Chapter 2
Financing and Phasing

In this section, potential funding sources available to implement the preferred design concept and scope for the I-95 improvements are evaluated. A preliminary phasing and finance plan is proposed that uses tolling as the main source of funding for all reconstruction, expansion and ongoing life cycle costs, with little or no funding from non-toll sources.

2.1 COST ESTIMATES FOR THE PREFERRED DESIGN CONCEPT AND SCOPE

The preferred design concept and scope described in **Appendix B** would adequately accommodate anticipated 2040 traffic volumes, and includes widening and reconstruction of the pavement throughout the corridor, reconstruction of the majority of the bridges, and interchange and safety improvements to bring the corridor up to desired standards. The capital cost of these improvements including the preliminary engineering, right of way, construction, toll equipment and construction engineering is estimated to be approximately $4.4 billion. The detailed capital cost estimate is documented in **Appendix C**.

In addition, operations and maintenance costs for the facility for a 40-year bond term would be approximately $4.8 billion, and renewal and replacement (capital maintenance) costs would total between $1.1 and $2.8 billion as documented in **Appendix C**, resulting in total costs to construct the proposed project as a toll facility and operate/maintain it over a 40-year period of approximately $10.3-$12.0 billion.

2.2 CURRENTLY AVAILABLE FUNDING FOR I-95 IMPROVEMENTS

2.2.1 Funding Overview

In order to address the transportation needs of the state, the NCDOT had an annual operating budget in Fiscal Year (FY) 2011 of approximately $4.46 billion. This money comes from three primary sources: the Highway Fund, the Highway Trust Fund, and federal funds, and addresses highway construction and maintenance, multimodal programs, transfers to the state's general fund and other non-transportation programs, and administrative programs. As is shown below, about 75 percent of the budget is available for highway programs.

Revenue for the Highway Fund comes from a variety of sources, including the state motor fuels 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.

Revenue for the Highway Trust Fund comes from taxes on motor fuel, alternative fuel, and vehicle use, as well as title fees, and interest and income from the fund. The Highway Trust Fund was created by state statute in 1989 and provides funding to complete a 3,600-mile intrastate system that will expand specific highways to four lanes and build 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 Program and provides extra money for the state's cities and towns to adequately maintain their streets.

Additional funds come from federal highway allocations, NC's General Fund, and other federal funds that go towards transit, rail, and airports.

Project needs far exceed available funding. In 2009, while developing its 10-year Program and Resource Plan, which is contained within the NCDOT document *From Policies to Projects* (NCDOT, July 2011), NCDOT identified state highway capital needs for the 2015-2020 time period of more than $45 billion. Over the same period, NCDOT's projected budget for these programs is approximately $8 billion.

The NCDOT is in the process of updating the Statewide Transportation Plan, with an expected completion in Spring 2012. In the previous plan, 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 across all modes of transportation in North Carolina over the next 25 years. This is the amount available to address nearly $85 billion (constant 2001 dollars) in multi-modal transportation needs, leaving a $30 billion funding shortfall. Adjusting the $85 billion in needs (in 2001 dollars) to 2011 dollars using the North Carolina Composite Index Inflation Factors (NCDOT, 2011) yields a present-day equivalent cost of $142 billion. The needs analysis of the plan identified, in constant 2001 dollars, $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.

2.2.2 Project Funding in North Carolina

NCDOT's current highway construction program is defined by the 2011-2020 Program and Resource Plan Project List, contained within the NCDOT document *From Policies to Projects* (NCDOT, July 2011). A subset of this project list, fiscal years 2012-2018, comprises the current State Transportation Improvement Program (STIP). The 5-year work program within this document identifies the Department's proposed spending for 2012-2016 in the amount of approximately $24 billion. The spending in FY 2011 of $4.46 billion is shown in **Table 2-1**. The two largest appropriations in the budget are for Construction and Engineering and Highway Maintenance, using over 80 percent of the total budget.

Table 2-1: Use of NCDOT Appropriations Statewide

Budget Item	FY 2011 Budget [2011$ in millions]	Percent of Total Appropriations
Construction and Engineering	$2,520	62%
Highway Maintenance	$1,132	28%
Operations	$178	4%
Administration	$260	6%
Total Program	$4,090	100%
Transfers	$375	-
Total Budget	$4,465	-

Source: *From Policies to Projects* (NCDOT, July 2011)

2.2.3 Current I-95 Corridor Project Funding

As noted in **Section 2.1**, NCDOT has $4.4 billion (2011 dollars) in capital needs on the I-95 corridor over the next 40 years. To begin addressing those needs on I-95, NCDOT has programmed through its 2011-2020 Program and Resource Plan Project List, contained within the NCDOT document *From Policies to Projects* (NCDOT, July 2011), projects at a cost of approximately $455 million. As shown in **Table 2-2**, approximately $69.5 million of this amount has already been spent on projects in FY 2011. Another $123.4 million is currently programmed for expenditure within the current 5-year work program from FY 2012-2016. The NCDOT has no policy or programming commitment to fund needed I-95 improvements beyond projects identified as funded in the Project List, which are only a portion of the total improvements needed along I-95 and include no highway widening.

Table 2-2: NCDOT Funding for I-95 Projects FY 2011 – FY 2020

Funding Year	Funding Amount [2011$ in millions]	Program Funding Amount [2011$ in millions]
FY 2011	$69.5	$69.5 (already spent)
FY 2012	$31.7	5-Year Work Program Total $123.4 (programmed funding)
FY 2013	$13.3	
FY 2014	$10.7	
FY 2015	$22.2	
FY 2016	$45.5	
FY 2017	$11.7	Developmental Program Total $261.8 (anticipated funding)
FY 2018	$78.6	
FY 2019	$94.8	
FY 2020	$76.7	
Total Funded STIP Projects	$454.7	$454.7

Source: I-95 Improvements within the STIP (Appendix C)

2.2.4 Conclusions Regarding STIP and Toll Funding Sufficiency

The $455 million dollars currently programmed through 2020 represents just 10% of the $4.4 billion in capital funds needed to implement the proposed I-95 improvements. In contrast, a feasible tolling program presented in **Section 2.5** would enable construction of the proposed I-95 capital improvements by 2040. As presented in **Section 2.5**, Phase 1 would include the reconstruction of the I-95 corridor with the necessary improvements to meet the 2040 non-tolled capacity requirements from NC 211 at MM 20 to I-40 at MM 81, and could be completed by 2020 at a cost of $1.8 billion (2011 dollars). Phase 2 would include the reconstruction of the remainder of the I-95 corridor and could be completed by 2040, at a cost of $2.6 billion (2011 dollars).

2.3 EVALUATION OF POTENTIAL OPTIONS FOR FUNDING THE PROPOSED PROJECT

Evaluation of Alternative Funding Strategies. As has been described previously in this document, I-95 is a critical highway corridor not only for North Carolina, but also for the eastern seaboard of the US. State and regional economies depend on the safe and efficient flow of people and goods within the NC

portion of the longer corridor. Recognizing the importance of the corridor but also facing a demonstrated and severe funding shortfall to maintain and improve this critically important highway through its traditional (STIP) funding program, NCDOT is using this document to evaluate and recommend alternative, sustainable funding options. Adding to that urgency is the fact that key elements of the infrastructure, particularly aging bridges and pavement, exacerbate the need for an infusion of funds sooner rather than later.

In this section, alternative funding strategies are identified and evaluated for feasibility. To evaluate funding options, the following objectives have been considered:

- Ability of the financing option to generate sufficient funds to make needed corridor capital improvements and fund ongoing maintenance and infrastructure preservation consistent with the preferred design concept and scope
- Preservation of anticipated state and federal funding for other critical highway corridor improvements and transportation programs

The following five funding alternatives were identified and evaluated. A summary of the performance of each alternative at meeting the objectives listed above is presented in **Table 2-3**.

1. Continued project programming through the STIP (status quo) – this funding option would continue traditional funding through the STIP
2. Increased appropriation of current state funds to I-95 – this option would require the transfer of large portions of existing NCDOT funding away from other programs to the I-95 corridor
3. Special federal funding – this option would rely on successfully obtaining special federal appropriations
4. Increased local funding – this option would require local governments to fund portions of the improvement program from either existing revenue streams (e.g., property tax) or from special assessments or new sales taxes.
5. Imposition of user fees (tolling) – this option would impose direct fees to users of the corridor, most likely through the collection of tolls.

Table 2-3: Evaluation of Funding Alternatives

Funding Alternative	Ability To Generate Sufficient Funding?	Preservation of Funding for Other Programs	Other Comments
Continued project programming through the STIP at the current funding rate	No – As demonstrated in Section 2.2.4, this alternative would not provide sufficient funds to finance needed capital and maintenance requirements is a timely manner	Yes – Continued programming through the STIP at the current rate would not affect funding for other programs	None
Increased appropriation of current state funds to I-95	No – As described in Section 2.2.1, NCDOT faces a large transportation funding gap during the study design period, leading to the conclusion in the current adopted statewide plan that many critical programs and corridors cannot be fully funded. It is not feasible to expect that sufficient fund transfers could be made without severe adverse impact on other critical programs.	No – Would severely hamper ability to address other critical non-I-95 needs	Statutory transportation funding equity requirements severely restrict NCDOT's ability to transfer funds between Divisions and budgetary programs.
Special federal funding	No – Recent trends in federal budgetary processes and in current Transportation Authorization deliberations have diminished states' ability to program major capital improvements through earmarks or other special appropriations.	No – in current budgetary environment, there is strong likelihood that a major federal earmark would diminish the potential for targeted funding of other projects	None
Increased local funding through local tax programs	No – NCDOT has been advised during public outreach activities that local tax capacity (sales tax, special use, etc.) is not sufficient to generate a significant portion of needed funds or likely to be passed by all the local governments along the corridor	No – Would impose substantial drain on ability of local governments to fund other needed programs	Funding of Interstate highways is a state/national responsibility, not a local responsibility
Imposition of user fees (tolling)	Yes – Financial analysis documented in Section 2.6 indicates strong likelihood of ability to generate needed funds	No – Would not impact funding of other programs	None

A combination of just the non-user fee funding alternatives listed in **Table 2-3**also was considered. The ability to redirect existing statewide funding sources to I-95 is limited given the other critical needs across the state and statutory transportation funding equity requirements. Special federal funding also would be expected to be limited (current federal aid funding for transportation in North Carolina is just over $1 billion) and likely would occur as one-time allocations. Therefore, a combination of increased appropriation of existing state funding sources and special federal funding would not be able to provide sufficient funds to construct/operate/maintain the proposed I-95 improvements. Local funding for a project of statewide/national importance is not equitable; however, if local jurisdictions choose to implement a tax, it could be used to accelerate segments within their county or to add additional aesthetic features or other elements that would not normally be funded from state or federal sources.

Recommended Funding Strategy. Based on the evaluation of funding strategies, it can be concluded that only the utilization of a user-fee revenue generation program for all or the majority of the financing for I-95 improvements will allow ongoing programming of needed improvements in this critical highway corridor. The backlog of needed transportation improvements across the state precludes NCDOT's ability to program a greater portion of the STIP to I-95. Additionally, there is little likelihood of sufficient special federal appropriations earmarked for I-95 and local funding is neither equitable nor able to generate sufficient funds.

Based on these conclusions, the remainder of this chapter will examine the ability of a user fee financing program to fund the proposed I-95 improvements, based on imposition of tolls and initiation of a combination of debt-financing and pay-as-you-go financing.

2.4 A PLAN FOR FINANCING THE I-95 IMPROVEMENT PROGRAM BY IMPLEMENTING TOLLS ON THE FACILITY

This section discusses the following elements of a tolling plan for I-95:

- Collection methods, rates, accounts and customer service
- Collection concepts
- Roadside Infrastructure
- Toll Interoperability

2.4.1 Collection Methods, Rates, Accounts, Customer Service

It is assumed that toll collection on I-95 will be operated as a subset of the overall North Carolina Turnpike Authority toll system. Tolls would be collected using an All Electronic Tolling (AET) system, with overhead toll gantries located within toll zones throughout the 182-mile corridor. AET allows tolls to be collected at normal highway speeds through a series of tolled gantries placed over the roadway, without requiring travelers to slow down or stop to pay a toll.

All drivers would be welcome to use the I-95 toll facility. Customers would have the option to pay their tolls via an electronic toll collection (ETC) method which utilizes a pre-paid transponder-based account or through video tolling.

It is assumed that toll accounts and transponders from North Carolina's transponder program, NC Quick Pass, would be accepted. In addition, other transponder programs that are interoperable with NC Quick Pass, expected to include EZ-Pass and SunPass, would also be accepted.

Customers using I-95 that do not have a transponder would be detected at the toll zones and an image of their license plates would be captured. These customers could pay their tolls through the 'Bill by Mail' process that would mail an invoice for the toll amount to the address of the vehicle owner. Toll rates for 'Bill by Mail' customers would be higher than the transponder based rate due to the increased processing costs.

Three vehicle toll classes would be set: two-axle vehicles, three-axle vehicles and four or more axle vehicles. Toll rates would be generally set at the mainline toll zones based on their interval distance and the nominal rate / mile.

This analysis assumes that the North Carolina Turnpike Authority would operate a staffed Customer Service Center (CSC) storefront at one rest area in each direction of I-95 (possibly at Welcome Centers), and unattended kiosks at the six other rest areas. Drivers would be able to gain information, open and replenish NC Quick Pass toll accounts and pay Bill by Mail invoices at these locations. There may be one additional store-front in the Fayetteville area at a commercial or retail location, and retail outlets such as convenience stores or pharmacies may be used under contract to support customer account management. In addition, NC Quick Pass replenishments and Bill by Mail invoice payments could be made online and through the mail,

2.4.2 Collection Concepts

Toll zones can be sited in a wide variety of schemes to approximate the nominal per-mile charge. Traditionally, there are two tolling schemes: entry-exit systems and barrier systems. Schematics of these systems are presented in **Figure 2-1** and described below

Entry-Exit Systems. An entry-exit system detects vehicles at every entrance and exit to calculate the trip length and thus the toll due (traditionally known as a "ticket system" because of paper tickets handed out on older toll facilities). Entry-exit ticket systems with cash collection are prohibitively expensive to build and operate, and have not been built in the United States since the 1960s. AET entry-exit systems require the matching of two discrete transaction messages to create one toll, and thus are much more complex to implement than an AET barrier system. Toll gantries and tolling infrastructure would be required on each ramp at each interchange on the facility. AET entry-exit systems are avoided by most AET toll operators because of higher capital and operating costs and the potential for 'orphan' transactions which increase leakage.

Barrier Systems. In a barrier system, each barrier charges the rate due for a specific segment of the toll facility. For example, a 20-mile road with 2 barrier plazas would charge the nominal per-mile rate times 10 miles at each location (assuming mainline toll zones were approximately equidistant).

If there are multiple interchanges in between these barrier plazas, there are typically some "ramp" plazas located away from the mainline barrier plazas which capture traffic that might otherwise be allowed to use the facility toll free. North Carolina's Triangle Expressway in suburban Raleigh employs this mix of mainline and ramp toll locations. If the barrier system is a cash barrier system, it requires construction of a large paved area, a toll plaza, and an administration building. The barriers are typically placed at the greatest intervals possible to reduce capital and operating costs. The economics of cash plaza facilities requires mainline spacing to be as far apart as possible. The trade-off is that tolls are not perfectly equitable with a barrier system, and the further apart the tolling points, the less equitable they are for short-distance drivers.

With AET, the economics shift: the capital costs still rise with more toll zones, but at a much lower absolute value than with cash collection facilities. Operating costs also increase with the number of toll zones and transactions, but are more greatly impacted by other factors which are reviewed in depth in this analysis later.

Systems Considered for the I-95 Project. Three separate AET tolling plans were considered for this study and are shown in **Figure 2-1**.

- The entry-exit system was considered. The capital and operating costs of this type of facility were evaluated as a part of this study and found to be prohibitive. Thus, an entry-exit system is not considered to be a viable toll collection method.
- The barrier system with mainline toll zones only was also considered. This concept allows numerous short length trips to enter and exit the system without paying a toll. It could also encourage toll diversion whereby traffic can exit the facility immediately before a mainline toll zone and use local streets to divert around the toll locations.
- A second barrier system that includes mainline toll zones and ramp toll zones at adjacent interchanges was also considered. This concept would reduce the number of untolled movements, but would also reduce the toll diversion, thereby reducing impact on local road networks. This concept was chosen for further evaluation. The details of this plan are explained further in this document.

2.4.3 Roadside Infrastructure

Each toll zone is assumed to have a small climate controlled toll vault (about 150 square feet) alongside it that provides connection to the roadside toll collection equipment, a fiber optic network and power supply. Each toll zone would also include a backup generator and an uninterrupted power supply system to provide power in the event of a raw interruption. Mainline and ramp toll zone equipment would be identical except for the size of the gantry structure and the amount of lane equipment.

Roadside technology (computers, cameras, transponder readers and vehicle detectors) may be provided by the North Carolina Turnpike Authority's current vendor or a new one selected under separate procurement. An illustration of typical toll zone equipment is depicted in **Figure 2-2**. Design and pricing structure are expected to follow the Triangle Expressway design. The cost estimate used in this analysis assumed 2 lanes of technology for each ramp toll zone and 5 lanes for the mainline toll zone (to include shoulders). This analysis assumes a dedicated fiber optic network which would run the length of the corridor and is included in the cost estimate.

This analysis includes a new roadside Toll Facility Host and Back Office Systems (BOS) computer equipment co-located with new attended Customer Service Center (CSC) storefronts. A fiber optic network connection to the North Carolina Turnpike CSC in Morrisville will be provided.

North Carolina will manage all account operations from its BOS / CSC in the Raleigh area, along with all other toll projects in the state. The only toll operations conducted specifically for I-95 are the on-site CSC storefronts described above and the incremental effort to process additional toll accounts, I-95 video images, and all the related account management and invoicing tasks.

2.4.4 Toll Interoperability

The proposed system is consistent with tolling approaches throughout the country. With a proposed schedule to begin opening the improved I-95 facility as a tolled highway by 2019, regional and perhaps national toll interoperability is assumed, particularly given that the North Carolina Turnpike Authority

(NCTA), as a part of NCDOT, has been a leader in the Alliance for Toll Interoperability (ATI). The ATI includes 31 agencies in 20 states with a focus on state-to-state toll interoperability through technology enhancement and the ability to enact legislation for reciprocity agreements to pursue toll violators and establishing toll collection technology standards. A 3.5 mile segment of the Triangle Expressway will open in December 2011 in the Raleigh area as an AET system with dual protocol readers able to read both E-Z Pass (northeastern US) and SunPass (Florida) transponders. The NCTA is actively pursuing agreements with all tolling programs along the I-95 corridor for interoperability on the Triangle Expressway and other planned facilities. It is anticipated that multi-protocol readers will be deployed on I-95.

2.4.5 Recommended Tolling Approach

As previously discussed, three separate AET toll plans were considered. These are the Entry-Exit system, the barrier system with only mainline toll zones, and the barrier system with both mainline and select ramp toll zone locations. The Entry-Exit system was eliminated due to high initial capital costs and high ongoing operating costs. The barrier system with only mainline toll zones was eliminated due to the ease with which vehicles could divert around the mainline toll zones. This diversion not only reduces potential revenue, but also adds to the potential for additional traffic impacts on these roadways being used for diversion.

The recommended tolling plan, the barrier system with both mainline and select ramp toll zones, is shown in **Figure 2-3**. The tolled traffic, revenue, and diversion analyses included in this document have been based upon a barrier system with nine mainline toll zones spaced at approximately 20 mile intervals and ramp toll zones placed at the adjacent interchanges along I-95. The interchange north of each mainline toll zone location will have the ramps to and from the north tolled, and the interchange south of the mainline toll zone locations will have the ramps to and from the south tolled. This type of toll plan greatly reduces the potential for traffic to divert off of I-95 and use local roads to re-enter I-95 at a point beyond the mainline toll zone while still allowing short local trips between interchanges to use I-95 without paying a toll.

2.5 PHASING PLAN

The proposed I-95 improvement program would be implemented to finance the approximately $4.4 billion cost of the proposed capital improvements to the entire I-95 corridor in North Carolina. As previously described, current funding limitations prevent NCDOT from allocating the necessary financing to these improvements from traditional funding sources. Traditional funding methods would extend the length of construction to at least 60 years.

A preliminary phasing and finance plan is proposed that uses tolling as the main source of funding for all reconstruction, expansion and ongoing life cycle costs, with little or no funding from non-toll sources.

A comprehensive financial model to assist in identifying and evaluating alternative project financing strategies has been developed. Key inputs to the development of appropriate financing options will be the results of the traffic and revenue forecasts, construction and right of way costs, operations and maintenance costing efforts, definition of project construction schedules and recurring costs such as renewal and replacement. The financial model has been developed to test and evaluate various project financing variables such as:

- Traffic and revenue assumptions
- Anticipated toll rates and duration of toll collection
- Operating and maintenance strategies and costs
- Capital costs
- Implementation or phasing options
- Need for supplemental, non-toll revenue sources
- Project debt structures
- Identification and assessment of the Finance Plan risks and risk mitigation strategies
- Refinement of the Finance Plan outputs to facilitate evaluation of alternatives and selection of preferred strategy

Several alternative project phasing and implementation plans were developed to identify the strategy that best meets NCDOT's project goals. Initial plans tested determined that development of a set of projects that would reconstruct the entire corridor simultaneously was not feasible from a finance standpoint and would most likely not be implementable due to the very large volume of construction resources required to accomplish this effort.

Therefore, corridor needs were examined to determine appropriate sequencing and timing of improvements. The phasing and implementation plan presented in this document includes an initial project to meet immediate capacity and/or pavement and bridge reconstruction needs, followed by a series of subsequent projects, to bring the corridor to its ultimate configuration. It is intended that the initial project would be bond funded with corridor revenues sufficient to finance all or the majority of the project costs. The subsequent projects would then be funded using toll equity or excess toll revenues on a "pay as you go" basis.

2.5.1 Phasing Approach

The phasing plan for I-95 uses the traffic model as the primary tool to forecast tolled traffic and revenue upon the application of tolls to I-95. The traffic model allows sensitivity testing within the corridor to evaluate changes in the toll plan, toll rates, inflation factors, and the scheduling of improvements. This modeling process included the development of a 2040 model to forecast non-tolled traffic. It included the entire I-95 corridor, US 301, all roadways crossing I-95 and the major potential diversion routes. The annual growth within the I-95 corridor is typically within the range of 1-2 percent, with the highest growth in the Fayetteville area of approximately 3.5 percent per year.

An initial project was identified that would provide for the most critical capacity improvements within the entire I-95 corridor in North Carolina. This project area extends from south of the Fayetteville area, near mile marker (MM) 20 to I-40 at MM 81, a distance of 61 miles. This is the portion of the corridor with the highest level of existing traffic and the highest projected growth in traffic. The ability of this first project phase to generate toll revenue was tested at several different toll rates. Included in this series of tests were the impacts of tolling the remainder of the corridor at a lower toll rate to generate additional revenue to allow the least additional funding from other sources and the ability to fund the subsequent improvements when needed. The initial improvement project is denoted as Phase 1 and the subsequent

improvements to the remainder of the corridor are denoted as Phase 2. The limits of these project areas are shown in **Figure 2-4**.

2.5.1.1 Phase 1 (NC 211 at MM 20 to I-40 at MM 81)

Phase 1 would include the reconstruction of the I-95 corridor with the necessary improvements to meet the 2040 non-tolled capacity requirements, from NC 211 at MM 20 to I-40 at MM 81, a length of approximately 61 miles. This is the portion of the corridor with the highest level of existing traffic, the highest traffic growth rate and the most immediate need for widening to meet the desired level of service. Phase 2, the improvements to the remainder of the corridor, would be made through a series of smaller projects after the completion of Phase 1.

Assumptions regarding project delivery and project schedule were developed to facilitate project cost inflation to mid-year of construction as an input to the finance analysis. It was assumed that Phase 1 would be completed through a Design-Build project delivery process. It was also assumed that Phase 1 would be delivered using toll revenue bond funds as the primary funding source. For the purposes of schedule development, it was assumed for this analysis that the NCDOT would be responsible for completion of the NEPA process, acquisition of the required right of way and acquisition of the required environmental permits. The estimated costs for Phase 1 are presented in **Table 2-4**. Costs are presented in both 2011 dollars and mid-year of construction dollars based on the assumed project schedule. The costs included are only for Phase 1 and do not include any costs for activities under Phase 2. The proposed schedule assumed for the toll financing analysis is that the NEPA process begins in January 2012 and takes just under three years. In addition, it was assumed that procurement of the Design-Build team would begin in 2014 and financial close would occur in July 2015. Construction duration was estimated at 36 months and Phase 1 would be open to traffic in January 2019. It must be noted that a different schedule would affect inflation impacts and the final costs.

Table 2-4: Phase 1 (NC 211 at MM 20 to I-40 at MM 81) Capital Cost

Activity	Assumed Responsible Party	Present Day Cost (2011$M)	Inflated Cost ($M)
Project Engineering	NCDOT	$93	$97
Right of Way	NCDOT	$128	$141
Design Build Contract	Design Build Team	$1,352	$1,566
Construction Engineering & Inspection	NCDOT	$159	$184
Toll Equipment[1]	Design Build Team	$78	$88
Total	-	$1,809	$2,077

Source: Capital Cost Estimate (Appendix B)

Notes:
1. Toll equipment costs for the entire corridor are assumed in Phase 1.

2.5.1.2 Phase 2 (Remainder of Corridor)

Phase 2 would include the reconstruction of the remainder of the I-95 corridor. This would include the approximately 120 miles that was not reconstructed with Phase 1. This reconstruction would follow the completion of Phase 1 and would be accomplished through a series of projects that would address the capacity, safety and obsolescence needs of the corridor.

It is assumed that Phase 2 would be completed through a Design-Build project delivery process. It is also assumed that Phase 2 would be delivered using available toll equity from the project. A schedule would be developed to prioritize the needs and use the available toll equity funds to address these requirements. This effort would be completed with input from all stakeholders as a part of the final Finance Plan.

The 2011 cost estimate for Phase 2 is $2.63 billion and is presented in **Table 2-5**. A delivery schedule for Phase 2 is not yet known, so inflated costs are not provided as they are in **Table 2-4**.

Table 2-5: Phase 2 (Remainder of Corridor) Capital Cost

Activity	Assumed Responsible Party	Present Day Cost (2011$M)
Project Engineering	NCDOT	$141
Right of Way	NCDOT	$194
Design Build Contract	Design Build Team	$2,056
Construction Engineering & Inspection	NCDOT	$242
Toll Equipment[1]	Design Build Team	$0
Total	-	$2,633

Source: Capital Cost Estimate (Appendix B)

Notes:
1. Toll equipment costs for the entire corridor are assumed in Phase 1.

2.5.1.3 Toll Zone Locations and Toll Rates

The following description of toll zone locations and toll rates has been used for the initial tests. It is anticipated that additional testing will be required. The entire corridor would be tolled as shown in **Figure 2-3 and Figure 2-5**. The nine mainline toll zones would be placed at intervals of approximately 20 miles. The interchanges immediately north and south of each mainline toll zone would have two ramps tolled to minimize the diversion of traffic at these interchanges. The interchange north of the mainline toll zone would have the ramps with traffic to and from north tolled and the interchange south of the mainline toll zone would have the ramps to and from the south tolled.

The entire corridor would be tolled upon completion of Phase 1, with different per mile toll rates assumed for Phase 1 (NC 211 at MM 20 to I-40 at MM 81) and the remainder of the corridor. Several different toll rates were tested. Phase 1 was tested at 2009 rates of $0.10 and $0.15 per mile. These tests determined that the higher rate of $0.15 per mile does not appreciably divert traffic away from the corridor or away from the Phase 1 limits. Therefore, this rate was used for this analysis. The remainder of the corridor was tested at $0.05 per mile. These rates equate to $0.192 per mile within the Phase 1 limits and $0.064 per mile for the remainder of the corridor in 2019, which for this analysis was considered to be the first year of tolling. An annual index rate of 2.5 percent (equal to inflation) was assumed for this analysis. The mainline toll zones have been placed with a spacing of 20 miles. Therefore, each of the three mainline toll zones within Phase 1 would have a toll when opened to traffic in 2019 of 20 miles tolled at $0.192 per mile, or $3.84 per zone. The six mainline gantries in the remainder of the project would have a toll when opened to traffic in 2019 of 20 times $0.064, or $1.28 per zone. A passenger car travelling from border to border in 2019 would be tolled a total of $19.20 under this scenario. The ramp tolls at the adjacent interchanges would each charge one-half of the toll assessed at the associated mainline toll zone.

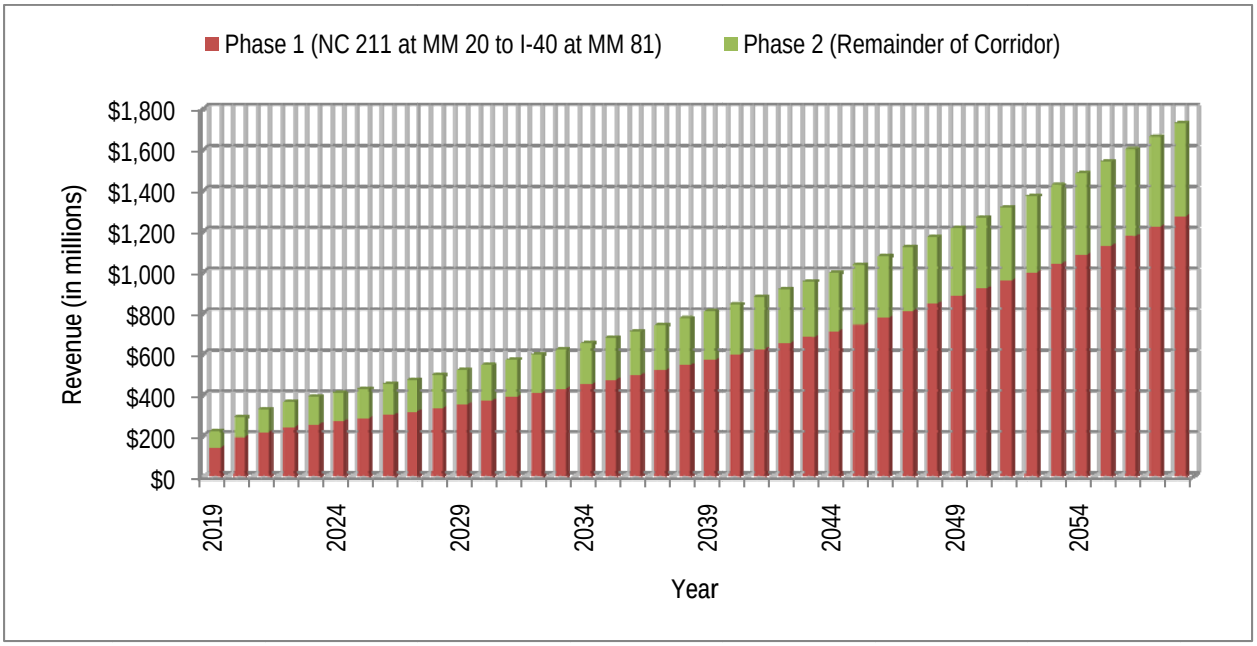
2.5.2 Revenue Projections

The traffic model was used to forecast the tolled traffic within the corridor. There were numerous important assumptions that were used in the modeling and revenue estimation processes. These include the following:

- A 40-year revenue schedule was developed to be consistent with the term of the revenue bonds
- Traffic forecasts were developed for 2020 and 2040 and straight line growth between and beyond these years was assumed
- All tolls would be collected electronically. A 'leakage' rate of 5 percent was assumed. Leakage is defined as revenue that is lost due to non-payment or inability to collect the revenue the facility would collect if all vehicles paid the proper toll. The approach used is consistent with the approach used for the Triangle Expressway
- There are separate 'ramp-up' periods for Phase 1 and Phase 2 due to the different toll rates. Ramp-up assumptions account for potential fluctuations in traffic volume and growth in the first several years due to tolling the facility
- Toll rates would adjust annually to match inflation, assumed to be 2.5 percent per year

Exhibit 2-1 presents the revenues which would be realized within the Phase 1 limits, the remainder of the corridor, and the total revenue during the 40-year term of the bonds using these assumptions. During that period, it is estimated that tolls would generate nearly $30 billion. During that same period, the project costs, which include reconstruction and ongoing life cycle costs, are approximately $10.3-$12.0 billion.

Exhibit 2-1: Revenue Projections



Source: Project Revenue Projections (Appendix B)

2.6 FINANCE PLAN

2.6.1 Phase 1 (NC 211 at MM 20 to I-40 at MM 81)

An initial preliminary Finance Plan has been developed for Phase 1 that investigates the use of bond funds to finance the Phase 1 improvements within a well-defined financing. The bonding analysis conducted as part of the finance plan development assumes project revenues would be used to fund as much of the Phase 1 costs as possible. Any additional surplus revenues that remain after the debt obligations and renewal and replacement for Phase 1 are covered can be used for Phase 2 projects. Details of the preliminary Finance Plan are contained in **Appendix B**. The Finance Plan would be updated in later project stages, as more details regarding the project become available.

The preliminary Finance Plan evaluated two cases, a 'Net Pledge' case and a 'Gross Pledge' case. The 'Gross Pledge' scenario assumes that Operations and Maintenance costs are pledged by an outside funding entity, in this case the NCDOT, and are taken out of the preliminary Finance Plan. The 'Net Pledge' case includes the Operations and Maintenance costs as a project cost to be paid by toll equity.

A bonding capacity analysis was performed for Phase 1. The major results of this analysis are summarized below:

- Net Pledge- Phase 1
    - The 'Net Pledge' case has a $180 million upfront funding gap. The requirement that Operations and Maintenance costs are to be paid from toll equity lowers the amount of toll revenue available to pay debt service.
    - The 'Net Pledge' case generates residual revenue (after debt service, operations and maintenance, and renewal and replacement) of approximately $14.1 billion over the 40-year term of the bonds. The net present value of this cash flow is $3.24 billion.
- Gross Pledge-Phase 1
    - The 'Gross Pledge' case has no upfront funding gap. With the Operations and Maintenance costs being guaranteed by another funding source, in this case the NCDOT, there is additional toll revenue available to pay debt service, thereby increasing the bond capacity. Phase 1 is self-sufficient under the 'Gross Pledge' case.
    - The 'Gross Pledge' case generates residual revenue (after debt service and renewal and replacement) of approximately $16.4 billion over the 40-year term of the bonds. The net present value of this cash flow is $3.30 billion.

2.6.2 Phase 2 (Remainder of Corridor)

Phase 2 includes all the improvements to the remainder of the I-95 corridor. The present day cost estimate for the Phase 2 improvements is approximately $2.63 billion. This is within the range of the net present value of both the 'Gross Pledge' and the 'Net Pledge' presented above for Phase 1. A series of Phase 2 projects would be developed as a part of the final Finance Plan for this project. This will be developed with input from stakeholders and will address the capacity, safety and obsolescence needs of the corridor.

2.7 SUMMARY

A cost estimate was developed for the refined preferred design concept and scope which would include widening and reconstruction of the pavement throughout the corridor, reconstruction of the majority of the bridge structures, and interchange and safety improvements to bring the corridor up to desired standards. Total costs to construct the proposed project as a toll facility and operate/maintain it over a 40-year period would be approximately $10.3-$12.0 billion. As a non-toll facility, the project would cost less, as there would be no toll gantries or other toll-related equipment or toll-related costs, but these costs are minor compared to the other capital and maintenance costs.

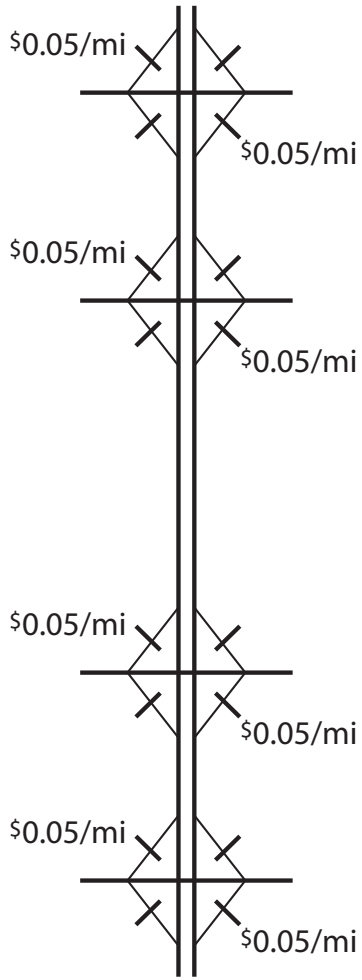
Since it is not possible to fund all the needs along the I-95 corridor with traditional funding sources, it is NCDOT's long term goal to fund all reconstruction, expansion and ongoing life cycle costs of the project using alternative funding strategies. The most feasible funding strategy was determined to be a combination of 1) toll revenue debt and 2) toll equity, with little or no funding from non-toll sources. A tolling analysis was performed to determine financial feasibility of tolling to achieve these goals, and to develop a proposed tolling plan.

The proposed tolling plan is described in **Section 2.4**. Under this plan, tolls would be collected using an All Electronic Toll (AET) system. Three toll collection schemes were considered: entry-exit, barrier with mainline toll zones only, and barrier with mainline toll zones and adjacent interchange ramp tolls. A barrier system with mainline toll zones and adjacent interchange ramp tolls was identified as the most appropriate for this analysis. The tolled traffic, revenue and diversion analyses included in this document have been based upon a barrier system with mainline toll zones spaced at approximately 20-mile intervals and ramp toll zones placed at the adjacent interchanges along I-95. This type of toll plan greatly reduces the potential for traffic to divert off of I-95 and use local roads to re-enter I-95 at a point beyond the mainline toll zone. Roadside infrastructure and interoperability were also discussed. It was assumed that both would be in accordance with existing North Carolina Turnpike Authority practices.

The construction of the preferred design concept and scope was divided into two phases for the financial analysis. An initial phase was identified that would provide for the capacity improvements that are the most critical within the entire I-95 corridor in North Carolina. This Phase 1 extends approximately 61 miles from south of the Fayetteville area, NC 211 at MM 20 to I-40 at MM 81. Phase 2 would include the reconstruction of the remainder of the I-95 corridor.

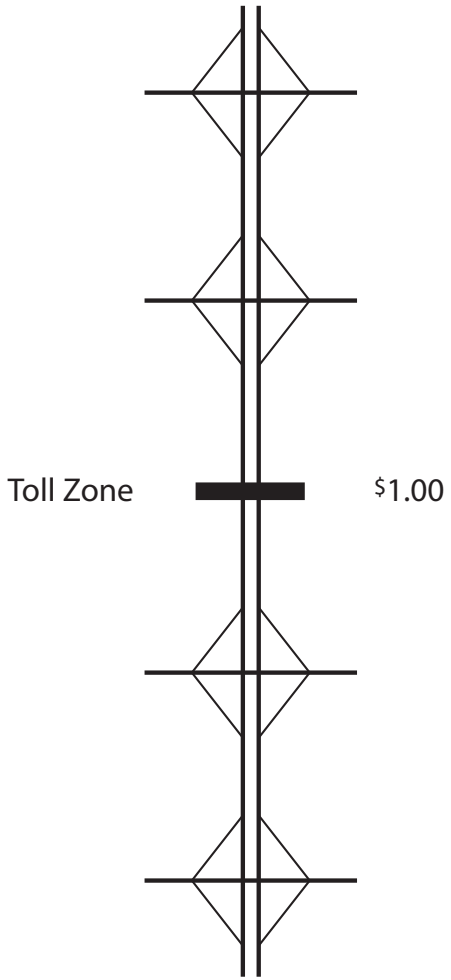
The entire corridor would be tolled upon completion of Phase 1, with different rates assumed for Phase 1 and Phase 2. Two bonding scenarios were evaluated for the preliminary finance plan. The 'Gross Pledge' scenario assumes that Operations and Maintenance costs are pledged by an outside funding entity, in this case the NCDOT, and are taken out of the preliminary Finance Plan. The 'Gross Pledge' case has no upfront funding gap and generates residual revenue with a present value of $3.30 billion. The 'Net Pledge' case includes the Operations and Maintenance costs as a project cost to be paid by toll equity. The 'Net Pledge' case has a $180 million upfront funding gap and generates residual revenue with a net present value of $3.24 billion. Both cases for Phase 1 would produce sufficient revenue to cover the estimated present day cost for the Phase 2 improvements of approximately $2.63 billion.

ENTRY-EXIT "TICKET" SYSTEM

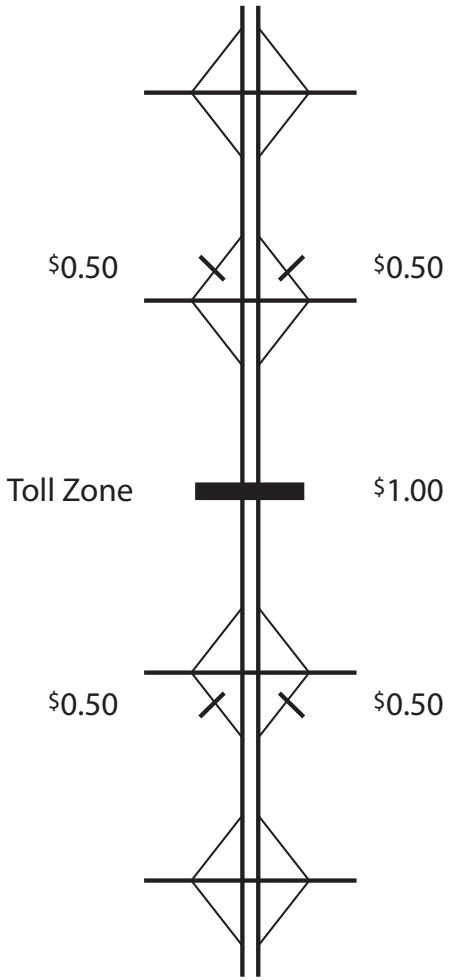


BARRIER SYSTEM

Mainline Toll Zones Only



Mainline Toll Zones w/Adjacent Ramp Tolling

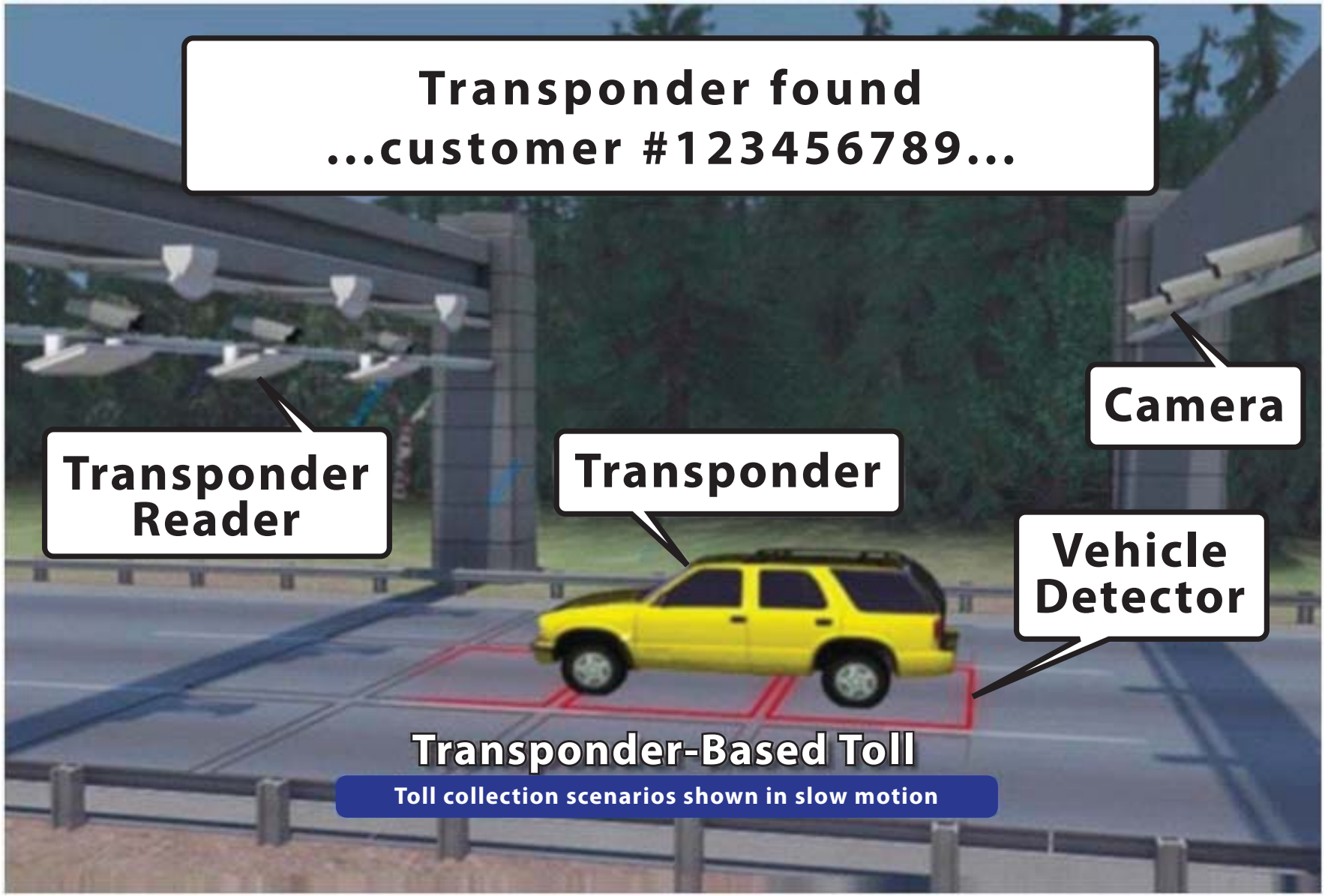


I95_EA_Fig4-1_ExampleTollSystems.ai AKB 12.06.11

I-95 PLANNING & FINANCE STUDY

EXAMPLE TOLL SYSTEMS

FIGURE 2-1



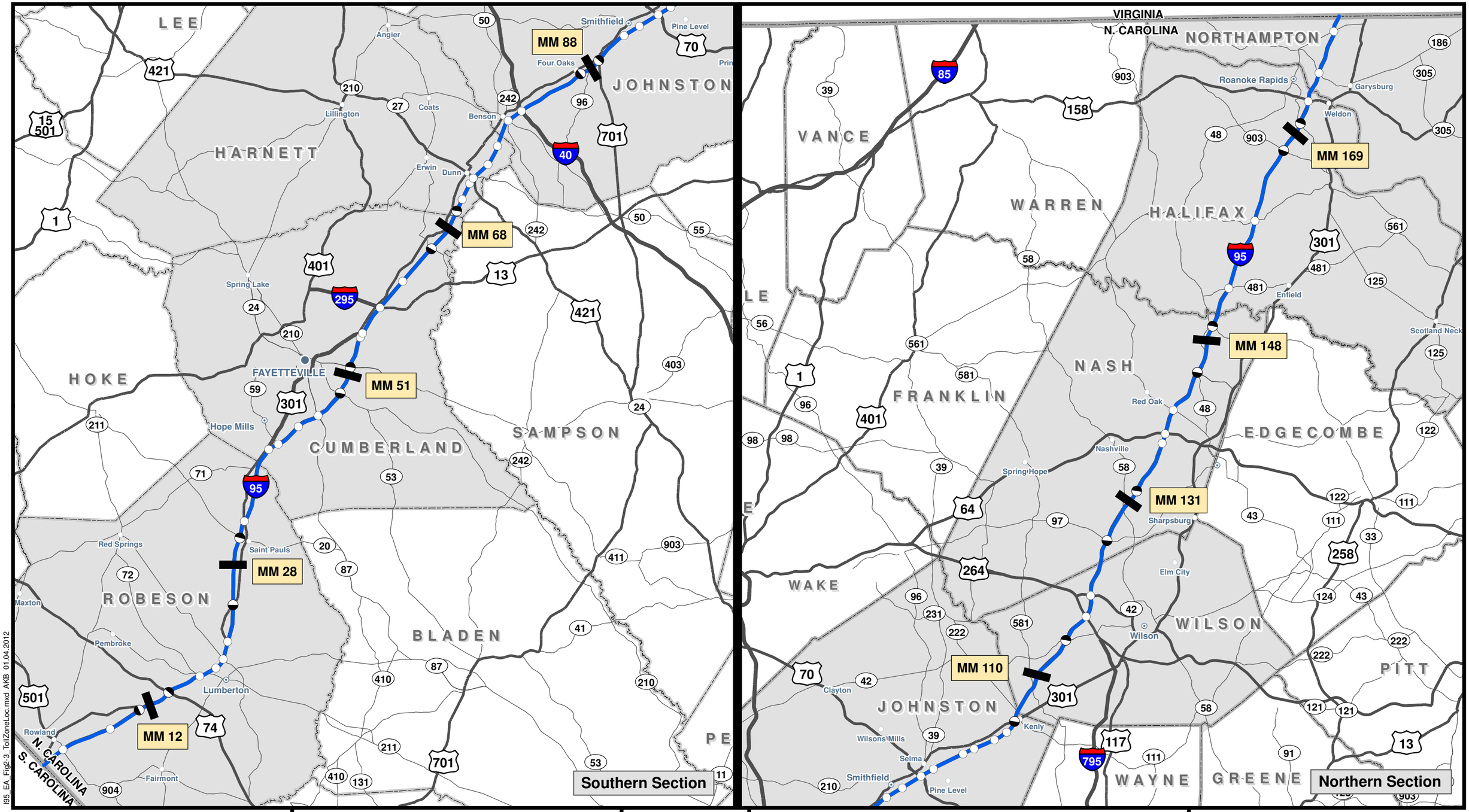
I95_EA_Fig4-2_AllElectronicTollZone.ai AKB 12.06.11

driving95 what's your view?

I-95 PLANNING & FINANCE STUDY

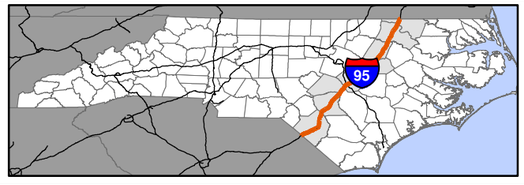
ALL-ELECTRONIC TOLL ZONE

FIGURE 2-2



I95_EA_Fig2-3_TollZoneLoc.mxd AKB 01.04.2012

I-95 PLANNING AND FINANCE STUDY



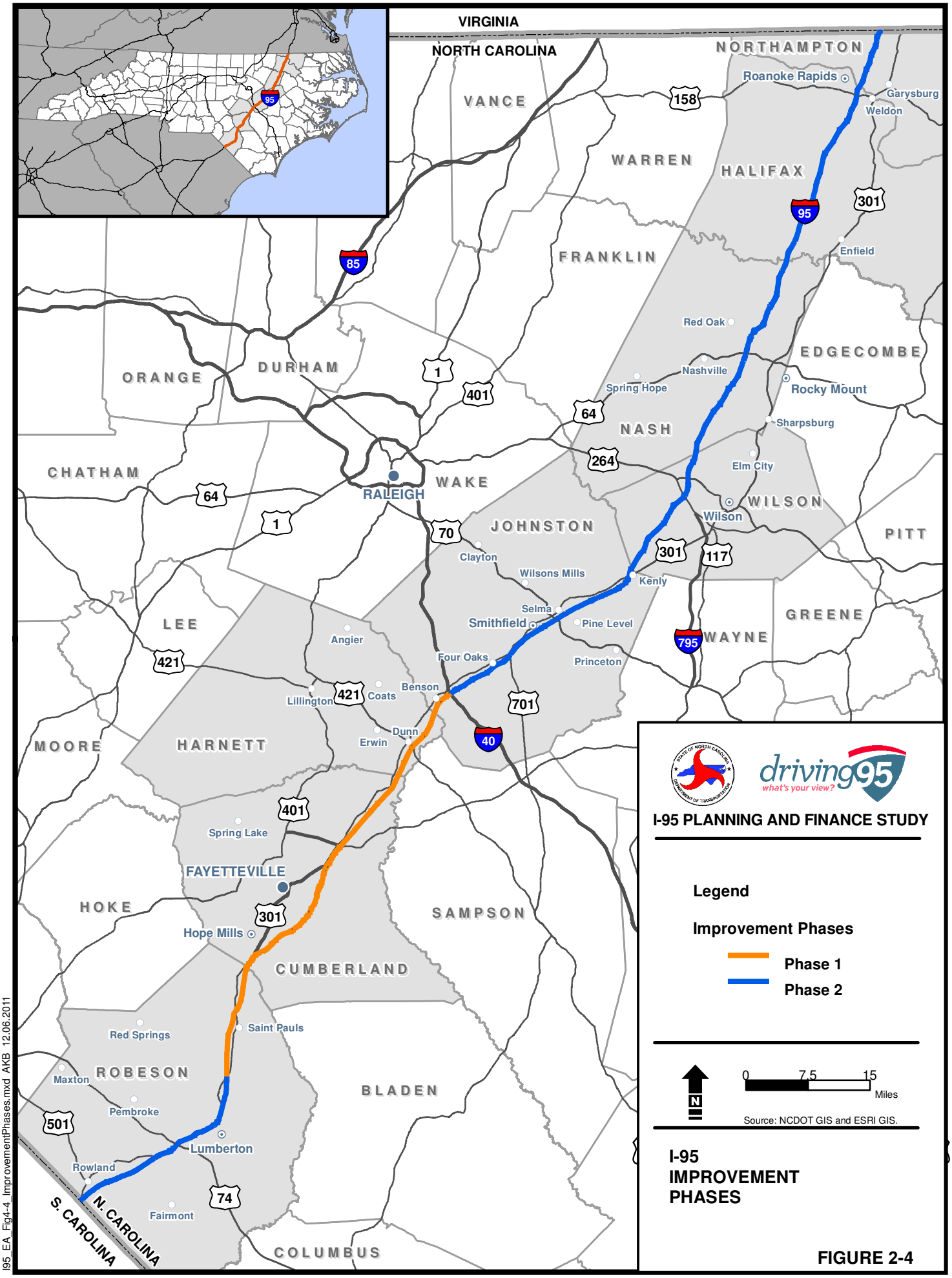
0 4.5 9
Miles

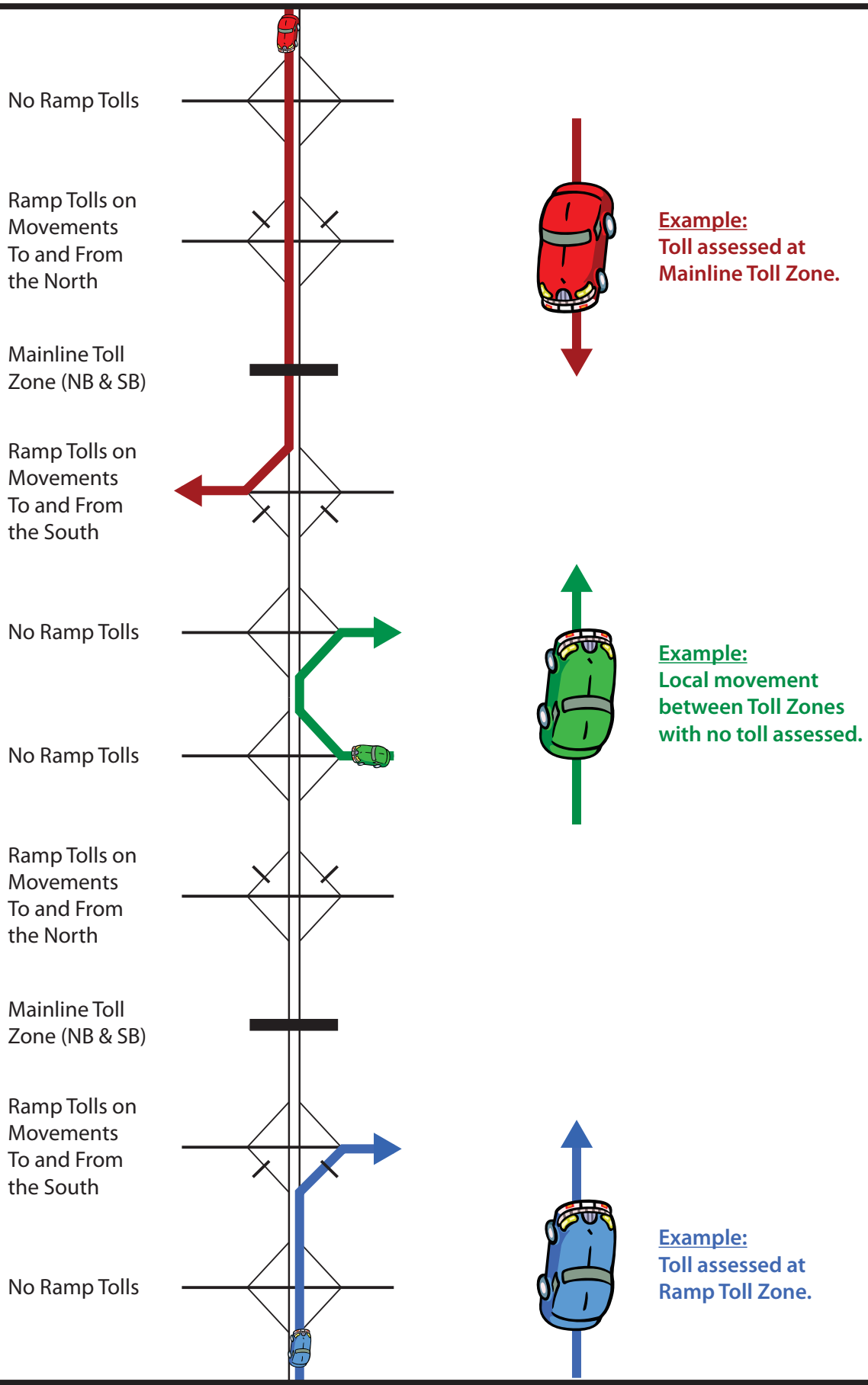
LEGEND

- I-95
- Interchange
- Interchange with Ramp Toll Zone
- Mainline Toll Zone
- Counties in Project Area

TOLL ZONE LOCATIONS

FIGURE 2-3


VIRGINIA
NORTH CAROLINA
NORTHAMPTON
Roanoke Rapids
Garysburg
Weldon
VANCE
WARREN
HALIFAX
FRANKLIN
Enfield
Red Oak
EDGECOMBE
Nashville
Spring Hope
Rocky Mount
Sharpsburg
NASH
Elm City
ORANGE
DURHAM
CHATHAM
WAKE
RALEIGH
WILSON
Wilson
JOHNSTON
PITT
Clayton
Wilsons Mills
Kenly
Selma
Smithfield
Pine Level
GREENE
LEE
Angier
WAYNE
Four Oaks
Princeton
Lillington
Coats
Benson
Dunn
Erwin
MOORE
HARNETT
Spring Lake
FAYETTEVILLE
HOKE
SAMPSON
Hope Mills
CUMBERLAND
Red Springs
Saint Pauls
ROBESON
Maxton
BLADEN
Pembroke
Lumberton
Rowland
Fairmont
COLUMBUS
S. CAROLINA
N. CAROLINA
85
95
158
301
1
401
64
264
70
117
421
701
40
795
501
74
I-95 PLANNING AND FINANCE STUDY
driving95
what's your view?
Legend
Improvement Phases
Phase 1
Phase 2
N
0
7.5
15
Miles
Source: NCDOT GIS and ESRI GIS.
I-95
IMPROVEMENT
PHASES
FIGURE 2-4
I95_EA_Fig4-4_ImprovementPhases.mxd AKB 12.06.2011



I95_EA_Fig4-5_ExampleTolled&UntolledTrips.ai AKB 12.07.11

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EXAMPLE TOLLED AND UNTOLLED TRIPS

FIGURE 2-5