

# Final Report

## Feasibility of Tolling I-95

Prepared for



North Carolina Department of Transportation



October 2003

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# Feasibility of Tolling I-95

## Finding and Recommendations

### 1 Statutory Directive

Session Law 2002-180 Part XVII directs the Department of Transportation "to study the feasibility of charging a toll on I-95 (in North Carolina) and directing the use of toll proceeds for expansion and maintenance of I-95." The Department is also directed to report its findings and recommendations to the Joint Legislative Transportation Oversight Committee and to the House of Representatives and Senate Appropriations Subcommittees on Transportation. This document summarizes the Department's investigation.

In responding to this legislative directive, the Department of Transportation focused its efforts on the engineering and funding feasibility of undertaking such an initiative. This report does not seek to address the political feasibility of such action. Further, the analysis, upon which recommendations made herein are based, has been conducted at a preliminary screening level of detail. For this reason, the Department has been consciously conservative in its assessment of probable I-95 improvement costs and of the revenue that might be generated from tolling.

### 2 I-95 Improvement Needs, Associated Costs, and Anticipated Resources

Interstate 95 traverses North Carolina from South Carolina to Virginia along the divide between the Sandhills and Piedmont regions of the state, a distance of 182 miles. The roadway was initially constructed between 1956 and 1980, and other than the section through Lumberton and the segment where Interstate 40 crosses I-95, it remains basically the same four-lane divided highway as when it was first built, much with 1960's design standards.

Unlike I-85 and I-40, which serve the major urban centers of the state, I-95 appears to serve primarily as a through travel route carrying many motorists who are traveling between origins and destinations to the north and south of North Carolina. "Local traffic," destined to ports, beaches, Fayetteville or the smaller cities along the corridor, is thought to be a less significant portion of I-95 traffic than on NC's other major Interstate routes.

While growth of I-95 traffic has been impacted less by growth of our urban areas than that of other Interstate routes in the state, significant improvements are still warranted. Traffic that includes significant amounts of both interstate and intrastate truck traffic is expected to increase by 2 to 3 percent annually through the year 2030.

The need for improvements to I-95 over the next 25 years is considerable. The graphic to the right indicates when various segments of I-95 can be expected to experience undesirable levels of congestion without significant capacity improvements. Increasing volumes will result in daily peak congestion, growing restriction on travel speeds, and the likelihood of longer, more frequent non-recurring delays due to crashes and other incidents, resulting in lost time and increasing injuries. The NCDOT anticipates that the entire corridor will need to be widened to eight lanes to maintain a desirable level of travel service and improve facility safety. The Department estimates that the probable cost of such an improvement program will be approximately \$3.0 billion in 2003 dollars.

To address ongoing maintenance and improvement needs, NCDOT must presently rely on its traditional federal and state funding sources. Over the past 7 years, the Department has spent \$86 million on I-95, a spending rate only 10% of what is needed to meet the 30-year, \$3.0 billion improvement need. If the entire amount of eligible funds likely to be allocated to NCDOT's Divisions 4 and 6 were spent on I-95 improvements, at the expense of other Division needs, the Department would be able to fund only

55% of I-95 needs. At the current spending rate, the Department will be able to fund neither widening to meet traffic growth nor maintenance needed for an aging facility. In addition, equity requirements and other transportation needs in the divisions would restrict the flow of funds to I-95, creating a decades-long improvement program.

### 3 Engineering Feasibility and Incremental Cost of Tolling

Many strategies exist for tolling I-95. The tolling strategies range from tolling all users to establishing tolling plans that toll varying percentages of the users based upon targeted segments. Implementation costs and potential revenues would be used to further refine a final strategy.

The Department has used a conservative “barrier system” tolling strategy for testing I-95 tolling feasibility. Barrier system tolling provides toll plazas only on the freeway proper of I-95. A multi-plaza approach was developed, which would provide sufficient spacing for efficient traffic flow yet discourage toll bypass, reasonable toll rates per plaza based on industry per-mile cost averages, and freedom for toll-free movements for many short distance, local trips. Based on field inspection of the corridor with an eye toward placement of toll plazas, it is the Department’s conclusion that the necessary mainline toll plazas could be constructed and operated with no irresolvable issues.

Implementation of a tolling strategy on I-95 will require a substantial capital outlay and operating structure beyond that required for traditional roadway widening. Plazas and “back room” operations centers are required for toll collection and performance of needed accounting functions. Toll collections personnel must also be retained and deployed. Capital cost and recurring Operations and Maintenance (O&M) cost of tolling I-95 are likely to be as follows:

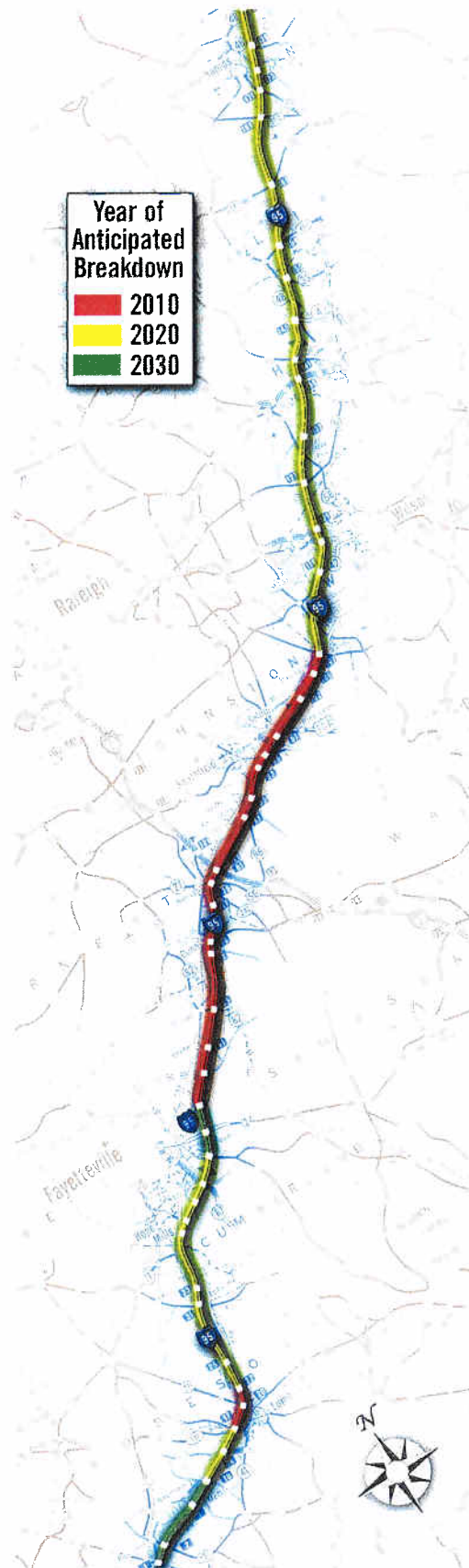


Figure 1  
Projected I-95 Congestion

Cost of Tolling	Approximate Total Cost (2003\$)
Mainline Toll Plazas	\$85,000,000
Toll Collection Equipment	\$75,000,000
Annual O&M	\$25,000,000 / per year

## 4 Potential I-95 Toll Revenue and Toll Finance Feasibility

A preliminary screening analysis was performed to identify the potential for acceptable financial conditions resulting from tolls being collected on I-95. As part of the analysis, the Department examined a range of values for key variables such as toll rates per mile, toll diversion percentages, and present value (or discount) rates representing potential bond market conditions, drawing on the experience of other states and agencies in building new toll roads.

How self-sufficient a toll facility will be over the long term is a function of its ability to pay 1) annual operating and maintenance cost, 2) annual costs to service project debt, and 3) periodic costs of capital improvement and rehabilitation. For preliminary feasibility studies, it is instructive to compare the present value of the project's cash flows to its capital cost. The cash flows in this case refer to the annual stream of toll revenues remaining after paying current operating and maintenance costs. This is commonly referred to as "net revenues." These long-term future cash flows are discounted back to present year so as to allow a correct dollar-to-dollar correlation.

For this study, project feasibility has been portrayed as a "feasibility ratio" which compares the present value of the

project's estimated future cash flows to its estimated project cost. While each individual agency must make its own determination as to the definition of a "feasible project," it is generally accepted that projects in the preliminary screening phase that exhibit feasibility ratios greater than 0.70 are strong candidates for tolls from a financial perspective. For the mid-range condition examined in this study (ten cents per mile toll rate and 30% diversion of traffic from I-95), the feasibility ratio is .81 with a capital cost of \$3 billion and net revenues of \$2.44 billion. The Department's conclusion is that this ratio suggests that I-95 is a very strong candidate for successful toll financing.

It should be noted that, ultimately, the real ability of this toll program to self-finance itself will be determined by future decisions and conditions that include, among other factors, the following:

- The phasing of the program and the determination of how toll revenues from initial phases will help finance latter phases.
- Toll rates and anticipated changes in such rates over time.
- Actual capital or bond market conditions.



## 5 Interstate Tolling Prohibitions and Initiatives

Currently, neither North Carolina nor federal statutes authorize general tolling of interstate highways. The statute that created the NC Turnpike Authority expressly prohibits tolling of existing highways in the state, and federal law generally prohibits Interstate highway tolling except for construction of bridges and tunnels.

However, Section 1216 of the current federal transportation authorization bill (Transportation Equity Act for the 21<sup>st</sup> Century, or TEA-21) identifies an Interstate tolling pilot program under which the Federal Highway Administration (FHWA) can authorize up to three Interstate tolling projects. To date, only one project, I-81 in Virginia, has been authorized by FHWA to move into the project development phase. Several other states are reported to be considering applications to FHWA for the other two available slots.

Entry into the pilot program requires application to FHWA, with that application in large part consisting of the same types of analysis prepared in response to this General

Assembly directive. The process is not burdensome, but in light of the apparent growing interest from other states, if there is legislative and administrative agreement that pursuit of one of the available slots is desirable, then such action should commence immediately in close consultation with the federal agency.

Need for Action: If there is a determination that the State should pursue a toll-based finance strategy for an I-95 improvement program, then continued, quick action seems imperative, in order to secure one of the three slots in the federal pilot program. At this time, there is no assurance that Congress will expand the program to open it to all states. Two parallel activities are required:

- The Department of Transportation would be directed to initiate formal entry into the federal pilot Interstate highway tolling program; and
- The General Assembly would rescind current statutory restrictions against tolling of existing NC highways.

## 6 Advantages and Disadvantages of I-95 Tolling

North Carolina has a tradition of resisting the tolling of its highways. Even with creation of the NC Turnpike Authority, the legislative intent was clearly to preserve the "free" nature of the state's existing highway network, by prohibiting that authority from pursuing projects that would toll existing roadways. However, in the case of I-95, the directive to conduct this feasibility study implies recognition of the inadequate funding stream available for maintenance and improvement. Implementation of tolls on I-95 would have benefits, but there would also be costs, or disbenefits. Following is a listing of what the Department considers the principle advantages and disadvantages of tolling I-95.

### I-95 Tolling Advantages:

- Would provide a dedicated revenue source for I-95 improvements adequate to finance improvement costs.

- Would generate revenue from out-of-state travelers who may well travel through the state without paying gas tax/user fees needed to maintain the state's roadways.
- Adds to eastern NC's attractiveness for industrial recruiting/relocation.
- Would allow needed safety improvements to be made in a timely fashion.
- Would relieve the demand for federal and state Highway Fund revenues for this project so that they can be used for other pressing transportation needs in the area.
- Could generate excess revenue that could support other transportation improvement projects. Such "system revenue" potentially could become a revenue source for the new NC Turnpike Authority. (Note: such "cross-subsidy" is not currently allowed under federal Interstate tolling programs, but there is discussion of



easing such restrictions as part of federal transportation program reauthorization.)

Disadvantages:

- Tolls many NC users of I-95 who are also buying gasoline and paying gas tax in NC. Some may see this as a form of "double taxation."
- Lower income North Carolinians may not be able to afford the tolls (however, alternative "free" routes are

available; in addition, electronic tolling techniques could provide mechanisms for lower toll rates for frequent users).

- Traffic diverting from I-95 to avoid tolls may increase congestion along US 301, the principal parallel route to I-95, resulting in the potential need for improvements to US 301.
- Possible negative safety impact, as some travelers leave the safer interstate highway to avoid tolls.

## 7 Conclusion: Feasibility Findings and Recommendations

In summary, North Carolina faces a growing need for revenue to address costly improvements on I-95. Over the next 30 years, the Department should spend \$3.0 billion to maintain and improve this 182-mile roadway. Given the state's continuing statewide demand for highway system improvements and the failure of traditional highway revenue to keep pace with demand, it is likely that traditional funding approaches could cover no more than 40% of the needed amount.

Based on the analysis described above, the Department offers the following conclusions:

- A long-term toll-financed improvement program could be implemented on I-95, with toll rates comparable to those collected in other states in the eastern US that would have a high likelihood of generating the necessary toll revenue to fully finance improvements to the roadway. Even if the toll revenue generated did not fully cover costs, the incremental amount of traditional, state and federal highway revenue required would be far less than would otherwise be needed, leaving revenue to address other pressing transportation needs

in the state. Alternatively, the schedule of the improvement program could be adjusted to match anticipated revenue.

- Opportunity exists at the federal level to participate in a pilot program that allows the tolling of segments of the Interstate highway system in three states.

Accordingly, it is the recommendation of the Department of Transportation that:

- The Department be directed to prepare the necessary application to the Federal Highway Administration to gain entry into that pilot program.
- In conjunction with entry into the Interstate tolling pilot program, the General Assembly take legislative action to remove the existing prohibition in NC Statute against tolling of existing highways.
- Further, consideration be given to assigning further assessment of the tolling of I-95 to the NC Turnpike Authority, since that agency is responsible for developing a work program of toll projects and will be developing the toll industry skills needed to implement this and other toll road projects in the state.

# Final Report

## Feasibility of Tolling I-95

### 1 Overview and Study Process

Session Law 2002-180 (Senate Bill 98) Part XVII directs the North Carolina Department of Transportation (NCDOT) to study "the feasibility of charging a toll on I-95 (in North Carolina) and directing the use of toll proceeds for expansion and maintenance of I-95." To satisfy this directive, the NCDOT initiated the I-95 Toll Feasibility Study. The study had two primary objectives:

1. To conduct a preliminary screening assessment, including a planning-level financial feasibility analysis, of charging a toll on I-95 from the South Carolina border to the Virginia border, and directing the use of toll revenue for I-95 rehabilitation, maintenance, and capacity improvements.
2. To review federal regulations regarding tolling of Interstate highways and assess the legality of tolling I-95, including a review of the requirements of Section 1216(b) of TEA-21 and determination of I-95 eligibility for the Interstate System Reconstruction and Rehabilitation Pilot Program.

A toll feasibility study is not a one-time evaluation, but rather an evolving, progressively more detailed series of assess-

ments. Feasibility studies are intended to determine a project's potential for success as a toll facility, by examining such elements as project need, engineering and environmental features, and cost and revenue estimates. A feasibility study typically involves three phases of analysis as listed below, each with an increasing level of detail.

- Preliminary screening
- Conceptual feasibility analysis
- Investment-grade analysis

In addressing Objective 1, a preliminary screening analysis was conducted. The purpose of preliminary screening is to determine if a potential project meets basic financial toll road viability criteria and to evaluate the engineering and environmental elements for fatal flaws. Preliminary screening is conducted with a minimum investment of resources, using readily available data. This approach is consistent with the preliminary feasibility assessment approach presented in the *NC Toll Road Feasibility Study – Final Report (March 2001)*.

The I-95 toll feasibility study was conducted under the direction of senior managers of the NCDOT. The work was reported, discussed, and confirmed through a series of collaborative working meetings. This report presents the study's methodology and findings.

### 2 I-95 Improvement Program

For purposes of preliminary screening, a broad improvement program for I-95 from South Carolina to the Virginia was identified. The basis of the program is the required number of "basic lanes" needed to accommodate year 2030 traffic demand. Basic number of lanes is the constant number of lanes assigned to a route, exclusive of auxiliary lanes. Presently, I-95 has four basic lanes, with two lanes serving each direction of travel. No funding for the construction of significant mainline capacity enhancements (i.e., addition of basic lanes) is included in the current State Transportation Improvement Program for I-95. However, a project feasibility study (Tip No. FS-0204A) addressing Interstate capacity improvements from I-95

Business (Exit 56) to NC 222 (Exit 107) is presently underway by the NCDOT.

Average Annual Daily Traffic (AADT) from the I-95 mainline count stations, which are monitored by the NCDOT, were reviewed for years 1991 through 2001. Year 2001 AADTs were ultimately excluded from the analysis due to abnormal traffic volumes resulting from the events of 9/11. Base year 2000 volumes were established through linear regression of the historical AADTs (1991 through 2000).

To forecast year 2030 traffic volumes, annual growth rate estimates at the mainline count stations were determined through a review of the following:

- Historical annual growth from 1991 to 2000
- Annual growth rates reported in recent traffic forecast reports prepared by the NCDOT

For purposes of estimating traffic demand for this study, annual growth rates were assumed to remain constant from year 2000 to year 2030. **Appendix A** provides the assumed annual traffic growth rates by count station and demand traffic forecast volumes from year 2003 to 2030.

In assessing the operational performance of I-95, the following assumptions were applied uniformly through the entire I-95 corridor.

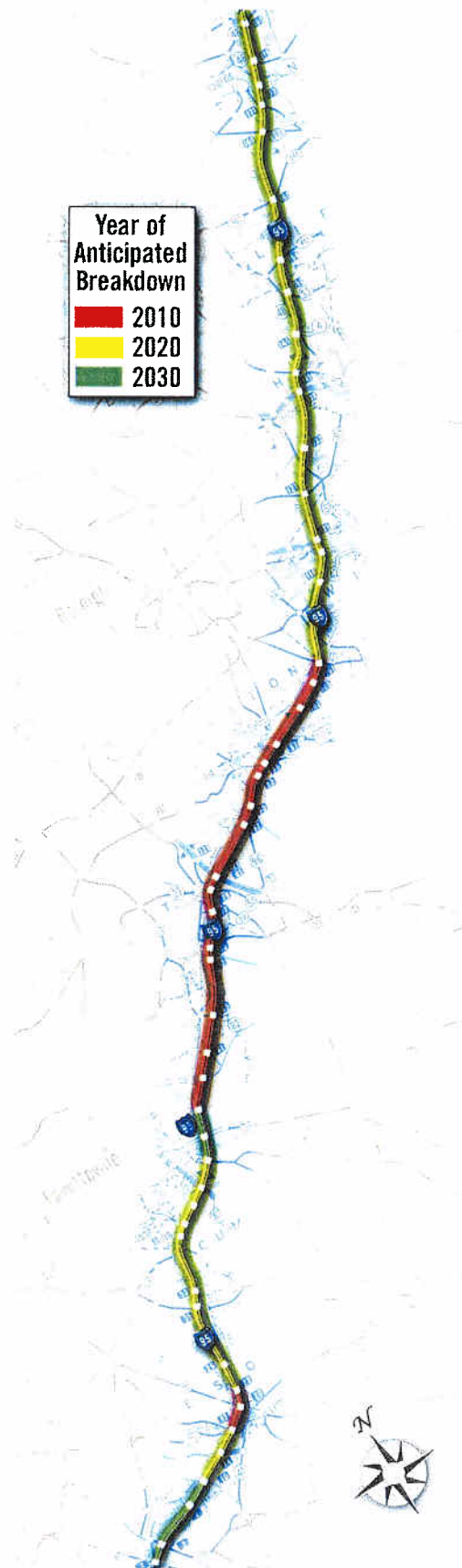
- Free Flow Speed: 75 mph
- K-Factor: 0.10
- Direction Distribution: 55/45
- Peak Hour Factor: 0.88
- Peak Hour Percent Trucks: 15% (assumed 60% of daily truck percentage occur in peak two hours of a.m. and p.m. peak periods)
- Terrain: Level

These assumptions were derived from the following sources:

- Recommended planning-level guidelines in the *Highway Capacity Manual (2000)*
- Documentation from recent traffic forecast reports prepared by the NCDOT
- Field data collected by the NCDOT

**Figure 1** indicates when segments of I-95 can be expected to experience undesirable levels of congestion (Level-of-Service D or worse) without significant capacity improvements under the growth assumptions used in this study. Increasing volumes will result in growing daily congestion and the likelihood of longer, more frequent non-recurring delays due to crashes and other incidents, resulting in lost time and increasing injuries. As shown in **Figure 1**, the entire corridor by 2030 will be in need of significant capacity improvements (addition of basic lanes) to maintain a desirable level of travel service and improve facility safety. **Appendix A** provides a detailed breakdown of the Level-of-Service estimates.

Based on the operational assessment, the NCDOT anticipates that the entire corridor from South Carolina to Virginia will need to be widened to eight lanes to maintain a desirable level of travel service (Level-of-Service C or better) and improve facility safety.



**Figure 1**  
Projected I-95 Congestion

