/US 264 interchange	Wilson	119	southbound	900 feet
North of the US 158 interchange	Halifax	173	southbound	700 feet

Source: PBS&J

2.2.7 Exit and entrance ramp design

The AASTHO Green Book lists the distance necessary for acceleration and deceleration lanes based on the design speed of the highway and the design speed of the ramp or loop. These are listed in **Table 2** below. The longer distance required for loops compared to ramps is due to the greater speed differential between main lanes and loops as compared to main lane and ramps.

Table 2: Standard Exit and Entrance Ramp Distances

Lane Type	Type	Good	Fair	Poor
Acceleration	Ramp	> 800 feet	800 - 550 feet	< 550 feet
Acceleration	Loop	> 1,400 feet	1,400 - 900 feet	< 900 feet
Deceleration	Ramp	≥ 400 feet	399 - 250 feet	< 250 feet
Deceleration	Loop	≥ 550 feet	499 - 350 feet	< 350 feet

Source: PBS&J

There are 45 ramps on the 56 interchanges on the corridor where a motorist has less than the optimal distance for accelerating onto or decelerating off of I-95. It is believed that these interchange locations have deficient ramp distances primarily because they were constructed prior to the adoption of the current standards. Of these 45 locations, six have a distance that would rank them as Poor, and 39 are ranked as Fair. The six rated Poor are included in **Table 3,** and their locations are shown on the Existing Conditions Survey in **Appendix A** and on the maps in **Appendix B**.

Table 3: Locations with Poor Exit and Entrance Ramp Design

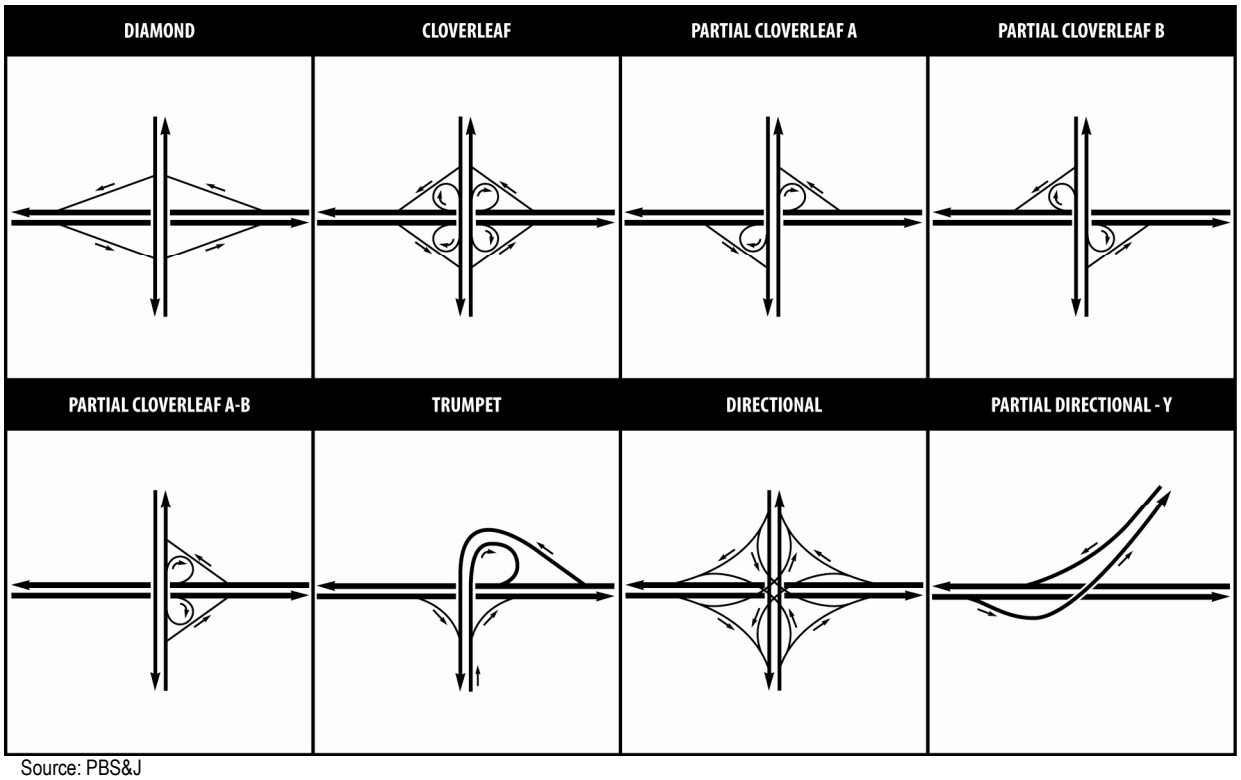
Location	County	Mile marker	Direction	Ramp
At the NC 211 (N. Roberts Ave.) interchange	Robeson	20	northbound	Loop on-ramp
At the SR1811 (Bud Hawkins Rd.) interchange	Harnett	70	southbound	Loop off-ramp
At the NC 210 interchange	Johnston	95	northbound	Loop on-ramp
At the US 70 interchange	Johnston	97	northbound	Loop on-ramp
At the SR 1927 (E. Anderson St.) interchange	Johnston	98	southbound	Loop on-ramp
At the SR 2339 (Bagley Rd.) interchange	Johnston	105	northbound	On-ramp

Source: PBS&J

2.3 INTERCHANGE FORMS

There are 56 roadways within the study area between Virginia and South Carolina with some form of access to I-95, either by direct ramps or slip ramps from collector-distributor (CD) roads. These locations allow travelers to access the local roadway system or other, major highways from I-95. The interchange forms found along I-95 are shown in **Figure 5**.

Figure 5: I-95 Interchange Forms



Source: PBS&J

There are eight system interchanges with other limited access highways in the I-95 corridor and 48 service interchanges that access I-95. Details for each interchange are listed in **Table 4**.

Table 4: I-95 Interchange Types and Constraining Factors

Interchange	County	Mile marker	Type	Factors constraining expansion
NC 130 (E. Main St.)	Robeson	2	Partial Cloverleaf (ParClo)-A	None
SR 2455 (Raynham Rd.)	Robeson	7	Diamond	None
SR 1003 (Chicken Rd.)	Robeson	10	Diamond	None
I-74/US 74 and US 74 BUS.	Robeson	14	Cloverleaf w/ CD	None
NC 72 (Caton Rd.)	Robeson	17	Diamond	East-side commercial development
SR 1536 (W Carthage Rd.)	Robeson	19	Diamond	Northwest quadrant commercial development and residential neighborhood in northeast quadrant
NC 211 (N Roberts Ave.)	Robeson	20	ParClo-A	Commercial development
US 301 (Fayetteville Rd.)	Robeson	22	Diamond	Commercial development
US 301 (Bucket Rd.)	Robeson	25	ParClo-B	Minor residential, family farms
NC 20 (W Broad St.)	Robeson	31	Tight Urban Diamond	Commercial development
US 301 (N 5th St.)	Robeson	33	Diamond	None
I-95 Business	Cumberland	40	Partial Directional-Y	Northeast Quadrant Commercial Development, Residential Neighborhood in Southeast Quadrant
NC 59 (Chicken Foot Rd.)	Cumberland	41	Diamond	None
SR 2341 (Claude Lee Rd.)	Cumberland	44	Diamond	None
NC 87 (Martin Luther King Jr Fwy.)	Cumberland	46	Cloverleaf w/ CD	None
NC 210/53 (Cedar Creek Rd.)	Cumberland	49	Diamond w/ Single Loop (NB on-ramp)	Commercial Development
NC 24	Cumberland	52	Cloverleaf w/ CD	None
SR 1832 (Murphy Rd.)	Cumberland	55	Diamond	None
I-95 Business	Cumberland	56	Partial Directional-Y	Mixed-Use Residential Development Along SB Ramp
I-295 and US 13 (Goldsboro Rd.)	Cumberland	58	Directional w/ Loop	2 Commercial
SR 1815 (Wade-Stedman Rd.)	Cumberland	61	Diamond	Minor Residential, Family Farms
NC 82 (Godwin-Falcon Rd.)	Cumberland	65	Diamond	None
SR 1811 (Bud Hawkins Rd.)	Harnett	70	ParClo-B	None
SR 1002 (Long Branch Rd.)	Harnett	71	Diamond	Commercial Development Along Eastside Ramps
SR 1793 (Spring Branch Rd.)	Harnett	72	Diamond	Commercial Development
US 421/NC 55 (E Cumberland St.)	Harnett	73	Diamond	Commercial Development
SR 1808 (Jonesboro Rd.)	Harnett	75	Diamond	Business in Northwest Quadrant
SR 1709 (Hodges Chapel Rd.)	Harnett	77	Diamond	Minor Commercial Development
NC 50 (E Main St.)	Johnston	79	Diamond w/ Single Loop (NB off-ramp)	Residential and Commercial Development
I-40	Johnston	81	Directional w/ Loops	None
SR 1178 (Keen Rd.)	Johnston	87	Diamond	None
US 701 and NC 96	Johnston	90	Modified Diamond w/ Single Loop (SB off-ramp)	Residential and Commercial Development

Table 4: I-95 Interchange Types and Constraining Factors

Interchange	County	Mile marker	Type	Factors constraining expansion
SR 1007 (Brogden Rd.)	Johnston	93	ParClo-B	None
NC 210 (E Market St.)	Johnston	95	Diamond w/ Single Loop (NB on-ramp)	Commercial Development
US 70	Johnston	97	ParClo-A	Commercial Development
SR 1927 (E Anderson St.)	Johnston	98	ParClo-AB	None
SR 2137 (Pittman Rd.)	Johnston	101	Diamond	None
SR2130 (Micro Rd.)	Johnston	102	Diamond	Northwest Quadrant Commercial Development
SR 2339 (Bagley Rd.)	Johnston	105	Diamond	Commercial Development North Side of Bagley Road
SR 2399 (Princeton Kenly Rd.)	Johnston	106	Diamond	Commercial Development Along West Side Service Road
US 301 (S Church St.)	Johnston	107	Diamond W Single Loop (SB on-ramp)	Commercial Development Along East Side Ramps
NC 42	Wilson	116	Diamond	None
US 264/I-795	Wilson	119	Cloverleaf w/ CD	None
US 264A	Wilson	121	Diamond	Commercial Development
NC 97	Nash	127	Diamond	None
SR 1717 (Sandy Cross Rd.)	Nash	132	Diamond	None
US 64	Nash	138	Cloverleaf w/ CD	None
NC 43 (Dortches Blvd.)	Nash	141	Diamond	None
NC 4	Nash	145	Trumpet A	Commercial Development
NC 33 (Swift Creek School Rd.)	Nash	150	Diamond	None
NC 481	Halifax	154	Diamond	None
NC 561	Halifax	160	Diamond	Minor Residential/Family Farms
NC 903	Halifax	168	Diamond	1 Commercial
NC 125	Halifax	171	Diamond w/ Single Loop (SB on-ramp)	1 Residential/Family Farm and 1 Commercial
US 158 (Julian R Allsbrook Hwy.)	Halifax	173	Diamond	Commercial Development
NC 46	Northampton	176	Diamond	Northwest Quadrant Commercial. Single Family Home in Southeast Quadrant.
NC 48	Northampton	180	Diamond	Truck Stop in Southwest Quadrant

Source: PBS&J

Interchange spacing plays a significant role in the traffic operations of a freeway. According to the AASHTO Green Book, the guidance regarding minimum interchange spacing is 1.0 miles in urban areas and 3.0 miles in rural areas. Note that this is a general rule of thumb and factors such as the weaving volume, signage, and lengths of the deceleration and acceleration lanes impact what the minimum interchange spacing distance can be without degrading the operations of the freeway. Of the 56 freeway segments on the I-95 corridor, 22 do not meet the minimum interchange spacing requirements and are listed in **Table 5**.

Table 5: I-95 Freeway Segments with Undesirable Interchange Spacing

Segment From	Segment To	County	Area Type	Interchange Spacing (miles)
NC 20 (W. Broad St.) (Exit 31)	US 301 (Exit 33)	Robeson	Rural	1.6
I-95 Business (Exit 40)	NC 59 (Chickenfoot Rd.) (Exit 41)	Cumberland	Rural	1.0
NC 59 (Chickenfoot Rd.) (Exit 41)	SR 2341 (Claude Lee Rd.) (Exit 44)	Cumberland	Rural	2.6
SR 2341 (Claude Lee Rd.) (Exit 44)	NC 87 (Exit 46)	Cumberland	Rural	2.2
NC Highway 53/210 (Cedar Creek Rd.) (Exit 49)	NC 24 (Exit 52)	Cumberland	Rural	2.7
SR 1832 (Murphy Rd.) (Exit 55)	I-95 Business (Exit 56)	Cumberland	Rural	1.0
I-95 Business (Exit 56)	I-295 (Fayetteville Outer Loop) / US 13 (Exit 58)	Cumberland	Rural	1.9
SR 1811 (Bud Hawkins Rd.) (Exit 70)	SR 1002 (Long Branch Rd.) (Exit 71)	Harnett	Rural	1.2
SR 1002 (Long Branch Rd.) (Exit 71)	SR 1793 (Pope Rd.) (Exit 72)	Harnett	Rural	1.7
SR 1793 (Spring Branch Rd.) (Exit 72)	US 421 (Cumberland St.) (Exit 73)	Harnett	Urban	0.6
US 421 (Cumberland St.) (Exit 73)	SR 1808 (Jonesboro Rd.) (Exit 75)	Harnett	Rural	1.9
SR 1808 (Jonesboro Rd.) (Exit 75)	SR 1709 (Hodges Chapel Rd.) (Exit 77)	Harnett	Rural	2.0
SR 1709 (Hodges Chapel Rd.) (Exit 77)	NC 50 (Exit 79)	Harnett / Johnston	Rural	2.6
NC 50 (Exit 79)	I-40 (Exit 81)	Johnston	Rural	1.6
SR 1178 (Keen Rd.) (Exit 87)	US 701 (Exit 90)	Johnston	Rural	2.2
NC 210/US 70 (Exit 95)	US 70 Alternate (Exit 97)	Johnston	Rural	2.1
US 70 Alternate (Exit 97)	SR 1927 (Pine Level Selma Rd.) (Exit 98)	Johnston	Rural	1.2
SR 2137 (Pittman Rd.) (Exit 101)	SR 2130 (East Main St.) (Exit 102)	Johnston	Rural	1.2
SR 2130 (East Main St.) (Exit 102)	SR 2339 (Bagley Rd.) (Exit 105)	Johnston	Rural	2.1
SR 2339 (Bagley Rd.) (Exit 105)	SR 2342 (Princeton Kenly Rd.) (Exit 106)	Johnston	Rural	1.4
SR 2342 (Princeton Kenly Rd.) (Exit 106)	US 301 (Exit 107)	Johnston	Rural	1.2
I-795/US 264 (Exit 119)	US 264 Alternate (Raleigh Rd.) (Exit 121)	Wilson	Rural	2.1

Source: PBS&J

2.4 STRUCTURES

This section details the condition of the structures in the I-95 corridor. There are currently 73 bridges along the I-95 mainline, carrying the highway over roadways, railroads, and bodies of water. There are 119 bridges carrying crossroads over I-95. The Bridge Inspection Reports (provided by NCDOT) were used to evaluate the existing condition of individual bridges along the mainline or crossing over I-95.

An example of a functionally obsolete bridge.

Deficiencies are reported in two primary categories: "structurally deficient" and "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.

2.4.1 Structures Assessment Methodology

The regularly-updated Bridge Inspection Reports provide an overall assessment of the present condition of the bridge with a Good, Fair, or Poor/Critical rating. This overall rating is based on the condition of the individual components of the bridge (i.e., deck, superstructure, substructure, etc.). According to the National Bridge Inspection Standards general condition ratings describe the current condition of the bridge. The general condition rating is an overall assessment of the physical condition of the deck and the superstructure. The general condition rating is a numeric scale that ranges from 0 (failed condition) to 9 (excellent).

In addition to this overall rating, the study reviewed the sufficiency ratings (used to determine eligibility for federal funding) to estimate the remaining life and structural/functional deficiencies to provide further insight into the overall condition of the bridges. The sufficiency rating is a computed numerical value used to determine eligibility of a bridge for Federal funding. The sufficiency rating formula result varies from 0 to 100. The formula includes factors for structural condition, bridge geometry, and traffic considerations. A bridge with a sufficiency rating of 80 or less is eligible for federal bridge rehabilitation funding. A bridge with a sufficiency rating of 50 or less is eligible for federal bridge replacement funding.

The study also reviewed the estimated remaining life of the bridges in the corridor. Estimated remaining life is the number of years of service that can be reasonably expected of the bridge without major repair or rehabilitation. The estimated remaining life can be extended as repairs and maintenance are performed.

2.4.2 Existing Condition of Structures

The general condition ratings of the bridges as reported in the Bridge Inspection Reports are mostly Fair. The general condition and sufficiency ratings vary significantly for each individual bridge as maintenance and repairs are done. The General Condition Rating for the bridges in the I-95 corridor are summarized by county in **Table 6**, and shown on the Existing Conditions Survey in **Appendix A** and on the maps in **Appendix B**, with 19% showing a Good rating and 5% rated as Poor. The rating for each individual bridge can be found in **Appendix C**.

Table 6: Bridge General Condition Rating

COUNTY	POOR		FAIR		GOOD	
	COUNT	% OF TOTAL	COUNT	% OF TOTAL	COUNT	% OF TOTAL
BRIDGES ON I-95						
ROBESON	0	0%	12	86%	2	14%
CUMBERLAND	0	0%	11	79%	3	21%
HARNETT	0	0%	2	100%	0	0%
JOHNSTON	2	18%	9	82%	0	0%
WILSON	0	0%	1	17%	5	83%
NASH	0	0%	11	92%	1	8%
HALIFAX	0	0%	4	50%	4	50%
NORTHAMPTON	0	0%	2	100%	0	0%
TOTAL	**2**	**3%**	**52**	**75%**	**15**	**22%**
BRIDGES OVER I-95						
ROBESON	2	11%	13	68%	4	21%
CUMBERLAND	1	4%	19	76%	5	20%
HARNETT	4	80%	1	20%	0	0%
JOHNSTON	0	0%	16	76%	5	24%
WILSON	0	0%	11	92%	1	8%
NASH	0	0%	14	78%	4	22%
HALIFAX	0	0%	11	92%	1	8%
NORTHAMPTON	1	25%	3	75%	0	0%
TOTAL	**8**	**7%**	**88**	**76%**	**20**	**17%**

Source: NCDOT Bridge Inspection Reports

Currently, 26 of the 119 overpass bridges (22%) and 6 of the 73 bridges (8%) along I-95 do not meet the minimum clearance requirement of 16 feet, making them functionally obsolete. The state of North Carolina mandates that no vehicle shall exceed a height of 13 feet, 6 inches (NC General Statute 20-116), and there are no overpass bridges on I-95 that are less than this height. The number of height deficient bridges by county is shown in **Table 7**.

Table 7: Bridges Over I-95 That Are Under Minimum Height

County	Total Number of Bridges over I-95	Number of Bridges Under Minimum Acceptable Height (16')	% of Total
ROBESON	20	5	25%
CUMBERLAND	25	3	12%
HARNETT	5	4	80%
JOHNSTON	21	8	38%
WILSON	12	0	0%
NASH	20	0	0%
HALIFAX	12	5	42%
NORTHAMPTON	4	1	25%
TOTAL	**119**	**26**	**22%**

Source: NCDOT Bridge Inspection Reports

There are six bridges categorized as structurally deficient and twelve as functionally obsolete among the 73 bridges on the I-95 roadway. There are 20 bridges categorized as structurally deficient and 32 as functionally obsolete among the 119 bridges that cross over I-95.

The average estimated remaining life of all the bridges is 22 years. Significant repairs or replacement will be necessary over the next 20 years on 35 of the 73 bridges on I-95 and 54 of the 119 bridges over I-95. The bridges that will need significant rehabilitation in order to continue to function safely are summarized in **Table 8** and shown on the Existing Condition Survey in **Appendix A** and on the maps in **Appendix B**.

Table 8: Estimated Remaining Life of Bridges

COUNTY	0-5 YRS		6-10 YRS		11-15 YRS		16-20 YRS		20+ YRS	
	COUNT	% OF TOTAL	COUNT	% OF TOTAL	COUNT	% OF TOTAL	COUNT	% OF TOTAL	COUNT	% OF TOTAL
BRIDGES ON I-95										
ROBESON	0	0%	0	0%	4	29%	9	64%	1	7%
CUMBERLAND	0	0%	0	0%	0	0%	2	14%	12	86%
HARNETT	0	0%	1	50%	1	50%	0	0%	0	0%
JOHNSTON	0	0%	8	73%	2	18%	0	0%	1	9%
WILSON	0	0%	0	0%	2	33%	0	0%	4	67%
NASH	0	0%	0	0%	0	0%	2	17%	10	83%
HALIFAX	0	0%	0	0%	0	0%	4	50%	4	50%
NORTHAMPTON	0	0%	0	0%	0	0%	0	0%	0	0%
TOTAL	**0**	**0%**	**9**	**12%**	**9**	**12%**	**17**	**23%**	**34**	**47%**
BRIDGES OVER I-95										
ROBESON	2	11%	3	16%	2	11%	7	37%	5	26%
CUMBERLAND	0	0%	1	4%	2	8%	3	12%	19	76%
HARNETT	0	0%	3	60%	1	20%	1	20%	0	0%
JOHNSTON	1	5%	6	29%	5	24%	0	0%	9	43%
WILSON	0	0%	0	0%	0	0%	1	8%	11	92%
NASH	0	0%	0	0%	2	11%	2	11%	14	78%
HALIFAX	0	0%	5	42%	3	25%	3	25%	1	8%
NORTHAMPTON	0	0%	0	0%	2	50%	2	50%	0	0%
TOTAL	**3**	**3%**	**18**	**15%**	**17**	**14%**	**19**	**16%**	**59**	**50%**

Source: NCDOT Bridge Inspection Reports

2.5 PAVEMENT CONDITION

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. The pavement rating formula result varies from 0 to 100. In addition to this overall rating an International Roughness Index (IRI) is calculated to indicate the smoothness of the roadway. Ideally, all highways would have an IRI value less than 100 (values greater than 125 are considered to be rough).

2.5.1 Assessment Methodology

Since the majority of the corridor is asphalt pavement and the remaining sections of continuously reinforced concrete pavement are scheduled to undergo rehabilitation in the near future, the pavement rating value was used to assess the overall condition of the pavement structure. 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.

2.5.2 Existing Condition of Pavement

Most of the pavement along the corridor has been rehabilitated to asphalt pavement, with the exception of Nash County and a small segment of Halifax County. Generally, the pavement conditions are currently very good on the surface along the entire corridor. However, the foundation of the pavement structure is in need of reconstruction, and continuing resurfacing efforts will not extend the pavement life as intended. **Table 9** depicts the current condition of the pavement for both the northbound and the southbound I-95 pavement. Segment detail on pavement conditions is provided in **Appendix C**, showing overall rating and roughness index.

Table 9: Pavement Condition by County

COUNTY	PAVEMENT CONDITION (MILES)		
	POOR (<50)	FAIR (50-75)	GOOD (>75)
ROBESON	0	0	77
CUMBERLAND	0	0	60
HARNETT	0	0	18
JOHNSTON	0	2	59
WILSON	0	0	33
NASH	15	14	23
HALIFAX	13	10	19
NORTHAMPTON	0	0	15
TOTAL	**28**	**26**	**303**

Note: Distances are approximated from milepost information in NCDOT data tables.
Source: NCDOT 2008 Pavement Condition Ratings; does not include recent ARRA resurfacing projects.

2.6 MAJOR UTILITIES

There are no utilities co-located within the I-95 highway right-of-way, but the corridor is crossed by major electric transmission lines and pipelines. In addition, many of the interchanges that cross I-95 carry local utilities such as sewer and water across the interstate. The condition of these facilities has not been determined, as NCDOT has no responsibility for their maintenance or improvement. Relocation costs would likely be borne by the utility owner.

2.7 INTELLIGENT TRANSPORTATION SYSTEMS

Intelligent transportation systems increase the effectiveness of the existing transportation infrastructure by providing real-time information to motorists through the development and deployment of advanced surveillance, detection, communications, information processing, data management, and traffic systems. NCDOT monitors traffic conditions using Closed Circuit Television (CCTV) cameras and speed sensors, and distributes traveler information via

permanent Variable Message Signs (VMS) and highway advisory radio. On the I-95 corridor, these facilities are located from Johnston County to the Virginia state line.

Weigh station on southbound I-95 in Lumberton, without weigh in motion facilities.

2.8 WEIGH STATIONS

In North Carolina, weigh stations on highways are owned and maintained by the NCDOT, and operated by the State Highway Patrol Motor Carrier Enforcement Administration Section. The NCDOT commissioned a feasibility study of weigh-in-motion facilities installed or planned along entire highway system, including I-95. The study recommended replacing facilities to weigh only incoming truck traffic first, and replace outbound scales later.

There are two weigh stations with weigh-in-motion facilities on I-95, located in Lumberton (mm 24) and Halifax County (mm 152). Inbound truck traffic can be weighed using transponder equipment that has been installed in both locations. Outbound scales have not yet been updated.

2.9 REST AREAS

NCDOT operates five rest areas along I-95. These are located, south to north, at mile markers 5, 48, 99, 142 and 181. The rest area at mile marker 5 is the also the North Carolina Welcome Center and serves only northbound traffic. The rest area at mile marker 181 also serves as a North Carolina Welcome Center and serves only southbound traffic. Each facility provides the same amenities, which include public rest rooms, travel information, picnic areas, barbecue grills, vending machines and public telephones. As shown in **Table 10**, four of the five rest areas have been rehabilitated since their initial construction.

Table 10: I-95 Rest Areas

Mile Marker	County	Initial Construction	Reconstruction
5	Robeson	1973	1999
48	Cumberland	1981	2009
99	Johnston	1967	2005
192	Nash	1980	-
181	Northampton	1968	1995

Source: NCDOT Highway Construction and Inventory Diagrams

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Section 3
Traffic Conditions

This section summarizes the existing traffic conditions of the I-95 corridor. The source for Average Annual Daily Traffic (AADT) volumes for the I-95 mainline segments is the 2008 Freeway AADT Volumes document produced by the Traffic Survey Group of NCDOT's Transportation Planning Branch. The 2008 Manual Classification Counts, Weigh in Motion Counts, and Automated Traffic Recorder (ATR) Counts (provided by NCDOT) were used to help identify the operating characteristics of the I-95 mainline. I-95 mainline seasonal and daily traffic volume distributions were identified from the ATR Based Seasonal Factor Groups for Interstate Routes produced by the Traffic Survey Group. In addition, year 1998 to 2008 ramp ADT volumes were provided by NCDOT.

NCDOT Traffic Volume Maps were used to obtain AADT volumes for the interchange crossroads and alternative route. The 2007 and 2008 crossroad volumes were obtained for east and west of I-95, except for seven locations, where AADT volumes were not available. It should be noted that driveways and/or frontage roads may exist between the interchange ramps and segments representing AADT volume depending on the location of the data count location. The alternative route, or US 301, AADT volumes were also obtained for the years 2007 and 2008.

3.1 TRAFFIC CONDITIONS ASSESSMENT METHODOLOGY

In general, traffic assessments are made using techniques from the Highway Capacity Manual and similar NCDOT procedures. A detailed discussion of the methodology used to review traffic conditions is contained in **Appendix D**.

3.2 TRAFFIC CHARACTERISTICS

Traffic conditions on any highway are not uniform. There are variations in the time of day or year that a highway is traveled and in the kind of motor vehicles that constitute the traffic volumes, based on the different travel purposes. This section describes the existing characteristics of traffic using I-95.

3.2.1 Mainline Traffic Volumes

The average AADT on I-95 by county in 2008 varied between 30,800 and 44,700, with Wilson County having the lowest average, and Harnett County having the highest. **Table 11** below shows the average volumes along with the highest and lowest AADTs for each county. The segment with the highest AADT is in Johnston County where there is a segment with 50,000 AADT. Johnston County also contains one of the segments with the lowest AADT of 29,000, and the other is in Wilson County.

Table 11: I-95 Mainline AADT Volumes in 2008 by County

County	Min	Max	Average
Robeson	30,000	45,000	35,800
Cumberland	32,000	44,000	39,300
Harnett	43,000	46,000	45,000
Johnston	29,000	50,000	35,800
Wilson	29,000	33,000	30,200
Nash	32,000	38,000	35,700
Halifax	34,000	36,000	35,100
Northampton	32,000	36,000	33,200

The minimum and maximum AADT volumes in **Table 12** represent the individual segments on the interstates in North Carolina with the lowest and highest AADT volume respectively. The average AADT is the average of all the individual segment AADT volumes on the interstate. Based on this information average and maximum AADT volumes on I-95 are lower than the 4 other interstates in North Carolina. This relatively low maximum and average AADT volume reflects the fact that all of the other interstates are closely aligned with major metropolitan areas while I-95 is a relatively rural highway. However, this information should not be used by itself to make a conclusion about congestion. Other factors, such as the number of lanes, peak hour factors, truck percentages, etc., influence the traffic operations of the interstates.

Table 12: Comparison of Year 2008 AADT Volumes on NC Interstates

Interstate	Min ADT	Max AADT	Average AADT
I-95	29,000	50,000	36,900
I-85	20,000	167,000	70,000
I-77	17,000	169,000	84,600
I-40	16,000	160,000	56,000
I-26	7,500	94,000	44,100

3.2.2 Historical Traffic Growth

I-95 traffic volumes generally increased in the ten years prior to 2000. In the ten years since then, traffic growth has been volatile, growing and shrinking due to the dynamic economic conditions over that period. The historical minimum, maximum, and average AADT volumes, broken down by county, from 1989 to 2008 are presented in **Table 13**. Average volumes were determined by calculating an unweighted average of the volumes on all segments within each county, and within the whole corridor. Using the average volumes from 1989 to 2008, a per year growth rate was determined between each year, and then averaged to determine the growth rate over the 20 year period.

From 1989 to 2008 the average growth rate per year of the volumes on I-95 was 1.2%. The highest average volume increases occurred in Harnett County, while the lowest average volume growth occurred in Northampton County. The yearly percent growth in average AADT volumes for each of the counties from 1989 to 2008 is as follows:

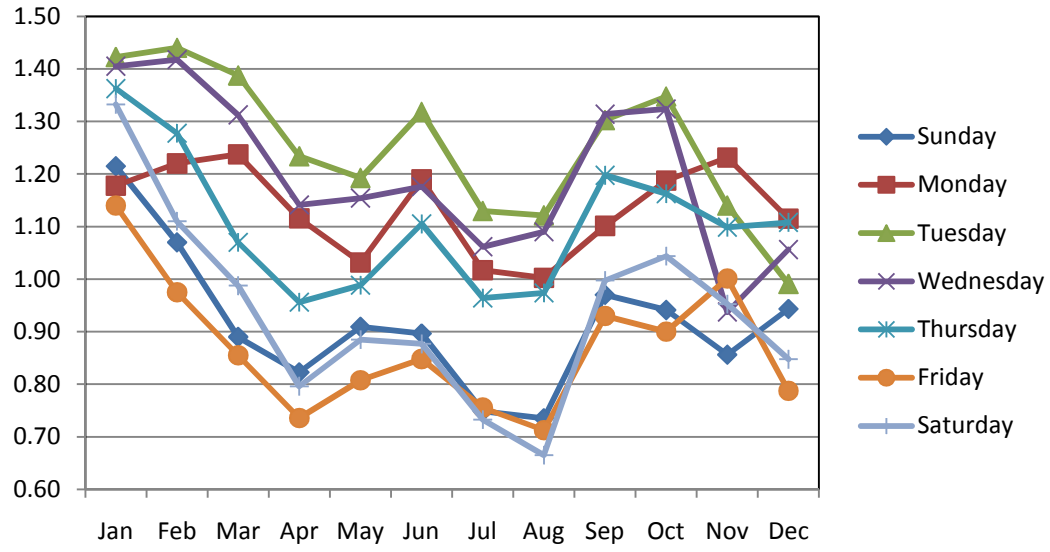
- Robeson County: 0.9% per year
- Cumberland County: 1.4% per year
- Harnett County: 2.3% per year

- Johnston County: 1.3% per year
- Wilson County: 1.7% per year
- Nash County: 1.7% per year
- Halifax County: 1.0% per year
- Northampton County: 0.6% per year
- I-95 Corridor in North Carolina: 1.2% per year

3.2.3 Seasonal and Daily Traffic Volumes

I-95 experiences a relatively wide range of seasonal and daily distributions due to the high percentage of recreational traffic. **Figure 6** shows the factoring from a daily volume to the AADT by day of the week and by month of the year. The lower factors indicate higher daily volumes while the higher factors indicate lower daily volumes. The summer months of July and August typically experience the highest volumes. The months of April, typically when schools have spring break, and December also experience higher volumes. The winter months of January and February typically 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. These patterns indicate a large amount of recreational travel on I-95, and indicate that the "typical" summer weekend experiences daily traffic 30-40% higher than the "average day" of the year (AADT).

Figure 6: I-95 Seasonal and Daily Volume Adjustment Factors for 2009



Note: The lower factors indicate higher daily volumes while the higher factors indicate lower daily volumes.
Source: NCDOT Seasonal Factors.xls provided by NCDOT Traffic Survey Group

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Table 13: I-95 Historical AADT Volume Ranges by County

County	Volume	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Robeson	Min	30,900	21,200	27,700	29,500	28,700	29,100	28,400	30,700	28,200	37,000	38,000	31,000	32,000	32,000	33,000	32,000	33,000	34,000	32,000	30,000
	Max	41,600	34,700	43,000	42,600	43,100	44,500	44,500	46,500	44,300	47,000	50,000	44,000	44,000	47,000	51,000	49,000	52,000	54,000	51,000	45,000
	Average	34,300	26,000	33,100	33,400	34,000	35,600	34,900	36,400	34,600	40,100	41,600	36,900	37,500	39,300	40,600	38,200	40,800	41,800	38,800	36,800
Cumberland	Min	28,300	20,200	26,100	24,400	26,900	26,400	28,200	27,000	25,000	29,000	28,000	28,000	32,000	32,000	33,000	30,000	33,000	34,000	31,000	32,000
	Max	35,000	32,000	35,500	37,500	38,800	39,300	37,900	41,500	38,700	42,000	43,000	42,000	46,000	48,000	46,000	46,000	46,000	48,000	47,000	44,000
	Average	30,400	25,800	30,500	30,000	32,000	32,900	34,600	33,800	33,600	36,800	37,300	36,200	38,300	39,000	39,800	38,800	39,900	41,300	39,700	38,300
Harnett	Min	28,600	29,100	31,400	34,300	34,500	34,000	37,300	37,500	38,700	37,000	43,000	41,000	42,000	42,000	44,000	44,000	44,000	46,000	46,000	43,000
	Max	31,300	29,500	33,800	35,900	35,800	35,800	39,300	42,400	42,300	42,000	50,000	47,000	46,000	47,000	48,000	46,000	49,000	49,000	49,000	46,000
	Average	30,000	29,300	32,400	35,300	35,100	34,800	38,300	40,100	40,800	39,400	46,700	44,000	44,400	44,600	46,400	44,700	46,600	47,700	47,400	44,700
Johnston	Min	24,200	22,400	22,600	25,000	23,900	24,700	29,100	27,300	32,900	32,000	32,000	30,000	30,000	28,000	29,000	30,000	32,000	31,000	29,000	29,000
	Max	32,400	30,200	33,200	37,500	35,800	35,900	40,700	43,900	45,400	44,000	55,000	50,000	49,000	50,000	50,000	51,000	53,000	53,000	54,000	50,000
	Average	29,800	25,800	27,700	30,800	28,700	29,200	34,200	34,200	38,600	40,400	41,100	37,800	37,600	37,600	37,900	37,100	41,700	39,600	38,700	36,200
Wilson	Min	24,200	22,400	22,600	24,900	23,900	24,700	30,800	27,300	35,100	32,000	32,000	30,000	30,000	28,000	29,000	30,000	32,000	31,000	29,000	29,000
	Max	24,700	24,000	23,500	26,200	25,600	26,100	32,900	28,200	37,400	33,000	34,000	32,000	31,000	31,000	30,000	31,000	34,000	34,000	34,000	33,000
	Average	24,300	22,900	22,900	25,300	24,500	25,100	31,500	27,500	35,700	32,300	32,500	30,500	30,500	29,300	29,300	30,300	32,800	32,500	31,500	30,800
Nash	Min	24,400	23,900	23,300	26,100	25,600	26,000	32,700	28,100	34,900	33,000	33,000	32,000	31,000	31,000	30,000	31,000	33,000	34,000	33,000	32,000
	Max	28,000	28,800	30,700	29,700	29,400	29,400	36,500	36,700	39,700	36,000	38,000	38,000	36,000	36,000	37,000	39,000	39,000	41,000	41,000	38,000
	Average	26,200	25,900	26,900	27,800	27,600	27,800	34,600	32,400	37,200	34,400	35,700	35,600	33,600	33,600	33,900	35,400	36,100	37,300	37,000	34,700
Halifax	Min	27,700	27,700	28,900	28,600	28,600	28,100	34,700	35,400	34,300	35,000	36,000	38,000	34,000	35,000	36,000	38,000	37,000	38,000	38,000	34,000
	Max	33,700	28,500	31,000	30,200	31,000	30,600	35,600	37,200	36,700	37,000	39,000	41,000	36,000	38,000	39,000	41,000	41,000	41,000	41,000	36,000
	Average	30,200	28,200	30,000	29,300	29,700	29,200	35,200	36,200	35,700	35,800	37,000	39,300	34,800	35,700	36,800	38,800	38,000	38,700	38,800	35,200
Northampton	Min	31,100	24,700	27,300	27,600	27,400	27,300	32,000	35,700	33,600	35,000	36,000	36,000	32,000	34,000	36,000	38,000	36,000	36,000	36,000	32,000
	Max	33,700	28,500	31,000	30,200	31,000	30,600	35,400	37,200	36,700	37,000	39,000	40,000	36,000	38,000	39,000	41,000	41,000	41,000	41,000	36,000
	Average	32,200	26,100	28,700	28,800	29,000	28,800	33,400	36,400	35,000	36,000	37,300	37,700	33,700	35,700	37,300	39,700	38,000	38,000	38,000	33,700
I-95 Corridor in NC	Min	24,200	20,200	22,600	24,400	23,900	24,700	28,200	27,000	25,000	29,000	28,000	28,000	30,000	28,000	29,000	30,000	32,000	31,000	29,000	29,000
	Max	41,600	34,700	43,000	42,600	43,100	44,500	44,500	46,500	45,400	47,000	55,000	50,000	49,000	50,000	51,000	51,000	53,000	54,000	54,000	50,000
	Average	30,200	26,200	29,700	30,800	30,800	31,400	34,800	34,800	36,400	38,000	39,500	37,400	37,300	37,800	38,700	38,000	40,200	40,500	39,300	37,000

[1] Source: Preliminary Traffic Estimates for NCDOT State TIP Project No. I-5133, I-95 Corridor Planning and Finance Study (MAB, May 2010)

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3.2.4 Peak Hour Traffic Volumes

The weekday peak hour (those hours having the highest hourly volume during a typical day) on I-95 varies from the midday to the early evening along the corridor. The Manual Classification Counts collected at 30 locations along the I-95 corridor show the most frequent weekday peak hour beginning at 1:00 PM. In addition, there are a considerable number of locations with the peak hour beginning from 4:15 PM to 5:00 PM. Limited data was available regarding the peak hour on the weekend. The two Automatic Traffic Recorder (ATR) counts located between Exits 58 and 61 (Cumberland County) and Exits 145 and 150 (Nash County) showed the Saturday peak hour starting at 11:00 AM and the Sunday peak hour starting at 2:00 PM at both locations.

The directional distribution of traffic represents the split of traffic travelling northbound and southbound on I-95 during the peak hour. The typical default directional distribution is a 60-40 split according to the *Highway Capacity Manual (HCM) 2000: Exhibit 9-2*. Typically higher directional distributions are associated with urban areas that have high percentages of commuter traffic.

The Manual Classification Counts collected at 30 locations along the I-95 corridor show the directional distribution of traffic varies between a 50-50 split to a 70-30 split during the peak hour. Of the 30 locations, 28 locations have a directional distribution split of 60-40 or lower with the corridor average being a 55-45 split. In Wilson County between exits 116 and 119, I-95 has a directional split of 65-35. The segment of I-95 between exits 173 and 176 in Halifax and Northampton Counties has a directional split of 70-30. The lower overall directional distribution of traffic on most of the I-95 corridor is consistent with the high percentage of recreational traffic on I-95 and the rural area roadway classifications along the majority of the corridor.

3.2.5 Truck Traffic

I-95 stretches from the Canadian border south to Miami, Florida, servicing 40% of the U.S. Gross Domestic Product, including 28% of all U.S. exports and 34% of all U.S. imports (I-95 Corridor Coalition) (www.i95coalition.org/i95/Home/I-95CorridorFacts/tabid/173/Default.aspx). Consequently, trucks constitute a substantial percentage of the traffic on I-95 within North Carolina. The 2008 Manual Classification Counts collected at 30 locations along the I-95 corridor show trucks are estimated to have comprised between 16 and 30 percent of the daily traffic. On average, trucks are estimated to comprise 23% of the daily traffic.

3.3 TRAFFIC OPERATING CONDITIONS

A standardized measure of the traffic flow on a roadway is level of service (LOS), which provides a measure of average travel speed, congestion, and freedom of movement for vehicles traveling along the roadway. For freeways such as I-95, LOS is rated on the letter grade scale:

- LOS A: Free flow; vehicles can move freely within the traffic stream.
- LOS B: Reasonably free flow operations; freedom to maneuver slightly restricted.
- LOS C: Flow with speeds at or near free flow; freedom to maneuver noticeably restricted.
- LOS D: Speeds decline, increasing traffic; freedom to maneuver noticeably limited.

- LOS E: Near capacity; little or no room to maneuver.
- LOS F: Breakdowns in traffic flow; capacity exceeded.

A LOS analysis was performed for the I-95 mainline, interchange crossroads and the alternative route US 301. A detailed description of the methodologies and assumptions used in the LOS analysis of the 2008 is contained in **Appendix D**. The I-95 mainline basic freeway segment LOS analysis was performed using the maximum service flow rate thresholds from the HCM 2000 Exhibit 23-2: LOS Criteria for Basic Freeway Segments, segment AADT volumes, and the freeway and traffic characteristics described in **Appendix D**. The LOS analysis of the alternative route and interchange crossroads was performed using the NCLOS software (Version 2.1), section AADT volumes, and the roadway and traffic characteristics described in **Appendix D**.

The K-30 factor used in the analysis of the I-95 mainline was 13% based on the two ATR counts of 12.4% and 13.8%. The K-30 factor represents the percentage of the AADT traffic volume occurring in the 30th highest hour of the year and is the factor traditionally used for operation analysis such as reported here. This means that only 29 hours a year will the I-95 corridor have a higher hourly volume than what was used in the analysis.

The NCDOT minimum LOS standard for a rural roadway is LOS C while the minimum LOS standard for an urban roadway is LOS D. For this analysis roadway sections with a LOS C or better are considered to be in Good condition, LOS D in Fair condition, and LOS E or LOS F in Poor condition.

3.3.1 Level of Service Analysis – I-95 Mainline

Based on the LOS analysis for the I-95 mainline using 2008 AADTs, most segments of I-95 currently experience Good traffic flow. The traffic operations analysis of the 58 basic freeway segments showed that 51 of the segments operated at LOS C or better (88%), 7 operated at LOS D (12%), and none operated at LOS E or F (0%). 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. Two of the segments with Fair rating are in Robeson County, one in Cumberland County, three in Harnett County, and one partially in Harnett and Johnston Counties.

The complete results of the analysis are in **Table 14**, showing the analyzed freeway segment AADT, number of lanes and LOS. The Existing Conditions Survey contained in **Appendix A** shows the LOS for each segment and are color coded based on Good, Fair, or Poor traffic conditions.

As mentioned in **Section 3.2.2**, I-95 experiences seasonal and daily distributions of traffic that indicate a high percentage of recreational traffic. It should be noted that although AADT volumes are shown in **Table 14**, the LOS reported here is based on the 30th highest hourly volume of the year. This reflects the traffic peaks that occur in peak traffic seasons and typical peak days.

As shown in **Table 12** above, I-95 appears to be more lightly travelled than other interstates in North Carolina. Additionally, the LOS analysis of the existing conditions completed as part of this needs assessment showed none of the segments operated at LOS E or F and only 7 segments

operated at LOS D. As discussed previously, a K-30 factor was used in the analysis of the I-95 mainline, meaning that the I-95 corridor will only operate with higher hourly traffic volumes than what is documented for 29 hours a year. Therefore, concerns about congestion during peak travel times do not seem warranted. The perception of congestion on the corridor may be due to ramp merges and diverges, traffic incidents or construction, rather than high volumes on the I-95 mainline.

Table 14: I-95 Mainline Traffic Operations for 2008

Segment From	Segment To	County	AADT	Number of Lanes	LOS
South Carolina State Line	NC 130 (Exit 2)	Robeson	30,000	4	B
NC 130 (Exit 2)	SR 2455 (Raynham Rd.) (Exit 7)	Robeson	31,000	4	B
SR 2455 (Raynham Rd.) (Exit 7)	SR 1003 (South Chicken Rd.) (Exit 10)	Robeson	32,000	4	B
SR 1003 (South Chicken Rd.) (Exit 10)	US 74 (Exit 14)	Robeson	34,000	4	C
US 74 (Exit 14)	NC 72 (Exit 17)	Robeson	35,000	4	C
NC 72 (Exit 17)	SR 1536 (Carthage Rd.) (Exit 19)	Robeson	45,000	4	D
SR 1536 (Carthage Rd.) (Exit 19)	NC 211 (North Roberts Ave.) (Exit 20)	Robeson	44,000	4	D
NC 211 (North Roberts Ave.) (Exit 20)	US 301 (Fayetteville Rd.) (Exit 22)	Robeson	40,000	4	C
US 301 (Fayetteville Rd.) (Exit 22)	US 301 (Exit 25)	Robeson	37,000	4	C
US 301 (Exit 25)	NC 20 (W. Broad St.) (Exit 31)	Robeson	37,000	4	C
NC 20 (W. Broad St.) (Exit 31)	US 301 (Exit 33)	Robeson	38,000	4	C
US 301 (Exit 33)	I-95 Business (Exit 40)	Robeson / Cumberland	39,000	4	C
I-95 Business (Exit 40)	NC 59 (Chickenfoot Rd.) (Exit 41)	Cumberland	32,000	4	B
NC 59 (Chickenfoot Rd.) (Exit 41)	SR 2341 (Claude Lee Rd.) (Exit 44)	Cumberland	36,000	4	C
SR 2341 (Claude Lee Rd.) (Exit 44)	NC 87 (Exit 46)	Cumberland	38,000	4	C
NC 87 (Exit 46)	NC Highway 53/210 (Cedar Creek Rd.) (Exit 49)	Cumberland	40,000	4	C
NC Highway 53/210 (Cedar Creek Rd.) (Exit 49)	NC 24 (Exit 52)	Cumberland	35,000	4	C
NC 24 (Exit 52)	SR 1832 (Murphy Rd.) (Exit 55)	Cumberland	33,000	4	C
SR 1832 (Murphy Rd.) (Exit 55)	I-95 Business (Exit 56)	Cumberland	33,000	4	C
I-95 Business (Exit 56)	I-295 (Fayetteville Outer Loop) / US 13 (Exit 58)	Cumberland	44,000	4	D[2]
I-295 (Fayetteville Outer Loop) / US 13 (Exit 58)	SR 1815 (Wade Stedman Rd.) (Exit 61)	Cumberland	43,000	4	C
SR 1815 (Wade Stedman Rd.) (Exit 61)	NC 82 (Godwin Falcon Rd.) (Exit 65)	Cumberland	43,000	4	C
NC 82 (Godwin Falcon Rd.) (Exit 65)	SR 1811 (Bud Hawkins Rd.) (Exit 70)	Cumberland / Harnett	43,000	4	C
SR 1811 (Bud Hawkins Rd.) (Exit 70)	SR 1002 (Long Branch Rd.) (Exit 71)	Harnett	43,000	4	C
SR 1002 (Long Branch Rd.) (Exit 71)	SR 1793 (Pope Rd.) (Exit 72)	Harnett	44,000	4	D[2]
SR 1793 (Pope Rd.) (Exit 72)	US 421 (Cumberland St.) (Exit 73)	Harnett	45,000	6[1]	C
US 421 (Cumberland St.) (Exit 73)	SR 1808 (Jonesboro Rd.) (Exit 75)	Harnett	46,000	4	D[2]

Table 14: I-95 Mainline Traffic Operations for 2008

Segment From	Segment To	County	AADT	Number of Lanes	LOS
SR 1808 (Jonesboro Rd.) (Exit 75)	SR 1709 (Hodges Chapel Rd.) (Exit 77)	Harnett	46,000	4	D[2]
SR 1709 (Hodges Chapel Rd.) (Exit 77)	NC 50 (Exit 79)	Harnett / Johnston	46,000	4	D[2]
NC 50 (Exit 79)	I-40 (Exit 81)	Johnston	50,000	6[1]	C
I-40 (Exit 81)	SR 1178 (Keen Rd.) (Exit 87)	Johnston	33,000	4	C
SR 1178 (Keen Rd.) (Exit 87)	US 701 (Exit 90)	Johnston	34,000	4	C
US 701 (Exit 90)	SR 1007 (Brogden Rd.) (Exit 93)	Johnston	37,000	4	C
SR 1007 (Brogden Rd.) (Exit 93)	NC 210/US 70 (Exit 95)	Johnston	37,000	4	C
NC 210/US 70 (Exit 95)	US 70 Alternate (Exit 97)	Johnston	35,000	4	C
US 70 Alternate (Exit 97)	SR 1927 (Pine Level Selma Rd.) (Exit 98)	Johnston	35,000	4	C
SR 1927 (Pine Level Selma Rd.) (Exit 98)	SR 2137 (Pittman Rd.) (Exit 101)	Johnston	35,000	4	C
SR 2137 (Pittman Rd.) (Exit 101)	SR 2130 (East Main St.) (Exit 102)	Johnston	35,000	4	C
SR 2130 (East Main St.) (Exit 102)	SR 2339 (Bagley Rd.) (Exit 105)	Johnston	34,000	4	C
SR 2339 (Bagley Rd.) (Exit 105)	SR 2342 (Princeton Kenly Rd.) (Exit 106)	Johnston	34,000	4	C
SR 2342 (Princeton Kenly Rd.) (Exit 106)	US 301 (Exit 107)	Johnston	33,000	4	C
US 301 (Exit 107)	NC 42 (Exit 116)	Johnston / Wilson	29,000	4	B
NC 42 (Exit 116)	I-795/US 264 (Exit 119)	Wilson	29,000	4	B
I-795/US 264 (Exit 119)	US 264 Alternate (Raleigh Rd.) (Exit 121)	Wilson	32,000	4	C
US 264 Alternate (Raleigh Rd.) (Exit 121)	NC 97 (Exit 127)	Wilson / Nash	33,000	4	C
NC 97 (Exit 127)	SR 1717 (Sandy Cross Rd.) (Exit 132)	Nash	32,000	4	C
SR 1717 (Sandy Cross Rd.) (Exit 132)	US 64 (Exit 138)	Nash	32,000	4	C
US 64 (Exit 138)	NC 43 (Exit 141)	Nash	38,000	4	C
NC 43 (Exit 141)	NC 4 (Exit 145)	Nash	37,000	4	C
NC 4 (Exit 145)	NC 33 (Exit 150)	Nash	36,000	4	C
NC 33 (Exit 150)	NC 481 (Exit 154)	Nash / Halifax	35,000	4	C
NC 481 (Exit 154)	NC 561 (Exit 160)	Halifax	35,000	4	C
NC 561 (Exit 160)	NC 903 (Exit 168)	Halifax	35,000	4	C
NC 903 (Exit 168)	NC 125 (Exit 171)	Halifax	36,000	4	C
NC 125 (Exit 171)	US 158 (Julian R Allsbrook Highway) (Exit 173)	Halifax	34,000	4	C
US 158 (Julian R Allsbrook Highway) (Exit 173)	NC 46 (Exit 176)	Halifax / Northampton	36,000	4	C
NC 46 (Exit 176)	NC 48 (Exit 180)	Northampton	32,000	4	B
NC 48 (Exit 180)	Virginia State Line	Northampton	33,000	4	B

1. Freeway segment contains 2 continuous lanes and 1 auxiliary lane in each direction.
2. These segments with LOS D are located in rural areas and thus do not meet the NCDOT minimum LOS standard.

In order to review congestion during the peak hours and seasons, the LOS for the highest traffic in the highest hour of the year (K-1 Factor) were also analyzed. Based on the two ATR counts, the percentage of AADT traffic occurring in the highest hour of the year are 13.8% and 15.6%.

The traffic analysis of the existing conditions summarized by county using the average K-1 Factor (14.7%) is shown in **Table 15**.

Table 15: I-95 Mainline 2008 LOS Analysis for Highest Hourly Traffic of the Year (K-1)

County	LOS A	LOS B	LOS C	LOS D	LOS E	LOS F
Robeson	0	0	9	3	0	0
Cumberland	0	0	7	5	0	0
Harnett	0	0	1	3	3	0
Johnston	0	0	13	0	1	0
Wilson	0	0	4	0	0	0
Nash	0	0	6	1	0	0
Halifax	0	0	6	0	0	0
Northampton	0	0	3	0	0	0

Note: For segments that span into two counties the LOS results are shown for both counties.

Based on the analysis of the most heavily travelled hour of the year, most of the segments on I-95 (44 of the 58, or 76%) operated at an acceptable LOS C in 2008; 11 of the 58 segments operated at LOS D (19%); and 4 of the 58 segments operated at LOS E (5%). Seven of the segments with LOS D are in rural areas and thus do not meet the NCDOT minimum LOS standard; four are located in Cumberland County, two in Harnett County, and one is on the Harnett/Cumberland County border. None of the 58 segments operated at LOS A, B, or F.

3.3.2 Level of Service Analysis – Interchange Crossroads

According to LOS analysis of the I-95 interchange crossroads for 2008, most interchange crossroad segments currently experience Good traffic flow. Results of the analysis are in **Table 16**, showing analyzed crossroads AADT, roadway classification, number of lanes and LOS. The analysis showed that 75 crossroad segments operated at LOS C or better (79%), 16 operated at LOS D (17%), 4 operated at LOS E (4%), and none operated at LOS F (0%). Six Robeson County crossroad segments rated Fair or Poor, with five so rated in Johnston County, three in Cumberland County, and two each in Harnett, Halifax, and Nash Counties.

Table 16: I-95 Interchange Crossroad Traffic Operations for 2008

Crossroad	County	Location [1]	Roadway Classification[2]	AADT	Number of Lanes	LOS
NC 130 (Exit 2)	Robeson	West of I-95	RH	3,400	2	B
		East of I-95	RH	2,300	2	A
SR 2455 (Raynham Rd.) (Exit 7)	Robeson	West of I-95	RH	550	2	A
		East of I-95	RH	930	2	A
SR 1003 (South Chicken Rd.) (Exit 10)	Robeson	West of I-95	RH	2,200	2	A
		East of I-95	RH	2,100	2	A
US 74 (Exit 14) [3]	Robeson	West of I-95	SF	Not Available[4]	4	-
		East of I-95	SF	Not Available[4]	4	-
NC 72 (Exit 17)	Robeson	West of I-95	RH	21,000	4	C
		East of I-95	MAS	17,000	4	C
SR 1536 (Carthage Rd.) (Exit 19)	Robeson	West of I-95	RH	5,400	2	C
		East of I-95	MAS	7,500	2	C
NC 211 (North Roberts Ave.) (Exit 20)	Robeson	West of I-95	RH	13,000	2	E
		East of I-95	PAI	23,000	4	D
US 301 (Fayetteville Rd.) (Exit 22)	Robeson	West of I-95	RH	10,000	2	D
		East of I-95	RH	18,000	2	E
US 301 (Exit 25)	Robeson	West of I-95	RH	2,700	2	A
		East of I-95	RH	2,800	2	B
NC 20 (W. Broad St.) (Exit 31)	Robeson	West of I-95	RH	8,700	2	D
		East of I-95	PAI	11,000	2	D
US 301 (Exit 33)	Robeson	West of I-95	RH	4,700	2	B
		East of I-95	RH	4,100	2	B
I-95 Business (Exit 40)	Cumberland	West of I-95	SF	14,000	4	A
NC 59 (Chickenfoot Rd.) (Exit 41)	Cumberland	West of I-95	RH	15,000	2	E
		East of I-95	RH	14,000	2	E
SR 2341 (Claude Lee Rd.) (Exit 44)	Cumberland	West of I-95	RH	2,900	2	B
		East of I-95	RH	Not Available[4]	2	-
NC 87 (Exit 46)	Cumberland	West of I-95	RH	20,000	4	B
		East of I-95	RH	15,000	4	B
NC 53/210 (Cedar Creek Rd.) (Exit 49)	Cumberland	West of I-95	RH	9,900	4	A
		East of I-95	RH	9,500	2	D
NC 24 (Exit 52)	Cumberland	West of I-95	RH	11,000	4	A
		East of I-95	RH	13,000	4	B
SR 1832 (Murphy Rd.) (Exit 55)	Cumberland	West of I-95	RH	4,400	2	B
		East of I-95	RH	3,600	2	B
I-95 Business (Exit 56)	Cumberland	West of I-95	RF	9,200	4	A
I-295 (Fayetteville Outer Loop) / US 13 (Exit 58)	Cumberland	West of I-95	RF	10,000	4	A
		East of I-95	RH	7,800	2	C
SR 1815 (Wade Stedman Rd.) (Exit 61)	Cumberland	West of I-95	RH	2,300	2	A
		East of I-95	RH	1,400	2	A
NC 82 (Godwin Falcon Rd.) (Exit 65)	Cumberland	West of I-95	RH	890	2	A
		East of I-95	RH	1,300	2	A
SR 1811 (Bud Hawkins Rd.) (Exit 70)	Harnett	West of I-95	RH	350	2	A
		East of I-95	RH	Not Available[4]	2	-
SR 1002 (Long Branch Rd.) (Exit 71)	Harnett	West of I-95	RH	6,400	2	C
		East of I-95	RH	2,700	2	A

Table 16: I-95 Interchange Crossroad Traffic Operations for 2008

Crossroad	County	Location [1]	Roadway Classification[2]	AADT	Number of Lanes	LOS
SR 1793 (Pope Rd.) (Exit 72)	Harnett	West of I-95	RH	Not Available[4]	4	-
		East of I-95	RH	Not Available[4]	2	-
US 421 (Cumberland St.) (Exit 73)	Harnett	West of I-95	PAI	21,000	4	D
		East of I-95	RH	10,000	2	D
SR 1808 (Jonesboro Rd.) (Exit 75)	Harnett	West of I-95	RH	5,800	2	C
		East of I-95	RH	3,200	2	B
SR 1709 (Hodges Chapel Rd.) (Exit 77)	Harnett	West of I-95	RH	Not Available[4]	2	-
		East of I-95	RH	Not Available[4]	2	-
NC 50 (Exit 79)	Johnston	West of I-95	PAI	9,500	2	D
		East of I-95	RH	5,700	2	C
I-40 (Exit 81)	Johnston	West of I-95	RF	33,000	4	C
		East of I-95	RF	20,000	4	B
SR 1178 (Keen Rd.) (Exit 87)	Johnston	West of I-95	RH	4,600	2	B
		East of I-95	RH	2,600	2	A
US 701 (Exit 90)	Johnston	West of I-95	RH	8,500	2	D
		East of I-95	RH	5,400	2	C
SR 1007 (Brogden Rd.) (Exit 93)	Johnston	West of I-95	MAS	5,200	2	C
		East of I-95	RH	3,000	2	B
NC 210/US 70 Bus (Exit 95)	Johnston	West of I-95	PAI	14,000	2	D
		East of I-95	RH	8,900	2	D
US 70 (Exit 97)	Johnston	West of I-95	PAI	19,000	4	D
		East of I-95	PAI	6,400	4	C
SR 1927 (Pine Level Selma Rd.) (Exit 98)	Johnston	West of I-95	RH	4,100	2	B
		East of I-95	RH	2,400	2	A
SR 2137 (Pittman Rd.) (Exit 101)	Johnston	West of I-95	RH	1,000	2	A
		East of I-95	RH	Not Available[4]	2	-
SR 2130 (East Main St.) (Exit 102)	Johnston	West of I-95	RH	1,500	2	A
		East of I-95	RH	1,800	2	A
SR 2339 (Bagley Rd.) (Exit 105)	Johnston	West of I-95	RH	2,100	2	A
		East of I-95	RH	2,200	2	A
SR 2342 (Princeton Kenly Rd.) (Exit 106)	Johnston	West of I-95	RH	1,500	2	A
		East of I-95	RH	2,700	2	A
US 301 (Exit 107)	Johnston	West of I-95	RH	4,600	2	B
		East of I-95	PAI	6,100	4	C
NC 42 (Exit 116)	Wilson	West of I-95	RH	7,600	2	C
		East of I-95	RH	7,000	4	A
I-795/US 264 (Exit 119)	Wilson	West of I-95	RF	16,000	4	B
		East of I-95	RF	21,000	4	B
US 264 Alternate (Raleigh Rd.) (Exit 121)	Wilson	West of I-95	MAS	16,000	4	C
		East of I-95	MAS	19,000	4	C
NC 97 (Exit 127)	Nash	West of I-95	RH	2,600	2	A
		East of I-95	RH	3,100	2	B
SR 1717 (Sandy Cross Rd.) (Exit 132)	Nash	West of I-95	RH	4,700	2	B
		East of I-95	RH	3,500	2	B
US 64 (Exit 138)	Nash	West of I-95	SF	39,000	4[5]	C
		East of I-95	UF	42,000	4	C
NC 43 (Exit 141)	Nash	West of I-95	RH	7,900	2	D
		East of I-95	RH	8,900	2	D

Table 16: I-95 Interchange Crossroad Traffic Operations for 2008

Crossroad	County	Location [1]	Roadway Classification[2]	AADT	Number of Lanes	LOS
NC 4 (Exit 145)	Nash	East of I-95	RH	7,100	4	A
NC 33 (Exit 150)	Nash	West of I-95	RH	1,800	2	A
		East of I-95	RH	1,500	2	A
NC 481 (Exit 154)	Halifax	West of I-95	RH	800	2	A
		East of I-95	RH	1,600	2	A
NC 561 (Exit 160)	Halifax	West of I-95	RH	1,600	2	A
		East of I-95	RH	1,200	2	A
NC 903 (Exit 168)	Halifax	West of I-95	RH	1,700	2	A
		East of I-95	RH	1,400	2	A
NC 125 (Exit 171)	Halifax	West of I-95	MAS	9,000	2	C
		East of I-95	MAS	5800	2	C
US 158 (Julian R Allsbrook Highway) (Exit 173)	Halifax	West of I-95	PAI	21,000	6	D
		East of I-95	PAI	17,000	4	D
NC 46 (Exit 176)	Northampton	West of I-95	RH	7,600	2	C
		East of I-95	RH	6,600	2	C
NC 48 (Exit 180)	Northampton	West of I-95	RH	2,800	2	B
		East of I-95	RH	1,100	2	A

[1] Driveways and/or crossroads may exist between interchange ramps and represented AADT volume depending on the location of the historical data count.
[2] Roadway Classification:
RH = Rural Highway
SF = Suburban Freeway
MAS = Minor Arterial, Suburban
PAI = Principal Arterial, Intermediate
RF = Rural Freeway
UF = Urban Freeway
[3] I-74/US 74 interchange was not open in 2008
[4] AADT data was not available for crossroad in the vicinity of the interchange
[5] Freeway segment contains 2 continuous lanes and 1 auxiliary lane in each direction

3.3.3 Level of Service Analysis – Alternative Route US 301

During times of congestion on I-95 due to high traffic volumes, vehicle crashes or other incidents, or construction, US 301 may 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 same alignment.

According to the LOS analysis for US 301 and US 301 Bypass for 2008, most of the alternative route segments currently experience Good traffic flow. The results of the analysis are in **Table 17**, showing the analyzed roadway segment AADT, classification, number of lanes and LOS. The analysis of the 182.5 miles of US 301 and US 301 Bypass showed that 146.7 miles operate at LOS C or better (80.4%), 34.1 miles operate at LOS D (18.7%), 0.8 mile operates at LOS E (0.4%), and 0.9 mile operates at LOS F (0.5%). The most congested sections of the alternative route are in the vicinity of Smithfield/Selma and Rocky Mount.

Table 17: US 301 Alternative Route Operations for 2008

Segment From	Segment To	County	Segment Length (miles)	AADT	Number of Lanes	Roadway Class. [1]	LOS
US 301							
SC State Line	SR 2519 (Robeson Rd)	Robeson	3.31	3,600	2	RH	B
SR 2519 (Robeson Rd)	SR 1155 (Dew Rd)	Robeson	4.52	1,100	2	RH	A
SR 1155 (Dew Rd)	I-95 at Exit 10	Robeson	4.01	2,200	2	RH	A

Table 17: US 301 Alternative Route Operations for 2008

Segment From	Segment To	County	Segment Length (miles)	AADT	Number of Lanes	Roadway Class. [1]	LOS
US 301 and I-95 run concurrent from Exit 10 to Exit 22 (LOS analysis included in Section 3.3.1)							
I-95 at Exit 22	SR 1529 (Mt. Olive Church Rd / W. Powersville Rd)	Robeson	2.55	10,000	2	MAS	C
SR 1529 (Mt. Olive Church Rd / W. Powersville Rd)	I-95 at Exit 25	Robeson	1.30	2,700	2	MAS	C
I-95 at Exit 25	W. Clark St	Robeson	5.94	4,000	2	RH	B
W. Clark St	SR 1912 (Evans Rd)	Robeson	0.98	6,300	2	RH	C
SR 1912 (Evans Rd)	SR 1723 (W. Parkton Tobermory Rd)	Robeson	4.73	4,700	2	RH	B
SR 1723 (W. Parkton Tobermory Rd)	NC 71	Robeson	1.65	2,600	2	RH	A
NC 71	I-95 at Exit 40	Robeson / Cumberland	2.87	9,000	4	MAS	C
I-95 at Exit 40	SR 2220 (Tom Starling Rd)	Cumberland	1.99	14,000	4	PAI	D
SR 2220 (Tom Starling Rd)	NC 87	Cumberland	5.57	20,000	4	PAI	D
NC 87	NC 24 / NC 210 (Grove St)	Cumberland	1.71	18,000	4	PAI	D
NC 24 / 210 (Grove St)	SR 1832 (Murphy Rd) / SR 1838 (Dunn Rd)	Cumberland	4.85	14,000	4	UF	A
SR 1832 (Murphy Rd) / SR 1838 (Dunn Rd)	SR 1722 (Beard Rd)	Cumberland	1.56	5,000	2	MAS	C
SR 1722 (Beard Rd)	SR 1933 (Pembroke Ln)	Cumberland	1.41	3,500	2	RH	B
SR 1933 (Pembroke Ln)	SR 1811 (Bud Hawkins Rd)	Cumberland / Harnett	11.97	2,200	2	RH	A
SR 1811 (Bud Hawkins Rd)	SR 1002 (Long Branch Rd)	Harnett	1.87	3,900	2	RH	B
SR 1002 (Long Branch Rd)	E. Best St	Harnett	1.72	2,700	2	RH	A
E. Best St	SR 1800 (Kitchen Rd)	Harnett	2.45	9,200	2	MAS	C
SR 1800 (Kitchen Rd)	SR 1709 (Hodges Chapel Rd)	Harnett	3.05	5,100	2	RH	B
SR 1709 (Hodges Chapel Rd)	NC 242	Harnett / Johnston	2.42	6,800	2	RH	C
NC 242	SR 1165 (Temple Rd)	Johnston	7.48	3,600	2	RH	B
SR 1165 (Temple Rd)	SR 1178 (Keen Rd)	Johnston	0.49	6,900	2	PAI	D
SR 1178 (Keen Rd)	SR 1182 (Boyette Rd) / Benson Ave	Johnston	1.92	3,800	2	PAI	C
SR 1182 (Boyette Rd) / Benson Ave	SR 1007 (Brogden Rd)	Johnston	3.94	12,000	2	PAI	D
SR 1007 (Brogden Rd)	SR 1900 (W. Noble St)	Johnston	4.51	24,000	4	PAI	D
SR 1900 (W. Noble St)	NC 96 (N. Sumner St)	Johnston	0.44	14,000	2	PAI	D
NC 96 (N. Sumner St)	NC 39	Johnston	0.93	6,700	2	PAI	D
NC 39	SR 2130 (W. Main St)	Johnston	3.98	3,300	2	RH	B
SR 2130 (W. Main St)	SR 2144 (Weaver Rd) / SR 2339 (Bagley Rd)	Johnston	2.18	3,000	2	RH	B
SR 2144 (Weaver Rd) / SR 2339 (Bagley Rd)	I-95 at Exit 107	Johnston	2.36	4,600	2	RH	B

Table 17: US 301 Alternative Route Operations for 2008

Segment From	Segment To	County	Segment Length (miles)	AADT	Number of Lanes	Roadway Class. [1]	LOS
I-95 at Exit 107	SR 1175 (Boswellville Rd) / SR 1646 (Lely Rd)	Johnston / Wilson	10.72	10,000	4	RH	A
SR 1175 (Boswellville Rd) / SR 1646 (Lely Rd)	SR 1103 (Wiggins Mill Rd)	Wilson	1.90	19,000	4	MAS	C
SR 1103 (Wiggins Mill Rd)	SR 1515 (Lipscomb Rd)	Wilson	4.18	22,000	4	PAI	D
SR 1515 (Lipscomb Rd)	SR 1328 (Firestone Pky) / SR 1426 (Rosebud Church Rd)	Wilson	3.68	18,000	4	RH	B
SR 1328 (Firestone Pky) / SR 1426 (Rosebud Church Rd)	SR 1333 (Stagecoach Rd)	Wilson	4.13	12,000	4	RH	A
SR 1333 (Stagecoach Rd)	SR 1733 (Mill Branch Rd)	Wilson / Nash	3.57	11,000	4	RH	A
US 301 Bypass							
SR 1733 (Mill Branch Rd)	NC 97 (Raleigh Rd)	Nash	3.26	17,000	4	RH	B
NC 97 (Raleigh Rd)	SR 1713 (Old Mill Rd) / SR 1836 (May Dr)	Nash	2.89	29,000	4	RH	C
SR 1713 (Old Mill Rd) / SR 1836 (May Dr)	US 64 Business (Sunset Ave)	Nash	0.30	26,000	4	PAI	D
US 64 Business (Sunset Ave)	SR 1604 (Hunter Hill Rd)	Nash	0.91	44,000	4	PAI	F
SR 1604 (Hunter Hill Rd)	NC 43 (Benvenue Rd)	Nash	0.78	29,000	4	PAI	E
NC 43 (Benvenue Rd)	US 301 Business	Nash	1.64	22,000	4	PAI	D
US 301							
US 301 Bypass	Tyler Dr (NC Wesleyan College)	Nash	2.08	27,000	4	PAI	D
Tyler Dr (NC Wesleyan College)	NC 4	Nash	1.58	15,000	4	MAS	C
NC 4	SR 1516 (Johnston Rd)	Nash	4.24	9,500	2	RH	D
SR 1516 (Johnston Rd)	SR 1521 (Ethridge Connector Rd)	Nash	2.17	6,400	2	RH	C
SR 1521 (Ethridge Connector Rd)	Randolph St	Nash / Edgecombe / Halifax	4.61	4,700	2	RH	B
Randolph St	E. Bryant St	Halifax	0.89	6,200	4	RH	A
E. Bryant St	NC 481	Halifax	1.67	3,400	2	RH	B
NC 481	NC 125 / NC 903	Halifax	6.33	2,200	2	RH	A
NC 125 / NC 903	NC 561	Halifax	2.19	3,800	2	RH	B
NC 561	King St	Halifax	0.80	5,300	2	RH	C
King St	NC 125 / NC 903 / SR 1158 (Pittsylania St)	Halifax	0.66	5,000	2	RH	B
NC 125 / NC 903 / SR 1158 (Pittsylania St)	Saint David St	Halifax	0.26	2,200	2	RH	A
Saint David St	SR 1651 (Washington Ave)	Halifax	4.98	3,300	2	RH	B
SR 1651 (Washington Ave)	SR 1652 (Sycamore St)	Halifax	1.92	2,200	2	RH	A
SR 1652 (Sycamore St)	US 158	Halifax / Northampton	2.04	9,700	2	RH	D

Table 17: US 301 Alternative Route Operations for 2008

Segment From	Segment To	County	Segment Length (miles)	AADT	Number of Lanes	Roadway Class. [1]	LOS
US 158	NC 186	Northampton	0.70	6,600	2	RH	C
NC 186	VA State Line	Northampton	6.72	2,700	2	RH	A

[1] Road way Classification:
RH = Rural Highway
MAS = Minor Arterial, Suburban
PAI = Principal Arterial, Intermediate
UF = Urban Freeway

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Section 4
Safety Conditions

This section summarizes existing safety conditions of the I-95 corridor. Traffic Engineering Accident Analysis System's Strip Analysis Reports for each county (provided by NCDOT) were used to evaluate existing total and fatal crash rates on the I-95 mainline and to identify specific crash hot spots. In addition, the Interstate Crash Data spreadsheet (provided by NCDOT) was used to examine the historical crash trends on the I-95 mainline as a whole.

4.1 SAFETY ASSESSMENT METHODOLOGY

The safety analysis is based on the Critical Crash Rate Method from the "Guidelines for Utilizing NC Statewide Crash Rates." The critical crash rate is a statistically derived value against which a calculated rate can be compared to see if the rate is far enough above an average that something besides chance must be the cause (NCDOT Traffic Safety Unit Strip Analysis Reports). For each I-95 mainline segment the critical crash rate was calculated based on the statewide crash rate with a 95% confidence interval. A critical crash rate was also developed for each county in the corridor. According to the Strip Analysis Reports, the 2005-2007 statewide crash rate (crashes per 100 million vehicle miles travelled) for all interstate routes in North Carolina is 84.80 for total crashes and 0.56 for fatal crashes.

Northbound and southbound freeway segments were divided by interchanges, and the analysis reviewed freeway segments upstream of the interchange, within the interchange, and downstream of the interchange. To include all merge and diverge accidents associated with an interchange, the freeway segment within the interchange was defined as 1,500 feet upstream of the diverge gore and 1,500 feet downstream of the merge gore. A "moving segment analysis" was used to identify the crash hot spots on the mainline; a 1-mile segment was analyzed moving at 0.1 mile increments along the entire length of the corridor.

For the segment analysis, the safety ratio, which is the critical crash rate divided by the actual crash rate, was reported. Poor/critical segments are defined as those having a safety ratio less than 1.00 (i.e., the critical crash rate is less than the actual segment crash rate); Fair segments are those having a safety ratio between 1.00 and 1.50; and Good segments are those having a safety ratio above 1.50. The straight-line diagrams in **Appendix A** show the crash rates along the I-95 corridor. In addition to the segment analysis and hot spot identification, **Table 19** has been included showing the historical crash trends on I-95 over a 15 year span.

4.2 SAFETY ANALYSIS

The first step in reducing the number of traffic crashes, fatalities, injuries, and property damage is identifying the factors that cause them. A safety analysis of the I-95 corridor was performed to establish general crash trends and identify specific crash hot spots.

4.2.1 Crash Trends

The total crash rate and injury crash rate on I-95 is lower than 4 other North Carolina interstates. However, the fatal crash rate on I-95 is higher than the 4 other North Carolina interstates. **Table**

18 below summarizes the historical North Carolina interstate crash rates from 1990-2008 using data provided by NCDOT.

Table 18: Comparison of Historical Crash Rates from 1990-2008 on NC Interstates

Interstate	Total Crash Rate	Fatal Crash Rate	Injury Crash Rate
I-95	58.9	1.61	22.7
I-85	85.0	0.76	31.8
I-77	91.0	0.64	33.6
I-40	65.3	0.59	25.0
I-26	61.0	0.67	23.5

Source: NCDOT Traffic Safety Unit "Historical Interstate Data by Route" (November 9, 2007)

As shown in **Table 18**, the fatal crash rate on I-95 is higher than the other interstates in North Carolina. It should be noted this is the fatal crash rate and not the number of fatalities. The cause for the higher fatal crash rate on I-95 cannot be pinpointed, but it's possible to identify factors that may lead to the higher fatal crash rate.

Based on the "Total Number of Driver's Involved in Crashes on I-95 in the State of North Carolina Listed by State in Which the Driver's License was Issued" (Sep. 2006 to Aug. 2009) provided by NCDOT, approximately half of all the drivers involved in a crash on I-95 in North Carolina are from outside of North Carolina. Drivers from other states involved in crashes are probably taking longer trips and more likely to be sleepy and less attentive.

Another factor that may lead to the higher fatal crash rate is higher speeds. Even though there is no precise information showing higher travel speeds on I-95, with I-95 being relatively flat and straight, along with lower volumes especially during the "non-tourist" times, higher speeds could be expected.

Another consideration is the high percentage of truck traffic. A car involved in an accident with a truck is much more likely to result in a fatality. Other roadway factors (documented in **Section 2.2**) such as inadequate horizontal clearance, stopping sight distance, decision sight distance, and exit and entrance ramp design may also come into play.

The historical crash trends on the I-95 mainline from 1994 to 2008, broken down for all vehicles and commercial motor vehicles, are presented in **Table 19** below. The crash rates for all vehicle types and commercial motor vehicles followed a similar pattern. The total crash rate and injury crash rate generally decreased since 2004. The fatal crash rate fluctuated up and down from 1994 to 2008. Analysis of the crash rates does not reveal a statistically reliable trend either upward or downward in the rates.

Table 19: I-95 Mainline Historical Crash Trends

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
All Vehicles															
Weighted ADT	28,000	29,000	30,000	32,000	33,000	34,000	35,000	36,000	37,000	37,000	38,000	40,000	40,000	41,000	41,000
VMT (100 MVM)	18.6	19.3	19.9	21.3	21.9	22.6	23.3	23.9	24.6	24.6	25.0	26.4	26.5	27.1	27.1
Crashes	933	1,084	1,468	1,343	1,315	1,267	1,574	1,362	1,663	1,981	1,991	1,567	1,480	1,427	1,285
Crash Rate	50.2	56.3	73.7	63.2	60.0	56.1	67.7	57.0	67.7	80.6	79.7	59.5	55.7	52.7	47.5
Fatal Crashes	30	34	29	22	26	21	33	24	32	23	30	35	26	29	24
Fatalities	39	43	31	33	29	26	43	29	40	27	37	46	32	36	28
Fatal Crash Rate	2.10	2.23	1.56	1.55	1.32	1.15	1.85	1.21	1.63	1.10	1.48	1.75	1.21	1.33	1.03
Injury Crashes	422	455	592	548	529	517	584	542	580	667	642	485	474	454	383
Injury Rate	22.7	23.6	29.7	25.8	24.1	22.9	25.1	22.7	23.6	27.1	25.7	18.4	17.9	16.8	14.2
In State	38.1%	41.1%	36.7%	42.6%	40.7%	42.4%	47.4%	44.2%	39.7%	42.3%	40.9%	45.8%	47.5%	45.8%	44.0%
Out of State	61.9%	58.9%	63.3%	57.4%	59.3%	57.6%	52.6%	55.8%	60.3%	57.7%	59.1%	54.2%	52.5%	54.2%	56.0%
Commercial Motor Vehicles															
Weighted ADT	4,300	4,400	4,600	4,900	5,000	5,200	5,400	5,500	5,700	5,700	5,800	5,800	6,100	6,300	6,300
VMT (100 MVM)	2.9	3.0	3.1	3.3	3.4	3.5	3.6	3.7	3.8	3.8	3.8	4.0	4.1	4.2	4.2
Crashes	219	180	275	241	233	261	308	247	277	329	327	279	242	225	186
Crash Rate	76.8	60.9	90.0	73.9	69.3	75.3	86.4	67.3	73.5	87.3	85.3	69.0	59.4	54.2	44.8
Fatal Crashes	8	10	7	5	5	2	7	6	9	2	4	12	4	5	5
Fatalities	8	19	7	9	7	2	9	6	14	9	5	14	5	5	10
Fatal Crash Rate	2.80	6.43	2.29	2.76	2.08	0.58	2.52	1.64	3.71	2.39	1.30	3.46	1.23	1.20	2.41
Injury Crashes	84	66	110	91	81	100	113	99	86	118	106	73	78	72	48
Injury Rate	29.4	22.3	36.0	27.9	24.1	28.9	31.7	27.0	22.8	31.3	27.7	18.1	19.2	17.3	11.6
In State	35.7%	22.4%	30.3%	22.2%	25.3%	28.1%	32.8%	38.9%	31.3%	22.0%	23.9%	20.7%	30.6%	22.4%	27.9%
Out of State	64.3%	77.6%	69.7%	77.8%	74.7%	71.9%	67.2%	61.1%	68.7%	78.0%	76.1%	79.3%	69.4%	77.6%	72.1%

Source: NCDOT Traffic Safety Unit "Historical Interstate Data by Route" (November 9, 2007)

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4.2.2 Safety Ratios

County-level I-95 mainline safety analysis results are contained in **Table 20**, showing the year 2008 AADT, three-year number of accidents, actual crash rate, critical crash rate, and safety ratio for total, injury, and fatal crashes. The analysis indicates that fatal crashes are an issue in Robeson and Nash Counties where safety ratios less than 1.0 indicate that fatal crash rates in these counties are statistically greater than average. For non-fatal crashes, the I-95 actual crash rate in all counties is substantially better than the critical crash rate. Note that the county-level safety analysis represents long sections of I-95 that may not identify specific crash hot spots.

Table 20: I-95 Mainline Safety Analysis Results by County, September 2006 – August 2009

County	2008 AADT	Number of Crashes	Actual Crash Rate (per 100 MVM)	Critical Crash Rate (per 100 MVM)	Safety Ratio
Total Crashes					
Robeson	35,800	1207	79.30	88.72	1.12
Cumberland	39,300	610	46.36	89.01	1.92
Harnett	45,000	213	48.85	92.17	1.89
Johnston	35,800	713	59.89	89.23	1.49
Wilson	30,200	236	43.50	91.40	2.10
Nash	35,700	601	58.47	89.57	1.53
Halifax	35,100	606	68.46	89.95	1.31
Northampton	33,200	142	51.69	94.12	1.82
Fatal Crashes					
Robeson	35,800	24	1.58	0.91	0.58
Cumberland	39,300	6	0.46	0.94	2.04
Harnett	45,000	2	0.46	1.26	2.74
Johnston	35,800	10	0.84	0.96	1.14
Wilson	30,200	4	0.74	1.18	1.59
Nash	35,700	13	1.26	0.99	0.79
Halifax	35,100	9	1.02	1.03	1.01
Northampton	33,200	2	0.73	1.48	2.03
Injury Crashes					
Robeson	35,800	349	22.93	25.89	1.13
Cumberland	39,300	188	14.29	26.05	1.82
Harnett	45,000	60	13.76	27.76	2.02
Johnston	35,800	158	13.27	26.17	1.97
Wilson	30,200	78	14.38	27.34	1.90
Nash	35,700	175	17.03	26.35	1.55
Halifax	35,100	160	18.08	26.55	1.47
Northampton	33,200	45	16.38	28.82	1.76

Source: NCDOT Traffic Safety Unit, County Crash Statistics

In order to determine specific freeway segments with safety concerns the same crash analysis was performed for each freeway segment. A summary of the safety ratios is shown in **Table 21**. I-95 mainline safety analysis results are detailed in **Table 22**, showing the analyzed freeway segments AADT, 3-year number of accidents, actual crash rate, critical crash rate, and safety ratio. The Existing Conditions Survey contained in **Appendix A** shows the safety ratio for each segment and are color-coded based on a Good, Fair, or Poor safety history.

Table 21: I-95 Mainline Crash Analysis Summary: Safety Ratio by Segment

	Poor (SR < 1.00) (number of segments)	Fair (SR 1.00-1.50) (number of segments)	Good (SR > 1.50) (number of segments)
NB Total Crashes	4	14	97
NB Fatal Crashes	0	4	111
SB Total Crashes	4	10	101
SB Fatal Crashes	1	1	113

Source: PBS&J

Segments of interest are highlighted in **Table 22**. Analysis of total crashes on the northbound I-95 mainline shows four segments with Poor safety ratios, fourteen segments with Fair safety ratios, and the remaining segments having Good safety ratios. Of the fourteen segments with Fair safety ratios, nine of the segments were located within an interchange. The four segments with Poor safety ratios are:

- US 74 interchange (Exit 14) (reconstructed during safety analysis time period)
- US 301 (Fayetteville Road) interchange (Exit 22)
- NC 20 (W. Broad Street) interchange (Exit 31)
- US 158 (Julian R Allsbrook Highway) interchange (Exit 173)

Safety analysis of fatal crashes on the northbound I-95 mainline shows no segments with Poor safety ratios, four segments with Fair safety ratios, and the remaining segments having Good safety ratios. The four segments with Fair safety ratios are:

- US 74 interchange (Exit 14) (reconstructed during safety analysis time period)
- SR 1815 (Wade Stedman Road) interchange (Exit 61)
- NC 481 interchange (Exit 154)
- Between the NC 125 interchange (Exit 171) and US 158 (Julian R Allsbrook Highway) interchange (Exit 173)

Safety analysis of total crashes on the southbound I-95 mainline shows four segments with Poor safety ratios, ten segments with Fair safety ratios, and the remaining segments having Good safety ratios. Of the ten segments with Fair safety ratios, all but one are located within an interchange. The four segments with Poor safety ratios are:

- NC 72 interchange (Exit 17)
- US 301 interchange (Exit 25)
- US 301 interchange (Exit 33)
- NC 481 interchange (Exit 154)

Safety analysis of fatal crashes on the southbound I-95 mainline showed one segment with a Poor safety ratio, one segment with a Fair safety ratio, and the remaining segments having Good safety ratios. The one segment with a Poor safety ratio was between the NC 4 (Exit 145) and NC 33 (Exit 150) interchanges. The one segment with a Fair safety ratio was within the US 74 (Exit 14) interchange (reconstructed during safety analysis time period).

Table 22: I-95 Mainline Safety Analysis Results, September 2006 – August 2009

Interchange From	Interchange To	2008 AADT	NORTHBOUND I-95								SOUTHBOUND I-95							
			Number of Accidents (3 years)		Actual Crash Rate		Critical Crash Rate		Safety Ratio		Number of Accidents (3 years)		Actual Crash Rate		Critical Crash Rate		Safety Ratio	
			Total	Fatal	Total	Fatal	Total	Fatal	Total	Fatal	Total	Fatal	Total	Fatal	Total	Fatal	Total	Fatal
South Carolina State Line	NC Highway 130 (Exit 2)	30,000	10	0	36.0	0.00	140.0	10.01	3.889	> 10	21	0	61.8	0.00	134.2	8.63	2.172	> 10
Within NC Highway 130 (Exit 2) Interchange		29,400	14	0	95.6	0.00	164.9	16.75	1.725	> 10	5	0	35.2	0.00	165.8	17.03	4.711	> 10
NC Highway 130 (Exit 2)	SR 2455 (Raynham Rd.) (Exit 7)	31,000	27	2	39.1	2.90	118.5	5.30	3.032	1.826	22	1	34.5	1.60	120.0	5.58	3.478	3.487
Within SR 2455 (Raynham Rd.) (Exit 7) Interchange		30,800	15	1	82.9	5.50	155.3	13.99	1.873	2.545	6	1	32.5	5.40	154.5	13.79	4.754	2.554
SR 2455 (Raynham Rd.) (Exit 7)	SR 1003 (South Chicken Rd.) (Exit 10)	32,000	22	1	56.8	2.60	130.8	7.86	2.304	3.023	10	1	26.5	2.70	131.5	8.02	4.963	2.969
Within SR 1003 (South Chicken Rd.) (Exit 10) Interchange		31,500	24	1	129.3	5.40	154.9	13.89	1.198	2.572	9	1	47.9	5.30	154.2	13.72	3.220	2.588
SR 1003 (South Chicken Rd.) (Exit 10)	US 74 (Exit 14)	34,000	14	1	49.5	3.50	139.4	9.87	2.817	2.820	15	0	53.7	0.00	139.8	9.97	2.604	> 10
Within US 74 (Exit 14) Interchange (Interchange Reconstructed During Safety Analysis)		32,300	51	2	149.4	5.90	134.1	8.60	0.898	1.458	29	2	91.6	6.30	136.2	9.09	1.487	1.442
US 74 (Exit 14)	NC Highway 72 (Exit 17)	35,000	10	0	23.2	0.00	128.2	7.29	5.527	> 10	35	0	80.1	0.00	127.9	7.22	1.597	> 10
Within NC Highway 72 (Exit 17) Interchange		29,500	27	0	149.8	0.00	164.3	16.59	1.097	> 10	33	1	170.5	5.20	159.0	15.04	0.932	2.891
NC Highway 72 (Exit 17)	SR 1536 (Carthage Rd.) (Exit 19)	45,000	13	0	64.3	0.00	150.6	12.73	2.342	> 10	15	0	74.2	0.00	150.6	12.73	2.030	> 10
Within SR 1536 (Carthage Rd.) (Exit 19) Interchange		41,300	17	1	80.5	4.70	150.8	12.79	1.874	2.721	19	0	91.8	0.00	151.5	12.97	1.650	> 10
SR 1536 (Carthage Rd.) (Exit 19)	NC Highway 211 (North Roberts Ave.) (Exit 20)	44,000	4	0	83.0	0.00	235.5	41.41	2.837	> 10	1	0	18.9	0.00	227.1	38.12	12.014	> 10
Within NC Highway 211 (North Roberts Ave.) (Exit 20) Interchange		34,900	15	0	77.3	0.00	157.1	14.52	2.033	> 10	19	0	95.6	0.00	156.0	14.21	1.632	> 10
NC Highway 211 (North Roberts Ave.) (Exit 20)	US 301 (Fayetteville Rd.) (Exit 22)	40,000	12	0	69.4	0.00	156.5	14.36	2.256	> 10	9	0	53.4	0.00	157.6	14.65	2.951	> 10
Within US 301 (Fayetteville Rd.) (Exit 22) Interchange		30,600	36	0	193.2	0.00	159.3	15.13	0.824	> 10	21	0	117.4	0.00	161.6	15.80	1.377	> 10
US 301 (Fayetteville Rd.) (Exit 22)	US 301 (Exit 25)	37,000	50	0	86.0	0.00	121.8	5.94	1.416	> 10	36	1	70.5	2.00	124.5	6.48	1.765	3.241
Within US 301 (Exit 25) Interchange		35,600	17	0	117.4	0.00	165.5	16.94	1.410	> 10	25	1	172.7	6.90	165.5	16.94	0.958	2.455
US 301 (Exit 25)	NC Highway 20 (W. Broad St.) (Exit 31)	37,000	104	0	96.7	0.00	111.5	4.01	1.153	> 10	75	1	65.3	0.90	110.6	3.86	1.694	4.284
Within NC Highway 20 (W. Broad St.) (Exit 31) Interchange		33,600	38	1	184.9	4.90	152.3	13.18	0.823	2.689	28	0	135.0	0.00	151.9	13.08	1.125	> 10
NC Highway 20 (W. Broad St.) (Exit 31)	US 301 (Exit 33)	38,000	11	1	89.6	8.10	171.9	18.87	1.919	2.329	14	0	102.0	0.00	166.5	17.24	1.633	> 10
Within US 301 (Exit 33) Interchange		36,400	25	0	122.6	0.00	151.5	12.96	1.236	> 10	34	1	180.8	5.30	154.7	13.84	0.856	2.611
US 301 (Exit 33)	I-95 Business (Exit 40)	39,000	86	1	68.4	0.80	109.4	3.65	1.599	4.567	100	1	76.2	0.80	108.8	3.56	1.428	4.454
Within I-95 Business (Exit 40) Interchange		39,000	3	0	48.4	0.00	214.5	33.35	4.431	> 10	6	0	96.9	0.00	214.5	33.35	2.213	> 10
I-95 Business (Exit 40)	NC Highway 59 (Chickenfoot Rd.) (Exit 41)	32,000	9	0	47.6	0.00	153.0	13.39	3.215	> 10	7	0	50.6	0.00	166.2	17.13	3.284	> 10
Within NC Highway 59 (Chickenfoot Rd.) (Exit 41) Interchange		29,600	9	1	48.9	5.40	157.2	14.54	3.215	2.693	9	0	45.3	0.00	154.0	13.64	3.399	> 10
NC Highway 59 (Chickenfoot Rd.) (Exit 41)	SR 2341 (Claude Lee Rd.) (Exit 44)	36,000	8	0	27.4	0.00	138.5	9.65	5.056	> 10	4	0	14.3	0.00	139.8	9.95	9.773	> 10
Within SR 2341 (Claude Lee Rd.) (Exit 44) Interchange		35,100	5	0	22.5	0.00	148.0	12.05	6.579	> 10	9	0	39.5	0.00	147.4	11.88	3.732	> 10
SR 2341 (Claude Lee Rd.) (Exit 44)	NC Highway 87 (Exit 46)	38,000	3	0	19.2	0.00	160.8	15.57	8.377	> 10	6	0	38.5	0.00	160.8	15.57	4.178	> 10
Within NC Highway 87 (Exit 46) Interchange		32,600	26	0	84.7	0.00	139.0	9.76	1.641	> 10	17	0	54.8	0.00	138.8	9.71	2.533	> 10
NC Highway 87 (Exit 46)	NC Highway 53/210 (Cedar Creek Rd.) (Exit 49)	40,000	9	0	24.9	0.00	132.6	8.26	5.325	> 10	12	0	33.0	0.00	132.4	8.22	4.013	> 10
Within NC Highway 53/210 (Cedar Creek Rd.) (Exit 49) Interchange		31,700	6	0	35.0	0.00	161.6	15.80	4.618	> 10	11	1	53.5	4.90	153.5	13.52	2.870	2.759
NC Highway 53/210 (Cedar Creek Rd.) (Exit 49)	NC Highway 24 (Exit 52)	35,000	8	0	26.3	0.00	137.3	9.35	5.219	> 10	9	1	40.5	4.50	147.2	11.83	3.635	2.629
Within NC Highway 24 (Exit 52) Interchange		31,400	13	1	40.3	3.10	136.3	9.13	3.383	2.945	6	0	17.8	0.00	135.2	8.85	7.593	> 10
NC Highway 24 (Exit 52)	SR 1832 (Murphy Rd.) (Exit 55)	33,000	10	0	30.4	0.00	135.1	8.84	4.445	> 10	13	0	37.7	0.00	133.8	8.54	3.549	> 10
Within SR 1832 (Murphy Rd.) (Exit 55) Interchange		31,500	5	0	26.4	0.00	153.9	13.62	5.829	> 10	10	0	51.5	0.00	153.1	13.40	2.972	> 10
SR 1832 (Murphy Rd.) (Exit 55)	I-95 Business (Exit 56)	33,000	2	0	27.7	0.00	203.2	29.25	7.334	> 10	3	0	138.4	0.00	332.2	84.23	2.400	> 10
Within I-95 Business (Exit 56) Interchange		44,000	2	0	28.6	0.00	205.5	30.10	7.187	> 10	10	0	143.1	0.00	205.5	30.10	1.436	> 10
I-95 Business (Exit 56)	I-295 (Fayetteville Outer Loop) / US 13 (Exit 58)	44,000	11	0	37.7	0.00	138.5	9.66	3.675	> 10	15	0	52.8	0.00	139.3	9.84	2.638	> 10
Within I-295 (Fayetteville Outer Loop) / US 13 (Exit 58) Interchange		37,800	25	0	82.9	0.00	139.4	9.85	1.681	> 10	22	0	69.5	0.00	138.5	9.65	1.993	> 10
I-295 (Fayetteville Outer Loop) / US 13 (Exit 58)	SR 1815 (Wade Stedman Rd.) (Exit 61)	43,000	26	0	55.8	0.00	126.4	6.90	2.266	> 10	24	0	46.8	0.00	124.3	6.46	2.657	> 10
Within SR 1815 (Wade Stedman Rd.) (Exit 61) Interchange		41,600	12	2	57.3	9.50	150.1	12.59	2.619	1.325	8	0	37.4	0.00	149.3	12.38	3.991	> 10
SR 1815 (Wade Stedman Rd.) (Exit 61)	NC Highway 82 (Godwin Falcon Rd.) (Exit 65)	43,000	43	0	57.3	0.00	117.1	5.02	2.043	> 10	38	0	50.9	0.00	117.2	5.04	2.302	> 10
Within NC Highway 82 (Godwin Falcon Rd.) (Exit 65) Interchange		42,200	13	0	61.8	0.00	149.6	12.45	2.420	> 10	12	0	55.2	0.00	148.4	12.14	2.688	> 10
NC Highway 82 (Godwin Falcon Rd.) (Exit 65)	SR 1811 (Bud Hawkins Rd.) (Exit 70)	43,000	58	1	67.1	1.20	114.8	4.59	1.710	3.825	41	0	51.8	0.00	116.2	4.85	2.243	> 10
Within SR 1811 (Bud Hawkins Rd.) (Exit 70) Interchange		42,500	9	0	57.2	0.00	161.0	15.61	2.814	> 10	5	0	29.1	0.00	157.2	14.54	5.402	> 10

Table 22: I-95 Mainline Safety Analysis Results, September 2006 – August 2009

Interchange From	Interchange To	2008 AADT	NORTHBOUND I-95								SOUTHBOUND I-95							
			Number of Accidents (3 years)		Actual Crash Rate		Critical Crash Rate		Safety Ratio		Number of Accidents (3 years)		Actual Crash Rate		Critical Crash Rate		Safety Ratio	
			Total	Fatal	Total	Fatal	Total	Fatal	Total	Fatal	Total	Fatal	Total	Fatal	Total	Fatal	Total	Fatal
SR 1811 (Bud Hawkins Rd.) (Exit 70)	SR 1002 (Long Branch Rd.) (Exit 71)	43,000	1	0	12.5	0.00	196.3	26.84	15.702	> 10	3	0	22.0	0.00	166.8	17.32	7.581	> 10
Within SR 1002 (Long Branch Rd.) (Exit 71) Interchange		40,000	15	0	78.0	0.00	155.0	13.92	1.987	> 10	9	0	46.5	0.00	154.2	13.71	3.316	> 10
SR 1002 (Long Branch Rd.) (Exit 71)	SR 1793 (Pope Rd.) (Exit 72)	44,000	9	0	43.4	0.00	149.7	12.48	3.449	> 10	9	0	43.4	0.00	149.7	12.48	3.449	> 10
Within SR 1793 (Pope Rd.) (Exit 72) Interchange		43,200	10	0	83.8	0.0	174.0	19.52	2.077	> 10	5	0	40.9	0.00	172.5	19.06	4.219	> 10
SR 1793 (Pope Rd.) (Exit 72)	US 421 (Cumberland St.) (Exit 73) (Weave)	45,000	4	0	50.7	0.00	197.3	27.18	3.891	> 10	6	0	93.7	0.00	211.9	32.40	2.261	> 10
Within US 421 (Cumberland St.) (Exit 73) Interchange		39,900	14	1	88.4	6.3	162.9	16.16	1.842	2.565	18	0	108.0	0.00	160.6	15.50	1.487	> 10
US 421 (Cumberland St.) (Exit 73)	SR 1808 (Jonesboro Rd.) (Exit 75)	46,000	5	0	20.1	0.00	143.4	10.85	7.132	> 10	9	0	36.8	0.00	144.0	11.01	3.914	> 10
Within SR 1808 (Jonesboro Rd.) (Exit 75) Interchange		43,400	14	0	68.8	0.00	151.8	13.04	2.206	> 10	20	0	97.5	0.00	151.7	13.01	1.555	> 10
SR 1808 (Jonesboro Rd.) (Exit 75)	SR 1709 (Hodges Chapel Rd.) (Exit 77)	46,000	4	0	15.6	0.00	142.4	10.61	9.129	> 10	5	0	18.4	0.00	140.6	10.16	7.643	> 10
Within SR 1709 (Hodges Chapel Rd.) (Exit 77) Interchange		42,100	17	0	70.3	0.00	146.4	11.61	2.082	> 10	14	0	59.7	0.00	146.9	11.77	2.461	> 10
SR 1709 (Hodges Chapel Rd.) (Exit 77)	NC Highway 50 (Exit 79)	46,000	37	1	80.7	2.20	126.8	6.98	1.572	3.174	24	1	57.8	2.40	129.1	7.48	2.234	3.116
Within NC Highway 50 (Exit 79) Interchange		43,200	17	1	85.0	5.00	153.8	13.61	1.810	2.721	22	0	97.6	0.00	149.3	12.38	1.529	> 10
NC Highway 50 (Exit 79)	I-40 (Exit 81)	50,000	2	0	30.4	0.00	210.0	31.71	6.908	> 10	5	0	44.5	0.00	176.5	20.29	3.966	> 10
Within I-40 (Exit 81) Interchange		30,680	30	0	123.7	0.0	150.3	12.64	1.215	> 10	26	0	104.1	0.00	148.5	12.17	1.426	> 10
I-40 (Exit 81)	SR 1178 (Keen Rd.) (Exit 87)	33,000	49	1	49.6	1.00	112.7	4.22	2.272	4.223	53	0	54.4	0.00	112.9	4.26	2.076	> 10
Within SR 1178 (Keen Rd.) (Exit 87) Interchange		31,800	13	1	65.4	5.00	152.2	13.17	2.328	2.634	8	0	41.0	0.00	152.9	13.36	3.730	> 10
SR 1178 (Keen Rd.) (Exit 87)	US 701 (Exit 90)	34,000	8	0	35.8	0.00	147.0	11.79	4.107	> 10	6	0	26.9	0.00	147.0	11.79	5.466	> 10
Within US 701 (Exit 90) Interchange		32,500	18	0	104.0	0.00	158.9	15.03	1.528	> 10	5	0	36.8	0.00	170.3	18.39	4.629	> 10
US 701 (Exit 90)	SR 1007 (Brogden Rd.) (Exit 93)	37,000	20	0	37.0	0.00	123.2	6.23	3.331	> 10	25	0	48.2	0.00	124.1	6.41	2.575	> 10
Within SR 1007 (Brogden Rd.) (Exit 93) Interchange		34,900	10	0	64.3	0.00	163.0	16.18	2.534	> 10	18	0	117.0	0.00	163.3	16.28	1.395	> 10
SR 1007 (Brogden Rd.) (Exit 93)	NC 210/US 70 (Exit 95)	37,000	5	0	40.5	0.00	171.6	18.76	4.236	> 10	8	0	43.4	0.00	154.0	13.66	3.549	> 10
Within NC 210/US 70 (Exit 95) Interchange		30,000	10	0	48.6	0.0	154.7	13.83	3.182	> 10	16	1	80.6	5.00	155.4	14.02	1.928	2.805
NC 210/US 70 (Exit 95)	US 70 Alternate (Exit 97)	35,000	12	1	59.6	5.00	150.7	12.77	2.529	2.554	7	0	34.8	0.00	150.7	12.77	4.332	> 10
Within US 70 Alternate (Exit 97) Interchange		27,400	16	0	82.3	0.0	159.0	15.05	1.932	> 10	13	0	71.7	0.00	161.9	15.88	2.258	> 10
US 70 Alternate (Exit 97)	SR 1927 (Pine Level Selma Rd.) (Exit 98)	35,000	6	0	56.9	0.00	179.9	21.36	3.161	> 10	9	0	75.8	0.00	173.5	19.37	2.290	> 10
Within SR 1927 (Pine Level Selma Rd.) (Exit 98) Interchange		33,900	6	0	40.4	0.00	164.0	16.49	4.059	> 10	11	0	77.1	0.00	166.0	17.09	2.154	> 10
SR 1927 (Pine Level Selma Rd.) (Exit 98)	SR 2137 (Pittman Rd.) (Exit 101)	35,000	11	0	26.6	0.00	129.2	7.50	4.857	> 10	21	0	50.5	0.00	129.1	7.47	2.556	> 10
Within SR 2137 (Pittman Rd.) (Exit 101) Interchange		34,300	17	0	94.0	0.00	155.2	13.98	1.651	> 10	15	0	80.6	0.00	154.2	13.71	1.913	> 10
SR 2137 (Pittman Rd.) (Exit 101)	SR 2130 (East Main St.) (Exit 102)	35,000	4	0	116.0	0.00	269.6	55.53	2.324	> 10	1	0	29.0	0.00	269.6	55.53	9.295	> 10
Within SR 2130 (East Main St.) (Exit 102) Interchange		33,500	8	0	45.5	0.00	156.6	14.36	3.441	> 10	7	0	39.9	0.00	156.8	14.43	3.930	> 10
SR 2130 (East Main St.) (Exit 102)	SR 2339 (Bagley Rd.) (Exit 105)	34,000	8	1	39.8	5.00	150.8	12.78	3.788	2.555	7	0	34.8	0.00	150.8	12.78	4.333	> 10
Within SR 2339 (Bagley Rd.) (Exit 105) Interchange		32,000	19	1	111.1	5.80	158.6	14.92	1.427	2.573	12	0	68.1	0.00	157.3	14.56	2.309	> 10
SR 2339 (Bagley Rd.) (Exit 105)	SR 2342 (Princeton Kenly Rd.) (Exit 106)	34,000	2	0	29.8	0.00	208.5	31.18	6.998	> 10	4	0	69.3	0.00	220.0	35.43	3.175	> 10
Within SR 2342 (Princeton Kenly Rd.) (Exit 106) Interchange		27,200	14	1	72.5	5.20	156.1	14.23	2.153	2.736	21	0	109.2	0.00	157.2	14.53	1.439	> 10
SR 2342 (Princeton Kenly Rd.) (Exit 106)	US 301 (Exit 107)	33,000	1	0	34.6	0.00	291.0	64.99	8.411	> 10	7	0	104.7	0.00	208.7	31.24	1.993	> 10
Within US 301 (Exit 107) Interchange		27,600	15	0	93.5	0.00	162.7	16.10	1.740	> 10	6	0	39.6	0.00	165.5	16.92	4.178	> 10
US 301 (Exit 107)	NC Highway 42 (Exit 116)	29,000	54	1	41.5	0.80	108.9	3.58	2.625	4.476	45	0	35.8	0.00	109.4	3.66	3.056	> 10
Within NC Highway 42 (Exit 116) Interchange		27,400	8	0	50.1	0.00	161.3	15.69	3.219	> 10	13	0	74.5	0.00	157.4	14.59	2.112	> 10
NC Highway 42 (Exit 116)	I-795/US 264 (Exit 119)	29,000	7	0	28.6	0.00	144.0	11.01	5.035	> 10	7	0	29.4	0.00	144.9	11.23	4.927	> 10
Within I-795/US 264 (Exit 119) Interchange		26,600	12	0	46.9	0.00	144.2	11.05	3.074	> 10	16	1	59.2	3.70	142.3	10.58	2.404	2.859
I-795/US 264 (Exit 119)	US 264 Alternate (Raleigh Rd.) (Exit 121)	32,000	7	0	54.7	0.00	169.9	18.25	3.106	> 10	7	0	57.1	0.00	172.0	18.88	3.011	> 10
Within US 264 Alternate (Raleigh Rd.) (Exit 121) Interchange		28,300	8	0	43.6	0.00	156.8	14.43	3.597	> 10	9	0	47.4	0.00	156.1	14.23	3.293	> 10
US 264 Alternate (Raleigh Rd.) (Exit 121)	NC Highway 97 (Exit 127)	33,000	38	1	48.3	1.30	116.3	4.87	2.408	3.749	46	1	59.6	1.30	116.6	4.93	1.957	3.794
Within NC Highway 97 (Exit 127) Interchange		31,200	17	1	85.5	5.00	152.0	13.09	1.777	2.619	14	0	68.1	0.00	150.7	12.75	2.213	> 10
NC Highway 97 (Exit 127)	SR 1717 (Sandy Cross Rd.) (Exit 132)	32,000	32	0	43.0	0.00	117.2	5.05	2.726	> 10	33	0	44.8	0.00	117.4	5.08	2.621	> 10
Within SR 1717 (Sandy Cross Rd.) (Exit 132) Interchange		30,300	17	0	81.3	0.00	150.4	12.66	1.849	> 10	13	0	64.0	0.00	151.3	12.92	2.365	> 10
SR 1717 (Sandy Cross Rd.) (Exit 132)	US 64 (Exit 138)	32,000	38	0	47.5	0.00	116.0	4.82	2.442	> 10	50	2	61.9	2.50	115.9	4.79	1.872	1.916
Within US 64 (Exit 138) Interchange		24,300	39	0	142.3	0.00	144.6	11.17	1.016	> 10	14	0	50.8	0.00	144.4	11.10	2.842	> 10

Table 22: I-95 Mainline Safety Analysis Results, September 2006 – August 2009

Interchange From	Interchange To	2008 AADT	NORTHBOUND I-95								SOUTHBOUND I-95							
			Number of Accidents (3 years)		Actual Crash Rate		Critical Crash Rate		Safety Ratio		Number of Accidents (3 years)		Actual Crash Rate		Critical Crash Rate		Safety Ratio	
			Total	Fatal	Total	Fatal	Total	Fatal	Total	Fatal	Total	Fatal	Total	Fatal	Total	Fatal	Total	Fatal
US 64 (Exit 138)	NC Highway 43 (Exit 141)	38,000	5	1	27.3	5.50	154.3	13.74	5.652	2.497	8	0	42.3	0.00	153.0	13.38	3.618	> 10
Within NC Highway 43 (Exit 141) Interchange		34,900	20	1	88.3	4.40	147.8	11.99	1.674	2.725	15	0	66.4	0.00	148.0	12.04	2.229	> 10
NC Highway 43 (Exit 141)	NC Highway 4 (Exit 145)	37,000	63	2	96.9	3.10	119.6	5.51	1.235	1.778	34	1	47.7	1.40	118.0	5.19	2.473	3.706
Within NC Highway 4 (Exit 145) Interchange		32,800	12	1	64.5	5.40	156.3	14.28	2.423	2.644	12	0	75.5	0.00	163.4	16.30	2.164	> 10
NC Highway 4 (Exit 145)	NC Highway 33 (Exit 150)	36,000	36	0	49.4	0.00	117.6	5.11	2.380	> 10	40	4	57.5	5.70	118.4	5.27	2.059	0.925
Within NC Highway 33 (Exit 150) Interchange		34,100	13	0	71.3	0.00	155.2	13.98	2.177	> 10	14	0	77.3	0.00	155.9	14.18	2.017	> 10
NC Highway 33 (Exit 150)	NC Highway 481 (Exit 154)	35,000	42	1	73.3	1.70	122.1	5.99	1.665	3.526	43	1	76.1	1.80	122.4	6.05	1.608	3.361
Within NC Highway 481 (Exit 154) Interchange		34,000	22	2	127.5	11.60	157.4	14.60	1.235	1.258	29	0	166.3	0.00	157.0	14.47	0.944	> 10
NC Highway 481 (Exit 154)	NC Highway 561 (Exit 160)	35,000	84	0	74.9	0.00	110.9	3.91	1.481	> 10	68	1	60.4	0.90	110.8	3.90	1.835	4.333
Within NC Highway 561 (Exit 160) Interchange		33,700	12	0	63.7	0.00	154.1	13.69	2.420	> 10	11	0	58.8	0.00	154.3	13.73	2.624	> 10
NC Highway 561 (Exit 160)	NC Highway 903 (Exit 168)	35,000	88	0	73.4	0.00	110.0	3.76	1.499	> 10	47	1	39.2	0.80	110.0	3.76	2.807	4.701
Within NC Highway 903 (Exit 168) Interchange		32,800	16	0	96.4	0.00	160.8	15.57	1.668	> 10	10	0	58.5	0.00	158.8	15.00	2.715	> 10
NC Highway 903 (Exit 168)	NC Highway 125 (Exit 171)	36,000	17	0	43.8	0.00	130.8	7.84	2.986	> 10	18	0	38.9	0.00	126.6	6.93	3.254	> 10
Within NC Highway 125 (Exit 171) Interchange		32,500	22	1	110.4	5.00	152.8	13.32	1.384	2.665	12	0	77.8	0.00	163.4	16.30	2.100	> 10
NC Highway 125 (Exit 171)	US 158 (Julian R Allsbrook Highway) (Exit 173)	34,000	16	2	67.2	8.40	144.8	11.22	2.155	1.336	14	0	63.2	0.00	147.3	11.86	2.331	> 10
Within US 158 (Julian R Allsbrook Highway) (Exit 173) Interchange		28,100	28	0	169.5	0.00	164.5	16.63	0.970	> 10	20	0	124.8	0.00	166.3	17.17	1.333	> 10
US 158 (Julian R Allsbrook Highway) (Exit 173)	NC Highway 46 (Exit 176)	36,000	19	1	48.7	2.60	130.6	7.82	2.683	3.006	15	0	38.2	0.00	130.5	7.79	3.417	> 10
Within NC Highway 46 (Exit 176) Interchange		30,200	13	0	75.9	0.00	159.8	15.28	2.106	> 10	17	0	100.7	0.00	160.8	15.57	1.597	> 10
NC Highway 46 (Exit 176)	NC Highway 48 (Exit 180)	32,000	17	0	30.3	0.00	122.5	6.08	4.043	> 10	20	0	35.3	0.00	122.3	6.05	3.465	> 10
Within NC Highway 48 (Exit 180) Interchange		29,200	17	0	99.8	0.00	159.8	15.28	1.601	> 10	12	1	71.1	5.90	160.2	15.40	2.254	2.610
NC Highway 48 (Exit 180)	Virginia State Line	33,000	17	0	92.2	0.00	154.1	13.67	1.671	> 10	8	0	44.3	0.00	154.8	13.88	3.495	> 10

Note: Yellow highlighted cells have Fair safety ratios and red highlighted cells have Poor safety ratios.

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4.2.3 Hot Spot Crash Analysis

In addition to comparing average crash rates to calculated critical crash rates by freeway segment, crash data was analyzed to identify high crash locations on the corridor and any potential physical or design causes. To eliminate boundary issues contained in the segment analysis, the moving segment method analyzed each 1-mile section of I-95 moving the segment in 0.1 mile increments. The hot spot crash analysis indicates potential issues in the areas listed below.

Northbound I-95

In the northbound direction, six hot spots were identified, all within interchanges:

- Mile marker 13.20 and14.89 – The US 74 interchange (Exit 14) is located within this segment. Construction took place at the interchange during the 3-year crash analysis study, and may have skewed the results for this segment. The majority of crash types on this segment consisted of running off the road left or right, sideswipe same direction, movable or fixed objects, and rear end slowing or stop, crash types consistent with interchange merging and exiting traffic as well as construction traffic making lane shifts and approaching lane closures.
- Mile marker 20.80 to 22.69 – The US 301 (Fayetteville Road) interchange (Exit 22) is located within this segment. The majority of crash types on this segment consisted of running off the road left or right, fixed objects, sideswipe same direction, and rear end slowing or stop, crash types consistent with interchange merging and exiting traffic.
- Mile marker 30.50 to 32.19 – The NC 20 (W. Broad Street) interchange (Exit 31) interchange is located within this segment. The majority of crash types on this segment consisted of fixed objects, rear end slowing or stop, and sideswipe same direction, crash types consistent with interchange merging and exiting traffic. It should be noted that I-95 passes over NC 20 on a narrow bridge with no shoulders where the guardrail is tight to the travel lanes.
- Mile marker 80.80 to 81.79 – The I-40 interchange (Exit 81) is located within this segment. The majority of crash types on this segment consisted of fixed objects and sideswipe same direction, crash types consistent with interchange merging and exiting traffic. The acceleration lane length (1,050 feet) at the loop ramp entrance is less than optimal. The acceleration lane is used to bring vehicles entering the freeway up to speed with the mainline traffic prior to attempting to merge. This is especially critical for a loop entrance ramp where vehicles have to maneuver the loop ramp at slower speeds than a standard entrance ramp. By having a less than optimal acceleration lane length, vehicles may have to merge onto the mainline at slower speeds creating a potentially unsafe condition.
- Mile marker 137.70 to 139.49 – The US 64 interchange (Exit 138) is located within this segment. The majority of crash types on this segment consisted of fixed object, running off the road left or right, rear end slowing or stop, and animals, crash types consistent with interchange merging and exiting traffic except for crashes involving animals. The interchange form located at US 64 is a cloverleaf with collector-distributor roads. The

collector-distributor entrance ramp has a relatively high AADT volume (6,900 vehicles per day) leading to more lane changes and the crash types experienced.

- Mile marker 172.40 to 173.89 – The US 158 (Julian R. Allsbrook Highway) interchange (Exit 173) is located within this segment. The majority of crash types on this segment consisted of rear end slowing or stops and fixed object, crash types consistent with interchange merging and exiting traffic. The decision sight distance (1,900 feet), defined as the distance a motorist has to visually identify an exit ramp and make a decision on which action to take, is less than optimal distance of 2,000 feet.

Southbound I-95

In the southbound direction, five hot spots were identified, all within interchange areas:

- Mile marker 16.20 to 17.49 – The NC 72 interchange (Exit 17) is located within this segment. The majority of crash types on this segment consisted of running off the road left or right, rear end slowing or stop, and fixed object, crash types consistent with interchange merging and exiting traffic. Due to the location of the off-ramp on a horizontal curve, the decision sight distance (1,000 feet) is less than optimal. In addition, the off-ramp has a relatively high AADT volume (7,300 vehicles per day) which leads to more lane changes and the crash types experienced.
- Mile marker 24.50 to 25.49 – The US 301 interchange (Exit 25) is located within this segment. The majority of crash types on this segment consisted of fixed objects, rear end slowing or stop, overturn or rollover, and sideswipe same direction, crash types consistent with interchange merging and exiting traffic. The number of rollover or overturn crashes may indicate an issue with the loop ramps. Contributing factors are the relatively short exit ramp deceleration length (400 feet) and entrance ramp acceleration length (700 feet). Additionally the exit is a loop-ramp with the taper for the deceleration beginning after the structure for the US 301 overpass. Due to the short deceleration lane length vehicles may not be able to slow down to a safe speed to navigate the loop exit ramp leading to the high number of overturn or rollover crashes.
- Mile marker 30.70 to 31.79 – The NC 20 (W. Broad Street) interchange (Exit 31) is located within this segment. The majority of crash types on this segment consisted of fixed objects, sideswipe same direction, and rear end slowing or stop, crash types consistent with interchange merging and exiting traffic. It should be noted that I-95 passes over NC 20 on a narrow bridge with no shoulders where the guardrail is tight to the travel lanes.
- Mile marker 32.10 to 33.89 – The US 301 interchange (Exit 33) is located within this segment. The majority of crash types on this segment consisted of fixed objects and sideswipe same direction, crash types consistent with interchange merging and exiting traffic. Due to the location of the off-ramp on a horizontal curve the decision sight distance (1,400 feet) is less than optimal.
- Mile marker 153.30 to 154.69 – The NC 481 interchange (Exit 154) is located within this segment. The majority of crash types on this segment consisted of fixed objects and movable objects. The decision sight distance (1,700 feet) for the exit ramp is less than optimal, possibly contributing to accident occurrence.

Section 5
Environmental Screening

To define the environmental context of the I-95 corridor, this section describes the natural and man-made features and resources of the I-95 corridor. The information in this section comes from the *I-95 Corridor Planning and Finance Study Environmental Screening Findings Memorandum* (Baker, March 2010), which was prepared to describe potential environmental constraints for use in the development of study alternatives, and is incorporated by reference. A screening-level evaluation of the environmental resources was performed based on currently available geographic information system (GIS) information for land use, zoning, demographics, natural resources, cultural resources, and hazardous waste sites.

Two study area boundaries for the environmental screening activities were developed, one for the demographic study area and one for the natural and cultural resource study area. The demographic study area is 10 miles on either side of existing I-95. The natural and cultural resources study area is one-half mile on either side of existing I-95. The demographic study area was developed to include stakeholders who regularly use I-95, but may live several miles away, in project outreach activities. In-place features such as endangered species, cultural resources, or noise receptors may influence potential alternatives when they are closely located to I-95, but will not be directly impacted by the project if they are located further from the highway.

Selected ground truthing was conducted to gauge the accuracy of the existing GIS information and identify potential problem areas. Intensive field surveys for natural resources and historic sites were not performed as part of this study; therefore, the screening may have substantially over- or underestimated actual resources within the project area. Findings from the environmental screening effort are summarized below.

5.1 DEMOGRAPHICS

There are 13 counties in the demographic study area (Bladen, Cumberland, Edgecombe, Halifax, Harnett, Hoke, Johnston, Nash, Northampton, Robeson, Sampson, Wayne, and Wilson). Based on 2000 Census data, these counties had a population of over 1 million people, which was almost 14 percent of North Carolina's population. Approximately 860,000 people lived within 10 miles of the I-95 corridor.

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,* was signed in 1994 to ensure that federally assisted projects do not have disproportionately high and adverse human health or environmental effects on minority or low-income populations. Of the 158 census tracts in the demographic study area, 67 met established thresholds for environmental justice consideration, where there were greater concentrations of low-income and minority populations in 2000. These include 21 of the 49 census tracts in Cumberland County, 6 of the 8 in Edgecombe County, 7 of the 10 in Halifax County, 4 of the 9 in Harnett County, both of those in Hoke County, 3 of the 15 in Johnston County, 5 of the 17 in Nash County, both of those in Northampton County, 12 of the 20 in Robeson County, and 6 of the 17 in Wilson County. There are six census tracts in the I-95 demographic study area located adjacent to the highway where at least 50% of the population is minority and 50% is below the poverty level:

- South of Lumberton
- In Fayetteville on I-95 Business
- North and south of Dunn
- North and south of Smithfield
- On US 301 in Wilson
- On US 301 in Rocky Mount

The number of Spanish speakers who spoke English less than very well exceeded 1,000 in 9 of the 13 counties in the demographic study area and exceeded 5 percent of the population in Johnston and Sampson Counties. In all cases, English was the most common language spoken and Spanish/Spanish Creole was the second most common language spoken. In Cumberland County, there were more than 1,000 people who spoke a language other than Spanish and spoke English less than very well.

5.2 CULTURAL RESOURCES

Cultural resources such historic places or archaeological sites within the study area may be protected by Section 106 of the National Historic Preservation Act of 1966 and Section 4(f) of the Department of Transportation Act of 1966. The NCDOT Human Environment Unit identified 102 sites that warrant further investigation if they are located within the area of potential effects of any proposed improvements to the I-95 corridor. This number includes seven sites currently listed in the National Register of Historic Places (NRHP). Of the NRHP listed sites, the Garner Farm Site is located in the immediate vicinity of I-95, near NC 125 in Halifax County. There are 19 other potential Section 106 resources in the immediate vicinity of I-95 that warrant further investigation.

5.3 RECREATIONAL RESOURCES

Section 4(f) of the Department of Transportation Act of 1966 also protects publicly owned parks, recreation areas, and wildlife/waterfowl refuges. In addition, Section 6(f) of the Land and Water Conservation Fund (LWCF) Act (Public Law 88-578) requires that recreation land acquired or developed with assistance under this section remains in use exclusively for public outdoor recreation.

A total of 19 parks and recreational facilities were identified based on the information provided by cities and counties in the study area: 12 in Robeson County, 3 each in Johnston and Harnett Counties, and 1 in Halifax County. Based on a review of the LWCF database (http://waso-lwcf.ncrc.nps.gov/public/index.cfm), Chockoyotte Park in Halifax County and C.D. Codrington Park in Harnett County have received LWCF funding and are Section 6(f) resources.

5.4 VOLUNTARY AGRICULTURAL DISTRICTS

In North Carolina, Voluntary Agricultural Districts (VADs) are established through county ordinances to promote the preservation and protection of farmland. If future improvements to I-95 necessitate the condemnation of lands in VADs, there are public hearing requirements that

must be met prior to any acquisition of right of way. There are 13 VADs in the immediate vicinity of I-95. This includes one district in Cumberland County, three districts each in Harnett and Northampton Counties, four in Johnston County, and two in Wilson County.

5.5 WATER RESOURCES

From south to north, the I-95 corridor passes through the Lumber, Cape Fear, Neuse, Tar-Pamlico, Roanoke, and Chowan River Basins. There are riparian buffer rules in place for the Neuse and Tar-Pamlico River Basins. These rules promulgated by North Carolina Department of Environment and Natural Resources Division of Water Quality are meant to protect and preserve existing riparian buffers of soil and vegetation in order to their functionality in protecting water quality.

The Wild and Scenic Rivers Act of 1968 (16 U.S.C. 1271-1287) mandates that "[i]n all planning for the use and development of water and related land resources, consideration shall be given by all Federal agencies involved to potential national wild, scenic and recreational river areas." In the I-95 natural resource study area, the Lumber River is listed as a Scenic River for its cultural, fish, historic, scenic, and wildlife resources.

Additionally, the following features were noted in the natural resource study area:

- Public water supply sources
- Surface water intakes
- Ambient water quality monitoring sites
- Benthic monitoring sites
- Wild and scenic rivers
- Water pipelines
- Water tank locations
- National Pollutant Discharge Elimination System (NPDES) permit sites; there is a NDPES facility (the Fayetteville Days Inn) in the immediate vicinity of the I-95 Interchange with I-295.

5.6 PROTECTED SPECIES

Some populations of plants and animals are declining because of either natural forces or their inability to compete for resources with the encroachment of humans. The North Carolina Natural Heritage Program and the United States Fish and Wildlife Service lists of rare and protected animal and plant species contain 11 federally listed species known to exist in counties crossed by the natural resource study area.

Protected species within the natural resource study area are shown in **Table 23**. In addition, there are 52 Federal Species of Concern listed for counties in the natural resource study area.

Table 23: Federally Protected Species in Counties in I-95 Natural Resource Study Area

Scientific Name	Common Name	Federal Status	County(ies) Listed
Vertebrates			
Alligator mississippiensis	American alligator	T/SA	Robeson, Cumberland, Northampton
Picoides borealis	Red-cockaded woodpecker	E	Robeson, Cumberland, Harnett, Johnston, Wilson, Nash, Halifax, Northampton
Haleaeetus Leucocephalus	Bald eagle	BGEPA	Harnett, Johnston, Wilson, Nash, Halifax, Northampton
Notropis mekistocholas	Cape Fear shiner	E	Harnett
Invertebrates			
Neonympha mithellii francisci	St. Francis' satyr butterfly	E	Cumberland
Alasmidonta heterodon	Dwarf wedgemussel	E	Johnston, Wilson, Nash, Halifax
Elliptio steinstansana	Tar River spinymussel	E	Johnston, Nash, Halifax
Vascular Plants			
Rhius michauxii	Michaux's sumac	E	Robeson, Cumberland, Johnston, Wilson
Schwalbea Americana	American chafseed	E	Cumberland
Lindera melissifolia	Pondberry	E	Cumberland
Lysimachia aperulaefolia	Rough-leaf loosestrife	E	Cumberland, Harnett

Notes: E - Endangered denotes a species in danger of extinction throughout all or a significant portion of its range
T - Threatened denotes a species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range
T/SA indicates species listed as Threatened due to similarity to a threatened species
BGEPA - Protected by the Bald and Golden Eagle Protection Act
Source: I-95 Corridor Planning and Finance Study Environmental Screening Findings Memorandum (Baker, March 2010)

5.7 AIR QUALITY

None of the counties located in the natural resource study area are designated as being in nonattainment of the National Ambient Air Quality Standards (NAAQS). However, Johnston and Nash Counties are designated as being in maintenance for the 8-hour ozone standard. Johnston County was a nonattainment area from 2004 to 2007 and was redesignated to maintenance status on December 26, 2007. Nash County was also a nonattainment area from 2004 to 2007, but was redesignated to maintenance status on January 5, 2007.

The North Carolina State Transportation Improvement Program (STIP) includes all projects in development for the I-95, as well as the rest of the state. Any recommended improvements that evolve from the I-95 Study located in nonattainment areas would have to be placed on the STIP or in a fiscally-constrained Long Range Transportation Plan (LRTP) in order to be in conformity with the State Implementation Plan (SIP) for improving and maintaining air quality.

The following organizations are responsible for updates to the LRTPs and air quality conformity issues in the I-95 Study Area:

- Robeson County is part of the Lumber River Council of Governments (COG)
- Cumberland, Sampson and Harnett counties are part of the Mid-Carolina COG
- Wilson, Nash, Halifax, and Northampton counties are part of the Upper Coastal Plain COG
- Johnston and Harnett counties are also part of the Capital Area Metropolitan Planning Organization (CAMPO)

5.8 NOISE IMPACTS

The environmental screening identified 92 areas that may potentially need to be modeled for noise impacts. Generally, there are several types of locations in the corridor that are considered to be noise sensitive receptors according to FHWA. The most prevalent are residential dwelling units, comprised primarily of single family residences along with some multi-family structures (condominiums/apartments) in various locations. Isolated receptor locations were not identified because these sites would not likely meet the cost reasonableness criteria for noise barrier construction.

Additionally, most noise sensitive areas with few receptors were also not identified if it was clearly seen that cost reasonableness or other criteria would not be met for noise barrier construction. For most of the remaining locations, the results of this qualitative review indicate that noise barrier construction would not likely meet the reasonable and/or feasible mitigation criteria established by NCDOT.

There are some medium to high possibility impact areas that may require noise barrier construction, and they are described in **Table 24**. A detailed noise analysis, required as part of a typical highway project, would be required to determine the feasibility and reasonableness of any proposed mitigation.

Table 24: Potential Noise Impact Areas With a Possibility for Barriers

General Location; Number/Type of Receptors	Reasonable/Feasible Mitigation Factors	Detailed Mitigation Analysis Needed? / Likelihood of Noise Barrier?	Approximate Barrier Length(s) (Assume 20-foot max height)
Exits 20-22, SB; 100+ Residences	Medium density, medium forestation	Yes / Medium Possibility	4,500’
North of Exit 52, NB; 40+ Residences	Medium density, 50% are close to I-95	Yes / Medium Possibility	2,100’
South of Exit 55, NB; 50+ Residences	Medium density, 30% are close to I-95	Yes / Medium Possibility	2,600’
Exit 56, SB; 70+ Residences	Medium-high density, 50% constructed	Yes / High Possibility	1,600’
Exit 56, NB; 30+ Residences	Medium density, medium forestation	Yes / Medium Possibility	2,100’
Exit 93, SB; 100+ Residences	Close to I-95, environmental justice issues (possible)	Yes / Medium Possibility	2,600’
Exit 101, SB; 12+ Residences	Low density, 50% are close to I-95	Yes / Medium Probability	1,600’
South of Exit 138 & SR 1770, NB; 100+ Residences	50% of the mobile homes not yet placed, 30% near I-95	Yes / Medium Possibility	1,600’

Source: I-95 Corridor Planning and Finance Study Environmental Screening Findings Memorandum (Baker, March 2010)

There are schools and churches scattered throughout the I-95 corridor, uses that NCDOT policy identifies as special use areas. Playgrounds, hospitals, retirement homes, parks and camps also fall under this category. Typically, schools and churches do not have exterior social activity areas that would warrant or benefit from noise mitigation. Based on a preliminary review of aerial photography, it appears that some of the schools in the study area have baseball diamonds,

soccer fields, and/or playgrounds. Normally, these locations are temporarily occupied and have loud on-site noise generating activities, reducing noise mitigation concerns.

There are also numerous commercial business areas in the study corridor. These areas are primarily located immediately adjacent to the interchanges. Most of these commercial zones include a mix of hotels or motels in addition to other travel service needs, office buildings, restaurants and retail shopping. Hotels and motels are considered to be noise sensitive receptors, similar to a residence. However, these facilities typically do not have exterior people activity sites where occupants spend time, with the exception of pool areas. Additionally, these commercial establishments depend on their visibility from I-95 for business purposes and their proprietors do not typically desire noise barriers to be located in between their businesses and the road.

5.9 LAND USE AND PLANNING

The long-range development plans for jurisdictions within the demographic study area were reviewed. There are several areas along I-95 that are targeted as growth areas. Cumberland County identified growth areas that included the Towns of Falcon, Wade, and Godwin. The City of Rocky Mount identified two growth areas, a Planned Growth Area (PGA) and a Smart Growth Area (SGA). The Western SGA includes the I-95 corridor, as does the PGA. Growth is anticipated to take place in Fayetteville, Wilson, and Roanoke Rapids in the vicinity of I-95.

5.10 OTHER ENVIRONMENTAL ISSUES

Other environmental features reviewed during the environmental screening included known hazardous waste sites, animal operation facilities (feed lots), and swine lagoons within the natural resource study area. Hazardous waste sites are found in the immediate vicinity of I-95 near Smithfield in Johnston County and in Roanoke Rapids in Halifax County. An animal operations facility is located in the immediate vicinity of I-95 near NC 58 in Nash County.

Section 6

Future Corridor Conditions

The objective of the I-95 Planning and Finance Study is to determine the need for future improvements to I-95, including phasing and cost, throughout the 182 mile corridor. This section describes future I-95 infrastructure and traffic operating conditions in the absence of significant investment, to support the purpose and need development task.

Projects included in NCDOT's 2009-2015 STIP impacting the traffic operations of I-95 or the interchange crossroads were included in the future conditions traffic analysis, if the right-of-way or construction is at least partially funded. These projects include:

- STIP Project No. U-2519. Connect future I-295 (Fayetteville Outer Loop), a proposed freeway on new location, to I-95 from the west. The proposed interchange will be located between US 301 (Exit 33) and I-95 Business (Exit 40) south of Fayetteville in Robeson County.
- STIP Project No. U-5026. Convert the existing grade separated SR 1770 (Sunset Avenue) at I-95 to an interchange. The proposed interchange will be located between SR 1717 (Sandy Cross Road, Exit 132) and US 64 (Exit 138) in Nash County.
- STIP Project No. I-4413. Widen US 301 (Fayetteville Road) to multi-lanes and improve the interchange at I-95 (Exit 22) in Robeson County to a diverging diamond.
- STIP Project No. R-2582. Widen NC 46 – US 158 to multi-lanes from I-95 (Exit 176) in Roanoke Rapids to east of Jackson in Northampton County.

STIP Project No. I-4745, widening of I-95 from I-95 Business (Exit 56) to I-40 (Exit 81) is also partially funded for right-of-way and construction but is not included in the future conditions traffic analysis. Right-of-way acquisition and construction has not started on STIP I-4745.

6.1 INFRASTRUCTURE

As stated previously in **Section 4.2.2**, the average estimated remaining life of all the bridges is 22 years. Based on NCDOT bridge assessments, significant repairs or replacement will be necessary over the next 20 years on 35 of the 69 bridges on I-95 and 54 of the 116 bridges over I-95 due to their short remaining life. In the next five years, three bridges over or along I-95 will need to be replaced or repaired, and the numbers sharply increase as time goes on. There are 27 bridges that need to be replaced or repaired in the next ten years, 36 in the next 15 years, and 89 in the next 20 years. The bridges that will need significant rehabilitation in order to continue to function safely are summarized in **Table 8** and shown on the Existing Condition Survey in **Appendix A** and on the maps in **Appendix B**. A detailed list of all I-95 bridges is contained in **Appendix C**.

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 there has been little reconstruction. As a result, the expected life cycle of new pavement in the future will decrease over time.

6.2 TRAFFIC VOLUMES AND LEVEL OF SERVICE

A traffic analysis was performed to assess how the existing roadway network would perform in the future year 2040 if no improvements were made to the I-95 corridor.

The same methodologies and assumptions used in the LOS analysis of the 2008 existing conditions (**Section 3.3**) were used in the analysis of the 2040 conditions with one exception. A peak hour factor (PHF) of 0.90 was used based on the NCDOT Congestion Management Guidelines. A detailed description of all the methodologies and assumptions used in the LOS analysis of the 2040 traffic conditions is contained in **Appendix D**.

The NCDOT minimum LOS standard for a rural roadway is LOS C while the minimum LOS standard for an urban roadway is LOS D. Areas identified as rural or urban in the existing conditions analysis remained so in the future conditions analysis. For this analysis roadway sections with a LOS C or better are considered to be in Good condition, LOS D in Fair condition, and LOS E or LOS F in Poor condition.

6.2.1 Future No-Build Traffic Estimates

The average annualized growth rate (AGR) on I-95 by county is projected to vary between 0.61% and 1.47%, with Northampton County having the lowest average, and Harnett County having the highest average. This is a lower growth rate than has been presented in previous I-95 studies, and reflects conservative forecasts of population and jobs growth in the corridor. 2009 and 2040 traffic estimates of the I-95 mainline and interchange crossroads were provided as part of the *Preliminary Traffic Estimates for NCDOT State TIP Project No. I-5133, I-95 Corridor Planning and Finance Study* (MAB, July 2010). **Table 25** below shows the county averaged AGR on I-95 along with the highest and lowest AGR for each county. The segment with the highest AGR is in Harnett County where there is a segment with a 1.48% AGR. Halifax County contains the segment with the lowest AGR of 0.53%.

Table 25: I-95 Mainline Annualized Growth Rates by County

County	Min	Max	Average
Robeson	0.71%	1.17%	0.91%
Cumberland	0.86%	1.47%	1.13%
Harnett	1.45%	1.48%	1.47%
Johnston	0.84%	1.47%	0.99%
Wilson	1.10%	1.34%	1.22%
Nash	1.20%	1.41%	1.32%
Halifax	0.53%	1.21%	0.97%
Northampton	0.57%	0.69%	0.61%

Source: Preliminary Traffic Estimates for NCDOT State TIP Project No. I-5133, I-95 Corridor Planning and Finance Study (M/A/B, July 2010)

The AGR was used to estimate year 2040 AADT volumes. The average 2040 AADT on I-95 by county is projected to vary between 41,000 and 73,500 vehicles per day, with Northampton County having the lowest average, and Harnett County having the highest average. **Table 26** below shows the county averaged AADT on I-95 along with the highest and lowest AADT for each county. The segment with the highest AADT is in Johnston County south of the I-40 interchange with an AADT of 80,400 vehicles per day. Northampton County contains the segment with the lowest AADT of 38,200 vehicles per day.

Table 26: I-95 Mainline AADT Volumes in 2040 by County (vehicles per day)

County	Min	Max	Average
Robeson	42,200	66,200	51,900
Cumberland	44,800	71,600	56,700
Harnett	71,200	75,200	73,500
Johnston	40,600	80,400	51,700
Wilson	40,600	52,000	46,000
Nash	49,600	62,000	53,700
Halifax	41,200	52,000	48,500
Northampton	38,200	45,800	41,000

Source: Preliminary Traffic Estimates for NCDOT State TIP Project No. I-5133, I-95 Corridor Planning and Finance Study (M/A/B, July 2010)

6.2.2 Future I-95 Mainline Level of Service

Based on the LOS analysis for the I-95 mainline using 2040 AADTs, most segments of I-95 are projected to experience Poor traffic flow. The traffic operations analysis of the 60 basic freeway segments show that none of the segments would operate at LOS A or B (0%), two would operate at LOS C (3%), 23 would operate at LOS D (38%), 16 would operate at LOS E (27%), and 19 would operate at LOS F (32%). Twenty-two of the 23 basic freeway segments projected to operate at LOS D are located in rural areas and thus do not meet the NCDOT minimum LOS standard. The two segments projected to operate with a Good rating are from NC 46 (Exit 176) to NC 48 (Exit 180) and from NC 48 (Exit 180) to the Virginia state line in Northampton County. The results of the analysis are in **Table 27**, showing the analyzed freeway segment AADT, number of lanes, LOS, year by which widening to 6-lanes is required, and year by which widening to 8-lanes is required.

The future conditions analysis shows that the widening of I-95 to 6-lanes will not be required for a substantial number of segments until beyond 2020. Three segments at the northern end of the corridor will not meet the criteria for widening to 6-lanes by the design year 2040. Only the section of I-95 from I-95 Business (Exit 56) to I-40 (Exit 81) will require widening to 8-lanes by 2040.

Table 27: I-95 Mainline Traffic Operations for 2040

Segment From	Segment To	County	2040 AADT	No. of Lanes	2040 LOS	Year 6-Lanes Required	Year 8-Lanes Required
South Carolina State Line	NC 130 (Exit 2)	Robeson	42,200	4	D[2]	2039	Post 2040
NC 130 (Exit 2)	SR 2455 (Raynham Rd.) (Exit 7)	Robeson	43,200	4	D[2]	2037	Post 2040
SR 2455 (Raynham Rd.) (Exit 7)	SR 1003 (South Chicken Rd.) (Exit 10)	Robeson	44,800	4	D[2]	2033	Post 2040
SR 1003 (South Chicken Rd.) (Exit 10)	US 74 (Exit 14)	Robeson	48,600	4	D[2]	2026	Post 2040
US 74 (Exit 14)	NC 72 (Exit 17)	Robeson	46,600	4	D[2]	2028	Post 2040
NC 72 (Exit 17)	SR 1536 (Carthage Rd.) (Exit 19)	Robeson	66,200	4	F	2009	Post 2040
SR 1536 (Carthage Rd.) (Exit 19)	NC 211 (North Roberts Ave.) (Exit 20)	Robeson	63,000	4	F	2009	Post 2040
NC 211 (North Roberts Ave.) (Exit 20)	US 301 (Fayetteville Rd.) (Exit 22)	Robeson	56,000	4	F	2018	Post 2040
US 301 (Fayetteville Rd.) (Exit 22)	US 301 (Exit 25)	Robeson	51,600	4	E	2015	Post 2040

Table 27: I-95 Mainline Traffic Operations for 2040

Segment From	Segment To	County	2040 AADT	No. of Lanes	2040 LOS	Year 6-Lanes Required	Year 8-Lanes Required
US 301 (Exit 25)	NC 20 (W. Broad St.) (Exit 31)	Robeson	49,600	4	D[2]	2018	Post 2040
NC 20 (W. Broad St.) (Exit 31)	US 301 (Exit 33)	Robeson	50,600	4	E	2017	Post 2040
US 301 (Exit 33)	Future I-295 (New Interchange)	Robeson	54,800	4	E	2014	Post 2040
Future I-295 (New Interchange)	I-95 Business (Exit 40)	Robeson / Cumberland	58,000	4	F	2013	Post 2040
I-95 Business (Exit 40)	NC 59 (Chickenfoot Rd.) (Exit 41)	Cumberland	46,000	4	D[2]	2033	Post 2040
NC 59 (Chickenfoot Rd.) (Exit 41)	SR 2341 (Claude Lee Rd.) (Exit 44)	Cumberland	47,400	4	D[2]	2027	Post 2040
SR 2341 (Claude Lee Rd.) (Exit 44)	NC 87 (Exit 46)	Cumberland	53,400	4	E	2017	Post 2040
NC 87 (Exit 46)	NC 53/210 (Cedar Creek Rd.) (Exit 49)	Cumberland	57,400	4	F	2011	Post 2040
NC 53/210 (Cedar Creek Rd.) (Exit 49)	NC 24 (Exit 52)	Cumberland	46,400	4	D[2]	2029	Post 2040
NC 24 (Exit 52)	SR 1832 (Murphy Rd.) (Exit 55)	Cumberland	44,800	4	D[2]	2034	Post 2040
SR 1832 (Murphy Rd.) (Exit 55)	I-95 Business (Exit 56)	Cumberland	45,200	4	D[2]	2033	Post 2040
I-95 Business (Exit 56)	I-295 (Fayetteville Outer Loop) / US 13 (Exit 58)	Cumberland	67,200	4	F	2009	2035
I-295 (Fayetteville Outer Loop) / US 13 (Exit 58)	SR 1815 (Wade Stedman Rd.) (Exit 61)	Cumberland	71,200	4	F	2009	2032
SR 1815 (Wade Stedman Rd.) (Exit 61)	NC 82 (Godwin Falcon Rd.) (Exit 65)	Cumberland	71,600	4	F	2009	2032
NC 82 (Godwin Falcon Rd.) (Exit 65)	SR 1811 (Bud Hawkins Rd.) (Exit 70)	Cumberland / Harnett	71,600	4	F	2009	2032
SR 1811 (Bud Hawkins Rd.) (Exit 70)	SR 1002 (Long Branch Rd.) (Exit 71)	Harnett	71,200	4	F	2009	2032
SR 1002 (Long Branch Rd.) (Exit 71)	SR 1793 (Pope Rd.) (Exit 72)	Harnett	72,200	4	F	2009	2031
SR 1793 (Pope Rd.) (Exit 72)	US 421 (Cumberland St.) (Exit 73)	Harnett	74,000	6[1]	F	2017	2040
US 421 (Cumberland St.) (Exit 73)	SR 1808 (Jonesboro Rd.) (Exit 75)	Harnett	75,000	4	F	2009	2028
SR 1808 (Jonesboro Rd.) (Exit 75)	SR 1709 (Hodges Chapel Rd.) (Exit 77)	Harnett	75,200	4	F	2009	2028
SR 1709 (Hodges Chapel Rd.) (Exit 77)	NC 50 (Exit 79)	Harnett / Johnston	75,200	4	F	2009	2028
NC 50 (Exit 79)	I-40 (Exit 81)	Johnston	80,400	6[1]	F	2013	2036
I-40 (Exit 81)	SR 1178 (Keen Rd.) (Exit 87)	Johnston	48,000	4	D[2]	2027	Post 2040
SR 1178 (Keen Rd.) (Exit 87)	US 701 (Exit 90)	Johnston	48,800	4	D[2]	2025	Post 2040
US 701 (Exit 90)	SR 1007 (Brogden Rd.) (Exit 93)	Johnston	50,800	4	E	2018	Post 2040
SR 1007 (Brogden Rd.) (Exit 93)	NC 210/US 70 (Exit 95)	Johnston	50,600	4	E	2019	Post 2040
NC 210/US 70 (Exit 95)	US 70 Alternate (Exit 97)	Johnston	48,000	4	D[2]	2026	Post 2040

Table 27: I-95 Mainline Traffic Operations for 2040

Segment From	Segment To	County	2040 AADT	No. of Lanes	2040 LOS	Year 6-Lanes Required	Year 8-Lanes Required
US 70 Alternate (Exit 97)	SR 1927 (Pine Level Selma Rd.) (Exit 98)	Johnston	47,800	4	D[2]	2026	Post 2040
SR 1927 (Pine Level Selma Rd.) (Exit 98)	SR 2137 (Pittman Rd.) (Exit 101)	Johnston	47,800	4	D[2]	2026	Post 2040
SR 2137 (Pittman Rd.) (Exit 101)	SR 2130 (East Main St.) (Exit 102)	Johnston	47,400	4	D[2]	2027	Post 2040
SR 2130 (East Main St.) (Exit 102)	SR 2339 (Bagley Rd.) (Exit 105)	Johnston	46,800	4	D[2]	2029	Post 2040
SR 2339 (Bagley Rd.) (Exit 105)	SR 2342 (Princeton Kenly Rd.) (Exit 106)	Johnston	45,800	4	D[2]	2031	Post 2040
SR 2342 (Princeton Kenly Rd.) (Exit 106)	US 301 (Exit 107)	Johnston	45,400	4	D[2]	2032	Post 2040
US 301 (Exit 107)	NC 42 (Exit 116)	Johnston / Wilson	40,600	4	D[2]	2038	Post 2040
NC 42 (Exit 116)	I-795/US 264 (Exit 119)	Wilson	41,000	4	D[2]	2037	Post 2040
I-795/US 264 (Exit 119)	US 264 Alternate (Raleigh Rd.) (Exit 121)	Wilson	50,400	4	E	2022	Post 2040
US 264 Alternate (Raleigh Rd.) (Exit 121)	NC 97 (Exit 127)	Wilson / Nash	52,000	4	F	2020	Post 2040
NC 97 (Exit 127)	SR 1717 (Sandy Cross Rd.) (Exit 132)	Nash	49,600	4	E	2023	Post 2040
SR 1717 (Sandy Cross Rd.) (Exit 132)	SR 1770 (Sunset Ave.) (New Interchange)	Nash	50,200	4	E	2036	Post 2040
SR 1770 (Sunset Ave.) (New Interchange)	US 64 (Exit 138)	Nash	50,200	4	E	2036	Post 2040
US 64 (Exit 138)	NC 43 (Exit 141)	Nash	62,000	4	F	2021	Post 2040
NC 43 (Exit 141)	NC 4 (Exit 145)	Nash	59,400	4	F	2015	Post 2040
NC 4 (Exit 145)	NC 33 (Exit 150)	Nash	54,000	4	E	2020	Post 2040
NC 33 (Exit 150)	NC 481 (Exit 154)	Nash / Halifax	51,800	4	E	2022	Post 2040
NC 481 (Exit 154)	NC 561 (Exit 160)	Halifax	50,000	4	E	2025	Post 2040
NC 561 (Exit 160)	NC 903 (Exit 168)	Halifax	52,000	4	E	2022	Post 2040
NC 903 (Exit 168)	NC 125 (Exit 171)	Halifax	50,200	4	E	2022	Post 2040
NC 125 (Exit 171)	US 158 (Julian R Allsbrook Hwy) (Exit 173)	Halifax	41,200	4	D	Post 2040	Post 2040
US 158 (Julian R Allsbrook Hwy) (Exit 173)	NC 46 (Exit 176)	Halifax / Northampton	45,800	4	E	2040	Post 2040
NC 46 (Exit 176)	NC 48 (Exit 180)	Northampton	38,200	4	C	Post 2040	Post 2040
NC 48 (Exit 180)	Virginia State Line	Northampton	39,000	4	C	Post 2040	Post 2040

1. Freeway segment contains 2 continuous lanes and 1 auxiliary lane in each direction. It was assumed auxiliary lanes would remain with widening.
2. These segments with LOS D are located in rural areas and thus do not meet the NCDOT minimum LOS standard.

6.2.3 Future Interchange Crossroad Level of Service

According to LOS analysis of the I-95 interchange crossroads for 2040, the majority of interchange crossroad segments are projected to experience Good traffic flow. Results of the analysis are shown in **Table 28**, showing analyzed crossroads AADT, roadway classification, number of lanes and LOS. The analysis showed that 67 crossroad segments would operate at LOS C or better (62%), 19 would operate at LOS D (18%), eight would operate at LOS E (7%), and 14 would operate at LOS F (13%). Six Nash County crossroad segments rate Poor, with four so rated in Robeson County, three each in Cumberland, Johnston, and Wilson Counties, two

so rated in Harnett County, one so rated in Northampton County, and none so rated in Halifax County.

Table 28: I-95 Interchange Crossroad Traffic Operations for 2040

Crossroad	County	Location [1]	Roadway Classification[2]	2040 AADT	Number of Lanes	2040 LOS
NC 130 (Exit 2)	Robeson	West of I-95	RH	5,000	2	C
		East of I-95	RH	3,600	2	B
SR 2455 (Raynham Rd.) (Exit 7)	Robeson	West of I-95	RH	1,200	2	A
		East of I-95	RH	1,700	2	A
SR 1003 (South Chicken Rd.) (Exit 10)	Robeson	West of I-95	RH	4,600	2	B
		East of I-95	RH	4,000	2	B
US 74 (Exit 14)	Robeson	West of I-95	SF	Not Available[3]	4	-
		East of I-95	SF	Not Available[3]	4	-
NC 72 (Exit 17)	Robeson	West of I-95	RH	29,800	4	D
		East of I-95	MAS	21,200	4	D
SR 1536 (Carthage Rd.) (Exit 19)	Robeson	West of I-95	RH	4,600	2	B
		East of I-95	MAS	16,400	2	F
NC 211 (North Roberts Ave.) (Exit 20)	Robeson	West of I-95	RH	24,000	2	F
		East of I-95	PAI	24,400	4	D
US 301 (Fayetteville Rd.) (Exit 22)	Robeson	West of I-95	MAS	Not Available[3]	4	-
		East of I-95	PAI	Not Available[3]	4	-
US 301 (Exit 25)	Robeson	West of I-95	RH	3,600	2	B
		East of I-95	RH	4,600	2	B
NC 20 (W. Broad St.) (Exit 31)	Robeson	West of I-95	RH	17,400	2	E
		East of I-95	PAI	17,400	2	F
US 301 (Exit 33)	Robeson	West of I-95	RH	8,600	2	D
		East of I-95	RH	6,000	2	C
Future I-295 (New Interchange)	Robeson	West of I-95	SF	17,000	4	A
I-95 Business (Exit 40)	Cumberland	West of I-95	SF	12,000	4	A
NC 59 (Chickenfoot Rd.) (Exit 41)	Cumberland	West of I-95	RH	27,400	2	F
		East of I-95	RH	29,000	2	F
SR 2341 (Claude Lee Rd.) (Exit 44)	Cumberland	West of I-95	RH	6,200	2	C
		East of I-95	RH	Not Available[3]	2	-
NC 87 (Exit 46)	Cumberland	West of I-95	RH	26,400	4	C
		East of I-95	RH	19,800	4	B
NC 53/210 (Cedar Creek Rd.) (Exit 49)	Cumberland	West of I-95	RH	14,800	4	B
		East of I-95	RH	19,600	2	F
NC 24 (Exit 52)	Cumberland	West of I-95	RH	18,200	4	B
		East of I-95	RH	20,800	4	C
SR 1832 (Murphy Rd.) (Exit 55)	Cumberland	West of I-95	RH	9,200	2	D
		East of I-95	RH	9,200	2	D
I-95 Business (Exit 56)	Cumberland	West of I-95	RF	22,000	4	B
I-295 (Fayetteville Outer Loop) / US 13 (Exit 58)	Cumberland	West of I-95	RF	17,200	4	B
		East of I-95	RH	8,600	2	D
SR 1815 (Wade Stedman Rd.) (Exit 61)	Cumberland	West of I-95	RH	3,700	2	B
		East of I-95	RH	1,900	2	A
NC 82 (Godwin Falcon Rd.) (Exit 65)	Cumberland	West of I-95	RH	1,300	2	A
		East of I-95	RH	1,500	2	A

Table 28: I-95 Interchange Crossroad Traffic Operations for 2040

Crossroad	County	Location [1]	Roadway Classification[2]	2040 AADT	Number of Lanes	2040 LOS
SR 1811 (Bud Hawkins Rd.) (Exit 70)	Harnett	West of I-95	RH	600	2	A
		East of I-95	RH	1,900	2	A
SR 1002 (Long Branch Rd.) (Exit 71)	Harnett	West of I-95	RH	7,600	2	D
		East of I-95	RH	5,400	2	C
SR 1793 (Pope Rd.) (Exit 72)	Harnett	West of I-95	RH	13,100	4	B
		East of I-95	RH	8,800	2	D
US 421 (Cumberland St.) (Exit 73)	Harnett	West of I-95	PAI	34,400	4	F
		East of I-95	RH	14,600	2	E
SR 1808 (Jonesboro Rd.) (Exit 75)	Harnett	West of I-95	RH	7,000	2	C
		East of I-95	RH	4,200	2	B
SR 1709 (Hodges Chapel Rd.) (Exit 77)	Harnett	West of I-95	RH	5,600	2	C
		East of I-95	RH	9,500	2	D
NC 50 (Exit 79)	Johnston	West of I-95	PAI	11,400	2	D
		East of I-95	RH	6,600	2	C
I-40 (Exit 81)	Johnston	West of I-95	RF	70,600	4	F
		East of I-95	RF	41,000	4	E
SR 1178 (Keen Rd.) (Exit 87)	Johnston	West of I-95	RH	6,400	2	C
		East of I-95	RH	2,200	2	A
US 701 (Exit 90)	Johnston	West of I-95	RH	10,600	2	D
		East of I-95	RH	6,600	2	C
SR 1007 (Brogden Rd.) (Exit 93)	Johnston	West of I-95	MAS	6,400	2	C
		East of I-95	RH	4,200	2	B
NC 210/US 70 Bus (Exit 95)	Johnston	West of I-95	PAI	15,400	2	F
		East of I-95	RH	10,200	2	D
US 70 (Exit 97)	Johnston	West of I-95	PAI	19,800	4	D
		East of I-95	PAI	6,800	4	C
SR 1927 (Pine Level Selma Rd.) (Exit 98)	Johnston	West of I-95	RH	5,400	2	C
		East of I-95	RH	2,600	2	A
SR 2137 (Pittman Rd.) (Exit 101)	Johnston	West of I-95	RH	1,400	2	A
		East of I-95	RH	Not Available[3]	2	-
SR 2130 (East Main St.) (Exit 102)	Johnston	West of I-95	RH	3,100	2	B
		East of I-95	RH	1,500	2	A
SR 2339 (Bagley Rd.) (Exit 105)	Johnston	West of I-95	RH	2,600	2	A
		East of I-95	RH	2,400	2	A
SR 2342 (Princeton Kenly Rd.) (Exit 106)	Johnston	West of I-95	RH	1,600	2	A
		East of I-95	RH	1,400	2	A
US 301 (Exit 107)	Johnston	West of I-95	RH	5,600	2	C
		East of I-95	PAI	5,600	4	C
NC 42 (Exit 116)	Wilson	West of I-95	RH	14,600	2	E
		East of I-95	RH	11,000	4	A
I-795/US 264 (Exit 119)	Wilson	West of I-95	RF	41,800	4	E
		East of I-95	RF	45,800	4	F
US 264 Alternate (Raleigh Rd.) (Exit 121)	Wilson	West of I-95	MAS	21,400	4	D
		East of I-95	MAS	27,400	4	D
NC 97 (Exit 127)	Nash	West of I-95	RH	3,900	2	B
		East of I-95	RH	4,700	2	B
SR 1717 (Sandy Cross Rd.) (Exit 132)	Nash	West of I-95	RH	4,600	2	B
		East of I-95	RH	6,200	2	C
SR 1770 (Sunset Ave.) (New Interchange	Nash	West of I-95	MAS	19,800	2	F
		East of I-95	MAS	19,800	2	F
US 64 (Exit 138)	Nash	West of I-95	SF	72,600	4[4]	F

Table 28: I-95 Interchange Crossroad Traffic Operations for 2040

Crossroad	County	Location [1]	Roadway Classification[2]	2040 AADT	Number of Lanes	2040 LOS
		East of I-95	UF	77,200	4	F
NC 43 (Exit 141)	Nash	West of I-95	RH	13,200	2	E
		East of I-95	RH	16,200	2	E
NC 4 (Exit 145)	Nash	East of I-95	RH	12,600	4	B
NC 33 (Exit 150)	Nash	West of I-95	RH	1,900	2	A
		East of I-95	RH	1,700	2	A
NC 481 (Exit 154)	Halifax	West of I-95	RH	1,100	2	A
		East of I-95	RH	3,100	2	B
NC 561 (Exit 160)	Halifax	West of I-95	RH	1,800	2	A
		East of I-95	RH	1,600	2	A
NC 903 (Exit 168)	Halifax	West of I-95	RH	1,700	2	A
		East of I-95	RH	1,500	2	A
NC 125 (Exit 171)	Halifax	West of I-95	MAS	12,600	2	D
		East of I-95	MAS	6,400	2	C
US 158 (Julian R Allsbrook Highway) (Exit 173)	Halifax	West of I-95	PAI	27,800	6	D
		East of I-95	PAI	17,600	4	D
NC 46 (Exit 176)	Northampton	West of I-95	RH	12,800	2	E
		East of I-95	RH	13,000	4	B
NC 48 (Exit 180)	Northampton	West of I-95	RH	4,600	2	B
		East of I-95	RH	1,800	2	A

[1] Driveways and/or crossroads may exist between interchange ramps and represented AADT volume depending on the location of the historical data count.
[2] Roadway Classification:
RH = Rural Highway
SF = Suburban Freeway
MAS = Minor Arterial, Suburban
PAI = Principal Arterial, Intermediate
RF = Rural Freeway
UF = Urban Freeway
[3] AADT data was not provided for crossroad
[4] Freeway segment contains 2 continuous lanes and 1 auxiliary lane in each direction

6.3 SAFETY CONDITIONS

With no safety improvements, I-95 is expected to continue to experience crash rates similar to those described in **Section 4.2**, due to increased vehicle miles of travel. The increase in congestion is expected to lead to a higher number of crashes but the crash rate is expected to remain relatively constant since it is based on exposure. Crash types typically associated with freeway congestion include rear end and lane maneuver, especially within interchanges. Slower operating speeds caused by congestion are anticipated to lower the severity of the crashes.

Section 7
Funding Commitments

This section identifies likely funding availability to address long-term maintenance and improvement needs of I-95. It identifies funds programmed for I-95 corridor improvements in NCDOT's adopted Work Program, as well as in adopted statewide, regional or local transportation plans. This information is intended to identify and evaluate the adequacy of the existing financing for I-95 maintenance and improvements.

7.1 FISCALLY CONSTRAINED LONG RANGE PLAN FUNDING FOR THE I-95 CORRIDOR

Based on conservative assumptions of revenue growth and adjusting for inflation, NCDOT has estimated that a total of $55 billion (constant 2001 dollars) would be available for investment in all modes of transportation in North Carolina over the next 25 years, according to the *Long-Range Statewide Multimodal Transportation Plan* (NCDOT, 2004). This is the amount available to address nearly $85 billion in multi-modal transportation needs; there is a $30 billion funding shortfall. The needs analysis of the plan identified $67.6 billion in highway and bridge needs over the 25-year planning horizon — $31.1 billion for statewide highways, including Interstate highways, $9.1 billion for regional facilities, and $26.4 billion for sub-regional roadways.

These figures include both existing and future needs in the four major needs categories of maintenance, preservation, modernization and expansion. The I-95 corridor is part of the Strategic Highways Corridors, a concept in the long-range plan that emphasizes the need to improve, protect, and maximize the capacity of a set of existing highways that are critical to statewide mobility and regional connectivity.

7.2 TRANSPORTATION FUNDING IN NORTH CAROLINA

In order to address the transportation needs of the state, the NCDOT had an annual operating budget in 2009-2010 of approximately $3.7 billion, according to the most recent information available from the Board of Transportation's Financial Update. This money comes from three primary sources: the Highway Fund, the Highway Trust Fund, and federal funds, as shown in **Table 25**.

Table 29: NCDOT 2009-2010 Major Revenue Sources

Funding Source	2009-2010 Budget (millions)	Percent of Total Funding
Highway Fund	$1,736.6	47.3%
Highway Trust Fund	$881.3	24.0%
Federal Funds (various programs)	$1,011.1	27.6%
Other	$39.7	1.1%
Total	$3,668.7	100.0%

Source: Financial Update, Board of Transportation Finance and Programming Committee, Mark Foster, Chief Financial Officer, NCDOT, January 6, 2010

Revenue for the Highway Fund comes from a variety of sources, including the state gas tax, motor vehicle registration fees, title fees and federal-aid appropriations. Traditionally, the Highway Fund has supported highway construction and maintenance, the State Highway Patrol, and the Division of Motor Vehicles. In the 1990s, the fund also began supporting public transportation and rail programs.

The Highway Trust Fund provides funding for upgrading the 3,600-mile intrastate system to four lanes and building urban loops around ten of North Carolina's largest cities. This fund also provides money to complete the paving of most of the state's secondary roads as part of the Secondary Road Improvement Program and provides extra money for the state's cities and towns to adequately maintain their streets through the Powell Bill Fund. Revenue for the Highway Trust Fund comes from taxes on motor fuel, alternative fuel, and vehicle use; title fees; and interest and income from the fund.

Additional funds come from federal highway dollars, General Fund dollars and other federal funds that go towards transit, rail and airports. This includes the Corridors of the Future funding, a US DOT program aimed at developing innovative national and regional approaches to reduce congestion and improve the efficiency of freight delivery. The I-95 corridor was one of six corridors selected in 2007 to participate in that program.

7.3 STIP FUNDING IN NORTH CAROLINA

NCDOT's current highway construction program is defined by the *NCDOT State Transportation Improvement Program 2009-2015* (June 2008). The budget for funding transportation improvements in the short-term is based on the certified budget and projections developed by NCDOT and the Office of State Budget and Management in the summer of 2007. The Highway Trust Fund revenues available for all programs were projected to be about $1 billion for FY 2009, dropping to $881 million in FY 2010, and $7.9 billion during the seven-year period. Of this $7.9 billion in revenue, $5.8 billion is allocated to the Intrastate and Urban Loop STIP programs. The remainder is reserved for purposes and projects not included in the STIP.

Table 26 shows how the $3.7 billion from NCDOT's major funding sources are to be spent in 2009-2010. The two largest appropriations in the budget are for TIP construction and Highway Maintenance, using approximately two thirds of the total budget.

Table 30: Projected Uses of NCDOT 2009-2010 Appropriations

Use of NCDOT Appropriations	2009-2010 Budget (millions)	Percent of Total Appropriations
TIP Construction	$1,359.9	37.1%
Highway Maintenance	$937.4	25.6%
Other Construction	$122.4	3.3%
Municipal Aid	$129.2	3.5%
State Agency Transfers	$392.6	10.7%
Debt Service	$149.9	4.1%
Governor's Highway Safety and other programs	$13.1	0.4%
Other Transportation Modes	$203.0	5.5%
North Carolina Turnpike Authority	$64.0	1.7%
Administration	$297.2	8.1%
Total Funding	$3,668.7	100.0%

Source: Financial Update, Board of Transportation Finance and Programming Committee, Mark Foster, Chief Financial Officer, NCDOT, January 6, 2010

7.4 I-95 CORRIDOR FUNDING

Past analysis by the NCDOT performed between 2003 and 2009 has estimated the investment needs for the I-95 corridor through the year 2030 at between $3 and $4 billion for long-range

improvements, including roadway widening, bridge replacement, pavement reconstruction, congestion management, and routine maintenance. To address these needs, NCDOT through its FY 2009-2015 STIP had programmed 34 projects at a cost of $1.021 billion. As shown in **Table 27**, $110.6 million of this amount has already been spent. Another $365 million is currently programmed for expenditure between FY 2009 and FY 2015. But fully 53% of the costs of these projects are identified as being unfunded, and NCDOT has no policy or programming commitment to fund needed I-95 improvements beyond projects identified in the STIP.

At the rate that projects have been funded in fiscal years 2009 through 2015, it would take at least ten additional years to make up the shortfall in unfunded costs for projects already programmed in the TIP. Without additional funding, the I-95 projects in the 2009-2015 STIP could not be completed before 2025. Further, and critical to this I-95 Planning and Finance Study, the one billion dollars currently programmed only addresses 25 – 33% of previously estimated corridor needs. Assuming that I-95 preservation and improvement needs continue to grow beyond 2030, NCDOT faces the very real prospect of continuing to fall further and further behind in its efforts to preserve this critical state and regional transportation facility. More starkly stated, without a major influx of additional funds, the State will fall ever-further behind, challenging its ability to even preserve its existing investment.

Table 31: STIP Spending on I-95 Projects FY 2009-2015

Funding	Amount
Total Project Cost	$1,021,586,000
Prior Years Spent	$110,565,000
FY 2009	$16,590,000
FY 2010	$18,879,000
FY 2011	$24,837,000
FY 2012	$25,537,000
FY 2013	$63,356,000
FY 2014	$47,680,000
FY 2015	$40,480,000
Funded (FY 2009-15)	$364,969,000
Unfunded	$546,052,000

Source: North Carolina Department of Transportation State Transportation Improvement Program 2009-2015 (June 2008)

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Section 8

Report Summary

The I-95 Study Area Needs Assessment was prepared to help identify existing conditions and future infrastructure and traffic operations needs of the I-95 corridor. Information from this report will be used to guide discussion of transportation problems, and later to identify alternatives that create potential solutions. This section of the report provides a summary of the report, including conclusions and implications of the assessment.

8.1 ROADWAY DESIGN

The existing design operation conditions of the I-95 corridor have been analyzed in terms of lane and route continuity, lane balance and ramp sequence, design principles that allow roadways to operate better by creating clearly defined paths for drivers. Lane and route continuity has been met throughout the entire I-95 corridor. The same is true for lane balance. The ramp sequencing standards have also been met along the entire I-95 corridor.

The existing conditions of the I-95 corridor in terms of roadway geometry indicate that the horizontal alignment is adequate for a 70+ mph design speed throughout the entire I-95 corridor, with no curves that would require speed reductions.

The vertical alignment is adequate for a 70+mph design speed through most of the I-95 corridor. The grade near mile marker 97 on I-95 at SR 1927 (E. Anderson St.) in Johnston County is 3.2 percent north of the interchange, and approximately 3.1 percent south of the interchange. The other location that does not meet the desired design speed is south of the I-95/US 301 interchange in Johnston County near mile marker 107, where there is a 3.2 percent grade.

The horizontal clearance is good for most of the I-95 corridor, with 30 feet or more of clearance between the edge of travel lanes and roadside hazards. However, there are two locations where there is less than 24 feet clear of roadside hazards. One is at the US 301/SR 1003 (Chicken Rd.) 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 both directions where there are breakaway light poles.

The stopping sight distance is adequate for a design speed of 70 mph or greater, for most of the I-95 corridor. There are three locations where the vertical curves reduce design speed to 65 – 70 mph.

There are 35 locations on the I-95 corridor where a motorist has less than the optimal 2000 feet for decision sight distance, defined as the distance that a motorist needs to visually identify an exit and then make a decision. Of these 35 locations, six have less than 1000 feet of decision sight distance and 29 have between 1000 and 2000 feet.

There are 45 ramps on the 56 interchanges on the corridor (approximately 20%) 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. It is believed that these interchange locations have deficient ramp distances primarily because they were constructed prior to the adoption of the current standards.

Interchange spacing plays a considerable role in the traffic operations of a freeway. The general rule of thumb regarding minimum interchange spacing is 1.0 miles in urban areas and 3.0 miles in rural areas. Of the 56 freeway segments between interchanges on the I-95 corridor 22 do not meet the minimum interchange spacing requirements.

8.2 INFRASTRUCTURE

The average estimated remaining life of all the bridges is 22 years, and the general condition ratings of most bridges are fair. However, the general condition and sufficiency ratings vary significantly from bridge to bridge as maintenance and repairs are done to keep the bridges safe for travel, a very high NCDOT priority. Significant repairs or replacement will be necessary over the next 20 years on 35 of the 69 bridges (50%) on I-95 and 54 of the 116 bridges (46 %) over I-95, as shown in **Table 32**.

Table 32: Summary of Bridge Conditions on I-95

	Bridges on I-95	Bridges over I-95
Total	69	116
Functionally obsolete	12	23
Structurally deficient	6	11
Average life	22	22
Number < 20 years estimated remaining life	35	54
Number < 10 years estimated remaining life	9	21
Number < 5 years estimated remaining life	0	3

Source: NCDOT Bridge Inspection Reports

There are nine bridges along I-95 that will need to be replaced or repaired within the next ten years, or 13% of all these bridges. Of the bridges over I-95, 21 bridges (19%) will need to be replaced or repaired in the next ten years, three of which will need to be repaired or replaced in the next five years.

Currently, 26 of the 116 overpass bridges (23%) and 6 of the 69 bridges (8%) along I-95 don't meet the minimum vertical clearance requirements, making them functionally obsolete. There are six bridges categorized as structurally deficient and twelve as functionally obsolete among the 69 bridges on the I-95 roadway. There are eleven bridges categorized as structurally deficient and 23 as functionally obsolete among the 116 bridges that cross over I-95.

Most of the pavement along the corridor has been rehabilitated to asphalt pavement, with the exception of Nash County and a small segment of Halifax County. Generally, the pavement surface is currently very good along the entire corridor. However, the foundation of the pavement structure is in need of reconstruction, shortening the effective life of subsequent pavement overlays.

8.3 TRAFFIC CONDITIONS

The average AADT on I-95 by county in 2008 varied between 30,800 and 44,700, with Wilson County having the lowest average, and Harnett County having the highest. The segment with the highest AADT is in Johnston County where there is a segment with 50,000 AADT. Johnston

County also contains one of the segments with the lowest AADT of 29,000, and the other is in Wilson County.

Traffic volumes on I-95 generally increased in the ten years prior to 2000. In the ten years since 2000, traffic growth has been volatile, growing and shrinking, mirroring the dynamic economic conditions over that period. From 1989 to 2008 the average annual growth rate of the volumes on I-95 was 1.2%. The highest average volume increases occurred in Harnett County (2.3%), while the lowest average volume growth occurred in Northampton County (0.6%).

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, typically when schools have spring break, and December 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.

Large trucks constitute a substantial percentage of the traffic on I-95 within North Carolina. The 2008 Manual Classification Counts show trucks comprise between 16 and 30 percent of the daily traffic. On average, large trucks comprise 23% of the daily traffic.

In 2008, most of the segments of I-95 experienced good traffic flow. The traffic operations analysis of the 58 basic freeway segments between interchanges showed that 52 of the segments operated at LOS C or better (90%), 6 operated at LOS D (10%), and none operated at LOS E or F (0%). Five of the six basic freeway segments operating at LOS D are located in rural areas and thus do not meet the NCDOT minimum LOS standard. Four of these are in Harnett County, one straddles Harnett and Johnston Counties, and one is in Robeson County.

On I-95 interchange crossroad, most of the interchange crossroad segments currently experience Good traffic flow, but with some unsatisfactory exceptions. The analysis showed that in 2008, 75 of the crossroad segments operated at LOS C or better (79%), 16 operated at LOS D (17%), 4 operated at LOS E (4%), and none operated at LOS F (0%). Robeson County contains six of the crossroad segments rated Fair or Poor, Johnston County contains five, Cumberland County contains three, and Harnett, Halifax and Nash Counties contain two each.

US 301 is the primary relief route for I-95 running parallel for the entire 182 miles, except from Exit 10 to Exit 22 where the two facilities run on the same alignment. Most of the route's segments currently experience good traffic flow. The analysis of US 301 and US 301 Bypass showed that 146.7 miles operate at LOS C or better (80.4%), 34.1 miles operate at LOS D (18.7%), 0.8 miles operate at LOS E (0.4%), and 0.9 miles operate at LOS F (0.5%). The most congested sections of the alternative route are in the vicinity of Smithfield/Selma and Rocky Mount.

8.4 SAFETY

Safety conditions on I-95 reflect the generally safer experience of interstate highways compared to other roadways. However, the analysis of safety ratios indicates that fatal crashes are an issue in Robeson and Nash Counties, where safety ratios less than 1.0 indicate that fatal crash rates in

these counties are statistically greater than average. For non-fatal crashes, the I-95 actual crash rate in all counties is substantially better than the critical crash rate.

The safety analysis of the total and fatal crashes on the I-95 mainline shows that of the 230 northbound and southbound segments, 37 (16%) had a Fair or Poor safety ratio, and the remaining segments had a Good safety ratio. Of the 37 segments with a Fair or Poor safety ratio, 23 were located within an interchange influence area.

In addition to the statistical crash data analysis by segment, a rolling segment analysis was performed to identify potential physical problems in the corridor that could be tied to crashes on I-95. In the northbound direction, six safety hot spots were identified where there were a statistically higher number of crashes, all within interchanges. In the southbound direction, five safety hot spots were identified, all within interchange areas.

The historical crash trends on the I-95 mainline from 1994 to 2008 for all vehicle types and commercial motor vehicles followed a similar pattern. The total crash rate and injury crash rate generally decreased since 2004. The fatal crash rate has fluctuated from 1994 to 2008.

8.5 ENVIRONMENTAL RESOURCES

A screening-level evaluation of the environmental resources was performed based on currently available geographic information system (GIS) information for land use, zoning, demographics, natural resources, cultural resources, and hazardous waste sites. The purpose of the evaluation was to identify potential environmental constraints for use in the development of study alternatives. Environmental resources listed below exist within the corridor and may be impacted by alternatives that arise from the study.

- Cultural resources
- Recreational resources
- Voluntary agricultural districts
- Water resources
- Protected species
- Air quality
- Noise sensitive sites

Any future projects that arise from the I-95 Planning and Finance Study will have to investigate these resources further in order to avoid environmental impacts.

There are six census tracts in the I-95 demographic study area located adjacent to the highway where at least 50% of the population is minority and 50% is below the poverty level:

- South of Lumberton
- In Fayetteville on I-95 Business
- North and south of Dunn
- North and south of Smithfield

- On US 301 in Wilson
- On US 301 in Rocky Mount

The number of Spanish speakers who spoke English less than very well exceeded 1,000 in nine of the 13 counties in the demographic study area and exceeded 5 percent of the population in Johnston and Sampson Counties. In all cases, English was the most common language spoken and Spanish/Spanish Creole was the second most common language spoken. In Cumberland County, there were more than 1,000 people who spoke a language other than Spanish and spoke English less than very well.

Public involvement efforts will require outreach focused on these communities to ensure equal participation in any project arising from the I-95 Planning and Finance Study.

8.6 FUTURE CONDITIONS

Based on NCDOT assessments of bridges on or over I-95, significant repairs 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 repaired, and the numbers sharply increase as time goes on. There are 27 bridges that need to be replaced or repaired in the next ten years, 36 in the next 15 years, and 89 in the next 20 years.

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 there has been little reconstruction. As a result, the expected life cycle of new pavement in the future will decrease over time.

Future traffic estimates (*Preliminary Traffic Estimates for NCDOT State TIP Project No. I-5133, I-95 Corridor Planning and Finance Study*, July 2010) showed annualized growth rates ranging from 0.53% to 1.48%. The annualized growth rates were used to project 2040 AADT volumes, which ranged from 38,200 in Northampton County to 80,400 in Johnston County.

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. Future conditions LOS analysis using 2040 AADTs showed most segments of I-95 are projected to experience Poor traffic flow. Projects included in NCDOT's 2009-2015 STIP impacting the traffic operations of I-95 or the interchange crossroads were included in the No-Build traffic analysis.

The traffic operations analysis of the 60 basic freeway segments showed that none of the segments would operate at LOS A or B (0%), 2 would operate at LOS C (3%), 23 would operate at LOS D (38%), 16 would operate at LOS E (27%), and 19 would operate at LOS F (32%). 22 of the 23 basic freeway segments projected to operate at LOS D are located in rural areas and thus do not meet the NCDOT minimum LOS standard. The two segments projected to operate with a Good rating are from NC 46 (Exit 176) to NC 48 (Exit 180) and from NC 48 (Exit 180) to the Virginia state line in Northampton County.

The future conditions traffic analysis showed that the widening of I-95 to 6-lanes will not be required for a substantial number of segments until beyond 2020. Three segments at the northern end of the corridor will not meet the criteria for widening to 6-lanes by the design year 2040. Only the section of I-95 from I-95 Business (Exit 56) to I-40 (Exit 81) will require widening to 8-lanes by 2040.

In contrast, the majority of interchange crossroad segments are projected to experience Good traffic flow in 2040. The analysis showed that 67 crossroad segments would operate at LOS C or better (62%), 19 would operate at LOS D (18%), 8 would operate at LOS E (7%), and 14 would operate at LOS F (13%). Segments with LOS E or F are considered Poor. Six Nash County crossroad segments rate Poor, with four so rated in Robeson County, three each in Cumberland, Johnston, and Wilson Counties, two so rated in Harnett County, one so rated in Northampton County, and none so rated in Halifax County.

With no major improvements to I-95, increase in congestion is expected to lead to a higher number of crashes but the crash rate is expected to remain relatively constant since it is based on exposure. Crash types typically associated with freeway congestion include rear end and lane maneuver, especially in the vicinity of interchanges. Slower operating speeds caused by congestion is anticipated to lower the severity of the crashes.

8.7 FUNDING COMMITMENTS

Past analysis by the NCDOT has estimated the investment needs for the I-95 through the year 2030 at between $3 and $4 billion for long-range improvements, including roadway widening, bridge replacement, pavement reconstruction, congestion management, and routine maintenance.

The 2009-2015 STIP lists 34 improvement projects for the I-95 corridor, consisting of capacity, pavement, infrastructure, and maintenance projects. These projects will cost $1.022 billion. 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 TIP to cover some of the remaining costs for these projects, leaving an unfunded backlog of $546 million, or 53% of the total costs.

Without additional funding, the I-95 projects in the 2009-2015 TIP could not be completed before 2025 at the current rate that projects have been funded. Assuming an ongoing funding stream to the I-95 corridor of $365 million every six years, or $61 million per year, it would take 65 years to address the full $4 billion needed to improve I-95, assuming constant buying power.

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Appendix A
Existing Conditions Survey

Appendix A

Existing Conditions Survey

Appendix B
Figures

Appendix B
Figures

Appendix C
Pavement and Bridge Tables

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Appendix C
Pavement and Bridge Tables

Table C-1: I-95 Pavement Conditions

Dir	Pavement Type[1]	County Name	BMP[2]	EMP[3]	Begin Description[4]	End Description	Rating	Ave. IRI[5]
N	Asphalt	Robeson	0	1.99	SC SL	MM 2	100	74.03
N	Asphalt	Robeson	1.99	4	MM 2	MM 4	100	65.88
N	Asphalt	Robeson	4	5.99	MM 4	MM 6	100	66.7
N	Asphalt	Robeson	5.99	7.99	MM 6	MM 8	100	64.62
N	Asphalt	Robeson	7.99	10.03	MM 8	MM 10	100	77.8
N	Asphalt	Robeson	10	11.98	MM 10	MM 12	100	60.2
N	Asphalt	Robeson	12	13.96	MM 12	MM 14	100	52.26
N	Asphalt	Robeson	14	15.97	MM 14	MM 16	100	58.88
N	Asphalt	Robeson	16	17.98	MM 16	MM 18	96.7	73.48
N	Asphalt	Robeson	18	20	MM 18	MM 20	96.7	69.9
N	Asphalt	Robeson	20	21.89	MM 20	Pvmt Chng	96.7	61.13
N	Asphalt	Robeson	21.9	24	MM 21.9	MM 24	100	58.68
N	Asphalt	Robeson	24	26.03	MM 24	MM 26	100	57.5
N	Asphalt	Robeson	26	28.02	MM 26	MM 28	100	59.5
N	Asphalt	Robeson	28	30.05	MM 28	MM 30	100	55.74
N	Asphalt	Robeson	30.1	32.06	MM 30	MM 32	100	62.88
N	Asphalt	Robeson	32.1	34.08	MM 32	MM 34	100	53.79
N	Asphalt	Robeson	34.1	36.09	MM 34	MM 36	100	52.69
N	Asphalt	Robeson	36.1	38.1	MM 36	MM 38	100	51.31
N	Asphalt	Robeson	38.1	38.64	MM 38	Cumberland CL	100	58.83
N	Asphalt	Cumberland	0	1.34	Robeson CL	MM 40	100	82.14
N	Asphalt	Cumberland	1.34	3.33	MM 40	MM 42	100	93.1
N	Asphalt	Cumberland	3.33	5.33	MM 42	MM 44	100	86.95
N	Asphalt	Cumberland	5.33	7.34	MM 44	MM 46	100	85.12
N	Asphalt	Cumberland	7.34	9.33	MM 46	MM 48	100	83.64
N	Asphalt	Cumberland	9.33	11.33	MM 48	MM 50	100	69.76
N	Asphalt	Cumberland	11.3	13.33	MM 50	MM 52	100	69.5
N	Asphalt	Cumberland	13.3	15.32	MM 52	MM 54	100	52.57
N	Asphalt	Cumberland	15.3	17.34	MM 54	MM 56	100	60.57
N	Asphalt	Cumberland	17.3	18.43	MM 56	Pvmt Chng	100	65.79
N	Asphalt	Cumberland	18.4	20.26	Pvmt Chng	Pvmt Chng	100	82.39

Table C-1: I-95 Pavement Conditions

Dir	Pavement Type[1]	County Name	BMP[2]	EMP[3]	Begin Description[4]	End Description	Rating	Ave. IRI[5]
N	Asphalt	Cumberland	20.3	21.31	Pvmt Chng	MM 60	100	79
N	Asphalt	Cumberland	21.3	23.36	MM 60	MM 62	100	97.52
N	Asphalt	Cumberland	23.4	25.36	MM 62	MM 64	100	99.88
N	Asphalt	Cumberland	25.4	27.36	MM 64	MM 66	100	96.67
N	Asphalt	Cumberland	27.4	29.36	MM 66	MM 68	100	86.36
N	Asphalt	Cumberland	29.4	30.33	MM 68	Harnett CL	100	85.05
N	Asphalt	Harnett	0	0.98	Cumberland CL	MM 70	100	80.25
N	Asphalt	Harnett	0.98	2.97	MM 70	MM 72	100	75.5
N	Asphalt	Harnett	2.97	4.96	MM 72	MM 74	100	99.02
N	Asphalt	Harnett	4.96	6.97	MM 74	MM 76	100	80.07
N	Asphalt	Harnett	6.97	8.85	MM 76	Johnston CL	100	75.15
N	Asphalt	Johnston	0	1.11	MM 77.88	MM 79	100	49.42
N	Asphalt	Johnston	1.11	2.6	MM 79	MM 80.5	55.9	76
N	Asphalt	Johnston	2.6	4.12	NewPvt2005	MM 82	91.7	52.91
N	Asphalt	Johnston	4.12	6.11	MM 82	MM 84	95	57.07
N	Asphalt	Johnston	6.11	8.09	MM 84	MM 86	95	59
N	Asphalt	Johnston	8.09	9.21	MM 86	Pvmt Chng	100	58.58
N	Asphalt	Johnston	9.21	10.11	Pvmt Chng	Pvmt Chng	95	67
N	Asphalt	Johnston	10.1	12.11	NewPvt2005	MM 90	100	52.98
N	Asphalt	Johnston	12.1	14.09	MM 90	MM 92	100	53.25
N	Asphalt	Johnston	14.1	16.08	MM 92	MM 94	95	57.93
N	Asphalt	Johnston	16.1	19.06	MM 94	Pvmt Chng	95	55
N	Asphalt	Johnston	19.1	20.05	Pvmt Chng	MM 98	100	62.95
N	Asphalt	Johnston	20.1	21.93	MM 98	Pvmt Chng	91.7	93.95
N	Asphalt	Johnston	21.9	24.12	Pvmt Chng	MM 102	81.7	102.91
N	Asphalt	Johnston	24.1	26.12	MM 102	MM 104	81.7	109.64
N	Asphalt	Johnston	26.1	29.13	MM 104	Pvmt Chng	81.7	106.35
N	Asphalt	Johnston	29.1	30.33	MM 107	Wilson CL	85	44.27
N	Asphalt	Wilson	0	1.78	Johnston CL	MM 110	100	41.67
N	Asphalt	Wilson	1.78	3.78	MM 110	MM 112	100	43.21
N	Asphalt	Wilson	3.78	6.22	MM 112	Pvmt Chng	100	47.87
N	Asphalt	Wilson	6.22	7.77	Pvmt Chng	MM 116	100	54.13
N	Asphalt	Wilson	7.77	9.76	MM 116	MM 118	100	46.21
N	Asphalt	Wilson	9.76	11.79	MM 118	MM 120	100	52.12

Table C-1: I-95 Pavement Conditions

Dir	Pavement Type[1]	County Name	BMP[2]	EMP[3]	Begin Description[4]	End Description	Rating	Ave. IRI[5]
N	Asphalt	Wilson	11.8	13.77	MM 120	MM 122	89.2	54.36
N	Asphalt	Wilson	13.8	14.83	MM 122	MM 123.07	96.7	57.13
N	Asphalt	Wilson	14.8	16.44	MM 123.07	Nash CL	96.7	67.12
N	Asphalt	Nash	0	1.33	Wilson CL	MM 126	100	73.71
N	Asphalt	Nash	1.33	3.03	MM 126	Tar River	100	71.44
N	JCP	Nash	3.03	3.34	Tar River	MM 128	22.9	147.5
N	JCP	Nash	3.34	4.34	MM 128	MM 129	29.6	121.5
N	JCP	Nash	4.34	5.35	MM 129	MM 130	39.3	123.45
N	JCP	Nash	5.35	6.35	MM 130	MM 131	9.6	131.55
N	JCP	Nash	6.35	7.35	MM 131	MM 132	25.3	142.5
N	JCP	Nash	7.35	8.35	MM 132	MM 133	66.2	150.32
N	JCP	Nash	8.35	9.35	MM 133	MM 134	49.4	145.27
N	JCP	Nash	9.35	10.35	MM 134	MM 135	60	152.55
N	JCP	Nash	10.4	11.34	MM 135	MM 136	52.7	149.05
N	JCP	Nash	11.3	12.34	MM 136	MM 137	54.7	160.32
N	JCP	Nash	12.3	13.34	MM 137	MM 138	52	154.41
N	JCP	Nash	13.3	14.34	MM 138	MM 139	51.5	146.95
N	JCP	Nash	14.3	15.34	MM 139	MM 140	54.2	154.18
N	JCP	Nash	15.3	16.34	MM 140	MM 141	56.9	142.68
N	JCP	Nash	16.3	17.34	MM 141	MM 142	53.6	133.5
N	JCP	Nash	17.3	18.34	MM 142	MM 143	53.8	127.91
N	Asphalt	Nash	18.4	20.36	MM 143	MM 145	91.7	55.55
N	Asphalt	Nash	20.4	22.36	MM 145	MM 147	91.7	54.6
N	Asphalt	Nash	22.4	24.36	MM 147	MM 149	84.2	54.74
N	Asphalt	Nash	24.4	26.24	MM 149	Halifax CL	96.7	61.05
N	Asphalt	Halifax	0	1.12	Nash CL	MM 152	91.7	75.21
N	Asphalt	Halifax	1.12	2.42	MM 152	JCP	88.4	66.64
N	JCP	Halifax	3.12	4.11	MM 154	MM 155	85.6	122
N	JCP	Halifax	4.11	5.12	MM 155	MM 156	75.8	106.09
N	JCP	Halifax	7.12	8.12	MM 158	MM 159	43.9	147.05
N	JCP	Halifax	8.12	9.12	MM 159	MM 160	73.3	133.36
N	Asphalt	Halifax	9.02	11.12	MM 159.9	MM 162	100	77.07
N	Asphalt	Halifax	11.1	12.58	MM 162	Pvmt Chng	100	84.77
N	Asphalt	Halifax	12.6	13.13	Pvmt Chng	MP 164	100	75.21

Table C-1: I-95 Pavement Conditions

Dir	Pavement Type[1]	County Name	BMP[2]	EMP[3]	Begin Description[4]	End Description	Rating	Ave. IRI[5]
N	Asphalt	Halifax	13.1	15.15	Pvmt Chng	MM 166	91.7	82.33
N	Asphalt	Halifax	15.2	15.93	MM 166	Pvmt Chng	96.7	80.78
N	Asphalt	Halifax	15.9	17.11	Pvmt Chng	MP 168	60	65.04
N	Asphalt	Halifax	17.1	19.13	MM 168	MM 170	68.5	48.12
N	Asphalt	Halifax	19.1	21.11	MM 170	MM 172	69	52.45
N	Asphalt	Halifax	21.1	23	MM 172	Northampton CL	96.7	72.11
N	Asphalt	Northampton	0	1.12	Halifax CL	Pvmt Chng	96.7	91.79
N	Asphalt	Northampton	1.12	4.12	MM 175	MM 178	100	58.89
N	Asphalt	Northampton	4.12	6.12	MM 178	MM 180	100	55.69
N	Asphalt	Northampton	6.12	7.49	MM 180	VA SL	100	52.86
S	Asphalt	Robeson	0	0.57	Cumberland CL	MM 38	100	51.92
S	Asphalt	Robeson	0.57	2.57	MM 38	MM 36	100	56.76
S	Asphalt	Robeson	2.57	4.59	MM 36	MM 34	100	63.19
S	Asphalt	Robeson	4.59	6.6	MM 34	MM 32	100	56.98
S	Asphalt	Robeson	6.6	8.61	MM 32	MM 30	100	60.21
S	Asphalt	Robeson	8.61	10.64	MM 30	MM 28	100	60.14
S	Asphalt	Robeson	10.6	12.64	MM 28	MM 26	100	56.26
S	Asphalt	Robeson	12.6	14.63	MM 26	MM 24	100	57.1
S	Asphalt	Robeson	14.6	16.78	MM 24	MM 21.9	100	56.11
S	Asphalt	Robeson	16.8	18.65	MM 21.9	MM 20	95	61.45
S	Asphalt	Robeson	18.7	20.66	MM 20	MM 18	100	82.69
S	Asphalt	Robeson	20.7	22.7	MM 18	MM 16	84.2	75.02
S	Asphalt	Robeson	22.7	24.7	MM 16	MM 14	100	76.2
S	Asphalt	Robeson	24.7	26.67	MM 14	MM 12	100	61.2
S	Asphalt	Robeson	26.7	28.63	MM 12	MM 10	100	66.45
S	Asphalt	Robeson	28.6	30.68	MM 10	MM 8	100	69.86
S	Asphalt	Robeson	30.7	32.68	MM 8	MM 6	100	65.5
S	Asphalt	Robeson	32.7	34.69	MM 6	MM 4	100	66.24
S	Asphalt	Robeson	34.7	36.69	MM 4	MM 2	100	83.02
S	Asphalt	Robeson	36.7	38.36	MM 2	SC SL	100	100.47
S	Asphalt	Cumberland	0	1.01	Harnett CL	MM 68	100	76.41
S	Asphalt	Cumberland	1.01	3.01	MM 68	MM 66	100	83.69
S	Asphalt	Cumberland	3.01	5	MM 66	MM 64	100	85.8
S	Asphalt	Cumberland	5	7.01	MM 64	MM 62	100	78.4

Table C-1: I-95 Pavement Conditions

Dir	Pavement Type[1]	County Name	BMP[2]	EMP[3]	Begin Description[4]	End Description	Rating	Ave. IRI[5]
S	Asphalt	Cumberland	7.01	9.04	MM 62	MM 60	100	82.1
S	Asphalt	Cumberland	9.04	10.14	MM 60	MM 58.92	100	83.88
S	Asphalt	Cumberland	10.1	11.91	Pvmt Chng	Pvmt Chng	100	72.66
S	Asphalt	Cumberland	11.9	13.01	MM 57.1	MM 56	100	50.92
S	Asphalt	Cumberland	13	15.03	MM 56	MM 54	100	50.88
S	Asphalt	Cumberland	15	17.02	MM 54	MM 52	100	50.6
S	Asphalt	Cumberland	17	19.02	MM 52	MM 50	100	62.48
S	Asphalt	Cumberland	19	21	MM 50	MM 48	100	61.98
S	Asphalt	Cumberland	21	22.98	MM 48	MM 46	100	91.3
S	Asphalt	Cumberland	23	25.01	MM 46	MM 44	100	65.43
S	Asphalt	Cumberland	25	26.99	MM 44	MM 42	100	70.6
S	Asphalt	Cumberland	27	29.01	MM 42	MM 40	100	77.18
S	Asphalt	Cumberland	29.8	30.36	MM 40	Robeson CL	100	71.7
S	Asphalt	Harnett	0	1.89	Johnston CL	MM 76	100	73.39
S	Asphalt	Harnett	1.89	3.87	MM 76	MM 74	100	75.17
S	Asphalt	Harnett	3.87	5.9	MM 74	MM 72	100	90.14
S	Asphalt	Harnett	5.9	7.9	MM 72	MM 70	100	79.88
S	Asphalt	Harnett	7.9	8.88	MM 70	Cumberland CL	100	71.7
S	Asphalt	Johnston	0	1.24	Wilson CL	MM 107	96.7	73.77
S	Asphalt	Johnston	1.24	4.23	MM 107	MM 104	76.7	102.21
S	Asphalt	Johnston	4.23	6.22	MM 104	MM 102	76.7	92.45
S	Asphalt	Johnston	6.22	8.33	MM 102	MM 99.9	76.7	73.7
S	Asphalt	Johnston	8.33	10.28	MM 99.9	MM 98	100	70.55
S	Asphalt	Johnston	10.3	11.34	MM 98	MM 96.9	96.7	67.38
S	Asphalt	Johnston	11.3	14.25	MM 96.9	MM 94	100	52.82
S	Asphalt	Johnston	14.3	16.25	MM 94	MM 92	100	58.12
S	Asphalt	Johnston	16.3	18.26	MM 92	MM 90	100	58.14
S	Asphalt	Johnston	18.3	20.27	MM 90	MM 80	100	61.43
S	Asphalt	Johnston	20.3	21.18	MM 88	MM 87.1	100	63.6
S	Asphalt	Johnston	21.2	22.3	MM 87.1	MM 86	100	54.92
S	Asphalt	Johnston	22.3	24.28	MM 86	MM 84	100	56.18
S	Asphalt	Johnston	24.3	26.27	MM 84	MM 82	95	51.38
S	Asphalt	Johnston	26.3	27.79	MM 82	MM 80.5	100	61.84
S	Asphalt	Johnston	27.8	29.31	MM 80.5	MM 79	78.4	51.88

Table C-1: I-95 Pavement Conditions

Dir	Pavement Type[1]	County Name	BMP[2]	EMP[3]	Begin Description[4]	End Description	Rating	Ave. IRI[5]
S	Asphalt	Johnston	29.3	30.39	MM 79	Harnett CL	100	84.5
S	Asphalt	Wilson	0	1.57	Nash CL	New Pvmt	100	62.66
S	Asphalt	Wilson	1.57	2.64	New Pvmt	MM 122	93.4	57.21
S	Asphalt	Wilson	2.64	4.62	MM 122	MM 120	93.4	63.14
S	Asphalt	Wilson	4.62	6.62	MM 120	MM 118	96.7	49.14
S	Asphalt	Wilson	6.62	8.64	MM 118	MM 116	96.7	48.79
S	Asphalt	Wilson	8.64	10.19	MM 116	MM 114.45	96.7	58.03
S	Asphalt	Wilson	10.2	12.64	MM 114.45	MM 112	100	43.85
S	Asphalt	Wilson	12.6	14.66	MM 112	MM 110	100	45.9
S	Asphalt	Wilson	14.7	16.41	MM 110	Johnston CL	100	43.68
S	Asphalt	Nash	0	1.91	Halifax CL	MM 149	91.7	56.2
S	Asphalt	Nash	1.91	3.9	MM 149	MM 147	91.7	57.53
S	Asphalt	Nash	3.9	5.89	MM 147	MM 145	91.7	64.8
S	Asphalt	Nash	5.89	7.89	MM 145	MM 143	91.7	54.55
S	JCP	Nash	7.9	8.89	MM 143	MM 142	48.1	147.9
S	JCP	Nash	8.89	9.89	MM 142	MM 141	63.9	148.45
S	JCP	Nash	9.89	10.9	MM 141	MM 140	49.5	131.32
S	JCP	Nash	10.9	11.9	MM 140	MM 139	41.9	141.6
S	JCP	Nash	11.9	12.91	MM 139	MM 138	55	142.73
S	JCP	Nash	12.9	13.91	MM 138	MM 137	58.7	138.77
S	JCP	Nash	13.9	14.91	MM 137	MM 136	36	151.77
S	JCP	Nash	14.9	15.89	MM 136	MM 135	49.1	146.8
S	JCP	Nash	15.9	16.89	MM 135	MM 134	34	144.64
S	JCP	Nash	16.9	17.89	MM 134	MM 133	73.8	128.23
S	JCP	Nash	17.9	18.89	MM 133	MM 132	31.9	152.91
S	JCP	Nash	18.9	19.89	MM 132	MM 131	40.3	141.23
S	JCP	Nash	19.9	20.89	MM 131	MM 130	33.5	123.18
S	JCP	Nash	20.9	21.89	MM 130	MM 129	32.6	159.82
S	JCP	Nash	21.9	22.9	MM 129	MM 128	42.2	130.77
S	JCP	Nash	22.9	23.22	MM 128	Tar River	59.9	118.75
S	Asphalt	Nash	23.2	24.91	Tar River	MM 126	100	74.78
S	Asphalt	Nash	24.9	26.26	MM 126	Wilson CL	100	70.32
S	Asphalt	Halifax	0	1.92	Northampton CL	MM 172	96.7	70.15
S	Asphalt	Halifax	1.92	3.89	MM 172	MM 170	71.8	48.63

Table C-1: I-95 Pavement Conditions

Dir	Pavement Type[1]	County Name	BMP[2]	EMP[3]	Begin Description[4]	End Description	Rating	Ave. IRI[5]
S	Asphalt	Halifax	3.89	5.9	MM 170	MM 168	81.8	49.57
S	Asphalt	Halifax	5.9	7.87	MM 168	MM 166	56	70.78
S	Asphalt	Halifax	7.87	9.89	MM 166	MM 164	45	96.05
S	Asphalt	Halifax	9.89	11.89	MM 164	MM 162	46	97.4
S	Asphalt	Halifax	11.9	14	MM 162	MM 159.9	40	114.84
S	JCP	Halifax	13.9	14.9	MM 160	MM 159	35.6	220.05
S	JCP	Halifax	14.9	15.9	MM 159	MM 158	5.6	214.3
S	JCP	Halifax	15.9	16.9	MM 158	MM 157	40.6	216.45
S	JCP	Halifax	16.9	17.9	MM 157	MM 156	39.9	195.5
S	JCP	Halifax	17.9	18.9	MM 156	MM 155	36.3	188.7
S	JCP	Halifax	18.9	19.9	MM 155	MM 154	5.6	201.45
S	Asphalt	Halifax	20.6	21.91	MM 153.3	MM 152	100	56.2
S	Asphalt	Halifax	21.9	22.99	MM 152	NASH CL	100	56.27
S	Asphalt	Northampton	0	1.37	VA SL	MM 180	100	52.61
S	Asphalt	Northampton	1.37	3.37	MM 180	MM 178	100	59.93
S	Asphalt	Northampton	3.37	6.37	MM 178	MM 175	100	57.81
S	Asphalt	Northampton	6.37	7.49	MM 175	Halifax CL	93.4	101.46

1. JCP= Jointed concrete pavement
2. BMP= Begin mile post
3. EMP= End mile post
4. Pvmt Chng= Pavement Change; CL= County line; SL= State line
5. IRI= International Roughness Index, indicating roadway smoothness. Ratings less than 100 are ideal; greater than 125 are rough.

Source: NCDOT 2008 Pavement Conditions Ratings

Table C-2: Bridges On I-95

COUNTY	NUMBER	ROUTE	ACROSS	GENERAL CONDITION RATING	SUFFICIENCY RATING	ESTIMATED REMAINING LIFE	DEFICIENCIES
ROBESON	770010	I-95 NBL	US301 & US501	FAIR	95	13	SD
ROBESON	770012	I-95 SBL	US301/501	FAIR	85	12	SD
ROBESON	770106	I-95 NBL	SR2457	FAIR	94.7	18	SD
ROBESON	770107	I-95 SBL	SR2457	FAIR	94.7	18	SD
ROBESON	770144	I-95 NBL	SR1541 & CSX RR	FAIR	80.6	16	NONE
ROBESON	770145	I-95 SBL	SR1541 & CSX RR	FAIR	80.6	18	NONE
ROBESON	770146	I-95 NBL	LUMBER RIVER	FAIR	73.3	18	NONE
ROBESON	770147	I-95 SBL	LUMBER RIVER	GOOD	98.1	43	NONE
ROBESON	770156	I-95 NBL	BIG MARSH SWAMP	FAIR	79	18	FO
ROBESON	770158	I-95 SBL	BIG MARSH SWAMP	FAIR	79	18	FO
ROBESON	770159	I-95NBL	NC20	FAIR	67.2	12	FO
ROBESON	770160	I-95 SBL	NC20	FAIR	66.6	12	FO
ROBESON	770164	I-95 NBL	LITTLE MARSH SWAMP	GOOD	66	19	FO
ROBESON	770165	I-95 SBL	LITTLE MARSH SWAMP	FAIR	66	18	FO
CUMBERLAND	250026	I-95 NBL	I-95 BUS & SR2284	FAIR	85	28	NONE
CUMBERLAND	250030	I-95 SBL	I-95 LOOP NBL & SR2284	FAIR	98	23	NONE
CUMBERLAND	250077	I-95 NBL	ROCKFISH CREEK	GOOD	97.3	31	NONE
CUMBERLAND	250083	I-95 SBL	ROCKFISH CREEK	FAIR	86	26	NONE
CUMBERLAND	250099	I-95 NBL	NC87	FAIR	98	28	NONE
CUMBERLAND	250103	I-95	NC87	FAIR	98	28	NONE
CUMBERLAND	250107	I-95 COLL	NC87	FAIR	100	28	NONE
CUMBERLAND	250108	I-95 SBL(CULL	NC87	GOOD	100	28	NONE
CUMBERLAND	250109	I-95 NBL	CAPE FEAR RIVER	FAIR	85.2	24	NONE
CUMBERLAND	250111	I-95 SBL	CAPE FEAR RIVER	FAIR	85.2	23	NONE
CUMBERLAND	250133	I-95 NBL	SR1006& CSX RR	FAIR	89.6	30	NONE
CUMBERLAND	250134	I-95 SBL	SR1006 & CSX RR	GOOD	92.9	30	NONE
CUMBERLAND	250157	I-95 NBL	BLACK RIVER	FAIR	78.8	18	FO
CUMBERLAND	250158	I-95 SBL	BLACK RIVER	FAIR	75.7	18	SD
CUMBERLAND	250341	I-95 RAMP CA	US301	---	98.3	---	NONE
CUMBERLAND	250342	I-95 RAMP CA	I-95 AND NC295	---	96.2	---	NONE
HARNETT	420073	I-95 NBL	US421 & NC55	FAIR	65.2	12	FO
HARNETT	420077	I-95 SBL	US421 & NC55	FAIR	65.2	10	FO
JOHNSTON	500082	I-95 NBL	BLACK CREEK	FAIR	67.7	10	NONE
JOHNSTON	500085	I-95 SBL	BLACK CREEK	FAIR	79.1	10	NONE

Table C-2: Bridges On I-95

COUNTY	NUMBER	ROUTE	ACROSS	GENERAL CONDITION RATING	SUFFICIENCY RATING	ESTIMATED REMAINING LIFE	DEFICIENCIES
JOHNSTON	500100	I-95	NEUSE RIVER	FAIR	56	10	NONE
JOHNSTON	500101	I-95 SBL	NEUSE RIVER	FAIR	80.2	10	NONE
JOHNSTON	500106	I-95 NBL	SR1927/SR2305/SOUTH RR	FAIR	94.9	12	NONE
JOHNSTON	500107	I-95 SBL	SR1927/SR2305/SOUTH RR	FAIR	90	14	NONE
JOHNSTON	500114	I-95 NBL	LITTLE RIVER	FAIR	9.1	8	SD
JOHNSTON	500116	I-95 SBL	LITTLE RIVER	FAIR	65.8	10	NONE
JOHNSTON	500118	I-95 NBL	CSX RR	POOR	52.7	10	NONE
JOHNSTON	500119	I-95 SBL	CSX RR	POOR	53	10	NONE
JOHNSTON	500122	I-95	US301	FAIR	95	24	FO
WILSON	970073	I-95	CONTENTNEA CREEK	GOOD	97.8	31	NONE
WILSON	970074	I-95	CONTENTNEA CREEK	FAIR	92.9	31	NONE
WILSON	970099	I-95 NBL	NS RR	---	91.7	---	NONE
WILSON	970102	I-95	NS RR	---	90.6	---	NONE
WILSON	970107	I-95 NBL	MILLSTONE CREEK	GOOD	91.6	28	NONE
WILSON	970108	I-95 SBL	MILLSTONE CREEK	GOOD	92.6	29	NONE
WILSON	970133	I-95 NBL	CREEK	GOOD	93.6	12	NONE
WILSON	970134	I-95 SBL	CREEK	GOOD	93.6	15	NONE
NASH	630009	I-95 NBL	TOISNOT SWAMP	FAIR	97.7	23	NONE
NASH	630012	I-95 SBL	TOISNOT SWAMP	FAIR	97.7	25	NONE
NASH	630021	I-95 NBL	TAR RIVER	FAIR	96.7	23	NONE
NASH	630022	I-95 SBL	TAR RIVER	FAIR	96.7	23	NONE
NASH	630128	I-95 NBL	SAPONY CREEK	FAIR	97.7	23	NONE
NASH	630133	I-95 SBL	SAPONY CREEK	FAIR	91.6	23	NONE
NASH	630190	I-95 NBL	SCL RR	FAIR	94.6	28	NONE
NASH	630192	I-95 SBL	SCL RR	GOOD	91.5	26	NONE
NASH	630201	I-95 NBL	STONEY CREEK	FAIR	98.5	23	NONE
NASH	630202	I-95 SBL	STONEY CREEK	FAIR	98.5	28	NONE
NASH	630222	I-95 NBL	SWIFT CREEK	FAIR	97.5	20	NONE
NASH	630223	I-95 SBL	SWIFT CREEK	FAIR	81.1	20	NONE
HALIFAX	410012	I-95 NBL	FISHING CREEK	FAIR	96.6	20	NONE
HALIFAX	410013	I-95 SBL	FISHING CREEK	FAIR	89.5	20	NONE
HALIFAX	410124	I-95NBL	US158	GOOD	99	46	NONE
HALIFAX	410129	I-95 SBL	US158	GOOD	99	46	NONE
HALIFAX	410131	I-95 NBL	SCL RR & BECKER DR.	FAIR	94.5	16	FO

Table C-2: Bridges On I-95

COUNTY	NUMBER	ROUTE	ACROSS	GENERAL CONDITION RATING	SUFFICIENCY RATING	ESTIMATED REMAINING LIFE	DEFICIENCIES
HALIFAX	410132	I-95 SBL	SCL RR & BECKER DR.	FAIR	94.5	16	FO
HALIFAX	410139	I-95 NBL	ROANOKE RIVER	GOOD	98.5	46	NONE
HALIFAX	410141	I-95 SBL	ROANOKE RIVER	GOOD	98.5	46	NONE
NORTHAMPTON	650009	I-95NBL	ROANOKE RIVER	FAIR	98.5	47	NONE
NORTHAMPTON	650011	I-95SBL	ROANOKE RIVER	FAIR	98.5	47	NONE

FO = Functionally obsolete; SD = Structurally deficient
Source: NCDOT Bridge Inspection Reports

Table C-3: Bridges Over I-95

COUNTY	NUMBER	ROUTE	ACROSS	GENERAL CONDITION RATING	SUFFICIENCY RATING	ESTIMATED REMAINING LIFE	DEFICIENCIES
ROBESON	770004	NC130	I-95	FAIR	100	21	NONE
ROBESON	770025	NC72	I-95	GOOD	100	42	NONE
ROBESON	770036	US301	I-95	FAIR	49	2	SD
ROBESON	770054	US301	I-95	FAIR	65	19	FO
ROBESON	770055	US74	I-95	GOOD	97	9	NONE
ROBESON	770086	SR2459	I-95	POOR	67.5	18	NONE
ROBESON	770096	SR1155	I-95	POOR	67.6	8	SD
ROBESON	770100	US301	I-95	FAIR	65	5	SD
ROBESON	770102	NC211	I-95	---	98	---	NONE
ROBESON	770104	SR2455	I-95	FAIR	93.9	24	SD
ROBESON	770124	SR2430	I-95	FAIR	80.5	18	NONE
ROBESON	770130	SR1003	I-95	FAIR	96	16	SD
ROBESON	770131	SR2422	I-95	FAIR	92.8	16	SD
ROBESON	770148	SR1536	I-95	FAIR	72.9	9	SD
ROBESON	770151	SR1529	I-95	GOOD	74	30	FO
ROBESON	770152	SR1758	I-95	FAIR	88.4	12	FO
ROBESON	770154	SR1006	I-95	FAIR	83.9	18	FO
ROBESON	770162	SR1726	I-95	GOOD	23.3	50	FO
ROBESON	770167	SR1723	I-95	FAIR	73.2	14	FO
ROBESON	770169	SR1718	I-95	FAIR	79.7	18	FO
CUMBERLAND	250005	NC59	I-95	FAIR	99	33	NONE
CUMBERLAND	250007	SR2243	I-95	FAIR	99.7	30	NONE
CUMBERLAND	250013	US13	I-95	GOOD	98.1	50	SD
CUMBERLAND	250019	NC82	I-95	POOR	50.5	8	SD

Table C-3: Bridges Over I-95

COUNTY	NUMBER	ROUTE	ACROSS	GENERAL CONDITION RATING	SUFFICIENCY RATING	ESTIMATED REMAINING LIFE	DEFICIENCIES
CUMBERLAND	250031	SR2337	I-95	GOOD	98.2	30	NONE
CUMBERLAND	250034	NC53	I-95	FAIR	83	32	NONE
CUMBERLAND	250072	SR2220	I-95	GOOD	95.6	28	NONE
CUMBERLAND	250097	SR2341	I-95	FAIR	100	26	NONE
CUMBERLAND	250098	SR2212	I-95	FAIR	98	28	NONE
CUMBERLAND	250118	SR2215	I-95	FAIR	98.3	28	NONE
CUMBERLAND	250132	SR2000	I-95	FAIR	98.1	36	NONE
CUMBERLAND	250135	NC24 EBL	I-95	FAIR	99	30	NONE
CUMBERLAND	250136	NC24 WBL	I-95	GOOD	94	28	NONE
CUMBERLAND	250138	NC24 EBL COLL.	I-95	FAIR	100	30	NONE
CUMBERLAND	250139	NC24 EBL COLL.	I-95	FAIR	100	28	NONE
CUMBERLAND	250142	I-95 BUS. LOOP	I-95	FAIR	71	18	NONE
CUMBERLAND	250146	SR1835	I-95	FAIR	99.1	28	NONE
CUMBERLAND	250147	SR1832	I-95	FAIR	100	28	NONE
CUMBERLAND	250152	SR1828	I-95	FAIR	98.7	28	NONE
CUMBERLAND	250153	SR1005	I-95	FAIR	60.9	11	FO
CUMBERLAND	250154	SR1815	I-95	FAIR	67.7	15	SD
CUMBERLAND	250155	SR1813	I-95	FAIR	88	20	FO
CUMBERLAND	250156	SR1806	I-95	FAIR	71.9	16	FO
CUMBERLAND	250159	SR1804	I-95	FAIR	88.9	21	NONE
CUMBERLAND	250303	SR1933	I-95	GOOD	90.8	48	NONE
HARNETT	420037	SR1811	I-95	POOR	79.9	14	SD
HARNETT	420057	SR1002	I-95	POOR	46.8	10	SD
HARNETT	420066	SR1793	I-95	POOR	51.5	10	SD
HARNETT	420080	SR1808	I-95	POOR	36.9	10	SD
HARNETT	420081	SR1709	I-95	FAIR	74.2	20	FO
JOHNSTON	500027	SR1171	I-95	FAIR	75.5	14	FO
JOHNSTON	500042	US70	I-95	GOOD	85	37	NONE
JOHNSTON	500051	NC50 & NC242	I-95	GOOD	80.4	46	FO
JOHNSTON	500053	SR1166	I-95	FAIR	64.2	9	FO
JOHNSTON	500062	SR1162	I-95	FAIR	83.8	11	FO
JOHNSTON	500066	US70 BUS	I-95	FAIR	67	5	FO
JOHNSTON	500067	US701	I-95	FAIR	66.7	15	SD
JOHNSTON	500076	SR1178	I-95	GOOD	100	48	NONE

Table C-3: Bridges Over I-95

COUNTY	NUMBER	ROUTE	ACROSS	GENERAL CONDITION RATING	SUFFICIENCY RATING	ESTIMATED REMAINING LIFE	DEFICIENCIES
JOHNSTON	500105	SR1007	I-95	FAIR	58.9	10	SD
JOHNSTON	500108	SR1001	I-95	FAIR	87.5	8	FO
JOHNSTON	500109	SR2137	I-95	FAIR	22.5	10	FO
JOHNSTON	500110	SR2130	I-95	FAIR	54.9	10	FO
JOHNSTON	500111	SR2141	I-95	FAIR	51.5	10	FO
JOHNSTON	500112	SR2339	I-95	FAIR	59.9	11	FO
JOHNSTON	500117	SR2399	I-95	FAIR	61.9	11	FO
JOHNSTON	500121	NC222	I-95	FAIR	91.8	29	NONE
JOHNSTON	500487	I-40 WBL RAMP	I-95	FAIR	100	41	NONE
JOHNSTON	500488	I-40 EBL	I-95	FAIR	83	43	NONE
JOHNSTON	500489	I-40 WBL	I-95	FAIR	96	41	NONE
JOHNSTON	500523	US70 BYP WB	I-95 & SR2398	GOOD	94	50	FO
JOHNSTON	500524	US70 BYP EB	I-95 & SR2398	GOOD	94.4	45	NONE
WILSON	970012	US264A	I-95	FAIR	98	18	NONE
WILSON	970015	NC581	I-95	FAIR	96	30	NONE
WILSON	970032	SR1118	I-95	FAIR	94.8	32	NONE
WILSON	970039	SR1116	I-95	FAIR	95.6	30	NONE
WILSON	970041	NC42	I-95	FAIR	99	30	NONE
WILSON	970084	SR1154	I-95	FAIR	95.6	28	NONE
WILSON	970085	SR1136	I-95	FAIR	99.8	49	FO
WILSON	970090	SR1001	I-95	FAIR	93.3	31	NONE
WILSON	970110	SR1309	I-95	FAIR	96.7	28	NONE
WILSON	970111	SR1313	I-95	FAIR	97.7	26	NONE
WILSON	970268	US117 EBL	I-95	FAIR	78.7	49	NONE
WILSON	970269	US117 WBL	I-95	GOOD	85	51	FO
NASH	630041	NC33	I-95	FAIR	82.2	20	FO
NASH	630050	NC97	I-95	GOOD	99	26	NONE
NASH	630054	NC58	I-95	FAIR	98.7	26	NONE
NASH	630098	NC48	I-95	---	86.7	---	NONE
NASH	630105	SR1745	I-95	FAIR	99.7	26	NONE
NASH	630121	NC43	I-95	FAIR	99	23	NONE
NASH	630162	US64 EBL	I-95	FAIR	95	23	NONE
NASH	630163	US64 WBL	I-95	FAIR	95	23	NONE
NASH	630164	SR1717	I-95	FAIR	89	26	NONE

Table C-3: Bridges Over I-95

COUNTY	NUMBER	ROUTE	ACROSS	GENERAL CONDITION RATING	SUFFICIENCY RATING	ESTIMATED REMAINING LIFE	DEFICIENCIES
NASH	630170	SR1703	I-95	FAIR	99.7	26	NONE
NASH	630177	SR1603	I-95	FAIR	95.3	26	NONE
NASH	630183	SR1700	I-95	GOOD	97.2	26	NONE
NASH	630200	SR1770	I-95	GOOD	95.5	28	NONE
NASH	630203	SR1522	I-95	---	66.8	---	SD
NASH	630218	SR1604	I-95	GOOD	98.5	23	NONE
NASH	630219	SR1544	I-95	FAIR	96.3	23	NONE
NASH	630220	SR1524	I-95	FAIR	99.6	23	NONE
NASH	630221	SR1544	I-95	FAIR	60.2	15	SD
NASH	630224	SR1510	I-95	FAIR	57.2	15	FO
NASH	630225	SR1515	I-95	FAIR	80.9	20	NONE
HALIFAX	410028	NC125	I-95	GOOD	88.8	41	NONE
HALIFAX	410049	NC481	I-95	FAIR	84.2	10	SD
HALIFAX	410055	SR1226	I-95	FAIR	74.9	16	FO
HALIFAX	410064	NC561	I-95	FAIR	77	12	NONE
HALIFAX	410067	SR1002	I-95	FAIR	83.4	20	NONE
HALIFAX	410079	SR1211	I-95	FAIR	85.4	16	NONE
HALIFAX	410088	SR1210	I-95	FAIR	88.8	10	SD
HALIFAX	410091	SR1615	I-95	FAIR	83.7	12	NONE
HALIFAX	410095	SR1001	I-95	FAIR	83.7	10	NONE
HALIFAX	410100	SR1612	I-95	FAIR	73.7	10	FO
HALIFAX	410105	SR1600	I-95	FAIR	83.8	11	NONE
HALIFAX	410107	NC903	I-95	FAIR	77	9	NONE
NORTHAMPTON	650041	NC46	I-95	FAIR	68	13	FO
NORTHAMPTON	650043	NC48	I-95	FAIR	67	17	FO
NORTHAMPTON	650055	SR1202	I-95	FAIR	73.6	17	NONE
NORTHAMPTON	650070	SR1201	I-95	POOR	82.7	15	FO

FO = Functionally obsolete; SD = Structurally deficient
Source: NCDOT Bridge Inspection Reports

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Appendix D
Traffic Conditions Assessment Methodology

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Appendix D
Traffic Conditions Assessment Methodology

The following traffic and roadway characteristics were used in the analysis the I-95 mainline based on information from the NCLOS software (Version 2.1), the Highway Capacity Manual (HCM) 2000, field observations, and NCDOT data:

- Terrain Type = Level (field observed)
- Base Free Flow Speed (BFFS) = 75 MPH for rural areas; 70 MPH for urban areas (HCM Exhibit 13-5)
- Lane Width = 12 ft. (field observed; default value from NCLOS software for a freeway located in the Coastal region of NC; HCM Exhibit 13-5 default value)
- Shoulder Width = 6 ft. (default value from NCLOS software for a freeway located in the Coastal region of NC; HCM Page 13-11 default value)
- Driver Population Factor = 1.0 (default value from NCLOS software for a freeway located in the Coastal region of NC; HCM Exhibit 13-5 default value)
- Design Hourly Volume (DHV) or K-30 Factor = 13% (based on average of the ATR counts between Exits 58 and 61 [12.4%] and between Exits 145 and 150 [13.8%])
- Percent RVs = 0% (default value from NCLOS software for a freeway located in the Coastal region of NC)
- Number of Lanes = 4 lanes except from SR 1793 (Pope Road) (Exit 72) to US 421 (Cumberland Street) (Exit 73) and from NC Highway 50 (Exit 79) to I-40 (Exit 81), which are 6 lane sections with 2 continuous lanes and an auxiliary lane in each direction (field observed).

For the analysis, I-95 was divided into segments containing similar traffic and roadway characteristics for such characteristics that vary along the corridor and sufficient data was available. **Table D-1** shows the segment grouping along with the traffic and roadway characteristics used in analysis of the I-95 mainline.

Using the AADT for each segment and the proposed roadway and traffic characteristics described above, a Level of Service (LOS) analysis was performed following the methodologies found in the HCM 2000. To determine the basic freeway segment LOS, the maximum service flow rate thresholds found in Exhibit 23-2: LOS Criteria for Basic Freeway Segments of the HCM 2000 were used. Straight line interpolation was used to determine the maximum service flow rate thresholds for Free Flow Speeds (FFS) between the values shown in HCM Exhibit 23-2.

The traffic operations analysis of the alternative route and interchange crossroads was performed using the NCLOS software (Version 2.1). The NCLOS software requires roadways to be classified for area type and as a principal arterial, minor arterial, 2-lane highway, multi-lane highway or freeway. Roadways were classified using the NCDOT Functional Classification System, aerial photography and engineering judgment. Additionally, in order for a segment to be classified as an arterial the signal spacing had to be 2 miles or less (HCM Page 12-1). The

NCLOS default traffic and roadway factors, shown below in **Table D-2**, were used in the analysis.

Table D-1: I-95 Operational Analysis Traffic and Roadway Characteristics Used in Analysis

Segment	Area Type[1]	D-Factor (%)[2]	Peak Hour Factor (PHF)[2,3]	Truck/Bus %[2]	Interchanges Per Mile[4]
South Carolina State Line to NC 72 (Exit 17)	Rural	55%	0.95	22%	0.50
NC 72 (Exit 17) to US 301 (Fayetteville Rd.) (Exit 22)	Urban (Lumberton)	55%	0.96	19%	0.75
US 301 (Fayetteville Rd.) (Exit 22) to I-95 Business (Exit 40)	Rural	55%	0.94	18%	0.33
I-95 Business (Exit 40) to I-95 Business (Exit 56)	Rural	55%	0.95	19%	0.50
I-95 Business (Exit 56) to I-40 (Exit 81)	Rural	55%	0.93	18%	0.75
I-40 (Exit 81) to US 301 (Exit 107)	Rural	55%	0.96	17%	0.75
US 301 (Exit 107) to SR 1717 (Sandy Cross Rd.) (Exit 132)	Rural	60%	0.93	14%	0.50
SR 1717 (Sandy Cross Rd.) (Exit 132) to NC 43 (Exit 141)	Urban (Rocky Mount)	55%	0.92	23%	0.33
NC 43 (Exit 141) to NC 125 (Exit 171)	Rural	55%	0.92	21%	0.50
NC 125 (Exit 171) to NC 46 (Exit 176)	Urban (Roanoke Rapids)	60%	0.95	12%	0.50
NC 46 (Exit 176) to Virginia State Line	Rural	55%	0.95	16%	0.50

[1] Source: NCDOT Functional Classification Maps
[2] Source: I-95 Manual Classification Counts provided by NCDOT
[3] A PHF of 0.90 was used for the No-Build conditions traffic analysis based on the NCDOT Congestion Management Capacity Analysis Guidelines.
[4] Source: Aerial photography

The existing conditions I-95 ramp merge and diverge locations were not analyzed. However, ramp service volumes were a criterion in the interchange identification included as part of the *Interchange Form Analysis Technical Memorandum* (March 9, 2010).

Table D-2: NCLOS Default Traffic and Roadway Factors

Roadway / Traffic Factor	Rural Freeway	Suburban Freeway	Urban Freeway	Rural 2-Lane Highway	Rural Multi-Lane Highway	Suburban Minor Arterial	Intermediate Principal Arterial
Region	Coastal	Coastal	Coastal	Coastal	Coastal	Coastal	Coastal
Terrain Type	Level	Level	Level	Level	Level	Level	Level
PHF[1]	0.95	0.95	0.95	0.95	0.95	0.90	0.92
Driver Pop. Factor	1.0	1.0	1.0	-	1.0	-	-
K-Factor (%)	15	12	10	15	15	12	12
D-Factor (%)	60	60	55	60	60	60	55
Truck/Bus %	10	10	10	10	10	-	-
RV %	0	0	0	0	0	-	-
Street Class[2]	-	-	-	I	-	II	II
No Passing Zone %	-	-	-	20	-	-	-
Arrival Type	-	-	-	-	-	3	4
Left-Turn %	-	-	-	-	-	8	12
Lane Width	12	12	12	12	12	-	-
Shoulder Width	6	6	6	6	-	-	-
Interchanges Per Mile	0.25	0.5	0.5	-	-	-	-
Base Free Flow Speed	-	-	-	60	-	-	-
Access Points/Mile	-	-	-	10	10	-	-
Median Type	-	-	-	-	Divided	-	-
Lateral Clearance	-	-	-	-	12	-	-
Cycle Length	-	-	-	-	-	120	120 [3]
g/C Ratio	-	-	-	-	-	0.55	0.50
Free Flow Speed	-	-	-	-	-	40	40
Segment Length	-	-	-	-	-	2	2
Signals Per Mile	-	-	-	-	-	3	4

[1] A PHF of 0.90 was used for the No-Build conditions traffic analysis based on the NCDOT Congestion Management Capacity Analysis Guidelines.
[2]Street Class is defined by roman numerals I and II for 2-lane highways; and I to IV for arterials.
[3] Default cycle lengths of 150 seconds were changed to 120 seconds. Typically a shorter cycle length is used for ramp terminal intersections and intersections with a fewer number of phases.
Source: NCLOS software (Version 2.1)

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