



NC Toll Project Development Policy Handbook



TOLL RATES		
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Acronyms

AADT	Annual Average Daily Traffic
ADSCR	Annual Debt Service Coverage Ratio
AI/ML	Artificial Intelligence/Machine Learning
BBB	Better Business Bureau
BBM	Bill by Mail
BOT	Board of Transportation
CAFE	Corporate Fuel Economy
CFADS	Cash Flows Available for Debt Service
CMT	Congestion Management Team
CTP	Comprehensive Transportation Plan
DE	Division Engineers (at NCDOT)
DOT	Department of Transportation
ETC	Electronic Toll Collection
ETL	Express Toll Lane
FAQs	Frequently Asked Questions
FHWA	Federal Highway Administration
FFST	Financial Feasibility Screening Tool
GP	General Purpose
HBO	Home-Based Other
HBW	Home-Based Work
HOT	High Occupancy Toll
HOV	High Occupancy Vehicle
IDPET	Intra-Departmental Project Evaluation Team
IPD	Integrated Project Delivery
ITS	Intelligent Transportation System
MPO	Metropolitan Planning Organization
MTP	Metropolitan Transportation Plan
NCDOT	North Carolina Department of Transportation
NCGA	North Carolina General Assembly
NCTA	North Carolina Turnpike Authority
NCSTM	North Carolina Statewide Travel Demand Model
NEPA	National Environmental Policy Act
NHB	Non-Home Based
NHS	National Highway System
O&M	Operations and Maintenance
P3	Public-Private Partnership
POC	Point of Contact
PSA	Pre-Submittal Assessment
R&R	Renewal and Replacement
RPO	Rural Planning Organization
SOV	Single Occupancy Vehicle
SPOT	Strategic Planning Office of Transportation
SRTA	State Road and Tollway Authority
STI	Strategic Transportation Investments
STIP	Statewide Transportation Improvement Program
T&R	Traffic and Revenue

TAZ	Traffic Analysis Zone
TIFIA	Transportation Infrastructure Finance and Innovation Act
TIP	Transportation Improvement Program
TPD	Transportation Planning Division
TREDIS	Transportation Economic Development Impact System
VMT	Vehicle Miles Traveled
VOT	Value of Time
VTC	Video Toll Collection

Executive Summary

In 2017, the North Carolina General Assembly (NCGA) urged the North Carolina Department of Transportation (NCDOT) to better define its process for examining the financial feasibility of using toll financing to advance the delivery of full access control or priced managed lane projects.

General Assembly Support

“Establishing policies and guidelines will allow for the Department to make informed decisions when selecting projects as toll candidates and is critical to moving the state forward. Understanding which project characteristics make a project viable for tolling, managed lanes, or a (P3) agreement is necessary in gaining public trust.”

-Senators Meredith, Davis, McInnis, and Rabon, April 6, 2017

Responsive to that legislative direction, NCDOT conducted an analysis of the need and feasibility of establishing policy to enable broader consideration of the feasibility of using toll financing to advance needed highway system improvements. That analysis resulted in adoption by the NC Board of Transportation of the NC Toll Project Development Policy (Toll Policy) in February 2018.

The Toll Policy directs NCDOT to develop a transparent process to identify, evaluate, and prioritize toll candidates. Further, it outlines overarching principles of this increased transparency. To implement the Toll Policy, NCDOT has prepared this *Toll Project Development Policy Handbook* or (*Handbook*).

Purpose of the *Handbook*

The purpose of the *Handbook* is to provide a “rule book” for implementation of the Toll Policy. Eligible proposed improvements and the feasibility process are defined in this *Handbook*.

A project evaluation process, consistent with current state law, applies to new alignment limited access highways with full access control, improvement of existing full access control highways by addition of priced managed lanes (or express lanes), conversion of other highways to tolled, full access highways, and new bridges or major bridge replacements.

The process is conducted in concert with the Metropolitan Planning Organizations (MPO) and Rural Planning Organizations (RPO), referred to as Project Sponsors, and is administered through a four-step screening process. North Carolina Turnpike Authority (NCTA) and a cross functional process works closely with Project Sponsors to identify viable projects which move through the screening process.

NC Toll Project Development Policy

From an institutional and program-delivery perspective, a comprehensive tolling vision and policy addresses multiple needs:

- **For accelerated project delivery** – toll financing removes projects from the highly-competitive push for funding using traditional state and federal funds.
- **For improved management of congested corridors** – tolls manage congestion by applying pricing strategies to available roadway capacity and providing a choice of travel to motorists.

- **For transparency** – a reasoned policy gives all regions of the state the ability to understand the process for selecting toll-financed projects.
- **For funding flexibility** – traditional funding sources (primarily motor fuels taxes and fees) are becoming less reliable; tolls allow NCDOT to stretch limited traditional financial resources.

Responding to these needs, the Toll Policy (shown in the box below) defines and implements a framework of steps and actions and expands the consideration of toll financing as an integral and important strategy to deliver critical, time-sensitive transportation solutions. This policy allows MPOs and RPOs and the Department to evaluate the feasibility of financing urban and rural highway improvements through levying of tolls or managed lanes pricing options.

To improve the Department's ability to manage a reliable transportation network, address congestion, leverage limited financial resources, and provide more user choice, the Department shall implement a NC Toll Policy.

The NC Toll Policy, defined and implemented by a Framework of steps and actions, expands the Department's consideration of toll financing as an integral and important strategy to deliver critical, time-sensitive transportation solutions. Under this policy the Department shall:

- Evaluate the feasibility of financing high-capacity urban and rural highway improvements through levying of tolls or managed lanes pricing options. Subject to current state law these improvements could include but are not limited to: new alignment highways with full access control, improvement of existing full access control highways by addition of priced managed lanes, conversion of other highways to tolled, full access control highways by reducing direct access and adding tolled general use or managed lane capacity, or high-volume bridges over bodies of water. This Policy defines "limited access highways" as those planned for high speed traffic, with few or no at-grade intersection, limited points of access, and a median divider between traffic lanes moving in opposite directions.
- Define feasibility of tolling and priced managed lanes in cooperation with the state's Metropolitan and Rural Planning Organizations (MPOs and RPOs) and guidelines as set forth in a *Toll Project Feasibility Handbook (Handbook)*. The *Handbook* will ensure that candidate projects are financially feasible, will operate safely, are publicly vetted, and reflect sound stewardship of funds and program performance. For all toll project or priced managed lane project to be programmed and constructed by the Department, it must be approved by the nominating MPO or RPO through inclusion in their adopted Comprehensive Transportation Plan (CTP), Metropolitan Transportation Plan (MTP), or other adopted local plan. It must also advance through the state's Strategic Prioritization process and score well enough to be included in the local Transportation Improvement Program (TIP) and the Statewide Transportation Improvement Program (STIP).

Best Practices Review of Peer States

The *Handbook* development team drew on the experience and expertise of other states in developing tools and processes for toll candidate consideration. A series of peer state interviews was conducted to better understand the needs and project evaluation processes across the United States and how these relate to North Carolina. These interviews focused on toll policy development and provided a strong understanding of the steps other agencies take in the development, communication, and delivery of greenfield toll roads and express lanes.

Peer interviews were conducted with the following agencies:

- Florida Department of Transportation (DOT) Central Office and Florida Turnpike Enterprise
- Georgia DOT/State Road and Tollway Authority (SRTA)
- Minnesota DOT
- Washington DOT
- Texas DOT
- Central Texas Regional Mobility Agency in Austin, Texas
- Riverside County Transportation Commission in California

Applicable Lessons Learned

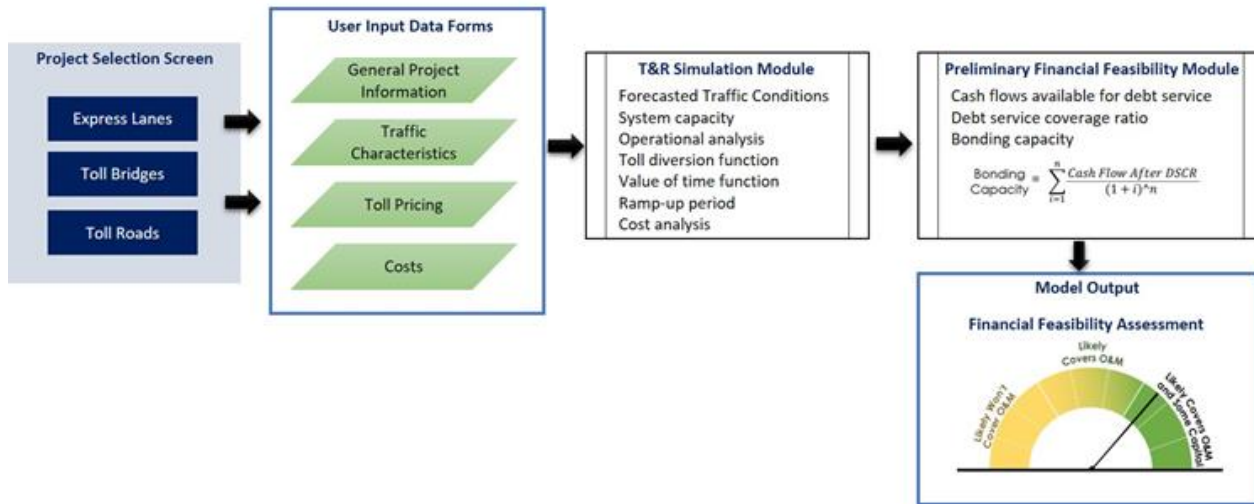
The interviewed agencies provided a wealth of information regarding their challenges, lessons learned, and techniques to overcome their challenges. Key findings included:

- **Forecasting/Identification** - Some agencies plan projects at a regional and system level and then prioritize smaller segments for phased implementation. Regardless of a system-level analysis, individual projects should be analyzed and evaluated with similar tools, such as the statewide model or standardized regional models.
- **Outreach** - It is important to proactively engage all agency stakeholders early and often. In addition, focused public education is key – many agencies acknowledged that after implementation, the public still thinks tolls are being used to generate revenue rather than manage demand.
- **Design/Delivery** - There must be an understanding that toll candidate design and delivery is different from non-toll candidates. Several technologies and design elements, such as toll system technology and enforcement and refuge area design, are unique to toll candidates.
- **Operations** - Agencies must consider having a dedicated team of operational and administrative staff available to respond to unanticipated issues, requiring more operations budget, resources, and evolving technology when more integrated corridor management and automated and connected vehicles come online. But agencies should focus policy on traffic and system performance rather than revenue generation. The development of specific and meaningful performance metrics can be key to public understanding and acceptance.

Financial Feasibility Framework

The Toll Policy allows MPOs and RPOs and NCDOT to evaluate the feasibility of financing urban and rural highway improvements through levying of tolls or managed lanes pricing options. **Chapter 4** documents the development, structure, and functions of the Financial Feasibility Screening Tool (FFST) to provide a high-level indication of the potential use of tolled revenues to finance or off-set toll candidate costs before conducting more detailed and rigorous traffic and revenue (T&R) studies. The FFST is an element of the broader Pre-Submittal Assessment, defined in **Chapter 5**, that is required for any toll candidate submitted by MPOs and RPOs. FFST is depicted in the following exhibit.

Model Overview



The FFST allows users to assess four types of transportation improvements: (1) new alignment highways with full access control; (2) improvement of existing full access control highways by addition of express lanes; (3) conversion of other highways to tolled, full access control highways; and (4) new bridges or major bridge replacements. This chapter explains the structure and functions of the analytical tool to help users understand the processes and concepts behind the modeling mechanisms.

The FFST is a Microsoft Excel-based spreadsheet model, its methodology being consistent with generally accepted forecasting principles used for evaluating tolled facilities. Simplified with industry standard assumptions for the development of this financial feasibility screening tool, the FFST is meant to be illustrative in nature and is intended to provide a scale of possible outcomes rather than a precise estimate.

Key elements of the FFST are:

- Consistent, readily available input data - The FFST relies on user-inputs to provide basic project information. Required inputs and initial assumptions are intended to be readily available to users. The tool, however, provides “reasonable assumptions” as default values for certain elements that NCDOT or the user can supersede if better data is available. Model inputs are divided into four categories: Project Information, Traffic Characteristics, Toll Pricing, and Costs.
- Focused models reflecting specific project scenarios - The FFST consists of two traffic forecasting models developed to allow estimation of the T&R potential of two types of tolled facilities reflecting their different project characteristics: express lane projects, and toll roads and toll bridges.
- Built-in revenue adjustments – Reflecting generally-accepted T&R forecasting principles, the FFST has built in adjustments for converting untolled traffic inputs into revenue expectations.
- Built-in capital, operating, and maintenance costs – Tolled projects require numerous cost elements that can be difficult to project without significant toll road development experience. To accommodate for this possible lack of experience, the FFST embeds certain cost elements needed to estimate costs on a life-cycle basis.

Financial Feasibility Module Outputs

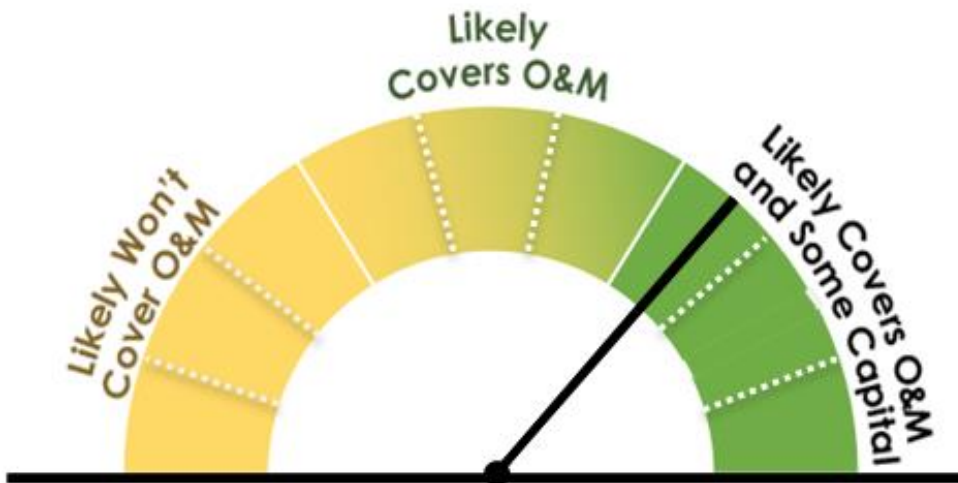
Using traffic and revenue inputs, along with cost information, the financial feasibility module calculates the ability of a toll candidate to generate revenue to cover its own costs of operation and to assess its ability to fund all or a portion of the capital costs through toll financing.

The assessment integrates the revenue forecast and the various cost elements estimates to determine “net” cash flows available for debt service (CFADS). The use of net toll revenues in the analysis assumes that operation and maintenance costs are paid from toll revenues first, and then the remaining toll revenues are available for debt service payments.

The feasibility assessment is tied to three conditions levels (depicted graphically below):

1. Likely covers Operations and Maintenance (O&M) and portion of Capital (i.e., presents positive financial flexibility)
2. Likely covers O&M only (i.e., potential financial flexibility)
3. Likely won't cover O&M (i.e., additional funding sources would likely be needed)

Financial Feasibility Screening Dial



Pre-Submittal Assessment

Chapter 5 outlines how and where a Pre-Submittal Assessment (PSA) of tolling candidates, consistent with NCDOT’s existing project prioritization process and including application of the FFST defined in **Chapter 4**, is incorporated within North Carolina’s current transportation project planning process. Specifically, it provides more details regarding application of performance-based criteria and standards to evaluate toll candidates and describes the most appropriate places along the planning spectrum where this evaluation could occur.

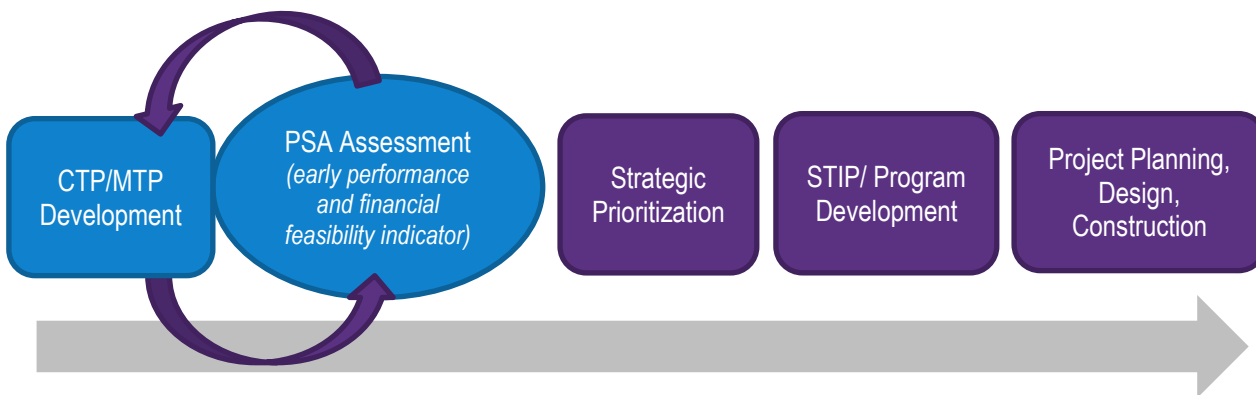
The PSA performance-based criteria are informed by NCDOT’s current strategic prioritization project scoring criteria which, when combined with financial feasibility results produced by application of the Financial Feasibility Screening Tool defined in **Chapter 4**, form the basis of a holistic, preliminary indication of a potential toll candidate’s viability. The financial components from **Chapter 4** combined with the performance-based components outlined in this chapter act as inputs into an overall PSA tool which operationalize the PSA process.

PSA as an Overlay to the Planning Process

The PSA process is designed to leverage transportation data (such as traffic and roadway attributes) already collected during the planning process to serve as inputs to effectively identify candidates for tolling without overburdening the transportation planning agencies. The process is applied as an overlay element in the development of Comprehensive Transportation Plans (CTP) and MPOs’ Metropolitan Transportation Plans

(MTP). This is shown graphically in the figure below. Timing to conduct PSA is driven by the local partner and can precede a CTP update, occur during its development, or occur after plan adoption but prior to a project's submission for strategic prioritization.

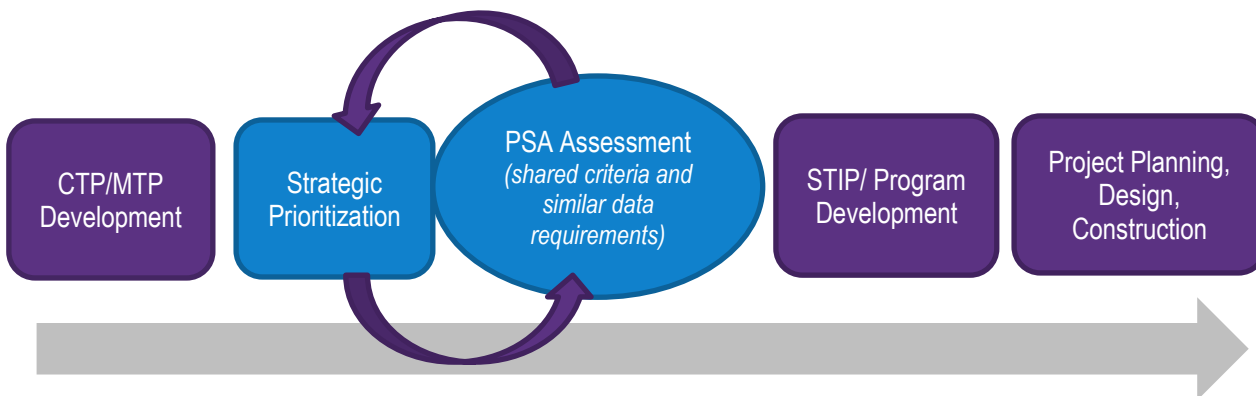
PSA and Long-Range Planning



PSA in Strategic Prioritization

The PSA process is designed to be applicable as an element of strategic prioritization as well as systems planning in the definition of projects that are submitted by MPOs and RPOs to NCDOT for project scoring. PSA must be completed before projects are submitted to NCDOT for scoring. The Toll Policy does not negate the Strategic Transportation Investments (STI) law which requires toll candidates (like other highway capacity projects) to be scored through strategic prioritization. The *Handbook* is designed to describe how MPOs and RPOs initiate a request for PSA. NCDOT's Division Engineers are not expected to submit projects through PSA but play a support/liason and coordination role to ensure analytical consistency and local/state resource support of the process.

PSA and Strategic Prioritization



Implementation

Chapter 6 describes how the PSA process links back to the 4-step process outlined in the NC Toll Policy and offers a synopsis of key implementation components to advance the PSA process. Some of the content builds upon implementation steps introduced in **Chapter 5** to further build a foundation toward instituting PSA into North Carolina transportation planning practice. The details and activities described in this chapter should be viewed as a "roadmap" for how the PSA process is initially communicated to project sponsors and stakeholders and how the process can be sustained and evolve over time.

Toll Policy Four Step Process

The toll policy adopted by the Board of Transportation in early 2018 outlines a four-step procedure whereby Project Sponsors and NCDOT will work together as described below.

- **Step One: Initial Project Identification** - Project Sponsors submit projects to NCDOT NCTA to be tested for toll-financing or priced managed-lanes feasibility following a first level of screening by the Project Sponsor.
- **Step Two: Initial NCDOT Toll Feasibility Testing** - Projects submitted by Project Sponsors passing Step One minimum requirements are evaluated by an Intra-Departmental Project Evaluation Team (IDPET) using the steps outlined in the PSA process including local coordination, use of the Financial Feasibility Screening Tool and performance-based criteria, and scheduled meetings to review and communicate results.
- **Step Three: MPO and RPO Screening** - Following Financial Feasibility testing and project performance evaluation from PSA, the Project Sponsor conducts further screening of the tolled or express lanes projects to ensure consistency with local plans and goals and acts to consider local approval.
- **Step Four: Prioritization and Programming** - Projects found to be suitable by IDPET for implementation as tolled or express lanes projects (Step 2), successfully screened by their MPO and RPO Project Sponsors for inclusion in their MTP, CTP or another adopted document, and endorsed for TIP/STIP prioritization (Step 3) are submitted to NCDOT through the strategic prioritization process.

Intra-Departmental Project Evaluation Team

Success in implementing the Toll Policy is dependent on a cooperative and collaborative working relationship between NCDOT and Project Sponsors in applying the PSA process. Through creating and operating an IDPET, NCDOT assists Project Sponsors in implementing PSA. NCDOT recognizes that the level of technical expertise varies widely across the many MPOs and RPOs and that PSA is a new process that requires some degree of expertise. This may be particularly true in application of the Statewide Travel Demand Model and the Financial Feasibility Screening Tool.

NCDOT's Transportation Planning Division (TPD) plays a lead management and coordination role for the IDPET and acts as resource and central staff liaison to Project Sponsors. TPD will direct Project Sponsor inquiries to other representatives on the IDPET as needed. Other NCDOT central business units on this team include NCTA, Planning and Programming's Statewide Transportation Improvement Program (STIP) Unit, the Strategic Planning Office, and Technical Services. Staff from NCDOT's fourteen Highway Division offices serve as local liaisons between Project Sponsors and central NCDOT staff to facilitate information flow and ensure a thorough local engagement and input process.

PSA Schedule, Steps, and Tools

The PSA schedule is estimated to take three months to complete and is triggered by the Project Sponsor after submission of a toll candidate for evaluation to the IDPET. From that point, the IDPET and the Project Sponsor enact a series of closely coordinated steps to evaluate the toll candidate's potential performance and financial viability. These steps rely on local and state data, tools, assumptions and staff resources, and a transparent process facilitated by joint reviews and documented outcomes.

Additional PSA Applications and Considerations

The PSA process is intended to add value and enrich decision-making at the local level. Its steps are designed to occur in parallel to a CTP and MTP update, and PSA support tools and analysis are designed to be easy to understand and translate to internal and external stakeholders. Over time and through the interests of Project Sponsor consideration of tolling, the PSA process can become mainstreamed within North Carolina's transportation planning framework. As noted, some Project Sponsors may choose to initiate PSA at the beginning of CTP and MTP development or prior to the start of their next CTP and MTP update.

Either way is acceptable – the key consideration is data availability, technical expertise, and timely state/local agency coordination to satisfactorily complete the PSA steps. If a CTP or MTP is under development, it must be clear the toll candidate(s) undergoing PSA evaluation have the potential to be identified as future toll candidate(s) in the adopted CTP and MTP.

Some RPOs and MPOs may not have the technical expertise to provide data requirements or travel demand model resources to complete the PSA analysis. NCDOT (through IDPET) will work with Project Sponsors to identify these needs early in the PSA process and provide technical support as requested.

Toll candidate(s) that advance through NCDOT’s programming and preconstruction process are incorporated within the NCDOT’s Integrated Project Delivery (IPD) process. This new process, under development, streamlines project development and delivery.

Financial Feasibility Application

One of the key objectives of the toll policy is to help Project Sponsors and NCDOT leverage limited financial resources. The policy expands the consideration of toll financing as an integral and important strategy to deliver critical, time-sensitive transportation solutions. This policy allows MPOs, RPOs, and NCDOT to evaluate the feasibility of financing urban and rural highway improvements through the levying of tolls or managed lanes options.

Financial feasibility is one element of the overall PSA. The FFST is housed at NCDOT, which is responsible for updating and disseminating the latest version of the tool as it evolves. NCDOT assigns a point-of-contact (POC) to manage the master working version of the FFST. The FFST was designed so that MPOs and RPOs may execute the tool on their own, using readily available resources. However, in the absence of internal resources, the IDPET can execute the tool on behalf of MPOs and RPOs.

PSA Requirements

PSA is conducted through a six-step process focused on transparency, data driven analysis and assumptions, and close coordination between Project Sponsors and IDPET. Transparency is essential to ensure Project Sponsors and IDPET operate from an accepted set of standards, agree on data inputs and assumptions, and jointly manage and communicate the use of analytical tools and techniques. Additionally, Project Sponsors must document and communicate PSA results and seek public input to be shared with local stakeholders and MPO and RPO policy boards. Every Project Sponsor must accept “Rules of Engagement” terms on NCDOT’s website to access and familiarize themselves with PSA related files and steps.

Additionally, Project Sponsors who choose to advance toll candidate(s) after PSA must adopt a resolution acknowledging local commitment of the toll candidate. Although it is estimated to take three months to complete PSA, the proposed timeframe will vary depending upon the number of toll candidates under evaluation, local meeting schedules, and as the process matures through *Handbook* updates.

PSA Training Program

NCDOT recognizes that the toll policy and accompanying PSA is a new process, and Project Sponsors may need significant assistance implementing these activities. Therefore, NCDOT prepared a series of three-hour PSA training sessions in four locations from late September through early October 2019. Over 60 participants representing Project Sponsors, NCDOT central and Field Division staff, and FHWA attended the sessions. The purpose of the training was to provide additional context of the NC Toll Policy and to allow participants to become familiar with PSA related tools, steps, and terminology. The input and feedback received from these sessions has refined this *Handbook*, PSA steps, and supporting tools/materials such as Financial Feasibility Screening Tool, User Guide, a PSA flowchart, and list of Frequently Asked Questions (FAQs).

Appendix

The *Handbook* Appendix contains reference materials for Project Sponsors and NCDOT staff, including the NC Toll Policy, presentations, PSA Form, and PSA steps/schedule. A flowchart is also included to visually convey how the six PSA steps relate to MTP and CTP process.

Updates to the *Handbook*

The NC Toll Project Development Policy and accompanying *Handbook* are living documents which are expected to be updated every two years (or in concert with NCDOT's strategic prioritization update cycles). This maintenance schedule allows NCDOT and Project Sponsors to evolve the PSA guidelines, steps, and schedule outlined in this *Handbook* through PSA implementation, i.e., through lessons learned from the evaluation of toll candidate(s) by Project Sponsors. *Handbook* updates also provide the opportunity to align toll candidate performance assessment with the latest NCDOT strategic prioritization scoring criteria or consider new assessment approach and methodologies based on research, national best practice, tolling technology changes, travel demand model enhancements, or other state legislative or NCDOT policy changes.

The IDPET initiates *Handbook* updates and leads a workgroup of internal and external stakeholders to consider and apply changes. Individual *Handbook* chapters may also be posted as hyperlinks on NCDOT's Planning Connect Page to efficiently amend specific chapters or sections.

1. Introduction

In 2017, the North Carolina General Assembly (NCGA) urged the North Carolina Department of Transportation (NCDOT) to better define its process for examining the financial feasibility of using toll financing to advance the delivery of full access control or priced managed lane projects, henceforth referred to as express lanes¹.

General Assembly Support

“Establishing policies and guidelines will allow for the Department to make informed decisions when selecting projects as toll candidates and is critical to moving the state forward. Understanding which project characteristics make a project viable for tolling, managed lanes, or a (P3) agreement is necessary in gaining public trust.”

-Senators Meredith, Davis, McInnis, and Rabon, April 6, 2017

Responsive to that legislative direction, NCDOT conducted an analysis of the need and feasibility of establishing policy that enables broader consideration of the feasibility of using toll financing to advance needed highway system improvements. That analysis, which resulted in adoption by the NC Board of Transportation of the NC Toll Project Development Policy (or Toll Policy) in February 2018, was conducted with consideration of existing statutory direction, as defined by passage of the Strategic Transportation Investments Act (STI) in 2013. Prior to STI, the North Carolina Turnpike Authority (NCTA) was authorized to study and develop up to nine projects. Studies had been initiated on five.

With STI passage, added focus was given to NCTA’s program. NCDOT has authority to develop and operate up to 11 projects. The current Statewide Transportation Improvement Program (STIP) has nine tolled projects, either new freeway projects such as completion of the Triangle Expressway in Wake County or the managed lanes projects on I-77 and US 74 in Mecklenburg County.

In authorizing toll road construction, the General Statutes direct that any tolled project:

- Shall be subject to the STI’s data-driven project prioritization process
- Requires approval by local planning organizations
- Considers local funding participation
- Applies tolling only to new capacity and requires a non-tolled alternative route

NCDOT now desires to bring increased transparency to the process to identify, evaluate, and prioritize toll candidates. The Toll Policy outlines the overarching principles of this increased transparency, and this *Handbook* provides the implementing steps of the policy.

1.1. Purpose of the *Handbook*

NCDOT undertook this policy development effort in response to multiple challenges and opportunities. There is need to:

¹ The NC Toll Policy Development Policy refers to “priced managed lanes.” Within the toll industry, such lanes are now more commonly referred to simply as “express lanes.” For purposes of this *Handbook*, express lanes will be used to refer to new, tolled lanes added within existing non-tolled freeways.

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- Respond to regional tolling initiatives; currently, MPOs in the Raleigh-Durham and Charlotte’s Metrolina regions are considering their own tolling programs.
 - Address project acceptance challenges, to avoid the perception of “imposed will” by NCDOT, as evidenced by the reactions to the I-77 project in Mecklenburg County.
 - Define a process for project development and review, recognizing the potential benefits of implementing a programmatic policy for tolling considering current STIP programming.
 - Increase accountability through more openness and transparency, particularly as NCDOT faces the funding challenges posed by diminishing reliability of traditional funding sources for the Highway Trust Fund.

The purpose of the *NC Toll Project Development Policy Handbook* is to provide a “rule book” for implementation of the NC Toll Policy. Eligible proposed improvements and the feasibility process are defined in this *Handbook*.

The evaluation process, consistent with current state law, applies to limited access projects on new alignment, full control of access projects, the addition of express lanes on existing full control of access facilities and the conversion of other highways to fully tolled facilities, and new bridges or major bridge replacements.

The feasibility process is conducted in concert with MPOs and RPOs (referred to as Project Sponsors) and is administered through a four-step screening process. NCTA and a cross functional process work closely with Project Sponsors to identify viable projects which move through the screening process.

The target audience of the *Handbook* are MPOs and RPOs who are considering toll candidates in or near their respective geographical areas. These organizations are referred to as Project Sponsors throughout the *Handbook*. Project Sponsors are expected to initiate consideration of potential projects as toll candidates. The Toll Policy being implemented by NCDOT requires MPOs and RPOs to submit toll candidates through the Pre-Submittal Assessment (PSA) process outlined in this *Handbook*. The PSA process is outlined in **Chapter 5** of the *Handbook*. The PSA process contains a set of performance-based criteria and standards to evaluate toll candidates and describes the most appropriate places along the planning spectrum where this evaluation occurs. The PSA performance-based criteria combined with financial feasibility results produced by the Financial Feasibility Screening Tool (FFST) in **Chapter 4** provides a preliminary indication of a toll candidate’s viability. The FFST is essentially a pre-Traffic and Revenue (T&R) Study. None of the criteria in Chapters 4 or 5 are “pass/fail” criteria, but they are intended to allow the Project Sponsors to make a more informed decision on whether to submit a toll candidate to the strategic prioritization process.

1.2. Organization of the *Handbook*

The *Handbook* has been organized as follows:

- **Chapter 1** introduces the *Handbook*.
- **Chapter 2** summarizes the process for developing the underlying NC Toll Project Development Policy.
- **Chapter 3** summarizes best-practices of other state and regional tolling agencies that informed the development of the North Carolina policy implementation and potential tolled project evaluation.
- **Chapter 4** documents the underlying FFST used to assess at a conceptual level the likelihood of a project generating sufficient toll revenue to finance all or a significant part of the cost of the toll candidate.
- **Chapter 5** documents the PSA that is to be conducted in parallel with application of the FFST defined in Chapter 4.
- **Chapter 6** provides a roadmap for conducting the four-step project development process defined in the toll candidate development policy, including application of the FFST and the PSA defined in Chapter 4 and Chapter 5, respectively.

The *Handbook* also includes a series of appendices which provide supporting presentations and forms.

- **Appendix A** presents the actual NC Toll Project Development Policy as it was adopted by the NC Board of Transportation in February 2018.
- **Appendix B** is the Briefing Book prepared by the NCDOT policy development team to document considerations leading to Policy development.
- **Appendix C** presents a flow chart that conveys how the six PSA steps relate to MTP and CTP process.
- **Appendix D** presents the PSA form to submit toll candidate(s) to NCDOT for performance and financial feasibility assessment.
- **Appendix E** maps the proposed PSA steps to be followed by MPOs and RPOs under the NC Toll Policy.

2. NC Toll Project Development Policy

2.1. Policy Need

The demands being placed on North Carolina's transportation network for mobility, new and better-managed capacity, and the funding needed for critical infrastructure projects are accelerating as the state grows and revenues to fund transportation continue to be challenged. As North Carolina's demographic and economic growth continues, so too does the demand for improvements to the state's transportation system and highway network, particularly in rapidly growing urban areas such as the Metro area (Charlotte) and the Triangle area (Raleigh, Durham, and Chapel Hill). One potential solution is expanded use of toll revenues to finance highway system improvements.

From an institutional and program-delivery perspective, a comprehensive tolling vision and policy addresses multiple needs:

- **For accelerated project delivery** – toll financing removes projects from the highly-competitive push for funding using traditional state and federal funds
- **For improved management of congested corridors** – tolls are used to manage congestion by applying pricing strategies to available roadway capacity and providing a choice of travel to the motorists
- **For transparency** – a reasoned policy will give all regions of the state the ability to understand the process for selecting toll-financed projects
- **For funding flexibility** – traditional funding sources (primarily motor fuels taxes and fees) are becoming less reliable; tolls will allow NCDOT to stretch limited traditional financial resources

2.1.1. Changing Transportation Landscape and Expanding Needs

North Carolina's rapid growth, its shifting development patterns, and expanding economy create an ever-changing transportation system implementation landscape. NCDOT faces pressures to provide a transportation infrastructure that can address challenges such as:

- Increasing traffic and congestion tracking with rapid population and employment/freight growth
- Diminishing state and federal funding from motor fuel receipts reflecting improved fuel efficiency and vehicle ownership changes
- A backlog of needed highway capacity and mobility management needs due to the combination of ever-increasing travel and declining revenue

In this challenging environment for keeping people and freight moving safely, efficiently, and reliably, NCDOT faces continuing pressure to provide users with innovative, efficient, and integrated transportation solutions and multimodal choices. The growing public expectation that the program be delivered in a transparent manner, using data-driven decision-making with broad opportunity for public participation and involvement, must be met.

2.1.2. Increasing Congestion

North Carolina continues to be one of the fastest growing states in the nation, currently the ninth most populous with over 9.5 million residents and is projected to be the eighth most populous by 2040 with a population of 12.5 million. About 90% of new residents will move to five metropolitan areas: Raleigh-Durham, Charlotte, Piedmont Triad, Wilmington, and Asheville. The Raleigh-Durham area will be the state's most populous with 3.2 million residents in 2040. The Charlotte and Piedmont Triad regions will have populations more than 3 million and 2 million, respectively.

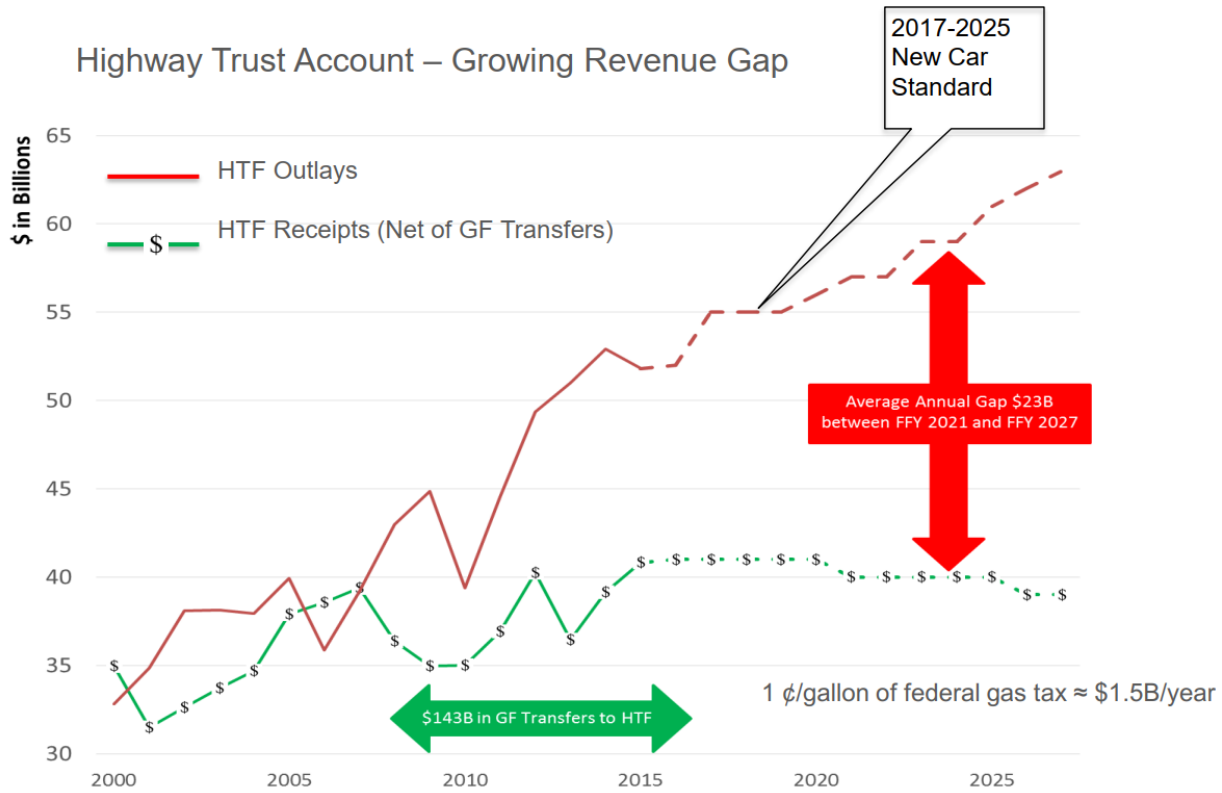
Total employment will increase to 5.7 million in 2040 from pre-recession 2007 levels of 4.1 million, according to NCDOT's 2040 Plan. With increasing population and employment comes increased need for efficient freight movement. According to the latest North Carolina State Freight Plan, freight movement by truck will

increase by 43 percent from 2015-2045. The addition of 3 million new residents presents transportation infrastructure challenges which the state will need to address if it is to retain its position of being attractive to companies considering locating here.

2.1.3. Funding Sufficiency

North Carolina cannot continue its reliance on traditional state and federal funding, primarily from motor fuel tax receipts, to address a growing backlog of transportation needs. Increasing corporate fuel economy (CAFE) standards and changes in vehicle ownership will result in revenue decline while vehicle miles of travel (demand) continue to grow. **Figure 1** shows the growing Highway Trust Account revenue gap.

Figure 1. Growing Revenue Gap



Source: NCDOT Strategic Initiatives Office

NCDOT owns and maintains approximately 80,000 miles of streets and highways. In 2012, in preparing its most recent statewide transportation plan, the 2040 Plan, NCDOT identified that \$93 billion is needed to maintain the highway system to a standard needed to preserve the infrastructure and provide the level of mobility needed to support the economy. A total of \$49 billion is needed to provide sufficient capacity, with \$19 billion of that needed just to address existing needs. Further, as shown in **Table 1** and **Table 2**, urban highway expansion needs greatly exceed non-urban needs, reflecting the state’s increasing urbanization. In the short term, urban area expansion project funding requests for the 2018–2027 STIP exceeded funding by \$1.3 billion.

The combination of highway needs and expected revenue results in a forecasted \$60 billion funding gap between anticipated revenue and documented transportation needs (2040 Plan). These needs are not just for new highway capacity but cross all modes of transportation and include safety, preservation, and mobility needs.

Table 1. 2040 Plan Highway Mobility Needs

Highway Mobility Needs, Target Level of Service	Cost (\$ in billions)
Non-Metro Expansion Needs	8,582
Metro Expansion Needs (within MPO areas)	40,564
Total Highways Expansion Needs	93,030

Table 2. P4.0 Urban Freeway Project Requests

Project Status	Identified Needs (\$ in millions)
Total Urban Free Capacity Project Requests	6,598
Urban Freeway Capacity Projects – Funded in 2018-2027 STIP	5,270
Urban Freeway Capacity Needs Gap	1,328

North Carolina’s Interstate Highway Network forms the backbone of the state’s transportation network, moving tens of thousands of trucks and hundreds of thousands of automobiles daily. As a significant subset of highway needs reported in the 2040 Plan, NCDOT is aware that the cost to upgrade its Interstate Highway Network is a very large portion of the Department’s capital budget.

- Costs to add needed capacity and rehab aging interstates over the next 25 years is \$28 billion.
- Within that number, the cost to upgrade Interstate 95 is \$5.5 billion.
- In addition, the cost to upgrade future interstates (I-87, I-587, I-42, and I-73/74) is \$3.4 billion.

Over the same 25 years, NCDOT’s total capital budget is approximately **\$32 billion**.

2.2. NC Toll Project Development Policy

NCDOT adopted a new toll policy to improve the Department’s ability to manage a reliable transportation network, address congestion, leverage limited financial resources, and provide more user choice. The NC Toll Project Development Policy (NC Board of Transportation, February 2018), defines and implements a framework of steps and actions, and expands the consideration of toll financing as an integral and important strategy to deliver critical, time-sensitive transportation solutions. This policy allows MPOs and RPOs and NCDOT to evaluate the feasibility of financing urban and rural highway improvements through levying of tolls or managed lanes pricing options. The NC Toll Policy is on the following page:

To improve the Department's ability to manage a reliable transportation network, address congestion, leverage limited financial resources, and provide more user choice, the Department shall implement a NC Toll Policy.

The NC Toll Policy, defined and implemented by a Framework of steps and actions, expands the Department's consideration of toll financing as an integral and important strategy to deliver critical, time-sensitive transportation solutions. Under this policy the Department shall:

- Evaluate the feasibility of financing high-capacity urban and rural highway improvements through levying of tolls or managed lanes pricing options. Subject to current state law these improvements could include but are not limited to: new alignment highways with full access control, improvement of existing full access control highways by addition of priced managed lanes, conversion of other highways to tolled, full access control highways by reducing direct access and adding tolled general use or managed lane capacity, or high-volume bridges over bodies of water. This Policy defines "limited access highways" as those planned for high speed traffic, with few or no at-grade intersection, limited points of access, and a median divider between traffic lanes moving in opposite directions.
- Define feasibility of tolling and priced managed lanes in cooperation with the state's Metropolitan and Rural Planning Organizations (MPOs and RPOs) and guidelines as set forth in a *Toll Project Feasibility Handbook (Handbook)*. The *Handbook* will ensure that candidate projects are financially feasible, will operate safely, are publicly vetted, and reflect sound stewardship of funds and program performance. For all toll project or priced managed lane project to be programmed and constructed by the Department, it must be approved by the nominating MPO or RPO through inclusion in their adopted Comprehensive Transportation Plan (CTP), Metropolitan Transportation Plan (MTP), or other adopted local plan. It must also advance through the state's Strategic Prioritization Process and score well enough to be included in the local Transportation Improvement Program (TIP) and the Statewide Transportation Improvement Program (STIP).

The complete NC Toll Project Development Policy is in **Appendix A**.

3. Best Practices Review of Peer States

A series of interviews were conducted in Spring 2018 to better understand the needs and project evaluation processes of the planners, designers, and operators of toll roads and express lanes across the United States and how these relate to North Carolina. These interviews were intended to focus on toll policy development and to ensure a stronger understanding of the steps other agencies take in the development, communication, and delivery of greenfield toll roads and express lanes. This effort assisted with developing a decision-making process and project financial feasibility framework and continues to facilitate the discussion of implementing tolled facilities in compliance with the NC Toll Project Development Policy.

3.1. Interviewees

The following agencies (also shown geographically in **Figure 2**) were part of the peer interviews:

- Florida DOT Central Office and Florida Turnpike Enterprise
- Georgia DOT/State Road and Tollway Authority (SRTA)
- Minnesota DOT
- Washington DOT
- Texas DOT
- Central Texas Regional Mobility Agency (Austin, TX)
- Riverside County Transportation Commission (CA)

Figure 2. Peer Interview Agencies



Additional agencies were also considered and contacted but were unable to provide sufficient details to be included in this best-practices review.

3.2. Type of Projects

The agency contacts for the peer review are diverse with variations in the size and types of toll candidates they oversee. **Table 3** provides a summary of the size and types of toll facilities operated or overseen by the peer review agencies.

Table 3. Type of Tolled Projects

Agency	Tollways	Express Lanes	Notes
Florida DOT	none	<ul style="list-style-type: none"> • 5 Express Toll Lanes (ETL) in operation • 11 ETL under construction 	Extensive use of managed lanes throughout the state. Four major regions throughout the state. 270 miles of ETL in 10 years.
Florida's Turnpike Enterprise	463 miles	<ul style="list-style-type: none"> • 1 ETL within a tollway 	Looking to include tolled express lanes with any tollway capacity expansion.
Georgia DOT/SRTA	None	<ul style="list-style-type: none"> • 1 High Occupancy Toll (HOT) and 1 ETL in operation (28 miles) • 1 ETL under construction (29 miles) 	150 miles of ETL in 10 years. SRTA now operates express bus service.
Minnesota DOT		<ul style="list-style-type: none"> • 3 HOT in operation (66 miles) • 1 HOT under construction 	Single lane operation, 6-10 a.m. and 3-7 p.m. High-Occupancy Vehicle (HOV) 2+, transit buses, motorcycles ride free. Open to traffic other times. Target is 50-55 MPH.
Washington DOT	2 Toll Bridges 1 Tunnel under construction	<ul style="list-style-type: none"> • 2 HOT in operation (31 miles) 	3 toll candidates under design including 1 ETL and 2 Greenfield projects.
Texas DOT	~70 toll facilities (roads and bridges)		Toll facilities are operated by State, Regional, County and Metropolitan Transit toll authorities. 315 miles of ETL in 10 years.
Central Texas RMA (Austin, TX)	tollways	<ul style="list-style-type: none"> • 1 ETL in operation (11 miles) 	Mix of Greenfield and ETL projects. Additional ETL in the environmental stage.
Riverside County Transportation Commission (CA)	none	<ul style="list-style-type: none"> • 1 ETL in operation (8 miles) 	1 ETL under National Environmental Policy Act (NEPA) review. Currently conducting a feasibility screening for additional ETL.

Note: HOV – High Occupancy Vehicle; HOT – High Occupancy Toll; ETL – Express Toll Lane

3.3. Project Identification and Justification

Step 1 in the North Carolina tolls project development process is initial toll candidate identification. A core aspect of project identification is project justification. To that end, one focus area of the peer review is to understand how other agencies identify and further justify tolled projects. Project identification varies by agency. Some state agencies stated that a project's need is primarily determined by local agencies in their respective planning processes. Beyond project identification, some agencies further rely on local agencies who have large roles in project management and delivery where local sales tax measures specifically list projects.

A summary of the agency considerations regarding project identification and justification include:

- Traffic Management
 - Provide enhanced mobility
 - Provide congestion relief/congestion management
 - Provide operational improvements
 - Deliver long-term solution to manage traffic flow
 - Provide more predictable/reliable travel time
- Multi-modal
 - Provide a travel choice
 - Support transit, vanpool, carpool, and park and ride
- Finance
 - Assist in project financing
 - At a minimum, cover cost to operate the express lanes with toll revenue
 - Provide revenue to fund future improvements
 - Borrow against future tolls for operations and maintenance costs
- Environmental
 - Decrease air pollution/air quality mitigation
 - Cannot build out of congestion
- Economics
 - Provide congestion- free corridors to foster economic development

Additionally, some agencies noted politics as a driver in project identification as well as prioritization.

While some agencies identified projects to address specific needs of a corridor, other agencies took a more regional approach. The regional approaches considered economic development and land use connections through focusing on connections to key activity centers and key transit connections. Some criteria used in the planning process to screen for the most viable express lanes include:

- Severity of congestion
- Travel time savings
- Proximity to employment centers
- Connections to other toll facilities
- Express commuter bus demands

3.4. Public Involvement

Public involvement is a critical component of any highway improvement project's public acceptance and delivery, but this is further heightened on toll candidates. The peer agencies uniformly agree that public engagement must be proactive, transparent, and collaborative for successful project delivery. With the way citizens get their information today, it is easy for citizens to generate and receive misinformation. This results in a great deal of energy that agencies must devote to gaining public support. Additionally, when using Public-Private Partnership (P3) for project delivery, agencies need to own the public involvement process and not ask contractors to handle it.

The one item of advice heard from nearly every agency interviewed is to start public outreach early. This cannot be overemphasized. Public outreach should start as early as possible in the planning process and be conducted continuously and proactively through construction and continue after being open to traffic. It is also important that key messages to the public are consistent throughout the project delivery process as well

as from project to project. This results in a long process, but a deliberate attempt to keep communications flowing and to limit periods of “radio silence” is needed. Several agencies mentioned the development of a communications plan for each project including webpages, videos/animations, public meetings, stakeholder briefings, social media campaigns, printed and electronic information, and grassroots outreach.

Tolled facilities require considerable coordination and collaboration. Typically, there is involvement with other state and federal agencies, elected officials, municipalities, business organizations, industry groups, community groups, and the public. Collaboration with the media is also a critical element; the media must be treated as a partner. In order to accurately relay the message, the owner agency must be proactive with media, prepare talking points, and respond back to the media in a timely fashion. Some agencies have had success with using paid media campaigns to prepare the public for these types of projects. Depending on existing relationships, a project’s sponsoring agency may need to earn media support and coverage.

Agencies use a variety of techniques when proactively engaging the public and stakeholders. Tools mentioned by the peer agencies, beyond the typical public workshops or hearings, include:

- Promotional videos
- Social media (Facebook, twitter, YouTube, Flickr)
- Community meetings, fairs, festivals
- Surveys and focus groups
- Public involvement mobile app
- Express Lane specific website
- Weekly blogs and interviews about specific elements of the project; i.e., basics of project, enforcement, toll bills, etc.

Potential tolling of any project can generate many questions from the public. **Table 4** provides common questions that tolling agencies reported receiving during the project delivery timeline.

Table 4. Commonly Asked Questions

Timing of Questions	Questions
Early Outreach through Construction	How much are the tolls? How much will it cost?
	How do I pay?
	Where does revenue go?
	Who can use facility?
	How do we use the lane?
	Will the project impact me (property taking)?
	Why am I paying twice?
	Why take the carpool lane?
	Why not widen instead of adding express lanes?
	Where are the ingress/egress points?
	When will it open?
During Operations	How do I use the express lanes?
	What are the tolls? What’s the price?
	How to open an account?
	Where can I get a transponder?
	Can the transponder be used in other States?
	What are the hours of operation?

Table 4. Commonly Asked Questions

Timing of Questions	Questions
	Can you add more access points?
	Why am I getting different invoices?
	How are lanes performing?
	What is being done to improve performance?
	Why is there still so much congestion?

3.5. Post-Implementation Results/Polling

Only a couple of agencies interviewed have conducted surveys, but others acknowledged the benefits that survey information could provide, and some stated they plan to conduct surveys soon. Based on the limited data available, the following section highlights this input.

Surveys have shown that participants were:

- Very receptive to express lanes
- Pleased with having the mobility option
- In agreement that the express lanes help their commute and reduce congestion
- Against allowing trucks in express lanes

Polls did show that in some areas, survey respondents stated that they wished lanes converted from HOV to HOT would be converted back to carpool. However, customers do acknowledge their driving time is less, stress is reduced, and that they are getting value for their money.

Agencies also noted some expected results varied once facilities were opened. Early implementers sometimes had more aggressive forecasts and are getting lower than expected revenues while newer facilities may have over corrected and are sometimes experiencing higher than expected revenues.

3.6. Challenges

The delivery of tolled projects can be challenging – a view acknowledged by many of the peer agencies. Despite that fact, many agencies focus their efforts on tolled projects due to revenue shortfalls from traditional sources as well as challenges addressing congestion. This section discusses the challenges of planning, delivering, and operating toll facilities as expressed by the peer agencies.

3.6.1. Planning / Environmental

Obtaining NEPA approval is challenging for tolled projects, particularly when tolling is not a part of the existing conditions. Typically, environmental justice concerns need to be addressed as well as properly educating the public. Some agencies take a conservative approach to clear projects with a tolling component to keep options open. Agencies also recommend obtaining NEPA approval or being well underway before moving projects forward.

Express Lanes are a hard concept for the public to understand. Agencies put a big focus on educating the public on how to use express lanes and how congestion pricing works. They also target business and property owners early in the process. There is also the challenge that even when the public is aware that a project will be dynamically priced, they have an expectation given the specific toll amounts which are typically not determined until the road opens. The public also does not understand why there cannot be a sunset of the tolls on a facility and need to be further educated on the operations and maintenance needs these toll facilities require. In other words, there needs to be as much transparency as possible in how toll pricing will work on the project.

3.6.2. Access

Many agencies struggle with vehicular access to managed lanes. Agencies would like to develop more well-defined methodologies on how ingress/egress locations are modeled and evaluated in order to have better informed outreach and communications with local stakeholders. This is further complicated when looking beyond a corridor, at a system of toll facilities where further engineering and access balance decisions need to be made. Logical termini are also a challenge as phases of a corridor are built out. There is a recognition that corridor level access locations may need to change as the network is built out but removing or moving access may be difficult for local stakeholders.

3.6.3. Design

Many express lanes are located in urbanized corridors with confined right of ways, and insertion of managed lanes likely require retrofitting existing corridors. The lack of right of way also hinders the ability to provide desirable shoulder widths (a significant issue when trying to account for enforcement and emergency pull-off areas). Agencies also experience challenges with designing merge and weave sections at managed lanes access points. Other challenges include ensuring that traffic forecasts are done in close proximity to entering into design.

3.6.4. Delivery

Some agencies experienced delivery challenges more related to contractual and construction issues rather than implementation of the express lane facility. Agencies mentioned experience with Intelligent Transportation System (ITS) devices (detectors, readers, etc.) and stated that the ITS systems need proper installation and testing by Construction Engineering and Inspection staff and that these devices can be hard to maintain.

Agencies acknowledge the need to have multiple financing tools in place for flexibility and a wide array of options for delivery such as Transportation Infrastructure Finance and Innovation Act (TIFIA), state funding, local funding, infrastructure bank, equity loan agreement, concession (private debt), and general obligation bonds. Some agencies also consider system financing as they build out their network.

3.6.5. Operations

Having standardized business rules within a region or state helps with public understanding, particularly when multiple agencies are operating tolled facilities. Users can be confused when facilities operated by different agencies connect as business/operating rules can be different (toll tags vs video tolling, HOV discounts, varying toll policies). There is also value in providing a centralized customer service center to handle the day-to-day activities, so the public can easily get concerns addressed.

The public is often skeptical of private sector or foreign investment involvement whether in toll system construction or collection. The public can be resistant to private entities collecting and controlling the tolls because they do not know if the tolls are set higher so the private entity can make money.

Several agencies stress that there should not be a cap on tolls and that there is a need for a more dynamic toll pricing to maximize revenue and meet performance targets. Agencies with HOT3+ policies also mentioned the difficulty with occupancy detection and enforcement. Further, while overall traffic flow improves with the addition of managed lane capacity, new congestion may occur in other places resulting in an overall perception that traffic has become worse in some locations. Many agencies also were unsure of the impact of autonomous and connected vehicles on toll facilities.

3.6.6. Transit

Nearly every agency stated that increased transit benefits accompanied their express lane projects. They stress the importance of ensuring that the express lanes properly connect to existing and planned transit facilities as well as how these connections affect toll segments and toll signage. Some agencies also

mentioned that if pricing continues to increase and become unaffordable for some users, this could result in increased transit ridership as well as use of park and ride facilities.

3.7. Lessons Learned Which May Be Applicable to North Carolina

The agencies interviewed as part of this effort provide a wealth of information regarding their challenges, lessons learned, and techniques to overcome their challenges. This section discusses the lessons which may be applicable to North Carolina.

3.7.1. Forecasting/Identification

Some agencies plan projects at a regional and system level and then prioritize smaller segments for phased implementation. Regardless of a system-level analysis, it would be beneficial to analyze and evaluate individual toll candidates with similar tools such as the statewide model or standardized regional models.

3.7.2. Outreach

For transparency as well as consistency in messaging and project understanding, it is important to proactively engage all agency stakeholders early and often. By coordinating with transit agencies early, a unified front is established to make sure that best recommendations and concepts are being developed for corridors. Many agencies have to break down silos between legal, financial, operations and maintenance (O&M), communications, and other departments. Strong support and involvement from the business community is also important.

Focused public education is key – many agencies acknowledge that after implementation, the public still thinks tolls are used to generate revenue rather than manage demand. One agency supplemented this with details on how additional revenues are used within the corridor and not for other portions of the region or state. Overall, ensuring that the public knows their feedback is considered and discussing the positive and negative impacts will go far in developing public acceptance of potential tolled projects.

3.7.3. Design/Delivery

There needs to be an understanding that toll candidate design and delivery is different from non-toll candidates. Design-build contracts for express lanes are quite different than traditional projects; however, these types of contracts save time on design and delivery. During the development of a toll candidate, toll system technology may become obsolete by the time the project completes construction. Alternative contracting methods could be utilized to implement the technology portion of the project so that the latest technology is installed and is compatible with the surrounding systems. It is also important to ensure that the contractor is qualified to handle ITS equipment.

Design should identify enforcement and refuge areas early in the planning and design process. These can be difficult to retrofit practically if sizing for transit storage. Also, be sure design commitments are feasible and achievable. Consider reducing general purpose lanes or shoulders to give more space to express lanes for better performance.

3.7.4. Operations

Agencies need to consider having a dedicated team of operational and administrative staff available to respond to unanticipated issues. Active monitoring of the toll operations requires more operations budget and resources and evolving technology when more integrated corridor management and automated and connected vehicles come on-line.

Agencies should focus policy on traffic and system performance rather than revenue generation. The development of specific and meaningful performance metrics is key to public understanding and acceptance. Make raw data available to increase transparency and discuss the positive and negative impacts on

commutes. Accomplish this by using a third party to conduct surveys. Agencies typically do a better job at conducting pre- and post-implementation surveys of public experience and tracking effectiveness.

4. Financial Feasibility Framework

The NC Toll Project Development Policy allows MPOs, RPOs, and NCDOT to evaluate the feasibility of financing urban and rural highway improvements through levying of tolls or managed lanes pricing options. This chapter documents the development of the FFST to provide a high-level indication of the potential use of tolled revenues to finance or off-set toll candidate costs before conducting more detailed and rigorous T&R studies. FFST allows users to assess four types of transportation improvements: (1) new alignment highways with full access control; (2) improvement of existing full access control highways by addition of express lanes; (3) conversion of other highways to tolled, full access control highways; and (4) new bridges or major bridge replacements. This chapter explains the structure and functions of the analytical tool to help users understand the processes and concepts behind the modeling mechanisms.

Financial feasibility is one element of the overall PSA, discussed in more detail in **Chapter 5**, which outlines how and where PSA evaluation of tolling candidates can be incorporated within North Carolina's current project planning process. Specifically, it provides more details regarding the performance-based criteria and standards to evaluate future toll candidates and describes the most appropriate places along the planning spectrum where this evaluation will occur. The performance-based criteria are informed by NCDOT's current strategic prioritization project-based scoring criteria and, when combined with financial feasibility tests outlined in this chapter, form the basis of a holistic, preliminary indication of the toll candidate's viability. Therefore, the financial components from this chapter combined with the performance-based components outlined in **Chapter 5** act as inputs into an overall PSA tool which will operationalize the toll candidate's feasibility evaluation process.

The Toll Policy implemented by NCDOT requires MPOs and RPOs to submit potential toll candidates through the PSA process outlined in this *Handbook*. The PSA process is not a "pass/fail" set of criteria. The financial feasibility testing outlined in this chapter will be used as a guide to local planning officials whether to continue to pursue advancing a toll candidate. The results from a PSA analysis are for information only; they do not preclude a project sponsor from submitting the toll candidate for project prioritization scoring nor deter NCDOT from receiving the project in strategic prioritization. The decision whether to submit a toll candidate for prioritization will be done by local planning officials.

As part of the PSA process, a project sponsor is required to populate a PSA form. This document captures key project information in order to initiate the assessment of a toll candidate and serves to kick off engagement with the IDPET as part of project analysis. A subsequent step in the PSA process is for the project sponsor to implement the FFST to get an initial indication of a toll candidate's ability to generate sufficient revenue to cover Operations and Maintenance (O&M) and potentially a portion of capital costs. In order to streamline and simplify data entry across these two files, NCDOT included a script file in the downloadable package of PSA files. The script file is an executable file (PSAProcessor.exe) that a user opens and runs in order to populate certain data fields in the FFST. Users follow this process if they choose to leverage the script file:

1. Open the PSA Processor folder
2. Open, populate, save, and close the pdf version of the PSA form. Do not change the file name
3. Click on the executable file and select run (the Excel-based FFST in the directory will automatically be updated and saved). A new excel file will be created (i.e. Single-Run-output.xlsx)
4. Open the Single-Run-output.xlsx file and continue to populate information required to perform the financial feasibility assessment.

It is important that the user not change the file names of either the pdf-based PSA form or the Excel-based FFST, or relocate these files to different locations, since the script file references these files as it runs.

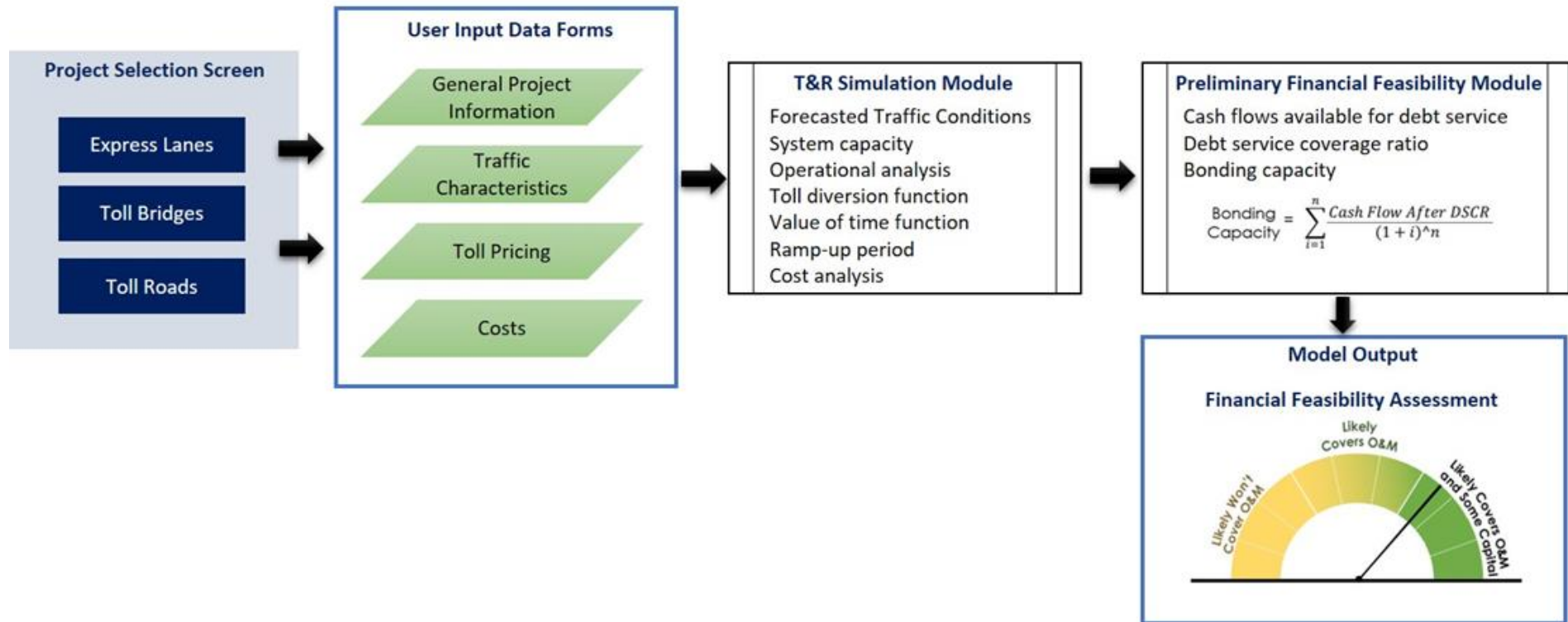
The FFST is a Microsoft Excel-based spreadsheet (model shown in **Figure 3**). The methodology is consistent with generally accepted forecasting principles used for evaluating tolled facilities, but is simplified with industry standard assumptions for the development of this financial feasibility screening tool. The tool

generates order-of-magnitude forecasts of the ability of toll revenues to cover not only operating and maintenance costs, but also the ability to contribute upfront funding toward construction costs through financing.

The FFST is meant to be illustrative in nature and is intended to provide a scale of possible outcomes rather than a precise estimate. The assessment is not adequate to support the financing of a project and more detailed analyses are required to support decision making on whether to move forward as a toll candidate.

The FFST provides the flexibility to assess new facilities or the conversion or upgrade of existing infrastructure to tolled facilities. The FFST is structured around three project categories: express lanes, toll bridges, and toll roads. This section describes the analytical framework of the financial tool, including modeling inputs, basic assumptions, and suggested parameters, to provide a preliminary determination of the viability of a toll-supported project.

Figure 3. Model Overview



4.1. Input Data

The FFST relies on user-inputs to provide basic project information. Required inputs and initial assumptions are intended to be readily available to users. The tool, however, provides “reasonable assumptions” as default values for certain elements that NCDOT or the user can supersede if better data is available. **Table 5** summarizes the model inputs required for each project type.

Table 5. Summary of Model Inputs

		User Inputs			Suggested Values with Supersede Capabilities
		Express Lanes	Toll Bridge	Toll Road	
Project Information	Project Identification Number	✓	✓	✓	
	Corridor/Bridge Name	✓	✓	✓	
	Corridor/Bridge Length (centerline miles)	✓	✓	✓	
	Total No. of General Purpose (GP) lanes (both directions)	✓	✓	✓	
	Total No. of Proposed Express Lanes (both directions)	✓			
	Project Location (county)	✓	✓	✓	
Traffic Characteristics	Opening Year	✓	✓	✓	
	Opening Year AADT	✓	✓	✓	
	Design Year	✓	✓	✓	
	Design Year AADT	✓	✓	✓	
	AADT Average Annual Growth Rate (%)	(1)	(1)	(1)	
	Truck Percentage	✓	✓	✓	
	Share of Toll-Exempt Vehicles	✓			
	Peak Period Characteristics	✓			
	Average Time Savings Compared to Alternate Route (minutes)		✓	✓	
	Intermediate Access Control Points?	✓		✓	
	Average Trip Length (%)	✓		✓	
	Value of Time (VOT) (\$/hour)				✓
	Toll Pricing	Electronic Toll Collection (ETC), Car Toll Rate (\$/mile)			
ETC, Truck Toll Rate (\$/mile)					✓
Bill by Mail (BBM), Car Toll Rate (\$/mile)					✓
BBM, Truck Toll Rate (\$/mile)					✓
Annual Rate Increase (%)					✓
Indexation Base Year					✓
Cost Data	Indexation Base Year	✓	✓	✓	
	Construction Duration (years)	✓	✓	✓	
	Roadway/Bridge Capital Improvement Costs	✓	✓	✓	
	Toll System Capital Improvement Costs				✓
	Roadway O&M (\$/lane-mile)				✓
	Bridge O&M (\$/deck area)				✓

Notes: (1) Automatically calculated based on user inputs.

Model inputs are divided into four categories:

- **Project Information.** This category groups general characteristics of the project. Some of the data are used as descriptive information to summarize the characteristics of the facility. Other data entries are necessary to estimate roadway capacity and other parameters for each year of the study period (e.g., number of transactions, revenues).
 - Project Identification Number
 - Corridor/Bridge name
 - Length of tolled project (centerline miles)
 - Number of general purpose lanes (total, both directions)
 - Proposed number of express lanes (total, both directions)
 - Project location – Enter the county (or counties) to reflect the geographical location of the project

- **Traffic Characteristics.** This category includes information about the existing and expected traffic conditions.
 - Opening Year – Year the toll candidate is expected to open.
 - Opening Year Annual Average Daily Traffic (AADT) – Bi-directional estimate of traffic volume in opening year. AADT is assumed to be toll-free demand and to reflect the annualized daily travel normalized for seasonal and weekday/weekend variations. Enter length-weighted AADT across all roadway segments in instances where intermediate access points exist. Collect information from regional or statewide travel demand model.
 - Design Year – Future forecast year of traffic demand, usually 20 years from the opening year.
 - Design Year AADT – Bi-directional estimate of traffic volume for design year, usually covering at least a 20-year projection into the future from the opening year. AADT is assumed to be toll-free demand and to reflect the annualized daily travel normalized for seasonal and weekday/weekend variations. Enter length-weighted AADT across all roadway segments.
 - AADT Average Annual Growth Rate (%) – The average annual traffic growth rate is automatically calculated based on opening year AADT and design year AADT. It is common practice to reduce traffic growth projection over the long term, especially after the design year. Hence, past the design year, the model reduces the average annual growth rate. The maximum annual growth rate after the design year is 0.75%. This approach provides a more conservative forecast that considers a more mature facility, future capacity constraints, and uncertainty in socioeconomic growth.
 - Truck percentage (%) – The average percent of truck traffic between the opening year and design year.
 - Average time savings compared to alternate route (minutes) – Average time, in minutes, that the new toll facility is expected to save users relative to the next-best competing route. Extract from regional or statewide travel demand model or approximate using a mapping tool (e.g., Google Maps).
 - Intermediate access points – This parameter refers to whether there are multiple access points (i.e., points of ingress or egress) where vehicles can enter express lanes from the general use lanes or exit the express lanes to the general use lanes. Intermediate ingress and egress points may also include access to surrounding roadway networks directly to or from express lanes or toll roads. Select Yes or No.
 - Share of Toll-Exempt Vehicles (%) – Share of AADT allowed to use the express lanes for free (e.g., emergency vehicles, transit buses/vanpools, HOT3+²).

² Managed lane designation where vehicles with 3 or more occupants are permitted in the toll lanes at no charge.

- Trip length percent – Select average length travelled by vehicles as opposed to entire trip length. If no intermediate access points, trip length is 100%. If intermediate access points are available, three options are provided: High (90%), Medium (75%), and Low (50%).
- Value of Time (\$/hour) – Suggested values of time based on the P6.0 prioritization process, Automobiles are assumed to have a value of time savings of \$12.50/hour while trucks are assumed to have a value of time savings of \$50.00/hour.
- Peak period characteristics – Applicable for express lane projects. A drop-down list menu is provided to select the duration of the peak periods of congestion. Peak hour factor assumptions are shown in **Table 6**.

Table 6. Peak Period Traffic Characteristics

Length of Peak Hour	k-factor (K)	Directional distribution factor (D)
3 hrs (1.5 hrs AM/1.5 hrs PM)	0.10	62%
4 hrs (2 hrs AM/2 hrs PM)	0.09	58%
6 hrs or more (3+ hrs in both AM & PM)	0.08	54%

Note: Generally accepted values for urban facilities.

- **Toll Pricing.** (See **Table 7**). The general assumption is that tolls will be collected electronically via overhead mainline gantries using both electronic toll collection (ETC) and video toll collection (VTC). The NCTA VTC program is named Bill by Mail (BBM). This section of the worksheet provides suggested ETC and BBM toll rates. ETC rates are 35% lower compared to BBM transactions, which is consistent with North Carolina’s current policy.
 - Car toll rate (\$/mile)
 - Trucks toll rate (\$/mile) – includes three or more axles
 - Annual rate increase (%) – annual rate to increase toll rates, suggested value of 2% is provided
 - Indexation base year – year of constant-dollar value of toll rates

Table 7. Type of Tolled Projects – Toll Rate (\$/mile)

	Express Lanes	Toll Bridges/Tunnels	Toll Roads
ETC, Car toll rate	<i>Refer to Table 10. Suggested rates are based on usage of the express lanes</i>	\$1.00	\$0.15
ETC, Truck toll rate		\$2.00	\$0.60
BBM, Car toll rate		\$1.53	\$0.23
BBM, Truck toll rate		\$3.06	\$0.90

* Toll rates expressed in 2018 dollars.

- **Costs.** This category groups capital, operations, and maintenance cost data necessary to evaluate the net revenue potential of a toll candidate. **Section 4.3**, Capital, Operation, and Maintenance Costs, provides details about the assumptions behind the suggested default values. Data inputs include:
 - Indexation base year – Year of constant-dollar value of costs
 - Construction duration (years)
 - Roadway/bridge capital improvement cost – Total capital cost for roadway or bridge improvements, includes project development and construction costs
 - Roadway O&M cost (\$/lane-mile) – Unit cost of routine maintenance to preserve pavement condition
 - Bridge O&M cost (\$/deck area) – Unit cost of routine maintenance to preserve bridge conditions

- Toll system implementation cost – Start-up costs associated with implementing an electronic tolling system (e.g., computer technology, gantries, transponder readers); refer to **Section 4.3.1**, Toll System Capital Costs, for details about suggested values.
- Annual inflation rate (%) – Annual rate to adjust constant-dollars to nominal dollars (i.e., year-of-expenditure dollars)

4.2. Traffic and Revenue Simulation Module

This section describes the modeling process used to estimate the T&R potential of tolled facilities in North Carolina. Two traffic forecasting models were developed due to different project characteristics: one for express lane projects and another for toll roads and toll bridges.

4.2.1. Express Lanes

The T&R model assumes that a baseline general purpose (GP) volume must be saturated before a level of congestion or delay is reached such that any traffic is willing to pay for the express lanes. The model uses the opening year AADT, the proposed number of express lanes, and the existing number of GP lanes to estimate baseline volumes based on capacity constraints shown in **Table 8** and **Table 9**. Usage of the express lanes is predicated on the overall level of traffic demand above the baseline volume in the GP lanes and the available capacity in the express lanes. Traffic projections in the express lanes for early years are adjusted downward based on experience with similar projects to reflect the time that it takes the driving public to recognize any potential benefits of using the facility (see ramp-up period assumptions in **Section 4.2.3.2**). Average daily traffic projections are converted to vehicle-miles traveled (VMT) by multiplying traffic volumes time the corridor length. Annual VMT is calculated by multiplying daily VMT by an annualization factor.

To estimate express lane annual gross revenue, a “base” toll rate per mile is assumed based on usage of the express lanes shown in **Table 10**. Base toll rates for 0% and 100% were established based on the minimum and maximum toll rates from the I-77 Managed Lanes Investment Grade T&R Study report³. The model allows the user to supersede the suggested minimum toll rate for conditions where traffic demand is at 0% of capacity. The remaining rates (i.e., 25% to 100%) are automatically populated based on a multiple of that base rate. When GP lane demand is greater than 95% of capacity, the model automatically increases the base rates per mile by a factor of two. Peak hour rates are 1.25x higher than base rates. **Figure 4** shows the comparison of daily versus peak-hour rates based on the current toll rates coded in the model.

Additional adjustments to estimated gross toll revenues include: an annual inflationary toll rate increase and a three-year ramp-up period for toll collections. Costs for recovery of lost revenue to account for toll violations are not included due to the scope of this financial feasibility screening tool. The precision to estimate revenues from toll violations will require adding more granularity to the analysis.

³ C&M Associates, April 2015

Table 8. Hourly Capacity Per Lane

Facility Type	Capacity (veh/hour/lane)
Baseline Express Lane Capacity	1,260
Max Express Lane Capacity	1,400
Baseline General Purpose Lane Capacity	1,600
Max General Purpose Lane Capacity	2,000

Source: Baseline and maximum hourly capacity of general purpose lanes based on Triangle Regional Travel Demand Model. Express lane capacity estimated at 70% of GP capacity based on national experience to maintain operating speed of 45 mph.

Table 9. Daily Capacity Per Lane

Facility Type	Capacity (veh/day/lane)
Baseline Express Lane Capacity	13,860
Max Express Lane Capacity	15,400
Baseline General Purpose Lane Capacity	18,000
Max General Purpose Lane Capacity	22,000

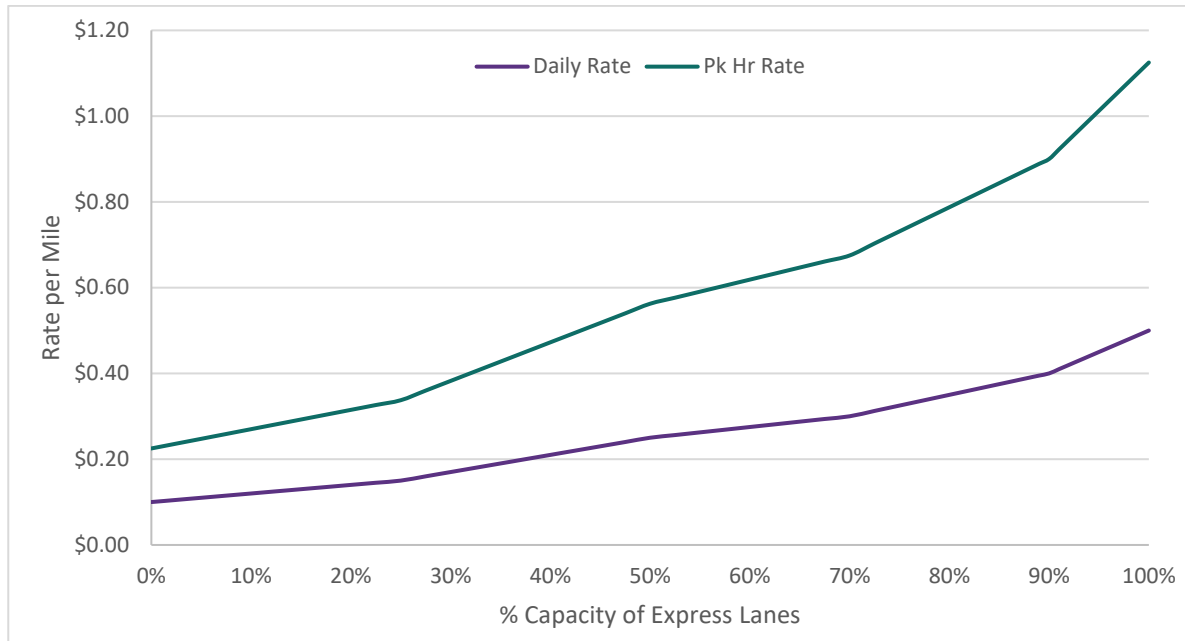
Source: Baseline and maximum capacity of general purpose lanes based on Triangle Regional Travel Demand Model. Express lane capacity estimated at 70% of GP capacity based on national experience to maintain operating speed of 45 mph.

Table 10. Base Toll Rates per Mile – Express Lanes (2018 dollars)

EL % Capacity	Base Daily Rate	Peak Hour Rate
0%	\$0.10	\$0.23
25%	\$0.15 (1.5x)	\$0.34
50%	\$0.25 (2.5x)	\$0.56
70%	\$0.30 (3.0x)	\$0.68
80%	\$0.35 (3.5x)	\$0.79
90%	\$0.40 (4.0x)	\$0.90
100%	\$0.50 (5.0x)	\$1.13

Note: (X) – multiple based on toll rate at 0% capacity

Figure 4. Rates per Mile, Daily vs. Peak Hour Rates (2018 dollars)



4.2.2. Toll Roads and Toll Bridges

Traffic demand for toll roads and toll bridges is predicated on:

1. toll-free demand
2. the anticipated share of trucks and passenger cars
3. a general toll diversion model

The model uses the opening year AADT to estimate baseline volumes under toll-free conditions. Toll-free demand projections are adjusted to account for the traffic that would divert to other highways to avoid paying a toll. The toll diversion model is a basic binary logit equation commonly used in practice to estimate the share of traffic willing to pay a toll based on a comparison of travel times between the toll facility and the best toll-free alternative route.

Toll Share = $1 / (1 + e^U)$, where

- α = time coefficient
- β = cost coefficient
- Toll Share = Probability of selecting a toll road
- e = Base of natural logarithm (ln)
- $U = \alpha * (Time_{TR} - Time_{FR}) + \beta * (Cost) + C_{TR} + C_{ETC}$
- Time_{TR} = Toll road travel time in minutes
- Time_{FR} = Non-toll road travel time in minutes
- Cost = Toll in dollars
- C_{TR} = Constant for toll road bias
- C_{ETC} = Constant for ETC bias

The time coefficient (i.e., alpha) and toll road bias coefficients were adopted from: (1) a national scan of toll road facilities⁴; (2) calibrated model work performed for the I-77 Express Lanes in Charlotte, NC; (3) the Mid-Currituck Bridge in Currituck County, NC; and (4) the North Carolina I-95 Economic Assessment. Time

⁴ Central Texas Turnpike System, Manor Expressway, Phoenix MPO, South Jersey TDM

coefficients for home-based work (HBW), home-based other (HBO) and non-home based (NHB) were combined into a single category for planning-level purposes. The FFST uses the value of time to estimate the cost coefficient (β). Based on the P6.0 prioritization process, automobiles are assumed to have a value of time savings at \$12.50/hour, and trucks are assumed to have a value of time savings at \$50.00/hour. Suggested VOTs can be superseded by NCTA or local users if more precise information is available. **Figure 5** shows the toll share curve for travel time savings of 15 minutes for passenger cars. **Table 11** shows the toll share coefficients adopted for this study.

Additional adjustments to estimate gross toll revenues include an annual inflationary toll rate increase, set at 2%, and a three-year ramp-up period for toll collections. Fines for recovery of lost revenue to account for toll violations are not included due to the scope of this financial feasibility screening tool. The precision to estimate revenues from toll violations will require adding more granularity to the analysis.

Figure 5. Toll Share Curve for Travel Time Savings of 15 minutes – Passenger Cars

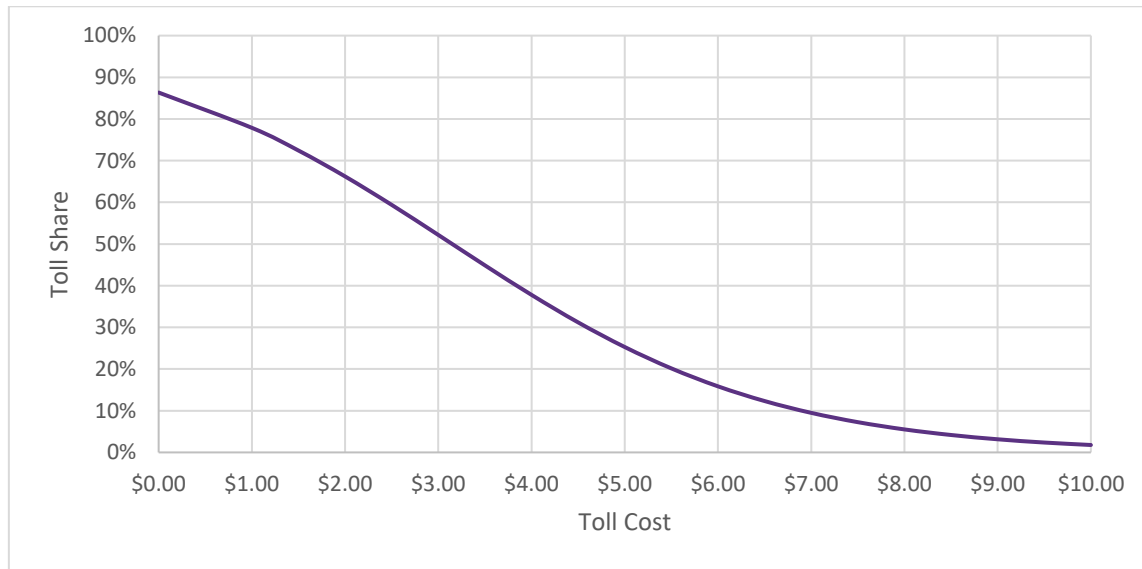


Table 11. Generic Toll Share Model Coefficients

	Base Toll Share Model	
	Passenger Cars	Trucks
Value of Time (VOT) - \$/hour	\$12.50	\$50.00
Time Coefficient (alpha)	0.122	0.091
Cost coefficient (beta)	0.558	0.146
Net Constant (toll & ETC bias constant)	-0.014	0.380

4.2.3. Revenue Adjustments

4.2.3.1. Annualization Factor

Annual revenue estimates are calculated by multiplying average daily VMT by an annualization factor. The model assumes 320 days.

4.2.3.2. Ramp-Up

Traffic in the first few years after opening is adjusted downward to reflect the time that it takes the driving public to recognize any potential benefits of using a new toll facility. The model currently uses a three-year ramp-up period based on previous traffic and revenues studies conducted in North Carolina and industry standards with similar projects.

- First year – 60%
- Second year – 80%
- Third year – 95%

4.2.3.3. ETC Market Share

It is assumed that tolls are collected electronically via overhead mainline gantries using both existing toll collection and video toll collection, consistent with the existing toll collection methods used on the Triangle and Monroe expressways. Motorists without an ETC transponder will be billed by mail (BBM). The assumed market share of ETC versus video transactions is presented in **Table 12**. These assumptions (i.e., ETC vs. Video) are based on actual experience from the Triangle Expressway⁵ and ETC penetration rates from other facilities in the United States.⁶

Table 12. Assumed ETC Market Share

Year	ETC	Video	
		I-Toll	BBM
1	60%	8%	32%
2	62%	8%	30%
3	64%	7%	29%
4	66%	7%	27%
5	68%	6%	26%
6	70%	6%	24%
7	72%	6%	22%
8	74%	5%	21%
9	76%	5%	19%
10	78%	4%	18%
11+	80%	4%	16%

4.2.3.4. Unbillable and Uncollectible Toll Transactions

Gross toll revenues are adjusted to reflect unbillable and uncollectible BBM toll transactions. Two different transaction types are assumed:

- **Pre-paid transponder transactions.** These include transponder transactions that have a toll associated with them, including I-Toll transactions (license plate-based transactions matched to existing transponder accounts).
- **Video toll transactions.** These transactions occur when no valid transponder transaction is recorded, but do not include I-Toll transactions (which are included with pre-paid transponder transactions). Recovery of revenue involves license plate image processing, vehicle owner identification, video toll invoicing, payment processing and violation processing.

⁵ North Carolina Turnpike Authority, Operations Statistics Report, October 26, 2018.

⁶ Maryland Transportation Authority; 2016 National Toll Technology Survey (IBTTA);

Transaction flow assumptions are summarized in **Table 13**. Collectible versus uncollectible assumptions for the first year are based on actual experience from Triangle Expressway. During 2015, NCTA was able to invoice 90.2% of BBM transactions on the Triangle Expressway. Approximately 6.7% of total BBM transactions were unbillable based on license plate images that could not be processed due to missing, blocked, or damaged license plates, unreadable images, or other reasons. An additional 3.1% of BBM transactions were unbillable based on insufficient vehicle owner address information. These operating statistics show that 9.8% of BBM transactions were uncollectible/unbillable in 2015.⁷

Table 13. Transaction Flow Assumptions

Year	ETC	I-Toll	Video	Collectible	Unbillable/ Uncollectible
1	60%	8%	32%	92%	8%
2	62%	8%	30%	92%	8%
3	64%	7%	29%	93%	7%
4	66%	7%	27%	93%	7%
5	68%	6%	26%	94%	6%
6	70%	6%	24%	94%	6%
7	72%	6%	22%	94%	6%
8	74%	5%	21%	95%	5%
9	76%	5%	19%	95%	5%
10	78%	4%	18%	96%	4%
11+	80%	4%	16%	96%	4%

4.3. Capital, Operation, and Maintenance Costs

Revenues generated from toll facilities are typically used to fund ongoing roadway and tolling O&M expenses. In some cases, toll revenue is also used to contribute to the financing of the project's upfront capital costs. This section details capital O&M cost assumptions to estimate net toll revenues and ultimately the bonding capacity of projects.

4.3.1. Toll System Capital Costs

Toll system capital costs include the cost for equipment and necessary infrastructure within the tolling zones. Also included are the costs of all associated systems, software, and offsite components to successfully process toll transactions. Toll system implementation costs can vary considerably from one project to another depending upon site conditions and infrastructure in place. For planning purposes, capital cost estimates were compiled from estimates developed for the Triangle Expressway, the Monroe Expressway, the Mid-Currituck Bridge, the North Belt Freeway in Arkansas, the Express Lane network in Atlanta, GA, and I-77 Express Lanes in Charlotte which are provided in **Table 14**, **Table 15**, and **Table 16**. The model uses \$422,000 per lane-mile for toll roads, \$250,000 per lane-mile for toll bridges; and \$450,000 per lane-mile for express lane projects. Suggested costs, however, can be superseded by NCTA or local users if more precise information is available.

⁷ North Carolina Monroe Expressway, Traffic and Toll Revenue Study, Final Report, November 2016.

Table 14. Planning-level Toll System Capital Costs per Lane-Mile – Toll Roads (2018 dollars)

Facility	State	Cost/Lane-mile
Sugarloaf Parkway Extension	GA	\$519,000
Monroe Expressway	NC	\$368,000
North Belt Freeway	AR	\$315,233
Triangle Expressway	NC	\$476,000
	Median	\$422,000

Sources: Sugarloaf Parkway Extension (Traffic and Revenue Study, HNTB, 2018); Monroe Expressway (Supplement to Preliminary Official Statement, January 2017, Monroe Expressway Toll Revenue Bonds, Series 2016); North Belt Freeway (North Belt Freeway Toll Feasibility Study, ATKINS, 2014)

Table 15. Planning-level Toll System Capital Costs per Lane-mile – Express Lanes (2018 dollars)

Facility	State	Cost/Lane-mile
SR-400	GA	\$235,000
I-285	GA	\$450,000
I-77	NC	\$496,000
	Median	\$450,000

Source: SR-400 and I-285 (Express Lane Network Study, HNTB, 2018); I-77 (I-77 Feasibility Study, HOV/HOT Conversion, 2010). I-77 costs inflated to 2018 dollars assuming 2.5% inflation rate.

Table 16. Planning-level Toll System Capital Cost per Lane-Mile – Toll Bridges (2018 dollars)

Facility	State	Cost/Lane-mile
Mid-Currituck Bridge	NC	\$250,000

Source: Financial Plan Mid-Currituck Bridge, 2019

Note: 12% contingency was added to estimate in financial plan due to single data point.

4.3.2. Tolling Renewal and Replacement (R&R) Costs

Periodic renewal and replacement (R&R) expenses are recurring, non-annual maintenance activities needed to maintain and upgrade the system over time. Tolling and ITS equipment replacements are based on varying life cycles of the infrastructure. **Table 17** shows a sample of replacement schedule assumptions used in practice. Annual average unit costs were developed based on R&R costs from the Triangle Expressway, the Mid-Currituck Bridge, and detailed tolling R&R cost estimates recently developed for tolled projects in Georgia. The following average annual unit costs per lane-mile are used: \$36,000 for toll roads, \$20,000 for toll bridges, and \$45,000 for express lanes. All costs are expressed in 2018 dollars and annual inflation of 2.5% is assumed (**Table 18** and **Table 19**).

Table 17. Typical Tolling Rehabilitation and Repair Schedule

Item	Equipment Type	Replacement Schedule (years)
Computer hardware	Tolling	3
Network management system SRTA	Tolling	7
TMC to toll system integration	Tolling	7
Network switches	Tolling and ITS	7
TMC Upgrade	ITS	7
Uninterruptible Power Supplies (UPS)	Tolling and ITS	10
CCTV system	Tolling	10
Back office toll collection system	Tolling	10
Toll gantries	Tolling	30

Table 18. Annual Average Tolling R&R Costs per Lane-Mile – Toll Roads, Toll Bridges, and Toll Road Conversions

Facility	State	Cost/Lane-mile
Sugarloaf Parkway Extension	GA	\$57,000
Monroe Expressway	NC	\$31,000
North Belt Freeway	AR	\$41,000
Triangle Expressway	NC	\$31,000
	Median	\$36,000

Sources: Sugarloaf Parkway Extension (Traffic and Revenue Study, HNTB, 2018); Monroe Expressway (Supplement to Preliminary Official Statement, January 2017, Monroe Expressway Toll Revenue Bonds, Series 2016); Triangle Expressway (NCTA, Financial Statement, 2018); North Belt Freeway (North Belt Freeway Toll Feasibility Study, ATKINS, 2014)

Table 19. Annual Average Tolling R&R Cost per Lane-Mile – Express Lanes

Facility	State	Cost/Lane-mile
SR-400	GA	\$30,000
I-285	GA	\$60,000
I-77	NC	Not available
	Median	\$45,000

Source: SR-400 and I-285 (Express Lane Network Study, HNTB, 2018).

4.3.3. Tolling System Operations and Maintenance Costs

The cost to operate and maintain the tolling system is commonly divided into two main categories: fixed costs and variable costs. Variable costs are related to vehicle transaction costs while fixed costs are related to contracts for enforcement, equipment maintenance, utilities, insurance, and administrative staff. Toll costs

were reviewed from various national existing toll facilities and planned facilities to develop conceptual unit costs⁸ (Table 20). Costs are in 2018 dollars and annual inflation of 2.5% is assumed.

Table 20. Tolling O&M Cost Assumptions

O&M Item	Unit	Assumption
ETC toll cost	Per transaction	\$0.15
Image toll cost	Per transaction	\$0.25
Video toll cost	Per transaction	\$0.50
Cost per non-tolled vehicle transaction	Per transaction	\$0.01
Annual toll system maintenance	Lane-miles	\$80,000
Annual cost per trooper	annual	\$125,000
Number of Troopers (1 trooper every 8-hour shift)	n/a	3
Percent of Gross Revenue paid by credit card	percent	90%
Credit card fees	percent	2.2%

4.3.4. Project Development and Capital Costs

Information provided by NCDOT and/or local agencies.

4.3.5. Roadway and Bridge Operations and Maintenance Costs

Roadway O&M cost estimates are based on lane-mile costs compiled from other agencies.⁹ Based on six data points, the average roadway O&M cost per lane-mile is \$25,000 (2018 dollars). This cost covers routine (e.g., mowing, sign repair) and preventive maintenance repairs (i.e., mill and overlay) but excludes major rehabilitation or reconstruction repairs. For toll bridges, a unit cost of \$0.05 per square feet of deck area (2018 dollars) per year is assumed to cover preventive maintenance repairs (e.g., joints, bearings, drainage). The bridge unit cost was adopted from the financial plan developed for the Mid-Currituck Bridge.

4.4. Financial Feasibility Module

Using traffic and revenue inputs, along with cost information, the financial feasibility module calculates the ability of a toll candidate to generate revenue to cover its own costs of operation and to assess its ability to fund all or a portion of the capital costs through toll financing. Prior to the implementation of tolls and issuance of debt, however, significant additional analyses will be required.

The assessment integrates the revenue forecast and the O&M expenditures forecast to determine “net” cash flows available for debt service (CFADS). The use of net toll revenues in the analysis assumes that O&M costs are paid from toll revenues first, and then the remaining toll revenues are available for debt service payments (Figure 6). Debt providers require annual debt service coverage ratios (ADSCR) for all project financings, and minimums are established based on the perceived level of risk. Since terms and covenants of bonds vary from transaction to transaction, a debt service coverage ratio of 2.0 is assumed for the purposes of this planning-level tool, which is illustrative of a Better Business Bureau (BBB) category rating.

⁸ Kansas Turnpike Authority, Virginia DOT, New Hampshire Turnpike System, Triangle Expressway (NC), Sugarloaf Parkway (GA), Express Lanes Network in Georgia, and New York State Thruway Authority

⁹ Florida’s Turnpike Enterprise, Miami-Dade Expressway, Orlando-Orange County Expressway Authority, Tampa-Hillsborough County Express Way.

Cash flows available after covering for debt service are discounted by 4.5% to determine the amount of debt a project can use for financing (i.e., bond capacity). The 4.5% reflects the current average market rate for bonds sold in the capital markets frequently used for toll candidates. The feasibility assessment is tied to three conditions levels (depicted graphically in **Figure 7**):

1. Likely covers O&M and portion of Capital – If the pointer falls in this region, it means the project presents positive financial flexibility, that is, future toll revenues will likely cover not only operating and maintenance costs, but also the ability to contribute upfront funding towards construction costs through financing.
2. Likely covers O&M only – If the pointer falls in this region, it means the project has potential financial flexibility, that is, future toll revenues will likely cover operating and maintenance costs but are not enough to contribute upfront funding towards construction costs through financing.
3. Likely won't cover O&M – If the pointer falls in this region, it means the project will likely require additional funding sources to operate and maintain.

Condition levels are further divided into three equal parts to indicate how projects perform within each of the financial feasibility condition levels. The feasibility assessment uses two performance criteria:

- Operating Margin (%) – Measure of operating efficiency. A higher margin is desirable. Example: An operating margin of 20% means that 80% of revenues are used to operate and maintain the toll road. A negative margin means that O&M costs exceed revenues.
- Bonding Capacity (%) – Measures the capacity of borrowing debt backed by future toll revenues to fund all or a portion of the capital costs. A higher percentage is desirable. Example: A bonding capacity of 30% means that 30% of capital costs can be supported through a toll financing.

Figure 6. Flow of Funds

Gross Potential Toll Revenues (GPTR)

Less: O&M and R&R estimates

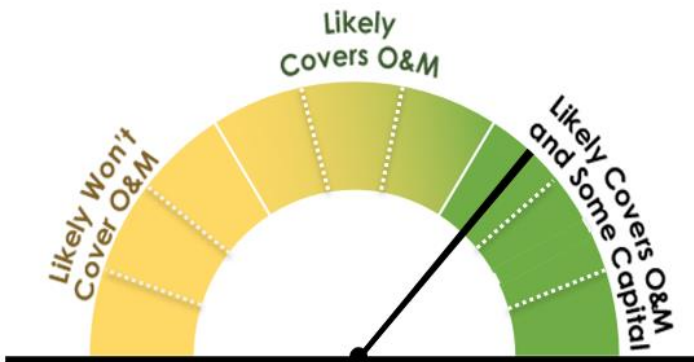
= Cash flow available for debt service (CFADS)

Multiply: % Revenue Cut

= Cash flow available after DSCR

$$\text{Bonding Capacity} = \sum_{i=1}^n \frac{\text{Cash Flow After DSCR}}{(1 + i)^n}$$

Figure 7. Financial Feasibility Screening Dial



5. Pre-Submittal Assessment

This chapter outlines how and where PSA evaluation of tolling candidates is incorporated within North Carolina's current transportation project planning process. Specifically, it provides more details regarding application of performance-based criteria and standards to evaluate candidate toll candidates and describes the most appropriate places along the planning spectrum where this evaluation will occur. The PSA performance-based criteria combined with financial feasibility results produced by the FFST (**Chapter 4**) provide a preliminary indication of a toll candidate's viability. Viability is defined by the project's performance and financial feasibility for advancement and consideration for submission to NCDOT's strategic prioritization process as determined through PSA.

PSA performance-based criteria relates to, but does not replicate, NCDOT's current, adopted strategic prioritization scoring criteria. It must be recognized that these PSA performance-based criteria are calculated prior to the strategic prioritization criteria scoring period, and thus there may be some differences in the strategic prioritization scoring results. The criteria outlined in this chapter currently relates to strategic prioritization 6.0 (or P6.0). These criteria will be updated for future strategic prioritization cycles.

Outside of a "grandfather" provision outlined in **Chapter 6**, NCDOT requires future toll candidates expected to be submitted to strategic prioritization to go through the PSA process as described in this *Handbook*. However, the PSA process is not a "pass/fail" set of criteria. The performance-based and financially feasible criteria act as a guide to inform and enhance local planning decisions. Local officials determine whether to continue to advance a potential toll candidate or not. To be clear, the PSA results are for information only – they do not preclude a Project Sponsor from submitting the toll candidate for strategic prioritization scoring; however, local officials are required to follow the public input provisions outlined under Implementation in **Chapter 6**.

5.1. PSA Informed by the Strategic Prioritization Process

5.1.1. Background of Prioritization

NCDOT programs projects in the STIP following a prioritization process outlined in the 2012 Strategic Prioritization Law and the 2013 Strategic Transportation Investments Law. All toll candidates are required to follow these laws and the NC Toll Policy approved by the Board of Transportation.

NCDOT's strategic prioritization process began in 2009 under Governor Perdue's Executive Order No. 2 which stated:

1. "The State Board of Transportation shall delegate to the Secretary the authority to approve highway construction projects and construction plans and to award highway construction contracts."
2. "The Secretary of the Department of Transportation shall implement throughout the Department a professional approval process for all highway construction programs, highway construction contracts, highway construction projects, and plans for the construction of projects."

The first formal strategic prioritization process was known as P1.0. The outputs of the prioritization process are the inputs to the STIP. The STIP is revised every two years, and thus the prioritization process is also updated every two years.

Candidate projects for scoring in the prioritization process are submitted by RPOs, MPOs, and NCDOT Division Engineers (DE). There are limits on the number of candidate projects that can be submitted based on the population of the geographical areas of the respective MPOs, RPOs, and DEs. Therefore, these planning partners (MPOs, RPOs, and DEs) need to evaluate toll candidates against other projects in their respective planning areas before deciding whether to submit them to NCDOT for scoring in the prioritization process.

5.1.2. Scoring Criteria

Once a candidate project is submitted to NCDOT, it is scored under the current scoring prioritization process. Candidate projects are scored using a combination of quantitative and qualitative data. Quantitative data consists of scoring criteria of congestion, benefit-cost, safety, freight, economic competitiveness and accessibility/connectivity, multi-modal, lane width, shoulder width and pavement condition. Current traffic data, reflecting current conditions, are used to calculate these scores. Under STI, projects are scored and eligible for funding based initially on route; however, a project not funded in its initial category (such as Statewide Mobility) can cascade and be funded in Regional Impact or Division Needs categories. Statewide Mobility projects are on routes that essentially serve interstate-type travel (interstates and major NCDOT freeways and expressways). Regional Impact projects are on routes that essentially serve intrastate-type travel (US and NC primary routes), and Division Needs serve local traffic needs (Secondary routes). Each category has separate scoring criteria and different weights are assigned to each criterion.

5.1.2.1. Quantitative Factors

At the time of *Handbook* development, the quantitative scoring criteria used to score toll candidates was determined through a consensus agreement approach and recommendations of the P6.0 Workgroup. Consensus meant everyone on the Workgroup could live with the recommendations and could advocate for the acceptance of those recommendations. The Workgroup recommendations were sent to the NCDOT Board of Transportation (BOT) who officially approved the criteria and associated weights for scoring as presented by the P6.0 Workgroup.

Table 21 lists the overall P6.0 quantitative scoring criteria for mobility and modernization specific improvement types:

Table 21. Default Weights for P6.0 Quantitative Scoring Criteria by Funding Category

Mobility Project Criteria	Statewide Mobility	Regional Impact	Division Needs
Benefit-Cost	25%	20%	15%
Congestion	30%	20%	15%
Economic Competitiveness	10%	0%	0%
Safety	10%	10%	10%
Freight	25%	10%	5%
Accessibility and Connectivity	N/A	10%	5%
Congestion	10%	5%	0%
Safety	25%	25%	20%
Freight	25%	10%	5%
Lane Width	10%	10%	5%
Shoulder Width	20%	10%	10%
Pavement Condition	10%	10%	10%

Source: NCDOT, P6.0 Scoring Components Webinar, June 2019.

Note: Area-Specific Criteria Weights are allowed with agreement from MPOs and RPOs/DEs. Multimodal criteria are also an option.

A summary of how the score is calculated for each quantitative criterion is provided below.

Benefit-Cost – measures the benefits of the project over a 10-year period against the estimated project cost to NCDOT. Score is based on travel time savings (calculated through multiple approaches) plus safety benefits (captured by monetizing severity of existing crashes) divided by the estimated project cost to NCDOT. Also, an additional factor called “funding leverage” provides a higher score if additional non-federal or non-state funds are committed to the project, thereby reducing the overall cost to NCDOT.

Congestion – measures the existing level of mobility along roadways by indicating congested locations and bottlenecks. For new location toll roads and bridges, congestion is measured along the parallel roadways. Scoring is split between existing volume and volume-to-capacity ratio, with the percent weights varying depending on STI funding category. Peak AADT is used as existing volume. Much information to support this score from parallel routes will be obtained and confirmed by the project sponsor.

Economic Competitiveness – measures the economic benefit the project is expected to provide in economic activity (GDP) and jobs over 10 years. Scoring is based on output from TREDIS (Economic Impact Model). The scoring is split 50/50 between the percent change in the county economy and the percent change in long-term jobs.

Safety – measures existing crashes along/at the project and calculates future safety benefits. Scoring is determined through a combination of crash density, crash severity, critical crash rate, and safety benefits for segments. For intersections, scoring is determined by crash frequency, severity index, and safety benefits.

Freight – accounts for key indicators of freight movement. Scoring is based 50% on Truck Volume + 50% on truck percentage + a Future Interstate Completion Factor. This Factor is a proximity measure to indicate if the project is helping complete a Future Interstate Corridor between National Highway System (NHS) routes.

Accessibility & Connectivity – measures how the project improves access to opportunity in rural and less-affluent areas and improves interconnectivity of the transportation network. A total of 50% of the scoring is based on a North Carolina county economic indicator (designated by NC Department of Commerce) and 50% is based on whether the project improves roadway mobility (such as by eliminating signals).

Multimodal – measures the degree to which the highway project benefits other modes. Scoring is based on the benefits to other modes, including proximity to intermodal facilities or transit/active transportation accommodations within the highway project.

Lane Width – measures the difference between the existing lane width and the NCDOT design standard lane width. The project will not necessarily be constructed to design standard.

Shoulder Width – measures the difference between the existing paved shoulder width and the NCDOT design standard paved shoulder width. The project will not necessarily be constructed to design standard.

Pavement Condition – measures the existing pavement condition along the project. This score is based on the 2018 Pavement Condition Survey and is calculated on a 0-100 scale Pavement Condition Rating.

Proposed toll candidates are scored in the appropriate category of projects (Statewide Mobility, Regional Impact, or Division Needs) using the scoring criteria and weights assigned to that category. One of the key quantitative scoring criteria which helps toll candidates maximize their quantitative score is the Benefit-Cost scoring criteria. The purpose of the Benefit-Cost criteria is to measure the benefits of the project over a 10-year period against the estimated project cost to NCDOT. The Benefit-Cost criteria weight of mobility projects in the Statewide Mobility funding category is 25%, in the Regional Impact funding category it is 20%, and in the Division Needs funding category it is 15%. Under the Benefit-Cost scoring criteria, project scores are maximized if either the benefits are increased or the costs to the Department are decreased. The benefits of the scoring criteria are travel time savings plus potential safety benefits of constructing a toll candidate. The costs of the scoring criteria are the costs to NCDOT to construct the project. Toll candidate operations, maintenance, and benefits costs are not included in the scoring criteria.

The cost to NCDOT to construct any project is decreased if other funds (non-Federal or non-State funds) are committed to the project. The more non-Federal or non-State funds committed to the project, the higher the project score. Toll candidates have the potential to generate revenue which reduces the overall project cost to NCDOT. In that scenario, they would provide a higher benefit-cost ratio, resulting in a higher score.

For toll candidates, the travel time savings is increased because of increased speeds resulting in shorter travel times. These are calculated using existing traffic data to run a comparison of the existing route network versus a new network with the toll candidate using North Carolina Statewide Travel Demand Model (NCSTM) to determine whether there are travel time savings. Increased interaction between NCSTM and local/regional models could further sophisticate this approach over time. Suggestions for how to achieve this are detailed under Tools and Techniques in **Section 5.2.5**.

Safety benefits within the Benefit-Cost criteria of candidate projects are quantified using a percent reduction in crashes. These reductions are measured according to specific project improvement types. The Strategic Planning Office of Transportation (SPOT) office relies on NCDOT's Safety personnel as technical/subject matter experts on crash reduction. The project improvement type in P6.0 that is most closely related to a greenfield toll candidate is a new location project. The addition of express lanes within an existing freeway are considered a freeway widening project. Both have a safety benefit factor of 10%. Conversion of shoulders to managed shoulders has a zero-safety benefit.

Another important scoring criterion where toll facilities have a positive effect in the quantitative scoring is safety. Safety criteria weight in P6.0 is 10% in each of the Statewide Mobility, Regional Impact, and Division Needs funding categories for mobility projects. The purpose of this criteria is to measure existing crashes along/at the project and calculate future safety benefits. For highway projects, 60% of the criteria is equally dependent on crash density, crash severity, and critical crash rate and the remaining 40% of the criteria are the safety benefits expected by constructing the project. Like the Benefit/Cost criteria, the safety benefit factor of a new greenfield toll candidate and/or the addition of express lanes to an existing freeway is 10% but the conversion of shoulders to managed shoulders has a zero benefit.

Toll candidates under the STI law of 2013 were given additional consideration under a provision called bonus allocation. The STI law (as amended by SB 99 SL 2017 Technical Corrections) states *“upon authorization to construct a toll candidate in which no project construction cost is derived from toll revenue bonds, the Department shall make available for allocation an amount equal to one-half of the revenue expected from the project over the first 10 years of the project, less operations costs, as set forth in the Investment Grade Traffic and Revenue Study. The amount made available for allocation to other eligible highway projects shall not exceed \$200 million of the capital construction funding directly attributable to the highway toll revenues committed in the Investment Grade Traffic and Revenue Study, for a project for which funds have been committed on or before July 1, 2015. The amount made available for allocation to other eligible highway projects shall not exceed \$100 million of the capital construction funding directly attributable to the highway toll revenues committed in the Investment Grade Traffic and Revenue Study, for a project for which funds are committed after July 1, 2015. If the toll candidate is in one or more MPO and RPO boundaries based on the boundaries in existence at the time of project construction contract letting, the bonus allocation shall be distributed proportionately to lane miles of new capacity within the Organization's boundaries. The Organization shall apply the bonus allocation only within those counties in which the toll candidate is located.”*

5.1.2.2. Qualitative Factors

The qualitative portion of project scores consists of the assignment of local input points by the MPOs, RPOs, and DEs. Each of these planning partners is allowed a limited number of points to assign to projects. No project may receive more than 100 points. **Table 22** shows how local input points are added to a project's quantitative score to complete the project scoring.

Table 22. Qualitative Scoring

Funding Category	Quantitative Data	Local Input Division / MPO or RPO
Statewide Mobility	100%	0% / 0%
Regional Impact	70%	15% / 15%
Division Needs	50%	25% / 25%

5.1.3. Project Submission Requirements

Projects are submitted to the SPOT database only by MPOs and RPOs and DEs. There is a limit to the number of new candidate projects that can be submitted for each updated version of the strategic prioritization process. These new projects then compete with projects already in the database that have not been committed to construction. The existing projects in the database consist of projects beyond the first five years of the current STIP that do not have right-of-way or construction committed. These existing projects receive updated inventory data to be rescored in the next version of prioritization.

The SPOT On|line tool is a web-based tool which allows new candidate projects to be submitted directly into the SPOT database. This tool also allows candidate projects to be scored using the criteria on a “test basis” prior to officially submitting the project to the SPOT database. This is done to assist MPOs, RPOs, and DEs to submit the best scoring projects in their geographical areas.

5.1.4. Scoring Process

Once the timeframe for submitting projects has passed, the SPOT database is closed, and the SPOT office performs quality assurance/quality control to ensure the proper eligible projects are ready to be scored. As part of this quality assurance/quality control, the SPOT office requests the MPOs, RPOs, and DEs to certify that the candidate projects submitted met their own respective procedures and process.

5.1.4.1. MPO and RPO Methodology

Under the Strategic Prioritization Law of 2012, the MPOs and RPOs must have an NCDOT-approved methodology for prioritization. In other words, these agencies have their own approved process for assigning local input points to candidate projects. Each MPO and RPO develops a local prioritization methodology that is then approved by NCDOT. As part of this methodology, a public involvement process is followed allowing the public the opportunity to comment on candidate projects. The 2012 law only addressed the MPOs and RPOs; however, the DEs are also a key part of the process. Each DE has a prioritization methodology approved by the NCDOT Chief Engineer and followed in the strategic prioritization process.

5.1.4.2. NCDOT Scoring Methodology

Once projects are submitted to NCDOT, the SPOT office reviews the projects and preliminarily assigns quantitative project data. This data is then returned to the MPOs, RPOs, and DEs for their quality assurance/quality control review before being officially scored by NCDOT. After the local areas confirm review, NCDOT officially scores the project using the quantitative data and scoring criteria. These scores are then returned to the planning partners for the assignment of local input points in the Regional Impact and Division Needs categories. The local partners plus NCDOT Divisions assign local points based on an approved local input methodology. The SPOT office sequences the process by first providing a window for Regional Impact point assignment and finalizing those scores. Subsequently, SPOT provides a window for Division Needs point assignment and finalizes those scores. Once all scores are finalized, the SPOT office hands the results to the NCDOT STIP Unit for the programming of a draft STIP.

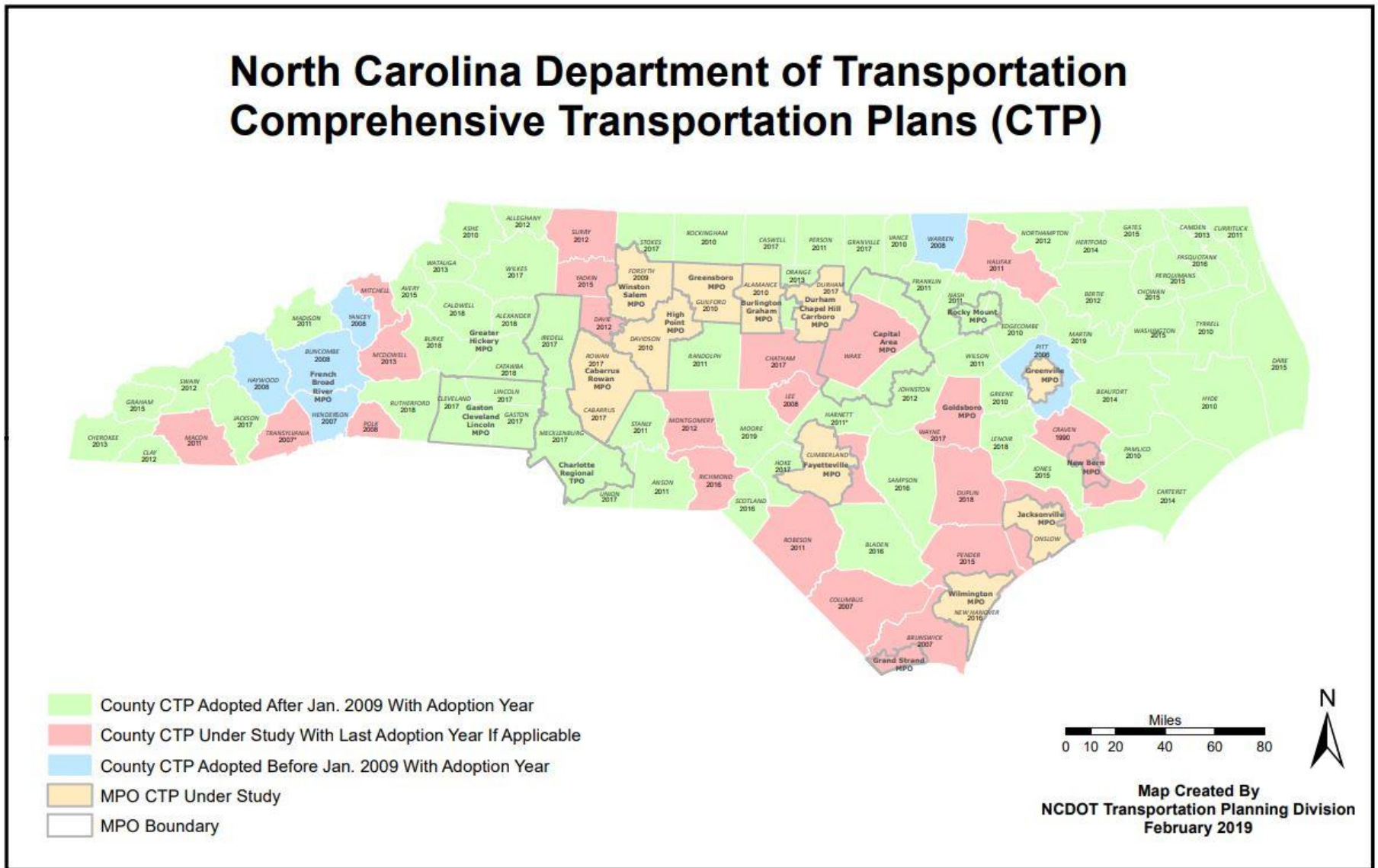
5.2. PSA as an Overlay to the Planning Process

This section provides an overview of how, where, and when PSA can be incorporated within the steps linking long range planning to strategic prioritization. The PSA process is designed to leverage transportation data (such as traffic and roadway attributes) collected during the planning process to serve as inputs to effectively identify candidates for tolling without overburdening the transportation planning agencies.

5.2.1. PSA in the Long-Range Planning Process

NCDOT's Transportation Planning Division (TPD) and MPOs and RPOs jointly oversee the development of CTPs, and MPOs oversee the development of MTPs. CTPs are developed under state legislation integrating community-adopted goals and transportation planning to set a multimodal long-range vision for respective areas. Upon completion, the CTP becomes a mutually adopted legal document between the state and local area partner(s). MTPs are designated through a federal process required in the state's 19 MPOs and are fiscally constrained. NCDOT has made considerable progress in creating county-wide CTPs since 2001 as evidenced by the **Figure 8** map from February 2019 (on the following page):

Figure 8. NCDOT CTP Coverage Map



The CTP and MTP are natural starting points for introducing PSA. The timing to conduct PSA is driven by the local partner and can precede a CTP update, occur during its development, or occur after plan adoption but prior to a project's submission for strategic prioritization. More discussion of this is provided in **Chapter 6** – the rest of this section assumes PSA is occurring during a CTP (or MTP) update.

CTPs are developed through five high-level steps that provide a framework for the sequence of key technical activities. PSA integration within this established process is depicted in a flowchart found in **Appendix C**.

Step 1 – Develop CTP Vision: collect data and identify existing and future transportation deficiencies. *Outcomes include the identification of a full range of community issues (opportunities and constraints); key stakeholders and a CTP Steering Committee; and transportation goals and objectives consistent with community vision.*

Step 2 – Conduct Needs Assessment: identify and evaluate various options for addressing the deficiencies. *Outcomes include identification of tools and data needs; documentation of land use, transportation, environmental, and community data for both the base and future years; and identification of deficiencies for all modes for both the base and future years.*

Step 3 – Analyze Alternatives: finalize CTP proposals and document the process. *Outcomes include the evaluation and documentation of alternatives and transportation/land use scenarios.*

Step 4 – Develop Final Plan: conduct the final review and adoption process

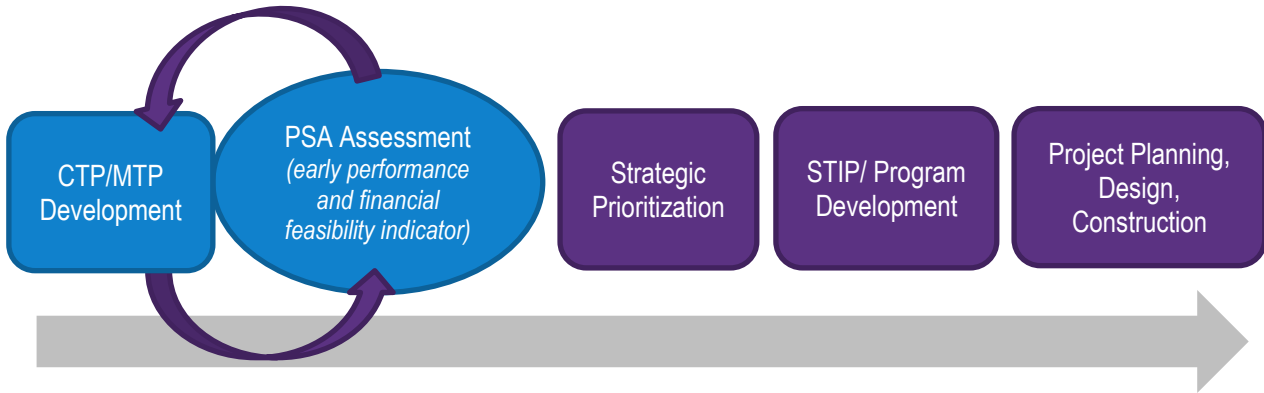
Step 5 – Adopt the Plan

The outcomes and analytical components associated with CTP Steps 1 through 3 are congruent with the benefits and insight offered by a PSA process as shown in **Figure 9**. Step 1 sets expectations for plan development and establishes community vision which guides the process. This becomes a natural setting to gauge and understand local views and interests on tolling solutions. Step 1 includes a “CTP Set Up Meeting” in which PSA is introduced based on local interest. PSA is part of a checklist and is offered as an additional screening mechanism which occurs within or in parallel to key CTP steps.

Local planning staff and leadership are made aware of the PSA application and schedule (described in **Chapter 6**) and review the local resources, available data, and staff commitment to PSA upfront. Additionally, the local partner could also opt to focus first on the highway deficiency analysis in Step 2 to understand the scope of forecasted congestion and safety conditions and consider a suite of solutions, including tolling. If the MPO or RPO should choose to start the PSA process at this point, it must occur in parallel to the remaining tasks, so it is not seen as a delay to achieve CTP completion in a timely manner. Under Step 3, the results of PSA for one or more projects inform the future development of an alternative that is documented within the CTP report or provide additional technical information to empower local decision making. At a minimum, the CTP report references which step PSA occurred and offers takeaways or statements to inform the next steps in the planning process. PSA tools are made available to each MPO and RPO. NCDOT outlines the format and guidelines for using PSA tools and works in close coordination with project sponsors to jointly communicate PSA results.

Additionally, NCDOT is initiating an optional “fiscal realism” step for new CTPs in rural or RPO areas. This step does not go as far as MPO fiscally constrained plans (which forecast available revenue compared to needs). Instead, rural partners use data such as historic funding levels, projects programmed in the STIP, and NCDOT ten-year revenue forecasts to conduct a quantitative/qualitative assessment of the financial feasibility of proposed system improvements. PSA supports this concept by providing a preliminary indication of how the same publicly-funded solution fares under one or more tolling scenarios. Therefore, communities that have not historically considered tolling options use PSA to explore and determine if they want to assume new financial alternatives and resources into their planning process.

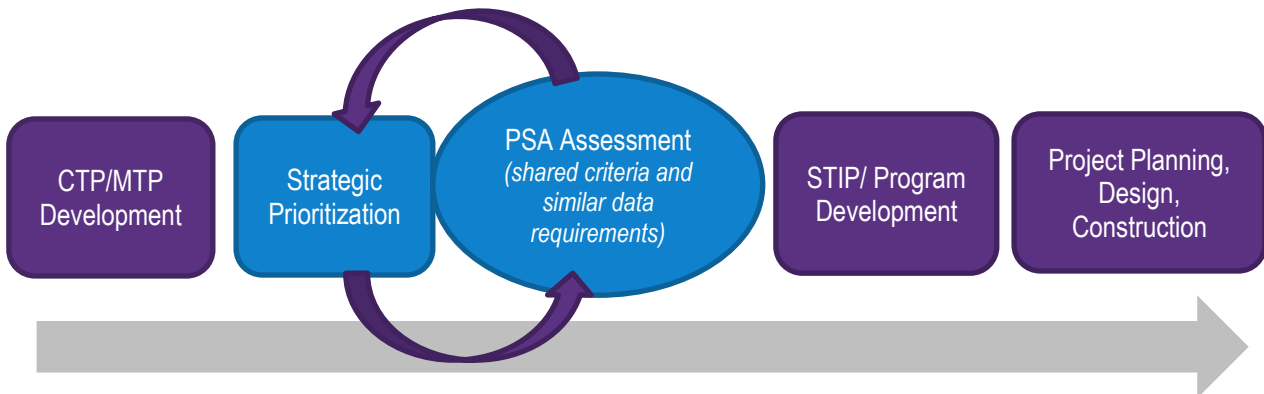
Figure 9. PSA and Long-Range Planning



5.2.2. PSA in Strategic Prioritization

As noted in **Section 5.1**, North Carolina’s strategic prioritization process includes a high degree of interaction and coordination between NCDOT and MPO and RPO staff. During each Prioritization cycle, the MPO and RPO staff review their CTPs or MTPs to consider new projects to submit for scoring. The deliberation is subject to a local review and engagement process but is also subject to NCDOT’s window for project submission. PSA is completed before projects are submitted to NCDOT for scoring. **A grandfather provision (see Section 5.2.7) was developed to avoid the need for toll candidate projects already in the STIP to be forced to undergo the PSA process.** The Toll Policy does not negate the STI law which requires toll candidates (like other highway capacity projects) to be scored through strategic prioritization. Therefore, local planning officials need to ensure they initiate the PSA process in enough time before projects are submitted for scoring (see **Figure 10**). The NC Toll Policy states the Project Sponsor (MPO and RPO) initiates the PSA process and must pass a resolution of support for the PSA evaluated toll candidate(s) if they are submitted through the strategic prioritization process. Therefore, the decision to submit toll candidate(s) for strategic prioritization lies solely with MPOs and RPOs. NCDOT’s DEs are not expected to submit projects through PSA but will play a liaison and coordination role between MPOs, RPOs, and NCDOT central staff to provide additional analytical support.

Figure 10. PSA and Strategic Prioritization



5.2.3. Recommended PSA Standards, Criteria, Measurements, Tests, and Guidelines

Table 23 shows the 14 PSA criteria grouped into the following five categories and the relationship between those five categories and the current P6.0 scoring criteria. As mentioned earlier in Chapter 5, please be aware these PSA criteria are related to the strategic prioritization scoring criteria but are not directly linked or

scored in the same precise manner as the strategic prioritization scoring criteria. For example, data used to score PSA may be updated later when scored under prioritization.

- Congestion Relief
- Financial Feasibility
- Safety
- Transportation System
- Freight

Table 23. Quantitative Scoring

Performance Category	PSA Criteria	Relationship to P6.0 Criteria
Congestion Relief	Ability to increase throughput (people and vehicles) through the corridor	Congestion: all funding categories
	Allow transit (or other modes) to utilize the corridor	Multimodal: all funding categories
	Ability to achieve desired travel time savings	Benefit-Cost: all funding categories
	Ability to provide reliable travel times through pricing	Benefit-Cost: all funding categories
Financial Feasibility	Ability for toll revenue to cover tolling and roadway Operating and Maintenance costs	None
	Ability for toll revenue to contribute upfront funding towards construction costs through financing	None
Safety	Is the current roadway or bridge built to today's design standards?	Lane Width and Shoulder Width: all funding categories
	Is the existing segment(s) of roadway or bridge experiencing higher than average crashes or fatalities?	Benefit-Cost and Safety: all funding categories
Transportation System	Extent of transportation system user benefits	Benefit-Cost and Safety: all funding categories
	Improved state/local/regional access and connectivity	Accessibility/Connectivity: Regional Impact and Division Needs
	State of good repair/asset management	Pavement Condition: all funding categories
	Extent of other transportation economic Benefits: <ul style="list-style-type: none"> • retaining firms in targeted industries • regional development potential • tourism and travel 	Economic Competitiveness, Benefit-Cost and Safety: all funding categories
	Extent of transportation feasibility benefit <ul style="list-style-type: none"> • If managed lane is proposed, can it be accommodated within existing right-of- way? 	None
Freight	Truck Volumes/Usage	Freight, Benefit-Cost and Safety: all funding categories

The following sections describe how these criteria relate to P6.0 criteria already in use and provide guidance on criteria calculation.

5.2.3.1. PSA to P6.0 Scoring Criteria Alignment

Most PSA criteria align with P6.0 criteria and can be calculated with commonly available transportation data. The combination of typical prioritization factors with financial feasibility criteria is used to determine whether a project is an appropriate candidate for tolling while minimizing additional effort in the planning process.

5.2.3.2. Criteria Guidelines

Table 24 summarizes the PSA criteria, measures, and data sources. The following sections provide more detail on the criteria in each category.

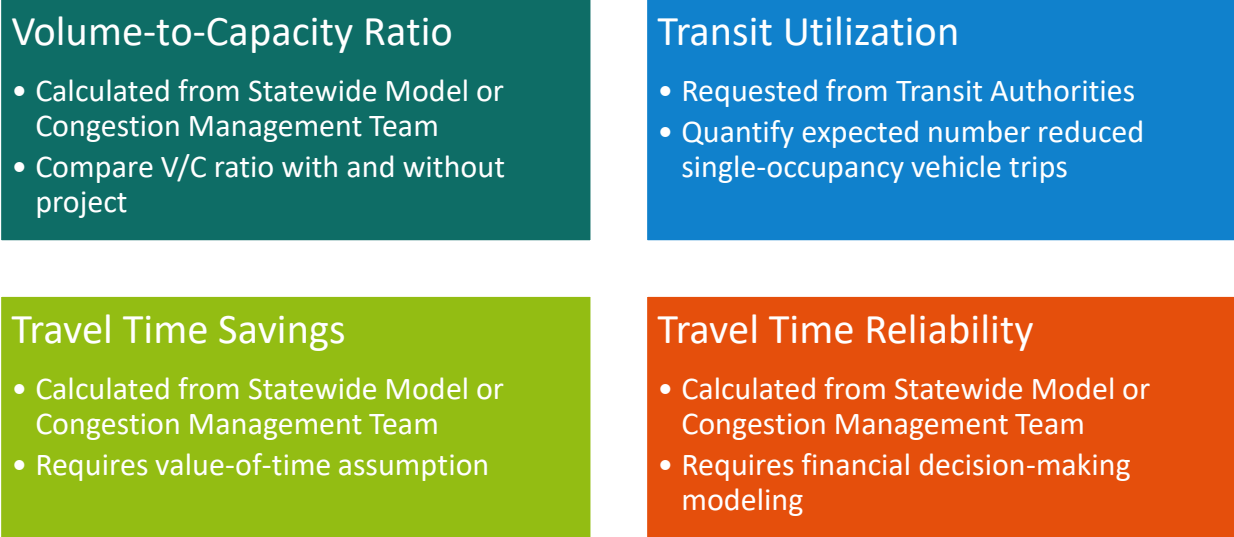
Table 24. Toll Candidate Feasibility Criteria and Measures

Performance Category	Criteria	Measure (qualitative and/or quantitative)	Data Requirements (Level of Effort / Sources)	
Congestion Relief	Ability to increase throughput (people and vehicles) through the corridor	Volume/Capacity ratio	Easy	Annual counts, coverage by HERE (NCDOT's traffic counting program, https://www.here.com/products/traffic-solutions/real-time-traffic-information); NCDOT roadway capacity and level of service calculation
	Allow transit to utilize	Yes/No. If yes, quantify expected usage	Easy	Acquire from Regional Transit Authorities, surveys
	Ability to achieve desired travel time savings	Quantify through travel time reliability calculation and modeling	Easy	HERE coverage, NCTA modeling as needed.
	Ability to provide reliable travel times through pricing	Quantify through travel time reliability calculation and modeling	Easy	HERE coverage, NCTA and financial modeling as needed.
Financial Feasibility	Ability for toll revenue to cover tolling and roadway Operating and Maintenance costs	Yes/No but quantify through using initial financial feasibility analysis developed in Chapter 4 .	Mod	Expected utilization, Initial Financial Feasibility Analysis
	Ability for toll revenue to contribute upfront funding towards construction costs through financing	Yes/No but quantify through using initial financial feasibility analysis developed in Chapter 4 .	Mod	Expected utilization, Initial Financial Feasibility Analysis
Safety	Is the current roadway or bridge built to today's design standards?	Yes/No	Easy	NCDOT Design Manual
	Is the existing segment(s) of roadway or bridge experiencing higher than average crashes or fatalities?	Yes/No but quantify vs. Statewide averages.	Easy	NCDOT 3 year moving averages
Transportation System	Extent of transportation system user benefits	Travel time (monetized productivity over 10-year period) + safety benefits divided by cost + State of Good Repair	Easy	Travel Time Savings plus Safety are strategic prioritization calculation
	Improved state/local/regional access and connectivity	Travel time to destinations (job centers, universities, hospitals, etc.)	Mod	HERE includes 15,000 Statewide and Regional Tier highways coverage
	State of good repair	Quantify expected operating and maintenance costs through initial financial feasibility analysis in Chapter 4 .	Mod	Acquire through Initial Financial Feasibility Analysis.
	Extent of other transportation economic benefits <ul style="list-style-type: none"> retaining firms in targeted industries regional development potential tourism and travel 	(Note: each could act as input to an economic model) Supplier, labor cost, and customer market valuations inventory of certified, available, and suitable sites inventory of tourism assets; dependence on the facility plus state/local data on number of visitors, average stay, level of expenditure and origin/destinations	Mod	Collect through surveys, economic development organizations, site preparedness profiles Change in Vehicle Miles Traveled/Vehicle Hours Traveled through economic models to track industry change Transportation Economic Development Impact System (TREDIS)
	Extend of transportation feasibility benefit If managed lane is proposed, can it be accommodated within existing right-of- way?	Yes/No	Easy	Corridor and parcel specific information
Freight	Truck Volumes/Usage	Yes/No. If yes, quantify volume of trucks expected to use the facility.	Mod	Statewide Travel Demand Model
	Truck Diversion Factor	If Greenfield or Bridge project, is truck diversion factor known?	Mod	Statewide Travel Demand Model

5.2.3.2.1. Congestion Relief

Four congestion relief criteria are proposed: volume-to-capacity ratio, multimodal utilization, travel time savings, and travel time reliability. Each of these criteria is routinely calculated by transportation planning entities, and they typically rely on modeling tools to estimate travel benefits. Modeling support from NCDOT includes the NCSTM and NCDOT's Congestion Management Team (CMT). An overview of congestion relief criteria is shown in **Figure 11**. The term transit is used in lieu of the term multimodal because the impact of buses sharing the roadway with vehicles affects congestion relief. It is unlikely that other forms of multimodal transportation share the actual toll lanes, but if proposed to do so those forms of transportation need to be factored into the congestion relief analysis.

Figure 11. Congestion Relief Criteria



Modeling outputs are the basis of the congestion relief criteria, and additional inputs are required to calculate measures for each criterion. For example, the Statewide model can be used to calculate the annual number of travel hours saved for automobiles and trucks over a ten-year period. Then, a value of time is assigned to each vehicle type. In the P6.0 prioritization process, automobiles assume value time savings at \$12.50/hour, and trucks assume value time savings at \$50.00/hour. The resulting travel time savings, illustrated in **Figure 12**, are used in the PSA and can be applied in the P6.0 cost-benefit analysis. These numbers, of course, will be updated and modified for the project's PSA analysis as agreed between the Project Sponsor and the IDPET.

Note: this value may vary based on data inputs needed to run the Financial Feasibility Tool described in Chapter 4.

Figure 12. Travel Time Savings Example



5.2.3.2.2. Financial Feasibility

The two financial feasibility criteria in the PSA measure the suitability of a project to use tolling to fund either maintenance and operations or upfront construction cost through financing (see **Figure 13**). A greater description of the Financial Assessment Rating is detailed in **Chapter 4** of the *Handbook* and is not repeated here.

Figure 13. Financial Feasibility Criteria

Toll Revenue for Operating and Maintenance Costs

- Forecasted utilization
- Financial Feasibility Analysis

Toll Revenue for Construction Costs through Financing

- Forecasted utilization
- Financial Feasibility Analysis

5.2.3.2.3. Safety

There are two ways safety is considered in the PSA (see **Figure 14**). The first is whether the roadway or bridge is built to current NCDOT design standards. Crash and fatality rates are the second measure of safety benefits for a project. The crash and fatality rates are compared to a 3-year moving average of Statewide rates. Crash rates are normalized by the number of vehicle-miles travelled to compare individual segments to each other and the Statewide network.

Figure 14. Safety Criteria

Meeting Current Design Standards

- NCDOT Design Manual

Crash and Fatality Rates

- Compared to statewide levels of crashes and fatalities
- Three-year moving average normalized by amount of traffic

5.2.3.2.4. Transportation System

Five criteria describing the transportation system are included in the PSA, as shown in **Figure 15**. Many of the measures used in this category are built from analysis in other categories. For example, the system user benefits criteria use the travel time savings calculated as one of the congestion relief criteria and its estimation is shown in **Figure 16**. The safety criteria and the safety benefits from the crash reduction factors and the state of good repair criteria is from the financial feasibility analysis.

Access and connectivity criteria measure the ability to improve access to areas and improve interconnectivity of the transportation network. In the prioritization process, accessibility is based on the economic indicator of the county in which the proposed project is located and whether the proposed project upgrades the mobility of the roadway. Example improvements include eliminating signals or improving mobility by upgrading the roadway facility type (e.g., from a two-lane highway to a freeway). The measure of accessibility is based on travel time savings per user.

The economic benefits criterion is information that is available through the TREDIS model used in the prioritization process under the economic competitiveness criteria. Briefly, this criterion is focused on the percent change to the county's economy and the percent change in long term jobs created by the proposed project.

The transportation feasibility benefit is one of the few qualitative criteria used in this process and is a judgement call by the local planning staff/officials.

Figure 15. Transportation System Criteria

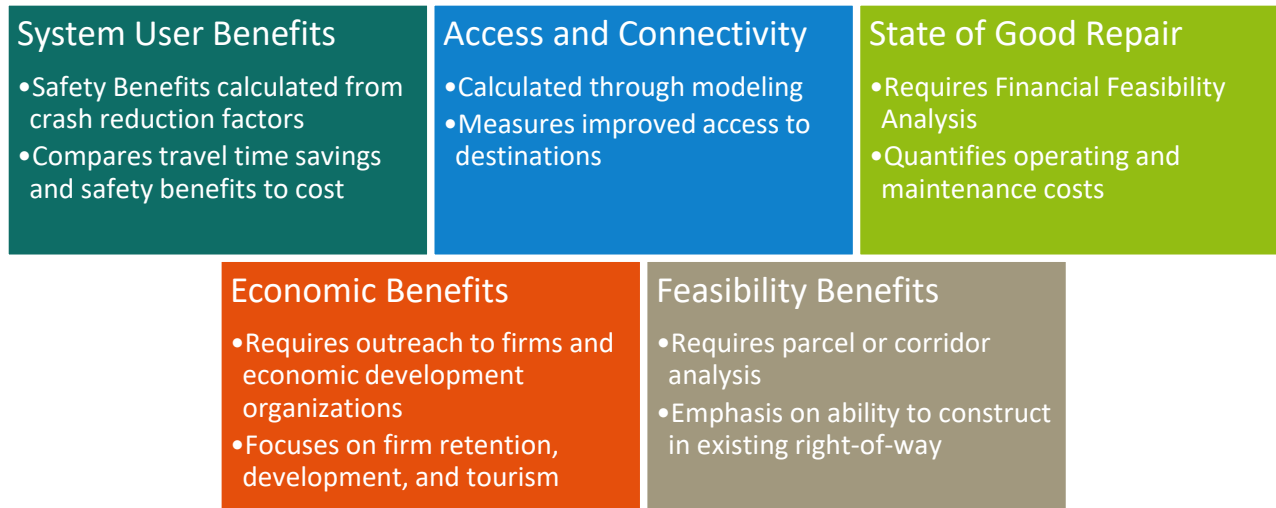
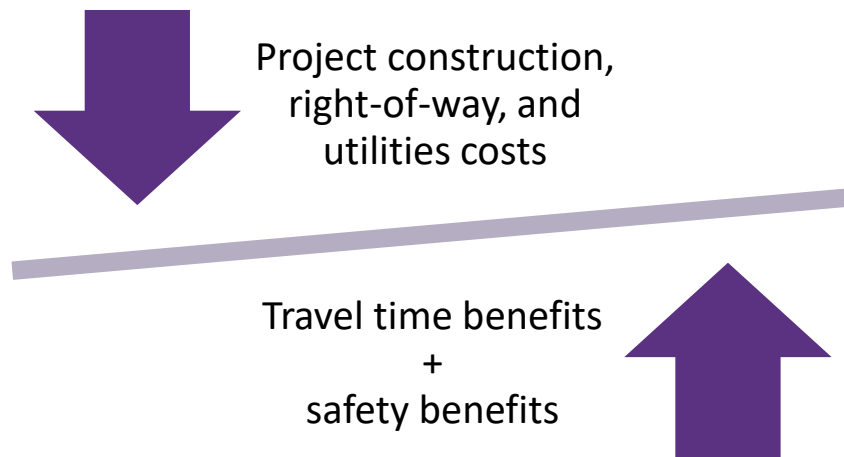


Figure 16. User Benefits Calculation



5.2.3.2.5. Freight Criteria

The freight criteria are straightforward. First, one needs to know whether trucks are allowed to use the proposed toll candidate. If yes, then what is the expected truck volume. The truck diversion factor is used in determining the impact on a Greenfield project to ascertain the effect on existing parallel routes as well as the Greenfield project.

5.2.4. Standard Practices for Data Needs and/or Evaluation

Table 24, shown previously, is a list of criteria and measures used by other State and local tolling agencies across the nation to initially assess whether a project will be pursued as a toll candidate and considered by MPOs and RPOs as part of PSA. These criteria apply to express lanes, toll bridges, new toll road facilities (or the conversion of partial control to full control access facilities), and other projects eligible under the NC Toll Policy. These are considered “best management” criteria and measures. Note some are quantitative and some are qualitative. These are intended to outline some basic elements of toll candidates which need to be considered before committing to undertaking a toll candidate. These are reviewed by MPOs and RPOs to help decide whether to submit the project as a toll candidate in the prioritization process. These are not “pass/fail” criteria. Toll candidates, however, need to be filtered through the attached criteria. Again, this is simply a tool that MPOs and RPOs use to assess whether the project is submitted as a toll candidate.

It is recognized that some MPOs and RPOs may not have the technical expertise to provide responses to all criteria and measures which are intended to be relatively simple to understand and evaluate. They are not all encompassing but are considered as a supplement to those criteria and measures used by MPOs and RPOs in evaluating potential toll candidates. NCDOT commits to provide technical assistance as needed and as requested by any MPO and RPO. Some criteria and measures in **Table 24** have a strong relationship to the quantitative criteria in the strategic prioritization process, and data sources and calculations are delineated in the far-right column. A few other criteria and measures may not have this relationship as they may be more qualitative. Still others are simply criteria and measures that project sponsors need to consider before making a final decision on submitting the project for scoring. Notwithstanding the above, none of these criteria and measures will truly provide a strong indication of whether a toll candidate will score well in the next prioritization process.

5.2.5. Tools and Techniques

It is recognized that a wide range of technical expertise is available among MPOs and RPOs in North Carolina for assessing feasibility of potential tolled projects. The PSA analysis is not intended to be a burden for MPOs and RPOs to determine whether to submit a candidate toll candidate for prioritization under STI. As described in **Chapter 6**, NCDOT staff is available to assist MPOs and RPOs who wish to use the highest potential candidates derived from their local/regional travel demand models, studies or CTPs as input into the NC Statewide Travel Demand Model (NCSTM) which serves as a consistent analytical platform to support the PSA process. Where these models exist, MPOs, RPOs, and IDPET are expected to coordinate and agree on how to manage, evaluate, and communicate the results of a candidate project through the PSA steps outlined in **Appendix E**.

5.2.5.1. Consideration for how to Integrate Statewide Model and Local/Regional Models

Integrating statewide and local or regional models may present an opportunity to leverage data from the NCSTM to better inform toll analyses. The NCSTM supports the PSA process as a single, uniform basis of analysis and a platform to provide information on value-of-time in specific corridors or zones. It can be adjusted to align with regional models but must maintain a standard of consistency for statewide toll candidate comparison.

The NCSTM provides a consistent analysis tool across the state and can assist NCDOT in high-level screening of toll candidates. Additionally, projects may extend beyond the boundary of an MPO or be critically impacted by facilities outside of the MPO boundary. In these cases, the NCSTM is used to conduct a preliminary assessment of corridors to develop external trip origin and destination tables which can then be modeled by the MPO to better assess intra-urban diversion. The NCSTM model remains a valuable tool for analyzing long-distance trips and regional diversion.

Additionally, the NCSTM assigns trips in value-of-time market segments for passenger cars, single-unit trucks, and multi-unit trucks. The resulting flows on the network inform the distribution of trips by value-of-time, assisting in initial feasibility analysis of a corridor. Local financial feasibility studies are then conducted to produce a more accurate, investment-grade estimate of the value roadway users place on time savings. Similarly, the NCSTM project analysis tool returns the origin and destination traffic analysis zones (TAZ) of

all users on a project corridor. This information is used to assess which TAZs are most likely to generate toll users.

Finally, the outputs from regional models are integrated into the NCSTM to improve its tolling assumptions over time. For example, reasonable toll rate assumptions can be taken from MPO models that have conducted detailed tolling studies. Additionally, if more detailed origin/destination data have been used in the MPO model, the NCSTM trip tables are adjusted accordingly.

5.2.6. Considerations for Future Prioritization Cycles

As part of identifying PSA performance-based criteria, the following changes are proposed for the next version of strategic prioritization (P7.0) to better enable toll candidate project evaluation and scoring.

1. **Freight:** The purpose of the criteria is to account for key indicators of freight movement. Fifty percent of the measure is the existing truck volume, fifty percent is the existing percentage of trucks and an additional measure called “future interstate completion factor”, the latter of which is intended to provide additional consideration to those routes that will complete Interstate Corridors between National Highway System (NHS) routes. ***It is proposed that the Workgroup include in this measure the ability of toll candidates to divert trucks from the existing project.*** This could be done by comparing truck volumes of the existing project before and after toll candidate is constructed. The higher the difference, the more points. This may help Greenfield projects and could encourage the allowance of trucks on managed lanes (however, this is a Department policy decision which may not be known at the time of a project submittal).
2. **Accessibility/Connectivity:** This criteria’s purpose is to improve access to opportunities in rural and less-affluent areas and improve interconnectivity of the transportation network. Fifty percent of the scoring is the County Economic indicator where points are based on economic distress indicators in the county of the project. The remaining fifty percent of the scoring of this criterion is whether the project upgrades the mobility of the roadway (e.g. eliminating signals, improving mobility by upgrading the roadway facility type i.e. two-lane to freeway) and points are based on travel time savings per user. In P6.0, managed lanes, new location toll roads, and bridges are NOT specifically listed as project facility types eligible for scoring. ***It is proposed that the Workgroup add these as project facility types (visible in SPOT Online) eligible for scoring.***

These proposed changes were presented to the P6.0 Workgroup in February 2019. These changes were briefly discussed by the Workgroup and then referred to their subcommittees for further analysis and discussion. This is in accordance with their normal approach when new changes are proposed. The *Handbook* will be updated to reflect these changes if future Workgroups take any action on them.

5.2.7. Toll Candidate Projects Subject to PSA

A primary purpose of the new NC Toll Policy is to ensure more consistency in how toll candidates are analyzed, reviewed, and determined to be viable for implementation. There are existing toll candidates being considered by MPOs and RPOs in the NCDOT SPOT database. Some toll candidates are committed through the right-of-way and/or construction phases in the STIP. They have already been reviewed, analyzed, and scored for implementation. Projects that are committed by NCDOT do not get reprioritized unless there are significant cost or scope changes. It is consistent with existing NCDOT policy to treat toll candidates in the SPOT database in a similar manner.

The window for MPOs and RPOs to submit any new candidate project under P6.0 opened in Fall 2019 and is expected to close in Spring 2020. In addition, the public involvement and resolution aspects of implementing the NC Toll Policy need to be completed after the PSA process is finished. Given the three-month window to submit projects to P6.0 and duration to complete the PSA process, it seems unrealistic to expect MPOs and RPOs to have sufficient time to review and present PSA results to their respective boards prior to officially determining to submit a toll candidate under P6.0.

Finally, there are existing toll candidates in MPO and RPO plans in various stages of planning and project development. These projects are not considered committed by NCDOT. These are the types of projects, along with any newly identified projects, that will follow the PSA process.

Therefore, a “grandfather” policy was recommended to determine which projects are subject to PSA. This recommendation required an amendment to the 2018 NC Toll Project Development Policy which was presented to the Board of Transportation and adopted in July 2019.

The additional language is:

Any toll candidate project(s) not committed in P6.0 will be subject to the *Handbook* guidelines. An MPO or RPO request to convert a current non-tolled project in NCDOT’s strategic prioritization database to a tolled project would be considered a new project and subject to the *Handbook* guidelines. As used in this Toll Policy, the term “committed” refers to the definition used for programming a project for right-of-way or construction in the STIP under NCDOT’s latest strategic prioritization process.

This recommendation helps to:

- Accommodate P6.0 schedule
- Recognize projects in planning vs project development phase
- Support project assessment for future Prioritization cycles

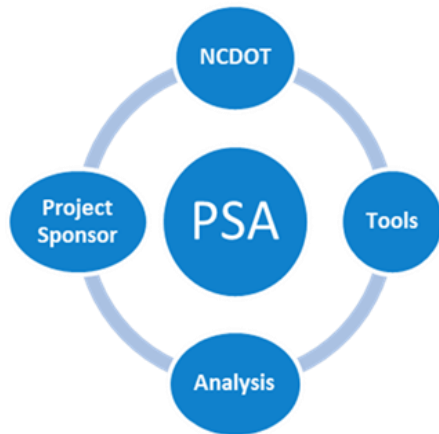
In implementing the NC Toll Policy, NCDOT retains the flexibility to review the status of each project which is subject to PSA. In some cases, a large project is broken into segments for constructability purposes and only one segment (of a two or three segment project) is committed. The other segments cannot feasibly be assessed through PSA since the data to run the PSA tools and the performance and financial outcomes would require using information for the entire length of the project. Additionally, there may be circumstances in which a project has advanced through preliminary engineering stages, and a level of performance and financial related information (similar to what would be gained through PSA) is already available. Other STI or statutory considerations may also apply. IDPET will review these situations on a case-by-case basis and closely coordinate PSA decision making with the project sponsor.

6. Implementation

This chapter provides a brief overview of how the PSA process links back to the 4-step process outlined in the NC Toll Project Development Policy and offers a synopsis of key implementation components to advance the PSA process. Some of the content builds upon the PSA process introduced in **Chapter 5 (Figure 17)** to further a foundation which institutes PSA into North Carolina’s transportation planning practice. The details and activities described in this chapter will be viewed as a “roadmap” for how the PSA process is initially communicated to project sponsors and stakeholders and also how the process can be sustained and evolve over time.

Two important principles guide this chapter: this *Handbook* is a “living document” that adapts to industry and best practice change; and the NC Toll Project Development Policy and PSA implementation must build upon a cooperative and coordinated process between Project Sponsors and NCDOT. This second point is best achieved through the enactment of an IDPET, see Section 6.2. Neither party will be successful in PSA unless they work together to ensure the steps, tools, and outcomes that the PSA helps to identify lead to the highest performing future toll candidate projects.

Figure 17. PSA and Long-Range Planning



6.1. Toll Policy Four Step Process

The NC Toll Policy adopted by the Board of Transportation in early 2018 outlines a four-step procedure whereby Project Sponsors (MPOs and RPOs) and NCDOT will work together as described below.

6.1.1. Step One – Initial Project Identification

Project Sponsors submit projects to NCDOT/NCTA to be tested for toll-financing or express-lanes feasibility following a first level of screening by the Project Sponsor. Initial screening is conducted consistent with guidelines provided in this *Handbook* and establishes minimum requirements to submit projects as listed below:

1. Project need must be identified in locally adopted transportation plan; this may be either a CTP or financially-feasible MTP
2. Project must be of facility type expressway or higher
3. Project uses Statewide or regional travel demand models as mutually agreed between Project Sponsors and NCDOT/NCTA to support benefits

4. Project has received MPO and RPO board resolution requesting NCDOT evaluation of feasibility for toll-financing or express lanes for project delivery

Other considerations, as the process evolves, could be added to the *Handbook*.

6.1.2. Step Two – Initial NCDOT Toll Feasibility Testing

Projects submitted by Project Sponsors passing Step One minimum requirements are evaluated by IDPET using the FFST (see **Section 6.5**) and the PSA evaluation tool (see **Section 6.4**), for initial NCDOT toll feasibility testing for operational and financial feasibility. The parameters of these tests differ between toll candidates and express lanes projects. Projects are run through operational and financial feasibility tests, and results are shared with the Project Sponsor for further consideration.

6.1.3. Step Three – MPO and RPO Screening

Following Financial Feasibility testing and evaluation of the project using the PSA by IDPET, the Project Sponsor in Step Three conducts further screening of the tolled or express lanes project to ensure that it is consistent with local plans and goals and is locally approved. NCDOT participates in project screening, and/or provides technical/analytical support at the request of the Project Sponsor. Project Sponsor screening may result in tolled and express lanes projects to be included in the MTP or CTP as specifically identified tolled and/or express lanes projects and must satisfy measures of effectiveness assessed through local modeling, criteria, standards and network benefits. Some of these measures come from a single, statewide list to provide policy consistency and candidate viability regardless of location. The exact measures are identified in this *Handbook*. Any independent traffic or economic analysis conducted as part of Step Three screening are completed by either NCDOT or the Project Sponsor, as determined by mutual agreement.

Documented public participation, input, and agency response in the form of fact sheets, Frequently Asked Questions (FAQs) and/or other communication material consistent with local planning practice must be demonstrated to ensure sufficient public opportunity in the decision-making process. Additionally, if the Project Sponsor intends to advance the toll candidate project and submit it with other local priority projects in the next round of strategic prioritization, they must pass a resolution acknowledging that decision.

6.1.4. Step Four – Prioritization and Programming

Projects found to be suitable by NCDOT for implementation as tolled or express lanes projects (Step 2), successfully screened by their MPO and RPO Project Sponsors for inclusion in their MTP, CTP or another adopted document, and endorsed for TIP/STIP prioritization (Step 3) are submitted to NCDOT through the strategic prioritization process. This step includes scoring and reviewing the candidate for programming potential (consistent with NCDOT's biennial strategic prioritization process) and ensuring maximum available local input points are assigned to the project to reinforce local priority. Step Four includes a high-level analysis of potential non-state, non-local funds which can be applied to the benefit-cost criteria under current financial and modeling assumptions.

6.2. Intra-Departmental Project Evaluation Team

Implementing PSA requires an integrated approach reliant on technical experts from a cross section of NCDOT. The formation of an IDPET represents this cross section and includes staff who manage, coordinate and/or provide technical support to Project Sponsors within each step of PSA. IDPET representatives consist of units responsible for systems planning, toll candidate development, project prioritization, and project programming as well as Field Division staff.

IDPET works closely with Project Sponsors to set schedule and resources expectations, review data inputs and assumptions which support modeling or financial/performance evaluation, and jointly review PSA outcomes. They also oversee that the PSA requirements (**Section 6.6**) are followed. If needed, IDPET engages other state agencies or NCDOT units outside of its team to secure additional data, resources or expertise.

NCDOT recognizes that the level of local technical expertise varies widely across North Carolina's MPOs and RPOs. Therefore, IDPET – through early coordination – identifies analytical approaches for planning organizations to leverage state/local resources and supply a greater degree and/or access to technical expertise. For example, most North Carolina RPOs practice without traditional travel demand models and may need technical guidance for how to develop forecasted traffic volumes through the NCSTM or other sketch level modeling techniques. The Project Sponsors and IDPET subject matter experts are key actors in the PSA who swap lead and support roles throughout the process and set jointly agreed upon expectations for toll candidate(s) timetables, assessment, and communicating PSA results.

NCDOT's TPD plays a lead management role for the IDPET. Staff within NCDOT's 14 Highway Divisions (such as the Division Staff Engineer or Division Planning Engineer) play a support role serving as liaisons between local project sponsors and central NCDOT staff to facilitate information flow and ensure a thorough local engagement and input process.

The following business units, with their respective roles, comprise the IDPET:

- **Transportation Planning Division** – lead oversight and advisory role; assign internal NCDOT resources and expertise as needed; liaison with project sponsor, North Carolina Turnpike Authority, and Division Engineer to schedule kick off and close out meetings; supply data collection for PSA tool inputs from CTPs AND MTPs; facilitate needed interaction between NC Statewide Travel Demand Model and local/regional models (such as travel time savings or other model-based performance measures); review suggested local data to supplement PSA inputs or override default assumptions (such as toll rates).
- **NCTA** – act as a resource throughout the process for project information (such as financial) and follow through with project sponsors who express interest in further studies or analyses beyond PSA. Co-review PSA results and documentation with TPD and co-coordinate with TPD and Project Sponsors on public input steps.
- **NCDOT Highway Divisions** – utilize Division Staff Engineer or Division Planning Engineer as local liaison to Project Sponsor; provide additional technical support to manage information flow between project sponsor and IDPET. Attend kick-off and close-out meetings and other team meetings to support PSA schedule and steps as needed.
- **STIP/SPOT** – advisory role; act as a resource for project information (such as prior feasibility studies, project scoring or programming history). Involve Corridor Development Engineers where appropriate to also liaison and coordinate between internal or external stakeholders to the process.
- **Technical Services** – advisory role

6.3. PSA Schedule, Steps and Tools

The PSA process must be initiated by Project Sponsors to confirm local commitment and secure NCDOT resources. The current estimate to complete PSA is approximately three months and is triggered by the Project Sponsor after they submit toll candidate(s) for evaluation through the PSA Process Form (**Appendix D**). The Project Sponsor provides locally based data through the Form mingled with state-based data. Any questions or concerns about the underlying data and data sources should be discussed during Step 2 (below) between the project Sponsor and IDPET. The information from the PSA Process Form provides data entry inputs to evaluate the criteria and measures found in **Table 24**, shown previously.

The PSA timeline for individual or multiple toll candidates may vary based on the extent of analytical iterations (such as multiple travel demand model runs), other data requirements, or MPO and RPO meeting schedules. Project Sponsors who choose to opt out of the PSA schedule due to unforeseen circumstances after Step 1 must communicate their decision to NCDOT at the earliest point possible. Step 2 marshals IDPET resources to review the submitted toll candidate(s) and jointly discuss data inputs or gaps to prepare the candidate(s) for formal PSA evaluation. IDPET identifies and engages key NCDOT technical staff (such as Travel Demand Modeling experts) to get involved depending upon the scale of analytical need. Simultaneously, Project Sponsors must inform MPO and RPO technical and policy board members of their intent to evaluate the toll candidate(s) and record this communication in meeting minutes. Step 3 includes a formal kick off meeting between IDPET and the Project Sponsor to review a proposed schedule, introduce

NCDOT technical experts, delineate resource expectations, and review the tools and techniques to guide the process. Step 4 involves the most analytical rigor – with multiple potential travel demand and financial feasibility adjustments and iterations. This step relies on frequent communication and meetings to agree upon revised assumptions and jointly evaluate results. Step 5 focuses on drafting documentation and reviewing results to share in Step 6, the last step of PSA, which requires Project Sponsors to communicate results, seek and respond to public input, and adopt a resolution if they choose to advance the toll candidate(s). An abbreviated list of actions per step are listed below and are detailed in **Appendix E**.

- **Step 1** - Project Sponsor (Lead Role) – complete and submit online PSA application form; 2-3 days
- **Step 2** – IDPET (Lead Role) – review submittal and provide feedback to Project Sponsor; Project Sponsor communicates intent to evaluate toll candidate(s) with local members; 2-3 days
- **Step 3** – IDPET (Lead Role) – coordinate and hold kick-off meeting with Project Sponsor; 1-2 weeks
- **Step 4** – IDPET (Local Role) – conduct modeling and financial feasibility testing using the FFST; 4-6 weeks
- **Step 5** - IDPET (Local Role) – review financial feasibility and performance outcomes; document outcomes; 1-2 weeks
- **Step 6** - Project Sponsor (Lead Role) – finalize documentation and share results, seek public input, and/or adopt a resolution if toll candidate(s) will advance to NCDOT strategic prioritization; 1-2 weeks

Prior to Step 1, Project Sponsors must accept “Rules of Engagement” terms found on NCDOT’s website to access and download PSA related files. These files include the excel based FFST, User Guide, and this *Handbook* which guides the toll candidate(s) tests, evaluation and screening process. Project Sponsors utilize the PSA files to conduct initial “sandbox” evaluation of multiple toll candidate(s) originating from local/regional models, network or corridor studies or from existing CTPs/MTPs. However, results from the PSA process consistent with the NC Toll Policy and evaluated for potential submittal through NCDOT’s strategic prioritization process must be conducted through the formal PSA schedule noted above and outlined in **Appendix E**. The joint process to conduct and manage PSA by Project Sponsors and IDPET operationalizes the NC Toll Policy and fosters closer coordination and communication of viable toll candidate(s) for further potential project development and study. Additionally, PSA tools and guidance undergo biennial updates to maintain integrity and align with industry practice and changes (such as assumptions associated with toll collection and/or tolling technology). Therefore, PSA files accessed through NCDOT’s website serve as the “master” versions with an “as of” date for full disclosure and awareness to Project Sponsors. The PSA Tool is also accessible by NCDOT’s DEs who again support and act as liaisons between Project Sponsors and IDPET.

The following “Rules of Engagement” terms will be located on NCDOT’s website by January 2020.

This website contains information related to the NCDOT’s Toll Project Development Policy approved by the Board of Transportation in February 2018. Specifically, this website provides access to the Financial Feasibility Screening Tool (FFST). The FFST is a very early, high level screening tool that assesses the potential of candidate toll or express lane projects to generate sufficient toll revenue to support project financing. It is NOT to be used as a traffic and revenue level toll analysis.

The use of the FFST tool is intended for Metropolitan Planning Organizations and Rural Planning Organizations who are considering potential toll candidates in or near their respective geographical areas. Use of this tool by others is permitted since this is in the public domain. It is recognized that users may make modifications to the inputs to the tool to help conduct sensitivity options. However, any modifications to the tool must be disclosed to and reviewed by NCDOT for acceptability.

As a condition of your use of the FFST, you promise not to use it for any purpose that is prohibited by the NCDOT Toll Policy and its regulations. By clicking on the “I agree” block below, you understand and agree that only NCDOT results from the FFST will be considered acceptable to the NCDOT.

As part of the PSA process, a project sponsor is required to populate a PSA Process Form. This document captures key project information in order to initiate the assessment of a toll candidate

project and serves to kick off engagement with the IDPET as part of project analysis. A subsequent step in the PSA process is for the project sponsor to implement the FFST to get an initial indication of a toll candidate's ability to generate sufficient revenue to cover O&M and potentially a portion of capital costs. In order to streamline and simplify data entry across these two files, NCDOT included a script file in the downloadable package of PSA files. The script file is an executable file (name.exe) that a user will open and run in order to populate certain data fields in the FFST. Users will follow this process if they choose to leverage the script file:

- Open, populate, save, and close the pdf version of the PSA form
- Click on the executable file and select run (the Excel-based FFST in the directory will automatically be updated and saved)
- Open the FFST and continue to populate information required to perform the financial analysis
- It is important that the user not change the file names of either the pdf-based PSA form or the Excel-based FFST, or relocate these files to different locations, since the script file references these files as it runs.

As noted above and in **Appendix E**, Step 4 of PSA includes an intense analytical process which has the potential for multiple iterations of candidate testing. The project is subject to both PSA performance-based criteria and financial feasibility tests which the Project Sponsors may run multiple times for sensitivity analysis. It should be understood that the FFST, which assesses the candidate's financial capability, provides preliminary, sketch level results not for immediate use in project planning/environmental or design decisions. Rather the level of analysis is commensurate to, but not at the same level of calculation detail as, NCDOT's strategic prioritization process. The data inputs (collected from the PSA Process Form in Step 1) populate within the FFST for ease of data transfer and calculations. It should be noted that Project Sponsors can also create a level of interaction between the FFST, their respective local/regional travel demand model and the NCSTM to support advanced evaluation. Enhanced interaction and connectivity between these models will likely extend the analytical process and timeline to generate results. The process requires the Project Sponsor to share results with IDPET, so the parties can jointly agree on how all assumptions, inputs, and outputs are understood and communicated.

6.4. Additional PSA Applications and Considerations

The PSA process is intended to add value and enrich decision making at the local level. The PSA tool and process are easy to understand (and not burdensome) to project sponsors and are understood within the overall North Carolina's planning framework (long range planning, strategic prioritization, and programming process). As noted, some project sponsors may choose to initiate PSA at the beginning of CTP and MTP development or prior to the start of their next CTP and MTP update. Either way is acceptable – the key consideration is understanding the data needs and availability of expertise to complete the PSA process satisfactorily. If a CTP or MTP is under development (but not yet adopted), it must be made clear from the Project Sponsors that the project is going to be identified as a toll candidate in the CTP or MTP.

PSA is considered in more than one step of the CTP and MTP process but occurs prior to strategic prioritization. It supports multiple or specific planning related applications to inform a CTP and MTP update, including:

- **Corridor studies** – provide performance and financial indicator impacts of various alternatives and how outputs compare against local/regional plan goals, standards, or benchmarks.
- **Network analysis** – provide performance and financial indicator impacts of multiple projects assumed to form a network of toll facilities across a region. Through further interaction between the NC Statewide Model and local/regional model PSA, provides enhanced sensitivity analysis of network-based transportation impacts at a local/regional scale (and per local/regional plan goals, standards, or benchmarks).
- **Feasibility studies** – NCDOT has produced a number of feasibility studies associated with projects which have toll candidate potential in recent years. Each feasibility study gathers preliminary data about

a project – identifying project characteristics and conducting an early, high-level environmental screening. Feasibility studies provide a preliminary cost estimate and profile for projects which also inform submittals for strategic prioritization and in most cases for projects which end up in NCDOT's STIP. Many of the same points collected for Feasibility Studies overlap with input data found on the PSA Process Form and inputs needed to run PSA tools – such as the Financial Feasibility tool. Therefore, the Department intends that future Feasibility Studies will be formatted to provide a direct link to the preliminary data inputs that correlate to the PSA online form. This step will build early efficiency into the PSA process and subsequent analytical steps. Other such opportunities to utilize and leverage field-collected or early project screening data will be explored for PSA.

- **Incorporate into the IPD process** – Toll candidate(s) which continue to advance through NCDOT's programming and preconstruction will be incorporated within the NCDOT's Integrated Project Delivery (IPD) process. This new process is under development and is expected to streamline project development and delivery.
- **Inform projects to submit to strategic prioritization** – PSA outcomes inform if a candidate project moves up in priority based in tolling viability and is ready for submission to the next round of strategic prioritization.

It is recognized that some MPOs and RPOs may not have the technical expertise to provide responses to all criteria and measures, but they are intended to be relatively simple to understand and evaluate. They also are not all encompassing but considered as a supplement to those criteria and measures used by MPOs and RPOs in evaluating toll candidates. NCDOT commits to provide technical assistance as needed and as requested by any MPO and RPO. Some attached criteria and measures have a strong relationship to the quantitative criteria in the strategic prioritization process and are delineated in the far-right column of **Table 23**, shown previously. A few other criteria and measures may not have this relationship as they may be more qualitative. Still others are simply criteria and measures that sponsoring agencies need to consider before making a final decision on submitting it for scoring. Notwithstanding the above, none of these criteria and measures truly provide a strong indication of whether a toll candidate will score well in the next prioritization process.

6.5. Financial Feasibility Application

One of the key components of the NC Toll Policy is to help Project Sponsors and NCDOT leverage limited financial resources. The policy expands the consideration of toll financing as an integral and important strategy to deliver critical, time-sensitive transportation solutions. This policy allows MPOs, RPOs, and NCDOT to evaluate the feasibility of financing urban and rural highway improvements through the levying of tolls or managed lanes options.

Financial feasibility is one element of the overall PSA, discussed in more detail in **Chapter 5** which outlines how and where PSA evaluation of tolling candidates can be incorporated within North Carolina's current planning process. Specifically, it provides more details regarding the performance-based criteria and standards to evaluate future toll candidates and describes the most appropriate places along the planning spectrum where this evaluation will occur. The performance-based criteria are informed by NCDOT's current strategic prioritization project-based scoring criteria and, when combined with financial feasibility tests, form the basis of a holistic, preliminary indication of the candidate's viability. Therefore, the financial components combined with the performance-based components outlined in **Chapter 5** act as inputs into an overall PSA tool which will operationalize the PSA process.

Using traffic and revenue inputs, along with cost information, the financial feasibility module calculates the ability of a toll candidate to generate revenue to cover its own costs of operation and to assess its ability to fund all or a portion of the capital costs through toll financing. Prior to the implementation of tolls and issuance of debt, however, significant additional analyses will be required.

The FFST is housed on NCDOT's Connect website and is available to MPOs and RPOs. NCDOT is responsible for updating and disseminating the latest version of the tool as it evolves over time. NCDOT assigns a point-of-contact (POC) who manages the master working version of the FFST. The POC is

available for providing technical assistance, training, quality control, and quality assurance to ensure the tool is applied properly. The FFST was designed so that MPOs and RPOs execute the tool on their own, using readily available resources. However, in the absence of internal resources, NCDOT through the POC can execute the tool on behalf of MPOs and RPOs.

6.6. PSA Requirements

Appendix E outlines the six-step PSA initiated by Project Sponsors to confirm local commitments and secure NCDOT resources. NCDOT Highway Divisions cannot submit toll candidates for PSA but serve to resource and liaison with Project Sponsors as they consider toll candidates for evaluation. Transparency, data sharing, commitment of technical resources and information sharing between Project Sponsors and IDPET are essential to execute PSA. Data inputs and assumptions must be agreed upon and expectations for the number of technical and coordination actions, lead roles and responsibilities should be understood as early in the process as possible and by PSA Steps 2 and 3.

The following requirements (most of which are noted in Section 6.3 are bulleted here for easy reference).

- **Prior to Step 1** -- Access PSA files by accepting “Rules of Engagement” terms.
- **Step 1** – Complete and submit toll candidate(s) through the PSA Process Form. Submittals outside the PSA Process Form cannot be evaluated through the formal PSA process.
- **Step 2** – Project Sponsor communicates intent to evaluate toll candidate(s) under PSA to local MPO and RPO technical and policy boards; communication is documented in meeting minutes.
- **Step 3** – Project Sponsors and IDPET agree on all technical prerequisites to prepare toll candidate(s) for Step 4, including data inputs, assumptions, staff/resource expectations, level of modeling/PSA tool interaction.
- **Step 4** – IDPET and Project Sponsors must agree on adjusted assumptions, conduct modeling and financial screening and jointly review and evaluate results to determine if additional analysis is needed.
- **Step 5** – Project Sponsor must document technical outcomes.
- **Step 6** – Project Sponsor must seek input through adopted public involvement or participation plans and communicate results with MPO and RPO technical and policy boards.

Additional requirements under Step 6 to comply with the NC Toll Policy are found below.

6.6.1. Public Involvement

As outlined in Step 3 of the NC Toll Policy, public participation and Project Sponsor’s responses to comments received must be demonstrated and documented. The extent of participation and use of communication materials to solicit, collect, and respond to comments should be consistent with locally adopted public involvement or participation plans and Federal Highway Administration (FHWA) guidelines to ensure sufficient opportunity for input. The public comment period for PSA evaluated toll candidates can overlap with the comment period to receive feedback on other local priority projects to be submitted for NCDOT strategic prioritization. The process used to solicit input on the latter is already approved by NCDOT. However, during an overlapping comment period, the Project Sponsor must clearly indicate which of their priority projects are toll candidates, evaluated through PSA, and must distinguish and separately document the input received and responses provided for those candidates. The documented results of public participation (along with a resolution of support and other items cited in the next section) should accompany PSA evaluated toll candidates when submitted to NCDOT for the next round of strategic prioritization. Project Sponsors should coordinate with NCDOT to determine how these materials can be incorporated within a future CTP and MTP update.

6.6.2. Project Sponsor Resolution

Project Sponsors who expect to submit PSA evaluated toll candidate(s) for the next (or future) round of strategic prioritization must adopt a resolution of support for the candidate(s). This action is consistent with

Step 4 of the NC Toll Policy, and PSA Steps 5 and 6 to confirm local support for the project and its potential benefits and its consistency with local CTP and MTP goals, objectives, priorities, and system performance. The resolution also communicates Project Sponsor commitment to continue advancing the project – either through submission to strategic prioritization and/or further analysis. *It should be noted the Project Sponsor is not required to pass a resolution if they do not expect to submit the toll candidate to strategic prioritization or decide to suspend further study.* However, PSA results and a summary of public input must be documented or referenced within CTP and MTP development. Resolutions can be adopted through MPO and RPO policy board motion after public input and Project Sponsor responses have been documented. This step can coincide with the formal MPO and RPO policy board action to recommend and submit priority projects to NCDOT for strategic prioritization; however, toll candidates developed under the NC Toll Policy are unique and therefore must be distinguished or highlighted to ensure adequate transparency of the process. The timetable to act is tied to CTP and MTP update cycles (including under a plan amendment to consider new toll candidates and/or can coincide with the submission of local prioritized projects to NCDOT. Therefore, the passage of a Project Sponsor resolution indicates:

- Sufficient public input opportunity was provided for the toll candidate(s).
- Endorsement of the toll candidate(s) potential to address existing or future transportation problems in the respective locality or region.
 - If over time or through further study the toll candidate(s) cannot achieve long range planning goals, objectives and transportation performance targets (or other criteria outlined in the resolution) the Project Sponsor and NCDOT can jointly reassess the scope of local support for the toll candidate(s).
- Toll candidate(s) were evaluated under NC Toll Policy guidelines.
- Toll candidate(s) have the potential to serve a distinct purpose and specific local objectives compared to other non-tolled candidate strategic prioritization projects.
- Toll candidate(s) align with CTP and MTP goals, objectives, priorities and system performance.

Neither NCDOT nor the NC Toll Policy specify standardized language to use in local resolutions – rather, each Project Sponsor is responsible to prepare the resolution and inform NCDOT when the respective MPO and RPO policy board is expected to act. As cited under the Public Involvement section in this *Handbook*, documented input plus the resolution must accompany the toll candidates when submitted to strategic prioritization. These materials can also be jointly reviewed with NCDOT if PSA evaluation occurs in advance of a strategic prioritization window closing (as noted in PSA Steps 5 & 6). NCDOT provides a field in its SPOT Online tool under P7.0 for Project Sponsors to acknowledge PSA evaluated toll candidate(s) and to capture their required documentation. Any toll candidates eligible for and submitted through SPOT Online under P6.0 require Project Sponsors to submit corresponding documentation directly to NCDOT. Therefore, PSA evaluated toll candidates submitted to strategic prioritization must include:

- Completed evaluation of PSA screening and results
- Documented public involvement process and responses
- Resolution of support for the toll candidate project(s)

6.7. PSA Training Program

NCDOT recognizes that the NC Toll Policy and PSA process is a new practice for Project Sponsors. NCDOT also recognizes that a wide range of local resources, tools, and capacity exist to evaluate and test candidate projects across MPO and RPO staff. Therefore, NCDOT provided a series of three-hour training sessions in four locations in late September/early October 2019. The purpose of the training was to provide additional context of the NC Toll Policy and to allow participants to become familiar with PSA related tools, steps, and terminology. Over 60 participants attended the training, and their input and feedback refined this *Handbook*, PSA steps, and supporting tools/materials such as Financial Feasibility Screening, User Guide, a PSA flowchart, and list of FAQs.

The training sessions included an overview presentation and opportunity for participants to test and interact with the excel-based PSA Tool, user guide, and hypothetical project case studies to demonstrate user

interface and tool functionality. Also, the revised materials resulting from participant input are accessible through NCDOT's Connect Planning webpage.

6.8. Future Considerations – Technology, Operations, and Multimodal Benefits

Technological advances enabled a steady evolution in how tolling systems are managed and operated. New back office systems and toll collection methods, for instance, have streamlined operational efficiencies, leading not only to direct cost savings to toll road operators but also improved traffic flows and enhanced customer satisfaction. The revenue and cost assumptions used in the development of the financial feasibility screening tool reflect the current state of the practice. A national scan of capital and O&M costs were reviewed from existing and planned toll facilities to develop planning level unit costs. However, new technologies and methodologies are emerging to further leverage toll candidate capabilities and enhance network performance. These could include new funding models which mingle various federal and state sources (along with traditional debt financing) to advance and realize benefits of multimodal improvements within tolling corridors. The *NC Toll Project Development Policy Handbook* and the FFST will evolve through successive updates to incorporate such changes provided through best practice, successful project examples, and research.

While not an exhaustive list, the following trends (over time) will impact tolling implementation in North Carolina. These technologies will impact the cost and/or revenue-side of toll financing and will require recalibrating the FFST to test these scenarios.

Connected and automated vehicles. Connected and automated vehicles offer opportunities to collect more real-time data about traffic conditions, travel patterns, mode choices, trip times, and other mobility measures. Research shows substantial discussions about how toll roads can prepare for the coming wave of connected vehicles. Topics floated around include infrastructure-to-vehicle communications of toll information with connected vehicles and managing vehicle occupancy detection with automated vehicles.

Mobile devices. Research shows that mobile devices will become a universal platform for tolling, payment processing, and road-user charges. Mobile phones are nearly ubiquitous, especially in regions where tolling is practical, and new apps debut regularly to support mobility, mode and route choices, and payment processes. Some agencies already are evaluating mobile technology for tolling.

Artificial Intelligence/Machine Learning (AI/ML). Research shows that the rise of AI/ML will drive more intelligent system operations. Machine learning algorithms are helping to improve traffic monitoring and analyzation of data coming from surveillance cameras and sensors. AI/ML applications are also envisioned for enhancing customer support, such as complementing live agents at call centers with virtual agents to lower costs, providing personalized experience, and analyzing customer behaviors in real time.

Satellite-Based Tolling. This technology will use satellite navigation sensors to locate and identify vehicles within toll lanes. Commercially available satellite navigation technology does not currently provide the necessary lane-level accuracy. This technology will eliminate the need of expensive roadside toll collection infrastructure and the need for transponders in vehicles.

Multimodal Projects. Certain toll candidates and financing arrangements can provide benefits beyond the roadway customers paying the toll. Enhancements are also attainable for transit service running on a tolled facility, particularly express lanes. These enhancements include better on-time performance due to travel time reliability and increased travel speeds. Several transit agencies have seen a significant uptick in transit ridership after express lanes have been implemented. For example, Miami-Dade Transit saw express bus ridership increase by 286% during its first six years of operations along 95 Express in Miami, Florida. Express buses running in the I-85 HOT3+ lanes in Atlanta, GA make up about 2% of the vehicular traffic but account for approximately a quarter of the person-throughput in the express lanes.

Additionally, new funding opportunities are gaining interest such as bringing transit elements (through FTA funds) into a tolled project and then selling the excess capacity to single occupancy vehicles (SOV) and non-qualifying HOVs. Future versions of this *Handbook* and FFST could assess how these more robust transit-within-tolling examples can provide a direct benefit to an existing transit route.

6.9. Updates to the *Handbook*

The NC Toll Project Development Policy and accompanying *Handbook* are living documents. They are not to be considered one-time documents. Much like the strategic prioritization process which is clearly related to the toll policy, there is a need to update the policy and the *Handbook*. This initial effort has been built on learning from the best management practices of others and applying that knowledge to the known conditions in North Carolina. However, the PSA process must be “tested”, and until potential toll candidates are submitted for PSA, analyzed, and results known, Project Sponsors and NCDOT will be uncertain of outcomes. NCDOT will, of course, work diligently to seek success with Project Sponsors and the PSA process, and NCDOT realizes that modifications to the process will likely be needed based on initial efforts.

In addition, the strategic prioritization process is tied to PSA. That process is very robust and is revised every two years. NCDOT must be mindful that changes to the strategic prioritization process will impact the PSA process. Examples might be that changes in project submission dates impact when a Project Sponsor might need to initiate or complete the PSA process. Also, changes in prioritization criteria and measures might make toll candidate projects more likely to score higher in prioritization and thus influence Project Sponsors to submit more potential projects to the PSA process. Another example of change might be to the bonus allocation clause.

As stated above, changes in toll technology might impact the attractiveness of tolling. Any effort to reduce construction and maintenance costs will certainly help Project Sponsors consider more tolling projects.

It is proposed that a *Handbook* review be completed, proposed changes be reviewed and discussed, and recommendations be made within the next two years. Again, this will be done consistent with the strategic prioritization cycle. The IDPET will take the lead to initiate a biennial review process and lead a workgroup or members of the current workgroup to consider and evolve changes to any part of the *Handbook*. The *Handbook* will also be posted online in a hyperlink manner which will make updates to individual chapters efficient.

Appendices



Appendix A. NC Toll Project Development Policy

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

NC Toll Project Development Policy



Effective Date: February 1, 2018

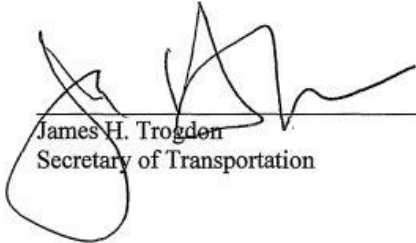


NC Toll Project Development Policy

Approved By: The North Carolina Board of Transportation

2/1/2018

Date of Approval



James H. Trogden
Secretary of Transportation

2/1/2018

Date of Approval



Michael S. Fox, Chairman
Board of Transportation

Person Responsible for Policy:

NC Turnpike Authority Director
NC Turnpike Authority
1 South Wilmington Street
Raleigh, NC 27601



NC TOLL PROJECT DEVELOPMENT POLICY

**NCDOT POLICY
A.09.0105**

Business Category: Secretary's Office		Business Area: North Carolina Turnpike Authority	
Approval Date: 2/1/2018		Last Revision Date: 2/1/2018	
Next Review Date: 12/31/2021			
Authority: Select all that apply: <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Requires Board approval <input type="checkbox"/> Requires FHWA approval <input type="checkbox"/> Requires other external agency approval: Click here to enter external agency name(s).		Policy Owner: NC Turnpike Authority Director	
Definitions: N/A			
<p>Policy: NCDOT desires to advance a new vision for examining the use of toll-funded financing options. These options could strengthen NCDOT's ability to manage a reliable transportation network and to provide choices for new users in a rapidly changing transportation landscape. The approach to support this vision could apply to a variety of tolling and pricing concepts and candidates such as (but not limited to) existing highways, new greenfield capacity, or bridge projects. NCDOT also recognizes the need to strengthen and improve the transparency of the entire tolling and managed lanes project development and delivery process including increasing opportunities for public participation and involvement. Proposed solutions would systematically advance through a series of steps to achieve project viability and equip NCDOT with additional tools to address immediate and emerging needs including:</p> <ul style="list-style-type: none"> Increasing congestion on corridors and regional networks which track with NC's rate of population and employment/freight growth; Diminishing state and federal funding from motor fuel receipts which track with new corporate average fuel economy (CAFE) standards and vehicle ownership changes; Growing pressure to develop and deliver transportation solutions which track with new federal emphases on system performance, partnerships, safety, security, and asset management; Increasing focus on transparent, data driven agency decision-making inclusive of increased public participation and involvement; and Providing users with innovative, efficient, and integrated transportation solutions and multimodal choices to connect people and places. <p>This context provides the basis for the following Policy Framework created to establish and implement an expanded, formalized program of toll-financed highway improvement projects. The framework consists of:</p> <ol style="list-style-type: none"> 1. Toll policy adopted by the Board of Transportation 2. Administrative/technical support by NCDOT 3. A toll and priced managed lane project feasibility process 4. Other considerations 			

North Carolina Toll Policy

To confirm the intent and direction of this new vision, the NC Board of Transportation would adopt the policy, consistent with current NC statutes, shown below:

To improve the Department's ability to manage a reliable transportation network, address congestion, leverage limited financial resources, and provide more user choice, the Department shall implement a NC Toll Policy.

The NC Toll Policy, defined and implemented by a Framework of steps and actions, expands the Department's consideration of toll financing as an integral and important strategy to deliver critical, time-sensitive transportation solutions. Upon adoption, the NC Toll Policy shall be applicable for eligible transportation projects submitted under NCDOT's next Strategic Prioritization cycle or Prioritization 6.0 (P6.C). Under this Policy the Department shall:

- *Evaluate the feasibility of financing high-capacity urban and rural highway improvements through levying of tolls or managed lanes pricing options. Subject to current state law these improvements could include but are not limited to: new alignment highways with full access control; improvement of existing full access control highways by addition of priced managed lanes; conversion of other highways to tolled, full access control highways by reducing direct access and adding tolled general use or managed lane capacity; or high-volume bridges over bodies of water. This Policy defines "limited access highways" as those planned for high speed traffic, with few or no at-grade intersections, limited points of access, and a median divider between traffic lanes moving in opposite directions.*
- *Define feasibility of tolling and priced managed lanes in cooperation with the state's Metropolitan and Rural Planning Organizations (MPOs/RPOs) and guidelines as set forth in a **Toll Project Feasibility Handbook** (Handbook). The Handbook will ensure that candidate projects are financially feasible, will operate safely, are publicly vetted, and reflect sound stewardship of funds and program performance. Any toll candidate project(s) not committed in P6.0 will be subject to the Handbook guidelines. An MPO or RPO request to convert a current non-tolled project in NCDOT's strategic prioritization database to a tolled project would be considered a new project and subject to the Handbook guidelines. As used in this Toll Policy, the term "committed" refers to the definition used for programming a project for right-of-way or construction in the STIP under NCDOT's latest strategic prioritization process." For any toll project or priced managed lane project to be programmed and constructed by the Department, it must be approved by the nominating MPO or RPO through inclusion in their adopted Comprehensive Transportation Plan (CTP), Metropolitan Transportation Plan (MTF), or other adopted local plan; it must also advance through the state's Strategic Prioritization process and score well enough to be included in the local Transportation Improvement Program (TIF) and Statewide Transportation Improvement Program (STIF).*

Administration/Technical Support

To support the expanded evaluation of projects across the state, and to avoid over-burdening local or regional planning agencies (MPOs and RPOs), NCDOT would establish a Project Financing Feasibility and Coordination function. Recognizing the project financing expertise of NCTA, the function would be located organizationally within NCTA and would establish a collaborative planning process with NCDOT's Transportation Planning Branch, Strategic Prioritization Office, and Feasibility Studies Unit. These units would be charged with preparing the *Toll Project Feasibility Handbook* to guide the application, coordination and procedures of the toll feasibility process, including proactive public/stakeholder engagement from Steps 1-4 found in this Framework. It is anticipated that these units would work closely with both NCDOT staff and external Project Sponsors to identify viable projects which successfully advance through a series of rigorous, documented steps. These units will ensure the process (from project submittal to programming viability) is conducted in a reasonable timeframe. The extent of that timeframe and any applicable "sunset" provision would be included in the *Handbook*. NCTA would play the lead role and act as a "single point of contact" to communicate and coordinate project feasibility information with NCDOT BOT/ NCTA Board, media, state/local elected officials, and key statewide or local stakeholders.

Toll and Priced Managed Lane Project Feasibility Process

To provide consistent consideration of tolled or priced managed lane projects, projects will be screened through a four-step project feasibility process initiated by the MPO or RPO (Project Sponsor) and coordinated through NCDOT. Each step, and how the tests/screens are applied, would be described in the *Toll Project Feasibility Handbook* and would be consistent with current NC statutes. The screening and evaluation process will be consistently applied regardless of location. Candidate projects would focus on:

- Greenfield (new) expressways/freeways (urban and rural) (e.g., Monroe Expressway in Union County; NC 540 in Wake County)
- Priced managed lanes (partial tolling) constructed within existing expressways/freeways (e.g., I-77 North)
- Upgrades of existing partial control of access roadways to full access control highways, by converting at-grade intersections to grade-separated interchanges, eliminating driveway connections to the main lanes, and tolling the new capacity (e.g., conversion of US 1 North in Raleigh/Wake County to limit access and facilitate higher speed movement)
- New bridges or major bridge replacements located on the primary highway network (e.g., Mid-Currituck Bridge)

Step One – Initial Project Identification

Project Sponsors would submit projects to NCDOT/NCTA to be tested for toll-financing or priced managed-lanes feasibility following a first level of screening by the Project Sponsor. Initial screening would be conducted consistent with guidelines provided in the *Handbook*, and would establish minimum requirements to submit projects, including:

1. Project need must be identified in locally adopted transportation plan; this may be either a Comprehensive Transportation Plan or financially-feasible Metropolitan Transportation Plan.
2. Must be of facility type expressway or higher
3. Uses Statewide and regional travel demand models to support benefits
4. Has received MPO/RPO board resolution requesting NCDOT evaluation of feasibility for toll-financing for project delivery

Other considerations, as the process evolves, could be added to the *Handbook*.

Step Two – Initial NCDOT Toll Feasibility Testing

Projects submitted by Project Sponsors passing Step One minimum requirements will be subject to initial NCDOT toll feasibility testing for operational and financial feasibility and other standard NCDOT evaluations (such as environmental impact). The exact parameters of these tests are to be determined and will differ between toll projects and priced managed lane projects. Projects which pass the operational and financial feasibility tests will be returned and results shared with the Project Sponsor for further consideration.

Step Three – MPO/RPO Screening

The Project Sponsor will conduct further screening of the tolled or priced managed lane project to ensure that the project is consistent with local plans and goals, and locally approved. NCDOT will participate in project screening, and/or provide technical/analytical support at the request of the Project Sponsor. Project Sponsor screening may result in tolled and priced managed lane projects to be included in the MTP or CTP as identified tolled and/or priced managed lane projects and must satisfy measures of effectiveness assessed through local modeling, criteria, standards and network benefits. Some of these measures should also come from a single, statewide list to provide policy consistency and candidate viability regardless of location. Although the exact measures have yet to be determined, they will be identified in the *Handbook*. Any independent traffic or economic analysis conducted as part of

Step Three screening could be completed by either NCDOT or the Project Sponsor, as determined by mutual agreement.

Documented public participation, input, and agency response, in the form of fact sheets, FAQ's, additional analysis/studies and other communication material consistent with local practice, must be demonstrated to NCDOT to ensure sufficient public opportunity in the decision-making process. An expected outcome of Step Three is a resolution by the Project Sponsor acknowledging the project's consistency with local plans and goals, inclusion in approved transportation plans, documented public input, and agency responses (within the CTP, MTP, or through other plans, independent studies) and endorsement of the toll or managed lanes project for STIP programming through the NCDOT Strategic Prioritization process.

Step Four – Prioritization and Programming

Projects found to be suitable by NCDOT for implementation as tolled or priced managed lane projects (Step 2), successfully screened by their MPO/RPO Project Sponsors for inclusion in their MTP, CTP or other adopted document and endorsed for TIP/STIP (Step 3) may be submitted to NCDOT through the Strategic Prioritization process. This step includes scoring and reviewing the candidate for programming potential (consistent with NCDOT's biennial Strategic Prioritization process) and ensuring maximum available local input points have been assigned to the project to reinforce local priority. Step Four would also include a high-level analysis of potential non-state, non-local funds which can be applied to the benefit-cost criteria under current financial and modeling assumptions.

Other Considerations

- **Financing and Delivery Methods** – More research is needed to develop policy recommendations for effective financing mechanisms (public-private, private only, or other finance/operating arrangements) which support a variety of toll-financed solutions in NC. Practices across the country include the transfer of asset ownership, transparency of terms in concessionaire agreements, risk registers to quantify project delivery risks, acceptance and evaluation of unsolicited bids; these should be examined for inclusion within or as an expansion to the current toll project feasibility steps. If applicable they should also be incorporated into the *Handbook*.
- **Performance and ROI** – Given the increased demand for optics into agency decision making, a process should be developed (over time) to support performance reporting and return on investment accountability of agency resources. Independent analysis (conducted by research institutes or third parties) could measure before/after results and document project effectiveness against standard, industry accepted metrics (such as travel time savings, reliability, productivity, or other metrics). Such a practice would bolster agency credibility, disseminate utilization rates, and promote project acceptance. If applicable such a practice should be incorporated into the *Handbook*.

Scope: This policy applies to all NCDOT and NCTA employee who are involved in the toll feasibility process.

Procedures: N/A

Related Documents: N/A

Revision History		
Revision Date	Revision Number	Description
07/01/19	1	Added the following amendment as approved by the NCDOT Board of Transportation on June 27, 2019: Amended policy with the following: <i>Any toll candidate project(s) not committed in P6.0 will be subject to the Handbook guidelines. An MPO or RPO request to convert a current non-tolled project in NCDOT's strategic prioritization database to a tolled project would be considered a new project and subject to the Handbook guidelines. As used in this Toll Policy, the term "committed" refers to the definition used for</i>

		<i>programming a project for right-of-way or construction in the STIP under NCDOT's latest strategic prioritization process."</i>
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Appendix B. NC Toll Project Development Briefing Book



NORTH CAROLINA Department of Transportation



NC Tolls Project Development Policy A Policy Framework Proposal

Briefing Book

September 2018

ncdot.gov

Proposed North Carolina Tolls Project Development Policy

To improve the Department's ability to manage a reliable transportation network, address congestion, leverage limited financial resources, and provide more user choice, the Department shall implement a NC Toll Policy. The NC Toll Policy, defined and implemented by a Framework of steps and actions, expands the Department's consideration of toll financing as an integral and important strategy to deliver critical, time-sensitive transportation solutions. Under this Policy the Department shall:

- **Evaluate the feasibility of financing high-capacity urban and rural highway improvements through levying of tolls or managed lanes pricing options.** Subject to current state law these improvements could include, but are not limited to: new alignment highways with full access control; improvement of existing full access control highways by addition of priced managed lanes; conversion of other highways to tolled, full access control highways by reducing direct access and adding tolled general use or managed lane capacity; or high-volume bridges over bodies of water. This Policy defines "limited access highways" as those planned for high speed traffic, with few or no at-grade intersections, limited points of access, and a median divider between traffic lanes moving in opposite directions.

- **Define feasibility of tolling and priced managed lanes in cooperation with the state's Metropolitan and Rural Planning Organizations (MPOs/RPOs) and guidelines as set forth in a Toll Project Feasibility Handbook (Handbook).** The Handbook will ensure that candidate projects are financially feasible, will operate safely, are publicly vetted, and reflect sound stewardship of funds and program performance. For any toll project or priced managed lane project to be programmed and constructed by the Department, it must be approved by the nominating MPO or RPO through inclusion in their adopted Comprehensive Transportation Plan (CTP), Metropolitan Transportation Plan (MTP), or other adopted local plan; it must also advance through the state's Strategic Prioritization process and score well enough to be included in the local Transportation Improvement Program (TIP) and Statewide Transportation Improvement Program (STIP).

Responding to General Assembly direction, NCDOT is considering a policy to create a transparent, proactive policy calling for structured consideration of the use of toll financing to advance transportation goals.

NC Toll Project Development Policy: A Policy Framework Proposal

Table of Contents

- I. The Charge and Need
- II. Analysis of Opportunities
- III. Toll Policy and Feasibility Process

Appendix A: State and Regional Best Practices

Appendix B: Proposed NC Toll Policy Framework



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The General Assembly has urged NCDOT to better define its process examining the financial feasibility using toll financing to advance the delivery of expressways or priced managed lane projects.

General Assembly Support

“Establishing policies and guidelines will allow for the Department to make informed decisions when selecting projects as toll candidates and is critical to moving the state forward. Understanding which project characteristics make a project viable for tolling, managed lanes, or a (P3) agreement is necessary in gaining public trust.”

*Senators Meredith, Davis, McInnis and Rabon
April 6, 2017*

4

What is North Carolina's current tolling authority?

NCDOT is conducting its policy development effort with consideration of existing statutory direction. That process was refined by passage of the Strategic Transportation Investments Act (STI) several years ago. Prior to STI, the **Turnpike Authority** was authorized to study and develop up to nine projects. Studies had actually been initiated on five.

With STI passage, added focus was given to the Turnpike Authority's program. NCDOT has authority to develop and operate up to 11 projects. **The current Statewide Transportation Improvement Program has nine tolled projects, either new freeway projects such as completion of the Triangle Expressway or managed lanes projects such as I-77 and US 74.**

In authorizing toll road construction, the General Statutes direct that any tolled project:

- Shall be subject to the STI's data-driven Project Prioritization process
- Requires approval by local planning organizations
- Considers local funding participation
- Applies tolling only to new capacity, requiring a non-tolled alternative route

NCDOT has undertaken this policy development effort in response to multiple challenges and opportunities. There is need to:

- **Respond to regional tolling initiatives;** currently, MPOs in the Raleigh-Durham and Metrolina regions are considering their own tolling programs
- **Address project acceptance challenges,** to avoid the perception of "imposed will" by NCDOT, as evidenced by the reactions to the I-77 project in Mecklenburg County
- **Define a process for project development and review,** recognizing the potential benefits of implementing a programmatic policy for considering tolling in light of current STIP programming
- **Increase accountability through more openness and transparency,** particularly as NCDOT faces the funding challenges posed by diminishing reliability on traditional funding sources for the Highway Trust Fund

NCDOT's current tolling authorization:

Today, through the NCTA, NCDOT is authorized to construct, operate and maintain up to eleven projects.

- Turnpike projects are subject to Project Prioritization
- Turnpike projects require approval from local planning organizations
- Encourages local funding participation
- Limits tolling to only new capacity only

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Why Consider a Comprehensive Tolling Vision and Policy for NC?

The demands being placed on North Carolina's transportation network, for mobility, for new and better-managed capacity, and for the funding needed for critical infrastructure projects, are accelerating as the state grows and revenues to fund transportation become less reliable. As North Carolina's demographic and economic growth continues, so too does the demand for continuing improvements to the state's transportation system and highway network, particularly in rapidly growing urban areas such as Charlotte and the Triangle area (Raleigh, Durham, and Chapel Hill).

Needs Addressed by Policy - From an institutional and program-delivery perspective, a comprehensive tolling vision and policy would address multiple needs:

- **For accelerated project delivery** – toll financing removes projects from the highly-competitive push for funding using traditional state and federal funds
- **For improved management of congested corridors** – tolls can be used to manage congestion by applying pricing strategies to available roadway capacity
- **For transparency** – a reasoned policy will give all regions of the state the ability to understand the process for selecting toll-financed projects
- **For funding flexibility** – traditional funding sources (primarily motor fuels taxes and fees) are becoming less reliable; tolls will allow NCDOT to stretch limited traditional funding

Mechanisms for selection and implementation have been tested and perfected in states and regions across the country. Our neighbors use toll financing for all of the reasons listed above.

Why consider a tolling vision and policy?

In the face of growing pressures to provide mobility for economic development and to manage scarce financial resources, a tolling vision and policy will address need for:

- accelerated project delivery
- improved management of congested corridors
- transparency in project selection
- funding flexibility

Expanded use of tolls is a path used successfully by neighboring states.

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NC is a rapidly growing state with an ever-changing transportation landscape and expanding needs.

North Carolina's rapid growth, our shifting development patterns, and expanding economy create an ever-changing transportation system implementation landscape.

NCDOT faces pressures to provide a transportation infrastructure that can address challenges such as these:

- Increasing traffic and congestion tracking with rapid population and employment/freight growth
- Diminishing state and federal funding from motor fuel receipts reflecting improved fuel efficiency and vehicle ownership changes
- A backlog of needed highway capacity and mobility management needs due to the combination of ever-increasing travel and declining revenue

In this challenging environment for keeping people and freight moving safely, efficiently, and reliably, NCDOT faces continuing pressure to provide users with innovative, efficient, and integrated transportation solutions and multimodal choices. Finally, the growing public expectation that the program be delivered in a transparent manner, using data-driven decision-making with broad opportunity for public participation and involvement must also be met.

Each of these challenges is addressed on the following pages.

Rapid growth leads to a changing transportation delivery landscape.

To deliver its transportation program effectively and efficiently, NCDOT faces three converging and overlapping challenges:

- Increasing traffic and congestion
- Diminishing traditional state and federal funding
- A backlog of needed highway capacity and mobility management needs

Might increased but well-managed use of toll revenue be at least a partial answer?

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Increasing congestion tracking with NC's growth is reducing our mobility and adding to the cost of living and of doing business.

North Carolina continues to be one of the fastest growing states in the nation, currently the 9th most populous state with over 9.5 million residents and projected to be the 8th most populous by 2040 with a population of 12.5 million.

90% of new residents will move to only five metropolitan areas: Raleigh-Durham, Charlotte, Piedmont, Wilmington and Asheville. The Raleigh-Durham area will be the state's most populous with 3.2 million residents in 2040. The Charlotte and Triad regions will have populations in excess of 3 million and 2 million, respectively.

Total employment will increase to 5.7 million in 2040 from pre-recession 2007 levels of 4.1 million, according to NCDOT's 2040 Plan. And with increasing population and employment comes increased need for efficient freight movement; according to the latest North Carolina State Freight Plan, freight moving by truck will increase 43 percent from 2015-2045.

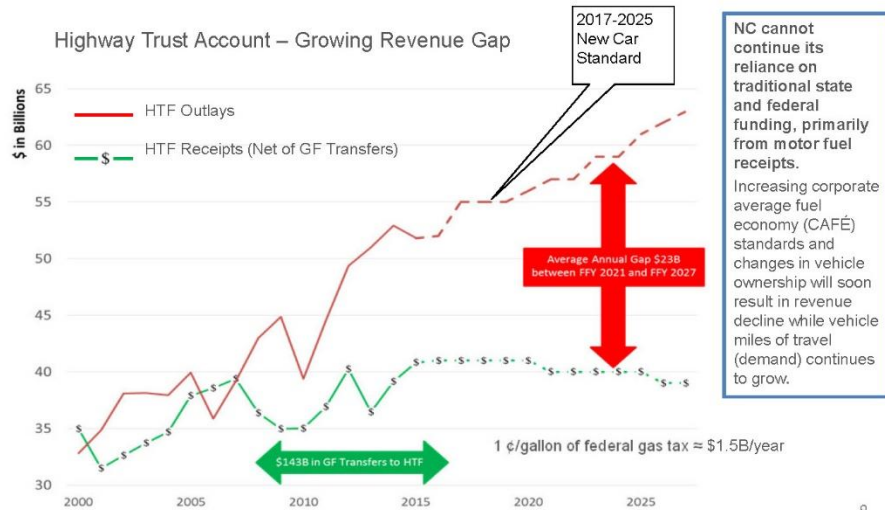
The addition of the 3 million new residents presents transportation infrastructure challenges that the state will need to address if we are to retain our position as being attractive to companies that are considering locating here.



In 2015, there were 18.26 billion vehicle miles traveled on NC urban interstates (FHWA's 2015 Highway Statistics). Using typical tolling rates of 12 cents/mile, this would generate 2.2 billion in toll revenue during that year.

8

Improving vehicle fuel economy and changes in ownership will require new ways to fund highway improvements.



A backlog of needed highway capacity and mobility management needs continues to challenge the state.

NCDOT owns and maintains 80,000 miles of streets and highways. In 2012, in preparing its most recent statewide transportation plan, the 2040 Plan, NCDOT identified that \$93 billion would be needed to maintain our highway system to a standard needed to preserve the infrastructure and provide the level of mobility needed to support the economy. \$49 billion would be needed to provide sufficient capacity, with \$19 billion of that needed just to address existing needs. Further, as shown in the table below, urban highway expansion needs greatly exceed non-urban needs, reflecting the state's increasing urbanization. In the short term, urban area expansion project funding requests for the 2018–2017 STIP exceeded funding by \$1.3 billion.

The combination of highway needs and expected revenue results in a forecasted \$60 billion funding gap between anticipated revenue and documented transportation needs (2040 Plan). These needs are not just for new highway capacity, but cross all modes of transportation, and include safety, preservation, and mobility needs.

NC has a large funding gap in addressing highway needs.

In its 2040 transportation plan, NCDOT forecasts a \$60 billion shortfall in addressing over \$93 billion of highway expansion needs.

2040 Plan Highway Mobility Needs		P4.0 Urban Freeway Project Requests	
Highway Mobility Needs, Target Level of Service	Cost (\$ in billions)	Project Status	Identified Needs (\$ in millions)
Non-Metro Expansion Needs	8,582	Total Urban Freeway Capacity Project Requests	6,598
Metro Expansion Needs (within MPO areas)	40,564	Urban Freeway Capacity Projects – Funded in 2018-2027 STIP	5,270
Total Highways Expansion Needs	93,030	Urban Freeway Capacity Needs Gap	1,328

Costs to upgrade current and future Interstates may exceed the available Capital Budget.

North Carolina's Interstate highway system forms the backbone of the state's transportation network, moving tens of thousands of trucks and hundreds of thousands of automobiles daily. As a significant subset of the highway needs reported in the 2040 Plan, NCDOT is also aware that the cost to upgrade our Interstate Highway network would be a very large portion of the Department's capital budget.

- Costs to add need capacity and rehab aging interstates over the next 25 years is **\$28 billion**.
- Within that number, the cost to upgrade Interstate 95 is **\$5.5 billion**.
- In addition, the cost to upgrade future interstates (I-87, I-587, I-42, and I-73/I-74) is **\$3.4 billion**.

Over the same 25 years, NCDOT's total capital budget is approximately **\$32 billion**.

Bottom Line:
You can't get from
There to Here.

If funding is depleted by interstate upgrades, this leaves little to no funding for other projects statewide.

11

Many states have concluded that tolling provides multiple benefits.

States like Georgia, Florida, Colorado, Virginia, and Texas have concluded that various forms of tolling provides them with choice, mobility, and funding options (see Appendix A for details).

Generally, benefits include:

- Accelerated project delivery
- Congestion management and relief
 - Ability to increase throughput (people and vehicles) through the corridor
 - Provide transit vehicles with free-flow corridors
 - Allow for single occupancy vehicles to pay for unused HOV capacity
 - Ability to achieve travel time savings
 - Ability to provide reliable travel times through pricing
- Financial feasibility
 - Ability for toll revenue to cover tolling and roadway O&M costs
 - Ability for toll revenue to cover or contribute upfront funding towards construction costs
- Other considerations: safety, economic development



Georgia, Florida, Colorado, Virginia, and Texas all have recognized that various forms of tolling are necessary tools in their ever-increasing battle to mitigate congestion and generate needed revenues for transportation.

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Today's modern toll roads offer flexibility in project types, objectives, and revenue potential.

Two primary types of toll roads are currently being developed in the U.S.

1. **Traditional, greenfield toll roads** – in the last 10 years these contemporary tollways have been largely developed in North Carolina, Texas, Illinois, and Florida
2. **Priced managed lanes** – these toll lanes operate next to un-tolled general purpose lanes on sections of Urban Interstates and other limited access facilities throughout the U.S.

Traditional toll roads and Priced Managed Lanes have different objectives and revenue earning potential.

1. **Traditional, greenfield toll roads**– these tollways seek to generate revenue to pay back their project debt while providing a mobility option in a region
2. **Priced managed lanes** – these toll lanes typically strive to improve and maximize person-throughput in a specific congested corridor during rush hour conditions. Secondly, they seek to generate their own operating revenue

Traditional toll roads primarily seek to repay their capital debt while priced managed lanes typically seek to relieve congestion in an urban corridor



Current toll road best practices offer NC a wealth of lessons learned to guide future project development.

An examination of current national toll road best practices can offer NC a wealth of lessons learned. Examples can be drawn from the nearby states of Georgia and Florida.

1. **Florida case study for traditional, greenfield toll roads** (Florida Statute 338.223) states that proposed toll projects
 - Must be economically feasible and included in FDOT's tentative work program
 - Impacted MPO must include the toll project in their TIP
 - The project must demonstrate economic and environmental feasibility
2. **Georgia case study for priced managed lanes** (Georgia State Transportation Board, 2007) stipulated that "All new capacity lanes within limited access corridors in Metro-Atlanta shall be managed," and
 - Mobility must be guaranteed in the managed lane
 - Lane management relies on eligibility, congestion pricings, and/or accessibility
 - Within the context of system-wide plan, each solution will be tailored to individual corridor needs
 - Managed Lanes have applicability statewide

Both Florida and Georgia have also faced growing pressure on their transportation systems and have established toll policies in their states.

Bottom-line take-aways?

- Numerous sound approaches are available for selecting and evaluating toll projects
- Successful states have a programmatic vision for why they want to use tolling/road pricing for a given corridor or system
- Develop goals for projects and programs and specific feasibility tests that can be measured
- Include local planning agencies and MPOs as soon as you can
- Retaining agency flexibility is ideal
- Ensure continuous public input and involvement throughout the process of developing any proposed toll facility

How should North Carolina *operationalize* change? It starts with the launch of a new NC Toll Policy.

To confirm NC's new vision and direction, the Board of Transportation has adopted a new NC Toll Policy.

This Policy outlines the context, basis, and rationale for a shift in current practice which moves the Agency to a broader, comprehensive tolling strategy.

The development of an operating framework is a critical component to help implement the Toll Policy and manage the process.

- Each step of the framework would involve public input, NCDOT and Project Sponsor coordination, and a series of tests to produce toll candidate projects with the highest potential viability.
- The framework is also flexible and will evolve over time as federal regulations, industry changes, or lessons learned (from NC or other best practice states) are applied to the process.
- Other states – such as Florida DOT – use a similar framework which is documented, visible, and easily accessible for transparency and accountability.

Finally, implementation of the NC Toll Policy will be housed in a **NC Toll Project Feasibility Handbook (Handbook)** which will describe the operating rules, procedures and roles/responsibilities between NCDOT/NCTA and Project Sponsors.

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What action steps are needed to trigger change and support a new NC Toll Policy and correlating Handbook?

Following adoption of the Policy by the Board of Transportation, the following action items (set forth in greater detail on the following pages) will be completed:

- ***Develop a new NC Toll Project Feasibility Handbook to govern implementation***
- ***Administer new cross-functional coordination in NCDOT***
- ***Incorporate other applicable best practice to mature the process***

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The NC Toll Policy directs a structured, transparent process for identifying and programming tolled projects.

The adoption of the NC Toll Policy (next page) launches the development of a framework to evaluate high capacity urban and rural highway improvements through levying of tolls or managed lanes pricing options and test the feasibility of those improvements through Metropolitan and Rural Planning Organization (MPO/RPO) planning practices. *Eligible proposed improvements and the feasibility process would be defined under the Handbook.*

- The evaluation process would be subject to current state law and apply to new alignment limited access highways; existing limited access highways by addition of general use lanes or priced managed lanes; conversion of other highways to limited access highways; or high-volume bridges over bodies of water.
- The feasibility process would be conducted in concert with MPOs/RPOs (referred to as Project Sponsors) and administered through a four-step screening process.
- The NCTA and a cross functional process (involving NCDOT's Transportation Planning Branch, Strategic Prioritization Office, and Feasibility Studies Units) would work closely with Project Sponsors to identify viable projects which move through the screening process. This close collaboration would support the steps are completed in a reasonable timeframe – and any applicable "sunset" provision is included in the *Handbook*.

The NC Toll Policy – defined and implemented by a framework of steps and actions that expand the Department's consideration of toll financing as an integral and important strategy to deliver critical, time-sensitive transportation solutions.

The *Handbook* is the operating "rule book" of the NC Toll Policy.

NCTA would act as a "single point of contact" to communicate and coordinate information with NCDOT BOT/NCTA Board, media, state/local elected officials, and key statewide or local stakeholders and the public.

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Adopted North Carolina Toll Policy

To improve the Department's ability to manage a reliable transportation network, address congestion, leverage limited financial resources, and provide more user choice, the Department shall implement a NC Toll Policy. The NC Toll Policy, defined and implemented by a Framework of steps and actions, expands the Department's consideration of toll financing as an integral and important strategy to deliver critical, time-sensitive transportation solutions. Under this Policy the Department shall:

- Evaluate the feasibility of financing high-capacity urban and rural highway improvements through levying of tolls or managed lanes pricing options. Subject to current state law these improvements could include, but are not limited to: new alignment highways with full access control; improvement of existing full access control highways by addition of priced managed lanes; conversion of other highways to tolled, full access control highways by reducing direct access and adding tolled general use or managed lane capacity; or high-volume bridges over bodies of water. This Policy defines "limited access highways" as those planned for high speed traffic, with few or no at-grade intersections, limited points of access, and a median divider between traffic lanes moving in opposite directions.
- Define feasibility of tolling and priced managed lanes in cooperation with the state's Metropolitan and Rural Planning Organizations (MPOs/RPOs) and guidelines as set forth in a *Toll Project Feasibility Handbook (Handbook)*. The *Handbook* will ensure that candidate projects are financially feasible, will operate safely, are publicly vetted, and reflect sound stewardship of funds and program performance. For any toll project or priced managed lane project to be programmed and constructed by the Department, it must be approved by the nominating MPO or RPO through inclusion in their adopted Comprehensive Transportation Plan (CTP), Metropolitan Transportation Plan (MTP), or other adopted local plan; it must also advance through the state's Strategic Prioritization process and score well enough to be included in the local Transportation Improvement Program (TIP) and Statewide Transportation Improvement Program (STIP).

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Candidate toll or priced managed lanes projects graduate through a four-step screening process.

A more structured, methodical screening process would ensure potential candidates – sourced to MPO/RPO plans – would be thoroughly vetted against a series of transportation related standards. The process would be triggered with the submittal of a candidate by a designated local Project Sponsor (MPO or RPO). The steps would include ongoing local practices but add additional evaluate requirements to document project performance against locally based measures of effectiveness and statewide factors applicable to any geographic location.

Public participation (initiated by project sponsors) shall be conducted as per the MPO/RPO public involvement process and public input incorporated into each step to strengthen long-term decision making and results.

Step 1: Initial Project Identification

Designated project sponsor submits candidate project to trigger process of state/local coordination and evaluation.

Step 2: Initial NCDOT Toll Feasibility Testing

Candidate project vetted for initial operational and financial feasibility testing.

Step 3: MPO/RPO Screening

Candidate project evaluated against local standards and statewide factors; local review may include special studies, such as economic impact analyses.

Step 4 – Prioritization and Programming

Candidate project evaluated for non-state, non-local funding availability and must receive maximum available local points by Project Sponsor for draft STIP/TIP consideration.

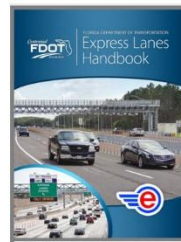
Each step of the 4-step screening process would be designed to identify projects with the highest tolling viability and reflect sound public agency stewardship and investment.

The Handbook should evolve and mature over time to sustain a responsive, modern implementation process.

In addition to the short term recommendations cited in the new NC Toll Policy, other longer-term steps are suggested to strengthen the viability, adaptation, and sustained implementation process described in the Handbook. Considerations cited here are not exhaustive but found in other states with mature tolling practices and network management responsibilities.

- Financing and Delivery Methods** – Continue efforts to develop policy recommendations for effective financing mechanisms (public-private, private only, or other finance/operating arrangements) which support a variety of toll financed solutions in NC. Practices across the country, including the transfer of asset ownership, transparency of terms in concessionaire agreements, risk registers to quantify project delivery risks, acceptance and evaluation of unsolicited bids, should be examined for inclusion within or as an expansion to the current toll project feasibility steps. If applicable they should also be incorporated into the Handbook.
- Performance and Return on investment (ROI)** – Given the increased demand for optics into agency decision making, a process should be developed (over time) to support performance reporting and return on investment accountability of agency resources. Independent analysis (conducted by research institutes or 3rd parties) could measure before/after results and document project

effectiveness against standard, industry accepted metrics (such as travel time savings, reliability, productivity or other metrics). Such a practice would bolster agency credibility, disseminate utilization rates, and promote project acceptance. If applicable, such a practice should be incorporated into the Handbook.



Florida DOT's Express Lane Handbook is a "living" document whose procedures, guidelines and rules are updated as the state network develops and evolves.

Appendix A State and Regional Best Practices

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Toll Project Selection and Evaluation

- **Project selection** identifies the process in which projects are selected for toll evaluation
- **Toll feasibility testing and evaluation** is the process or methodology by which a project is evaluated
- **Toll project selection and evaluation techniques** vary widely from state to state
 - Either can be governed by legislation, adopted policy, or informal project by project objectives, goals and needs
- **Screening and evaluation processes can differ by toll facility type and purpose:**
 - New greenfield corridors (new road on a new alignment)
 - Managed "Express" Lanes where all users pay
 - Managed "HOT" Lanes where HOV users are provided a discount

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Project Selection Approaches

Project Selection Entities & Approaches	
Entity	Approach
Legislature	<ul style="list-style-type: none"> • Statute defines criteria or process • Statute enumerates specific project(s)
Governor	<ul style="list-style-type: none"> • Policy directs criteria or process • Identifies specific project(s)
DOT	<ul style="list-style-type: none"> • Adopted policy or resolution • Statewide screening process • Identifies specific project(s)
Regional/Local	<ul style="list-style-type: none"> • Regional transportation authority develops selection process • MPO or similar entity develops selection process • City/County develops selection process

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Common Criteria for Toll Evaluation and Prioritization

Congestion Relief

- Ability to increase throughput (people and vehicles) through the corridor
 - Allow transit to utilize
 - Allow for single occupancy vehicles to pay for unused HOV capacity
- Ability to achieve travel time savings
- Ability to provide reliable travel times through pricing
- Works for additional capacity or HOV conversion to HOT

Financial Feasibility

- Ability for toll revenue to cover tolling and roadway O&M costs
- Ability for toll revenue to contribute upfront funding towards construction costs through financing

Other criteria: Safety, Economic Development

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Project Selection by Legislative Statute

Broad statute identifies entity authorized or criteria to be used in selecting a toll project:

- **Washington** - RCWA 47.56.820 – Limits ability to authorize a toll project to Legislature
- **North Carolina** - N.C.G.S.A. 136-89.183 - If project isn't included in statute, NCTA must consult the Joint Legislative commission on Governmental Operations
- **Ohio** - O.R.C. 5531.12 – DOT may develop toll projects or toll as part of a P3 at the discretion of the Director
- **Florida** – Fla. Stat. Sec. 338.01 et seq. Limited Access and Toll Facilities – Provides FDOT with authority to establish tolls on State Highway System that are developed in accordance with FL Transportation Plan
- **Virginia** – VA Code Sec. 33.2-1800 et seq. Public Pvt. Transportation Act of 1995 (as amended) is a comprehensive PPP statute intended to encourage private investment in transportation facilities. P3 office created which has issued Manual on P3 project selection, evaluation, and implementation
- **Kentucky** – KRS Chapter 175B
 - Any highway or section of highway built to federal interstate standards
 - Any fully or partially controlled highway not consistent with interstate standards that exceeds \$100 million in total cost

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Legislative Statute – Florida Example

Prescriptive statute identifies criteria to select toll projects - Florida F.S.A. 338.223 - Proposed turnpike projects:

- Projects must be economically feasible and included in a tentative work program before becoming part of the system
- MPO must include the project in their TIP
- Must demonstrate economic and environmental feasibility
- Economic feasibility test: For project revenue bonds, the net revenues of the project will be sufficient to pay at least 50% of the annual debt service on the bonds by the end of the 12th year of operation and to pay at least 100% of the debt service on the bonds by the end of the 30th year of operation. In implementing this paragraph, up to 50% of the costs of the project may be funded from turnpike revenues.
- For projects financed from revenues of the turnpike system, the project is expected to generate sufficient revenues to amortize project costs within 15 years of opening to traffic.

In Simpler Terms - Proposed Florida Turnpike projects must pass a four pronged test:

- 1st - Projects must serve a public good
- 2nd - Be environmentally sound
- 3rd - Obtain local approval
- 4th - Pass a test of economic feasibility (for greenfield toll roads)

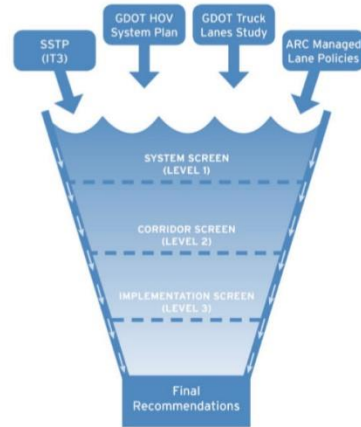
26

Project Selection by Adopted DOT Board Policy

Georgia Transportation Board Resolution

State Transportation Board adopted on June 21, 2007

1. All new capacity lanes with limited access corridors in Metro-Atlanta shall be managed, and
2. Mobility shall be guaranteed in the managed lane, and
3. Lane management relies on eligibility, congestion pricing, and/or accessibility, and
4. Within the context of system-wide plan, each solution will be tailored to individual corridor needs, and
5. Managed Lanes have applicability statewide.

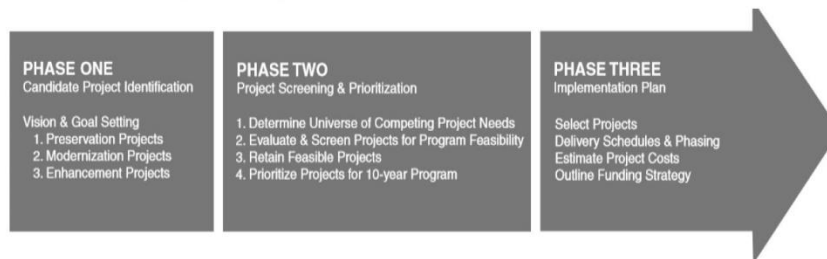


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Project Selection by DOT Internal Policy

Multi-step process: statewide screening leads to specific corridor analysis

- Minnesota
 - Statewide screening advanced to corridor-specific screening
- Kansas
 - KTA conducts a Long Term Needs Study (LTNS) every 5 years
 - Looks at a 10-year period
 - Leads to an implementation plan



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Evaluation Process - Minnesota

Performance Measures -
"Have the Lanes met performance goals as well as agency & customer expectations?"

- Lane performance
 - Travel Time Reliability
 - Speed
 - Vehicle volumes and
 - Throughput
- Travel-Time Reduction
- Change in Congested Vehicle Miles Traveled
- Transit Suitability
- Customer Satisfaction



Benefit Cost Analysis –
"From an economic perspective, are the benefits worth the investment?"

- Benefits
 - Vehicle operating and maintenance
 - Costs
 - Capital
 - Operating
 - Salvage
- Financial Analysis**
- Debt Capacity
 - Financial Feasibility %
 - Debt/Construction Costs

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Evaluation Process - Kansas

Screening and Prioritization Process



Criteria used to prioritize projects

- Improved System Condition
- Safety Benefits
- Customer Mobility Benefits
- Freight Mobility Benefits
- Economic Benefits
- Project Support
- Project Readiness
- Consistency with State/Regional Initiatives
- Multi-State Partnerships and Collaboration
- Local/Private Partnership Potential
- Toll Revenue Growth Potential
- Toll Financial Feasibility Potential

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Colorado

Two-Step Screening Process

- First Tier
 - V/C ratios, > 30,000 volumes, Truck Traffic, Population Growth, Link to State's 2020/2025 STP
 - Sponsored by private entities
 - Roadway segments with completed or ongoing corridor studies
- Second Tier
 - Preliminary traffic and revenue analyses
 - Preliminary capital cost estimates
 - Maintenance and operating cost estimates
 - Preliminary financial feasibility assessment

Close Coordination and Practice

- Five MPOs and ten RPOs make up Statewide Transportation Advisory Committee (STAC)
 - Advises Colorado DOT on large scale transportation needs
- Statewide MPO Committee
 - Regular meetings to identify topics of significance
 - Forum to communicate and collaborate on best practice and analytical approaches
- Statewide Travel Demand Model (20-year horizon)
 - Single platform to forecast and evaluate future toll impact and analysis

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Florida

Vision – *Manage Congestion, Provide Choices*

- Express Lanes Handbook
 - Promotes tools as effective mitigation strategy
 - Access control, vehicle eligibility, variable pricing, or combination
 - Managed lanes can include express lanes, high occupancy vehicle (HOV) lanes, reversible lanes, truck-only toll lanes, and vehicle-restricted lanes
- 2013 Statewide Directive
 - Additional Interstate capacity shall be express lanes
 - Additional non-Interstate limited access facilities shall be express lanes (determined through planning process)
 - Conversion of existing tolled lanes to express lanes

Regional Concept of Transportation Options (RCTO)

- Developed by individual regions based on stakeholder agreements
 - 1st phase – *Unified front*...internal agreement with owners/operators
 - 2nd phase – *External output*...solicit support from MPOs and local governments in the region
- Rigorous evaluation (9-18 months) of candidates**
- Planning Level, Traffic and Revenue, Demand Modeling
 - Preferred Express Lane Model (ELTOD)
 - In depth financial feasibility study – FL Finance Office
 - Heavy emphasis on proactive, public involvement
 - Output *must* follow pricing policy guidelines in Handbook
- One set of rules** for uniform evaluation

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Texas – North Central COG

Regional Managed Lanes Policy

- 10 lane cap on new freeway capacity
- New capacity reviewed for tolling, express, and managed lanes potential
- Focus on reliability (guaranteed 50 mph) and utilization
- Unsolicited proposals must adhere to policy

High degree of coordination

- Regional Workgroup (TxDOT, COG, Tollway)
- Rigorous analysis of candidates and network benefits
- Pre-planning through operations / monitoring / performance

Education and Communication

- Public service announcements focused on reliable trips and travel time savings
- Simulations/videos, social media, tech friendly messaging

Texas A&M – Transportation Institute

- 3rd party reviewer and auditor
 - Before/after evaluation of expected vs. actual time savings
 - “Thermostat” tool for data, goals – *iterate* to conclusions
 - Media friendly reports build credibility and validate decisions

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Virginia

PPPs are leading edge tool

PPTA Implementation Manual & Guidelines (2017)

- Manual outlines VDOT P3 project delivery process. Latest edition streamlines and standardizes the process and increases transparency, competition, and public engagement.
- Manual complemented by published P3 Public Engagement Guidelines (2016)
- Structured process with “chapters” for project:
 - Screening and identification;
 - Development;
 - Procurement; and
 - Implementation phases.
- Addresses risk management, value of investment, and public engagement.
- Two-level screening process for viable candidates
 - Use of *Risk Register*
 - Satisfy series of technical, financial, legal, and stakeholder criteria

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Appendix B

NC Tolls Project Development Policy

A Policy Framework Proposal

NC Tolls Project Development Policy

A Policy Framework Proposal

NCDOT desires to advance a new vision for examining the use of toll-funded financing options. These options could strengthen NCDOT's ability to manage a reliable transportation network and provide new user choice in a rapidly changing transportation landscape.

The approach to support this vision could apply to a variety of tolling and pricing concepts and candidates such as (but not limited to) existing highways, new greenfield capacity, or bridge projects. NCDOT also recognizes the need to strengthen and improve the transparency of the entire tolling and managed lanes project development and delivery process including increasing opportunities for public participation and involvement.

Proposed solutions would systematically advance through a series of steps to achieve project viability and equip NCDOT with additional tools to address immediate and emerging needs including:

- Increasing congestion on corridors and regional networks which track with NC's rate of population and employment/freight growth;
- Diminishing state and federal funding from motor fuel receipts which track with new corporate average fuel economy (CAFE) standards and vehicle ownership changes;
- Growing pressure to develop and deliver transportation solutions which track with new federal emphases on system performance, partnerships, safety, security and asset management; and
- Increasing focus on transparent, data driven agency decision-making inclusive of increased public participation and involvement.
- Providing users with innovative, efficient, and integrated transportation solutions and multimodal choices to connect people and places.

Step 1 – Initial Project Identification

Project Sponsors

Consistent with the Strategic Prioritization process, MPOs and RPOs will be designated Project Sponsors and will use their respective Metropolitan and Comprehensive Transportation Planning process to identify tolling candidates.

Any entity wishing to offer a tolling candidate must work with MPOs/RPOs to ensure proposed candidate addresses a *need* in a mutually adopted plan or could be considered during the next plan update cycle.

MPOs and RPOs would submit projects to NCDOT/NCTA to be tested for toll-financing or priced managed-lanes feasibility following a first level of screening by the Project Sponsor. Initial screening would be conducted consistent with guidelines provided in the *Handbook*, and would establish minimum requirements to submit projects, including:

1. Sponsor must identify the need which the toll candidate addresses in the locally adopted transportation plan; this could be a Comprehensive Transportation Plan or fiscally constrained Metropolitan Transportation Plan.
2. Sponsor must identify the facility type as expressway or higher.
3. Sponsor must consider the use of statewide and regional travel demand models to support project benefits.
4. Sponsor must provide the MPO/RPO board resolution requesting NCDOT evaluation of feasibility for toll-financing for project delivery.

Step 1 triggers the starting point for future consideration of a toll or priced managed lane candidate for programming and construction. Each step along the way would represent a well coordinated state/local process and align with a consistent vetting practice. The candidate must be approved by the nominating Project Sponsor through inclusion in their adopted Comprehensive Transportation Plan (CTP), Metropolitan Transportation Plan (MTP), or other adopted local plan; it must also advance through the state's Strategic Prioritization process and score well enough to be included in the local Transportation Improvement Program (TIP) and Statewide Transportation Improvement Program (STIP).

Step 2 – Initial NCDOT Toll Feasibility Testing

Toll Feasibility Testing

This early screen is consistent with national best practice and offers a glimpse into initial candidate efficacy.

Projects submitted by Project Sponsors passing Step One minimum requirements will be subject to initial NCDOT toll feasibility testing for operational and financial feasibility and other standard NCDOT evaluations (such as environmental impact). The exact parameters of these tests are to be determined and will differ between toll projects and priced managed lane projects.

This test provides an early indicator or "confidence level" in project viability and may represent an harbinger of future utilization, user acceptance, and performance proficiency. Operation and financial feasible tests are standard practice for agencies such as Florida which are long experienced in identifying candidates and managing toll financed networks

Projects which pass the operational and financial feasibility tests will be returned and results shared with the Project Sponsor for further consideration.

Step 3 – MPO/RPO Screening

MPO/RPO Screening

This step could be augmented by additional studies initiated by Project Sponsors. CAMPO is utilizing the Triangle Tolling Study (2018 completion) as input into their 2045 MTP update. The study focuses on specific benefits provided to a multimodal regional network and the technological and operational structures needed to support such candidates. The study also identifies performance measures to evaluate future tolling decisions and outlines how candidates can be tested through a rigorous analytical modeling review.

The Project Sponsor will conduct further screening of the tolled or priced managed lane project to ensure that the project is consistent with local plans and goals, and locally approved. NCDOT will participate in project screening, and/or provide technical / analytical support at the request of the Project Sponsor.

Project Sponsor screening may result in tolled and priced managed lane projects to be included in the MTP or CTP as identified tolled and/or priced managed lane projects, and must satisfy measures of effectiveness assessed through local modeling, criteria, standards, and network benefits. Some of these measures should also come from a single, statewide list to provide policy consistency and candidate viability regardless of location. Although the exact measures have yet to be determined, they will be identified in the *Handbook*. Any independent traffic or economic analysis conducted as part of Step Three screening could be completed by either NCDOT or the Project Sponsor, as determined by mutual agreement.

Documented public participation, input, and agency response (in the form of fact sheets, FAQs, additional analysis/studies and other communication material consistent with local practice) must be demonstrated to NCDOT to ensure sufficient public opportunity in the decision-making process.

An expected outcome of Step Three is a resolution by the Project Sponsor acknowledging the project's consistency with local plans and goals, inclusion in approved transportation plans, documented public input, and agency responses (within the CTP, MTP, or through other plans, independent studies) and endorsement of the toll or managed lanes project for STIP programming through the NCDOT Strategic Prioritization process.

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Step 4 – Prioritization and Programming

Strategic Prioritization Scoring Considerations

NCDOT's Project Prioritization Working Group could consider revisions to scoring toll and managed lane candidate projects within the next round of Strategic Prioritization (P6.0) in response to NC's new Toll Policy.

Projects found to be suitable by NCDOT for implementation as tolled or priced managed lane projects (Step 2), successfully screened by their MPO/RPO Project Sponsors for inclusion in their MTP, CTP or other adopted document and endorsed for TIP/STIP (Step 3) may be submitted to NCDOT through the Strategic Prioritization process.

In Step 4, MPOs/RPOs will continue to work with NCDOT/NCTA to determine toll revenue forecasts applicable to the benefit-cost scoring criteria for candidate projects. Under the Strategic Transportation Investments (STI) law non-state, non-local funds can be used to reduce state financial obligation to a project and up to 50% of the contribution is considered a "bonus" amount available to program other highway projects subject to STI provisions. These "point in time" candidate assessments are not investment grade analyses but rather documented assumptions about revenue potential and utilization based on preliminary design and basic financial modeling.

Additionally, NCDOT's Project Prioritization Working Group could consider needed revisions to scoring projects within the Strategic Prioritization process. These revisions could include scoring formulas/weights or other considerations which enhance programming potential afforded by toll financing or pricing strategies.

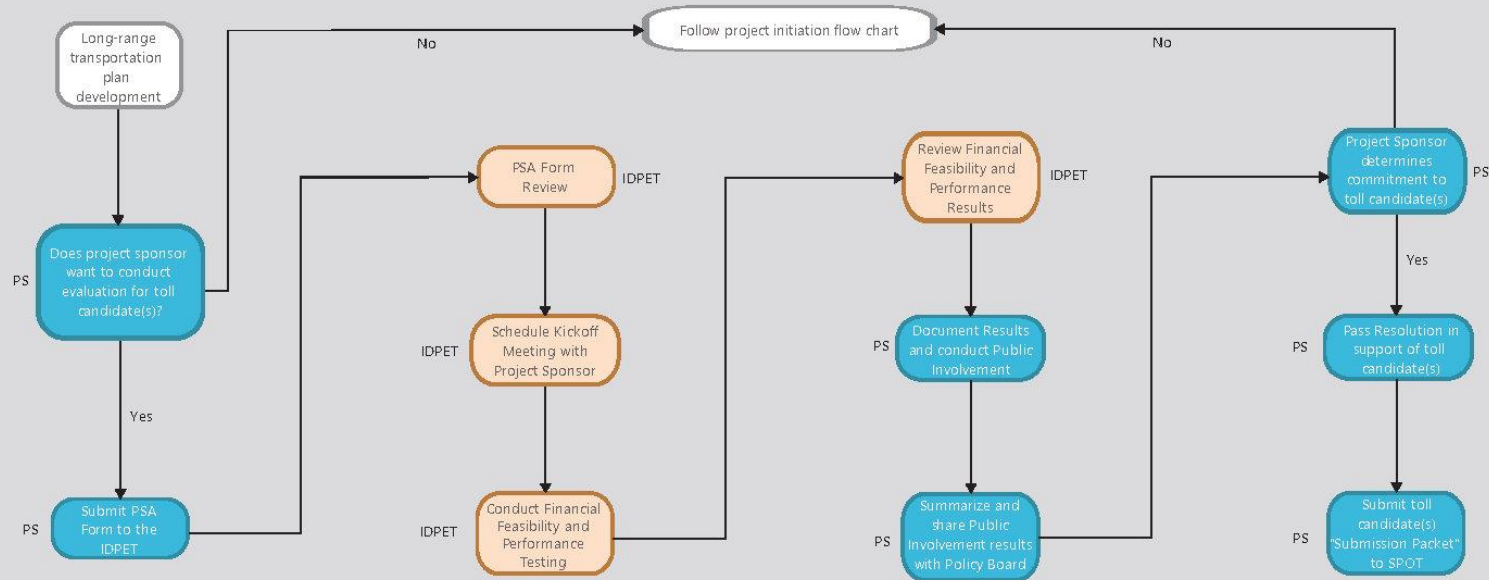
This step includes scoring and reviewing candidates for programming potential (similar to other fully publicly funded highway capacity improvements under NCDOT's biennial Strategic Prioritization process) and ensuring maximum available local input points have been assigned to emphasize local priority.

40

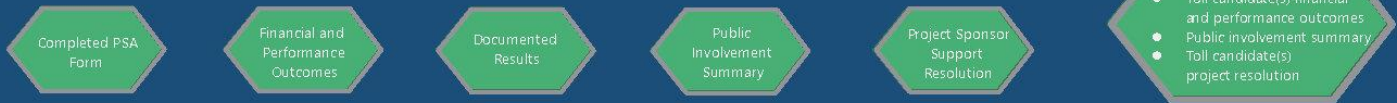
Appendix C. PSA Flowchart

This flowchart visually conveys how the six PSA steps relate to NCDOT's MTP and CTP process.

Toll Candidate Project Pre-Submittal Assessment



PSA Deliverables



Acronym	Definition
PSA	Pre-Submittal Assessment
IDPET	Intra-Departmental Project Evaluation Team
PS	Project Sponsor
SPOT	Strategic Prioritization Office

PSA Flowchart Task Color	Lead Role
Blue	Project Sponsor
Orange	Intra-Departmental Project Evaluation Team

*The PSA process is estimated to take about three months, however this timeframe may change as the practice evolves

DATE: November 11, 2019



Appendix D. PSA Process Form

The PSA Process Form acts as a starting point for Metropolitan and Rural Planning Organizations to formally request that toll candidate project(s) be evaluated under PSA. The Form is to be completed online and triggers engagement by NCDOT's Intra-Departmental Project Evaluation Team to review data inputs, apply the PSA Tool (which includes the Financial Feasibility Screening Tool) and discuss local resources with Project Sponsors to start the PSA process.



Pre-Submittal Assessment (PSA) Process Form

Submittal Date:

For optimal functionality, this form should be viewed with Adobe Reader. You can download the reader for free here: <https://get.adobe.com/reader/>

Project Information

Project type: Toll Road Express Lane Toll Bridge

Project name:

Project purpose and need:

MPO/RPO submitting project:

MPO/RPO point of contact:

Email: Phone:

Is project part of Comprehensive Transportation Plan (CTP) or Metropolitan Transportation Plan (MTP):

If Yes, list CTP or MTP and year adopted:

Does project have a SPOT ID or CTP/MTP ID? If so please provide:

Route number: Bridge Length (miles):

Termini: from: to:

Description:

NCDOT Division: County:

Toll-related improvement type:

- Toll lanes conversion of existing general purpose lane(s)
- Widen existing bridge for toll lanes
- Toll new bridge facility (Greenfield)

Existing cross section:

Proposed cross section:

Roadway Attributes

Data for italicized fields are optional and will be completed by NCDOT if omitted.

Existing total number of lanes (both directions):

Total number of proposed lanes (both directions):

Existing lane width: Existing shoulder width:

Existing speed limit: Projected speed limit:

Traffic Attributes

Data for italicized fields are optional and will be completed by NCDOT if omitted.

Current year:

Existing average annual daily traffic (AADT):

Opening year of project:

Opening year AADT:

Design year:

Projected design year AADT:

Existing truck percentage:

Projected design year truck percentage:

Funding Attributes

Data for italicized fields are optional and will be completed by NCDOT if omitted.

Funding sources:

Other funds (if any):

Estimated construction cost: \$ Year of estimate:

Estimated ROW cost: \$ Year of estimate:

Estimated utilities cost: \$ Year of estimate:

Total estimated bridge capital cost: \$ Year of estimate:

Expected Operations and Maintenance Cost (will be determined from financial feasibility assessment): \$

Tolling Attributes

Data for italicized fields are optional and will be completed by NCDOT if omitted.

Proposed toll/trip: \$

Will transit vehicles be allowed to utilize the toll facility? (select)

Additional Considerations

(Please use this space to provide or clarify any additional information pertinent to your project submittal. For example a description of an improvement type not listed above, availability of additional local data to further inform project attributes, or additional purpose and need details.)

Appendix E. PSA Steps

The following table serves as a guide to describe the PSA steps, expected timelines, and NCDOT vs Project Sponsor roles to complete toll candidate(s) evaluation and communicate results. Any adjustments to this schedule (such as to accommodate the evaluation of multiple toll candidate(s)) should be considered when the Project Sponsor accepts the “Rules of Engagement” terms on NCDOT website to access PSA files. Project Sponsors who choose to opt out of the PSA steps due to unforeseen circumstances after the PSA schedule is established must communicate their decision with NCDOT at the earliest point possible.

ROLE <i>(lead)</i>	STEP	STEP DETAIL(S)	TIMELINE
Project Sponsor <i>(MPO and RPO)</i>	(1) Submit PSA Process Form	<ul style="list-style-type: none"> • Complete and submit online PSA Process Form for each toll candidate • Review data inputs and local resources availability to support assessment 	2-3 days
NCDOT IDPET / Project Sponsor <i>(TPD leads review; assigns resources; liaisons with Project Sponsor and local Division Engineer)</i>	(2) Review toll candidate(s) submittal	<ul style="list-style-type: none"> • Highlight missing data, gaps or critical information needed to conduct PSA • Review feedback with Project Sponsor • Project Sponsor communicates intent to evaluate toll candidate(s) with respective MPO and RPO technical and policy boards; decision documented in meeting minutes 	2-3 days
NCDOT IDPET <i>(TPD leads review; assigns resources; liaisons with Project Sponsor and local Division Engineer)</i>	(3) Project management	<ul style="list-style-type: none"> • Coordinate and schedule kick-off meeting with Project Sponsor to review schedule, introduce staff involved, discuss resource expectations • Review all input assumptions/data to run financial feasibility analysis and/or interaction with local, regional or the North Carolina statewide model 	1-2 weeks
NCDOT IDPET <i>(TPD & NCTA coordinate and assign modeling resources; oversee PSA Tool interaction and application)</i>	(4) Conduct assessment	<ul style="list-style-type: none"> • Conduct financial feasibility and performance testing using the FFST • Review preliminary outcomes, adjust default assumptions and/or run additional iterations through Project Sponsor input 	4-6 weeks
NCDOT IDPET / Project Sponsor <i>(TPD & NCTA review outcomes and preliminary documentation; liaison with Project Sponsor and local Division Engineer)</i>	(5) Project Management	<ul style="list-style-type: none"> • Coordinate and schedule meeting with Project Sponsor to review final technical outcomes • Project Sponsor documents technical outcomes 	1-2 weeks
Project Sponsor / NCDOT IDPET <i>(Project Sponsor completes documentation, public input and determines next steps; liaisons with TPD & Division Engineer)</i>	(6) Project Management	<ul style="list-style-type: none"> • Communicate results with MPO and RPO technical and policy boards • Review process, schedule to solicit and respond to public input via adopted public involvement and participation plan requirements • Draft resolution (if applicable) to support toll candidate(s) to be submitted to NCDOT strategic prioritization • Project Sponsor finalizes documentation and determines where to record – CTP AND MTP update or stand-alone document • If applicable Project Sponsor prepares 1) resolution 2) technical outcomes, and 3) public input summary to go with submittal to SPOT 	1-2 weeks
		TOTAL	3 months