

NC TOLL PROJECT DEVELOPMENT HANDBOOK

Financial Feasibility
Screening Tool

User Guide



Table of Contents

Page

1. Introduction	4
1.1. Why this Tool?	4
1.2. What is this Tool?	4
1.3. About this User Guide	4
1.4. User Guide Terminology	4
1.4.1. Microsoft Excel Terminology	4
1.4.2. Tolling Terminology	5
1.5. Disclaimer	5
2. Getting Started	6
2.1. Installing and Saving	6
2.2. Workbook Protection	6
2.3. Navigating through the Workbook	6
2.4. Worksheets	7
2.4.1. Home Page	7
2.4.2. User Guidelines	9
2.4.3. Projects' Information (Batch-Run Version only)	10
2.4.4. Express Lanes	11
2.4.5. Toll Bridges	13
2.4.6. Toll Roads	15
2.4.7. Version Control	16
2.5. Pre-Submittal Assessment (PSA) – Financial Feasibility Screening Tool (FFST) Linkage	31
3. How to use the Tool	17
3.1. Express Lanes Worksheet	18
3.1.1. Data Entry	18
3.2. Toll Bridges	22
3.2.1. Data Entry	22
3.3. Toll Roads	26
3.3.1. Data Entry	26
3.4. Financial Feasibility Dial	30
4. Hypothetical Case Studies	31
4.1. Case Study #1 – Express Lanes	33
4.2. Case Study #2 – Toll Bridge	37
4.3. Case Study #3 – Toll Road	41
4.4. Case Study #4 – Toll Road with Major Bridge Structure	44

Figures

Figure 2-1. Enabling Macros	6
Figure 2-2. Worksheet Tabs – Single-Run Version	7
Figure 2-3. Worksheet Tabs – Batch-Run Version.....	7
Figure 2-4. Home Page Screenshot – Single-Run Version.....	8
Figure 2-5. Home Page Screenshot – Batch-Run Version	9
Figure 2-6. User Guidelines Screenshot	10
Figure 2-7. Projects’ Information Worksheet	11
Figure 2-8. Express Lanes Screenshot – Single-Run Version.....	12
Figure 2-9. Express Lanes Screenshot – Batch-Run Version.....	13
Figure 2-10. Toll Bridges Screenshot – Single-Run Version.....	14
Figure 2-11. Toll Bridges Screenshot – Batch-Run Version	14
Figure 2-12. Toll Road Screenshot – Single-Run Version	15
Figure 2-13. Toll Roads Screenshot – Batch-Run Version	16
Figure 3-1. Data Sections of Toll Project Worksheets.....	17
Figure 3-2. Express Lanes – Project Information	18
Figure 3-3. Express Lanes – Traffic Characteristics	19
Figure 3-4. Example of Embedded Comments	20
Figure 3-5. Express Lanes – Toll Pricing	21
Figure 3-6. Express Lanes - Costs	21
Figure 3-7. Express Lanes – Notes	22
Figure 3-8. Toll Bridges – Project Information	23
Figure 3-9. Toll Bridges – Traffic Characteristics	23
Figure 3-10. Toll Bridges – Toll Pricing	24
Figure 3-11. Toll Bridges - Costs.....	25
Figure 3-12. Toll Bridges – Notes.....	26
Figure 3-13. Toll Roads – Project Information.....	26
Figure 3-14. Toll Roads – Traffic Characteristics	27
Figure 3-15. Toll Roads – Toll Pricing	28
Figure 3-16. Toll Roads – Costs.....	29
Figure 3-17. Toll Roads – Notes.....	30
Figure 3-18. Financial Feasibility Assessment Dial	30
Figure 4-1. Single-Run Version – Express Lanes	34
Figure 4-2. Batch-Run Version – Express Lanes	35
Figure 4-3. Batch-Run Version – Express Lanes	35
Figure 4-4. Single-Run Version – Toll Bridges	38
Figure 4-5. Batch-Run Version – Toll Bridges.....	39
Figure 4-6. Batch-Run Version – Toll Bridges.....	39
Figure 4-7. Single-Run Version – Toll Roads.....	42
Figure 4-8. Batch-Run Version – Toll Roads.....	43
Figure 4-9. Batch-Run Version – Toll Roads.....	43
Figure 4-10. Single-Run Version – Toll Road with Major Bridge Structure	45
Figure 4-11. Batch-Run Version – Toll Road with Major Bridge Structure	46
Figure 4-12. Batch-Run Version – Toll Road with Major Bridge Structure	46

Acronyms and Abbreviations

AADT	Average Annual Daily Traffic
BBM	Bill by Mail
ETC	Electronic Toll Collection
FFST	Financial Feasibility Screening Tool
GP	General Purpose lanes
HOT	High Occupancy Toll
MPO	Metropolitan Planning Organization
NCDOT	North Carolina Department of Transportation
NCTA	North Carolina Turnpike Authority
O&M	Operations and Maintenance
PSA	Pre-Submittal Assessment
RPO	Rural Planning Organization
T&R	Traffic and Revenue
TSI	Toll System Implementation
VOT	Value of Time
VTC	Video Toll Collection

1. Introduction

1.1. Why this Tool?

The North Carolina Department of Transportation (NCDOT) has adopted a new toll policy to improve the department's ability to manage a reliable transportation network. The North Carolina Toll Project Development Policy (hereafter referred to as 'toll policy') expands the consideration of toll financing as an integral and important strategy to deliver critical, time-sensitive transportation solutions. The policy allows Metropolitan Planning Organizations (MPO), Rural Planning Organizations (RPO), and NCDOT to evaluate the feasibility of financing urban and rural highway improvements through the levying of tolls or managed lanes pricing options.

Financial feasibility is one of the six steps of the overall Pre-Submittal Assessment (PSA). PSA is a performance-based process to evaluate future toll candidates under the new toll policy before candidates can advance and be considered for submission to NCDOT's Strategic Prioritization process. As part of the PSA process, a project sponsor is required to populate the PSA form. The PSA document captures key project information to initiate the assessment of a toll candidate project and serves to kick off engagement with the inter-department project evaluation team (IDPET) as part of project analysis. A subsequent step in the PSA process is for the project sponsor to implement the Financial Feasibility Screening Tool to get an initial indication of a potential toll candidate's financial performance.

1.2. What is this Tool?

The Financial Feasibility Screening Tool (hereafter the "Tool") is a Microsoft Excel-based spreadsheet. The Tool provides the flexibility to assess new facilities or the conversion or upgrade of existing infrastructure to tolled facilities. The Tool 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 the addition of priced-managed lanes;
3. Conversion of other highways to tolled, full-access control highways; and
4. High-volume bridges over bodies of water

The Tool generates order-of-magnitude forecasts of toll revenues' ability to cover operating and maintenance costs as well as the ability to contribute upfront funding toward construction costs. The tool was developed using Excel 365 and may not be compatible with older versions.

1.3. About this User Guide

This guide provides first-time users an overview of the purpose and uses of the Tool, describes tolling terminology, explains how to set up and use the Tool, and provides hypothetical examples of toll projects to assess the financial feasibility. This guide assumes that you have:

- Basic knowledge of Excel
- Basic understanding of transportation concepts
- Basic understanding of time value of money concepts (i.e., constant/real dollars vs. nominal dollars)
- Moderate understanding of travel demand concepts

1.4. User Guide Terminology

1.4.1. Microsoft Excel Terminology

This guide uses the following Excel terminology:

Workbook – a workbook is an Excel file containing a collection of worksheets.

Worksheet – a worksheet is a spreadsheet inside an Excel workbook file. A workbook can contain multiple worksheets.

1.4.2. Tolling Terminology

This guide uses the following tolling terminology:

Annual Average Daily Traffic – Bidirectional estimate of total vehicles on any given day of the year (i.e., total volume of vehicle traffic for a year divided by 365 days).

Design Year – Future forecast year of traffic demand. Typically relies on travel demand model.

Intermediate Access Points – Refers to whether there are multiple access points (i.e., points of ingress or egress) where vehicles can enter or exit express lanes from the general purpose lanes. Intermediate ingress and egress points may also include access to surrounding roadway networks directly to or from express lanes or toll roads.

Trip Length Percent – Refers to the average length traveled by vehicles as opposed to entire trip length. If there are no intermediate access points, the Tool will default to 100%.

Value of Time (VOT) – Refers to the cost of time spent on travel. It includes costs to businesses of the time their employees and vehicles spend on travel, and costs to consumers of personal (unpaid) time spent on travel. In other words, the price an individual is willing to pay to save on travel time.

Express Lanes – For purposes of the toll handbook, express lanes refer to new, tolled lanes added within existing non-tolled freeways or limited-access facilities.

Toll Exempt Vehicles – Share of vehicles allowed to use the express lanes for free (e.g., HOT3+¹).

Toll Diversion – Share of traffic not willing to pay a toll based on a comparison of travel times between the toll facility and the best toll-free alternative route.

General Purpose Lanes – Refers to all lanes that are not express lanes (i.e., non-tolled).

1.5. Disclaimer

The Tool is meant to be illustrative in nature and is intended to provide a scale of possible outcomes rather than a precise estimate. Results are intended to be used solely for planning purposes to provide NCDOT and local agencies an overall magnitude of a project's financial value. The assessment is not adequate to support the financing of a project and does not guarantee any particular outcomes. NCDOT, the North Carolina Turnpike Authority (NCTA), and their consultants are not responsible for costs or damages of any kind, if any, suffered by the user or any other party because of decisions made or actions taken based upon this Tool. This is a preliminary tool to quickly gauge an understanding if a more traditional traffic and revenue (T&R) study should be considered. Default values used in the Tool were calculated from similar project types in North Carolina, peer states and industry accepted averages. Additionally, the case studies provided in Chapter 4 do not cover every type of situation that could be evaluated.

¹ Managed lane designation where vehicles with three or more occupants are permitted in the toll lanes at no charge.

2. Getting Started

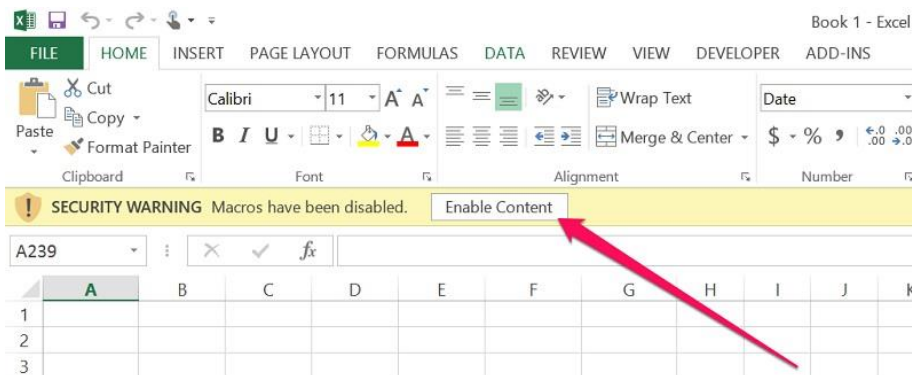
2.1. Installing and Saving

Download and save a copy of the Tool to your computer's hard drive or to any directory you like. Two versions of the Tool are available. The analytical framework is the same between the versions and the same results will be achieved.

1. **Single-Run Version** – This version is ideal when assessing a limited number of scenarios because inputs are entered directly in the project type worksheets.
2. **Batch-Run Version** – This version is an effective option for users who need to assess the financial feasibility of multiple projects. This version provides users a worksheet to enter up to 10 toll projects for each project type. A drop-down list menu is available to switch among projects more efficiently. This version simplifies the work of retyping repetitive information and serves as a repository in case the user needs to revisit certain scenarios to run alternative analyses, saving time and resources.

Regardless of which version you select, make sure to enable macros. Most likely, once you open the file, a yellow message bar will appear with a shield icon and the Enable Content button. See Figure 2-1. Alternatively, use the Trust Center. Click **File>Options>Trust Center>Trust Center Settings>Macro Settings** and make your selection.

Figure 2-1. Enabling Macros



2.2. Workbook Protection

The Tool is password protected to prevent inadvertent deletion or changes to key calculations and default values. NCDOT will release updated versions when necessary.

2.3. Navigating through the Workbook

You navigate through the Tool as you would any Excel workbook. There are two basic ways to navigate across worksheets:

1. The most common way is to click on the worksheet's tab you want to navigate to at the bottom of the screen, or
2. Click the hyperlinked texts that are available throughout the workbook.

Figure 2-2 and Figure 2-3 show the worksheet tabs for the Single-Run and Batch-Run Versions of the Tool, respectively.

Figure 2-2. Worksheet Tabs – Single-Run Version

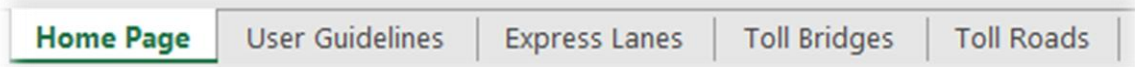
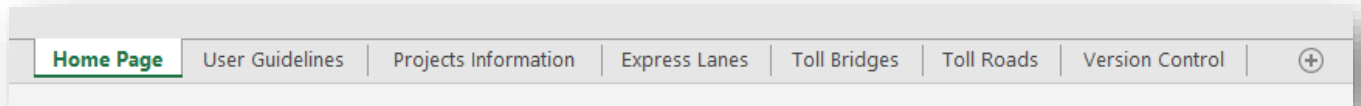


Figure 2-3. Worksheet Tabs – Batch-Run Version



2.4. Worksheets

This section describes in detail each worksheet in the Tool.

2.4.1. Home Page

The first worksheet in the workbook is the Home Page (Figure 2-4). It provides a brief overview and a link to a quick Getting Started guide. There is no data entry on this worksheet. The Batch-Run Version of the Tool (Figure 2-5) includes a link to the “Projects Information” worksheet.

Figure 2-4. Home Page Screenshot – Single-Run Version

Financial Feasibility Screening Tool
North Carolina Department of Transportation
V.1.0

About this Tool > The Financial Feasibility Screening Tool is a conceptual, planning-level evaluation model to assess the viability of implementing roadway corridors and/or bridge crossings in North Carolina as toll facilities. The assessment relies on readily available data and numerous assumptions to provide a high-level indication of the potential leveraging capacity of revenues to finance the project before conducting more detailed and rigorous traffic and revenue studies.

The tool is intended to be used solely for planning purposes to provide NCDOT and local agencies an overall magnitude of a project's financial value. The assessment is not adequate to support the financing of a project and does not guarantee any particular outcomes. More detailed analyses are required to support decision making on whether or not to move forward as a toll project.

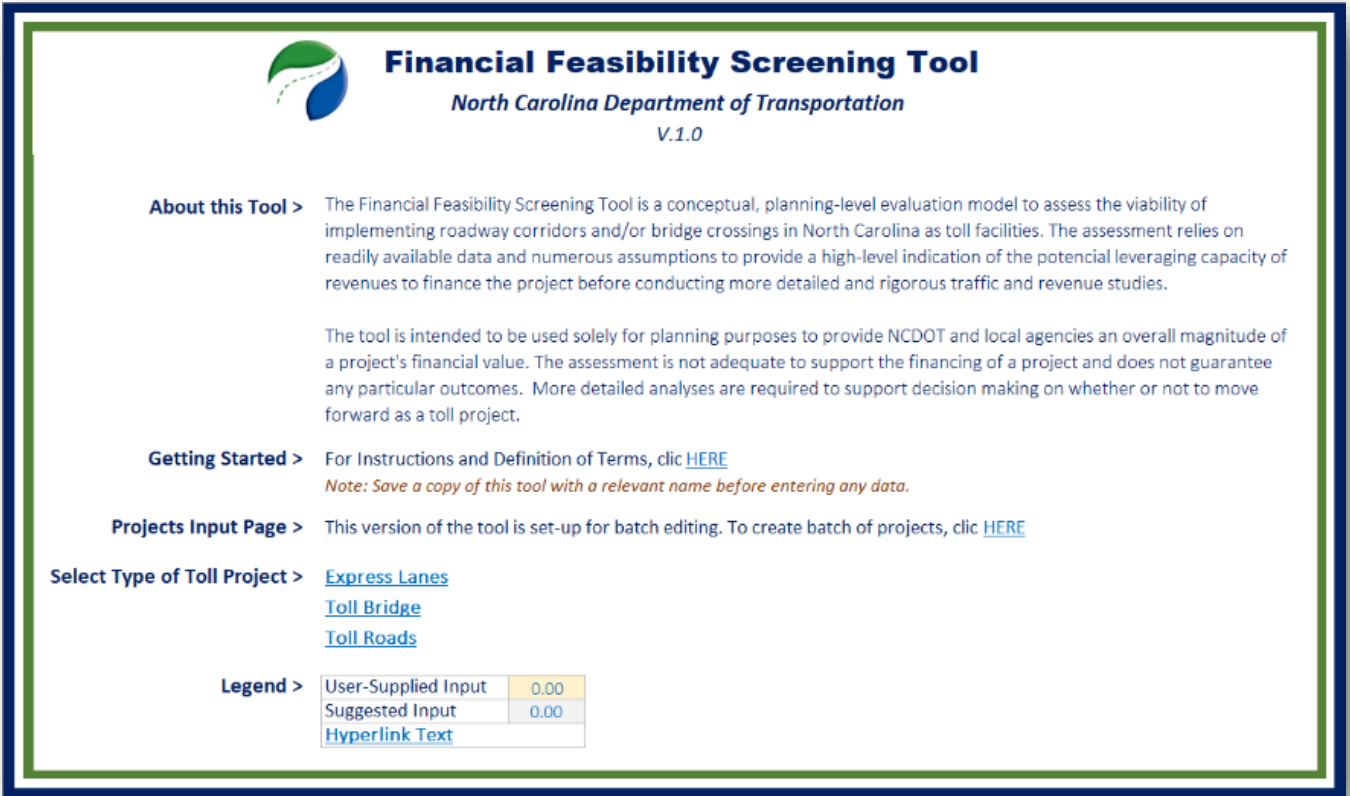
Getting Started > For Instructions and Definition of Terms, click [HERE](#)
Note: Save a copy of this tool with a relevant name before entering any data.

Select Type of Toll Project > [Express Lanes](#)
[Toll Bridge](#)
[Toll Roads](#)

Legend >

User-Supplied Input	0.00
Suggested Input	0.00
Hyperlink Text	

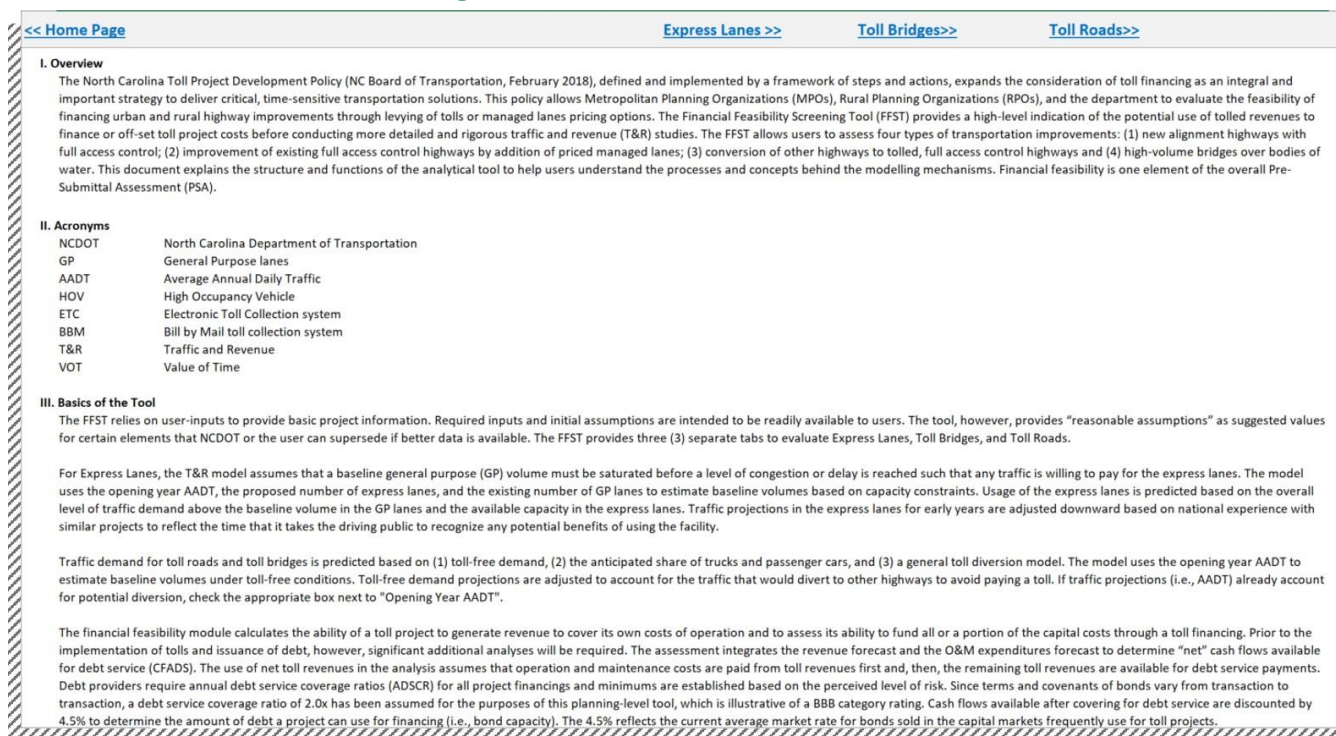
Figure 2-5. Home Page Screenshot – Batch-Run Version



2.4.2. User Guidelines

The second worksheet in the workbook is the User Guidelines (Figure 2-6). It briefly provides information about the Tool, instructions on how to operate the Tool, and guidelines on how to interpret the outputs. There is no data entry on this worksheet.

Figure 2-6. User Guidelines Screenshot



2.4.3. Projects' Information (Batch-Run Version only)

The Projects' Information worksheet allows users to enter up to 10 projects for each project type when using the Batch-Run Version of the Tool (Figure 2-7). Most of the data entry occurs on this worksheet. Cells are color coded to assist in the data-entry process. Each item is populated with input messages to provide additional guidance about the data that should be entered in the cells. After entering projects' information, select the project type of interest to run the Tool.

Figure 2-7. Projects' Information Worksheet

Express Lanes			
	1	2	3
Corridor Name	Project B	Project C	Project D
Physical Characteristics			
Project Identification Number			
Corridor Length (miles)			
Total No. of General Purpose (GP) lanes (both directions)			
Total No. of proposed express lanes (both directions)			
Project Location (Enter county or counties)			
Traffic Characteristics			
Opening Year			
Opening Year AADT			
Design Year			
Design Year AADT			
Truck Percentage			
Share of Toll-Exempt Vehicles			
Select Peak Period Characteristics	6 hrs or more (3+ hrs in both AM & PM)	6 hrs or more (3+ hrs in both AM & PM)	3 hrs (1.5 hrs)
Intermediate Access Point?	Yes	Yes	
Trip Length Percent	Medium - 75%	Medium - 75%	
Costs			
Construction Duration (in years)			
Roadway Capital Improvement Cost (\$)			
Indexation Base Year of Capital Improvement Costs			

Toll Bridges			
	1	2	3
Bridge Name	Project I	Project J	Project K
Physical Characteristics			
Project Identification Number			
Bridge Length (miles)			
Total No. of lanes (both directions)			
Project Location (Enter county or counties)			
Traffic Characteristics			
Opening Year			
Opening Year AADT			
Design Year			
Design Year AADT			
Does Projected Traffic Already Account for Diversion (i.e., Toll Demand)?	No	No	
Truck Percentage			
Average time savings compared to alternate route (minutes)			
Costs			
Construction Duration (in years)			
Bridge Capital Improvement Cost (\$)			
Indexation Base Year of Capital Improvement Costs			

2.4.4. Express Lanes

This worksheet is the main input data sheet to assess the preliminary financial feasibility of express-lane corridors (Figure 2-8). The user is only allowed to enter data in the light-yellow cells. Data entry can occur as a direct entry by the user or can be made by a selection from a drop-down menu if the option is available. An error message will appear if the user tries to overwrite cells with a drop-down menu. Automatic calculations appear in white cells. Grayed out cells with black text indicate suggested values.

If using the Batch-Run Version (Figure 2-9), a drop-down list menu is available to shift among projects. The worksheet will populate automatically based on the information provided in the Projects' Information worksheet. Still, the user is required to enter some data in the light-yellow cells.

Figure 2-8. Express Lanes Screenshot – Single-Run Version

Express Lanes	
Project Information	Traffic Characteristics
Project Identification Number <input type="text"/> Corridor Name <input type="text"/> Corridor Length (miles) <input type="text"/> Total No. of General Purpose (GP) lanes (both directions) <input type="text"/> Total No. of proposed express lanes (both directions) <input type="text"/> Project Location (Enter County or counties) <input type="text"/>	Opening Year <input type="text"/> Opening Year AADT <input type="text"/> Design Year <input type="text"/> Design Year AADT <input type="text"/> Average Annual Growth Rate (AADT) <input type="text" value="#DIV/0!"/> Truck Percentage <input type="text"/> Share of Toll-Exempt Vehicles <input type="text"/> Select Peak Period Characteristics <input type="text" value="4 hrs (2 hrs AM / 2 hrs PM)"/> Intermediate Access Point? <input type="text" value="Yes"/> Trip Length Percent <input type="text" value="Medium - 75%"/> Suggested: Value of Time (\$/hr) <input type="text" value="\$12.50"/> <input type="text" value="\$12.50"/>
Dynamic Toll Pricing	Costs
Minimum Electronic Toll Collection (ETC) Rate <input type="text"/> Suggested: <input type="text"/> Minimum Toll Rate (\$/mile) <input type="text" value="\$0.10"/> <input type="text" value="\$0.10"/>	Capital Costs Construction Duration (in years) <input type="text"/> Roadway Capital Improvement Cost (\$) <input type="text"/> Indexation Base Year of Capital Improvement Costs <input type="text"/> Toll System Implementation Cost (\$/lane-mile) <input type="text" value="\$450,000"/> Suggested: <input type="text" value="\$450,000"/> Indexation Base Year of Toll System Capital Cost <input type="text" value="2018"/> <input type="text" value="2018"/>
Bill By Mail (BBM) Toll Rates Minimum Toll Rate (\$/mile) <input type="text" value="\$0.15"/> Annual Toll Rate Increase (%) <input type="text" value="1.0%"/> <input type="text" value="1.0%"/> Indexation Base Year <input type="text"/>	Operating Costs Roadway Maintenance (\$/lane-mile) <input type="text" value="\$25,000"/> <input type="text" value="\$25,000"/> Indexation Base Year of Roadway Maintenance <input type="text" value="2018"/> <input type="text" value="2018"/> Annual Inflation Rate for Costs (%) <input type="text" value="2.75%"/> <input type="text" value="2.75%"/>
Toll Rate Versus Express Lane Demand 	

Figure 2-9. Express Lanes Screenshot – Batch-Run Version

Express Lanes	
Project Information <p>Project Identification Number: 0</p> <p>Corridor Name: Project</p> <p>Corridor Length (miles): 0</p> <p>Total No. of General Purpose (GP) lanes (both directions): 0</p> <p>Total No. of proposed express lanes (both directions): 0</p> <p>Project Location (Enter County or counties): 0</p>	Traffic Characteristics <p>Opening Year: 0</p> <p>Opening Year AADT: -</p> <p>Design Year: -</p> <p>Design Year AADT: -</p> <p>Average Annual Growth Rate (AADT): #DIV/0!</p> <p>Truck Percentage: 0%</p> <p>Share of Toll-Exempt Vehicles: 0%</p> <p>Select Peak Period Characteristics: 3 hrs (1.5 hrs AM / 1.5 hrs PM)</p> <p>Intermediate Access Point?: No</p> <p>Trip Length Percent: High - 90%</p> <p>Value of Time (\$/hr): \$12.50</p>
Dynamic Toll Pricing <p>Minimum Electronic Toll Collection (ETC) Rate: Suggested: \$0.10</p> <p>Minimum Toll Rate (\$/mile): \$0.10</p> <p>Bill By Mail (BBM) Toll Rate</p> <p>Car toll (\$/mile): \$0.15</p> <p>Annual Toll Rate Increase (%): 1.0%</p> <p>Indexation Base Year: 2018</p> <p>Toll Rates Versus Express Lane Demand</p>	Costs <p>Capital Costs</p> <p>Construction Duration (in years): 0</p> <p>Roadway Capital Improvement Cost (\$): \$0</p> <p>Indexation Base Year of Capital Improvement Costs: 2018</p> <p>Toll System Implementation Cost (\$/lane-mile): \$450,000</p> <p>Indexation Base Year of Toll System Capital Cost: 2018</p> <p>Operating Costs</p> <p>Roadway Maintenance (\$/lane-mile): \$25,000</p> <p>Indexation Base Year Roadway Maintenance Cost: 2018</p> <p>Annual Inflation rate for Costs (%): 3.0%</p>

2.4.5. Toll Bridges

This worksheet is the main input data sheet to assess the preliminary financial feasibility of toll bridges. The user is only allowed to enter data in the light-yellow cells (Figure 2-10). Data entry can occur as a direct entry by the user or can be made by a selection from a drop-down menu if the option is available. An error message will appear if the user tries to overwrite cells with a drop-down menu. Automatic calculations appear in white cells. Grayed out cells with black text indicate suggested values.

If using the Batch-Run Version (Figure 2-11), a drop-down list menu is available to shift among projects. The worksheet will populate automatically based on the information provided in the Projects' Information worksheet. Still, the user is required to enter some data in the light-yellow cells.

Figure 2-10. Toll Bridges Screenshot – Single-Run Version

Toll Bridges			
Project Information		Traffic Characteristics	
Project Identification Number		Opening Year	
Bridge Name		Opening Year AADT	
Bridge Length (miles)		Design Year	
Total No. of lanes (both directions)		Design Year AADT	
Project Location (Enter County or counties)		Average Annual Growth Rate (AADT)	#DIV/0!
		Truck Percentage	
		Average time savings compared to alternate route (minutes)	Suggested:
		Value of Time (\$/hr) - Car	\$12.50 \$12.50
		Value of Time (\$/hr) - Truck	\$50.00 \$50.00
Toll Pricing		Costs	
Electronic Toll Collection (ETC) Rates		Capital Costs	
Car Toll Rate (\$/trip)		Construction Duration (in years)	
Truck Toll Rate (\$/trip)		Bridge Capital Improvement Cost (\$)	
		Indexation Base Year of Capital Improvement Costs	
			Suggested:
		Toll System Implementation Cost (\$/lane-mile)	\$250,000 \$250,000
		Indexation Base Year of Toll System Capital Cost	2018 2018
Bill By Mail (BBM) Toll Rates		Operating Costs	
Car Toll Rate (\$/trip)	\$0.00	Roadway Maintenance (\$/lane-mile)	\$25,000 \$25,000
Truck Toll Rate (\$/trip)	\$0.00	Bridge Maintenance (\$/ft^2)	\$0.05 \$0.05
Annual Toll Rate Increase (%)	2.0% 2.0%	Indexation Base Year	2018 2018
Indexation Base Year	2019	Annual Inflation rate for Costs (%)	3.0% 3.0%

Figure 2-11. Toll Bridges Screenshot – Batch-Run Version

Toll Bridges			
Project Information		Traffic Characteristics	
Project #	0	Opening Year	0
Bridge Name	Project K	Opening Year AADT	-
Bridge Length (miles)	0	Design Year	0
No. of lanes in both directions	0	Design Year AADT	-
Project Location (Enter County or counties)	0	Average Annual Growth Rate (AADT)	#DIV/0!
		Truck Share (%)	0%
		Average time savings compared to alternate route (minutes)	0 Suggested:
		Value of Time (\$/hr) - Car	\$12.50 \$12.50
		Value of Time (\$/hr) - Truck	\$50.00 \$50.00
Toll Pricing		Costs	
Electronic Toll Collection (ETC) Rates		Capital Costs	
Car toll (\$/trip)		Construction Duration (in years)	0
Truck toll (\$/trip)		Bridge Capital Improvement Cost (\$)	\$0
		Indexation Base Year of Capital Improvement Costs	0
			Suggested:
		Toll System Implementation Cost (\$/lane-mile)	\$250,000 \$250,000
		Indexation Base Year of Toll System Capital Cost	2018 2018
Bill By Mail (BBM) Toll Rates		Operating Costs	
Car toll (\$/trip)	\$0.00	Roadway Maintenance (\$/lane-mile)	\$25,000 \$25,000
Truck toll (\$/trip)	\$0.00	Bridge Maintenance/Preservation Cost (\$/ft^2)	\$0.05 \$0.05
Annual Toll Rate Increase (%)	2.0% 2.0%	Indexation Base Year	2018 2018
Indexation Base Year	2018	Annual Inflation rate for Costs (%)	3.0% 3.0%

2.4.6. Toll Roads

This worksheet is the main input data sheet to assess the preliminary financial feasibility of toll roads (Figure 2-12). The user is only allowed to enter data in the light-yellow cells. Data entry can occur as a direct entry by the user or can be made by a selection from a drop-down menu if the option is available. An error message will appear if the user tries to overwrite cells with a drop-down menu. Automatic calculations appear in white cells. Grayed out cells with black text indicate suggested values.

If using the Batch-Run Version (Figure 2-13), a drop-down list menu is available to shift among projects. The worksheet will populate automatically based on the information provided in the Projects' Information worksheet. Still, the user is required to enter some data in the yellow color-coded cells.

Figure 2-12. Toll Road Screenshot – Single-Run Version

Toll Roads			
Project Information		Traffic Characteristics	
Project Identification Number		Opening Year	<input type="checkbox"/> Check box only if projected traffic already account for toll diversion (i.e. Toll Demand)
Corridor Name		Opening Year AADT	
Corridor Length (miles)		Design Year	
Total No. of lanes (both directions)		Design Year AADT	
Length of roadway on bridge structure (miles)		Average Annual Growth Rate (AADT)	#DIV/0!
Project Location (Enter County or counties)		Truck Percentage	
		Average time savings compared to alternate route (minutes)	
		Intermediate Access Point?	Yes
		Trip Length Percent	Medium - 75% Suggested:
		Value of Time (\$/hr) - Car	\$12.50 \$12.50
		Value of Time (\$/hr) - Truck	\$50.00 \$50.00
Toll Pricing		Costs	
Electronic Toll Collection (ETC) Rate	Suggested:	Capital Costs	
Car Toll Rate (\$/mile)	\$0.14 \$0.14	Construction Duration (in years)	
Truck Toll Rate (\$/mile)	\$0.56 \$0.56	Roadway Capital Improvement Cost (\$)	
Bill By Mail (BBM) Toll Rates		Indexation Base Year of Roadway Capital Improvement Costs	
Car Toll Rate (\$/mile)	\$0.21	Toll System Implementation Cost (\$/lane-mile)	\$422,000 \$422,000 Suggested:
Truck Toll Rate (\$/mile)	\$0.86	Indexation Base Year of Toll System Capital Cost	2018 2018
Annual Toll Rate Increase (%)	2.0% 2.0%	Operating Costs	
Indexation Base Year		Roadway Maintenance (\$/lane-mile)	\$25,000 \$25,000
		Bridge Maintenance (\$/ft^2)	\$0.05 \$0.05
		Indexation Base Year of Operating Costs	2018 2018
		Annual Inflation Rate for Costs (%)	2.75% 2.75%

Figure 2-13. Toll Roads Screenshot – Batch-Run Version

Toll Roads			
Project Information		Traffic Characteristics	
Project Identification Number	<input type="text" value="0"/>	Opening Year	<input type="text" value="0"/>
Corridor Name	<input style="background-color: yellow; border: 2px solid orange;" type="text" value="Project G"/>	Opening Year AADT	<input type="text" value="-"/>
Corridor Length (miles)	<input type="text" value="0"/>	Design Year	<input type="text" value="0"/>
Total No. of lanes (both directions)	<input type="text" value="0"/>	Design Year AADT	<input type="text" value="-"/>
Length of roadway on bridge structure (miles)	<input type="text" value="0"/>	Average Annual Growth Rate (AADT)	<input type="text" value="#DIV/0!"/>
Project Location (Enter County or counties)	<input type="text" value="0"/>	Truck Percentage	<input type="text" value="0%"/>
		Average time savings compared to alternate route (minutes)	<input type="text" value="0"/>
		Intermediate Access Point?	<input type="text" value="Yes"/>
		Trip Length Percent	<input type="text" value="Medium - 75%"/> Suggested:
		Value of Time (\$/hr) - Car	<input type="text" value="\$12.50"/> \$12.50
		Value of Time (\$/hr) - Truck	<input type="text" value="\$50.00"/> \$50.00
Toll Pricing		Costs	
Electronic Toll Collection (ETC) Rates		Capital Costs	
	Suggested:	Construction Duration (in years)	<input type="text" value="0"/>
Car toll rate (\$/mile)	<input type="text" value="\$0.14"/> \$0.14	Roadway Capital Improvement Cost (\$)	<input type="text" value="\$0"/>
Truck toll rate (\$/mile)	<input type="text" value="\$0.56"/> \$0.56	Indexation Base Year of Capital Improvement Costs	<input type="text" value="0"/>
Bill By Mail (BBM) Toll Rates			Suggested:
Car toll rate (\$/mile)	<input type="text" value="\$0.21"/> \$0.21	Toll System Implementation Cost (\$/lane-mile)	<input type="text" value="\$422,000"/> \$422,000
Truck toll rate (\$/mile)	<input type="text" value="\$0.86"/> \$0.86	Indexation Base Year of Toll System Capital Cost	<input type="text" value="2018"/> 2018
Annual rate increase (%)	<input type="text" value="2.0%"/> 2.0%		
Indexation Base Year	<input type="text" value=""/>	Operating Costs	
		Roadway Maintenance (\$/lane-mile)	<input type="text" value="\$25,000"/> \$25,000
		Bridge Maintenance (\$/ft^2)	<input type="text" value="\$0.05"/> \$0.05
		Indexation Base Year of Operating Costs	<input type="text" value="2018"/> 2018
		Annual Inflation rate for Costs (%)	<input type="text" value="2.75%"/> 2.75%

2.4.7. Version Control

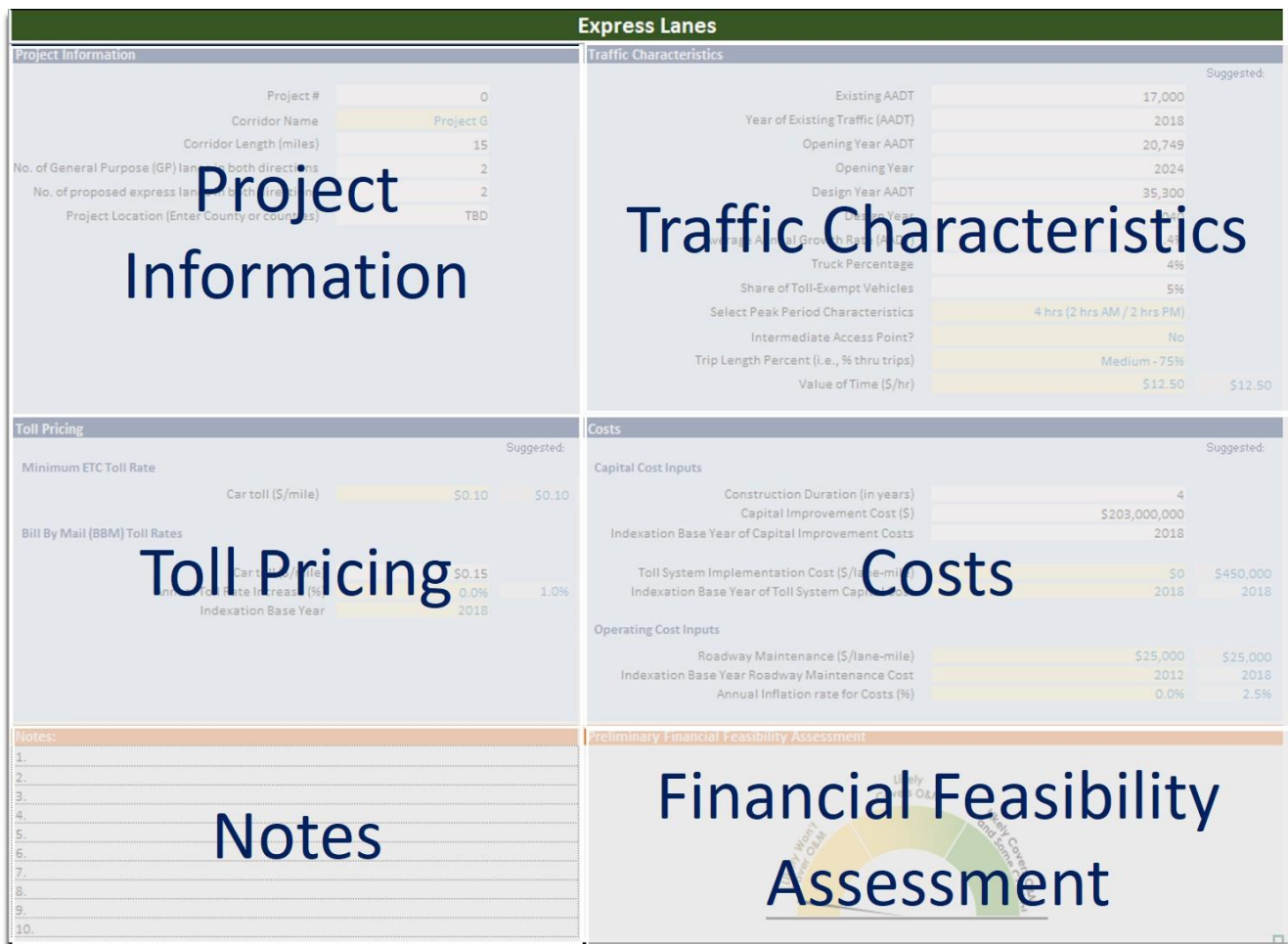
The Version Control worksheet helps to keep track of changes made to the Tool as it evolves over time and includes information about *who* modified the document and *when*. There is no data entry on this worksheet. NCDOT is responsible for updating and disseminating the latest version of the Tool.

3. How to use the Tool

This chapter provides detailed guidance on how to input data and how to interpret the financial assessment results. Each of the three toll project worksheets are divided into six sections (Figure 3-1): project information, traffic characteristics, toll pricing, costs, notes, and financial feasibility assessment. The following sections discuss each of these areas in detail. Note that while there are two different versions of the Tool (i.e., Single-Run vs. Batch-Run), the inputs are all the same. If using the Batch-Run Version, most of the inputs occur in the Projects' Information worksheet.

The Tool relies on user inputs to provide basic project information. Required inputs and initial assumptions are intended to be readily available to users. While the Tool does provide reasonable assumptions as suggested values, certain elements can be updated if better data is available.

Figure 3-1. Data Sections of Toll Project Worksheets



3.1. Express Lanes Worksheet

3.1.1. Data Entry

3.1.1.1. Project Information

In this section, users provide general characteristics of the project (Figure 3-2). Some of the data is used as descriptive information to summarize the characteristics of the facility. Other data is necessary to estimate roadway capacity and other parameters for each year of the study period. Users should input data in the light-yellow cells. If using the Batch-Run version, provide inputs in the Projects' Information worksheet.

Figure 3-2. Express Lanes – Project Information

Project Information	
Project Identification Number	
Corridor Name	
Corridor Length (miles)	
Total No. of General Purpose (GP) lanes (both directions)	
Total No. of proposed express lanes (both directions)	
Project Location (Enter County or counties)	

Project Identification Number – Enter project identification number

Corridor Name – Enter project name

Corridor Length (miles) – Enter centerline miles of corridor

Total No. of General Purpose (GP) Lanes (both directions) – Enter total number of general purpose lanes (both directions)

Total No. of proposed Express Lanes (both directions) – Enter total number of express lanes (both directions)

Project Location – Enter the county (or counties) to reflect the geographical location of the project

3.1.1.2. Traffic Characteristics

In this section, users provide inputs regarding projected traffic and other traffic characteristics (Figure 3-3). Users should input data in the light-yellow cells. If using the Batch-Run Version of the Tool, provide inputs in the Projects' Information worksheet.

- **Opening Year** – Enter the year the toll project is expected to open.
- **Opening Year AADT** – Enter bidirectional 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** – Enter year for which the roadway is being designed, usually 20 years from the opening year.
- **Design Year AADT** – Enter bidirectional 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.

Truck Percentage (%) – Enter the average percent of truck traffic between the opening year and design year. Note: The Tool assumes that heavy-commercial vehicles are not allowed to use the express lanes.

Figure 3-3. Express Lanes – Traffic Characteristics

Traffic Characteristics		
Opening Year		
Opening Year AADT		
Design Year		
Design Year AADT		
Average Annual Growth Rate (AADT)	#DIV/0!	
Truck Percentage		
Share of Toll-Exempt Vehicles		
Select Peak Period Characteristics	4 hrs (2 hrs AM / 2 hrs PM)	
Intermediate Access Point?	Yes	
Trip Length Percent	Medium - 75%	Suggested:
Value of Time (\$/hr)	\$12.50	\$12.50

Share of Toll-Exempt Vehicles (%) – Share of vehicles allowed to use the express lanes for free (e.g., emergency vehicles, transit buses/vanpools, HOT3+²).

Select Peak Period Characteristics – A drop-down list menu is provided to select the duration of the peak periods of congestion.

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 purpose lanes or exit the express lanes to the general purpose 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.

Trip Length Percent (i.e., % thru trips) – Select average length traveled by vehicles on the express lanes 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) – Enter user's value of time (VOT). Suggested VOT is based on the P6.0 prioritization process. Automobiles are assumed to have a VOT savings of \$12.50/hour while trucks are assumed to have a VOT savings of \$50/hour.

In addition to this User Guide, the Tool is embedded with pop-up messages. Clicking on or hovering over the cell will show these comments (Figure 3-4).

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

Figure 3-4. Example of Embedded Comments

Average Annual Growth Rate (AADT)	3.4%
Truck Percentage	4%
Share of Toll-Exempt Vehicles	5%
Select Peak Period Characteristics	4 hrs (2 hrs AM / 2 hrs PM)
Intermediate Access Point?	No
Trip Length Percent (i.e., % thru trips)	
Value of Time (\$/hr)	

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 purpose lanes or exit the express lanes to the general use lanes. Select Yes or No.

Costs	
Capital Cost Inputs	
Construction Duration (in years)	4
Capital Improvement Cost (\$)	\$203,000,000
Indexation Base Year of Capital Improvement Costs	2018

3.1.1.3. Dynamic Toll Pricing

In this section, users need to input the toll rate for passenger cars (Figure 3-5). 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). NCTA's VTC program is named Bill by Mail (BBM).

Minimum ETC Car Toll Rate (\$/mile) – Enter toll rate for passenger cars. A suggested value is recommended.

BBM, Car Toll Rate (\$/mile) – Automatically calculated. No user inputs.

Annual Toll Rate Increase (%) – annual rate to increase toll rates. Suggested value of 1% is provided.

Indexation Base Year – year of constant-dollar value of toll rates.

Figure 3-5. Express Lanes – Toll Pricing

Toll Pricing		
		Suggested:
Minimum ETC Toll Rate		
Car toll (\$/mile)	<input type="text" value=""/>	\$0.10
Bill By Mail (BBM) Toll Rates		
Car toll (\$/mile)	<input type="text" value="\$0.00"/>	
Annual Toll Rate Increase (%)	<input type="text" value=""/>	1.0%
Indexation Base Year	<input type="text" value=""/>	

3.1.1.4. Costs

In this section, users need to input costs items for construction and operations in the light-yellow cells (Figure 3-6). Enter costs in dollar terms and the corresponding indexation base year. Note that capital cost estimates are sometimes expressed in nominal dollars from several different years. Nominal dollars reflect the effects of inflation (a.k.a. year-of-expenditure dollars). To estimate the net present value for financial feasibility purposes, it is important that capital-cost values be expressed in real/constant dollars, using a common base year. If capital-improvement costs are in nominal dollars, convert to constant dollars, applying an inflation adjustment factor. For base year, select the current calendar year or the year construction is expected to start. If capital-improvement costs are already estimated in constant-dollar values, no further adjustments are necessary.

Figure 3-6. Express Lanes - Costs

Costs		
Capital Costs		
Construction Duration (in years)	<input type="text" value=""/>	
Roadway Capital Improvement Cost (\$)	<input type="text" value=""/>	
Indexation Base Year of Capital Improvement Costs	<input type="text" value=""/>	
		Suggested:
Toll System Implementation Cost (\$/lane-mile)	<input type="text" value="\$450,000"/>	\$450,000
Indexation Base Year of Toll System Capital Cost	<input type="text" value="2018"/>	2018
Operating Costs		
Roadway Maintenance (\$/lane-mile)	<input type="text" value="\$25,000"/>	\$25,000
Indexation Base Year of Roadway Maintenance Cost	<input type="text" value="2018"/>	2018
Annual Inflation Rate for Costs (%)	<input type="text" value="3.0%"/>	3.0%

Construction Duration – Enter the construction period duration (in whole years).

Roadway Capital Improvement Cost – Enter the total capital cost. This includes project development and construction costs. Enter cost in constant dollars.

Indexation Base Year of Capital-Improvement Costs – Enter the base year corresponding to the dollar terms of the capital-improvement costs.

Toll System Implementation Cost – Enter startup costs associated with implementing an electronic tolling system (e.g., computer technology, gantries, transponder readers). A value of \$450,000 per lane mile is suggested if no other estimate is available. The suggested cost is expressed in 2018 dollars.

Indexation Base Year of Toll System Capital Costs – Enter the base year corresponding to the dollar terms of the Toll System Implementation Cost.

Roadway Maintenance (\$/lane mile) – Enter the unit cost of annual routine maintenance to preserve pavement condition. A value of \$25,000 per lane mile is suggested. The suggested cost is expressed in 2018 dollars.

Indexation Base Year for Roadway Maintenance Cost – Enter the base year corresponding to the dollar terms of Roadway Operations and Maintenance (O&M) Cost.

Annual Inflation Rate (%) – Enter the annual rate at which costs are expected to increase.

3.1.1.5. Notes

This section is available for users to keep track of the source of inputs and assumptions (Figure 3-7). Use this section for document deviation from the suggested values.

Figure 3-7. Express Lanes – Notes

Notes:
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3.2. Toll Bridges

3.2.1. Data Entry

3.2.1.1. Project Information

In this section, users provide general characteristics of the project (Figure 3-8). Some of the data is 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. Users should input data in the light-yellow cells. If using the Batch-Run Version, provide inputs in the Projects' Information worksheet.

Figure 3-8. Toll Bridges – Project Information

Project Information	
Project Identification Number	
Bridge Name	
Bridge Length (miles)	
Total No. of lanes (both directions)	
Project Location (Enter County or counties)	

Project Identification Number – Enter the project identification number.

Bridge Name – Enter the project name.

Bridge Length (miles) – Enter the centerline miles of bridge.

Total No. of Lanes (both directions) – Enter the total number of general purpose lanes (both directions).

Project Location – Enter the county (or counties) to reflect the geographical location of the project.

3.2.1.2. Traffic Characteristics

In this section, users provide inputs regarding the project’s projected traffic and other traffic characteristics (Figure 3-9). Users should input data in the light-yellow cells. If using the Batch-Run Version of the Tool, provide inputs in the Projects’ Information worksheet.

Figure 3-9. Toll Bridges – Traffic Characteristics

Traffic Characteristics		
Opening Year		<input type="checkbox"/> Check box only if projected traffic already account for toll diversion (i.e. Toll Demand)
Opening Year AADT		
Design Year		
Design Year AADT		
Average Annual Growth Rate (AADT)	#DIV/0!	
Truck Percentage		
Average time savings compared to alternate route (minutes)		Suggested:
Value of Time (\$/hr) - Car	\$12.50	\$12.50
Value of Time (\$/hr) - Truck	\$50.00	\$50.00

Opening Year – Enter the year the toll bridge is expected to open.

Opening Year AADT – Enter bidirectional 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. Collect information from regional or statewide travel demand model.

Design Year – Future forecast year of traffic demand.

Design Year AADT – Enter bidirectional 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.

Truck Percentage (%) – Enter the average percent of truck traffic between the opening year and design year.

Average Time Savings Compared to Alternate Route (min.) – The average time, in minutes, that the new toll facility is expected to save users relative to next-best competing route. Extract from regional or statewide travel demand model or approximate using a mapping tool (e.g., Google Maps).

Value of Time (\$/hour) – Enter the user’s value of time (VOT). The suggested values of time are based on the P6.0 prioritization process. Automobiles are assumed to have a VOT savings of \$12.50/hour, while trucks are assumed to have a VOT savings of \$50/hour.

3.2.1.3. Toll Pricing

In this section, users need to input the toll rate for passenger cars and truck vehicles (Figure 3-10). 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 North Carolina Turnpike Authority (NCTA) VTC program is named Bill by Mail (BBM).

Figure 3-10. Toll Bridges – Toll Pricing

Toll Pricing			
Electronic Toll Collection (ETC)			
Car Toll (\$/trip)	<input type="text"/>		
Truck Toll (\$/trip)	<input type="text"/>		
Bill By Mail (BBM)			
Car Toll (\$/trip)	<input type="text" value="\$0.00"/>	\$0.00	
Truck Toll (\$/trip)	<input type="text" value="\$0.00"/>	\$0.00	
Annual Toll Rate Increase (%)	<input type="text" value="2.0%"/>	2.0%	2.0%
Indexation Base Year	<input type="text"/>		

ETC, Car Toll (\$/trip) – Enter the toll for passenger cars.

ETC, Truck Toll (\$/trip) – Enter the toll for trucks (three or more axels).

BBM, Car Toll (\$/trip) – This is automatically calculated. No user inputs.

BBM, Truck Toll (\$/trip) – This is automatically calculated. No user inputs.

Annual Toll Increase (%) – This is the annual rate to increase the toll. A suggested value of 2% is provided.

Indexation Base Year – This is the year of constant-dollar value of toll. Suggest entering current calendar year.

3.2.1.4. Costs

In this section, users need to input costs items for construction and operations in the light-yellow cells (Figure 3-11). Enter the costs in dollar terms and the corresponding indexation base year. Note that capital cost

estimates are sometimes expressed in nominal dollars from several different years. Nominal dollars reflect the effects of inflation (a.k.a. year-of-expenditure dollars). To estimate the net present value for financial feasibility purposes, it is important that capital-cost values are expressed in real/constant dollars, using a common base year. If capital-improvement costs are in nominal dollars, convert to constant dollars applying an inflation adjustment factor. For base year, select the current calendar year or the year construction is expected to start. If capital-improvement costs are already estimated in constant-dollar values, no further adjustments are necessary.

Figure 3-11. Toll Bridges - Costs

Costs		
Capital Costs		
Construction Duration (in years)		
Bridge Capital Improvement Cost (\$)		
Indexation Base Year of Capital Improvement Costs		
		Suggested:
Toll System Implementation Cost (\$/lane-mile)	\$250,000	\$250,000
Indexation Base Year of Toll System Capital Cost	2018	2018
Operating Costs		
Roadway Maintenance (\$/lane-mile)	\$25,000	\$25,000
Bridge Maintenance (\$/ft ²)	\$0.05	\$0.05
Indexation Base Year of Operating Costs	2018	2018
Annual Inflation Rate for Costs (%)	2.75%	2.75%

Construction Duration – Enter the construction period duration (in whole years).

Bridge Capital Improvement Cost – Enter the total capital cost. Includes project development and construction costs. Enter cost in constant dollars.

Indexation Base Year of Capital-Improvement Costs – Enter the base year corresponding to the dollar terms of the capital-improvement costs.

Toll System Implementation Cost – Enter the startup costs associated with implementing an electronic tolling system (e.g., computer technology, gantries, transponder readers). A value of \$250,000 per lane mile is suggested if no other estimate is available. Suggested cost is expressed in 2018 dollars.

Indexation Base Year of Toll System Capital Costs – Enter the base year corresponding to the dollar terms of the Toll System Implementation Cost.

Roadway Maintenance (\$/lane mile) – Enter the unit cost of annual routine maintenance to preserve pavement condition. A value of \$25,000 per lane mile is suggested. The suggested cost is expressed in 2018 dollars.

Bridge Maintenance Cost (\$/ft²) – Enter unit cost of annual routine maintenance to preserve bridge condition. A value of \$0.05/ft² is suggested. The suggested cost is expressed in 2018 dollars.

Indexation Base Year of Operating Costs – Enter the base year corresponding to the dollar terms of operating costs.

Annual Inflation Rate for Costs (%) – Enter the annual rate at which costs are expected to increase.

3.2.1.5. Notes

This section is available for users to keep track of the source of inputs and assumptions (Figure 3-12). Use this section to document deviation from the suggested values.

Figure 3-12. Toll Bridges – Notes

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3.3. Toll Roads

3.3.1. Data Entry

3.3.1.1. Project Information

In this section, users provide general characteristics of the project (Figure 3-13). Some of the data is 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. Users should input data in the light-yellow cells. If using the Batch-Run Version, provide inputs in the Projects' Information worksheet.

Figure 3-13. Toll Roads – Project Information

Project Information	
Project Identification Number	
Corridor Name	
Corridor Length (miles)	
Total No. of lanes (both directions)	
Length of roadway on bridge structure (miles)	
Project Location (Enter County or counties)	

Project Identification Number – Enter the project identification number.

Corridor Name – Enter the project name.

Corridor Length (miles) – Enter the centerline miles of corridor.

Total No. of Lanes (both directions) – Enter the total number of general purpose lanes (both directions).

Length of Roadway on Bridge Structure (miles) – Enter length of roadway portion on major bridge structure. Enter lengths greater than 500 feet (i.e., ≥ 0.1 miles). This is an optional field to account for maintenance costs of major bridge structures.

Project Location – Enter the county (or counties) to reflect the geographical location of the project.

3.3.1.2. Traffic Characteristics

In this section, users provide inputs regarding projected traffic and other traffic characteristics (Figure 3-14). Users should input data in the light-yellow cells. If using the Batch-Run Version of the Tool, provide inputs in the Projects' Information worksheet.

Figure 3-14. Toll Roads – Traffic Characteristics

Traffic Characteristics			
Opening Year			<input type="checkbox"/> Check box only if projected traffic already account for toll diversion (i.e. Toll Demand)
Opening Year AADT			
Design Year			
Design Year AADT			
Average Annual Growth Rate (AADT)		#DIV/0!	
Truck Percentage			
Average time savings compared to alternate route (minutes)			
Intermediate Access Point?		Yes	
Trip Length Percent		Medium - 75%	Suggested:
Value of Time (\$/hr) - Car		\$12.50	\$12.50
Value of Time (\$/hr) - Truck		\$50.00	\$50.00

Opening Year – Enter year the toll road is expected to open.

Opening Year AADT – Enter bidirectional estimate of traffic volume in opening year. AADT is assumed to be toll-free demand and to reflect the annual 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.

Design Year AADT – Enter bidirectional 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.

Truck Percentage (%) – Enter average percent of truck traffic between opening year and design year.

Average Time Savings Compared to Alternate Route (min.) – average time, in minutes, that new toll facility is expected to save users relative to 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 purpose lanes or exit the express lanes to the general purpose 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.

Value of Time (\$/hour) – Enter user’s value of time (VOT). Suggested values of time are based on the P6.0 prioritization process. Automobiles are assumed to have a VOT savings of \$12.50/hour while trucks are assumed to have a VOT savings of \$50/hour.

3.3.1.3. Toll Pricing

In this section, users need to input the toll rate for passenger cars and truck vehicles (Figure 3-15). 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). NCTA’s VTC program is named Bill by Mail (BBM).

Figure 3-15. Toll Roads – Toll Pricing

Toll Pricing			
Electronic Toll Collection (ETC) Rate			Suggested:
Car Toll Rate (\$/mile)		\$0.14	\$0.14
Truck Toll Rate (\$/mile)		\$0.56	\$0.56
Bill By Mail (BBM) Toll Rates			
Car Toll Rate (\$/mile)		\$0.21	
Truck Toll Rate (\$/mile)		\$0.86	
Annual Toll Rate Increase (%)		2.0%	2.0%
Indexation Base Year			

ETC, Car Toll Rate (\$/mile) – Enter the toll rate for passenger cars. A suggested value is recommended.

ETC, Truck Toll Rate (\$/mile) – Enter the toll for trucks (three or more axles). A suggested value is recommended.

BBM, Car Toll Rate (\$/mile) – This is automatically calculated. No user inputs.

BBM, Truck Toll Rate (\$/mile) – This is automatically calculated. No user inputs.

Annual Toll Rate Increase (%) – The annual rate to increase toll rates. Suggested value of 2% is provided.

Indexation Base Year – This is the year of constant-dollar value of toll rates.

3.3.1.4. Costs

In this section, users need to input costs items for construction and operations in the light-yellow cells (Figure 3-16). Enter the costs in dollar terms and the corresponding indexation base year. Note that capital cost estimates are sometimes expressed in nominal dollars from several different years. Nominal dollars reflect the effects of inflation (a.k.a. year-of-expenditure dollars). To estimate the net present value for financial feasibility purposes, it is important that capital-cost values be expressed in real/constant dollars, using a common base year. If capital-improvement costs are in nominal dollars, convert to constant dollars applying an inflation adjustment factor. For base year, select the current calendar year or the year construction is

expected to start. If capital-improvement costs are already estimated in constant-dollar values, no further adjustments are necessary.

Figure 3-16. Toll Roads – Costs

Costs			
Capital Costs			
Construction Duration (in years)			
Roadway Capital Improvement Cost (\$)			
Indexation Base Year of Roadway Capital Improvement Costs			
			Suggested:
Toll System Implementation Cost (\$/lane-mile)	\$422,000	\$422,000	
Indexation Base Year of Toll System Capital Cost	2018	2018	
Operating Costs			
Roadway Maintenance (\$/lane-mile)	\$25,000	\$25,000	
Bridge Maintenance (\$/ft ²)	\$0.05	\$0.05	
Indexation Base Year of Operating Costs	2018	2018	
Annual Inflation Rate for Costs (%)	2.75%	2.75%	

Construction Duration – Enter the construction period duration (in whole years).

Roadway Capital Improvement Cost – Enter the total capital cost, this includes project development and construction costs. Enter cost in constant dollars.

Indexation Base Year of Capital-Improvement Costs – Enter the base year corresponding to the dollar terms of the capital-improvement costs.

Toll System Implementation Cost – Enter the startup costs associated with implementing an electronic tolling system (e.g., computer technology, gantries, transponder readers). A value of \$422,000 per lane mile is suggested if no other estimate is available. Suggested cost is expressed in 2018 dollars.

Indexation Base Year of Capital-Improvement Costs – Enter the base year corresponding to the dollar terms of the Toll System Implementation Cost.

Roadway Maintenance (\$/lane mile) – Enter unit cost of annual routine maintenance to preserve pavement condition. A value of \$25,000 per lane mile is suggested. Suggested cost is expressed in 2018 dollars.

Bridge Maintenance/Preservation Cost (\$/ft²) – Enter unit cost of annual routine maintenance to preserve bridge condition. A value of \$0.05/ft² is suggested. The suggested cost is expressed in 2018 dollars.

Indexation Base Year for Roadway Maintenance Cost – Enter the base year corresponding to the dollar terms of Roadway O&M Cost.

Annual Inflation Rate (%) – Enter the annual rate at which costs are expected to increase.

3.3.1.5. Notes

This section is available for users to keep track of the source of inputs and assumptions (Figure 3-17). Use this section to document deviation from the suggested values.

Figure 3-17. Toll Roads – Notes

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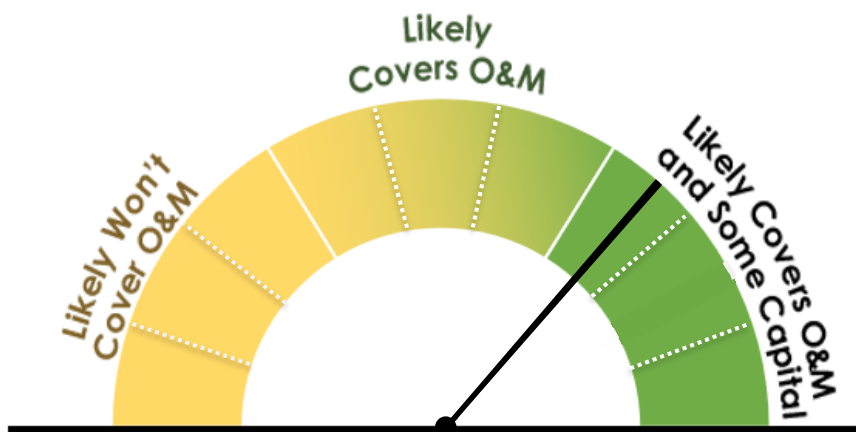
3.4. Financial Feasibility Dial

The financial feasibility dial estimates, at a high level, the ability of a toll project to generate revenue to cover its own costs of operation and to assess 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 are required. The feasibility assessment is tied to three conditions levels (Figure 3-18):

1. **Likely covers O&M and some 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 position of the dial should be interpreted as a "confidence level" within each of the three financial condition levels. The Tool is meant to be illustrative in nature and intended to provide a scale of possible outcomes rather than a precise estimate.

Figure 3-18. Financial Feasibility Assessment Dial



3.5. Pre-Submittal Assessment (PSA) Linkage to Financial Feasibility Screening Tool (FFST)

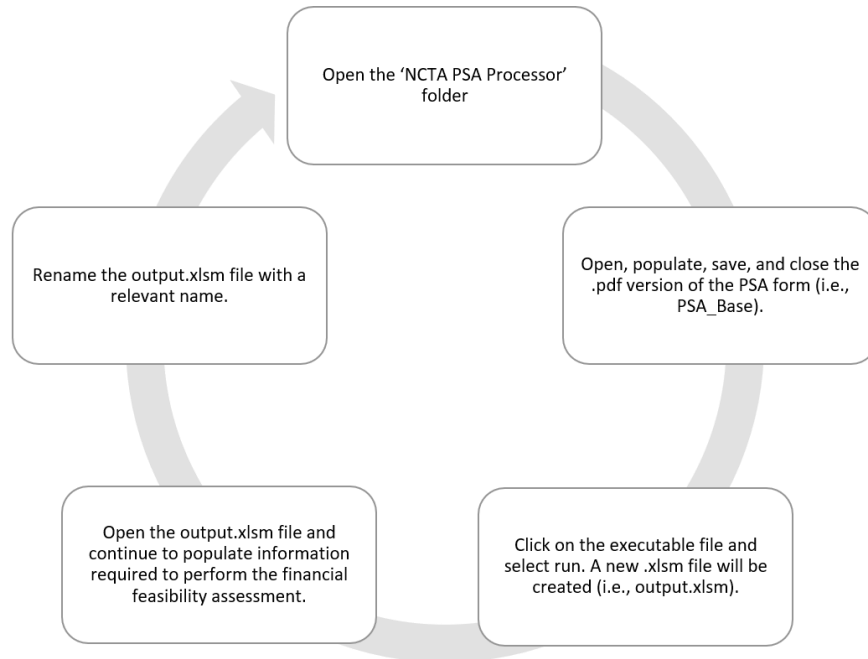
The PSA document captures key project information to initiate the assessment of a toll candidate's preliminary financial feasibility. To streamline and simplify data entry between the PSA form and the FFST, NCDOT has included a script file in the downloadable package of PSA files. The script file is an executable file (PSAProcessor.exe) that a user will run to populate certain data fields in the Single-Run Version of the Tool. Follow this procedure if you choose to leverage the PSA Processor (Figure 3-19).

1. Open the 'NCTA PSA Processor' folder
2. Open, populate, save, and close the .pdf version of the PSA form (i.e., PSA_Base). Do not change the file name.
NOTE: If you have a PSA form that has been already populated, create a copy and paste inside the 'NCTA PSA Processor' folder. Rename the imported PSA file to *PSA_Base*. The original PSA_Base file in the directory will have to be temporarily renamed to something different.
3. Click on the executable file and select run. The FFST in the directory (i.e., Single-Run.xlsm) will automatically be updated and saved. A new .xlsm file will be created (i.e., output.xlsm).
4. Open the output.xlsm file and continue to populate information required to perform the financial feasibility assessment.
5. Rename the output.xlsm file with a relevant name.

3.5.1. Notes about the PSA Processor

1. It is important that the user not change the file names of either the pdf-based PSA form or the Excel-based FFST in the 'NCTA PSA Processor' folder, or relocate these files to different locations, since the script file references these files as it runs.
2. The FFST in the directory will not update even after running the executable file if key data fields in the PSA form are missing.
3. A new output.xlsm file is created every time the executable file is run. The script will not append or supersede in the same output.xlsm file if data in the PSA form is updated or if a different project type is selected.

Figure 3-19. PSA Processor



4. Hypothetical Case Studies

This chapter shows hypothetical examples of toll projects to provide further guidance on how to fill out the forms. These examples are provided for illustrative purposes only and do not represent real projects. A total of four cases are provided, one for each project type, using the Single-Run and Batch-Run Versions of the Tool. The fourth case shows how to apply the Tool for a Toll Road with major bridge structures.

4.1. Case Study #1 – Express Lanes

Jane needs to evaluate the financial feasibility of a 15-mile express lane project in North Carolina. After reading the User Guide, Jane downloaded and installed the Financial Feasibility Screening Tool into her computer's hard drive and selected the Express Lanes tab. She collected basic project information from the agency's database.

The express-lane corridor is anticipated to have two, toll-dedicated travel lanes per direction and will be open to traffic in 2023. The express lanes will run adjacent to three, free general purpose lanes per direction where drivers can choose to pay a toll for a reliable travel time.

In collaboration with her colleagues, she extracted projected traffic from the calibrated travel demand model. During opening year, AADT is estimated at 199,000 vehicles per day. In 2040, the travel demand model estimates 230,000 vehicles per day. Heavy trucks represent 10% of highway vehicles, while 2% of vehicles are estimated to use the express lanes without paying a toll. Toll-exempt vehicles include transit buses and vanpools, as well as emergency vehicles.

The corridor will have multiple access points (i.e., points of ingress or egress) where vehicles can enter the express lanes from the general purpose lanes or exit the express lanes to the general purpose lanes. Travel patterns suggest express-lane vehicles will travel, on average, 75% of the corridor length.

The express lanes will be managed by dynamic pricing, with the cost rising as demand increases during morning and evening peak travel times and decreasing during off-peak travel times. Based on toll pricing studies and data from other toll facilities in North Carolina, Jane decides to establish the minimum toll collection rate for electronic toll transactions at \$0.10 per mile. The toll rate for bill-by-mail transactions is automatically calculated. The toll rate of \$0.10/mile is in 2019 dollars.

In coordination with the NCDOT, Jane gathers that a cost estimate developed in 2017 show that this project will cost \$1.4 billion (in constant dollars) and will take four years to construct. The cost estimate did not include Toll System Implementation (TSI) costs. Hence, Jane decides to use the suggested value of \$450,000 in 2018 dollars. For operating cost assumptions, she also decides to use the suggested values in the Tool.

Figure 4-1 shows the Express Lanes worksheet of the Single-Run Version. Jane entered the information directly in the light-yellow cells of the Tool.

Figure 4-2 shows the inputs in the Projects' Information worksheet of the Batch-Run Version. Figure 4-3 shows the Express Lanes worksheet of the Batch-Run Version populated with most of the information in the white color-coded cells. Jane still had to enter some of the information she collected in the light-yellow cells.

The express-lane corridor is anticipated to generate enough revenues to cover its own costs of operation and a portion of the capital costs through a toll financing.

Figure 4-1. Single-Run Version – Express Lanes

Express Lanes	
Project Information	Traffic Characteristics
Project Identification Number: 1234 Corridor Name: Case Study #1 Corridor Length (miles): 15 Total No. of General Purpose (GP) lanes (both directions): 6 Total No. of proposed express lanes (both directions): 4 Project Location (Enter County or counties): Example	Opening Year: 2023 Opening Year AADT: 199,000 Design Year: 2040 Design Year AADT: 230,000 Average Annual Growth Rate (AADT): 0.9% Truck Percentage: 10% Share of Toll-Exempt Vehicles: 2% Select Peak Period Characteristics: 6 hrs or more (3+ hrs in both AM & PM) Intermediate Access Point?: Yes Trip Length Percent: Medium - 75% <small>Suggested:</small> Value of Time (\$/hr): \$12.50 <small>Suggested: \$12.50</small>
Dynamic Toll Pricing	Costs
Minimum Electronic Toll Collection (ETC) Rate <small>Suggested:</small> Minimum Toll Rate (\$/mile): \$0.20 <small>\$0.10</small>	Capital Costs Construction Duration (in years): 4 Roadway Capital Improvement Cost (\$): \$1,400,000,000 Indexation Base Year of Capital Improvement Costs: 2017 Toll System Implementation Cost (\$/lane-mile): \$450,000 <small>Suggested: \$450,000</small> Indexation Base Year of Toll System Capital Cost: 2018 <small>2018</small>
Bill By Mail (BBM) Toll Rates Minimum Toll Rate (\$/mile): \$0.31 Annual Toll Rate Increase (%): 1.0% <small>10%</small> Indexation Base Year: 2019	Operating Costs Roadway Maintenance (\$/lane-mile): \$25,000 <small>\$25,000</small> Indexation Base Year of Roadway Maintenance: 2018 <small>2018</small> Annual Inflation Rate for Costs (%): 2.75% <small>2.75%</small>
Toll Rate Versus Express Lane Demand 	Preliminary Financial Feasibility Assessment
Notes: 1. 2. 3. 4. 5. 6. 7. 8. 9.	

Figure 4-2. Batch-Run Version – Express Lanes
Projects' Information Worksheet

Express Lanes

	Corridor Name	1	
		Cash Study #1	
Physical Characteristics			
	Project Identification Number	1234	
	Corridor Length (miles)	15	
	Total No. of General Purpose (GP) lanes (both directions)	6	
	Total No. of proposed express lanes (both directions)	4	
	Project Location (Enter county or counties)	Example	
Traffic Characteristics			
	Opening Year	2023	
	Opening Year AADT	199,000	
	Design Year	2040	
	Design Year AADT	230,000	
	Truck Percentage	10%	
	Share of Toll-Exempt Vehicles	2%	
	Select Peak Period Characteristics	6 hrs or more (3+ hrs in both AM & PM)	6 hr
	Intermediate Access Point?	Yes	
	Trip Length Percent	Medium - 75%	
Costs			
	Construction Duration (in years)	4	
	Roadway Capital Improvement Cost (\$)	\$1,400,000,000	
	Indexation Base Year of Capital Improvement Costs	2017	

Figure 4-3. Batch-Run Version – Express Lanes
Express Lanes Worksheet

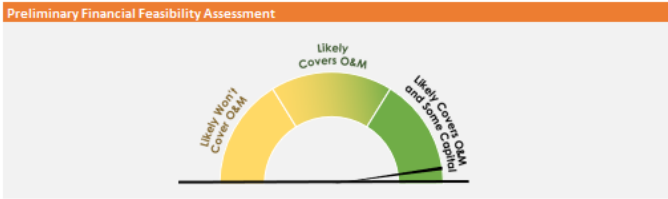
Express Lanes

Project Information	Traffic Characteristics
Project Identification Number: 1234	Opening Year: 2023
Corridor Name: Cash Study #1	Opening Year AADT: 199,000
Corridor Length (miles): 15	Design Year: 2040
Total No. of General Purpose (GP) lanes (both directions): 6	Design Year AADT: 230,000
Total No. of proposed express lanes (both directions): 4	Average Annual Growth Rate (AADT): 0.9%
Project Location (Enter County or counties): Example	Truck Percentage: 10%
	Share of Toll-Exempt Vehicles: 2%
	Select Peak Period Characteristics: 6 hrs or more (3+ hrs in both AM & PM)
	Intermediate Access Point?: Yes
	Trip Length Percent: Medium - 75% Suggested:
	Value of Time (\$/hr): \$12.50 \$12.50

Dynamic Toll Pricing	Costs
<p>Minimum Electronic Toll Collection (ETC) Rate Suggested:</p> <p>Minimum Toll Rate (\$/mile): \$0.20 \$0.10</p> <p>Bill By Mail (BBM) Toll Rate</p> <p>Car toll (\$/mile): \$0.31</p> <p>Annual Toll Rate Increase (%): 1.0% 1.0%</p> <p>Indexation Base Year: 2019</p> <p>Toll Rates Versus Express Lane Demand</p>	<p>Capital Costs Suggested:</p> <p>Construction Duration (in years): 4</p> <p>Roadway Capital Improvement Cost (\$): \$1,400,000,000</p> <p>Indexation Base Year of Capital Improvement Costs: 2017</p> <p>Toll System Implementation Cost (\$/lane-mile): \$450,000 \$450,000</p> <p>Indexation Base Year of Toll System Capital Cost: 2018 2018</p> <p>Operating Costs</p> <p>Roadway Maintenance (\$/lane-mile): \$25,000 \$25,000</p> <p>Indexation Base Year Roadway Maintenance Cost: 2018 2018</p> <p>Annual Inflation rate for Costs (%): 2.75% 2.75%</p>

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4.2. Case Study #2 – Toll Bridge

John needs to evaluate the financial feasibility of a new six-mile toll bridge in North Carolina. After reading the User Guide, John downloaded and installed the Financial Feasibility Screening Tool into his computer's hard drive and selected the Toll Bridges tab. He collected basic project information from the agency's database.

The new toll bridge is anticipated to have two tolled lanes per direction and will open to traffic in 2022. In collaboration with his colleagues, John extracted projected traffic from the calibrated travel demand model. Opening year AADT is estimated at 5,000 vehicles per day. In 2040, the travel demand model estimates 7,000 vehicles per day. Heavy trucks represent 5% of highway vehicles.

The new toll facility is expected to save drivers 25 minutes relative to the next-best alternative route. John decides to use the suggested values of time since they match the P6.0 prioritization process.

Based on recent toll pricing studies, John and his team of planners believe that \$6/trip is adequate to charge passenger cars. The toll rate for trucks is \$10/trip. The toll rates for bill-by-mail transactions are automatically calculated. Toll rates are expressed in 2019 dollars. Consistent with industry standards, John anticipates toll rates will be increased annually at the same rate of inflation. For planning purposes, he decides to use 2% for the annual rate increase.

In coordination with the NCDOT, John gathers from a cost estimate developed in 2018 that this project will cost \$500 million (in constant dollars) and will take three years to construct. The cost estimate did include Toll System Implementation (TSI) costs. For operating cost assumptions, John decides to use the suggested values in the Tool. Figure 4-4 shows the Toll Bridges worksheet of the Single-Run Version. John entered the information directly in the light-yellow cells of the Tool.

Figure 4-5 shows the inputs in the Projects Information worksheet of the Batch-Run Version. Figure 4-6 shows the Toll Bridges worksheet of the Batch-Run Version populated with most of the information in the white color-coded cells. John still had to enter some key information in the light-yellow cells.

Based on the inputs, future toll revenues will likely cover the costs of operation.

Figure 4-4. Single-Run Version – Toll Bridges

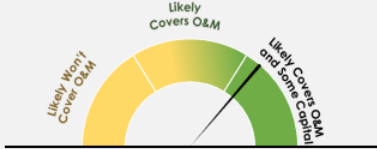
Toll Bridges			
Project Information		Traffic Characteristics	
Project Identification Number	1234	Opening Year	2022 <input type="checkbox"/> Check box only if projected traffic already account for toll diversion (i.e. Toll Demand)
Bridge Name	Case Study #2	Opening Year AADT	5,000
Bridge Length (miles)	6	Design Year	2040
Total No. of lanes (both directions)	4	Design Year AADT	7,000
Project Location (Enter County or counties)	Example	Average Annual Growth Rate (AADT)	1.9%
		Truck Percentage	5%
		Average time savings compared to alternate route (minutes)	25 Suggested:
		Value of Time (\$/hr) - Car	\$12.50 \$12.50
		Value of Time (\$/hr) - Truck	\$50.00 \$50.00
Toll Pricing		Costs	
Electronic Toll Collection (ETC) Rates		Capital Costs	
Car Toll Rate (\$/trip)	\$6.00	Construction Duration (in years)	3
Truck Toll Rate (\$/trip)	\$10.00	Bridge Capital Improvement Cost (\$)	\$500,000,000
		Indexation Base Year of Capital Improvement Costs	2018 Suggested:
Bill By Mail (BBM) Toll Rates		Toll System Implementation Cost (\$/lane-mile)	\$0 \$250,000
Car Toll Rate (\$/trip)	\$9.18	Indexation Base Year of Toll System Capital Cost	0 2018
Truck Toll Rate (\$/trip)	\$15.30		
Annual Toll Rate Increase (%)	2.0% 2.0%	Operating Costs	
Indexation Base Year	2019	Roadway Maintenance (\$/lane-mile)	\$25,000 \$25,000
		Bridge Maintenance (\$/ft^2)	\$0.05 \$0.05
		Indexation Base Year of Operating Costs	2018 2018
		Annual Inflation Rate for Costs (%)	2.75% 2.75%
Notes:		Preliminary Financial Feasibility Assessment	
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Figure 4-5. Batch-Run Version – Toll Bridges
Projects' Information Worksheet

Toll Bridges		1
Bridge Name		Case Study #2
Physical Characteristics		
Project Identification Number		1234
Bridge Length (miles)		6
Total No. of lanes (both directions)		4
Project Location (Enter county or counties)		Example
Traffic Characteristics		
Opening Year		2022
Opening Year AADT		5,000
Design Year		2040
Design Year AADT		7,000
Does Projected Traffic Already Account for Diversion (i.e., Toll Demand)?		No
Truck Percentage		5%
Average time savings compared to alternate route (minutes)		25
Costs		
Construction Duration (in years)		3
Bridge Capital Improvement Cost (\$)		\$500,000,000
Indexation Base Year of Capital Improvement Costs		2018

Figure 4-6. Batch-Run Version – Toll Bridges
Toll Bridges Worksheet

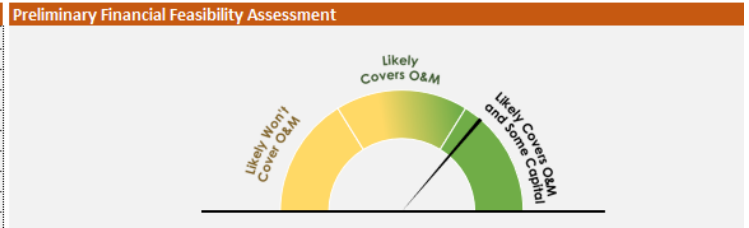
Toll Bridges

Project Information	Traffic Characteristics
Project Identification Number: 1234	Opening Year: 2022
Bridge Name: Case Study #2	Opening Year AADT: 5,000
Bridge Length (miles): 6	Design Year: 2040
No. of lanes in both directions: 4	Design Year AADT: 7,000
Project Location (Enter County or counties): Example	Average Annual Growth Rate (AADT): 1.9%
	Truck Share (%): 5%
	Average time savings compared to alternate route (minutes): 25 Suggested:
	Value of Time (\$/hr) - Car: \$12.50 \$12.50
	Value of Time (\$/hr) - Truck: \$50.00 \$50.00

Toll Pricing	Costs
Electronic Toll Collection (ETC) Rates	Capital Costs
Car toll (\$/trip): \$6.00	Construction Duration (in years): 3
Truck toll (\$/trip): \$10.00	Bridge Capital Improvement Cost (\$): \$500,000,000
	Indexation Base Year of Capital Improvement Costs: 2018
Bill By Mail (BBM) Toll Rates	
Car toll (\$/trip): \$9.18	Toll System Implementation Cost (\$/lane-mile): \$0 Suggested: \$250,000
Truck toll (\$/trip): \$15.30 Suggested:	Indexation Base Year of Toll System Capital Cost: 2018 2018
Annual Toll Rate Increase (%): 2.0% 2.0%	Operating Costs
Indexation Base Year: 2019	Roadway Maintenance (\$/lane-mile): \$25,000 \$25,000
	Bridge Maintenance/Preservation Cost (\$/ft ²): \$0.05 \$0.05
	Indexation Base Year of Operating Costs: 2018 2018
	Annual Inflation rate for Costs (%): 2.75% 2.75%

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4.3. Case Study #3 – Toll Road

Judy needs to assess the financial feasibility of a new 15-mile toll road project in North Carolina. After reading the User Guide, Judy downloaded and installed the Financial Feasibility Screening Tool into her computer's hard drive and selected the Toll Roads worksheet. She collected basic project information from the agency's database.

The toll road is anticipated to have two tolled travel lanes per direction and will open to traffic in 2024. In collaboration with her colleagues, Judy extracted projected traffic information from the travel demand model. Opening year AADT is estimated at 21,000 vehicles per day. In 2040, the travel demand model estimates 25,000 vehicles per day. The modeler, however, informed Judy that the projected traffic is the toll demand, that is, traffic diversion has already been accounted for. Judy then checked the box in the worksheet to account for this. Heavy trucks represent 6% of highway vehicles.

The new toll facility is expected to save drivers 20 minutes relative to the next-best alternative route. Judy decides to use the suggested values of time in the Tool since they match the P6.0 prioritization process. The corridor will have multiple access points and she estimates that trip length's will be 75% of the length of the corridor.

Judy and her team of planners decide to use the suggested toll rates in the Tool because they are in-line with today's national toll pricing rates for similar facilities. The toll rates for bill-by-mail transactions are automatically calculated. Toll rates are expressed in 2018 dollars and it is assumed that toll rates will increase by 2% every year.

In coordination with NCDOT, Judy gathers from a cost estimate developed in 2017 that this project will cost \$600 million (in constant dollars) and it will take three years to build. The cost estimate did not include Toll System Implementation (TSI) costs. Hence, Judy decides to use the suggested value of \$422,000 in 2018 dollars. For operating cost assumptions, she also decides to use the suggested values in the Tool.

Figure 4-7 shows the Express Lanes worksheet of the Single-Run Version. Judy entered the information directly in the light-yellow cells of the Tool. Figure 4-8 shows the inputs in the Projects' Information worksheet of the Batch-Run Version. Figure 4-9 shows the Toll Roads worksheet of the Batch-Run Version populated with most of the information in the white color-coded cells. Judy still had to enter key information in the light-yellow cells.

Based on the inputs, net toll revenues will likely cover the costs to maintain and operate the facility and potentially a portion of the capital costs through a toll financing.

Figure 4-7. Single-Run Version – Toll Roads

Toll Roads			
Project Information		Traffic Characteristics	
Project Identification Number	1234	Opening Year	2024 <input checked="" type="checkbox"/> Check box only if projected traffic already account for toll diversion (i.e. Toll Demand)
Corridor Name	Case Study #3	Opening Year AADT	21,000
Corridor Length (miles)	15	Design Year	2040
Total No. of lanes (both directions)	4	Design Year AADT	25,000
Length of roadway on bridge structure (miles)	0	Average Annual Growth Rate (AADT)	1.1%
Project Location (Enter County or counties)	Example	Truck Percentage	6%
		Average time savings compared to alternate route (minutes)	20
		Intermediate Access Point?	Yes
		Trip Length Percent	Medium - 75% Suggested:
		Value of Time (\$/hr) - Car	\$12.50 \$12.50
		Value of Time (\$/hr) - Truck	\$50.00 \$50.00
Toll Pricing		Costs	
Electronic Toll Collection (ETC) Rate		Capital Costs	
	Suggested:	Construction Duration (in years)	3
Car Toll Rate (\$/mile)	\$0.14 \$0.14	Roadway Capital Improvement Cost (\$)	\$600,000,000
Truck Toll Rate (\$/mile)	\$0.56 \$0.56	Indexation Base Year of Roadway Capital Improvement Costs	2017
Bill By Mail (BBM) Toll Rates			Suggested:
Car Toll Rate (\$/mile)	\$0.21	Toll System Implementation Cost (\$/lane-mile)	\$422,000 \$422,000
Truck Toll Rate (\$/mile)	\$0.86	Indexation Base Year of Toll System Capital Cost	2018 2018
Annual Toll Rate Increase (%)	2.0% 2.0%	Operating Costs	
Indexation Base Year	2018	Roadway Maintenance (\$/lane-mile)	\$25,000 \$25,000
		Bridge Maintenance (\$/ft ²)	\$0.05 \$0.05
		Indexation Base Year of Operating Costs	2018 2018
		Annual Inflation Rate for Costs (%)	2.75% 2.75%
Notes:		Preliminary Financial Feasibility Assessment	
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Figure 4-8. Batch-Run Version – Toll Roads
Projects' Information Worksheet

Toll Roads

	1
Corridor Name>	Case Study #3
Physical Characteristics	
Project Identification Number	1234
Corridor Length (miles)	15
Total No. of lanes (both directions)	4
Length of roadway on bridge structure (miles)	0
Project Location (Enter county or counties)	Example
Traffic Characteristics	
Opening Year	2024
Opening Year AADT	21,000
Design Year	2040
Design Year AADT	25,000
Does Projected Traffic Already Account for Diversion (i.e., Toll Demand)?	Yes
Truck Percentage	6%
Average time savings compared to alternate route (minutes)	20
Intermediate Access Point?	Yes
Trip Length Percent	Medium - 75%
Costs	
Construction Duration (in years)	3
Roadway Capital Improvement Cost (\$)	\$600,000,000
Indexation Base Year of Capital Improvement Costs	2017

Figure 4-9. Batch-Run Version – Toll Roads
Toll Roads Worksheet

Toll Roads			
Project Information		Traffic Characteristics	
Project Identification Number	1234	Opening Year	2024
Corridor Name	Case Study #3	Opening Year AADT	21,000
Corridor Length (miles)	15	Design Year	2040
Total No. of Lanes (both directions)	4	Design Year AADT	25,000
Length of roadway on bridge structure (miles)	0	Average Annual Growth Rate (AADT)	1.1%
Project Location (Enter County or counties)	Example	Truck Percentage	6%
		Average time savings compared to alternate route (minutes)	20
		Intermediate Access Point?	Yes
		Trip Length Percent	Medium - 75% Suggested:
		Value of Time (\$/hr) - Car	\$12.50 \$12.50
		Value of Time (\$/hr) - Truck	\$50.00 \$50.00
Toll Pricing		Costs	
Electronic Toll Collection (ETC) Rates Suggested:		Capital Costs	
Car toll rate (\$/mile)	\$0.14 \$0.14	Construction Duration (in years)	3
Truck toll rate (\$/mile)	\$0.56 \$0.56	Roadway Capital Improvement Cost (\$)	\$600,000,000
Bill By Mail (BBM) Toll Rates		Indexation Base Year of Capital Improvement Costs	2017
Car toll rate (\$/mile)	\$0.21	Toll System Implementation Cost (\$/lane-mile)	\$422,000 \$422,000 Suggested:
Truck toll rate (\$/mile)	\$0.86	Indexation Base Year of Toll System Capital Cost	2018 2018
Annual rate increase (%)	2.0% 2.0%	Operating Costs	
Indexation Base Year	2018	Roadway Maintenance (\$/lane-mile)	\$25,000 \$25,000
		Bridge Maintenance (\$/ft*2)	\$0.05 \$0.05
		Indexation Base Year of Operating Costs	2018 2018
		Annual Inflation rate for Costs (%)	2.75% 2.75%
Notes:		Preliminary Financial Feasibility Assessment	
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4.4. Case Study #4 – Toll Road with Major Bridge Structure

Judy wants to evaluate the financial feasibility of a new 10-mile toll road project in North Carolina. After reading the User Guide, Judy downloaded and installed the Financial Feasibility Screening Tool into her computer’s hard drive and selected the Toll Roads worksheet. She collected basic project information from the agency’s database.

The toll road is anticipated to have two, tolled-travel lanes per direction and 0.5-miles of roadway will be on a major bridge structure. The toll road is planned to open in 2024. In collaboration with her colleagues, Judy extracted projected traffic from the travel demand model. Opening year AADT is estimated at 30,000 vehicles per day. In 2040, the travel demand model estimates 36,000 vehicles per day. The traffic demand modeler informed Judy that volume projections are toll-free volumes (i.e., do not account for toll diversion). Heavy trucks represent 6% of highway vehicles.

The new toll facility is expected to save drivers 25 minutes relative to the next-best alternative route. Judy decides to use the suggested values of time in the Tool since they match the P6.0 prioritization process.

Judy and her team of planners decide to use the suggested toll rates in the Tool because they are in-line with today’s national toll pricing rates for similar facilities. The toll rates for bill-by-mail transactions are automatically calculated. Toll rates are expressed in 2019 dollars and it is assumed that rates will increase by 2% every year.

In coordination with NCDOT, Judy gathers from a cost estimate developed in 2018 that this project will cost \$600 million (in constant dollars) and it will take approximately four years to complete. The cost estimate did not include Toll System Implementation (TSI) costs. Hence, Judy decides to use the suggested value of \$422,000 in 2018 dollars. She also decides to use the suggested values in the Tool for operating cost assumptions.

Figure 4-7 shows the Express Lanes worksheet of the Single-Run Version. Judy entered the information directly in the light-yellow cells of the Tool. Figure 4-8 shows the inputs in the Projects' Information worksheet of the Batch-Run Version. Figure 4-9 shows the Toll Roads worksheet of the Batch-Run Version populated with most of the information in the white color-coded cells. Judy still had to enter key information in the light-yellow cells.

Based on the inputs, net toll revenues will likely cover the costs to maintain and operate the facility and potentially a portion of the capital costs through a toll financing.

Figure 4-10. Single-Run Version – Toll Road with Major Bridge Structure

Toll Roads			
Project Information		Traffic Characteristics	
Project Identification Number	1234	Opening Year	2024 <input type="checkbox"/> <i>Check box only if projected traffic already account for toll diversion (i.e. Toll Demand)</i>
Corridor Name	Case Study #4	Opening Year AADT	30,000
Corridor Length (miles)	10	Design Year	2040
Total No. of lanes (both directions)	4	Design Year AADT	36,000
Length of roadway on bridge structure (miles)	0.5	Average Annual Growth Rate (AADT)	1.1%
Project Location (Enter County or counties)	Example	Truck Percentage	6%
		Average time savings compared to alternate route (minutes)	25
		Intermediate Access Point?	Yes
		Trip Length Percent	Medium - 75% Suggested:
		Value of Time (\$/hr) - Car	\$12.50 \$12.50
		Value of Time (\$/hr) - Truck	\$50.00 \$50.00
Toll Pricing		Costs	
Electronic Toll Collection (ETC) Rate	Suggested:	Capital Costs	
Car Toll Rate (\$/mile)	\$0.14 \$0.14	Construction Duration (in years)	4
Truck Toll Rate (\$/mile)	\$0.56 \$0.56	Roadway Capital Improvement Cost (\$)	\$600,000,000
Bill By Mail (BBM) Toll Rates		Indexation Base Year of Roadway Capital Improvement Costs	2018
Car Toll Rate (\$/mile)	\$0.21	Toll System Implementation Cost (\$/lane-mile)	\$422,000 \$422,000 Suggested:
Truck Toll Rate (\$/mile)	\$0.86	Indexation Base Year of Toll System Capital Cost	2018 2018
Annual Toll Rate Increase (%)	2.0% 2.0%	Operating Costs	
Indexation Base Year	2019	Roadway Maintenance (\$/lane-mile)	\$25,000 \$25,000
		Bridge Maintenance (\$/ft^2)	\$0.05 \$0.05
		Indexation Base Year of Operating Costs	2018 2018
		Annual Inflation Rate for Costs (%)	2.75% 2.75%
Notes:		Preliminary Financial Feasibility Assessment	
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**Figure 4-11. Batch-Run Version – Toll Road with Major Bridge Structure
Projects Information Worksheet**

Toll Roads

	1
Corridor Name>	Case Study #4
Physical Characteristics	
Project Identification Number	1234
Corridor Length (miles)	10
Total No. of lanes (both directions)	4
Length of roadway on bridge structure (miles)	0.5
Project Location (Enter county or counties)	Example
Traffic Characteristics	
Opening Year	2024
Opening Year AADT	30,000
Design Year	2040
Design Year AADT	36,000
Does Projected Traffic Already Account for Diversion (i.e., Toll Demand)?	No
Truck Percentage	6%
Average time savings compared to alternate route (minutes)	25
Intermediate Access Point?	Yes
Trip Length Percent	Medium - 75%
Costs	
Construction Duration (in years)	4
Roadway Capital Improvement Cost (\$)	\$600,000,000
Indexation Base Year of Capital Improvement Costs	2018

**Figure 4-12. Batch-Run Version – Toll Road with Major Bridge Structure
Toll Roads Worksheet**

Toll Roads			
Project Information		Traffic Characteristics	
Project Identification Number	1234	Opening Year	2024
Corridor Name	Case Study #4	Opening Year AADT	30,000
Corridor Length (miles)	10	Design Year	2040
Total No. of lanes (both directions)	4	Design Year AADT	36,000
Length of roadway on bridge structure (miles)	0.5	Average Annual Growth Rate (AADT)	1.1%
Project Location (Enter County or counties)	Example	Truck Percentage	6%
		Average time savings compared to alternate route (minutes)	25
		Intermediate Access Point?	Yes
		Trip Length Percent	Medium - 75% Suggested:
		Value of Time (\$/hr) - Car	\$12.50 \$12.50
		Value of Time (\$/hr) - Truck	\$50.00 \$50.00
Toll Pricing		Costs	
Electronic Toll Collection (ETC) Rates Suggested:		Capital Costs	
Car toll rate (\$/mile)	\$0.14 \$0.14	Construction Duration (in years)	4
Truck toll rate (\$/mile)	\$0.56 \$0.56	Roadway Capital Improvement Cost (\$)	\$600,000,000
Bill By Mail (BBM) Toll Rates		Indexation Base Year of Capital Improvement Costs	2018
Car toll rate (\$/mile)	\$0.21	Toll System Implementation Cost (\$/lane-mile)	\$422,000 \$422,000 Suggested:
Truck toll rate (\$/mile)	\$0.86	Indexation Base Year of Toll System Capital Cost	2018 2018
Annual rate increase (%)	2.0% 2.0%	Operating Costs	
Indexation Base Year	2018	Roadway Maintenance (\$/lane-mile)	\$25,000 \$25,000
		Bridge Maintenance (\$/ft^2)	\$0.05 \$0.05
		Indexation Base Year of Operating Costs	2018 2018
		Annual Inflation rate for Costs (%)	2.75% 2.75%
Notes:		Preliminary Financial Feasibility Assessment	
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