NEW ISSUE – BOOK ENTRY ONLY **Ratings: See "RATINGS" herein.**

This Official Statement has been prepared by the North Carolina Turnpike Authority to provide information on the Series 2019 Bonds. Selected information is presented on this cover page for the convenience of the user. Unless indicated, capitalized terms used on this cover page have the meanings given hereafter in this Official Statement. To make an informed decision regarding the Series 2019 Bonds, a prospective investor should read this Official Statement in its entirety.

$370,975,000
NORTH CAROLINA TURNPIKE AUTHORITY
Triangle Expressway System Senior Lien Turnpike Revenue Bonds, Series 2019

Dated: Date of Delivery **Due: as shown on inside of front cover**

Tax Treatment	In the opinion of Bond Counsel, under current law and subject to conditions described in the Section herein "TAX TREATMENT," interest on the Series 2019 Bonds (a) is not included in gross income for federal income tax purposes, (b) is not an item of tax preference, and (c) is exempt from all income taxes in the State of North Carolina. A holder may be subject to other federal tax consequences as described in the Section "TAX TREATMENT" herein.
Redemption	The Series 2019 Bonds are subject to optional and mandatory sinking fund redemption as described herein. See "THE SERIES 2019 BONDS – Redemption Provisions."
Purpose	The proceeds of the Series 2019 Bonds will be used to (a) pay certain costs of an extension of the existing Triangle Expressway System (as hereinafter defined) from its existing eastern termination point to intersect with I-40 known as Complete 540 – Phase 1, (b) provide funds to pay interest on certain Series 2019 Bonds, (c) pay the premium for a Bond Insurance Policy issued by the 2019 Bond Insurer, (d) pay the premium for the portion of the Reserve Alternative Instrument relating to the amount of the increase in the Senior Lien Parity Reserve Account Requirement resulting from the issuance of the Series 2019 Bonds and (e) pay certain costs incurred in connection with the issuance of the Series 2019 Bonds. See "PLAN OF FINANCE" for a description of other sources of funds to be used to pay for Complete 540 – Phase 1, including the Authority's 2019 State Appropriation Bonds and proceeds of the 2019 TIFIA Loan, both of which are expected to close on the same date as the Series 2019 Bonds.
Security	The Series 2019 Bonds will be special obligations of the Authority, secured by and payable from the Receipts (hereinafter defined) of the Triangle Expressway System described in this Official Statement and, under certain circumstances, proceeds of the Series 2019 Bonds, investment earnings and certain other available funds. *Neither the credit nor the taxing power of the State of North Carolina (the "State") or any of the State's political subdivisions is pledged for the payment of principal of or interest on the Series 2019 Bonds, and no Owner of the Series 2019 Bonds has the right to compel the exercise of the taxing power of the State or any of the State's political subdivisions or the forfeiture of any of their respective properties other than Receipts in connection with any default on the Series 2019 Bonds.* ACCELERATION IS NOT A REMEDY AVAILABLE TO OWNERS OF THE SERIES 2019 BONDS UPON DEFAULT. THE AUTHORITY HAS NO TAXING POWER.
Bond Insurance	The scheduled payment of principal of and interest on the Series 2019 Bonds maturing on January 1 in the years 2042, 2049 (initially bearing CUSIP No. 65830RCT4), and 2055 (initially bearing CUSIP No. 65830RCU1) when due will be guaranteed under an insurance policy to be issued concurrently with the delivery of the Series 2019 Bonds by Assured Guaranty Municipal Corp.
Interest Payment Dates	Interest on the Series 2019 Bonds will be paid on January 1 and July 1, commencing July 1, 2020. See "THE SERIES 2019 BONDS – Interest Rate Provisions of Series 2019 Bonds."
Denominations	$5,000 or any whole multiple thereof.
Closing/Settlement	On or about December 17, 2019
Bond Counsel	Hunton Andrews Kurth LLP, Charlotte, North Carolina
Underwriters' Counsel	McGuireWoods LLP, Raleigh, North Carolina
Trustee and Bond Registrar	Wells Fargo Bank, N.A., Philadelphia, Pennsylvania

The Series 2019 Bonds are offered, when, as and if issued and received by the Underwriters, subject to prior sale and the opinion of Bond Counsel as to their validity, the tax treatment of interest thereon and certain other matters.

J.P. Morgan

BofA Securities **Citigroup** **Loop Capital Markets**

Siebert Williams Shank & Co., LLC **Wells Fargo Securities**

The date of this Official Statement is November 21, 2019.

MATURITY SCHEDULE

$77,390,000 Series 2019 Serial Bonds

Due January 1	Principal Amount	Interest Rate	Yield	CUSIP***
2042*	$23,030,000	3.00%	3.04%	65830RCS6
2043	25,600,000	5.00	2.71**	65830RCN7
2044	28,760,000	5.00	2.72**	65830RCP2

$111,680,000 Series 2019 5.00% Term Bonds due January 1, 2049, Yield 2.77%** CUSIP 65830RCQ0***
$80,000,000 Series 2019 5.00% Term Bonds due January 1, 2049*, Yield 2.65%** CUSIP 65830RCT4***
$46,905,000 Series 2019 4.00% Term Bonds due January 1, 2055, Yield 3.11%** CUSIP 65830RCR8***
$55,000,000 Series 2019 4.00% Term Bonds due January 1, 2055*, Yield 2.97%** CUSIP 65830RCU1***

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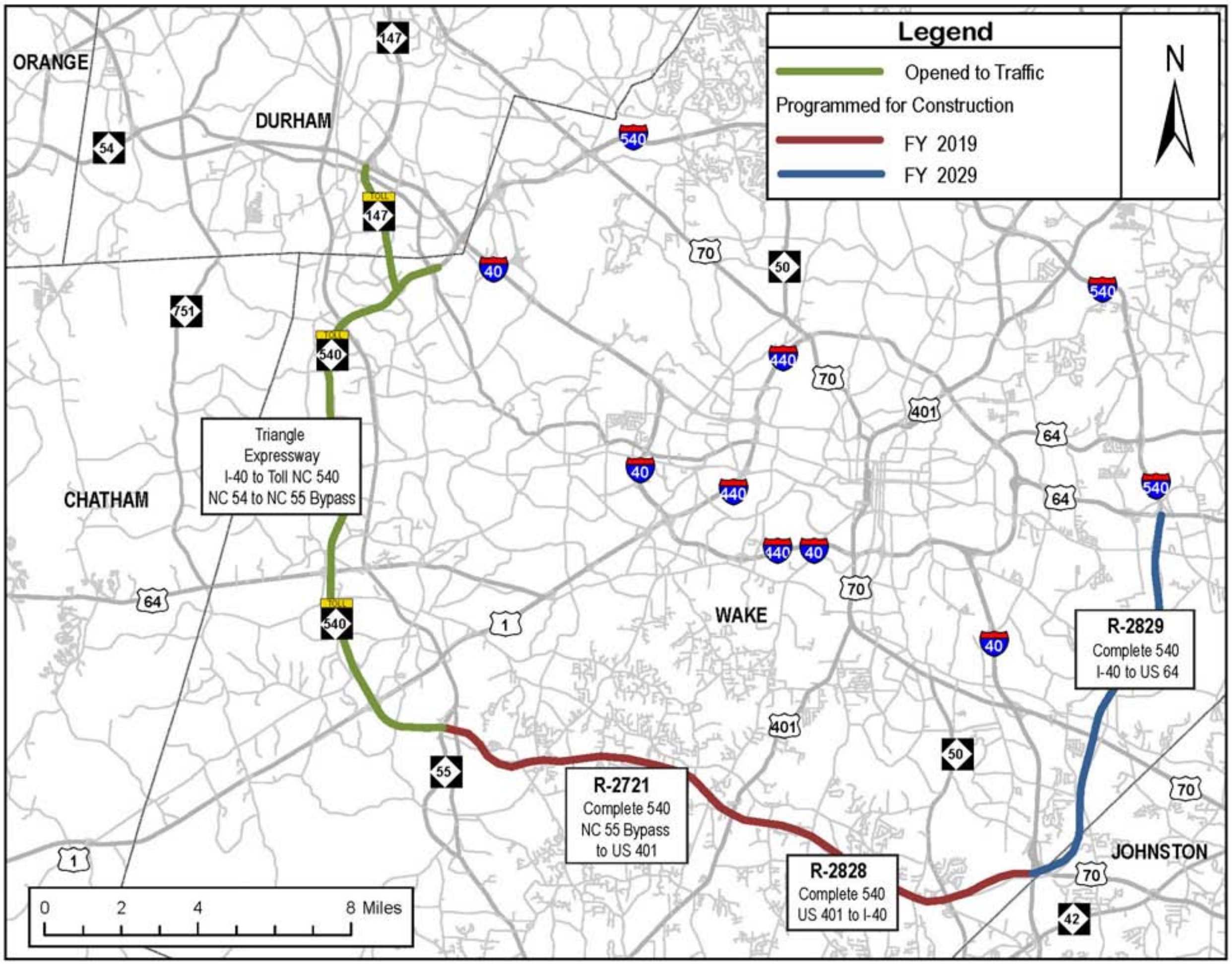
* Insured.

**Yield to January 1, 2030 optional call date at par.

*** CUSIP® is a registered trademark of the American Bankers Association. CUSIP Global Services is managed on behalf of the American Bankers Association by S&P Capital IQ. CUSIP data herein is provided by S&P Capital IQ, a division of McGraw-Hill Financial, Inc. The CUSIP data herein is provided solely for the convenience of reference only. Neither the Authority nor the Underwriters are responsible for selection or use of these CUSIP numbers, and no representation is made as to their correctness on the Series 2019 Bonds or as indicated above. The CUSIP number for a specific maturity is subject to being changed after the issuance of the Series 2019 Bonds as a result of various subsequent actions including, but not limited to, a refunding in whole or in part of the Series 2019 Bonds.

North Carolina Turnpike Authority Triangle Expressway System
(including Complete 540 – Phase 1 and Phase 2)



Existing Triangle Expressway System

Complete 540 – Phase 1 (STIP R-2721 (includes R-2721A and R-2721B)) and R-2828)

Complete 540 – Phase 2 (STIP R-2829)

NORTH CAROLINA TURNPIKE AUTHORITY

STATE OFFICIALS

Roy Cooper	Governor
MG(R) James H. Trogdon, III, P.E.	Secretary of NCDOT
Bobby Lewis, P.E.	Chief Operating Officer of NCDOT
Evan Rodewald	Chief Financial Officer of NCDOT
Tim Little, P.E.	Chief Engineer of NCDOT

AUTHORITY BOARD MEMBERS[1]

MG(R) James H. Trogdon, III, P.E.	Chairman
Perry R. Safran	Vice Chairman
Robert D. Teer, Jr.	Secretary/Treasurer
Scott Aman	Member
Jim Crawford	Member
Montell W. Irvin, P.E.	Member
Charles L. Travis, III	Member
James Walker	Member

AUTHORITY MANAGEMENT STAFF

James J. "J.J." Eden	Executive Director
Marvin T. Butler	Chief of Staff
David Roy	Director of Finance and Budget
Andy Lelewski, P.E.	Director of Program Development
Manish Chourey	Chief Technology Officer
Rodger Rochelle, P.E.	Chief Engineer
Dennis Jernigan, P.E.	Director of Highway Operations

MUNICIPAL ADVISOR

PFM Financial Advisors, LLC, Orlando, Florida

TRAFFIC & REVENUE CONSULTANT

CDM Smith Inc., East Hartford, Connecticut

GENERAL ENGINEERING CONSULTANT

HNTB Corporation, Raleigh, North Carolina

BOND COUNSEL

Hunton Andrews Kurth LLP, Charlotte, North Carolina

[1] There is currently one vacancy on the Board of Directors of the Authority.

IN CONNECTION WITH THIS OFFERING, THE UNDERWRITERS MAY OVERALLOT OR EFFECT TRANSACTIONS THAT STABILIZE OR MAINTAIN THE MARKET PRICE OF SERIES 2019 BONDS AT A LEVEL ABOVE THAT WHICH MIGHT OTHERWISE PREVAIL IN THE OPEN MARKET. SUCH STABILIZING, IF COMMENCED, MAY BE DISCONTINUED AT ANY TIME.

No dealer, broker, salesman or other person has been authorized to give any information or to make any representation other than those contained in this Official Statement in connection with the offering described herein, and, if given or made, such other information or representation must not be relied upon as having been authorized. This Official Statement does not constitute an offer to sell or the solicitation of an offer to buy any securities other than the Series 2019 Bonds offered hereby, nor shall there be any offer or solicitation of such offer or sale of the Series 2019 Bonds in any jurisdiction in which it is unlawful to make such offer, solicitation or sale. Neither the delivery of this Official Statement nor the sale of any of the Series 2019 Bonds implies that the information herein is correct as of any date subsequent to the date hereof.

Neither the Series 2019 Bonds nor the Trust Agreement have been registered or qualified with the Securities and Exchange Commission by reason of the provisions of Section 3(a)(2) of the Securities Act of 1933, as amended, or Section 304(a)(4) of the Trust Indenture Act of 1939, as amended. The registration or qualification of the Series 2019 Bonds and the Trust Agreement in accordance with applicable provisions of securities laws of the states, if any, in which the Series 2019 Bonds and the Trust Agreement have been registered or qualified, and the exemption from registration or qualification in other states, shall not be regarded as a recommendation thereof.

In making an investment decision, investors must rely on their own examination of the terms of the offering, including the merits and risks involved. These securities have not been recommended by any federal or state securities commission or regulatory authority. Furthermore, the foregoing authorities have not confirmed the accuracy or determined the adequacy of this document. Any representation to the contrary is a criminal offense.

All quotations from and summaries and explanations of laws and documents herein do not purport to be complete, and reference is made to such laws and documents for full and complete statements of their provisions. Any statements made in this Official Statement involving estimates or matters of opinion, whether or not expressly so stated, are intended merely as estimates or opinions and not as representations of fact. The information set forth herein has been obtained from the Authority and other sources that are deemed to be reliable, but is not guaranteed as to accuracy or completeness by, and is not to be construed as a representation of, the Underwriters. The information contained herein is subject to change after the date of this Official Statement, and this Official Statement speaks only as of the date hereof.

Certain statements contained in this Official Statement reflect forecasts and constitute forward-looking statements rather than historical facts. In this respect, the words “estimate,” “project,” “anticipate,” “expect,” “intend,” “believe” and similar expressions are intended to identify forward-looking statements. All such forward-looking statements are expressly qualified by the cautionary statements set forth in this Official Statement.

References to web site addresses presented herein are for informational purposes only and may be in the form of a hyperlink solely for the reader’s convenience. Unless specified otherwise, such web sites and the information or links contained therein are not incorporated into, and are not part of, this Official Statement.

The Underwriters have provided the following sentence for inclusion in this Official Statement. The Underwriters have reviewed the information in this Official Statement in accordance with, and as part of, their responsibilities to investors under the federal securities laws as applied to the facts and circumstances of this transaction, but the Underwriters do not guarantee the accuracy or completeness of such information.

Assured Guaranty Municipal Corp. (the “2019 Bond Insurer”) makes no representation regarding the Series 2019 Bonds or the advisability of investing in the Series 2019 Bonds. In addition, the 2019 Bond Insurer has not independently verified, makes no representation regarding, and does not accept any responsibility for the accuracy or completeness of this Official Statement or any information or disclosure contained herein, incorporated herein, or omitted herefrom, other than with respect to the accuracy of the information regarding the 2019 Bond Insurer supplied by the 2019 Bond Insurer and presented under the heading “BOND INSURANCE” and APPENDIX G – “Specimen Municipal Bond Insurance Policy.”

The Trustee has not reviewed or participated in the preparation of this Official Statement and assumes no responsibility for the contents, accuracy, fairness or completeness of the information given in this Official Statement or for the recitals contained in the Trust Agreement or for the validity, sufficiency, or legal effect of any of such documents. Furthermore, the Trustee has no oversight responsibility, and is not accountable, for the use or application by the Authority of the proceeds from the sale of the Series 2019 Bonds. The Trustee has no duty to, has not undertaken to evaluate, and has not evaluated, the risks, benefits, or propriety of any investment in the Series 2019 Bonds and makes no representation, and has reached no conclusions, regarding the investment quality of the Series 2019 Bonds, about all of which the Trustee expresses no opinion and expressly disclaims the expertise to evaluate.

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OFFICIAL STATEMENT

Concerning

NORTH CAROLINA TURNPIKE AUTHORITY
Triangle Expressway Senior Lien Turnpike Revenue Bonds, Series 2019

INTRODUCTION

The purpose of this Official Statement, which includes the appendices, is to provide certain information in connection with the issuance by the North Carolina Turnpike Authority (the "Authority") of its $370,975,000 Triangle Expressway System Senior Lien Turnpike Revenue Bonds, Series 2019 (the "Series 2019 Bonds"). The Series 2019 Bonds will be issued pursuant to applicable provisions of law, a bond order adopted by the Authority on October 31, 2019 (the "Bond Order"), an Amended and Restated Trust Agreement dated as of December 1, 2019 (the "Amended and Restated Trust Agreement"), which restates and compiles into a single document the Trust Agreement dated as of June 1, 2009 (the "Original Trust Agreement"), as supplemented by a First Supplemental Trust Agreement dated as of July 1, 2009 (the "First Supplemental Trust Agreement"), a Second Supplemental Trust Agreement dated as of March 1, 2017 (the "Second Supplemental Trust Agreement"), a Third Supplemental Trust Agreement dated as of December 1, 2018 (the "Third Supplemental Trust Agreement" and, together with the Original Trust Agreement, the First Supplemental Trust Agreement and the Second Supplemental Trust Agreement, the "Prior Trust Agreement"), between the Authority and Wells Fargo Bank, N.A., as trustee (the "Trustee"), and a Fourth Supplemental Trust Agreement dated as of December 1, 2019 (the "Fourth Supplemental Trust Agreement" and, together with the Amended and Restated Trust Agreement, the "Trust Agreement"), between the Authority and the Trustee.

This introduction provides certain limited information to serve as a guide to the Official Statement and is expressly qualified by the Official Statement as a whole. Investors should make a full review of the entire Official Statement and the documents summarized or described herein.

For the definition of certain terms used herein and a summary of certain provisions of the Trust Agreement, see APPENDIX A hereto. Capitalized terms used herein and not otherwise defined have the meanings given such terms in the Trust Agreement unless otherwise indicated.

Authorization. The Series 2019 Bonds are being issued pursuant to Article 6H of Chapter 136 of the North Carolina General Statutes (Tolls Roads and Bridges), as amended (the "Authority Act") and The State and Local Government Revenue Bond Act, Article 5 of Chapter 159 of the General Statutes of North Carolina, as amended (the "Revenue Bond Act"), the Bond Order and the Trust Agreement.

Security. The Series 2019 Bonds will be special obligations of the Authority, secured by and payable from the Receipts of the Triangle Expressway System and, under certain circumstances, proceeds of the Series 2019 Bonds, including investment earnings and certain other funds. The Series 2019 Bonds will be additionally secured by certain funds, accounts and subaccounts held by the Trustee under the Trust Agreement. See "PLAN OF FINANCE" and "SECURITY AND SOURCES OF PAYMENT FOR THE SERIES 2019 Bonds" herein.

Purpose and Plan of Finance. The Series 2019 Bonds are being issued for the purpose of providing funds, together with other available funds, to (a) pay a portion of the costs of land acquisition, design, construction and equipping of Complete 540 – Phase 1 (as hereinafter defined), (b) provide funds to pay interest on certain Series 2019 Bonds, (c) pay the premium for a Bond Insurance Policy issued by the 2019 Bond Insurer, (d) pay the premium for the portion of the Reserve Alternative Instrument relating to the amount of the increase in the Senior Lien Parity

Reserve Account Requirement resulting from the issuance of the Series 2019 Bonds and (e) pay certain costs incurred in connection with the issuance of the Series 2019 Bonds.

Under the Prior Trust Agreement, the Authority has previously issued its (a) $35,173,108.85 original principal amount Triangle Expressway System Senior Lien Turnpike Revenue Bonds, Series 2009B (the "2009B Bonds"), which are capital appreciation bonds, all of which remain outstanding, (b) $200,515,000 Triangle Expressway System Senior Lien Turnpike Revenue Refunding Bonds, Series 2017 (the "2017 Bonds"), of which $194,035,000 in principal amount is currently outstanding and (c) $401,155,000 Triangle Expressway System Senior Lien Turnpike Revenue Refunding Bonds, Series 2018 (the "2018 Bonds"), all of which remain outstanding. The proceeds of the 2017 Bonds were used to redeem certain maturities of the $234,910,000 Triangle Expressway System Senior Lien Turnpike Revenue Bonds, Series 2009A (the "2009A Bonds" and, together with the 2009B Bonds, the "2009 Bonds"), which are no longer outstanding. The proceeds of the 2018 Bonds were used to refund in advance of its maturity the Authority's Triangle Expressway Revenue Bond, TIFIA Series 2009 (the "TIFIA Series 2009 Bond"), which evidenced the Authority's obligation to repay a loan from the United States Department of Transportation, acting by and through the Executive Director of the Build America Bureau ("USDOT"), pursuant to a TIFIA Loan Agreement, dated as of July 1, 2009, between the Authority and USDOT (the "TIFIA Loan Agreement"), in an original principal amount not to exceed $386,662,363 (the "2009 TIFIA Loan"), pursuant to the Transportation Infrastructure Finance and Innovation Act of 1998 ("TIFIA"), to provide funds for the costs of the Triangle Expressway System.

The Initial Project. The proceeds of the 2009 Bonds were used to pay a portion of the costs of land acquisition, design, construction and equipping of the initial segment of the Triangle Expressway System, which currently consists of an approximately 18.8-mile toll road facility located in Durham and Wake Counties, North Carolina (the "Initial Project"). A portion of the costs of the Initial Project were also paid from the proceeds of State Appropriation Revenue Bonds (see "PLAN OF FINANCE – State Appropriated Revenues; 2019 State Appropriation Revenue Bonds") and the 2009 TIFIA Loan.

Complete 540 – Phase 1. The proceeds of the Series 2019 Bonds will be used to finance, in part, the costs of land acquisition, design, construction and equipping of the next phase of the Triangle Expressway System known as Complete 540 – Phase 1, consisting of the extension of the Triangle Expressway for approximately 17.8 miles from the NC 55 Bypass in Apex to I-40 ("Complete 540 - Phase 1," and together with the Initial Project, the "Triangle Expressway System"). Construction of Complete 540 – Phase 1 is planned to begin in late 2019, and it is expected to be substantially complete by July 1, 2023. Construction costs to date, including design and engineering costs, development costs, and right-of-way acquisition have been funded from funds provided by the North Carolina Department of Transportation ("NCDOT") as part of the State Transportation Improvement Program. Such costs are expected to be reimbursed from the proceeds of the Series 2019 Bonds or other sources described herein.

The Authority intends to issue its $115,979,250 Triangle Expressway System Appropriation Revenue Bonds, Series 2019 (Capital Appreciation Bonds) (the "2019 State Appropriation Bonds"), the proceeds of which will be used to (a) pay a portion of the costs of Complete 540 – Phase 1 and (b) pay costs of issuance of the 2019 State Appropriation Revenue Bonds. The 2019 State Appropriation Bonds are payable solely from State Appropriated Revenues (as described herein) and are not secured by Revenues or Receipts of the Triangle Expressway System under the Trust Agreement. See "PLAN OF FINANCE – State Appropriated Revenues; 2019 State Appropriation Revenue Bonds"

A portion of the costs of Complete 540 – Phase 1 will be paid from the proceeds of a subordinated loan under TIFIA in an estimated amount of $499,461,981 (the "2019 TIFIA Loan") to be made by USDOT to the Authority pursuant to a TIFIA Loan Agreement, expected to be dated as of December 17, 2019, between the Authority and USDOT (the "2019 TIFIA Loan Agreement"). The Authority expects to close on the 2019 TIFIA Loan Agreement on the closing date for the Series 2019 Bonds (the "Closing Date"), and closing of the 2019 TIFIA

Loan is a condition to closing of the Series 2019 Bonds. The Authority's obligations under the 2019 TIFIA Loan Agreement will be evidenced by its subordinate Triangle Expressway Revenue Bond, TIFIA Series 2019 (the "TIFIA Series 2019 Bond"), which will be issued under the Fourth Supplemental Trust Agreement. See "PLAN OF FINANCE - 2019 TIFIA Loan."

The remaining costs of Complete 540 – Phase 1 are expected to be paid from contributions from the General Reserve Fund and from one or more issues of State of North Carolina Grant Anticipation Revenue Vehicle Bonds ("GARVEE Bonds") and State matching funds. The GARVEE Bonds are currently expected to be issued in Fiscal Year 2022. Funds from the NCDOT National Highway Performance Program in an amount of up to $81,000,000 are also available for Complete 540 – Phase 1, although at this time the Authority does not anticipate that such funds will be needed ("NCDOT NHPP Funds"). In addition, under the NCDOT Renewal and Replacement Guaranty, NCDOT has agreed to provide additional funding to provide for the completion of Complete 540 – Phase 1 in the event that the funds referred to above are not sufficient for such purpose. See "PLAN OF FINANCE - NCDOT Renewal and Replacement Guaranty."

<u>The Authority and the Triangle Expressway System</u>. See "THE AUTHORITY" herein for certain information regarding the Authority and "THE TRIANGLE EXPRESSWAY SYSTEM" herein for particular information regarding the Triangle Expressway System. The Initial Project portion of the Triangle Expressway System financed in part originally with the proceeds of the Series 2009 Bonds has been completed and is operating. See "PLAN OF FINANCE" and "THE TRIANGLE EXPRESSWAY SYSTEM – General." Complete 540 - Phase 1 consists of three separate projects in the NCDOT State Transportation Improvement Program ("STIP") identified as R-2828, R-2721A and R-2721B. The Authority and NCDOT have entered into separate design-build agreements for the design and construction of each separate project identified in the STIP. See "THE TRIANGLE EXPRESSWAY SYSTEM – Construction of Complete 540 – Phase 1" for a discussion of each contractual arrangement and a description of each contract. The final phase of the Triangle Expressway System consists of the remaining 10.8 miles from I-40 to the US 64/US 264 Bypass and is identified in the STIP as R-2829 ("Complete 540 – Phase 2"). The Authority expects to commence construction of Complete 540 – Phase 2 in 2029.

<u>Consultants Reports</u>. CDM Smith Inc. (the "Traffic Consultant") has prepared the comprehensive traffic and revenue study attached hereto as APPENDIX B, which forecasts the estimated traffic and toll revenue for the Triangle Expressway System, including Complete 540 – Phase 1. HNTB Corporation, the General Engineering Consultant (the "GEC") has prepared the GEC's Report attached hereto as APPENDIX C, which, among other things, describes the location, construction cost estimates, construction schedule and operation and maintenance expense cost estimates for Complete 540 – Phase 1.

<u>Details of Bonds</u>. The Series 2019 Bonds will be dated the date of delivery thereof. Interest on the Series 2019 Bonds will be payable on January 1 and July 1, beginning July 1, 2020, at the rates shown on the inside front cover. See "THE SERIES 2019 BONDS." Principal of the Series 2019 Bonds will be payable, subject to prior redemption as described herein, on January 1 in the years and amounts shown on the inside front cover.

The Series 2019 Bonds will be issued as fully registered bonds in book-entry-only form, without physical delivery of bond certificates to the beneficial owners of the Series 2019 Bonds. The Bond Registrar will make payment of principal of and interest on the Series 2019 Bonds to The Depository Trust Company, New York, New York ("DTC"), which will in turn remit such payment to its participants for subsequent distribution to the beneficial owners of the Series 2019 Bonds. Individual purchases of the Series 2019 Bonds by the beneficial owners will be made in denominations of $5,000 or whole multiples thereof. See APPENDIX F hereto for more information regarding DTC and the book-entry-only system.

The scheduled payment of principal of and interest on the Series 2019 Bonds maturing on January 1 in the years 2042, 2049 (initially bearing CUSIP No. 65830RCT4), and 2055 (initially bearing CUSIP No. 65830RCU1) (collectively, the "Insured Series 2019 Bonds") when due will be guaranteed under an insurance policy to be issued concurrently with the delivery of the Series 2019 Bonds by the 2019 Bond Insurer. In addition, the 2019 Bond Insurer will provide the Series 2019 Debt Service Reserve Policy in lieu of a cash deposit for the Senior Lien Parity Reserve Account. See "BOND INSURANCE."

Tax Status. See "TAX TREATMENT" herein.

Professionals. The Underwriters set forth on the cover page of this Official Statement (the "Underwriters") are underwriting the Series 2019 Bonds. Hunton Andrews Kurth LLP, Charlotte, North Carolina, is serving as Bond Counsel. McGuireWoods LLP, Raleigh, North Carolina, is serving as counsel to the Underwriters. Ebony Pittman, Esq., an Assistant Attorney General for the State, is serving as counsel to the Authority. Wells Fargo Bank, N.A., Philadelphia, Pennsylvania, is serving as the Trustee and Bond Registrar. PFM Financial Advisors, LLC, Orlando, Florida, is acting as municipal advisor to the Authority in connection with the issuance of the Series 2019 Bonds.

THE AUTHORITY

The Authority is a body politic and corporate and a public agency of the State of North Carolina (the "State") created pursuant to the Authority Act and exists within the North Carolina Department of Transportation ("NCDOT"). The Authority is authorized to design, establish, purchase, construct, operate, and maintain no more than eleven projects, including the Triangle Expressway System.

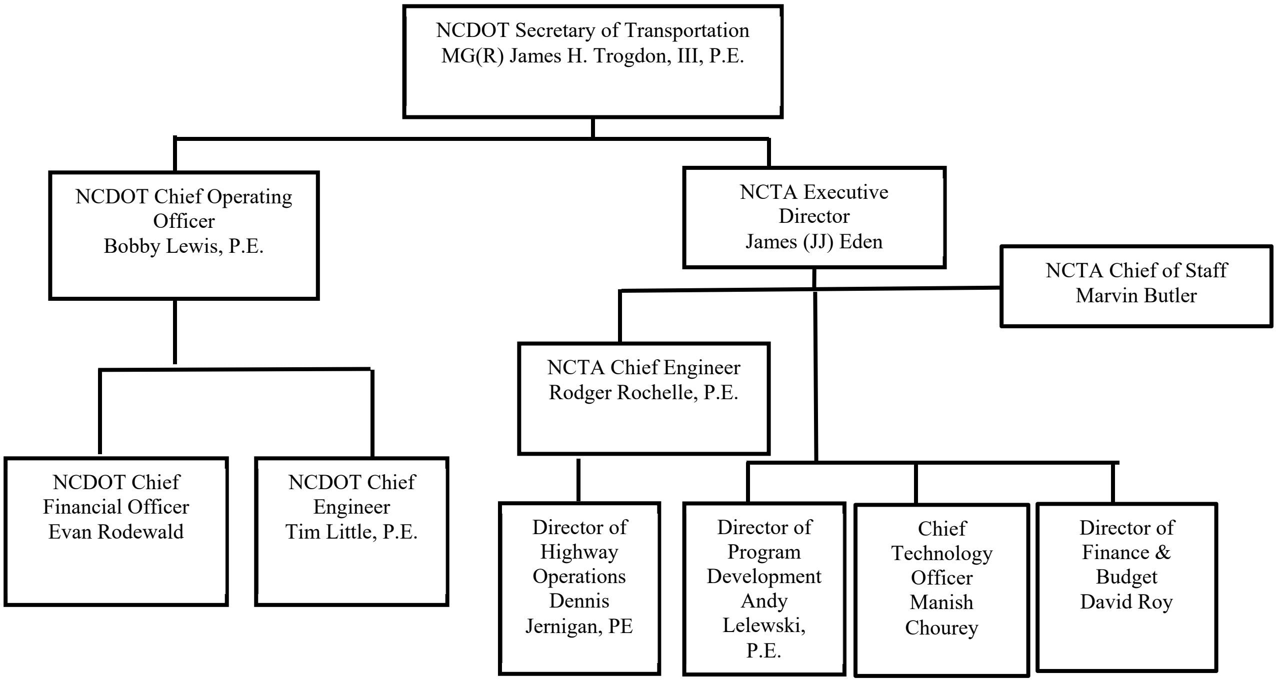
The Authority is governed by a nine-member Authority Board, consisting of four members appointed by the General Assembly of North Carolina (two members appointed by the President Pro-Tempore of the Senate and two members appointed by the Speaker of the House of Representatives), four members appointed by the Governor of the State, and the North Carolina Secretary of Transportation. The Chair of the Authority is selected by the Authority Board. Currently, MG(R) James H. Trogdon, III, P.E., the North Carolina Secretary of Transportation, serves as the Chairman of the Authority Board.

The following is a list of the current members of the Authority Board, their occupations and the expiration of their terms of office. There is currently one vacancy on the Authority Board.

Name	Occupation	Term Expires
MG(R) James H. Trogdon, III, P.E., Chairman	Secretary, NCDOT	Ex-Officio
Perry R. Safran, Vice Chairman	Attorney, Safran Law Offices	2021
Robert D. Teer, Jr., Secretary/Treasurer	President, Teer Associates	2019*
Scott Aman	President, New Dixie Oil Corporation	2021
Jim Crawford	Former Member, North Carolina General Assembly	2019*
Montell W. Irvin, P.E.	President and CEO, Ramey Kemp & Associates, Inc.	2019*
Charles L. Travis, III	President, Housing Studio, PA and Former Mayor, Town of Cornelius	2023
James Walker	Attorney/Mediator	2023

* Under the Act, all members of the Authority Board remain in office until their successors are appointed and qualified.

The Authority is part of NCDOT, and the executive leadership of both the Authority and NCDOT are involved in all Authority projects. The following organizational chart demonstrates the integration of various functions of NCDOT and the Authority.



The following are the current members of senior management of NCDOT and the Authority and summaries of their professional experience.

MG(R) James H. Trogdon, III, P.E., Secretary, NCDOT. Major General James H. "Jim" Trogdon, III was named as Secretary to NCDOT by Governor Roy Cooper on January 3, 2017. Prior to assuming this role, Mr. Trogdon served as the National Transportation Director for SAS Institute. Mr. Trogdon previously worked at NCDOT for more than 20 years, serving most recently as its Chief Operating Officer from 2009 until his retirement in 2013. Mr. Trogdon holds the rank of Major General (Ret) in the Army National Guard, and retired in 2016 as the Deputy Adjutant General for the North Carolina National Guard. He earned his Masters of Strategic Studies degree from the U.S. Army War College in Carlisle, Pennsylvania, and he earned his bachelor's degree and master's degree in civil engineering from North Carolina State University in Raleigh, North Carolina. He is a licensed professional engineer in North Carolina.

James J. "J.J." Eden, Executive Director of the Authority. James J. "J.J." Eden is the executive director of the Authority and is responsible for developing and implementing its strategic vision to address the combined effects of rapid growth, increasing congestion and funding challenges. Prior to serving as executive director of the Authority, Mr. Eden served as vice president and director of the National Tolling & Managed Lanes Division at AECOM. He also serves as president and chief executive officer of the nonprofit Alliance for Toll Interoperability. His previous experience also includes serving as the Authority's chief operating officer from 2006 to 2010, and as a founder of the Interagency Group, better known as the E-ZPass system. Mr. Eden began his career as assistant chief engineer at the Pennsylvania Turnpike Commission, where he designed multiple-award winning facilities and construction and maintenance procedures. He is an honorary member of the International Bridge, Tunnel & Turnpike Association.

Bobby Lewis, P.E., Chief Operating Officer, NCDOT. Bobby Lewis oversees the high-level operations of the Information Technology, Division of Highways, Planning and Programming, Fiscal, and Legislative and Government Affairs divisions within the NCDOT. Before returning to NCDOT as its Chief Operating Officer in February 2017, Mr. Lewis served as the office executive for Michael Baker International's operations in Cary, Asheville, Greensboro and Charlotte. Mr. Lewis began his career in the NCDOT Division of Highways and served in a number of roles at NCDOT, including county maintenance engineer, district engineer, division maintenance engineer, division engineer and Chief of Staff. Mr. Lewis earned a bachelor's degree from North Carolina State University, and is a licensed professional engineer in North Carolina.

Evan Rodewald, Chief Financial Officer, NCDOT. Evan Rodewald is responsible for overseeing NCDOT's financial operations, including accounting operations, cash management, purchasing and support services. Before joining NCDOT, Mr. Rodewald spent more than two decades working in various capacities in the North Carolina General Assembly Fiscal Research Division. Mr. Rodewald earned a bachelor's degree from The University of the South, a Master of Business Administration from Duke University's Fuqua School of Business and a Master of Public Policy from Duke University's Sanford School of Public Policy.

Tim Little, P.E., Chief Engineer, NCDOT. Tim Little has served as the Chief Engineer of NCDOT since September 2017. As such, Mr. Little oversees and directs the engineering and program activities of all 14 Transportation Divisions. Mr. Little has worked at NCDOT for more than 25 years, during which time he has held various positions, including county maintenance engineer, district engineer, division operations engineer and division engineer. Mr. Little is a graduate of North Carolina State University and is a licensed professional engineer in North Carolina.

Marvin T. Butler, Chief of Staff of the Authority. Marvin Butler is responsible for oversight of administrative support services including managerial staff, vendors and consultants. Prior to joining the Authority in 2014, Mr. Butler served 22 years in various roles with NCDOT, including Human Resources recruiter for the Transportation Engineer Associate Program, as well as Administrator of the Federal Highway Administration's Workforce Development Program across the state. Mr. Butler received his degree from the University of North Carolina at Pembroke.

Rodger Rochelle, P.E., Chief Engineer of the Authority. Rodger Rochelle serves as the Authority's Chief Engineer. Prior to this role, Mr. Rochelle served as the Director of NCDOT Technical Services. Mr. Rochelle has 28 years of experience with NCDOT including Director of Transportation Program Management, various roles within the Structure Design Unit, administrator of the NCDOT Research and Development Program, and the Director of the Alternative Delivery Unit. Mr. Rochelle holds a Bachelor's Degree in Civil Engineering and a Master's Degree in Engineering, both from Duke University, and is a licensed Professional Engineer and a Certified Public Manager.

David Roy, Director of Finance and Budget of the Authority. David Roy serves as the Authority's Director of Finance and Budget. Since joining the Authority in 2013, Mr. Roy has been responsible for all aspects of financial analysis, planning, and reporting for turnpike projects. Prior to joining the Authority, Mr. Roy spent seven years in investment banking with Credit Suisse, serving in various fixed income and valuation risk capacities. Mr. Roy is a native of Raleigh, North Carolina and received his undergraduate degree in Business Administration, with a second major in Economics, from The University of North Carolina at Chapel Hill. He later received his MBA from the University of Chicago, Booth School of Business.

Andy Lelewski, P.E., Director of Program Development of the Authority. Andy Lelewski serves as the Authority's Director of Program Development. He is a registered professional engineer in North Carolina. Prior to his work at the Authority, Mr. Lelewski worked for the national consulting firm PBS&J, now Atkins, a member of the SNC Lavalin Group, for 11 years. In 2007, he began working with the Authority as a consultant project manager for toll technology and operations activities and joined the Authority in 2009. He is responsible for the planning, design, implementation, and operation of the toll collection systems and operation services for all Authority projects. Mr. Lelewski is a graduate of the University of Pittsburgh, School of Engineering.

Manish Chourey, Chief Technology Officer of the Authority. Manish Chourey serves as the Authority's Chief Technology Officer. Prior to joining the Authority, he was a Senior Director of System Development at Conduent. Mr. Chourey has more than 25 years of experience in all phases of software development and technical solutions for tolling projects. He has Bachelor's Degrees in Physics and Applied Technology and Computer Science from the University of Mumbai, and has a Masters in Technology Management from the University of Maryland Global Campus.

Dennis Jernigan, P.E., Director of Highway Operations of the Authority. Dennis Jernigan serves as the Authority's Director of Highway Operations. Prior to his role, Mr. Jernigan served as the NCDOT Division 5 Construction Engineer. Mr. Jernigan has over 28 years of experience with NCDOT, including Roadway Construction Engineer for the Central Construction Unit, Division 4 Resident Engineer, and Assistant Resident Engineer in Divisions 6 and 8. Mr. Jernigan holds a Bachelor's Degree in Civil Engineering from North Carolina State University, and is a licensed Professional Engineer and a Certified Public Manager.

The Authority Act authorizes the Authority to issue bonds pursuant to the Revenue Bond Act to finance the cost of the turnpike projects it undertakes, and to fix, revise, charge and collect tolls and fees for the use of the turnpike projects. The Triangle Expressway System was the first toll project financed by the Authority. In addition to the Triangle Expressway System, the Authority has completed the Monroe Expressway, an approximately 19.8-mile controlled access roadway including 18.1 miles of toll road in Mecklenburg and Union Counties, North Carolina (the "Monroe Expressway"), and is proceeding with plans for financing and constructing several additional toll road projects in the State. These projects consist of a network of express lanes along I-77, I-485 and US 74 in the Charlotte area, and the Mid-Currituck Bridge to connect the North Carolina Outer Banks to the mainland. **None of these other projects are or will be cross-collateralized with the Triangle Expressway System**.

THE SERIES 2019 BONDS

Authorization

The issuance of the Series 2019 Bonds received the required approval of the North Carolina Local Government Commission (the "LGC") on November 5, 2019. The LGC is a division of the State Treasurer's office charged with general oversight of local government finance in North Carolina, as well as certain matters of finance by selected State agencies. Its approval is required for the issuance of the Series 2019 Bonds by the Authority. In determining whether to allow bonds to be issued under the Revenue Bond Act, the LGC has been given wide statutory discretion to consider the need for and feasibility of the projects to be financed, the issuing unit's capability to repay the amount financed from the pledged revenue sources and the issuer's general compliance with State budget and finance laws. Under the Revenue Bond Act, the LGC is also responsible, with the Authority's approval, for selling bonds issued pursuant to the Revenue Bond Act. If the Chairman, the Secretary, or any designated assistant of the LGC determines that an event or circumstance has occurred or information has become known prior to sale of the Series 2019 Bonds, or the Secretary of the LGC determines that an event or circumstance has occurred or information has become known prior to the closing of the Series 2019 Bonds, that, in his or her judgment, makes such findings and determinations by the LGC no longer accurate, the matter could be referred back to the LGC for further consideration of its approval in light of such event, circumstance or information.

General

The Series 2019 Bonds will be dated the date of delivery thereof and will bear interest from their date as described below. The Series 2019 Bonds will mature, subject to prior redemption as described below, on January 1 in the years and amounts shown on the inside front cover. The Series 2019 Bonds will be issued as fully registered bonds and will be subject to the provisions of the book-entry-only system described below. Individual purchases of the Series 2019 Bonds by the beneficial owners will be made in denominations of $5,000 or whole multiples thereof.

Interest Rate Provisions of Series 2019 Bonds

Interest on the Series 2019 Bonds will be payable on each January 1 and July 1, beginning July 1, 2020, at the rates shown on the inside front cover page hereof.

Redemption Provisions

Optional Redemption. The Series 2019 Bonds are subject to redemption prior to their respective maturities, at the option of the Authority, either in whole or in part on any date on or after January 1, 2030, at a redemption price equal to 100% of the principal amount of Series 2019 Bonds to be redeemed, plus accrued interest to the redemption date.

Sinking Fund Redemption. The Series 2019 Bonds maturing on January 1, 2049, with a yield of 2.77%, are subject to mandatory sinking fund redemption, at a redemption price equal to the principal amount to be redeemed plus accrued interest, if any, to the redemption date, without premium, on January 1 in the years and amounts as follows:

Year	Amount
2045	$18,725,000
2046	20,575,000
2047	22,300,000
2048	24,090,000
2049*	25,990,000

* Maturity.

The Series 2019 Bonds maturing on January 1, 2049, with a yield of 2.65%, are subject to mandatory sinking fund redemption, at a redemption price equal to the principal amount to be redeemed plus accrued interest, if any, to the redemption date, without premium, on January 1 in the years and amounts as follows:

Year	Amount
2045	$13,380,000
2046	14,725,000
2047	15,970,000
2048	17,270,000
2049*	18,655,000

* Maturity.

The Series 2019 Bonds maturing on January 1, 2055, with a yield of 3.11%, are subject to mandatory sinking fund redemption, at a redemption price equal to the principal amount to be redeemed plus accrued interest, if any, to the redemption date, without premium, on January 1 in the years and amounts as follows:

Year	Amount
2050	$6,780,000
2051	7,175,000
2052	7,590,000
2053	8,015,000
2054	8,445,000
2055*	8,900,000

* Maturity.

The Series 2019 Bonds maturing on January 1, 2055, with a yield of 2.97%, are subject to mandatory sinking fund redemption, at a redemption price equal to the principal amount to be redeemed plus accrued interest, if any, to the redemption date, without premium, on January 1 in the years and amounts as follows:

Year	Amount
2050	$7,470,000
2051	8,100,000
2052	8,770,000
2053	9,470,000
2054	10,200,000
2055*	10,990,000

* Maturity.

Additional Redemptions. The Series 2019 Bonds are also subject to redemption from Net Insurance Proceeds or Net Eminent Domain Proceeds received by the Authority in certain circumstances. In addition, so long as there is TIFIA Indebtedness Outstanding, in the event that the Authority has failed to comply with the Rate Coverage Test set forth in the 2019 TIFIA Loan Agreement for thirty (30) consecutive months, the Authority is required to optionally redeem, purchase and cancel or defease the Senior Lien Indebtedness (including the Series 2019 Bonds) and the TIFIA Series 2019 Bond on a pro rata basis (based on the amount of the TIFIA Indebtedness and Senior Lien Indebtedness Outstanding) in amounts sufficient to allow the Authority to be in compliance with such Rate Coverage Test. See "SECURITY AND SOURCES OF PAYMENT FOR THE SERIES 2019 BONDS—Application of Receipts."

Redemption Provisions. At least 30 days, but not more than 60 days, prior to the redemption date of any Series 2019 Bonds to be redeemed, whether such redemption be in whole or in part, the Bond Registrar will cause a notice of redemption to be mailed first-class, postage prepaid, to all Owners of Series 2019 Bonds to be redeemed in whole or in part; provided, however, that notices to any Securities Depository will be sent by registered or certified mail or by other electronic means as may be required by the operational procedures of such Securities Depository. Failure to mail any such notice to any Owner or any defect in such notice will not affect the validity of the proceedings for such redemption as to the Series 2019 Bonds of any other Owner to whom such notice is properly given.

The Series 2019 Bonds shall be redeemed only in whole multiples of $5,000 principal amount. If less than all of the Series 2019 Bonds are called for redemption, the maturities or portions of maturities of Series 2019 Bonds to be redeemed will be as set forth in an Officer's Certificate of the Authority filed with the Trustee. If less than all the Series 2019 Bonds of any one maturity are called for redemption, and the Series 2019 Bonds are not held in book-entry only form, the Bond Registrar will effect the redemption of the Series 2019 Bonds of such maturity on a pro-rata basis among registered owners, subject to $5,000 minimum denomination requirements, using such method as the Trustee deems fair and appropriate. If the Series 2019 Bonds are held in book-entry only form, and less than all of the Series 2019 Bonds of any one maturity are to be called for redemption, the particular Series 2019 Bonds or portions thereof to be redeemed will be selected by lot in accordance with the procedures of the Securities Depository. If a portion of a Series 2019 Bond is called for redemption, a new Series 2019 Bond of the same Series and maturity, in principal amount equal to the unredeemed portion thereof, will be issued to the Owner upon surrender thereof.

Upon giving notice and depositing funds or securities with the Trustee or the Bond Registrar as provided in the Trust Agreement, the Series 2019 Bonds or portions thereof so called for redemption shall become due and payable on the redemption date, and interest on such Series 2019 Bonds or portions thereof shall cease to accrue from and after such date.

Any notice of optional redemption may state that the redemption to be effected is conditioned upon the receipt by the Trustee or Bond Registrar on or prior to the redemption date of moneys sufficient to pay the principal of and premium, if any, and interest on the Series 2019 Bonds to be redeemed and that if such moneys are not so received such notice shall be of no force or effect and such Series 2019 Bonds shall not be required to be redeemed. In the event that such notice contains such a condition and moneys sufficient to pay the principal of and interest on such Series 2019 Bonds are not received by the Trustee or Bond Registrar on or prior to the redemption date, the redemption will not be made and the Bond Registrar will within a reasonable time thereafter give notice, in the manner in which the notice of redemption was given, that such moneys were not so received.

Book-Entry-Only

The Series 2019 Bonds will be issued as fully registered bonds in book-entry-only form without physical delivery of bonds to the beneficial owners of the Series 2019 Bonds. The Trustee will make payments of principal of and interest on the Series 2019 Bonds to DTC, which will in turn remit such payments to DTC participants for subsequent distribution to the beneficial owners of the Series 2019 Bonds. See APPENDIX F hereto for more information regarding DTC and the book-entry-only system.

PLAN OF FINANCE

Pursuant to the Trust Agreement, the proceeds of the Series 2019 Bonds will be applied to (a) pay a portion of the costs of land acquisition, design, construction and equipping of the next phase of the Triangle Expressway System known as Complete 540 – Phase 1, consisting of the extension of the Triangle Expressway for approximately 17.8 miles from the NC 55 Bypass in Apex to I-40, (b) provide funds to pay interest on certain Series 2019 Bonds, (c) pay the premium for the Bond Insurance Policy issued by the 2019 Bond Insurer with respect to certain maturities of the Series 2019 Bonds, (d) pay the premium for the portion of the Reserve Alternative Instrument relating to the amount of the increase in the Senior Lien Parity Reserve Account Requirement resulting from the issuance of the Series 2019 Bonds, and (e) pay certain costs incurred in connection with the issuance of the Series 2019 Bonds.

2009B Bonds

The Authority issued the 2009B Bonds on July 29, 2009, in the principal amount of $35,173,108.85 as Capital Appreciation Bonds maturing January 1, 2030 through January 1, 2038, in order to provide a portion of the financing for the Triangle Expressway System. The 2009B Bonds remain outstanding under the Trust Agreement, and are secured on parity with the Series 2019 Bonds. The scheduled payment of principal of and interest on the 2009B Bonds when due is guaranteed under an insurance policy issued by Assured Guaranty Corp. ("AGC").

2017 Bonds

The Authority issued the 2017 Bonds on March 30, 2017, to refund in advance of their maturities the 2009A Bonds maturing on and after January 1, 2020. $194,035,000 in principal amount of the 2017 Bonds remains outstanding under the Trust Agreement. The outstanding 2017 Bonds are secured on parity with the Series 2019 Bonds. The scheduled payment of principal of and interest on certain maturities of the 2017 Bonds when due is guaranteed under an insurance policy issued by Assured Guaranty Municipal Corp. ("AGM").

2018 Bonds

The Authority issued the 2018 Bonds on December 12, 2018, to refund in advance of its maturity the Authority's TIFIA Series 2009 Bond, which evidenced the Authority's obligation to repay the 2009 TIFIA Loan to USDOT. All of the 2018 Bonds remain outstanding under the Trust Agreement. The 2018 Bonds are secured on parity with the Series 2019 Bonds. The scheduled payment of principal of and interest on certain maturities of the 2018 Bonds when due is guaranteed under an insurance policy issued by AGM.

2019 TIFIA Loan

The Authority will enter into the 2019 TIFIA Loan Agreement with USDOT, pursuant to which the Authority will borrow an estimated amount of $499,461,981 under the 2019 TIFIA Loan. Interest on the TIFIA Loan will compound semi-annually, and will be fully capitalized until July 1, 2025. Proceeds of the 2019 TIFIA Loan, when drawn upon, are expected to be used to finance a significant portion of the costs of Complete 540 – Phase 1. The 2019 TIFIA Loan will be evidenced by the TIFIA Series 2019 Bond, which will be issued under the Fourth Supplemental Trust Agreement.

The unpaid balance of the 2019 TIFIA Loan bears interest at an interest rate determined on the date of closing of the 2019 TIFIA Loan, which is expected to occur on the Closing Date. Funds under the 2019 TIFIA Loan Agreement are disbursed upon presentation by the Authority of a request for disbursement in accordance with the provisions of the 2019 TIFIA Loan Agreement. The Authority's obligation to make the loan repayments required under the 2019 TIFIA Loan Agreement will be evidenced by the TIFIA Series 2019 Bond, and will secured by a pledge under the Trust Agreement of the Trust Estate. The pledge of the Trust Estate to secure the 2019 TIFIA Loan repayments will be generally subordinate to the payment of Senior Lien Indebtedness, including the Series 2019 Bonds. However, if obligations are owed to USDOT under the 2019 TIFIA Loan Agreement, upon the occurrence of a Bankruptcy Related Event under the Trust Agreement with respect to the Authority, the obligations of the Authority to USDOT under the 2019 TIFIA Loan Agreement will become Senior Lien Indebtedness, secured on a parity with other Senior Lien Indebtedness (including the Series 2019 Bonds), except that USDOT will not be entitled to be paid from amounts on deposit in the Senior Lien Reserve Fund. See "SECURITY AND SOURCES OF PAYMENT FOR THE SERIES 2019 BONDS – TIFIA Indebtedness Upon Occurrence of Bankruptcy Related Event."

In the event that the Authority determines that it would achieve interest savings, the Authority may issue its Triangle Expressway System Turnpike Revenue Bond Anticipation Notes ("TIFIA BANs"), which would be issued in anticipation of the final disbursement of proceeds the 2019 TIFIA Loan. TIFIA BANs would be issued pursuant to a Supplemental Trust Agreement and could be either on parity with the Series 2019 Bonds or Subordinate Lien Indebtedness.

State Appropriated Revenues; 2019 State Appropriation Bonds

Pursuant to Section 136-176(b2) of the North Carolina General Statutes, the General Assembly of North Carolina has provided for a continuing annual appropriation of $25,000,000 to the Authority from the Highway Trust Fund to finance the Triangle Expressway System. Pursuant to the legislation, amounts so appropriated may be used by the Authority to pay debt service or related financing costs and expenses on revenue bonds or notes issued by the Authority to finance costs of the Triangle Expressway System or to fund debt service reserves, operating reserves, and similar reserves in connection therewith. This State appropriation for the Triangle Expressway System is defined in the Trust Agreement and herein as the "State Appropriated Revenues." The annual appropriation does not constitute a pledge of the faith and credit and taxing power of the State, and nothing prohibits the General Assembly from amending the annual appropriation to decrease or eliminate the amount annually appropriated to the Authority.

The Authority previously entered into a separate Trust Agreement, dated as of July 1, 2009 (the "Original State Appropriation Revenue Bond Trust Agreement"), pursuant to which the Authority issued its Triangle Expressway System State Appropriation Revenue Bonds, Series 2009B (Federally Taxable – Issuer Subsidy – Build America Bonds) in the original principal amount of $352,675,000 (the "2009 State Appropriation Bonds"), of which $20,210,000 remains outstanding. On May 10, 2018, pursuant to the Original State Appropriation Revenue Bond Trust Agreement, as amended by a First Supplemental Trust Agreement dated as of May 1, 2018 (together with the Original State Appropriation Revenue Bond Trust Agreement and any additional supplements thereto, the "State Appropriation Revenue Bond Trust Agreement"), the Authority issued its Triangle Expressway System Appropriation Revenue Refunding Bonds, Series 2018A in the principal amount of $150,125,000 (the "2018A State Appropriation Bonds"), the proceeds of which were used to refund certain maturities of the 2009 State Appropriation Bonds. In addition, pursuant to the State Appropriation Revenue Bond Trust Agreement and a Second Supplemental Trust Agreement dated as of December 1, 2018, the Authority issued its $161,759,000 Triangle Expressway System Appropriation Revenue Refunding Bond, Series 2018B (the "2018B State Appropriation Bond") on December 31, 2018, which was privately placed with a financial institution, the proceeds of which were used to redeem certain additional maturities of the 2009 State Appropriation Revenue Bonds on January 1, 2019.

The Authority intends to enter into a Third Supplemental Trust Agreement dated as of December 1, 2019, as a supplement to the State Appropriation Revenue Bond Trust Agreement, pursuant to which it will issue the 2019 State Appropriation Bonds, the proceeds of which will be used to (a) pay a portion of the costs of Complete 540 – Phase 1 and (b) pay costs of issuance of the 2019 State Appropriation Revenue Bonds.

The 2009 State Appropriation Bonds, the 2018A State Appropriation Bonds, the 2018B State Appropriation Bond and the 2019 State Appropriation Bonds are payable solely from the State Appropriated Revenues, and are not secured by Receipts of the Authority under the Trust Agreement.

The 2009 State Appropriation Bonds, the 2018A State Appropriation Bonds, the 2018B State Appropriation Bond, the 2019 State Appropriation Bonds and any other bonds issued under the State Appropriation Revenue Bond Trust Agreement (collectively, the "State Appropriation Revenue Bonds") are secured solely by the State Appropriated Revenues and investment earnings thereon and certain funds provided in the State Appropriation Revenue Bond Trust Agreement. The State Appropriation Revenue Bonds are not secured by the tolls or other revenues of the Triangle Expressway System or any funds held under the Trust Agreement. Under the State Appropriation Revenue Bond Trust Agreement, amounts not needed in any Fiscal Year to make debt service payments on the State Appropriation Revenue Bonds will be withdrawn from the State Appropriation Revenue Bond Trust Agreement and deposited to the Revenue Fund under the Trust Agreement. Upon such withdrawal from the State Appropriation Revenue Bond Trust Agreement, the amounts so transferred shall be transferred free and clear of the lien on and pledge created under the State Appropriation Revenue Bond Trust Agreement and will constitute "Revenues" and "Receipts" under the Trust Agreement. There is no assurance that any such amounts will be available to be transferred to the Trust Agreement.

THE SERIES 2019 BONDS, THE 2019 STATE APPROPRIATION BONDS AND THE 2019 TIFIA LOAN ARE ALL REQUIRED TO CLOSE AT THE SAME TIME. IF FOR ANY REASON THE 2019 STATE APPROPRIATION BONDS OR THE 2019 TIFIA LOAN ARE NOT ABLE TO CLOSE ON THE CLOSING DATE FOR THE SERIES 2019 BONDS, THE SERIES 2019 BONDS WILL NOT CLOSE.

NCDOT Operations and Maintenance Guaranty

As described below under "SECURITY AND SOURCES OF PAYMENT FOR THE SERIES 2019 BONDS," the payment of Operations and Maintenance ("O&M") Expenses of the Triangle Expressway System is payable from Receipts after the prior payment of debt service on Senior Lien Bonds, Subordinate Lien Bonds, if any, Junior Indebtedness (including TIFIA Indebtedness), if any, and the funding of certain debt service and related reserves. In order to assure a source of funds for payment of Operations and Maintenance Expenses of the Triangle Expressway System, the Authority and NCDOT entered into the Operations and Maintenance Expense Guaranty Agreement dated August 20, 2008.

The Operations and Maintenance Expense Guaranty Agreement provides that in the event that there is a deficiency in the Receipts such that there are not funds available in the Operations and Maintenance Expense Fund to pay Operations and Maintenance Expenses, the Authority will make a request to NCDOT to fund the deficiency in the Operations and Maintenance Expense Fund, and those expenses will be funded by NCDOT. To date, the Authority has not had to request any such funding from NCDOT under the Operations and Maintenance Expense Guaranty Agreement.

On May 3, 2018, NCDOT adopted a resolution approving similar guaranties of operation and maintenance expenses for Complete 540 – Phase 1 and Complete 540 – Phase 2 (the "2018 NCDOT Guaranty"). NCDOT is expected to execute the Fourth Supplemental Trust Agreement, which supplements the Trust Agreement to incorporate the obligation of NCDOT under the Operations and Maintenance Expense Guaranty Agreement and the 2018 NCDOT Guaranty into the Trust Agreement (collectively, the "NCDOT O&M Guaranty"). The NCDOT O&M Guaranty provides that any amounts required to be paid by NCDOT thereunder are payable solely from the State Highway Fund, and are subject to appropriation by the State and the availability of amounts in such fund. There is no assurance that funds will be available in the State Highway Fund to make such payments if needed. The Authority will be required to repay any amount so advanced, with interest. The Trust Agreement creates an Operating Reserve Fund that the Authority would draw upon to pay required Operations and Maintenance Expenses prior to any draw on the NCDOT O&M Guaranty. See APPENDIX A – "Definitions of Certain Terms and Summary of the Trust Agreement – The Trust Agreement – Application of Receipts."

NCDOT Renewal and Replacement Guaranty

The Trust Agreement creates a Renewal and Replacement Fund as a special fund to which deposits are to be made from Receipts to pay all or a portion of the cost of unusual or extraordinary maintenance, repairs, renewals or replacements or capital improvements related to the Triangle Expressway System. Under the Trust Agreement, deposits to the Renewal and Replacement Fund are to be made from Receipts in amounts designed to assure that funds will be available for the required purpose when needed, as described under the caption "SECURITY AND SOURCES OF PAYMENT FOR THE SERIES 2019 Bonds – Application of Receipts." In order to assure that construction of the Initial Project was completed and that the Renewal and Replacement Fund is funded as required, the NCDOT has undertaken pursuant to the Construction Completion Assurance and Standby Renewal and Replacement Funding Agreement dated April 15, 2009, to fund any deficiency in the Renewal and Replacement Fund from the amount that is required at the time to be on deposit in the Renewal and Replacement Fund. To date, the Authority has not had to request any such funding from NCDOT under the Construction Completion Assurance and Standby Renewal and Replacement Funding Agreement.

In the 2018 NCDOT Guaranty, NCDOT approved similar funding of the costs of construction and completion, as well as any deficiency in the Renewal and Replacement Fund, with respect to Complete 540 – Phase 1 and Complete 540 – Phase 2. NCDOT is expected to execute the Fourth Supplemental Trust Agreement in order to incorporate the obligation of NCDOT under the Construction Completion Assurance and Standby Renewal and Replacement Guaranty Agreement and the 2018 NCDOT Guaranty into the Trust Agreement (collectively, the "NCDOT Renewal and Replacement Guaranty"). The NCDOT Renewal and Replacement Guaranty provides that any amounts required to be paid by NCDOT thereunder are payable solely from the State Highway Fund or the State Highway Trust Fund, and are subject to appropriation by the State and the availability of amounts in the respective source funds. There is no assurance that funds will be available in the State Highway Fund or the State Highway Trust Fund to make such payments if needed. The Authority will be required to repay any amount so advanced, with interest. See APPENDIX A – "Definitions of Certain Terms and Summary of the Trust Agreement – The Trust Agreement – Application of Receipts."

In the NCDOT Renewal and Replacement Guaranty, the Authority agreed to cooperate with appropriate officials of NCDOT such that the timing of payments to pay the costs of Complete 540 – Phase 1 pursuant to the undertaking will not disrupt NCDOT's other contractual obligations being funded from the State Highway Trust Fund or the State Highway Fund and will not interfere with NCDOT's committed debt service payments. Among committed debt service payments, on June 27, 2019, the State issued its $300,000,000 Limited Obligation (Build NC) Bonds, Series 2019A (the "Build NC 2019A Bonds"). The act that authorizes such bonds provides that funds from the State Highway Trust Fund shall be the source of repayment for such bonds. The act also authorizes for the issuance of up to $3 billion in bonds, including the Build NC 2019A Bonds, for regional and divisional projects identified in the Statewide Transportation Improvement Plan through December 31, 2028, subject to a number of constraints.

Repayment of NCDOT Contributions

The Authority may be required to repay any amounts advanced by NCDOT as described above under "NCDOT Operations and Maintenance Guaranty" and "NCDOT Renewal and Replacement Guaranty," with interest, from Receipts, but only after payment of current debt service on the Series 2019 Bonds and other Senior Lien Indebtedness, Subordinate Lien Indebtedness and any Junior Indebtedness, including TIFIA Indebtedness, the funding of any deficiency in all debt service reserve funds held under the Trust Agreement, funding of required deposits to the Operations and Maintenance Expense Fund, the Operating Reserve Fund, and the Renewal and Replacement Fund, required under the Trust Agreement, or from amounts deposited and held in the General Reserve Fund available for such expense. See "SECURITY AND SOURCES OF PAYMENT FOR THE SERIES 2019 BONDS – Application of Receipts."

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ANNUAL DEBT SERVICE REQUIREMENTS

The following table sets forth for each Fiscal Year ending June 30, the amounts required for the payment of debt service on the Senior Lien Bonds currently Outstanding under the Trust Agreement, the Series 2019 Bonds and the TIFIA Series 2019 Bond.

Fiscal Year Ending June 30,	Current Outstanding Senior Lien Indebtedness		Series 2019 Bonds		Total Senior Lien Indebtedness		TIFIA Series 2019 Bond[1]		Total Debt Service
	Principal	Interest	Principal	Interest	Principal	Interest	Principal	Interest	
2020	$6,580,000	$28,159,294	$ -	$9,198,348	$6,580,000	$37,357,642	$ -	$ -	$43,937,642
2021	9,430,000	27,763,494	-	17,069,100	9,430,000	44,832,594	-	-	54,262,594
2022	11,250,000	27,246,494	-	17,069,100	11,250,000	44,315,594	-	-	55,565,594
2023	13,990,000	26,615,494	-	17,069,100	13,990,000	43,684,594	-	-	57,674,594
2024	17,170,000	25,836,494	-	17,069,100	17,170,000	42,905,594	-	-	60,075,594
2025	18,965,000	24,933,119	-	17,069,100	18,965,000	42,002,219	-	-	60,967,219
2026	21,340,000	23,925,494	-	17,069,100	21,340,000	40,994,594	-	7,582,524	69,917,118
2027	23,995,000	22,792,119	-	17,069,100	23,995,000	39,861,219	-	8,959,000	72,815,219
2028	26,865,000	21,520,619	-	17,069,100	26,865,000	38,589,719	-	11,767,785	77,222,504
2029	26,600,000	20,250,322	-	17,069,100	26,600,000	37,319,422	500,000	15,586,761	80,006,183
2030	32,255,000	18,955,775	-	17,069,100	32,255,000	36,024,875	500,000	15,573,361	84,353,236
2031	35,650,000	17,411,025	-	17,069,100	35,650,000	34,480,125	500,000	15,559,961	86,190,086
2032	39,470,000	15,617,275	-	17,069,100	39,470,000	32,686,375	500,000	15,546,552	88,202,927
2033	48,795,000	14,253,025	-	17,069,100	48,795,000	31,322,125	500,000	15,533,161	96,150,286
2034	53,400,000	13,338,525	-	17,069,100	53,400,000	30,407,625	500,000	15,519,761	99,827,386
2035	57,590,000	12,284,525	-	17,069,100	57,590,000	29,353,625	500,000	15,506,361	102,949,986
2036	61,805,000	11,100,900	-	17,069,100	61,805,000	28,170,000	1,000,000	15,489,620	106,464,620
2037	65,845,000	9,925,850	-	17,069,100	65,845,000	26,994,950	1,000,000	15,462,839	109,302,789
2038	60,490,000	8,464,550	-	17,069,100	60,490,000	25,533,650	1,000,000	15,436,039	102,459,689
2039	63,655,000	6,178,750	-	17,069,100	63,655,000	23,247,850	1,000,000	15,409,239	103,312,089
2040	56,855,000	3,382,575	-	17,069,100	56,855,000	20,451,675	1,000,000	15,382,420	93,689,095
2041	49,030,000	980,600	-	17,069,100	49,030,000	18,049,700	21,547,661	15,355,639	103,982,999
2042	-	-	23,030,000	16,723,650	23,030,000	16,723,650	42,815,066	14,502,983	97,071,700
2043	-	-	25,600,000	15,738,200	25,600,000	15,738,200	43,970,198	13,347,852	98,656,250
2044	-	-	28,760,000	14,379,200	28,760,000	14,379,200	45,157,548	12,160,501	100,457,250
2045	-	-	32,105,000	12,857,575	32,105,000	12,857,575	46,374,824	10,943,226	102,280,625
2046	-	-	35,300,000	11,172,450	35,300,000	11,172,450	47,625,996	9,692,054	103,790,500
2047	-	-	38,270,000	9,333,200	38,270,000	9,333,200	48,910,923	8,407,126	104,921,250
2048	-	-	41,360,000	7,342,450	41,360,000	7,342,450	50,231,574	7,086,476	106,020,500
2049	-	-	44,645,000	5,192,325	44,645,000	5,192,325	51,585,743	5,732,306	107,155,375
2050	-	-	14,250,000	3,791,200	14,250,000	3,791,200	18,592,948	4,567,521	41,201,669
2051	-	-	15,275,000	3,200,700	15,275,000	3,200,700	19,094,577	4,065,892	41,636,169
2052	-	-	16,360,000	2,568,000	16,360,000	2,568,000	19,610,167	3,550,302	42,088,469
2053	-	-	17,485,000	1,891,100	17,485,000	1,891,100	20,138,813	3,021,655	42,536,569
2054	-	-	18,645,000	1,168,500	18,645,000	1,168,500	20,682,150	2,478,319	42,973,969
2055	-	-	19,890,000	397,800	19,890,000	397,800	21,240,145	1,920,324	43,448,269
2056	-	-	-	-	-	-	21,813,621	1,346,848	23,160,469
2057	-	-	-	-	-	-	22,401,716	758,753	23,160,469
2058	-	-	-	-	-	-	11,425,865	154,365	11,580,230
Total	$801,025,000	$380,936,318	$370,975,000	$473,405,798	$1,172,000,000	$854,342,114	$581,719,533	$333,407,526	$2,941,469,173

Note: Amounts may not foot due to rounding.
[1] Estimated.

ESTIMATED SOURCES AND USES OF SERIES 2019 BOND PROCEEDS

Sources:	
Par Amount of the Series 2019 Bonds	$370,975,000
Net Original Issue Premium	57,330,849
Total Sources	$428,305,849
Uses:	
Costs of Complete 540 – Phase 1	$356,620,255
Costs of Issuance[1]	4,753,518
Capitalized Interest	66,932,076
Total Uses	$428,305,849

Note: Totals may not foot due to rounding.

[1] Includes legal fees, underwriters' discount, premium for the Bond Insurance Policy, premium for the Series 2019 Debt Service Reserve Policy, rating agency fees, fees and expenses of the Trustee and municipal advisor, and miscellaneous fees and expenses.

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ESTIMATED COMPLETE 540 – PHASE 1 SOURCES AND USES OF FUNDS

	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	TOTAL
Sources[1]:						
Proceeds of Series 2019 Bonds	$387,655,410	$40,650,439	$ -	$ -	$ -	$428,305,849
2019 TIFIA Loan[2]	-	279,462,940	219,999,041	-	-	499,461,981
Proceeds of 2019 State Appropriation Bonds	104,971,678	11,007,572	-	-	-	115,979,250
NCDOT GARVEE Bonds	-	-	82,469,132	157,846,168	2,684,700	243,000,000
GARVEE State Match funds	-	-	27,489,711	52,615,389	894,900	81,000,000
General Reserve contribution	-	-	-	30,102,864	-	30,102,864
Total Sources	$492,627,088	$331,120,951	$329,957,884	$240,564,420	$3,579,600	$1,397,849,943
Uses:						
Costs of Complete 540 – Phase 1	$420,316,838	$331,120,951	$329,957,884	$210,461,557	$3,579,600	$1,295,436,829
Costs of Issuance[3]	5,378,174	-	-	-	-	5,378,174
Series 2019 Subaccount of the Capitalized Interest Account	66,932,076	-	-			66,932,076
TIFIA Debt Service Reserve Account	-	-	-	30,102,864	-	30,102,864
Total Uses	$492,627,088	$331,120,951	$329,957,884	$240,564,420	$3,579,600	$1,397,849,943

[1] Does not include investment earnings.
[2] Estimated as of the date of this Official Statement.
[3] Includes legal fees, underwriters' discount, premium for the Bond Insurance Policy, premium for the Series 2019 Debt Service Reserve Policy, rating agency fees, fees and expenses of the Trustee and municipal advisor, and miscellaneous fees and expenses.
Note: Totals may not foot due to rounding.

SECURITY AND SOURCES OF PAYMENT FOR THE SERIES 2019 BONDS

General

The Series 2019 Bonds will be special obligations of the Authority, secured by and payable from the Receipts of the Triangle Expressway System and, under certain circumstances, proceeds of the Series 2019 Bonds, including investment earnings and certain net insurance and other funds.

The principal of and interest on the Series 2019 Bonds shall not be payable from the general funds of the Authority, nor shall they constitute a legal or equitable pledge, charge, lien, or encumbrance upon any of its property or upon any of its income, receipts, or revenues, except the Receipts and other funds which are pledged under the Bond Order and the Trust Agreement. Neither the credit nor the taxing power of the State or any instrumentality thereof are pledged for the payment of the principal or interest of the Series 2019 Bonds, and no Owner of Series 2019 Bonds has the right to compel the exercise of the taxing power by the State or any instrumentality thereof or the forfeiture of any of its property other than Receipts in connection with any default thereon. Acceleration is not a remedy available to Owners of the Series 2019 Bonds. The Authority has no taxing power.

As described below under "Application of Receipts," the payment of Operations and Maintenance Expenses of the Triangle Expressway System are payable from Receipts after the payment of debt service on Senior Indebtedness, Subordinated Indebtedness, if any, Junior Indebtedness (including TIFIA Indebtedness), and the funding of certain reserves. As such, the Series 2019 Bonds and other Senior Lien Indebtedness are secured by a "gross revenue" pledge of the Receipts of the Triangle Expressway System.

Pledge of Receipts

The Receipts of the Triangle Expressway System are pledged to the payment of, and as security for (a) any Senior Lien Parity Debt, Subordinate Lien Parity Debt and Junior Indebtedness including TIFIA Indebtedness and (b) any Senior Lien Derivative Agreement Regularly Scheduled Payments and Subordinate Lien Derivative Agreement Regularly Scheduled Payments incurred pursuant to the Trust Agreement.

The term "Receipts" for any particular period means all receipts, revenues, income, proceeds and money received in any period by or for the Authority in respect of the Triangle Expressway System, including all toll revenues, payments, proceeds, fees, charges, rents and all other income derived by or for the Authority from the ownership and operation of the Triangle Expressway System, and all other income derived by the Authority from the operation or ownership of the Triangle Expressway System, the proceeds of use and occupancy or business interruption insurance and amounts received as liquidated damages under contracts for construction of the Triangle Expressway System and the portion of the State Appropriated Revenues transferred to the Revenue Fund from the State Appropriation Revenue Bonds Trust Agreement. See APPENDIX A hereto for a complete definition of Receipts.

Senior Lien Parity Reserve Account

The Trust Agreement creates a special account of the Senior Lien Debt Service Fund designated the Senior Lien Parity Reserve Account. Each Senior Lien Resolution providing for the issuance or incurrence of Senior Lien Indebtedness may provide that the Senior Lien Indebtedness authorized thereby will be secured by the Senior Lien Parity Reserve Account. If any Senior Lien Indebtedness is secured by the Senior Lien Parity Reserve Account, the Authority must fund the Senior Lien Parity Reserve Account in an amount equal to the Senior Lien Parity Reserve Account Requirement at the time of delivery and payment for such Senior Lien Indebtedness. If the Senior Lien Resolution authorizing Senior Lien Indebtedness does not provide that such Senior Lien Indebtedness will be secured by the Senior Lien Parity Reserve Account, such Senior Lien Indebtedness will have no claim on the Senior Lien Parity Reserve Account.

The Series 2019 Bonds will be secured by the Senior Lien Parity Reserve Account. Following the issuance of the Series 2019 Bonds, and the effectiveness of the Fourth Supplemental Trust Agreement, the amount required to be on deposit in the Senior Lien Parity Reserve Account will be $34,914,811, which is equal to 50% of the least of (i) the Maximum Long-Term Debt Service Requirement for all Senior Lien Bonds and Senior Lien Parity Debt secured by the Senior Lien Parity Reserve Account, (ii) 125% of the average annual Long-Term Debt Service Requirement for all Senior Lien Bonds and Senior Lien Parity Debt secured by the Senior Lien Parity Reserve Account and (iii) 10% of the stated principal amount of all Senior Lien Bonds and Senior Lien Parity Debt secured by the Senior Lien Parity Reserve Account (the "Senior Lien Parity Reserve Account Requirement"). The Senior Lien Parity Reserve Account Requirement will be satisfied by the Series 2019 Debt Service Reserve Policy issued by the 2019 Bond Insurer. Moneys on deposit in the Senior Lien Parity Reserve Account (or provided under a Reserve Alternative Instrument) will be used as necessary to pay the principal of and interest on all Senior Lien Indebtedness secured by the Senior Lien Parity Reserve Account to the extent that moneys on deposit in the Senior Lien Debt Service Fund and Accounts thereof for such payment are insufficient therefor. See APPENDIX A – "Definitions of Certain Terms and Summary of the Trust Agreement" for a more detailed description of the Senior Lien Parity Reserve Account Requirement.

The Authority has purchased the Series 2019 Debt Service Reserve Policy from the 2019 Bond Insurer in an amount equal to the Senior Lien Parity Reserve Account Requirement for all Senior Lien Bonds, including the Series 2019 Bonds, which will be deposited in the Senior Lien Parity Reserve Account, and secures all of the Senior Lien Indebtedness.

A Senior Lien Resolution authorizing Senior Lien Indebtedness may also provide for the creation of a Senior Lien Special Reserve Account to be maintained by the Trustee or a Depositary that will secure only the Senior Lien Indebtedness authorized by such Senior Lien Resolution. The Series 2019 Bonds will not be secured by a Senior Lien Special Reserve Account.

Other Funds and Accounts

The following funds and accounts are created under the Trust Agreement and are held by the Trustee unless otherwise specifically noted:

<u>Revenue Fund</u>. The Authority will deposit all Receipts as received in the Revenue Fund for application as hereinafter described.

<u>Senior Lien Debt Service Fund</u>. The Senior Lien Debt Service Fund is composed of seven separate accounts, consisting of the Capitalized Interest Account, the Interest Account, the Principal Account, the Sinking Fund Account, the Redemption Account, the Senior Lien Parity Reserve Account and the Hedging Acquisition Account. Each Supplemental Agreement authorizing a Series of Bonds will provide for the creation, to the extent applicable, of separate subaccounts within the Capitalized Interest Account, the Interest Account, the Principal Account, the Sinking Fund Account and the Redemption Account relating to the Series of Bonds authorized by such Supplemental Agreement. Upon the occurrence of a Bankruptcy Related Event, the TIFIA Interest Account, the TIFIA Principal Account and the TIFIA Debt Service Reserve Account will be moved to the Senior Lien Debt Service Fund.

Subordinate Lien Debt Service Fund. The Subordinate Lien Debt Service Fund is composed of six separate accounts, consisting of the Capitalized Interest Account, the Interest Account, the Principal Account, the Sinking Fund Account, the Redemption Account and the Subordinate Lien Parity Reserve Account. The deposit to such Fund from Receipts is subordinate to the deposits required to be made to the Senior Lien Debt Service Fund.

Junior Indebtedness Debt Service Fund. The Junior Indebtedness Debt Service Fund is composed of six separate accounts, consisting of the Interest Account, the Principal Account, the Junior Indebtedness Debt Service Reserve Account, the TIFIA Interest Account, the TIFIA Principal Account and the TIFIA Debt Service Reserve Account; provided that, if a Bankruptcy Related Event has occurred, the TIFIA Interest Account, the TIFIA Principal Account and the TIFIA Debt Service Reserve Account shall be moved from the Junior Indebtedness Debt Service Fund to the Senior Lien Debt Service Fund. Any deposit to such Fund from Receipts is subordinate to the deposits required to be made to the Senior Lien Debt Service Fund and the Subordinate Lien Debt Service Fund.

Hedging Acquisition Account. The Hedging Acquisition Account is held by the Trustee and requires that certain deposits be made to such account in the event the Authority issues variable interest rate bonds and enters into a hedging arrangement in connection therewith. The purpose of the Hedging Acquisition Account is to assure that funds are available to pay the termination payments the Authority might be required to pay if such hedge were terminated. The Authority has no present plans to issue variable interest rate bonds under the Trust Agreement.

Operations and Maintenance Expense Fund. The Operations and Maintenance Expense Fund is held by a depositary selected by the Authority. Moneys held for the credit of the Operations and Maintenance Expense Fund are to be used only to pay all or a portion of the cost of any Operating Expenses of the Triangle Expressway System.

Operating Reserve Fund. The Operating Reserve Fund is held by a depositary selected by the Authority. Moneys held for the credit of the Operating Reserve Fund shall be used to pay all or a portion of the cost of any Operating Expenses or as provided in the Capital Improvements Budget to the extent that funds in the Operating and Maintenance Expense Fund are insufficient for such purpose. Any amounts received from NCDOT under the NCDOT O&M Guaranty are deposited to the Operating Reserve Fund.

Renewal and Replacement Fund. Moneys held for the credit of the Renewal and Replacement Fund are to be used to pay all or a portion of the cost of unusual or extraordinary maintenance, repairs, renewals or replacements or capital improvements related to the Triangle Expressway System. Any funds provided by NCDOT pursuant to the NCDOT Renewal and Replacement Guaranty may only be used for such purposes. In the Authority's sole discretion, amounts on deposit in the Renewal and Replacement Fund from sources other than the NCDOT Renewal and Replacement Guaranty may be used (i) to make deposits to the appropriate subaccounts in the Interest Account, the Principal Account and the Sinking Fund Account of the Senior Lien Debt Service Fund or the Subordinate Lien Debt Service Fund or the Junior Indebtedness Debt Service Fund (including the TIFIA Interest Account and the TIFIA Principal Account) to remedy any deficiency therein, (ii) to make any required deposits or pay interest on or the principal of or amortization requirements in respect of any Senior Lien Parity Debt or Subordinate Lien Parity Debt when due or (iii) to make any Senior Lien Derivative Agreement Regularly Scheduled Payments or Subordinate Lien Derivative Agreement Regularly Scheduled Payments when due, whenever moneys are insufficient for such purpose. In addition, following an Event of Default, amounts in the Renewal and Replacement Fund (other than amounts provided by NCDOT) shall be used to remedy such default.

Insurance and Condemnation Award Fund. Under certain circumstances described in the Trust Agreement, Net Insurance Proceeds and Net Eminent Domain Proceeds received by the Authority or

NCDOT are required to be deposited in the Insurance and Condemnation Award Fund. Moneys held in the Insurance and Condemnation Award Fund will be disbursed to repair or replace the Triangle Expressway System or to pay or redeem Bonds and Parity Debt, in the manner set forth in the Trust Agreement.

General Reserve Fund. Under the Trust Agreement and the 2019 TIFIA Loan Agreement, there are two accounts within the General Reserve Fund, the Restricted Account and the Unrestricted Account. The 2019 TIFIA Loan Agreement places certain restrictions on the use of funds in both the Restricted Account and the Unrestricted Account of the General Reserve Fund. Subject to such restrictions, funds in the Unrestricted Account may be used for any lawful purpose of the Authority, including payment of Operating Expenses, payment for capital improvements, repayment to NCDOT of any amount owed under the NCDOT O&M Guaranty or the NCDOT Renewal and Replacement Guaranty, and the funding of Non-System Projects. See APPENDIX A – "Definitions of Certain Terms and Summary of the Trust Agreement – General Reserve Fund."

Application of Receipts

The Trust Agreement provides that on the last Business Day of each month, the Trustee shall withdraw all Receipts and other amounts held in the Revenue Fund and apply the same in the following manner and order (see "The Trust Agreement – Application of Receipts" in APPENDIX A hereto for a more detailed description of the application of the Receipts):

(a) to the Interest Account (and the TIFIA Interest Account if a Bankruptcy Related Event has occurred) of the Senior Lien Debt Service Fund and to any other Persons entitled thereto as the holder of Senior Lien Parity Debt the amount (in equal monthly deposits) needed to pay interest payable on Senior Lien Bonds (including TIFIA Indebtedness if a Bankruptcy Related Event has occurred) and other Senior Lien Parity Debt on the next Interest Payment Date (if such Interest Payment Date is within seven months of such deposit);

(b) to the Principal Account and the Sinking Fund Account (and the TIFIA Principal Account if a Bankruptcy Related Event has occurred) of the Senior Lien Debt Service Fund and to any other Persons entitled thereto as the holder of Senior Lien Parity Debt the amount (in equal monthly deposits) needed to pay the Principal payable on Senior Lien Bonds (including TIFIA Indebtedness if a Bankruptcy Related Event has occurred) and any other Senior Lien Parity Debt on the next Principal Payment Date for each such Senior Lien Bonds or Senior Lien Parity Debt;

(c) if the amount in the Senior Lien Parity Reserve Account is less than the Senior Lien Parity Reserve Account Requirement or the amount in any Senior Lien Special Reserve Account is less than the applicable Senior Lien Special Reserve Account Requirement, or, if a Bankruptcy Related Event has occurred, the TIFIA Debt Service Reserve Account is less than the TIFIA Debt Service Reserve Account Requirement, (1) one-twelfth (1/12) of the amount required to make up any deficiency in the Senior Lien Parity Reserve Account and (2) to the Trustee or other Person holding a Senior Lien Special Reserve Account, one-twelfth (1/12) of the amount required to make up any deficiencies in any Senior Lien Special Reserve Account and (3) if a Bankruptcy Related Event has occurred, one-twelfth (1/12) of the amount required to make up any deficiency in the TIFIA Debt Service Reserve Account for deposit in the TIFIA Debt Service Reserve Account; provided, however, that if there shall not be sufficient Receipts to satisfy all such deposits and payments, such deposits and payments shall be made for deposit to the Senior Lien Parity Reserve Account, each Senior Lien Special Reserve Account and, if a Bankruptcy Related Event has occurred, the TIFIA Debt Service Reserve Account ratably according to the amount so required to be deposited or paid;

(d) to the appropriate subaccounts of the Subordinate Lien Debt Service Fund amounts needed (in equal monthly installments) to pay interest on and principal of Subordinate Lien Bonds or Subordinate Lien Parity Debt;

(e) to the Subordinate Lien Parity Reserve Account, if any, and any Subordinate Lien Special Reserve Account, the amount required to make up any deficiencies therein;

(f) to the credit of the Junior Indebtedness Debt Service Fund, an amount (in equal monthly installments) equal to the sum of (i) the amount of interest payable on any Outstanding Junior Indebtedness on the next Interest Payment Date for such Junior Indebtedness and (ii) principal as due pursuant to the applicable Junior Indebtedness Agreement(s); provided, provided that, with respect to any TIFIA Indebtedness, if no Bankruptcy Related Event has occurred, there shall be transferred the following amounts (in equal monthly installments) with respect to such TIFIA Indebtedness and in the following order of priority (w) to the TIFIA Interest Account, the interest portion of TIFIA Mandatory Debt Service then due (or the accrual of appropriate amounts in advance thereof), (x) to the TIFIA Principal Account, the principal portion of TIFIA Mandatory Debt Service then due (or the accrual of appropriate amounts in advance thereof), (y) to the TIFIA Interest Account, the interest portion of the TIFIA Scheduled Debt Service then due, and (z) to the TIFIA Principal Account, the principal portion of the TIFIA Scheduled Debt Service then due;

(g) (1) if the amount in the Junior Indebtedness Debt Service Reserve Account is less than the Junior Indebtedness Debt Service Reserve Account Requirement, to the credit of the Junior Indebtedness Debt Service Reserve Account, one-twelfth (1/12) of the amount required to make up any deficiency in the Junior Indebtedness Debt Service Reserve Account and (2) if no Bankruptcy Related Event has occurred and the amount in the TIFIA Debt Service Reserve Account is less than the TIFIA Debt Service Reserve Account Requirement, to the credit of the TIFIA Debt Service Reserve Account, one-sixth (1/6) of the amount required to make up any deficiency in the TIFIA Debt Service Reserve Account for deposit in the TIFIA Debt Service Reserve Account, provided that, if there shall not be sufficient Receipts to satisfy all such deposits and payments, such deposits and payments shall be made for deposit to the Junior Indebtedness Debt Service Reserve Account and the TIFIA Debt Service Reserve Account ratably according to the amount so required to be deposited or paid;

(h) to a Bond Insurer for Insured Bonds, including the Series 2017 Bond Insurer, the Series 2018 Bond Insurer and the 2019 Bond Insurer, any fees and interest, including Excess Interest, due to such Bond Insurer in excess the amount of principal and interest paid by it with respect to such Insured Bonds, to any provider of a Reserve Alternate Instrument, including the Series 2017 Debt Service Reserve Policy, the Series 2018 Debt Service Reserve Policy and the Series 2019 Debt Service Reserve Policy, any fees and interest payable to such provider in excess of the amount paid to it from the applicable Senior Lien Parity Reserve Account, Senior Lien Special Reserve Account, Subordinate Lien Parity Reserve Account or Subordinate Lien Special Reserve Account, and to any Credit Provider of a Credit Facility other than a Bond Insurance Policy or a Reserve Alternate Instrument, any fees and interest payable to such Credit Provider in excess of the amount paid to it directly or indirectly from the sources listed in (a) through (g) above; provided that, to the extent there are insufficient amounts available to pay all amounts referenced in this subsection, amounts due relating to Senior Lien Bonds shall be paid first;

(i) to the credit of the Hedging Acquisition Account, the amount of the requirement therefor;

(j) to the credit of the Operations and Maintenance Expense Fund, an amount equal to the next succeeding month's budgeted Operating Expenses as set forth in the Annual Budget;

(k) to the credit of the Operating Reserve Fund such amount as necessary so that the balance equals the Operating Reserve Fund Requirement;

(l) to the credit of the Renewal and Replacement Fund such amount as necessary so that the balance equals the Renewal and Replacement Fund Requirement;

(m) to NCDOT any amounts necessary to reimburse NCDOT for any Operating Advance made by NCDOT to the Authority pursuant to the NCDOT O&M Guaranty or any payments by NCDOT to the Authority pursuant to the NCDOT Renewal and Replacement Guaranty, together with interest thereon, at the rates and in the manner provided in the Trust Agreement;

(n) so long as the TIFIA Series 2019 Bond remains Outstanding, in the event that the Authority has failed to comply with the Rate Coverage Test set forth in the 2019 TIFIA Loan Agreement for thirty (30) consecutive months, to optionally redeem, purchase and cancel or defease Senior Lien Indebtedness (including the Series 2019 Bonds) and the TIFIA Series 2019 Bond on a pro rata basis in amounts sufficient to allow the Authority to be in compliance with such Rate Coverage Test;

(o) after all deposits or payments are made in accordance with subsections (a) through (n) above, any remaining moneys shall be deposited in the Restricted Account and Unrestricted Account of the General Reserve Fund in accordance with the terms of the Trust Agreement and the 2019 TIFIA Loan Agreement.

Upon the occurrence of a Bankruptcy Related Event, any Outstanding TIFIA Indebtedness shall automatically and without notice become a Senior Lien Bond, and the TIFIA Interest Account, the TIFIA Principal Account and the TIFIA Debt Service Reserve Account will be moved to the Senior Lien Debt Service Fund and will be funded on a parity with the accounts in the Senior Lien Debt Service Fund as described in (a), (b) and (c) above.

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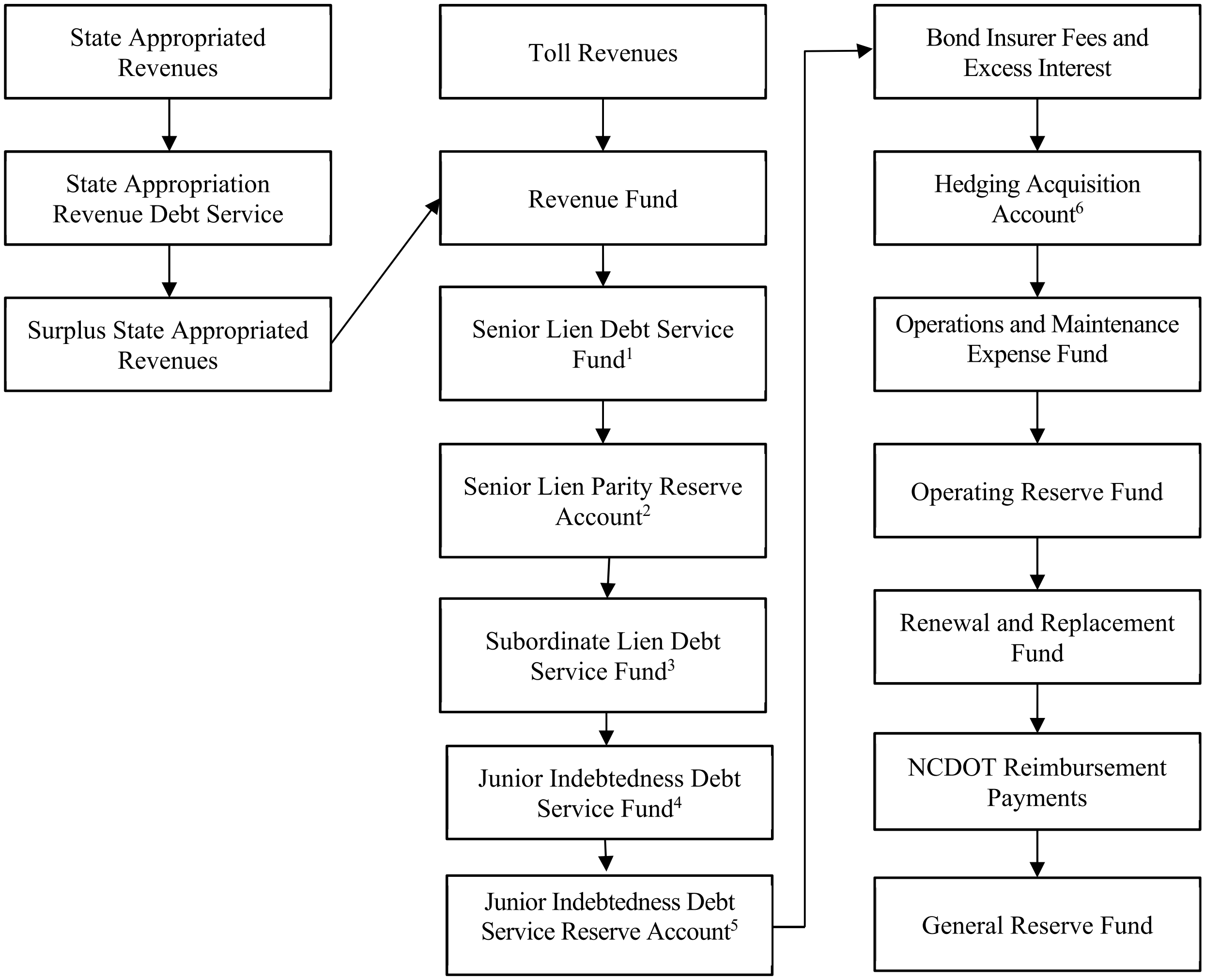
The following chart depicts the flow of funds under the Trust Agreement, including the flow of funds of the State Appropriated Revenues under the State Appropriation Revenue Bond Trust Agreement into the Revenue Fund created by the Trust Agreement.



[1] Deposits to the following Accounts in the following order of priority until each Account requirement is funded: Interest Account, Principal Account and Sinking Fund Account. After a Bankruptcy Related Event has occurred, this Fund will include a TIFIA Interest Account and TIFIA Principal Account, to be paid on parity with the Interest Account and Principal Account.

[2] After a Bankruptcy Related Event has occurred, the TIFIA Debt Service Reserve Account will be funded on parity with the Senior Lien Parity Reserve Account.

[3] Deposits to the following Accounts in the following order of priority until each Account requirement is funded: Interest Account, Principal Account and Sinking Fund Account, and Subordinate Lien Parity Reserve Account.

[4] Includes the TIFIA Interest Account and TIFIA Principal Account within the Junior Indebtedness Debt Service Fund (so long as no Bankruptcy Related Event has occurred).

[5] Includes the TIFIA Debt Service Reserve Account (so long as no Bankruptcy Related Event has occurred).

[6] The Hedging Acquisition Account would only be used if the Authority were to issue variable interest rate bonds. At present, the Authority has no plans to issue such Bonds.

TIFIA Indebtedness Upon Occurrence of Bankruptcy Related Event

In the case of the occurrence of a Bankruptcy Related Event, any TIFIA Indebtedness automatically and without notice is deemed to constitute a Senior Lien Bond, and the Holder of such TIFIA Indebtedness will be entitled to all rights of a Holder of a Senior Lien Bond, except that the Holders of any such TIFIA Indebtedness will have no rights in, or claim to, any amounts held in the Senior Lien Parity Reserve Account or any Senior Lien Special Reserve Account. A Bankruptcy Related Event is defined in the Trust Agreement and the 2019 TIFIA Loan Agreement to include voluntary and involuntary proceedings with respect to the Authority under any Insolvency Law, application for or consent by the Authority to the appointment of a receiver for itself and its assets, failure by the Authority generally to pay its debts with respect to the Triangle Expressway as they become due, and failure by the Authority to make two (2) consecutive payments on the TIFIA Series 2019 Bond in accordance with the 2019 TIFIA Loan Agreement. See APPENDIX A – "Definitions of Certain Terms and Summary of the Trust Agreement."

Rate Covenant

Under the Trust Agreement, the Authority has covenanted as follows:

(i) to fix, charge and collect tolls, fees, rentals and other charges for the use of and for services furnished or to be furnished by the Triangle Expressway System, and that from time to time and as often as it shall appear necessary, to revise such tolls, fees, rentals and other charges as may be necessary or appropriate, in order that for each Fiscal Year, beginning with the first full Fiscal Year in which the Triangle Expressway System is in operation, the Revenues in such Fiscal Year will be not less than 130% of the Long-Term Debt Service Requirement for Senior Lien Indebtedness only for such Fiscal Year; and

(ii) to fix, charge and collect tolls, fees, rentals and other charges for the use of and for services furnished or to be furnished by the Triangle Expressway System, and that from time to time and as often as it shall appear necessary, to revise such tolls, fees, rentals and other charges as may be necessary or appropriate, in order that for each Fiscal Year, beginning with the first full Fiscal Year in which the Initial Project is in operation, the Revenues in such Fiscal Year will be not less than 110% of (x) the Long-Term Debt Service Requirement for Senior Lien Indebtedness, Subordinate Lien Indebtedness and TIFIA Indebtedness for such Fiscal Year and (y) the deposits to be made to the Senior Lien Parity Reserve Account, the Subordinate Lien Parity Reserve Account and the TIFIA Debt Service Reserve Account for such Fiscal Year.

The Authority also covenants to fix, charge and collect tolls, fees, rentals and other charges so that the Receipts will be sufficient in each Fiscal Year to make all the deposits described in paragraphs (a) through (i) in "-Application of Receipts" above to the various funds described above. The Trust Agreement contains certain additional provisions regarding the Authority's covenants as to tolls. See "The Trust Agreement – Rate Covenant" in APPENDIX A hereto for such additional details.

If the rate covenant described in (i) and (ii) above (herein, the "Rate Covenant") is not met, the Authority is obligated to request a Traffic Consultant to make its recommendations, if any, as to a revision of the Authority's tolls, fees, rentals and charges, its Operating Expenses or the method of operation of the Triangle Expressway System in order to satisfy the Rate Covenant. The Authority is obligated under the Trust Agreement to revise its tolls, fees, rentals and charges or its Operating Expenses or alter its methods of operation, which revisions or alterations need not comply with the Traffic Consultant's recommendations but which are projected by the Authority to result in compliance with the Rate Covenant. See also "THE TRIANGLE EXPRESSWAY SYSTEM – Toll Rate Policy" herein.

Parity and Subordinated Indebtedness

Under the conditions and limitations set forth in the Trust Agreement and without the approval or consent of the Owners or Holders of Indebtedness, the Authority may issue or incur additional Senior Lien Indebtedness secured by a pledge, charge and lien upon the Trust Estate on a parity with the Series 2019 Bonds.

In general, additional Long-Term Indebtedness constituting Senior Lien Indebtedness may be incurred if prior to incurrence there is delivered to the Trustee:

(i) an Officer's Certificate certifying that the Authority was in compliance with its rate covenant as described above for the most recent Fiscal Year for which audited financial statements are available;

(ii) a report of a Traffic Consultant stating that for each Fiscal Year next succeeding the date on which such Senior Lien Indebtedness is incurred through the final maturity date of all Senior Lien Indebtedness, the forecasted Revenues in each such Fiscal Year is at least 140% of the Long-Term Debt Service Requirement with respect to all Senior Lien Indebtedness (excluding any Long-Term Indebtedness constituting Senior Lien Indebtedness to be refunded by the Long-Term Indebtedness to be incurred) and the Long-Term Indebtedness proposed to be incurred;

(iii) a report of a Traffic Consultant stating that for each Fiscal Year next succeeding the date on which such Long-Term Indebtedness is incurred through the final maturity date of any Long-Term Indebtedness, the forecasted Revenues in each such Fiscal Year is at least (x) 130% of (1) the Long-Term Debt Service Requirement with respect to all Outstanding Senior Lien Indebtedness, Subordinate Lien Indebtedness and TIFIA Indebtedness (excluding any Long-Term Indebtedness to be refunded by the Long-Term Indebtedness to be incurred) and the Long-Term Indebtedness to be incurred and (2) the amounts to be deposited in such Fiscal Year to the Senior Lien Parity Reserve Account, the Subordinate Lien Parity Reserve Account, and the TIFIA Debt Service Reserve Account, and (y) the Loan Life Coverage Ratio is a least 130%;

(iv) a report of a Traffic Consultant showing that (1) for each Fiscal Year next succeeding the date on which such Long-Term Indebtedness is incurred through the final maturity date of any Long-Term Indebtedness, the forecasted Revenues in each Fiscal Year will be sufficient to make all of the deposits in each such Fiscal Year required under the Trust Agreement as described in paragraphs (a) through (i) under "—Application of Receipts" above and (2) all Outstanding TIFIA Indebtedness will be fully retired by its final maturity date; and

(v) evidence that such Senior Lien Indebtedness will be rated at an investment grade rating by Fitch, Moody's or S&P.

In addition, so long as any of the Insured Bonds are Outstanding, unless AGC and AGM agree otherwise, additional Long-Term Senior Lien Indebtedness may not be incurred unless the Authority files with the Trustee, AGC and AGM (a) an Officer's Certificate demonstrating that the Revenues for each of the two most recent Fiscal Years for which audited financial statements are available were, in each Fiscal Year, at least 175% of the Long-Term Debt Service Requirement with respect to all Outstanding Long-Term Indebtedness constituting Senior Lien Indebtedness for such Fiscal Year, (b) a report of the Traffic Consultant described in (ii) above showing that (1) the forecasted Revenues in each Fiscal Year is at least 175% of the Long-Term Debt Service Requirement with respect to all Outstanding Long-Term Indebtedness constituting Senior Lien Indebtedness (excluding any Long-Term Indebtedness constituting Senior Lien Indebtedness to be refunded by the Long-Term Indebtedness to be incurred) and the Long-Term

Indebtedness proposed to be incurred, and (2) the forecasted Revenues in each Fiscal Year is also at least 150% of the Long-Term Debt Service Requirement with respect to all Outstanding (and proposed to be incurred) (A) Long-Term Indebtedness constituting Senior Lien Indebtedness (excluding any Long-Term Indebtedness constituting Senior Lien Indebtedness to be refunded by the Long-Term Indebtedness to be incurred) and (B) TIFIA Indebtedness, and (c) evidence that the proposed Senior Lien Indebtedness has been rated at an investment grade rating by at least one nationally recognized municipal bond rating agency.

Notwithstanding the foregoing, AGC and AGM have waived the foregoing provisions with respect to the issuance of the Series 2019 Bonds and the TIFIA Indebtedness to finance Complete 540 - Phase 1. See "THE TRIANGLE EXPRESSWAY SYSTEM – Complete 540" herein.

So long as the TIFIA Series 2019 Bond is Outstanding, the 2019 TIFIA Loan Agreement contains additional restrictions on the issuance of additional Senior Lien Indebtedness. See "The Trust Agreement – Limitation on Senior Lien Indebtedness" in APPENDIX A hereto for such additional restrictions.

The Trust Agreement contains certain additional provisions setting forth requirements for the issuance of Senior Lien Indebtedness and certain additional conditions under which Senior Lien Indebtedness may be incurred in order to complete the Initial Project or any Additional Project or to refund Outstanding Long Term Indebtedness or in certain other circumstances. See "The Trust Agreement – Limitation on Senior Lien Indebtedness" in APPENDIX A hereto for such additional details.

Under the conditions and limitations set forth in the Trust Agreement and without the approval or consent of the Owners or Holders of Senior Lien Indebtedness, the Authority may issue or incur Subordinated Indebtedness secured by a pledge, charge and lien upon Trust Estate subordinate to the payment of Senior Lien Indebtedness.

THE TRIANGLE EXPRESSWAY SYSTEM

General

The "Triangle Expressway" currently extends for approximately 18.8 miles from the interchange of I-40 and NC 147 on the north end to the NC 55 Bypass near Holly Springs, North Carolina on the south end, and includes 12 interchanges (collectively, the "Triangle Expressway System"). The Triangle Expressway is a segment of the partially complete "Outer Loop" around the greater Raleigh, North Carolina area. Using the Triangle Expressway, travelers have a limited-access, six-lane, high-speed facility from I-40 to the NC 55 Bypass near Holly Springs, reducing congestion on NC 55, a heavily utilized road which runs parallel to the Triangle Expressway. The Triangle Expressway provides access to a rapidly developing area within the Triangle region, which is projected to have substantial increases in both population and employment over the next 25 years, and improves access into the Research Triangle Park and other area employment centers.

The Triangle Expressway System initially was comprised of two major construction projects known as the Triangle Parkway (also referred to as "Toll NC 147") and the Western Wake Freeway (also referred to as "Toll NC 540"). The two projects were financed together, but had three different opening dates based on the volume of work in each project. The first segment of the Triangle Expressway System, the Triangle Parkway, broke ground in August 2009 and opened to traffic in December 2011. The second and third segments of the Triangle Expressway System, which made up the Western Wake Freeway, opened in August 2012 and December 2012, respectively.

In April of 2017, a new interchange known as the Veridea Parkway Interchange opened to traffic. The Veridea Parkway Interchange is located between the US 1 interchange and the NC 55 Bypass interchange on the southern end of the Triangle Expressway and provides a direct local link between the Triangle Expressway and Veridea Parkway/Old Holly Springs-Apex Road. The Veridea Parkway Interchange was paid for in part with proceeds of the Series 2009 Bonds. A second interchange, the Morrisville Parkway Interchange, is currently under construction and is expected to be completed in early 2020 to provide increased connectivity and access. Toll revenues from both the Veridea Parkway Interchange and the Morrisville Parkway Interchange are or will be included in Receipts and Revenues of the Triangle Expressway System.

The Authority and NCDOT entered into a Project Specific Agreement for Triangle Expressway and Executory Contract for Lease of Right-of-Way for Triangle Expressway (the "Project Specific Agreement") on March 6, 2008. The Project Specific Agreement establishes the terms and conditions under which NCDOT supports the Authority in its efforts to finance, construct, equip, operate and maintain the Triangle Expressway System in accordance with the Authority Act. The Authority and the NCDOT entered into a Lease Agreement (the "Lease Agreement") under which the NCDOT leases to the Authority all rights-of-way necessary for the Triangle Expressway System for one dollar per year. The Lease Agreement provides the Authority uninterrupted access to and full use of the Triangle Expressway System rights-of-way up to and until the Authority ceases to operate the Triangle Expressway System as a toll facility, at which time the Lease Agreement will terminate and the Triangle Expressway System will revert to the NCDOT.

Extension of NC 147

The NCDOT 2018-2027 STIP includes, as Project U-5966, funding for the construction of a multilane highway that will connect the segment of the Triangle Expressway System known as Toll NC 147 (at the interchange with Toll NC 540) to McCrimmon Parkway at Town Hall Drive in Morrisville, North Carolina (the "Highway 147 Extension"). The STIP shows funding for right-of-way and utility relocation for the Highway 147 Extension in Fiscal Year 2024 and construction in Fiscal Year 2027. The Highway 147 Extension would provide the area with more direct access to the Triangle Expressway System from the communities to the south of the Triangle Expressway. The Highway 147 Extension will not be part of the Triangle Expressway System, but will provide direct highway access to the Triangle Expressway System.

Maintenance of the Triangle Expressway System

Maintenance is performed to standards defined in the Authority's maintenance rating program guidelines, standard operating procedures for roadway elements, and NCDOT performance standards, and utilizes criteria used to measure compliance. The Authority has an independent consultant who conducts the Maintenance Rating Program ("MRP") for the Triangle Expressway on a quarterly basis. The maintenance rating program assesses various elements of the Triangle Expressway, including road surface, unpaved shoulders and ditches, drainage, roadside and traffic control devices. The Authority's target rating for the MRP is 90; the Triangle Expressway's MRP rating as of June 30, 2019 was 92.1. If the Authority is unable to fund the maintenance costs after satisfying debt payments, the NCDOT O&M Guaranty ensures that operating and maintenance costs will be paid by NCDOT.

Complete 540 – Phase 1

Compete 540 – Phase 1 is an extension of the Triangle Expressway System, and will be a six-lane controlled access toll facility. It will modify one interchange and add six new interchanges to the Triangle Expressway System. Complete 540 – Phase 1 consists of three separate NCDOT State Transportation Improvement Program ("STIP") Projects R-2721A, R-2721B and R-2828, that make up the approximately 17.8 mile portion of Complete 540 from the NC 55 Bypass in Apex east to I-40 in Johnston County. STIP

Project R-2721A is the portion of the Triangle Expressway from the NC 55 Bypass to east of Holly Springs Road; STIP Project R-2721B is the portion from east of Holly Springs Road to east of US 401; and STIP project R-2828 is from east of US 401 to I-40. Complete 540 - Phase 1 will have controlled access interchanges with the following roads: NC 55 Bypass, Holly Springs Road, Bells Lake Road, Fayetteville Road (US 401), Old Stage Road, Benson Highway (NC 50) and US 70/I-40 and will have six mainline toll collection zones.

The following map shows the route of Complete 540 – Phase 1, including the STIP Project references:

Complete 540 – Phase 2

The final phase of the Triangle Expressway System consists of the remaining 10.8 miles from I-40 to the US 64/US 264 Bypass and is identified in the STIP as R-2829. The Authority expects to commence construction of Complete 540 – Phase 2 in 2029. Completion of Complete 540 – Phase 2 will complete the 540 Outer Loop around the greater Raleigh area, which will accomplish several objectives, including improved mobility within or through the area during peak travel periods, reduction of forecasted congestion on the existing roadway network within the area, and improving linkage in the regional roadway network. It is expected that completion of the 540 Outer Loop will benefit local commuters living south and east of Raleigh as well as motorists making longer trips through the Triangle region to and from points south and east.

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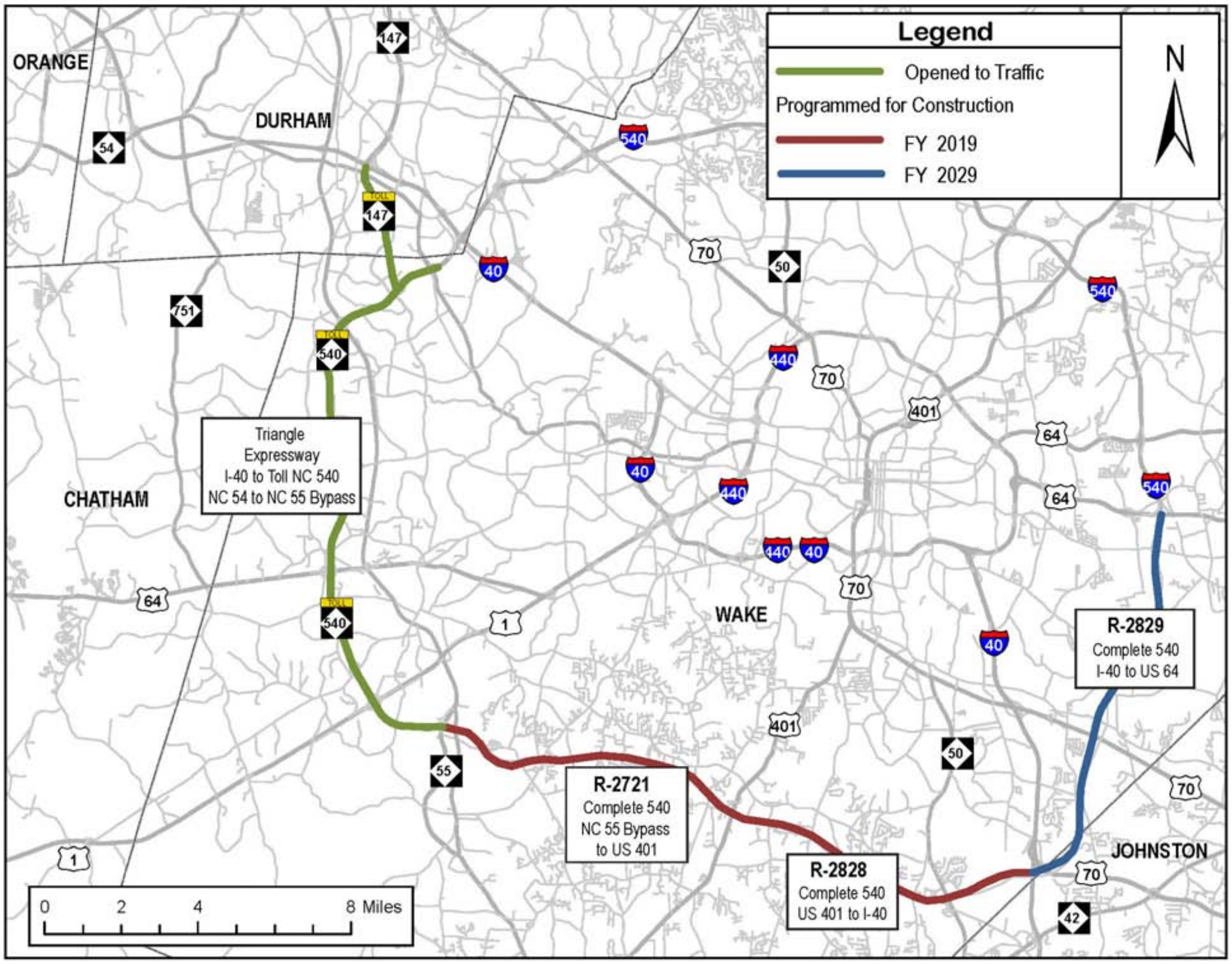
The following map shows the route of Complete 540 – Phase 1 and Complete 540 – Phase 2, including the STIP Project references and expected dates of commencement of construction:



Construction of Complete 540 – Phase 1

Complete 540 – Phase 1 will be built using the design build method of contracting. A joint venture consisting of Flatiron Constructors, Inc. and Branch Civil, Inc. was selected to design and build STIP Projects R-2721A and R-2721B ("Flatiron-Branch"). A joint venture consisting of The Lane Construction Corporation and Blythe Construction, Inc. ("Lane-Blythe;" with Flatiron-Branch, each, a "Design-Build Contractor" and collectively, the "Design-Build Contractors") was selected to design and build STIP R-2828. See "THE TRIANGLE EXPRESSWAY SYSTEM – Design-Build Contractors." Such contracts are fixed price contracts, subject to certain contingencies. Design of all three projects began in early 2019, with groundbreaking expected to occur in late 2019. The estimated project costs for Complete 540 – Phase 1, based on the prices bid by the Design-Build Contractors, are set forth in the following table:

[Table on following page]

Complete 540 - Phase 1 Capital Cost Breakdown (in millions)

Project Element	R-2721A Cost ($M)	R-2721B Cost ($M)	R-2828 Cost ($M)	Total Cost ($M)
Highway Design-Build Contract	$ 183.76	$ 161.14	$ 406.12	$ 751.02
Third Party Delay Contingency	$ 13.17	$ 11.55	$ 29.11	$ 53.83
Change Order Contingency	$ 12.83	$ 12.53	$ 28.47	$ 53.83
Construction Engr. & Inspection	$ 11.93	$ 10.38	$ 26.06	$ 48.37
Incentives	$ 0.54	$ 0.72	$ 2.25	$ 3.51
Landscaping	$ 2.67	$ 2.32	$ 5.84	$ 10.83
Right of Way	$ 54.89	$ 79.08	$ 71.62	$ 205.59
Utilities	$ 8.39	$ 26.41	$ 24.40	$ 59.20
Toll Integration Vendors	$ 3.96	$ 6.98	$ 10.30	$ 21.24
Agency Labor and Administration	$ 3.37	$ 3.29	$ 7.33	$ 14.00
Administrative Contingency	$ 8.05	$ 8.37	$ 16.81	$ 33.22
Diesel & AC Price Adj. Reserve Fund	$ 3.90	$ 2.20	$ 3.30	$ 9.40
Mussel Prop. & Env. Prot. Measures	$ -	$ -	$ 31.40	$ 31.40
Total Cost ($M)	**$ 307.46**	**$ 324.97**	**$ 663.01**	**$ 1,295.44**

The Cost of Complete 540 – Phase 1 will be paid from the proceeds of the Series 2019 Bonds, the 2019 State Appropriation Bonds and the 2019 TIFIA Loan. The Authority expects to close on the 2019 State Appropriation Bonds and the 2019 TIFIA Loan Agreement on the Closing Date. The remaining Cost of Complete 540 – Phase 1 is expected to be paid from one or more issues of the State of North Carolina GARVEE Bonds and State matching funds. In addition, funds from the NCDOT National Highway Performance Program in an amount of up to $81,000,000 are available to pay costs of Complete 540 – Phase 1, although at this time the Authority does not anticipate that such funds will be needed. Based upon the estimate of its engineers and the contract prices, the Authority believes that sufficient funds will be available to pay the Cost of Complete 540 – Phase 1 from the sources described above. Nevertheless, in the event that unexpected or unforeseen circumstances result in additional unanticipated costs, NCDOT has undertaken pursuant to the NCDOT Renewal and Replacement Guaranty in the Trust Agreement to provide additional funding to complete construction of Complete 540 - Phase 1 if the amounts described above are not sufficient. The Trust Agreement provides that such payments are to be paid by NCDOT from amounts then available in the State Highway Fund or the State Highway Trust Fund, subject to appropriation and availability of amounts for such use in such funds.

Design-Build Contractors

The Design-Build Contractor for STIP Project R-2828 is Lane-Blythe, of which The Lane Construction Corporation ("Lane") and Blythe Construction, Inc. ("Blythe") are 50% partners. Lane and Blythe are individually prequalified with NCDOT and Lane-Blythe is prequalified with NCDOT. Lane and Blythe are experienced contractors in delivering projects featuring greenfield and toll facilities, including all-electronic toll highways, across the country. Lane-Blythe has teamed with WSP USA Inc. ("WSP") as the lead design firm for Project R-2828. Lane-Blythe and WSP provide strong North Carolina design-build experience and a deep pool of resources for construction and self-performance. For example, Lane was the prime contractor for the construction of the $98.7 million I-85/I-485 interchange in Mecklenburg County, North Carolina; the $722 million I-95 express lanes P3 project in Fairfax County, Virginia; and the $1,067 million IH-35E Managed Lanes project in Denton and Dallas Counties Texas. Similarly, Blythe was the prime contractor for the $157 million 5.1 mile segment of I-485 in Mecklenburg County, North Carolina and the $117 million six mile segment of US 311 in Guilford and Randolph Counties, North Carolina.

The selected Design-Build Contractor for both STIP Project R-2721B and R-2721A is Flatiron-Branch, a joint venture of Flatiron Constructors, Inc. ("Flatiron") and Branch Civil, Inc. ("Branch"), which combines two experienced design-build contractors with extensive experience in North Carolina and throughout the Southeast. Flatiron and Branch both have a history of self-performing a majority of the work on design-build projects, including greenfield work. For example, Flatiron was the lead contractor for a $177 million project in Guilford County, North Carolina that involved a four lane, 9.4 mile interstate and a taxiway bridge at Piedmont Triad International Airport, and the $136 million I-85 Yadkin River Bridge project in Davidson and Rowan Counties, North Carolina. Branch was the primary contractor for the $37.5 million I-95 express lane extension in Stafford County Virginia and the $222 million US Route 58 project in Carroll, Floyd and Patrick Counties, Virginia. The local management and talent are supplemented by Flatiron and Branch's national reach combining for a pool of 4,000 employees.

Flatiron-Branch has teamed with HDR Engineering, Inc. of the Carolinas ("HDR") as the lead designer for STIP Project R-2721B. HDR is one of the largest engineering firms in the country and is consistently ranked by Engineering News Record among the Top 20 Transportation Firms and Top 500 Design Firms.

Flatiron-Branch teamed with Gannett Fleming, Inc. ("GF") as the lead designer for STIP Project R-2721A. Founded in 1915 and located in North Carolina since 1965, GF is a nationally recognized, privately-held, multi-disciplinary consulting engineering and construction management firm with more than 2,200 employees skilled in 30 professional disciplines.

Description of Design-Build Contracts

The Design-Build Contracts provide that the Design-Build Contractors will design and construct the project segments in accordance with the functional plans provided by the Authority. The Design-Build Contractors are required to design the project in accordance with the project contract documents that include the Request for Proposals (the "Construction RFP") and all standard drawings, details and specifications that are referred to therein. The design is required to conform to Federal Highway Administration and American Association of State Highway and Transportation Officials ("AASHTO") guidelines.

Right-of-Way Acquisition

NCDOT has completed advanced right of way acquisitions for portions of Complete 540 – Phase 1. Purchase of the remainder of the parcels began in earnest in January 2019. The acquisition of some of the parcels is affected by the Transportation Corridor Official Map Act ("Map Act"), under which NCDOT recorded corridor maps that imposed restrictions on a landowner's rights to improve, develop and subdivide property within the corridor, but was not required to purchase the property at the time of the filing of a future corridor map. In June of 2016, the North Carolina Supreme Court ruled that the filing of a transportation corridor map pursuant to the Map Act resulted in a taking of the property owners' rights to improve, develop and subdivide their property, for which the landowners were entitled to compensation. Under State law, whether a property owner should be paid for the property, and how much are determined on a case-by-case basis. The Map Act settlements are a part of the right of way acquisition process for Complete 540 – Phase 1, and therefore typically proceed on the same timeframe as the acquisition of the property itself. While the parcels to be acquired may be eligible for Map Act claims, the purchase price is negotiated between the Authority (or its agents) and the landowner in the ordinary course unless the landowner makes a Map Act claim. The Authority does not believe that the possibility of Map Act claims will delay the acquisitions. The construction budgets for right-of-way acquisition for each project uses a purchase price equal to 170% of the appraised value of the rights of way to be acquired. As of the end of October, 2019, approximately 44% of the right-of-way parcels in Project R-2721A had been settled, approximately 59% of the right-of-way parcels in Project R-2721B had been settled, and approximately 7% the right-of-way parcels in Project R-2828 had been settled.

Project Cost Contingencies

The Design-Build Contracts are fixed fee, lump sum contracts that limit the Authority's exposure to the majority of risk elements for design and construction of Complete 540 – Phase 1. The unlimited notices to proceed under the Design-Build Contracts were issued on September 26, 2019 and in accordance with the contracts, the bid amounts were adjusted based on the 20-City Construction Cost Index published in the Engineering News Record, using the percentage calculated from the baseline index value as compared to the index value for September 2019 (the month in which the unlimited notices to proceed were issued). These increases are $0.3 million (R-2721A), $1.2 million (R-2721B), and $2.9 million (R-2828). However, contingencies are still included in the Capital Cost Breakdown to account for any reasonable possible issues that may arise.

Contingency funds have been specifically set aside for additional payments made to the Design-Build contractors as a result of any delay to their work caused by third parties (e.g. railroad, utility companies, property owners). The project budget contains $53.8 million for such contingencies.

Contingency funds have also been specifically set aside for design and construction change orders and the graduated on-time completion bonus (as described in more detail in the GEC Report). The project budget contains $53.8 million for such contingencies.

A general administrative contingency of approximately 3% of the total project cost was included in the project budget to cover unforeseen circumstances. The total amount of contingency funds available for the acquisition and construction of Complete 540 – Phase 1, is more than $150 million, which is available to pay for any cost overruns, including right-of-way acquisition costs in excess of those budgeted and increases in construction cost.

Provisions have been included in the Design-Build Contracts for price adjustments for asphalt binder and diesel fuel. These items have price adjustment clauses due to the inherent volatility in the marketplace, to ensure that the Authority does not pay exorbitant amounts in bid contingencies, and to balance the risk to the Design-Build Contractors. When the price of these materials drops from a base price index as provided in the Construction Contracts, NCDOT reduces payments to the Design-Build Contractor according to a quantity-based formula. If the prices rise above the base prices noted in the Construction Contracts, the Authority will draw from its contingency pool to pay additional compensation. The Authority anticipates entering into a hedging agreement in order to cap its exposure to price fluctuations in diesel fuel, and possibly asphalt binder. The reserve funds for these adjustments remain in the project budget, at $4.8 million for diesel fuel and $4.6 million for asphalt binder.

Additional information about the Design-Build Contractors and their respective Design-Build contracts is included in APPENDIX C – GEC REPORT to this Official Statement.

Payment and Performance Bonds

Each Design-Build Contractor was required to provide a payment and performance bond equal to its Design-Build Contract amount. The performance bonds secure each of the Design-Build Contractor's agreement to construct the Project in accordance with the terms and conditions of its Design-Build Contract, and within the time allowed. The payment bond protects the laborers, material suppliers and subcontractors against non-payment. For R-2721A and R-2721B, Liberty Mutual Insurance Company, Travelers Casualty and Surety Company of America, Fidelity and Deposit Company of Maryland, Zurich American Insurance Company, Federal Insurance Company, Berkshire Hathaway Specialty Insurance Company and Hartford Fire Insurance Company are serving as surety for the bonds with a coverage amount of $183,459,000 for R-2721A and $159,983,000 for R-2721B. For R-2828, Liberty Mutual Insurance Company, National Union Fire Insurance Company of Pittsburgh, PA, Zurich American Insurance Company, Fidelity and Deposit Company of Maryland and Berkshire Hathaway Specialty Insurance Company are serving as surety for the bonds with a coverage amount of $403,200,000.

Warranty

Each Design-Build Contractor is also required to provide a three-year warranty on its work, beginning at substantial completion of its portion of Complete 540 – Phase 1. The warranty begins after acceptance of that portion of the Complete 540 project at substantial completion. Each Design-Build Contractor must furnish a warranty bond in the amount of 5% of the total cost of its Design-Build Contract (R-2721A: $9.17 million, R-2721B: $8.00 million, R-2828: $20.16 million, for a total of $37.33 million) to guarantee that the contract warranty requirements will be satisfied. In addition to the warranty that is required by the Construction RFP, each Design-Build Contractor has provided additional warranties.

For R-2721A and R-2721B, Flatiron-Branch will extend the asphalt pavement warranty to six years for materials and workmanship, doubling the required warranty period using the criteria provided in the Warranty Criteria for New Hot Mix Asphalt Pavement section of the Construction RFP. Flatiron-Branch team will extend the bridge component warranty to 10 years for materials and workmanship, using the criteria provided in the Warranty Criteria for Bridge Components section of the Construction RFP. Additional warranty bonds will be provided for the extended warranty periods listed above.

For R-2828 project, Lane-Blythe is extending the overall warranty by an additional 2 years for a total of five years. This extended warranty will apply to major components of work defined as bridges, pavements, retaining walls, noise walls, culverts, and overhead sign structures. Lane-Blythe will warrant and guarantee materials and workmanship against latent and patent defects arising from faulty materials, faulty workmanship, or negligence. Materials and workmanship will be guaranteed for a period of five years following the date of final acceptance of the work by the Authority. The first 36 months of the guarantee will be supported by Lane-Blythe's warranty bond described above, and the additional 24 months will be covered by an extension of the warranty bond. Over the duration of the warranty and guarantee period, Lane-Blythe will replace and/or remediate mutually agreed-upon defective materials and workmanship without cost to the Authority or NCDOT.

Liquidated Damages and Incentive Bonuses

Liquidated damages will be assessable from each Design-Build Contractor for failure to perform within the Design-Build Contract time requirements. In particular, each Design-Build Contractor will be liable for liquidated damages in the amount of $20,000 per calendar day for each day of delay in achieving substantial completion beyond the projected applicable substantial completion date. In addition, if a Design-Build Contractor does not achieve final completion by the projected final completion date, liquidated damages in the amount of $5,000 per calendar day for each day of delay will be due. These liquidated damage provisions provide an additional layer of performance protection in the Design-Build Contracts. The amount of liquidated damages included in the Design-Build Contracts for delay is unlimited.

The Design-Build Contracts include significant incentives for the Design-Build Contractor to meet certain schedule milestones. In the event that substantial completion is achieved by the contractual substantial completion date and toll collection and enforcement technology is fully implemented, the Design-Build Contractor will be eligible for a per diem bonus ranging from $2,000 -$12,500.

Insurance Coverage

Each Design-Build Contractor for the Complete 540 – Phase 1 will be required to provide limited amounts of insurance coverage during construction including workers compensation insurance in the amount required by law. Additionally, commercial general liability insurance coverage (including bodily injury, property damage, personal injury and advertising injury), umbrella excess liability coverage, business automobile liability insurance, pollution liability insurance, builders risk insurance are expected to meet or exceed limits required by law, licensing requirements, by the respective surety and/or good business practice. Railroad Protective Liability Insurance for Bodily Injury Liability, Property Damage Liability, and Physical Damage to Property is required by the Design-Build Contract, and general liability insurance is required by the Professional Engineering Firm prequalification process utilized by the Authority.

Status of Permitting

The Authority and NCDOT have obtained a phased North Carolina Department of Environmental Quality, Division of Water Resources ("NCDEQ-DWR") Section 401 Water Quality Certification and Neuse Riparian Buffer Authorization for Complete 540 – Phase 1 and Complete 540 – Phase 2 (collectively, "Complete 540"). The Authority and the NCDOT have obtained a phased United States Army Corps of Engineers ("USACE") Section 404 Permit for Complete 540. The USACE permit is a phased permit based on final impact calculations for the R-2721A and R-2721B projects, and preliminary impact calculations for R-2828. Because the Section 404 Permit for R-2828 was based on preliminary calculations, a major permit modification will be required once final design drawings are available for that segment.

Lane-Blythe is responsible for all work necessary for the Authority and NCDOT to secure the major permit modification needed for construction of R-2828. The Flatiron-Branch is responsible for all work necessary for the Authority and NCDOT to prepare permit modification packages for any changes in impacts resulting from their final designs for R-2721A and R-2721B.

Settlement of Lawsuit

Sound Rivers, Inc., Center for Biological Diversity, and Clean Air Carolina, represented by the Southern Environmental Law Center, filed claims in federal court in 2018, and the North Carolina Office of Administrative Hearings in 2019, related to the environmental process and impacts of the construction of Complete 540. On August 22, 2019, NCDOT and Sound Rivers, Inc., Center for Biological Diversity and Clean Air Carolina signed a settlement agreement pursuant to which the plaintiffs agreed to dismiss such claims in return for an agreement from NCDOT to set in place protections for clean air, clean water and endangered aquatic species. The expenditures the Authority is obligated to make under the settlement are included in the plan of finance for Complete 540 – Phase 1 and Phase 2. The settlement agreement includes covenants not to challenge future approvals for Complete 540 – Phase 1 or Phase 2, and will permit the Authority to proceed with the implementation of Complete 540 – Phase 1 and Phase 2.

Project Management and Compliance

The Authority is implementing a comprehensive and proactive Project Management and Compliance Monitoring Plan (the "Plan") for Complete 540 – Phase 1, designed to ensure that planning, design, right-of-way acquisition, construction, operation and maintenance of the project meet all applicable federal, state and local laws and regulations (including the requirements generated by the National

Environmental Policy Act ("NEPA") process, as well as the design and construction standards and specifications). The Plan includes the following concepts:

Preliminary/Right-of-Way Design. Preliminary designs and right-of-way plans for R-2721A and R-2721B were completed by an external consultant contracted with the Authority prior to bidding. The preliminary designs and right-of-way plans for R-2828 will be prepared by the Lane-Blythe's engineering firm, WSP USA ("WSP"). The Authority is coordinating closely with NCDOT's division personnel and design groups.

Final Design. Final design will be completed by Gannett Fleming for R-2721A, HDR Inc. for R-2721B, and WSP for R-2828, as part of the design scope of the design-build contracts. As part of the Authority's management process, it will conduct frequent "over-the-shoulder" design reviews and audits of the Complete 540 project with Federal Highway Administration – North Carolina Division ("FHWA") and other units of NCDOT to ensure that the Complete 540 project is in compliance with applicable design criteria from the earliest stages of design.

Right-of-way Acquisition. Preliminary right-of-way plans were completed by a third-party consultant for R-2721A and R-2721B. Preliminary right-of-way limits have been established based on construction limits from functional roadway design plans for the R-2828 project. The Authority has selected two professional services firms to handle the right-of-way acquisition process for R-2721A and R-2721B on its behalf, both of which have extensive experience in the field of right-of-way acquisition, relocations, and related services and will adhere to the provisions of the Uniform Relocation and Real Property Acquisition Act of 1970 ("Uniform Act") as well as all appropriate state and federal guidelines. The Design-Build Contractor for R-2828 includes a right-of-way firm that will also adhere to the Uniform Act and is responsible for right-of-way acquisition now that right-of-way plans have been completed by the contractor and approved by the Authority.

Construction Oversight. The Authority and NCDOT have hired the firm S&ME Inc. ("S&ME"), to be directly responsible for construction management/construction oversight of Complete 540 – Phase 1. S&ME's scope of work, includes overseeing Summit Design and Engineering Services, the Construction Engineering and Inspection firm (the "CEI firm"). The activities of the CEI firm will include inspection, erosion control inspection, materials sampling and testing, surveying grade verification, documentation of pay quantities, and claims avoidance.

QA/QC Testing. The Authority will require each Design-Build Contractors to procure independent quality assurance/quality control ("QA/QC") personnel to provide certain testing and quality control services in connection with the Project.

Environmental and Permit Monitoring. The Authority will require the Design-Build Contractors to staff independent personnel to provide impartial environmental and permit monitoring services in conjunction with their portion of Complete 540 – Phase 1. These services will include the monitoring of items during each phase of the construction, including construction runoff water quality device inspections, hazardous material spill reporting and response, compliance with USACE Section 404 permit requirements and NCDEQ - DWR, and notifications of archaeological discoveries.

All-Electronic Tolling

The Authority utilizes an all-electronic tolling ("AET") system for the Triangle Expressway System where vehicles are detected while traveling at highway speeds, without having to stop and pay cash tolls. Six mainline toll zones for Complete 540 – Phase 1 will be located between interchanges to ensure that all users of the Triangle Expressway pay a toll. Customers may elect to pay tolls using a pre-paid transponder-based account, which results in a 35% discount on rates compared to customers without a transponder. For customers using the Triangle Expressway without a transponder, an image of their license plate is captured and they are sent an invoice by U.S. Mail. All customers can make their payments by cash, check, money order or credit card.

Toll Collection System Technology

Electronic Toll Collection System. The Electronic Toll Collection System ("ETCS") consists of the transponder and reader/antenna technology, which will be installed and operated by Kapsch TrafficCom USA, Inc. ("ETCS Contractor" or "Kapsch"). The ETCS facilitates AET by processing transponder reads from multiple transponder programs at all speeds, and assigning reads to the proper vehicles. The ETCS Contractor coordinates with the Roadside Toll Collection System ("RTCS") contractor to ensure seamless and accurate operation with and within the RTCS. The ETCS contractor also interfaces with the Back Office System contractor through the transponder reader for automatic input of the transponders into a transponder inventory application and customer accounts. The ETCS is a multiprotocol solution that will allow the Authority to read transponders issued by the Authority, transponders from the E-ZPass Group (described below) and transponders from Florida and Georgia toll agencies.

Roadside Toll Collection System. The RTCS is a fully-automated, multi-lane, free-flow system, specifically designed for accurately detecting and classifying vehicles traveling the roadway at high speeds and capturing transactions through transponder reads or license plate images. The RTCS functionality includes multiple levels of optical character recognition and automated license plate recognition, and the vendor is responsible for performing manual license plate image reviews to ensure complete and timely transactions are transmitted to the BOS. The RTCS includes fully automated toll zones, a toll facilities host and a database, a digital video audit system and interfaces with the BOS. The RTCS will be installed and operated by Kapsch.

Back Office System. The Back Office System ("BOS"), currently operated by Conduent, processes the roadside toll transactions and posts these transactions to the transponder and video-based accounts. The BOS includes the system host, databases, and the video processing for customers without registered pre-paid transponder accounts. The BOS is the interface to the payment systems and commercial establishments. In October 2018, the Authority executed a new BOS contract with TransCore, with system turnover expected during calendar year 2020, and TransCore is expected to be the BOS provider when Complete 540 – Phase 1 is opened to traffic. The BOS contractor's responsibilities include the design, development, installation, and implementation of hardware, software, and telecommunication networks for customer account processing, billing processing, necessary system interfaces, and maintenance.

Operation Services. The Operation Services contractor (the "Operations Contractor") is AECOM, which provides for the operations and staffing of the operations and customer service centers. Customer service and account management services include operational service for the call center, walk-in counters, mail and e-mail processing, transponder inventory control, and all other activities involving BOS processes.

Interoperability

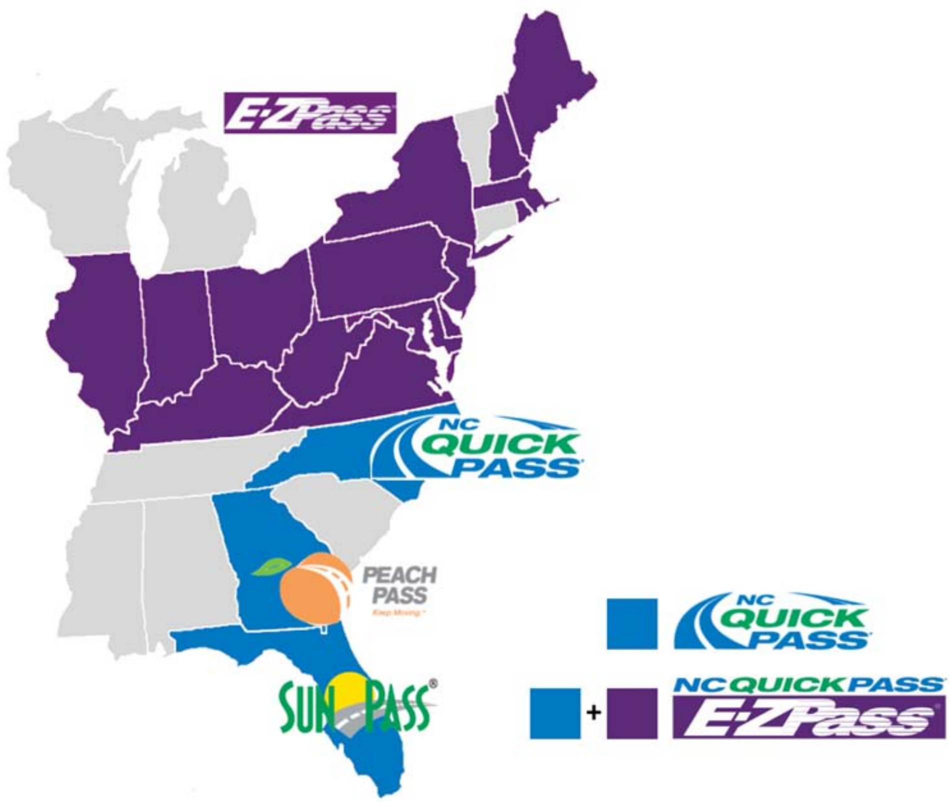
The Authority is a full member of the E-ZPass Group, with an interoperability agreement that permits all E-ZPass® agencies in 17 states to accept the NC Quick Pass® E-ZPass transponder as a form of payment and permits the Authority to accept E-ZPass as a form of payment on toll roads in North Carolina. This agreement enables the Authority to do business with the more than 35 million drivers who have E-ZPass transponders.

A similar agreement exists between the Authority and Florida's Turnpike Enterprise and Central Florida Expressway Authority, permitting interoperability between NC Quick Pass, Florida's SunPass®, the Central Florida E-Pass and Georgia's Peach Pass® prepaid toll programs, covering 13 agencies in Florida and Georgia.

The interoperability agreements have expanded the versatility of the NC Quick Pass system and allow NC Quick Pass to be the premier interoperable transponder program along the east coast. In September of 2016 and again in October of 2018, the Authority received the President's Award for Excellence from The International Bridge, Tunnel and Turnpike Association (IBTTA) for its Multi-Agency Interoperability Program and its leadership in technology solutions for interoperability.

In Fiscal Year 2019, the total number of transactions for interoperable agency customers utilizing the Triangle Expressway System was approximately 5.9 million; the number of NC Quick Pass transactions utilizing other states' facilities was approximately 2.1 million.

The map set forth below shows states with systems that are interoperable with the NC Quick Pass system and where the NC Quick Pass E-ZPass transponder can be used.



Toll Collection Enforcement

The Authority maintains a NC Quick Pass Operations Center and three Customer Service Centers (each, a "CSC") in the State. The Morrisville CSC is adjacent to the Triangle Expressway for customers to pay toll invoices, establish accounts and buy transponders.

The Authority administers two payment programs on the Triangle Expressway: electronic toll collection using NC Quick Pass transponders, or Bill by Mail using the OCR/ALPR system described under "Toll Collection System Technology – *Roadside Toll Collection System*" above. Under the Authority's Toll Rate Policy, Bill by Mail toll rates are the base rates, and NC Quick Pass customers receive a 35% discount off the Bill by Mail toll rate. The NC Quick Pass transponder program involves setting up a pre-paid account with the Authority and installing a transponder in the vehicle to allow for the automatic deduction of tolls from the pre-paid account. Drivers not in the NC Quick Pass transponder program are invoiced for tolls incurred through the Bill by Mail program.

If a customer uses the Triangle Expressway system and the tolls are not paid within the invoice cycle, a Bill by Mail invoice will be sent to the registered owner of the motor vehicle by first-class mail to the address associated with the vehicle and provided by the North Carolina Division of Motor Vehicles ("NC DMV"), another state's DMV, or another recognized source, as applicable. The first Bill by Mail invoice will include any tolls incurred during the invoice cycle. A person who receives an invoice for an unpaid toll must either pay the invoice or request a review of the invoice by the Authority. If the person invoiced does not take one of such actions within 30 days after the invoice is sent, the Authority will add a \$6.00 processing fee to the toll amount the person owes, with a maximum of \$48.00 in processing fees allowed against that person within a twelve-month period. Each invoice also includes a "failure to pay" statement explaining the fees and the consequences of non-payment. The Authority will add a \$25.00 civil penalty after the second unpaid invoice. Only one civil penalty may be assessed within a six-month period. The failure of a person to pay an invoice, including any processing fee and any civil penalty, is grounds to withhold the registration renewal of any motor vehicle registered in that person's name. When the Authority notifies the North Carolina Commissioner of Motor Vehicles of a person who owes a toll, processing fee or civil penalty, the North Carolina Commissioner of Motor Vehicles must withhold the registration renewal of any motor vehicle registered in that person's name until the required payment is made. If necessary, the Authority uses collection agencies to collect unpaid tolls and fees from users of the Triangle Expressway. As of the end of Fiscal Year 2018, the Authority was billing approximately 96.6% of total lane transactions. Of the transactions billed, the Authority collected approximately 96.2%, resulting in a combined toll collection rate of approximately 92.9%.

If a person receiving an invoice asks for a review of the invoice for use of the Triangle Expressway, then the Authority is to conduct a review and determine whether the person is liable for the toll. If the Authority determines that the person is liable for the toll, the person may contest this determination by filing a petition for a contested case hearing at the North Carolina Office of Administrative Hearings.

Under the State constitution, amounts collected in the form of civil penalties in excess of the cost of collection are required to be paid to the school administrative unit to provide additional support for the public school system. Therefore, most or all of the civil penalties the Authority collects from the Triangle Expressway System will not be treated as Receipts under the Trust Agreement and will not be paid to the Authority. The Authority will be entitled to collect the full amount of all tolls and the processing fees.

Intelligent Transportation System

The Triangle Expressway Intelligent Transportation System ("ITS") consists of roadside devices including closed circuit television ("CCTV") cameras, microwave vehicle detection stations ("MVDS"), full-matrix dynamic message signs ("DMS") and a wrong-way driver detection and notification system. The ITS is currently connected via a 38-mile fiber-optic communications system using Gigabit Ethernet technology for both the toll collection system and the Intelligent Transportation System. The ITS will be expanded for the Complete 540 – Phase 1 with similar technologies. The ITS provides video and data sharing with the Authority, NCDOT, and Triangle Expressway System users.

The Authority has traffic management workstations and office space allocated in the North Carolina Statewide Transportation Operations Center ("STOC") located in the National Guard Joint Force Headquarters Building in Raleigh. This facility hosts the State's emergency management center. A portion of the STOC is dedicated for the Authority, and serves as a location for the Authority to monitor traffic conditions on the Triangle Expressway.

Toll Rate Policy

Pursuant to Section 136-89.183 of the North Carolina General Statutes, the Authority has the power to fix, revise, charge, retain, enforce, and collect tolls and fees for the use of turnpike projects, including the Triangle Expressway System.

On September 17, 2008, the Authority adopted a toll rate policy (the "Toll Rate Policy") which provides guidelines pursuant to which the Authority shall establish and adjust toll rate schedules for its turnpike projects. Pursuant to the Toll Rate Policy, the Authority was required to hire the Traffic Consultant to prepare a Traffic and Revenue Report for the Triangle Expressway System and forecast the projected traffic for and the toll revenues to be generated from the Triangle Expressway System. After receipt of such traffic and revenue study, the Toll Rate Policy directs the Authority to adopt a toll rate schedule for the use of the turnpike project based upon factors it determines appropriate, including but not limited to, the location of the turnpike project for which the toll is collected, the type of vehicles anticipated to use the turnpike project, the method of collection of the toll (electronic, video, cash or other method) and other factors, including the rate increase assumptions in the traffic and revenue study. The Traffic Consultant prepared the initial Comprehensive Traffic and Revenue Study Final Report for the Triangle Expressway System dated April 6, 2009 (the "Traffic and Revenue Report"), which contained a proposed toll rate schedule with the assumption that the tolls would be increased each year. A copy of the Traffic and Revenue Report is available on the Authority's web page at https://www.ncdot.gov/divisions/turnpike/turnpike-projects/Pages/triangle-expressway-documents.aspx. References to web site addresses presented herein are for informational purposes only and may be in the form of a hyperlink solely for the reader's convenience. Unless specified otherwise, such web sites and the information or links contained therein are not incorporated into, and are not part of, this Official Statement.

Under the Toll Rate Policy, an increase in the toll rates is required in each year unless the Authority provides to the Trustee (1) a resolution of the Authority's Board directing that the toll rates will not be increased or will be increased in a lesser amount than assumed in the Traffic and Revenue Report; (2) a certificate of an officer of the Authority to the effect that the Authority is in compliance with all applicable rate covenants in the Trust Agreement and all other documents for the Bonds issued to finance the Triangle Expressway; and (3) a report of the Traffic Consultant showing that for each succeeding fiscal year through the final maturity date for all indebtedness issued to finance the Triangle Expressway, the forecasted Revenues in each such fiscal year would be such that one dollar of additional senior lien indebtedness could be issued by the Authority in compliance with the requirements of the additional debt limitations set forth in the documents related to all bonds issued to finance the Triangle Expressway.

In 2012 and 2013, in order to reflect the actual start of toll collections on various phases of the Triangle Expressway System and to ensure that toll rates were not increased precipitately, the Authority engaged the Traffic Consultant to provide revised annual gross toll revenue estimates based on delayed implementation dates for programmed toll increases to better reflect the actual dates of operation of the Triangle Expressway. The Traffic Consultant delivered a 2012 Revised Toll Revenue Letter dated December 13, 2012 (the "2012 T&R Letter") and a 2013 Revised Toll Revenue Letter dated June 3, 2013 (the "2013 T&R Letter"). By resolutions adopted on December 20, 2012, and again on June 20, 2013, the Authority determined to adopt a toll rate schedule that deferred inception of rates or rate increases for certain road segments and changed the date of toll increases from July to January in each year. In March, 2016, the Traffic Consultant delivered a report addressing the impact of the addition of the new Veridea Parkway Interchange to the Triangle Expressway System, based on an expected opening date by the end of March, 2017, which included a revised proposed toll rate schedule for that interchange. On August 4, 2016, the Authority adopted the rates included in the March 31, 2016 report as the toll rates for the Veridea Parkway Interchange. That report included a confirmation of certain tolling conventions, including that the Class 2 toll rates will equal two times the Class 1 toll rates, that Class 3 toll rates will equal four times the Class 1 toll rates, and that electronic toll collection rates continue to be discounted by 35% of the Bill by Mail rates. In addition, rates were recommended for new toll zones to keep per mile toll rates as consistent as possible. A similar report was prepared to address the impact of the addition of the new Morrisville Parkway Interchange to the Triangle Expressway System, based on an expected opening date in 2020, which includes a proposed toll rate schedule for that interchange. The Authority adopted the rates for the Morrisville Parkway Interchange in October, 2019. The Traffic and Revenue Study includes the proposed toll rates for Complete 540 – Phase 1. It is anticipated that the setting of future toll rates will continue to follow the conventions currently in place with respect to the Triangle Expressway System, including the goal of relatively consistent per mile rates. In any case, such toll rates will meet the requirement of the Toll Rate Policy that the forecasted Revenues resulting from such toll rates would support the issuance of at least one dollar of additional senior lien indebtedness under the Trust Agreement.

Each revision of the toll rate schedule includes a formal revision to the Traffic and Revenue Report, a determination by the Authority's financial advisor that the new forecasted revenues would be sufficient under the Trust Agreement to meet the Rate Covenant, and an opinion of bond counsel to the Authority that such action would not have an adverse effect on the exclusion of interest on the Bonds issued under the Trust Agreement from gross income for federal income tax purposes or cause the Authority to be in violation of any of its covenants under the Trust Agreement.

Historical Performance of Triangle Expressway System

The Authority's audited financial statements for the last four Fiscal Years show total operating revenues (reported on an accrual basis) for the Authority of $30.709 million, $39.148 million, $45.520 million and $49.648 million for Fiscal Years 2015, 2016, 2017, and 2018, respectively. The audited financial statements for Fiscal Year 2019 are the first to include operating revenues from both the Triangle Expressway System and the Monroe Expressway. For additional information regarding the operations of the Authority, see APPENDIX D – "Audited Financial Statements of the Authority for Fiscal Years ended June 30, 2019 and 2018." Based on those numbers, and certain agreed upon procedures performed by the Authority's auditor, the Authority's revenues from the Triangle Expressway have been significantly above the levels required to meet the Rate Covenant. The Authority's audited financial statements and the corresponding report on agreed upon procedures are posted as part of the Authority's Continuing Disclosure undertaking. The audited financial statements attached as APPENDIX D were re-issued by the auditor on November 27, 2019, to make certain adjustments to the allocation of cash and investments between restricted and unrestricted categories in the Statements of Net Position. Such adjustments did not result in a change to the Authority's total net position.

Total revenue, which is shown on a cash basis and inclusive of toll revenue and processing fees, is listed in the chart below with operating expenses. Fiscal Year 2019 revenues increased by $3,613,655 or 7.4% from the prior year, while Fiscal Year 2019 operating expenses increased $2,109,159 or 11.7% from the prior year. Fiscal Year 2018 revenues increased $4,927,672 or 11.2% from the prior year while Fiscal Year 2018 operating expenses increased $1,714,869 or 10.5% from the prior year.

	Fiscal Year 2017*	Fiscal Year 2018*	Fiscal Year 2019*
Total Revenue	$44,009,928	$48,937,600	$52,551,254
Operating Expenses	16,304,561	18,019,430	20,128,589

*The revenue and operating expenses vary from the numbers shown in the audited financial statements, which are generally presented on an accrual basis rather than a cash basis.

Rate Covenant	2015	2016	2017	2018	2019**
Revenues to Long-Term Debt Service Requirement for Senior Lien Indebtedness (130% minimum)	322%	385%	434%	405%	235%
Revenues to (i) Long-Term Debt Service Requirement for Senior Lien Indebtedness, Subordinate Lien Indebtedness and TIFIA Indebtedness for such Fiscal Year plus (ii) required deposits to Senior Lien Parity Reserve Account, Subordinate Lien Parity Reserve Account and the TIFIA Debt Service Reserve Account (110% minimum)	141%	154%	165%	162%	175%

**Unaudited.

The number of transactions and corresponding toll revenue have continued to increase in 2019. As of June 30, 2019, total transactions increased by 8.7% over the previous Fiscal Year, and year to date revenues on a cash basis were up 7.4% over the previous Fiscal Year. See APPENDIX D.

2019 TRAFFIC AND REVENUE STUDY

In connection with the issuance of the Series 2019 Bonds, the Traffic Consultant prepared the Triangle Expressway and Complete 540 - Phase 1 Traffic and Revenue Study (the "2019 Traffic and Revenue Study"). The 2019 Traffic and Revenue Study sets forth estimated traffic and revenue for the Triangle Expressway system, including Complete 540 - Phase 1, in which traffic and revenue estimates are based on the existing Triangle Expressway (referred to herein as the "Triangle Expressway") being extended from its current southern terminus at NC 55 Bypass eastward to I-40. A complete copy of the 2018 Traffic and Revenue Study is included as APPENDIX B attached hereto. The 2019 Traffic and Revenue Study has been prepared on the basis of numerous assumptions and other factors described in the 2019 Traffic and Revenue Study and should be read in its entirety and in light of such assumptions and other factors. The sensitivity analyses in the 2019 Traffic and Revenue Study make certain assumptions about toll rates through 2058. The Authority Board has not authorized tolls for the original Triangle Expressway System beyond 2049.

Assumptions. The traffic and revenue estimates for the existing Triangle Expressway and Complete 540 - Phase 1 contained in the 2019 Traffic and Revenue Study are predicated on the following basic assumptions, which are considered reasonable for purposes of the base condition forecast:

1. Complete 540 - Phase 1 is scheduled to open on July 1, 2023. The forecasts within the 2019 Traffic and Revenue Study assume that prior to this date, the Triangle Expressway will continue to operate as it currently exists, with certain interchange and toll zone location modifications as enumerated in the 2019 Traffic and Revenue Study. The forecasts assume that the 17.8-mile extension that is Complete 540 – Phase 1 will open to traffic and begin collecting toll revenue on July 1, 2023.

2. A new interchange at Morrisville Parkway will be open to traffic in early 2020. A new mainline toll zone north of the new Morrisville interchange will be associated with this new interchange, and related adjustments in toll rates at existing mainline toll zones north of Green Level West Road will be made.

3. Existing ramp toll zones at Hopson Road and US 64 will be removed and replaced with two new mainline tolling zones immediately north of these respective interchanges. Associated toll rate adjustments will also occur to maintain similar through-trip per-mile toll rates. These toll-collection system changes are assumed to begin on July 1, 2023.

4. Tolls on Triangle Expressway and Complete 540 - Phase 1 will continue to be charged for three vehicle classes, using a cashless all-electronic toll collection methodology. Class 1 toll rates for each year of the forecast period are shown as in Table 6.5 and Table 7.1 of the 2019 Traffic and Revenue Study, which assumes continued annual increases in toll rates.

5. Highway and other transportation improvements set forth in Tables 6.1, 6.2, and 6.3 of the 2019 Traffic and Revenue Study will be implemented within the time frames assumed in those tables. For purposes of the base case traffic and revenue forecast, no other transportation improvement projects, particularly new roads, additional road capacity, or new interchanges, will be constructed during the forecast period other than those shown in Table 6.1, 6.2, and 6.3 of the 2019 Traffic and Revenue Study. In particular, the 2019 Traffic and Revenue Study assumes that the planned Highway 147 Extension (STIP Project U-5966) will not occur.

6. The estimated annual rates of inflation used for purposes of the forecast are shown in Table 6.7 of the 2019 Traffic and Revenue Study.

7. The estimated method-of-payment market shares among electronic toll collection ("ETC") and bill-by-mail ("BBM") used for purposes of the forecast is shown in Table 6.12 of the 2019 Traffic and Revenue Study.

8. Economic growth in the project study area will generally occur as forecasted by the independent economist used in the 2019 Traffic and Revenue Study.

9. Leakage and fee revenue adjustments are applied to the estimated gross toll revenue forecasts. The adjustments are based on 5.5 years of actual experience on the Triangle Expressway, provided to the Traffic Consultant by the Authority. The forecast assumes that toll revenue collection, particularly as related to BBM transactions and processing fee revenue, will continue to be collected at similar rates over the forecast period.

10. The Triangle Expressway and Complete 540 - Phase 1 will be well maintained, efficiently operated, effectively signed, and promoted to encourage maximum usage.

11. Motor fuel will remain in adequate supply throughout the forecast period. Fuel price increases will not significantly exceed the overall rate of inflation.

12. No national, state, or regional emergency will arise that would abnormally restrict the use of motor vehicles. Future transportation technology changes will not significantly negatively impact traffic and revenue on the Triangle Expressway and Complete 540 - Phase 1 over the projection period.

Study Process. Following is a summary of the study process used in developing the 2019 Traffic and Revenue Study.

A comprehensive work program was developed to meet the specific objectives of the study. In general, the study was comprised of six major efforts:

1. Data collection and summarization;

2. Corridor growth analysis;

3. Stated preference surveys;

4. Triangle Regional Model Refinement and Calibration;

5. Traffic and Toll Revenue Analysis; and

6. Traffic and Toll Revenue Sensitivity Tests.

The Traffic Consultant previously issued a Complete 540 Planning Level Traffic and Revenue Study (the "Planning Level Study") on May 31, 2017. The Planning Level Study provided traffic and toll revenue forecasts for the existing Triangle Expressway and for three scenarios that included various assumptions regarding portions of the Complete 540 project. Data collected for the Planning Level Study included traffic counts, travel-speed data, travel-pattern data from StreetLight Data, Inc., historical data and toll revenue on the Triangle Expressway, and planned roadway improvements in the study area. The traffic and revenue projections in the Planning Level Study were based on the Triangle Regional Model version 5 ("TRMv5"), including its assumptions regarding growth and location of future population, number of households, and employment.

In preparing the 2019 Traffic and Revenue Study, the Traffic Consultant used data collected as part of the Planning Level Study described above and also obtained additional data. Additional data collected included traffic count data from NCDOT made available since the Planning Level Study was conducted, as well as updated toll transaction and revenue data obtained from the Authority. The Traffic Consultant also received data on leakage and fee revenue associated with BBM transactions on the Triangle Expressway. To supplement the 63 traffic counts conducted in the fall of 2017 as part of the Planning Level Study, traffic counts were conducted in 15 additional locations. With NCDOT's permission, updated travel speed data for the 2016 calendar year was obtained in the study area from HERE Technologies' geospatial travel time data via the Regional Integrated Transportation Information System.

The Traffic Consultant obtained the latest version of the Triangle Regional Model, the Triangle Regional Model Version 6 (the "TRMv6"), from the Institute of Transportation Research and Education at

North Carolina State University. The Triangle Regional Model is a key tool for evaluating future corridor growth and travel demand in the region and encompasses three complete counties – Durham, Orange, and Wake – and seven other partial counties in North Carolina. The official base year of the TRMv6 is 2013 and supports forecast years 2025, 2035, and 2045. Each forecast year includes socioeconomic forecasts for variables such as population, number of households, and employment for geographic units called Traffic Analysis Zones.

The socioeconomic assumptions in the TRMv6 were analyzed by an independent economist, Dr. Stephen J. Appold, who has expertise in North Carolina economic trends and forecasts. Dr. Appold developed a set of socioeconomic inputs to the TRMv6 to enable the Traffic Consultant to create a model year 2016 for calibration purposes. Using an analysis of major employers, employment centers, housing developments, and the latest available historic trends and forecasts, Dr. Appold also created revised socioeconomic inputs, including population, number of households, and employment, for each of 2016, 2025, 2035, and 2045. Dr. Appold's adjustments to socioeconomic inputs, after review and acceptance by the Traffic Consultant, were used to create revised trip tables for each forecast year.

Stated preference surveys were conducted by Resource Systems Group, Inc. ("RSG") to estimate "values of time" ("VOT") for motorists in the study area. VOT expresses a driver's willingness to pay a toll to achieve a time savings. Estimated VOT was developed for different market segments and geographic areas in the model area and incorporated into the TRMv6 to support the development of traffic and toll revenue forecasts. Roadway improvements in the study area were reviewed against current plans of NCDOT and the two Metropolitan Planning Organizations ("MPO") in the area (the Capital Area MPO and the Durham Chapel-Hill Carrboro MPO) and adjusted where necessary.

The TRMv6 was used to analyze the traffic and toll revenue potential of the Triangle Expressway and Complete 540 - Phase 1 system. Traffic assignments were conducted using the refined and calibrated TRMv6, incorporating the adjusted trip tables, and using the Traffic Consultant's toll diversion algorithms. The assignments included model inputs developed by the Traffic Consultant and RSG, including motorist VOTs, motor vehicle operating cost ("VOC"), toll rate schedules, and NC Quick Pass and BBM market shares. Estimated annual transactions and revenues were calculated under two separate scenarios. Scenario 1 assumed continued operation of the existing Triangle Expressway, without construction of Complete 540 - Phase 1. Scenario 2 assumed Complete 540 - Phase 1 would be constructed and opened to traffic on July 1, 2023. Under both scenarios, estimated annual transactions and revenues were calculated for 2020, 2025, 2035 and 2045. Intermediate years were developed by interpolating between model years 2020 and 2025, 2025 and 2035, and 2035 and 2045. After 2045, nominal increases in traffic were assumed.

Lastly, a transaction and toll revenue sensitivity analysis was conducted for Fiscal Years 2025 and 2045 to provide information on the sensitivity of the forecasts to changes in key assumptions. In particular, the sensitivity tests analyzed the sensitivity of the base condition forecasts against reduced economic growth, reduced motorist VOT, increased motor fuel prices, reduced truck market share, and an increased ramp up period on Complete 540 - Phase 1.

The Traffic and Revenue Study should be read in its entirety and in light of the assumptions and other factors set forth above. See APPENDIX B – Traffic and Revenue Study.

GEC REPORT

The GEC has prepared the GEC's Engineering Report (the "GEC Report") attached hereto as APPENDIX C, which documents and describes the following for the Triangle Expressway:

- Authority Organizational Structure

- Complete 540 Project Background and History
- Project construction and Implementation
- Design Details
- Toll Collection Operations
- Operations, Maintenance, Renewal and Replacement
- Environmental Considerations
- Public Involvement
- Project Costs
- Cash Flow Projections
- Implementation Schedule

The GEC Report has been prepared on the basis of numerous assumptions and other factors described in the GEC Report. Specifically, the GEC Report makes the following key assumptions and used the described methodology:

- At the time the financial plan and the GEC Report were prepared, the capital cost of the combined highway design-build contracts was budgeted as $746.6 million. Additionally, a third party delay contingency of $53.8 million and a change order contingency of $53.8 million have been budgeted.

- Design-Build Contractor bids were based on fuel and asphalt binder prices as of October 2018 (R-2828), December 2018 (R-2721B), and March 2019 (R-2721A). In accordance with the price adjustment clauses as outlined in the Design-Build Contracts, the Contractors' invoices will be adjusted either positively or negatively according to the current commodity price at the time certain construction activities occur. Contingency in the amount of $9.4 million for price escalation of these commodities has been included in the Project budget.

- The capital cost items that are not included in the Design-Build Contract include landscaping, toll system integration, right-of-way purchases, dry utility relocation, construction management and oversight, and other Authority expenses such as financial incentives for on-time completion by the Design-Build Contractors and management reserves. In summary, these costs were estimated as follows:

    - Landscaping: One and a half percent (1.5%) of the estimated cost for the highway construction contract was set aside for landscaping along the project corridor.

    - Toll System Integration: The vendor agreements for the Electronic Toll Collection System, Roadside Toll Collection System and Back Office System used by the Authority for the existing Triangle Expressway System will be amended to include Complete 540 – Phase 1 upon its completion.

- Right of Way: The Authority enlisted the services of a qualified land appraisal and acquisition firm, Carolina Land Acquisitions ("CLA"), to prepare estimates for the acquisition of approximately 650 parcels along the corridor. CLA performed initial cost estimates for each parcel, and made assumptions for parcels settling for amounts in excess of the appraised values. Based on historical data, assumptions were also made as to the number of parcels that would require condemnation and thus higher settlement costs. As a result, a 70% contingency was added to the appraised value recognizing that many parcels settle above appraisal.

- Utility Relocation: The Authority enlisted the services of a qualified utility relocation firms, Hinde Engineering, to assess the utility relocations required, coordinate with the utility owners, and prepare relocation cost estimates.

- Construction Engineering and Inspection ("CEI"): NCDOT and the Authority have selected Summit Design and Engineering Services to provide CEI services for the Project. The activities of the CEI firm will include inspection, erosion control inspection, materials sampling and testing, surveying grade verification, documentation of pay quantities, and claims avoidance.

- NCDOT/Authority Expenses and Reserves: The budget includes the costs of early completion incentives for Design-Build Contractors, construction administration and support, public education and outreach, and administrative reserves.

- Construction Management and Oversight: NCDOT and the Authority have selected S&ME to serve as an extension of the staff and construction engineer of NCDOT – Division 5. S&ME will be directly responsible for construction management and construction oversight of Complete 540 – Phase 1 which includes overseeing the CEI firm. The Division 5 construction engineer will be responsible for overseeing these contracts. The construction management budget for these services is included within the NCDOT labor and administration budget.

- Operations and Maintenance ("O&M") cost estimates were based on the preliminary project design plans and the actual O&M costs incurred by the Triangle Expressway System. The operating and maintenance budgets will be updated annually.

The GEC Report should be read in its entirety and in light of the assumptions and other factors set forth above. See APPENDIX C – "GEC Report" for a current capital cost budget for Complete 540 – Phase 1.

PROJECTED CASH FLOW AND DEBT SERVICE COVERAGE

Table of Projected Revenues, Operations and Maintenance Expenses, Cash Flows and Debt Service Coverage Ratios

The table below has been compiled by the Authority to show the projections for estimated Toll Revenues, the debt service requirements for the Series 2019 Bonds, the 2019 TIFIA Loan, the 2018 Bonds, the 2017 Bonds, and the 2009B Bonds, estimated debt service coverage ratios for Senior Lien Bonds, projected Operation and Maintenance Expenses, projected deposits to the Renewal and Replacement Fund, and projected deposits to the General Reserve for each of the Fiscal Years ending June 30, 2019 through June 30, 2049. The Authority Board has not taken action to permit toll rates beyond 2049 for the Triangle Expressway System, and therefore, revenues from such tolls are not included in Receipts in the Projected

Cash Flow and Debt Service Coverage table below. The Act requires the Authority to remove tolls from the Triangle Expressway System only after fulfillment of all obligations of the Authority in connection with revenue bonds issued to finance a turnpike project, as defined in the Act. The Act defines all segments of the Triangle Expressway System as a single "project" under the Act. To the extent the Authority Board authorizes tolling and establishes toll rates beyond 2049, revenues from such tolls would be included in "Revenue" and "Receipts."

See also "RISK FACTORS – Forward-Looking Statements."

Preliminary Projected Cash Flow and Debt Service Coverage

	A	B	C	D	E	F	G	H
Fiscal Year 30-Jun	Total Revenues	Net State Appropriation	Total Pledged Receipts	Series 2019 Bonds Debt Service	Outstanding Senior Lien Debt Service	Total Senior Lien Debt Service	Senior Lien Debt Service Coverage	Excess Revenues after Senior Lien Debt Service
2020	57,085,766	3,239,765	60,325,531	-	(34,739,294)	(34,739,294)	1.74x	25,586,237
2021	60,713,762	3,236,028	63,949,790	-	(37,193,494)	(37,193,494)	1.72x	26,756,296
2022	63,337,304	2,002,512	65,339,817	-	(38,496,494)	(38,496,494)	1.70x	26,843,323
2023	65,864,735	2,017,192	67,881,926	-	(40,605,494)	(40,605,494)	1.67x	27,276,432
2024	101,843,999	2,030,811	103,874,811	(8,534,550)	(43,006,494)	(51,541,044)	2.02x	52,333,767
2025	119,236,016	2,043,681	121,279,697	(17,069,100)	(43,898,119)	(60,967,219)	1.99x	60,312,478
2026	133,136,592	2,028,507	135,165,099	(17,069,100)	(45,265,494)	(62,334,594)	2.17x	72,830,505
2027	142,862,259	2,041,599	144,903,858	(17,069,100)	(46,787,119)	(63,856,219)	2.27x	81,047,640
2028	149,295,458	2,056,844	151,352,303	(17,069,100)	(48,385,619)	(65,454,719)	2.31x	85,897,584
2029	155,992,971	2,072,524	158,065,496	(17,069,100)	(46,850,322)	(63,919,422)	2.47x	94,146,074
2030	163,186,995	2,087,964	165,274,959	(17,069,100)	(51,210,775)	(68,279,875)	2.42x	96,995,084
2031	170,762,750	2,105,473	172,868,223	(17,069,100)	(53,061,025)	(70,130,125)	2.46x	102,738,098
2032	178,766,813	2,121,390	180,888,203	(17,069,100)	(55,087,275)	(72,156,375)	2.51x	108,731,828
2033	186,970,659	414,200	187,384,859	(17,069,100)	(63,048,025)	(80,117,125)	2.34x	107,267,734
2034	195,505,988	413,100	195,919,088	(17,069,100)	(66,738,525)	(83,807,625)	2.34x	112,111,463
2035	204,399,088	413,600	204,812,688	(17,069,100)	(69,874,525)	(86,943,625)	2.36x	117,869,063
2036	213,471,930	416,900	213,888,830	(17,069,100)	(72,905,900)	(89,975,000)	2.38x	123,913,830
2037	222,831,654	414,400	223,246,054	(17,069,100)	(75,770,850)	(92,839,950)	2.40x	130,406,104
2038	232,825,465	412,600	233,238,065	(17,069,100)	(68,954,550)	(86,023,650)	2.71x	147,214,415
2039	242,917,014	412,900	243,329,914	(17,069,100)	(69,833,750)	(86,902,850)	2.80x	156,427,064
2040	253,271,911	-	253,271,911	(17,069,100)	(60,237,575)	(77,306,675)	3.28x	175,965,236
2041	264,069,526	-	264,069,526	(17,069,100)	(50,010,600)	(67,079,700)	3.94x	196,989,826
2042	275,760,497	-	275,760,497	(39,753,650)	-	(39,753,650)	6.94x	236,006,847
2043	288,658,796	-	288,658,796	(41,338,200)	-	(41,338,200)	6.98x	247,320,596
2044	301,594,217	-	301,594,217	(43,139,200)	-	(43,139,200)	6.99x	258,455,017
2045	314,687,375	-	314,687,375	(44,962,575)	-	(44,962,575)	7.00x	269,724,800
2046	325,604,411	-	325,604,411	(46,472,450)	-	(46,472,450)	7.01x	279,131,961
2047	333,891,086	-	333,891,086	(47,603,200)	-	(47,603,200)	7.01x	286,287,886
2048	341,992,170	-	341,992,170	(48,702,450)	-	(48,702,450)	7.02x	293,289,720
2049	350,352,674	12,500,000	362,852,674	(49,837,325)	-	(49,837,325)	7.28x	313,015,349
2050	126,038,152	-	126,038,152	(18,041,200)	-	(18,041,200)	6.99x	107,996,952
2051	129,157,111	-	129,157,111	(18,475,700)	-	(18,475,700)	6.99x	110,681,411
2052	132,397,486	-	132,397,486	(18,928,000)	-	(18,928,000)	6.99x	113,469,486
2053	135,631,263	-	135,631,263	(19,376,100)	-	(19,376,100)	7.00x	116,255,163
2054	138,804,763	-	138,804,763	(19,813,500)	-	(19,813,500)	7.01x	118,991,263
2055	142,250,101	-	142,250,101	(20,287,800)	-	(20,287,800)	7.01x	121,962,301
2056	145,792,195	-	145,792,195	-	-	-		145,792,195
2057	149,183,644	-	149,183,644	-	-	-		149,183,644
2058	152,786,419	-	152,786,419	-	-	-		152,786,419

A Source: CDM Smith Inc.; Triangle Expressway and Complete 540 Phase 1 Traffic and Revenue Study dated September 2019 - Scenario 2.

B Scheduled annual State Appropriation of $25,000,000 less debt service on the outstanding State Appropriation Bonds and planned 2019 State Appropriation Bonds.

C Toll Revenues (A) plus Net State Appropriation (B).

D Debt service on the Series 2019 Bonds net of capitalized interest through January 1, 2024.

E Other outstanding Senior Lien Debt Service which includes the unrefunded Series 2009B Bonds, the Series 2017 Bonds and the Series 2018 Bonds.

F Series 2019 Bonds Debt Service (D) plus Outstanding Senior Lien Debt Service (E).

G Total Pledged Receipts (C) divided by the sum of Total Senior Lien Debt Service (F).

H Total Pledged Receipts (C) less Total Senior Lien Debt Service (F).

Preliminary Projected Cash Flow and Debt Service Coverage (continued)

	I	J	K	L	M	N	O	P	Q
Fiscal Year 30-Jun	TIFIA Mandatory Debt Service	TIFIA Scheduled Debt Service (net of mandatory)	TIFIA Reserve Fund (Deposit) / Release	Senior & Mandatory TIFIA Debt Service Coverage	Senior & All TIFIA Debt Service Coverage	Operations & Maintenance Requirement	Renewal & Replacement Requirement	General Reserve Deposit/ (Withdrawal)	General Reserve Balance
2020	-	-	-	1.74x	1.74x	(20,451,497)	(23,498,529)	(18,363,788)	62,483,186
2021	-	-	-	1.72x	1.72x	(19,742,837)	(8,579,634)	(1,566,175)	60,917,011
2022	-	-	-	1.70x	1.70x	(20,312,677)	(2,766,290)	3,764,356	64,681,367
2023	-		(30,102,864)	1.67x	1.67x	(20,651,989)	(3,674,012)	(27,152,433)	37,528,934
2024	-	-	(2,580,245)	2.02x	2.02x	(47,023,443)	(1,748,568)	981,511	38,510,445
2025	-	-	(326,324)	1.99x	1.99x	(49,276,280)	(995,809)	9,714,065	48,224,510
2026	(1,137,379)	(6,445,146)	274,137	2.13x	1.93x	(51,303,075)	(18,974,345)	(4,755,302)	43,469,208
2027	(1,343,850)	(7,615,150)	(93,777)	2.22x	1.99x	(52,607,433)	(9,952,864)	9,434,566	52,903,774
2028	(1,765,168)	(10,002,618)	(73,310)	2.25x	1.96x	(52,982,571)	(4,850,923)	16,222,994	69,126,768
2029	(2,338,014)	(13,748,747)	7,214	2.39x	1.98x	(53,604,157)	(5,267,709)	19,194,661	88,321,429
2030	(2,336,004)	(13,737,357)	158,246	2.34x	1.96x	(54,247,641)	(46,025,388)	(19,193,060)	69,128,369
2031	(2,333,994)	(13,725,967)	127,780	2.39x	2.01x	(54,910,321)	(25,146,600)	6,748,996	75,877,365
2032	(3,886,638)	(12,159,914)	93,479	2.38x	2.05x	(55,589,670)	(6,528,382)	30,660,703	106,538,068
2033	(3,883,290)	(12,149,871)	54,719	2.23x	1.95x	(56,284,695)	(8,879,961)	26,124,635	132,662,703
2034	(3,879,940)	(12,139,821)	10,744	2.23x	1.96x	(57,001,901)	(4,796,749)	34,303,796	166,966,499
2035	(3,876,590)	(12,129,771)	(39,365)	2.26x	1.99x	(57,740,011)	(27,226,257)	16,857,069	183,823,568
2036	(7,744,810)	(8,744,810)	(96,731)	2.19x	2.01x	(58,711,527)	(4,398,409)	44,217,543	228,041,111
2037	(7,731,419)	(8,731,419)	(134,521)	2.22x	2.04x	(59,875,596)	(1,999,674)	51,933,473	279,974,584
2038	(7,718,019)	(8,718,019)	(209,575)	2.49x	2.28x	(61,021,702)	(19,985,660)	49,561,439	329,536,024
2039	(7,704,619)	(8,704,619)	(296,925)	2.57x	2.36x	(62,192,690)	(19,535,203)	57,993,008	387,529,032
2040	(16,382,420)	-	(399,274)	2.70x	2.70x	(63,387,314)	(52,719,290)	43,076,938	430,605,970
2041	(36,903,299)	-	(520,096)	2.54x	2.54x	(64,613,331)	(37,912,896)	57,040,204	487,646,174
2042	(57,318,050)	-	846,951	2.84x	2.84x	(65,859,210)	(4,342,965)	109,333,574	596,979,748
2043	(57,318,050)	-	2,429,821	2.93x	2.93x	(67,136,992)	(30,758,974)	94,536,403	691,516,150
2044	(57,318,050)	-	2,595,966	3.00x	3.00x	(68,442,137)	(4,937,884)	130,352,913	821,869,063
2045	(57,318,050)	-	2,800,088	3.08x	3.08x	(69,778,905)	(1,299,165)	144,128,768	965,997,831
2046	(57,318,050)	-	3,054,235	3.14x	3.14x	(70,662,781)	(8,489,359)	145,716,006	1,111,713,837
2047	(57,318,050)	-	3,375,570	3.18x	3.18x	(71,181,213)	(46,550,933)	114,613,261	1,226,327,098
2048	(57,318,050)	-	3,789,190	3.23x	3.23x	(71,802,751)	(6,691,397)	161,266,712	1,387,593,811
2049	(57,318,050)	-	4,332,937	3.39x	3.39x	(72,432,275)	(1,132,003)	186,465,959	1,574,059,769
2050	(23,160,469)	-	5,065,989	3.06x	3.06x	(11,724,777)	(65,316,336)	12,861,359	1,586,921,128
2051	(23,160,469)	-	747,890	3.10x	3.10x	(24,375,860)	(9,178,688)	54,714,284	1,641,635,412
2052	(23,160,469)	-	801,311	3.15x	3.15x	(24,618,367)	(916,161)	65,575,800	1,707,211,212
2053	(23,160,469)	-	882,304	3.19x	3.19x	(24,866,386)	(35,505,608)	33,605,004	1,740,816,216
2054	(23,160,469)	-	1,013,271	3.23x	3.23x	(25,115,391)	(9,345,863)	62,382,811	1,803,199,026
2055	(23,160,469)	-	1,244,875	3.27x	3.27x	(25,370,156)	(20,108,719)	54,567,833	1,857,766,859
2056	(23,160,469)	-	1,712,910	6.29x	6.29x	(25,627,414)	(4,304)	98,712,917	1,956,479,776
2057	(23,160,469)	-	2,895,060	6.44x	6.44x	(25,890,179)	(153,011)	102,875,044	2,059,354,820
2058	(11,580,230)	-	21,930,066	13.19x	13.19x	(26,155,437)	-	136,980,818	2,196,335,638

I Estimated TIFIA Mandatory Debt Service as of the date of this Official Statement. Assumes an interest rate of 2.68% for the 2019 TIFIA Loan.

J Estimated TIFIA Scheduled Debt Service, net of Mandatory Debt Service, as of the date of this Official Statement.

K Sum of estimated deposits to the TIFIA Reserve Fund to meet the requirement thereof as annual debt service on the 2019 TIFIA Loan increases and releases of projected fund earnings. Assumes an interest rate of 2.68% for the 2019 TIFIA Loan.

L Total Pledged Receipts (C) divided by the sum of Total Senior Lien Debt Service (F), and TIFIA Mandatory Debt Service (I). Assumes an interest rate of 2.68% for the 2019 TIFIA Loan.

M Total Pledged Receipts (C) divided by the sum of Total Senior Lien Debt Service (F), plus TIFIA Mandatory Debt Service (I) and plus TIFIA Scheduled Debt Service (J).

N Estimated deposits to the Operations and Maintenance Expenses Fund and the Operating Reserve Fund.

O Estimated deposits to the Renewal and Replacement Fund.

P The sum of Excess Revenues after Senior Lien Debt Service (H), plus TIFIA Mandatory Debt Service (I), plus TIFIA Scheduled Debt Service (J), plus TIFIA Reserve Fund (Deposit)/Release (K), plus Operations & Maintenance Requirement (N) and plus Renewal & Replacement Requirement (O).

Q The sum of the Prior Year General Reserve Balance (Q) plus current year General Reserve Deposit/(Withdrawal) (P).

RISK FACTORS

The following is a discussion of certain risk factors that should be considered in evaluating an investment in the Series 2019 Bonds. This discussion does not purport to be either comprehensive or definitive. The order in which risks are presented is not intended to reflect either the likelihood that a particular event will occur or the relative significance of such an event. Moreover, there may well be other risks associated with an investment in the Series 2019 Bonds in addition to those set forth herein.

General

The financial forecasts in this Official Statement are based generally upon certain assumptions and upon projections as to estimated Revenues and Operations and Maintenance Expenses. See APPENDIX B – 2019 Traffic and Revenue Study. Inevitably, some underlying assumptions and projections used to develop the forecasts will not be realized, and unanticipated events and circumstances may occur. Therefore, the actual results achieved during the forecast periods will vary from the forecasts, and such differences may be material.

Forward-Looking Statements

The statements contained in this Official Statement, and in other information provided by the Authority, that are not purely historical, are forward-looking statements, which generally can be identified with words or phrases such as "anticipates," believes," "could," "estimates," "expects," "foresees," "may," "plan," "predict," "should," "will" or other words or phrases of similar import. All statements included in this Official Statement and Appendices hereto that any person expects or anticipates will, should or may occur in the future, including, but not limited to, the projections in the Traffic and Revenue Study, are forward-looking statements. These statements are based on assumptions and analysis made by the Authority and the Traffic Consultant, as applicable, in light of their experience and perception of historical trends, current conditions and expected future developments as well as other factors they believe are appropriate in the circumstances. However, whether actual results and developments will conform with expectations and predictions is subject to a number of risks and uncertainties and factors beyond the Authority's control. The risk factors and assumptions described under the caption “RISK FACTORS” and elsewhere in this Official Statement could cause actual results to differ materially from those expressed in any forward-looking statement. All of the forward-looking statements made in this Official Statement and any Appendices are qualified by these cautionary statements. There can be no assurance that the actual results or developments anticipated will be realized or, even if substantially realized, that they will have the expected consequences to or effects on Receipts. All forward-looking statements included in this Official Statement are based on information available to the Authority on the date hereof, and the Authority assumes no obligation to update any such forward-looking statements.

The forward-looking statements herein are necessarily based on various assumptions and estimates that are inherently subject to numerous risks and uncertainties, including risks and uncertainties relating to the possible invalidity of the underlying assumptions and estimates and possible changes or developments in social, economic, business, industry, market, legal and regulatory circumstances and conditions and actions taken or omitted to be taken by third parties, including customers, suppliers, business partners and competitors, and legislative, judicial and other governmental authorities and officials. Assumptions related to the foregoing involve judgments with respect to, among other things, future economic, competitive and market conditions and future business decisions, all of which are difficult or impossible to predict accurately and, therefore, there can be no assurance that the forward-looking statements included in this Official Statement will prove to be accurate.

Costs of Complete 540 – Phase 1

As described in "THE TRIANGLE EXPRESSWAY - Construction of Complete 540 – Phase 1" herein, the undertaking consists of the planning, designing, engineering and construction of the portion of the Triangle Expressway System referred to as Complete 540 – Phase 1 (as described in the GEC Report attached as APPENDIX C). The Authority has entered into the Design-Build Contracts with the Design-Build Contractors. The Design-Build Contracts are fixed price, lump sum contracts obligating the applicable Design-Build Contractor to perform the design, construction and utility relocation coordination, of Complete 540 – Phase 1 by the deadlines set forth therein.

As with any major construction effort, Complete 540 - Phase 1 involves many risks that could result in cost overruns, in delays or in a failure to complete the Complete 540 - Phase 1. Certain of the risks to achieving the construction milestones on time and within budget include shortages of materials and labor, work stoppages, labor disputes, bad weather, floods, earthquakes, hurricanes and other casualties, delays in achieving utility relocations, unforeseen engineering, environmental or geological problems, changes in law, discovery of unidentified hazardous materials, historical artifacts or unidentified utilities, third-party litigation or protests (including protests or litigation about noise or vibrations or traffic delays in adjacent lanes resulting from construction), difficulties in obtaining or renewing permits or other federal, state or local government approvals, changes in federal and state or local design or building requirements and permit conditions, and interference with or by military operations, any of which could increase the cost and delay of the Project. In addition, lack of coordination among the Authority, the Design-Build Contractors, NCDOT, utility owners or permitting agencies or the failure of any of them to complete their portions of the work or their inspections or approvals on schedule could also result in delays and/or cost overruns or in a failure to complete the Project.

Specifically, while the Design-Build Contracts shift to the Design-Build Contractors a significant amount of the risk and responsibility for time delays and cost increases associated with design, engineering, utility relocation coordination and construction, the Design-Build Contracts ultimately allow for increases in price and extensions of time for performance in certain cases, including, but not limited to, those involving Authority directed changes, Authority caused delays, hazardous materials and certain defined force majeure events. The Authority is relying on the Design-Build Contractors to design, engineer, permit, manage and construct the highway in accordance with standards, specifications and an agreed-upon scope of work. There is no assurance that the Design-Build Contractors can design and engineer Complete 540 – Phase 1 in a manner such that it reasonably can be constructed for the fixed price and by the completion dates set forth in the Design-Build Contracts. Further, the responsibility of the Design-Build Contractors for all phases of design and engineering under the Design-Build Contracts may increase the impact that any financial instability, insolvency or bankruptcy of either Design-Build Contractor, or any entity guaranteeing the obligations of a Design-Build Contractor, could have on the cost of, or completion date for, Complete 540 – Phase 1. The number of rights-of-way yet to be acquired for Complete 540 – Phase 1 could result in delays to the construction schedule, or higher costs for acquisition of the parcels than budgeted, particularly as a result of Map Act claims that become part of the purchase price for some parcels.

To the extent cost increases result in Costs of Complete 540 – Phase 1 exceeding funds available to pay such Costs, NCDOT will contribute funds necessary to complete construction of Complete 540 – Phase 1 to the Authority as described above under "THE TRIANGLE EXPRESSWAY SYSTEM – Construction of Complete 540 – Phase 1." The NCDOT's obligation to make such payments is subject to appropriation of funds therefor. The NCDOT's obligation is limited to payment of the costs of an Additional Project such as Complete 540 – Phase 1, defined as all costs for right-of-way acquisition, design, engineering, construction, acquisition and equipping thereof in accordance with the plans and specifications therefore. It is not clear whether such costs would include construction period interest if completion of the project was delayed. The Authority is required to repay such contributions, if any, to NCDOT, with interest.

Payment and Performance Bonds

A potential purchaser of the Series 2019 Bonds can have no assurance that the Design-Build Contractors or subcontractor, guarantor, surety or property insurer will be willing or capable of meeting its responsibilities in connection with Complete 540 - Phase 1 or that the issuer of any performance or payment bond, any guarantee or any property insurance policy will honor or will be able to honor a claim in a timely manner.

Although the Authority does not expect its payment obligations outstanding at any one time under the Design-Build Contracts to exceed the amount of the payment bonds provided by the Design-Build Contractors, there can be no assurance that the payment and performance bonds provided by the Design-Build Contractors will be sufficient to satisfy the Authority's payment or performance obligations under the Design-Build Contracts. Not all events are covered under such payment and performance bonds. The issuer of each of the Design-Build Contractor's payment and performance bonds does not guarantee payment or performance under all circumstances, and the issuer of such bonds may assert any defenses it may have for payment or performance. Moreover, in the event that a default occurs under a Design-Build Contract, there is a possibility of litigation between the Authority and the applicable Design-Build Contractor, or between the Authority and the providers of the related performance bonds and payment bonds, which could further delay the construction and opening of Complete 540 - Phase 1. In addition, there can be no assurance that the Authority will recover any amounts under the performance bonds and payment bonds provided by a Design-Build Contractor or any other contractor related to Complete 540 - Phase 1.

Liquidated Damages

The amount of liquidated damages the Design-Build Contractors could be required to pay in connection with Complete 540 - Phase 1 may be limited by contract and may not be sufficient to cover all of the Authority's losses in the event of a delay or a failure to complete the required work in accordance with the plans and specifications, and other requirements of the contract documents. There are numerous events that could cause an extension of the schedule and that could result in increased costs for Complete 540 - Phase 1. Liquidated damages, however, are payable by the Design-Build Contractors only under certain circumstances and even if paid, may not be sufficient to cover debt service payments on the Series 2019 Bonds. In addition, collection of liquidated damage amounts may require extensive litigation and no assurance can be provided that such amounts will in fact be collected.

Events of Force Majeure

Construction and operation of the Triangle Expressway System is at risk from events of force majeure, such as earthquakes, tornados, hurricanes or other natural disasters, epidemics, blockades, rebellions, war, riots, acts of sabotage, terrorism or civil commotion, and spills of hazardous materials, among other events. The State self-insures for such risks, and a significant casualty event could affect the availability of funds to repair the Triangle Expressway. Construction or operations may also be stopped or delayed from non-casualty events such as discovery of archaeological artifacts, changes in law, and litigation, among other things.

Limited Insurance Coverage

Although the Design-Build Contractors are required to provide insurance during construction of Complete 540 – Phase 1, such required insurance policy will not cover damage and delay from all events that could interrupt construction. Risks that may not be insurable/insured include the following risks that may delay the project without causing property damage: epidemics, blockades, strikes and riots. Other risks that may not be insured/insurable include war, nuclear events, criminal or intentional acts of the insured, pollution, unforeseeable environmental or geological conditions, discovery of archaeological artifacts, changes in law, bankruptcy and acts of terrorism. Insurance policies may not be maintained or obtainable in amounts that would be sufficient or be paid in sufficient time in all events to pay all of the Authority's expenses under the Trust Agreement and the supplements thereto, including debt service on the Series 2019 Bonds.

Funding Risk

Proceeds of the 2019 TIFIA Loan constitute a key component of the funding for Complete 540 – Phase 1. Failure to meet certain disbursement conditions set forth in the 2019 TIFIA Loan Agreement as well as an event of default under the 2019 TIFIA Loan Agreement may result in the suspension or delay in the disbursement of proceeds of the 2019 TIFIA Loan Agreement.

A portion of the costs of Complete 540 – Phase 1 are expected to be paid from one or more issues of the State of North Carolina Grant Anticipation Revenue Vehicle Bonds ("GARVEE Bonds") and State matching funds. GARVEE Bonds are issued under Section 136-18(12b) of the North Carolina General Statutes, as amended from time to time (the "GARVEE Act"), and The State and Local Government Revenue Bond Act, Section 159-80 et. seq. of the North Carolina General Statutes (collectively with the GARVEE Act, the "Act"). GARVEE Bonds are payable solely from Federal Transportation Funds, which are federal aid revenues received by or on behalf of the State pursuant to Title 23 of the United States Code, the Federal Aid Agreement (which is a memorandum of Agreement between NCDOT and the Federal Highway Administration ("FHWA") pursuant to which NCDOT and FHWA agree to the debt service costs on GARVEE Bonds relating to specific eligible projects that will be paid by FHWA) and the Act. Federal Transportation Funds have historically been authorized by Congress under multiple-year authorizing legislation designed to provide continuity in the flow of Federal Transportation Funds to the states, including the State. The current authorization is provided by the "Fixing America's Surface Transportation Act" which provides for funding through September 30, 2020. There can be no assurance that such measures will be continued under any future federal reauthorization or that, if continued, such measures will be sufficient to ensure that Federal Transportation Funds will be available as needed if in the future Congress amends existing laws or fails to reauthorize expired transportation legislation, or if future legislation or federal administrative action reduces the amount of Federal Transportation Funds available to NCDOT.

NCDOT is required to provide matching funds for the projects financed with GARVEE Bond proceeds. Such funds are provided from the State Highway Trust Fund, which in turn is funded from the North Carolina motor fuels tax, a tax on the transfer of motor vehicle titles, DMV titles and other fees, and interest income. Although the Authority and NCDOT have modeled the STIP and the State Highway Trust Fund to ensure that there will be adequate cash to pay for projects in the STIP, including matching funds for GARVEE Bond funded projects, there is no guaranty that such funds will be sufficient.

Change in Law

The Authority and the Triangle Expressway System are subject to various laws and regulations, including, among others, laws governing environmental protection and laws governing tolling, which may change from time to time. The Authority's business, financial condition and results of operations may be adversely affected by changes in such laws or regulations. In each session of the North Carolina General Assembly, bills may be introduced that have a potential impact on the Authority or NCDOT. Although NCDOT and the Authority actively monitor such bills and proposals and interact with members of the General Assembly and staff members during the legislative sessions, there can be no assurance that there will not be future legislative changes that may have a material effect on the Authority. To the extent that the Authority is required to expend additional funds not originally contemplated to comply with any new or amended regulations or laws, such amended or new law or regulation could have a negative impact on the Authority's cash flow.

Operating Risks

The ability of the Triangle Expressway System to generate Receipts in amounts sufficient to pay debt service on the Series 2019 Bonds when due is subject to the risks inherent in toll facilities. The ability to repay the Series 2019 Bonds will be dependent on the volume of traffic that utilizes the Triangle Expressway System and the ability of the Authority and its vendor's computer systems to accurately process data. Revenues to be generated through such use will be influenced by numerous factors, including, among others, the ability to manage toll evasion; the ability to control expenses; the availability of adequately-trained personnel; population, employment and income trends within the region; the congestion on alternative freeways, highways, and streets; time savings experienced by utilizing the Triangle Expressway System; the toll rates; the availability and price of fuel; and the construction of new or improved competitive roadways or other transit facilities.

Rate Covenant Not a Guarantee

The Authority's ability to pay the debt service with respect to the Series 2019 Bonds depends on its ability to generate Receipts at the levels required by the Trust Agreement, which in turn depends on the use of the Triangle Expressway System by a sufficient number of toll-paying vehicles. Although the Authority has covenanted in the Trust Agreement to establish toll rates at specified levels as more particularly described herein, and expects that sufficient Receipts will be generated through the imposition and collection of such tolls, the Authority's covenant does not constitute a guarantee that sufficient Receipts will be available to pay debt service with respect to the Series 2019 Bonds.

Ability to Maintain or Raise Rates

The Authority may need to raise toll rates in the future above the anticipated scheduled toll rate increases under the projected toll rate schedule to support its debt service requirements. The effect of any future rate increase is unknown. It is possible that a future increase in rates could result in reduced usage of the Triangle Expressway System, resulting in decreased Receipts.

Traffic and Revenue Assumptions

The revenue forecasts in the 2019 Traffic and Revenue Study are based upon certain assumptions described above. See "2019 Traffic and Revenue Study" herein and APPENDIX B – 2019 Traffic and Revenue Study. The 2019 Traffic and Revenue Study is not a guarantee of any future events or trends and the forecasts therein are subject to future economic and social conditions and demographic developments that cannot be predicted with certainty. Further, any of the estimates and assumptions in the 2019 Traffic and Revenue Study are inherently subject to significant economic and competitive uncertainties and contingencies, many of which are beyond the control of the Authority. Changes in social conditions might include, for example, the increased use of telecommuting. Cultural shifts in attitudes towards public transportation, casual and arranged carpools and telecommuting, governmental or employer incentive programs or subsidies and other trends that are hard to predict could affect the number of commuters willing and able to pay a toll on the Triangle Expressway System. Technological advancements might include broadened use of electric or battery-driven cars, which, together with more stringent air quality standards, might radically change the characteristics of vehicles on the road. Increased use of ride-sharing services like Uber and Lyft might decrease traffic congestion and, therefore, the use of the Triangle Expressway System as a result of reduced car ownership or surge pricing which could possibly delay or divert peak hour demands. Further development and widespread adoption of autonomous vehicles could also reduce traffic congestion through decreases in accidents due to human error and better synchronized traffic flow through communication between such vehicles. These are only a few of the potential societal or technological changes which may adversely affect use of the Triangle Expressway System.

No representation is made or intended, nor should any representation be inferred, with respect to the likely existence of any particular future set of facts or circumstances, and prospective purchasers of the Series 2019 Bonds are cautioned not to place undue reliance upon the projections in the Traffic and Revenue Study or upon any other projections or requirements for projections. If actual results are less favorable than the results projected or if the assumptions used in preparing such projections prove to be incorrect, the Authority's ability to make payments pursuant to the Trust Agreement in the amounts and at the times required to pay debt service on the Series 2019 Bonds or other payments required under the Trust Agreement with respect to the Series 2019 Bonds, may be materially and adversely affected.

Other risks that are impossible to predict and thus are not taken into account in the long-term forecasts included in the Traffic and Revenue Study or in the projected financial information, but that could affect the number of toll payers and Receipts in the shorter term, include malfunctions of the tolling system, unusual weather, casualty events and other emergencies. Neither the Traffic Consultant nor the Authority can guarantee that the projected results set forth in the Traffic and Revenue Study will reflect actual results and the differences may be material. Failure to achieve or realize any of the assumptions described above may have a materially adverse effect upon the Receipts actually realized.

Free Alternate Route

The Authority Act requires NCDOT to maintain an existing, alternate, comparable non-toll route corresponding to each turnpike project undertaken by the Authority. Although the alternate route for the Triangle Expressway is a less desirable route, motorists wishing to avoid tolls may choose this alternate route.

Motor Fuel Prices and Taxes

Among other assumptions, the revenue forecasts in the 2019 Traffic and Revenue Study make certain assumptions about motor fuel supply, prices and taxes. There is no assurance that motor fuel will remain in adequate supply or that motor fuel prices and federal and State motor fuel taxes will not increase by more than the assumed amounts during the forecast period covered by the 2019 Traffic and Revenue Study.

Dilution of Senior Lien Security Upon Bankruptcy Related Event

Upon the occurrence of an Event of Default that is a Bankruptcy Related Event under the Trust Agreement, in the event that any TIFIA Indebtedness is outstanding, the Authority's obligations under the TIFIA Indebtedness will be deemed to be Senior Lien Indebtedness, and USDOT will be deemed to be the secured owner of such Senior Lien Indebtedness. A Bankruptcy Related Event is defined in the Trust Agreement and the 2019 TIFIA Loan Agreement to include voluntary and involuntary proceedings with respect to the Authority under any Insolvency Law, application for or consent by the Authority to the appointment of a receiver for itself and its assets, failure by the Authority generally to pay its debts with respect to the Triangle Expressway as they become due, and failure by the Authority to make two (2) consecutive payments on the TIFIA Series 2019 Bond in accordance with the 2019 TIFIA Loan Agreement. In such event, the TIFIA Indebtedness would be secured by and payable from the Trust Estate (except for the Senior Lien Parity Reserve Account) on a basis equal to that of other Outstanding Senior Lien Obligations.

Holders of Series 2019 Bonds Not Majority Holders

Under the Trust Agreement, the Holders of a majority of Bonds and Parity Debt then Outstanding have the ability to direct remedies after an Event of Default, and take certain actions under the Trust Agreement. The Holders of the Series 2019 Bonds will hold less than a majority of the Bonds Outstanding under the Trust Agreement. See APPENDIX A- "Definitions of Certain Terms and Summary of the Trust Agreement – The Trust Agreement - Remedies."

Limitation and Enforceability of Remedies

The remedies available to Owners of the Series 2019 Bonds upon an Event of Default under the Trust Agreement are limited to the seeking of specific performance or a writ of mandamus or other suit, action or proceeding compelling and requiring the Authority and its officers to observe and perform any covenant, condition or obligation prescribed in the Agreement. ACCELERATION IS NOT A REMEDY AVAILABLE TO OWNERS OF THE SERIES 2019 BONDS. See APPENDIX A – "Definitions of Certain Terms and Summary of the Trust Agreement – The Trust Agreement – Remedies."

The remedies available under the Trust Agreement are in many respects dependent upon regulatory and judicial actions that are often subject to discretion and delay. Under existing law, such remedies may not be readily available. In addition, enforcement of such remedies (i) may be subject to general principles of equity which may permit the exercise of judicial discretion, (ii) are subject to the exercise in the future by the State and its agencies and political subdivisions of the police power inherent in the sovereignty of the State, (iii) are subject, in part, to the provisions of the United States Bankruptcy Act and other applicable bankruptcy, insolvency, reorganization, moratorium or similar laws relating to or affecting the enforcement of creditors' rights generally, now or hereafter in effect, and (iv) are subject to the exercise by the United States of the powers delegated to it by the federal Constitution. The various legal opinions to be delivered concurrently with the delivery of the Series 2019 Bonds will be qualified to the extent that the enforceability of certain legal rights related to the Series 2019 Bonds is subject to limitations imposed by bankruptcy, reorganization, insolvency or other similar laws affecting the rights of creditors generally and by equitable remedies and proceedings generally.

CONTINUING DISCLOSURE

In the Fourth Supplemental Trust Agreement, the Authority will undertake, for the benefit of the beneficial owners of the Series 2019 Bonds, to provide to the Municipal Securities Rulemaking Board (the "MSRB"):

(a) by not later than seven months from the end of each Fiscal Year, beginning with the Fiscal Year ending June 30, 2020, audited financial statements of the Authority for such Fiscal Year, if available, prepared in accordance with Section 159-34 of the General Statutes of North Carolina, as it may be amended from time to time, or any successor statute, or, if such audited financial statements of the Authority are not available by seven months from the end of such Fiscal Year, unaudited financial statements of the Authority for such Fiscal Year to be replaced subsequently by audited financial statements of the Authority to be delivered within fifteen (15) days after such audited financial statements become available for distribution;

(b) by not later than seven months from the end of each Fiscal Year, beginning with the Fiscal Year ending June 30, 2020, the financial and statistical data as of a date not earlier than the end of the preceding Fiscal Year evidencing compliance by the Authority with the Rate Covenant described under the heading "SECURITY AND SOURCES OF PAYMENT FOR THE SERIES 2019 Bonds – Rate Covenant" including the calculation of Revenues and Long-Term Debt Service Requirement, to the extent that such items are not included in the financial statements referred to in (a) above;

(c) within ten (10) Business Days following the occurrence of an event, notice of any of the following events with respect to the Series 2019 Bonds:

(i) principal and interest payment delinquencies;

(ii) unscheduled draws on debt service reserves reflecting financial difficulties;

(iii) unscheduled draws on credit enhancements reflecting financial difficulties;

(iv) substitution of credit or liquidity providers, or their failure to perform;

(v) issuance by the Internal Revenue Service of a proposed or final determination of taxability with respect to the Series 2019 Bonds; a Notice of Proposed Issues on IRS Form 5701-TEB with respect to the Series 2019 Bonds; adverse tax opinions, material notices or determinations with respect to the tax status of the Series 2019 Bonds; or other event affecting the tax status of the Series 2019 Bonds;

(vi) defeasances;

(vii) rating changes;

(viii) tender offers; and

(ix) bankruptcy, insolvency, receivership or similar proceeding by the Authority;

(d) within ten (10) Business Days following the occurrence of an event, notice of any of the following events with respect to the Series 2019 Bonds, if material:

(i) non-payment related defaults;

(ii) modification to the rights of the beneficial owners of the Series 2019 Bonds;

(iii) bond calls, other than bond calls relating to mandatory sinking fund redemption;

(iv) release, substitution or sale of any property securing repayment of the Series 2019 Bonds;

(v) mergers, consolidations, acquisition and sales of assets (other than in the ordinary course of business);

(vi) appointment of a successor or additional trustee or a change in the name of the trustee;

(vii) legislation shall be filed with the North Carolina General Assembly by the Governor of North Carolina or legislation is reported out of a committee in either body of the General Assembly which, if adopted in the form so filed or reported, would result in a reduction or delay in the receipt of $25 million in State Appropriated Revenues in any Bond Year; and

(viii) an administrative action is taken by the Governor of North Carolina, NCDOT or any other agency or authority of the State which will result in a reduction or delay in the receipt of $25 million in State Appropriated Revenues in any Bond Year;

(ix) incurrence of a financial obligation of the Authority, if material, or agreement to covenants, events of default, remedies, priority rights, or other similar terms of a financial obligation of the Authority, any of which affect security holders, if material; and

(x) default, event of acceleration, termination event, modification of terms, or other similar events under the terms of the financial obligation of the Authority, any of which reflect financial difficulties.

(e) in a timely manner, notice of a failure of the Authority to provide required annual financial information described in (a) or (b) above on or before the date specified.

At present, Section 159-34 of the General Statutes of North Carolina requires the Authority's financial statements to be prepared in accordance with generally accepted accounting principles and to be audited in accordance with generally accepted auditing standards.

The Fourth Supplemental Trust Agreement will also provide that if the Authority fails to comply with the undertaking described above, the Trustee or any beneficial owner of the Series 2019 Bonds may take action to protect and enforce the rights of all beneficial owners with respect to such undertaking, including an action for specific performance; provided, however, that the Authority's failure to comply with the undertaking will not constitute an Event of Default under the Trust Agreement. All actions shall be instituted, had and maintained for the benefit of all beneficial owners of the Series 2019 Bonds.

Pursuant to the Fourth Supplemental Trust Agreement, the Authority will reserve the right to modify from time to time the information to be provided to the extent necessary or appropriate in the judgment of the Authority, provided that any such modification will be done in a manner consistent with Rule 15c2-12 issued under the Securities Exchange Act of 1934, as it may be amended from time to time ("Rule 15c2-12"), and provided further that:

(a) any such modification may only be made in connection with a change in circumstances that arises from a change in legal requirements, change in law, or change in the identity, nature, or status of the Authority;

(b) the information to be provided, as modified, would have complied with the requirements of Rule 15c2-12 as of the date of this Official Statement, after taking into account any amendments or interpretations of Rule 15c2-12, as well as any changes in circumstances; and

(c) any such modification does not materially impair the interests of the beneficial owners of the Series 2019 Bonds, as determined either by the Trustee or bond counsel, or by the approving vote of the Owners of a majority in principal amount of the Series 2019 Bonds pursuant to the terms of the Trust Agreement, as it may be amended from time to time, at the time of the amendment.

Any annual financial information containing modified operating data or financial information is required to explain, in narrative form, the reasons for the modification and the impact of the change in the type of operating data or financial information being provided.

The undertaking described above will terminate upon payment, or provision having been made for payment in a manner consistent with Rule 15c2-12, in full of the principal of and interest on all of the Series 2019 Bonds.

During the previous five years, the Authority has not failed to comply, in all material respects, with its other undertakings relating to continuing disclosure of information pursuant to Rule 15c2-12 except as described in the following sentences. Although audited financial statements of the State were otherwise publicly available, the Authority did not link the audited financial statements of the State to certain of its issues for the Fiscal Years ended June 30, 2014 and 2015, as required under certain of its prior undertakings, and did not file a notice of failure to file such audited financial statements of the State. In addition, the Authority was approximately 20 days late in filing such audited financial statements of the State under the requisite CUSIP numbers for the Fiscal Year ended June 30, 2016. For the Fiscal Years ended June 30, 2014 and 2015, the Authority failed to file certain required operating data with respect to its outstanding bonds for the Triangle Expressway System, and did not file a notice of failure to file such operating data. For the Fiscal Years ended June 30, 2016 and 2017, the Authority failed to file certain required operating data with respect to the 2009 State Appropriation Bonds. The Authority has made notice filings with EMMA with respect to such failures to file and has filed the missing audited financial statements of the State and the missing operating data for each applicable Fiscal Year. The Authority has procedures in place to ensure timely filings pursuant to Rule 15c2-12, and has engaged Digital Assurance Certification, LLC ("DAC") to assist it in its continuing disclosure filings.

LITIGATION

No litigation is now pending or, to the best of the Authority's knowledge, threatened against or affecting the Authority seeking to restrain or enjoin the authorization, execution or delivery of the Series 2019 Bonds, the Amended and Restated Trust Agreement or the Fourth Supplemental Trust Agreement or contesting the validity or the authority or proceedings for the authorization, execution or delivery of the Series 2019 Bonds, the Amended and Restated Trust Agreement or the Fourth Supplemental Trust Agreement or the Authority's creation, organization or corporate existence, or the title of any of the Authority's present officers to their respective offices, or the Authority's authority to carry out its obligations thereunder.

CERTAIN RELATIONSHIPS

Hunton Andrews Kurth LLP is serving as Bond Counsel in connection with the issuance of the Series 2019 Bonds. Hunton Andrews Kurth LLP also represents the Trustee and the Underwriters and their affiliates in unrelated matters. McGuireWoods LLP is serving as counsel to the Underwriters in connection with the issuance of the Series 2019 Bonds, and also represents the Trustee and the Underwriters and their affiliates in unrelated matters. In addition, McGuireWoods LLP has been approved as one of the firms that is eligible to provide bond counsel services on other bond issues of the Authority, and may advise the Authority from time to time with respect to such issues.

LEGAL MATTERS

Legal matters related to the authorization, execution, sale and delivery of the Series 2019 Bonds are subject to the approval of Hunton Andrews Kurth LLP, Bond Counsel. See the form of the Bond Counsel opinion (the "Bond Opinion") attached hereto as APPENDIX E. The Bond Opinion will be limited to matters relating to authorization and validity of the Series 2019 Bonds and to the tax status of interest thereon, as described in the section "TAX TREATMENT." Bond Counsel has not been engaged to investigate the financial resources of the Authority or its ability to provide for payment of the Series 2019 Bonds, and the Bond Opinion will make no statement as to such matters or as to the accuracy or completeness of this Official Statement or any other information that may have been relied on by anyone in making the decision to purchase Series 2019 Bonds.

Certain legal matters will be passed upon for the Authority by Ebony Pittman, Esq., an Assistant Attorney General for the State, and for the Underwriters by McGuireWoods LLP, Raleigh, North Carolina, counsel to the Underwriters.

TAX TREATMENT

Opinion of Bond Counsel

In the opinion of Bond Counsel under current law, interest, including accrued original issue discount ("OID"), on the Series 2019 Bonds (a) is not included in gross income for federal income tax purposes, (b) is not an item of tax preference, and (c) is exempt from all income taxes in the State. Except as discussed below regarding OID, no other opinion is expressed by Bond Counsel regarding the tax consequences of the ownership of or the receipt or accrual of interest on the Series 2019 Bonds.

Bond Counsel's opinion with respect to the Series 2019 Bonds will be given in reliance upon certifications by representatives of the Authority as to certain facts relevant to both the opinion and requirements of the Internal Revenue Code of 1986, as amended (the "Code"). Bond Counsel's opinion is subject to the condition that there is compliance subsequent to the issuance of the Series 2019 Bonds with all requirements of the Code that must be satisfied in order for interest thereon to remain excludable from gross income for federal income tax purposes. The Authority has covenanted to comply with the current provisions of the Code regarding, among other matters, the use, expenditure and investment of the proceeds of the Series 2019 Bonds and the timely payment to the United States of any arbitrage rebate amounts with respect to the Series 2019 Bonds. Failure by the Authority to comply with such covenants, among other things, could cause interest on the Series 2019 Bonds to be included in gross income for federal income tax purposes retroactively to their date of issue.

Customary practice in the giving of legal opinions includes not detailing in the opinion all the assumptions, limitations and exclusions that are a part of the conclusions therein. See "*Statement on the Role of Customary Practice in the Preparation and Understanding of Third-Party Legal Opinions*", 63 Bus. Law. 1277 (2008)" and "*Legal Opinion Principles*", 53 Bus. Law. 831 (May 1998). Purchasers of the Series 2019 Bonds should seek advice or counsel concerning such matters as they deem prudent in connection with their purchase of Series 2019 Bonds.

Bond Counsel's opinion represents its legal judgment based in part upon the representations and covenants referenced therein and its review of current law, but is not a guarantee of result or binding on the Internal Revenue Service (the "Service") or the courts. Bond Counsel assumes no duty to update or supplement its opinion to reflect any facts or circumstances that may come to Bond Counsel's attention after the date of its opinion or to reflect any changes in law or the interpretation thereof that may occur or become effective after such date.

Original Issue Discount

The initial public offering prices of each maturity of the Series 2019 Bonds maturing in 2042 (the "OID Bonds") will be less than their stated principal amount. In the opinion of Bond Counsel, under current law, the difference between the stated principal amount and the initial offering price of each maturity of the OID Bonds to the public (excluding bond houses and brokers) at which a substantial amount of such maturity of such Series 2019 Bonds is sold will constitute OID. The offering prices set forth on the inside cover of this Official Statement for the OID Bonds are expected to be the initial offering price to the public at which a substantial amount of each maturity of such Series 2019 Bonds are sold.

Under the Code, for purposes of determining the holder's adjusted basis in an OID Bond, OID treated as having accrued while the holder holds the OID Bond will be added to the holder's basis. OID will accrue on a constant yield-to-maturity method. The adjusted basis will be used to determine taxable gain or loss upon the sale or other disposition (including redemption or payment at maturity) of an OID Bond.

Prospective purchasers of the OID Bonds should consult their own tax advisors with respect to the calculation of accrued OID and the state and local tax consequences of owning or disposing of OID Bonds.

Original Issue Premium

Series 2019 Bonds purchased, whether upon issuance or otherwise, for an amount (excluding any amount attributable to accrued interest) in excess of their principal amount will be treated for federal income tax purposes as having amortizable bond premium. A holder's basis in such a Series 2019 Bond must be reduced by the amount of premium which accrues while such Series 2019 Bond is held by the holder. No deduction for such amount will be allowed, but it generally will offset interest on the Series 2019 Bonds while so held. Purchasers of such Series 2019 Bonds should consult their own tax advisors as to the calculation, accrual and treatment of amortizable bond premium and the state and local tax consequences of holding such Series 2019 Bonds.

Other Matters

In addition to the matters addressed above, prospective purchasers of the Series 2019 Bonds should be aware that the ownership of tax-exempt obligations may result in collateral federal income tax consequences to certain taxpayers, including without limitation financial institutions, property and casualty insurance companies, S corporations, foreign corporations subject to the branch profits tax, recipients of Social Security or Railroad Retirement benefits and taxpayers who may be deemed to have incurred or continued indebtedness to purchase or carry tax-exempt obligations. Prospective purchasers of the Series 2019 Bonds should consult their tax advisors as to the applicability and impact of such consequences.

Prospective purchasers of the Series 2019 Bonds should consult their own tax advisors as to the status of interest on the Series 2019 Bonds under the tax laws of any state other than North Carolina.

The Service has a program to audit state and local government obligations to determine whether the interest thereon is includible in gross income for federal income tax purposes. If the Service does audit the Series 2019 Bonds, under current Service procedures, the Service will treat the Authority as the taxpayer and the owners of the Series 2019 Bonds will have only limited rights, if any, to participate.

There are many events that could affect the value and liquidity or marketability of the Series 2019 Bonds after their issuance, including but not limited to public knowledge of an audit of the Series 2019 Bonds by the Service, a general change in interest rates for comparable securities, a change in federal or state income tax rates, legislative or regulatory proposals affecting state and local government securities and changes in judicial interpretation of existing law. In addition, certain tax considerations relevant to owners of Series 2019 Bonds who purchase Series 2019 Bonds after their issuance may be different from those relevant to purchasers upon issuance. Neither Bond Counsel's opinion nor this Official Statement purports to address the likelihood or effect of any such potential events or such other tax considerations and purchasers of the Series 2019 Bonds should seek advice concerning such matters as they deem prudent in connection with their purchase of Series 2019 Bonds.

BOND INSURANCE

Series 2019 Bond Insurance Policy

Concurrently with the issuance of the Series 2019 Bonds, Assured Guaranty Municipal Corp. ("AGM") will issue its Municipal Bond Insurance Policy (the "Policy") for the Series 2019 Bonds maturing on January 1 in the years 2042, 2049 (initially bearing CUSIP No. 65830RCT4), and 2055 (initially bearing CUSIP No. 65830RCU1) (the "Insured Series 2019 Bonds"). The Policy guarantees the scheduled payment of principal of and interest on the Insured Series 2019 Bonds when due as set forth in the form of the Policy included as APPENDIX G to this Official Statement.

The Policy is not covered by any insurance security or guaranty fund established under New York, California, Connecticut or Florida insurance law.

Assured Guaranty Municipal Corp.

AGM is a New York domiciled financial guaranty insurance company and an indirect subsidiary of Assured Guaranty Ltd. ("AGL"), a Bermuda-based holding company whose shares are publicly traded and are listed on the New York Stock Exchange under the symbol "AGO". AGL, through its operating subsidiaries, provides credit enhancement products to the U.S. and international public finance (including infrastructure), and structured finance markets and, as of October 1, 2019, asset management services. Neither AGL nor any of its shareholders or affiliates, other than AGM, is obligated to pay any debts of AGM or any claims under any insurance policy issued by AGM.

AGM's financial strength is rated "AA" (stable outlook) by S&P Global Ratings, a business unit of Standard & Poor's Financial Services LLC ("S&P"), "AA+" (stable outlook) by Kroll Bond Rating Agency, Inc. ("KBRA") and "A2" (stable outlook) by Moody's Investors Service, Inc. ("Moody's"). Each rating of AGM should be evaluated independently. An explanation of the significance of the above ratings may be obtained from the applicable rating agency. The above ratings are not recommendations to buy, sell or hold any security, and such ratings are subject to revision or withdrawal at any time by the rating agencies, including withdrawal initiated at the request of AGM in its sole discretion. In addition, the rating agencies may at any time change AGM's long-term rating outlooks or place such ratings on a watch list for possible downgrade in the near term. Any downward revision or withdrawal of any of the above ratings, the assignment of a negative outlook to such ratings or the placement of such ratings on a negative watch list may have an adverse effect on the market price of any security guaranteed by AGM. AGM only guarantees scheduled principal and scheduled interest payments payable by the issuer of bonds insured by AGM on the date(s) when such amounts were initially scheduled to become due and payable (subject to and in accordance with the terms of the relevant insurance policy), and does not guarantee the market price or liquidity of the securities it insures, nor does it guarantee that the ratings on such securities will not be revised or withdrawn.

Current Financial Strength Ratings. On November 7, 2019, S&P announced it had affirmed AGM's financial strength rating of "AA" (stable outlook). AGM can give no assurance as to any further ratings action that S&P may take.

On August 13, 2019, Moody's announced it had affirmed AGM's insurance financial strength rating of "A2" (stable outlook). AGM can give no assurance as to any further ratings action that Moody's may take.

On December 21, 2018, KBRA announced it had affirmed AGM's insurance financial strength rating of "AA+" (stable outlook). AGM can give no assurance as to any further ratings action that KBRA may take.

For more information regarding AGM's financial strength ratings and the risks relating thereto, see AGL's Annual Report on Form 10-K for the fiscal year ended December 31, 2018.

Capitalization of AGM. At September 30, 2019:

- The policyholders' surplus of AGM was approximately $2,473 million.

- The contingency reserves of AGM and its indirect subsidiary Municipal Assurance Corp. ("MAC") (as described below) were approximately $1,100 million. Such amount includes 100% of AGM's contingency reserve and 60.7% of MAC's contingency reserve.

- The net unearned premium reserves and net deferred ceding commission income of AGM and its subsidiaries (as described below) were approximately $1,829 million. Such amount includes (i) 100% of the net unearned premium reserve and deferred ceding commission income of AGM, (ii) the net unearned premium reserves and net deferred ceding commissions of AGM's wholly owned subsidiary Assured Guaranty (Europe) plc ("AGE"), and (iii) 60.7% of the net unearned premium reserve of MAC.

The policyholders' surplus of AGM and the contingency reserves, net unearned premium reserves and deferred ceding commission income of AGM and MAC were determined in accordance with statutory accounting principles. The net unearned premium reserves and net deferred ceding commissions of AGE were determined in accordance with accounting principles generally accepted in the United States of America.

Incorporation of Certain Documents by Reference. Portions of the following documents filed by AGL with the Securities and Exchange Commission (the "SEC") that relate to AGM are incorporated by reference into this Official Statement and shall be deemed to be a part hereof:

- the Annual Report on Form 10-K for the fiscal year ended December 31, 2018 (filed by AGL with the SEC on March 1, 2019);

- the Quarterly Report on Form 10-Q for the quarterly period ended March 31, 2019 (filed by AGL with the SEC on May 10, 2019);

- the Quarterly Report on Form 10-Q for the quarterly period ended June 30, 2019 (filed by AGL with the SEC on August 8, 2019); and

- the Quarterly Report on Form 10-Q for the quarterly period ended September 30, 2019 (filed by AGL with the SEC on November 8, 2019).

All consolidated financial statements of AGM and all other information relating to AGM included in, or as exhibits to, documents filed by AGL with the SEC pursuant to Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended, excluding Current Reports or portions thereof "furnished" under Item 2.02 or Item 7.01 of Form 8-K, after the filing of the last document referred to above and before the termination of the offering of the Series 2019 Bonds shall be deemed incorporated by reference into this Official Statement and to be a part hereof from the respective dates of filing such documents. Copies of materials incorporated by reference are available over the internet at the SEC's website at http://www.sec.gov, at AGL's website at http://www.assuredguaranty.com, or will be provided upon request to Assured Guaranty Municipal Corp.: 1633 Broadway, New York, New York 10019, Attention: Communications Department (telephone (212) 974-0100). Except for the information referred to above, no information available on or through AGL's website shall be deemed to be part of or incorporated in this Official Statement.

Any information regarding AGM included herein under the caption "BOND INSURANCE – Assured Guaranty Municipal Corp." or included in a document incorporated by reference herein (collectively, the "AGM Information") shall be modified or superseded to the extent that any subsequently included AGM Information (either directly or through incorporation by reference) modifies or supersedes such previously included AGM Information. Any AGM Information so modified or superseded shall not constitute a part of this Official Statement, except as so modified or superseded.

Miscellaneous Matters. AGM makes no representation regarding the Series 2019 Bonds or the advisability of investing in the Series 2019 Bonds. In addition, AGM has not independently verified, makes no representation regarding, and does not accept any responsibility for the accuracy or completeness of this Official Statement or any information or disclosure contained herein, or omitted herefrom, other than with respect to the accuracy of the information regarding AGM supplied by AGM and presented under the heading "BOND INSURANCE".

LEGALITY FOR INVESTMENT

Section 159-140 of the General Statutes of North Carolina provides that the Series 2019 Bonds are securities in which all public officers and public bodies of the State and its political subdivisions and agencies and all insurance companies, trust companies, investment companies, banks, savings banks, building and loan associations, savings and loan associations, credit unions, pension or retirement funds, other financial institutions engaged in business in the State, executors, administrators, trustees and other fiduciaries may properly and legally invest funds, including capital in their control or belonging to them, and the Series 2019 Bonds are securities which may properly and legally be deposited with and received by any State or municipal officer or any agency or political subdivision of the State for any purpose for which the deposit of bonds, notes or obligations of the State is now or may hereafter be authorized by law.

RATINGS

S&P is expected to give the Insured Series 2019 Bonds the rating of "AA" on the understanding that the 2019 Bond Insurer will issue the Policy simultaneously with the issuance of the Series 2019 Bonds. S&P and Fitch Ratings ("Fitch") have given the Series 2019 Bonds underlying ratings of "BBB" (stable outlook) and "BBB" (stable outlook), respectively.

Further explanation of the significance of such ratings may be obtained from S&P and Fitch. The Authority and 2019 Bond Insurer have provided to S&P and Fitch, as applicable, certain information not included in this Official Statement. The ratings are not a recommendation to buy, sell or hold the Series 2019 Bonds and should be evaluated independently. The ratings reflect only the view of the particular rating agency, and neither the Authority nor the LGC makes any representation as to the appropriateness of the ratings. There is no assurance that such ratings will not be withdrawn or revised downward by S&P or Fitch. Such action may have an adverse effect on the market price of the Series 2019 Bonds. Neither the Authority, the LGC nor the Underwriters have undertaken any responsibility after the issuance of the Series 2019 Bonds to assure maintenance of the ratings or to oppose any such revision or withdrawal.

Moody's rated the Series 2009 Bonds, but has not provided a rating for the 2017 Bonds, 2018 Bonds or Series 2019 Bonds. No assurance can be given that the issuance of the Series 2019 Bonds will not have a negative effect on the rating currently assigned to the Series 2009 Bonds.

UNDERWRITING

The Underwriters have entered into a Bond Purchase Agreement to purchase all of the Series 2019 Bonds, if any of the Series 2019 Bonds are to be purchased, at a purchase price equal to 100% of the principal amount thereof, plus net original issue premium of $57,330,848.70, and less an underwriters' discount of $928,618.04. The obligation of the Underwriters to pay for the Series 2019 Bonds is subject to certain terms and conditions set forth in the Bond Purchase Agreement.

The Underwriters and their respective affiliates are full service financial institutions engaged in various activities, which may include securities trading, commercial and investment banking, financial advisory, investment management, principal investment, hedging, financing and brokerage services. Certain of the Underwriters and their respective affiliates have, from time to time, performed, and may in the future perform, various financial advisory and investment banking services for the Authority, for which they received or will receive customary fees and expenses.

In the ordinary course of their various business activities, the Underwriters and their respective affiliates may make or hold a broad array of investments and actively trade debt and equity securities (or related derivative securities, which may include credit default swaps) and financial instruments (including bank loans) for their own account and for the accounts of their customers and may at any time hold long and short positions in such securities and instruments. Such investment and securities activities may involve securities and instruments of the Authority.

The Underwriters and their respective affiliates may also communicate independent investment recommendations, market color or trading ideas and/or publish or express independent research views in respect of such assets, securities or instruments and may at any time hold, or recommend to clients that they should acquire, long and/or short positions in such assets, securities and instruments.

The Underwriters may offer and sell the Series 2019 Bonds to certain dealers (including dealers depositing the Series 2019 Bonds into investment trusts) and others at prices lower than the initial public offering prices stated on the inside front cover page hereof. The public offering prices may be changed from time to time by the Underwriters.

J.P. Morgan Securities LLC ("JPMS"), one of the Underwriters of the Series 2019 Bonds, has entered into negotiated dealer agreements (each, a "Dealer Agreement") with each of Charles Schwab & Co., Inc. ("CS&Co.") and LPL Financial LLC ("LPL") for the retail distribution of certain securities offerings at the original issue prices. Pursuant to each Dealer Agreement, each of CS&Co. and LPL may purchase Series 2019 Bonds from JPMS at the original issue price less a negotiated portion of the selling concession applicable to any Series 2019 Bonds that such firm sells.

BofA Securities, Inc., an underwriter of the Series 2019 Bonds, has entered into a distribution agreement with its affiliate Merrill Lynch, Pierce, Fenner & Smith Incorporated ("MLPF&S"). As part of this arrangement, BofA Securities, Inc. may distribute securities to MLPF&S, which may in turn distribute such securities to investors through the financial advisor network of MLPF&S. As part of this arrangement, BofA Securities, Inc. may compensate MLPF&S as a dealer for their selling efforts with respect to the Series 2019 Bonds

Citigroup Global Markets Inc., an underwriter of the Series 2019 Bonds, has entered into a retail distribution agreement with Fidelity Capital Markets, a division of National Financial Services LLC (together with its affiliates, "Fidelity"). Under this distribution agreement, Citigroup Global Markets Inc. may distribute municipal securities to retail investors at the original issue price through Fidelity. As part of this arrangement, Citigroup Global Markets Inc. will compensate Fidelity for its selling efforts

Wells Fargo Securities is the trade name for certain securities-related capital markets and investment banking services of Wells Fargo & Company and its subsidiaries, including Wells Fargo Bank, National Association, which conducts its municipal securities sales, trading and underwriting operations through the Wells Fargo Bank, NA Municipal Products Group, a separately identifiable department of Wells Fargo Bank, National Association, registered with the Securities and Exchange Commission as a municipal securities dealer pursuant to Section 15B(a) of the Securities Exchange Act of 1934.

Wells Fargo Bank, National Association, acting through its Municipal Products Group ("WFBNA"), one of the underwriters of the Series 2019 Bonds, has entered into an agreement (the "WFA Distribution Agreement") with its affiliate, Wells Fargo Clearing Services, LLC (which uses the trade name "Wells Fargo Advisors") ("WFA"), for the distribution of certain municipal securities offerings, including the Series 2019 Bonds. Pursuant to the WFA Distribution Agreement, WFBNA will share a portion of its underwriting or remarketing agent compensation, as applicable, with respect to the Series 2019 Bonds with WFA. WFBNA has also entered into an agreement (the "WFSLLC Distribution Agreement") with its affiliate Wells Fargo Securities, LLC ("WFSLLC"), for the distribution of municipal securities offerings, including the Series 2019 Bonds. Pursuant to the WFSLLC Distribution Agreement, WFBNA pays a portion of WFSLLC's expenses based on its municipal securities transactions. WFBNA, WFSLLC, and WFA are each wholly-owned subsidiaries of Wells Fargo & Company.

Wells Fargo Bank, National Association is serving as an underwriter, Trustee and Bond Registrar for the Series 2019 Bonds and will be compensated separately for serving in each capacity.

MISCELLANEOUS

Members of the LGC staff have participated in the preparation of this Official Statement and other documents related to the issuance of the Series 2019 Bonds, but the LGC and its staff assume no responsibility for the accuracy or completeness of any representation or statement in this Official Statement.

The LGC and the Authority have each duly authorized the execution and delivery of this Official Statement.

NORTH CAROLINA LOCAL GOVERNMENT COMMISSION

By: /s/ Greg C. Gaskins
Secretary

NORTH CAROLINA TURNPIKE AUTHORITY

By: /s/ James H. Trogdon, III
Chairman

APPENDIX A

DEFINITIONS OF CERTAIN TERMS AND SUMMARY OF THE TRUST AGREEMENT

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APPENDIX A

DEFINITIONS OF CERTAIN TERMS
AND SUMMARY OF THE TRUST AGREEMENT

DEFINITIONS

In addition to the defined terms set forth in the front section of this Official Statement to which this Appendix A is attached, the following is a summary of certain definitions set forth in the Trust Agreement and used in this Official Statement. Capitalized terms used herein and not otherwise defined have the meanings given such terms in the Trust Agreement.

"Accreted Amount" means (a) with respect to Capital Appreciation Bonds of any Series, the amount set forth in a Supplemental Agreement for such Bonds as the amount representing the initial principal amount, plus the accreted and compounded interest on such Capital Appreciation Bonds, and (b) with respect to Convertible CAB Bonds of any Series, the amount set forth in a Supplemental Agreement for such Bonds as the amount representing the initial principal amount, plus the accreted and compounded interest on such Convertible CAB Bonds up to the Convertible CAB Bond Conversion Date therefor and thereafter the Accreted Amount as of such Convertible CAB Bond Conversion Date; provided the determination of the Accreted Amount of a Bond during the period while interest thereon is compounded may be set forth in the respective Supplemental Agreement and the Accreted Amount of a Bond may never exceed the maturity amount of such Bond.

"Additional Project" means any addition, acquisition, improvement, betterment, extension or equipping of or relating to the Initial Project as authorized by the Act, or any previous Additional Project that has become part of the Triangle Expressway System and located within the geographic boundaries comprising the Capital Area Metropolitan Planning Organization and the Durham, Chapel Hill, Carrboro Metropolitan Planning Organization; provided, however, that the term "Additional Project" will not include any Non-System Project unless the Authority specifically identifies such Non-System Project as an Additional Project upon compliance with the provisions of the Trust Agreement and, if any TIFIA Indebtedness is Outstanding, the requirements of the TIFIA Loan Agreement. The 2019 Additional Project is an Additional Project which is part of the Triangle Expressway System. The Authority is planning a future Additional Project to continue the Triangle Expressway System to the east of the 2019 Additional Project.

"Additional Projects Account" means an account in the Project Fund created and so designated by the Trust Agreement.

"Annual Budget" means the Authority's budget for the Triangle Expressway System for a Fiscal Year adopted pursuant to the Authority's bylaws, rules and regulations as in effect from time to time.

"Authority" means the North Carolina Turnpike Authority, a body politic and corporate and a public agency of the State within NCDOT.

"Authority Attorney" means the attorney or law firm designated by the Authority from time to time to perform the duties of counsel to the Authority under the Trust Agreement, including the Attorney General of the State or any assistant or deputy Attorney General of the State.

"Authority Board" means the Board of Directors of the Authority, as the governing body thereof.

"Authority Secretary" means the person appointed or employed by the Authority to perform the duties imposed on the Secretary of the Authority by the Trust Agreement, including the Secretary of the Authority Board or any assistant or deputy Secretary of the Authority Board.

"Authorized Denominations" means $5,000 or any whole multiple thereof (a) for Current Interest Bonds, calculated based on the principal amount of such Bonds, and (b) for Convertible CAB Bonds and Capital Appreciation Bonds, calculated based on the maturity amount of such Bonds.

"Authorized Officer" means the Executive Director, the Chief Financial Officer and any other person authorized by resolution of the Authority Board to perform the duties imposed on an Authorized Officer by the Trust Agreement whose name and specimen signature is filed pursuant to an Officer's Certificate with the Trustee for such purpose.

"Balloon Long-Term Indebtedness" means fixed or variable rate Long-Term Indebtedness 25% or more of the principal payments of which are due in a single twelve-month period which portion of the principal is not required by the documents pursuant to which such Indebtedness is incurred to be amortized by redemption or prepayment prior to the expiration of such period.

"Bankruptcy Related Event" means (a) an involuntary proceeding will be commenced or an involuntary petition will be filed seeking (i) liquidation, reorganization or other relief in respect of the Authority or any of its debts, or of a substantial part of the assets of the Authority, under any Insolvency Law, or (ii) the appointment of a receiver, trustee, liquidator, custodian, sequestrator, conservator or similar official for the Authority for a substantial part of the assets of the Authority, and, in any case referred to in the foregoing subclauses (i) and (ii), such proceeding or petition will continue undismissed for 60 days or an order or decree approving or ordering any of the foregoing will be entered; or (b) the Authority will (i) apply for or consent to the appointment of a receiver, trustee, liquidator, custodian, sequestrator, conservator or similar official for the Authority or for a substantial part of the assets of the Authority, or (ii) generally not be paying its debts with respect to the Triangle Expressway System as they become due unless such debts are the subject of a bona fide dispute, or become unable to pay its debts generally as they become due, or (iii) make a general assignment for the benefit of creditors, or (iv) consent to the institution of, or fail to contest in a timely and appropriate manner, any proceeding or petition with respect to it described in clause (a) of this definition, or (v) commence a voluntary proceeding under any Insolvency Law, or file a voluntary petition seeking liquidation, reorganization, an arrangement with creditors or an order for relief under any Insolvency Law, or (vi) file an answer admitting the material allegations of a petition filed against it in any proceeding referred to in the foregoing subclauses (i) through (v), inclusive, of this clause (b), or (vii) take any action for the purpose of effecting any of the foregoing; or (c) (i) all or a substantial part of the Triangle Expressway System or the Trust Estate will be sold or otherwise disposed of in a public or private sale or disposition pursuant to a foreclosure of any liens or security interest thereon securing the Senior Lien Indebtedness, or (ii) all or a substantial part of the Triangle Expressway System or the Trust Estate will be transferred pursuant to a sale or disposition in lieu of foreclosure.

"Bond" or "Bonds" means, collectively, the Senior Lien Bonds and the Subordinate Lien Bonds.

"Bond Insurance Policy" means a municipal bond insurance policy or similar arrangement permitted by the Act and obtained or established in connection with the incurrence of any Bonds or other indebtedness. With respect to the Series 2019 Bonds, "Bond Insurance Policy" means the insurance policy issued by Assured Guaranty Municipal Corp. insuring the scheduled payment of the principal of and interest on the Insured Series 2019 Bonds.

"Bond Insurer" means, with respect to the Trust Agreement, the Person providing a Bond Insurance Policy. With respect to the Series 2017 Bonds, the Series 2018 Bonds and the Series 2019 Bonds, "Bond Insurer" means Assured Guaranty Municipal Corp., a New York stock insurance company, or any successor thereto or assignee thereof.

"Bond Registrar" means, with respect to the Series 2019 Bonds, Wells Fargo Bank, N.A.

"Bond Year" means, with respect to the Series 2019 Bonds, the period commencing on January 1 of any year and ending on December 31 of the same year, provided that the first Bond Year for the Series 2019 Bonds will begin on the date of issuance of the Series 2019 Bonds.

"Business Day" means any day other than a Saturday, a Sunday or a day on which offices of the United States Government or the State are authorized to be closed or on which commercial banks are authorized or required by law, regulation or executive order to be closed in New York, New York, in Raleigh, North Carolina or in the city where the principal or designated office of the Trustee is located.

"Calculation Date" means each January 1 and July 1.

"Calculation Period" means a twelve (12) month period ending on a Calculation Date.

"Capital Appreciation Bonds" means Bonds the interest on which is compounded at the rates and on the dates set forth in a Supplemental Agreement and is payable upon redemption or on the maturity date of such Bonds; provided, however, that nothing in the Trust Agreement will prohibit the Authority from designating in the appropriate Supplemental Agreement any such Bonds by a name other than Capital Appreciation Bonds.

"Capital Improvements Budget" for any Fiscal Year means the budget for capital improvements adopted by the Authority in accordance with the Trust Agreement.

"Capitalized Interest Account" means the respective accounts in the Senior Lien Debt Service Fund and the Subordinate Lien Debt Service Fund created and so designated by the Trust Agreement.

"Chief Financial Officer" means the person appointed or employed by the Authority to perform the duties imposed on the Chief Financial Officer by the Trust Agreement.

"Complete 540 Phase 2 Project" means the NCDOT STIP Project R-2829 being the extension of the Triangle Expressway System for the 10.8 miles from east of US 70 (Clayton Bypass) just east of I-40 to the US 64/US 264 Bypass (I-87) in Knightdale. Complete 540 Phase 2 will complete the Outer Loop around the greater Raleigh area.

"Completion Date" means the date of acquisition or completion of the Initial Project and any Additional Project, or of any segment of the foregoing, as the case may be, as certified by the Authority pursuant to the Trust Agreement.

"Completion Indebtedness" means any Long-Term Indebtedness incurred for the purpose of financing the completion of the Initial Project or any Additional Project for which Long-Term Indebtedness has theretofore been incurred in accordance with the provisions of the Trust Agreement, to the extent necessary to complete the Initial Project or such Additional Project, in the manner and scope contemplated at the time that such Long-Term Indebtedness theretofore incurred was originally incurred, and, to the extent the same will be applicable, in accordance with the general plans and specifications for the Initial Project or such Additional Project, as originally prepared with only such changes as have been made in conformance with the documents pursuant to which such Long-Term Indebtedness theretofore incurred was originally incurred; provided, however, that such Long-Term Indebtedness will not exceed 5% of the aggregate principal amount of the Long-Term Indebtedness originally incurred by the Authority to finance the costs of the Initial Project or any Additional Project.

"Construction and Renewal and Replacement Agreement" means (a) the Construction Completion Assurance and Standby Renewal and Replacement Funding Agreement, dated as of April 15, 2009, between the Authority and NCDOT, including any supplement or amendment thereto, and (b) NCDOT's obligations under the Trust Agreement to pay (i) amounts for deposit to the Additional Projects Account of the Project Fund as are necessary for the completion of an Additional Project, including the 2019 Additional Project, and (ii) amounts for deposit to the Renewal and Replacement Fund so that amounts in the Renewal and Replacement Fund will be equal to the Renewal and Replacement Fund Requirement.

"Convertible CAB Bond Conversion Date" or "Dates" means the conversion dates identified for particular Convertible CAB Bonds in a Supplemental Agreement for such Bonds.

"Convertible CAB Bonds" means Bonds the interest on which is compounded at the rates and on the dates set forth in a Supplemental Agreement for such Bonds until the Convertible CAB Bond Conversion Date for such Bonds, with interest payable semiannually thereafter on each Interest Payment Date at such rates, with the accreted interest through the Convertible CAB Bond Conversion Date for such Bonds treated as principal on such Bonds thereafter, and with the principal of such Bonds payable upon redemption or on the maturity date of such Bonds; provided, however, that nothing in the Trust Agreement will prohibit the Authority from designating in the appropriate Supplemental Agreement any such Bonds by a name other than Convertible CAB Bonds.

"Credit Facility" means a line of credit, letter of credit, standby bond purchase agreement or similar liquidity or credit facility permitted by the Act (but excluding a Bond Insurance Policy) and established or obtained in connection with the incurrence of any Indebtedness.

"Credit Provider" means the Person providing a Credit Facility. If and to the extent permitted by law, the Authority may be a Credit Provider for the sole purpose of providing liquidity support for Indebtedness.

"Current Interest Bonds" means Bonds (other than TIFIA Indebtedness) the interest on which is payable on the Interest Payment Dates provided therefor in any Supplemental Agreement, including Convertible CAB Bonds after the applicable Convertible CAB Bond Conversion Date.

"Default" means any Event of Default and any event that, after notice or lapse of time or both, would become an Event of Default.

"Defaulted Interest" means any interest on any Bond of any Series which is payable, but is not punctually paid or duly provided for, on any Interest Payment Date.

"Defeasance Obligations" means noncallable (a) Government Obligations and (b) Defeased Municipal Obligations.

"Defeased Municipal Obligations" means obligations of state or local government municipal bond issuers which are rated the highest rating category by S&P, Fitch or Moody's, respectively, provision for the payment of the principal of, premium, if any, and interest on which will have been made by deposit with a trustee or escrow agent of Government Obligations, the maturing principal of and interest on which, when due and payable, will provide sufficient money to pay the principal of, premium, if any, and interest on such obligations of state or local government municipal bond issuers. References in this definition to state or local government bond issuers will mean the State of North Carolina and North Carolina local government bond issuers, and, to the extent permitted by law, states other than the State of North Carolina and local government bond issuers other than North Carolina local government bond issuers.

"Depositary" means the State Treasurer of the State and one or more banks or trust companies or other institutions, including the Trustee, duly authorized by law to engage in the banking business and designated by the Authority as a depositary of moneys under the Trust Agreement.

"Derivative Agreement" means an interest rate swap, cap, collar, floor, forward, option, put, call or other agreement, arrangement or security however denominated, entered into in order to hedge interest rate fluctuations on all or a portion of any Indebtedness or to provide debt management by changing payments to be made by the Authority with respect to all or a portion of any Indebtedness.

"Derivative Agreement Additional Payments" means payments required to be paid by the Authority under a Derivative Agreement other than Derivative Agreement Regularly Scheduled Payments, including termination payments required to be paid in connection with the termination of a Derivative Agreement, whether voluntarily or upon the occurrence of an event of default, termination event or similar event thereunder.

"Derivative Agreement Regularly Scheduled Payments" means regularly scheduled payments required to be paid by the Authority under a Derivative Agreement that are based upon a fixed or variable imputed rate on a notional amount set forth in the Derivative Agreement and which are intended by the Authority to correspond to interest payments on the underlying Derivative Indebtedness.

"Derivative Indebtedness" means the portion of any Indebtedness meeting the requirements set forth in clauses (a) and (b) below:

(a) in connection with such Indebtedness, the Authority will have entered into a Derivative Agreement in respect of all or a portion of such Indebtedness, and

(b) (i) if such Indebtedness bears interest at a variable rate, such Derivative Agreement provides that during the Derivative Period, the Authority will pay to the provider of the Derivative Agreement a fixed rate (the "Synthetic Fixed Rate") and the provider of the Derivative Agreement will pay to the Authority a variable rate on a notional amount equal to all or a portion of the Outstanding principal amount of such Indebtedness, or (ii) if such Indebtedness bears interest at a fixed rate, such Derivative Agreement provides that during the Derivative Period, the Authority will pay to the provider of the Derivative Agreement a variable rate (the "Synthetic Variable Rate") and the provider of the Derivative Agreement will pay to the Authority a fixed rate on a notional amount equal to all or a portion of the Outstanding principal amount of such Indebtedness.

"Derivative Period" means the period during which a Derivative Agreement is in effect.

"Eminent Domain" means the eminent domain or condemnation power by which all or any part of the Triangle Expressway System may be taken for another public use or any agreement that is reached in lieu of proceedings to exercise such power.

"Event of Default" means each of those events of default set forth in the Trust Agreement and described in "THE TRUST AGREEMENT – Events of Default" below.

“First Supplemental Trust Agreement” means the First Supplemental Trust Agreement dated as of July 1, 2009, between the Authority and the Trustee.

“Fiscal Year” means the period commencing on the first day of July of any year and ending on the last day of June of the following year.

“Fitch” means Fitch Inc., a corporation organized and existing under the laws of the State of Delaware, its successors and assigns, and if such corporation will be dissolved or liquidated or will no longer perform the functions of a securities rating agency, “Fitch” will be deemed to refer to any other nationally recognized securities rating agency designated by the Authority by notice to the Trustee.

“Fourth Supplemental Trust Agreement" means the Fourth Supplemental Trust Agreement dated as of December 1, 2019, between the Authority and the Trustee, supplementing the Prior Trust Agreement.

“General Engineering Consultant” means any engineer or firm of engineers of favorable reputation for skill and experience in performing the duties for which such consultant is required to be employed pursuant to the provisions of the Trust Agreement.

“General Reserve Fund” means the fund created and designated the North Carolina Turnpike Authority Triangle Expressway General Reserve Fund by the Trust Agreement.

“Government Obligations” means direct obligations of, or obligations the principal of and the interest on which are fully and unconditionally guaranteed by, the United States of America in either certificated or book-entry form, including (a) stripped Government Obligations stripped by the United States Treasury itself and (b) interest only portions of obligations issued by the Resolution Funding Corporation.

“Grant Anticipation Notes” means any grant anticipation notes issued by the Authority in compliance with the provisions of the Trust Agreement.

“Guarantee Repayments” means the obligated repayment by the Authority to NCDOT from Receipts of certain amounts paid into the Trust Agreement pursuant to the provisions of the Trust Agreement and Construction and Renewal and Replacement Agreement, with interest thereon at the rate provided for in Section 136-176(b) of the NCGS, as described in the Trust Agreement.

“Hedging Acquisition Account” means the account in the Senior Lien Debt Service Fund created and so designated by the Trust Agreement.

“Hedging Acquisition Account Requirement” means the amount to be deposited from time to time to the credit of the Hedging Acquisition Account in accordance with the requirements of the TIFIA Loan Agreement. The Hedging Acquisition Account Requirement, if any, will be computed by the Authority at the beginning of each Fiscal Year, subject to the approval of USDOT, and will be funded during that Fiscal Year pursuant to the Trust Agreement.

“Holder” means the holder or owner of Senior Lien Parity Debt, Subordinate Lien Parity Debt or Junior Indebtedness.

“Indebtedness” means all obligations incurred or assumed by the Authority in connection with the ownership or operation of the Triangle Expressway System:

(a) for payments of principal and interest with respect to borrowed money, including any obligation to repay a Credit Provider for moneys drawn to pay and retire or purchase Indebtedness and including the continuing obligation to pay principal and interest with respect to any Bonds pursuant to the subrogation provisions of a Bond Insurance Policy following the payment to the Owner of such Bonds of the insured principal and interest from amounts paid by the Bond Insurer under such Bond Insurance Policy; and

(b) for payments under leases which are required to be capitalized in accordance with generally accepted accounting principles and under installment or lease purchase or conditional sale contracts;

provided, however, that (i) Indebtedness will include only such obligations as are secured by the Trust Estate, (ii) Indebtedness will not include any State Appropriation Revenue Bonds, and (iii) any obligation to pay a Credit Provider for moneys drawn to purchase, but not pay and retire, Indebtedness will constitute Indebtedness only to the extent such payments are in excess of any scheduled payments of principal and interest required to be made to such Credit Provider as an Owner or Holder of such Indebtedness.

"Initial Project" means the land, easements, rights of way, capital improvements and equipment financed with the proceeds of the Series 2009 Bonds, the State Appropriation Revenue Bonds and the TIFIA Series 2009 Bond, as more particularly described in the Supplemental Agreement for the Series 2009 Bonds and the TIFIA Loan Agreement.

"Initial Project Account" means the account in the Project Fund created and so designated by the Trust Agreement.

"Insolvency Laws" means the United States Bankruptcy Code, 11 U.S.C. §101 et seq., as from time to time amended and in effect, and any state bankruptcy, insolvency, receivership, conservatorship or similar law now or hereafter in effect.

"Insurance and Condemnation Award Fund" means the fund created and designated the North Carolina Turnpike Authority Triangle Expressway Insurance and Condemnation Award Fund by the Trust Agreement.

"Insurance Consultant" means any Person or firm having a favorable reputation in the State for skill and experience in dealing with the insurance requirements of road and highway systems similar to the Triangle Expressway System and in performing the duties to be imposed upon the Insurance Consultant by the Trust Agreement, including, without limitation, the Risk Manager for the State Department of Insurance.

"Insured Series 2019 Bonds" means the Series 2019 Bonds maturing on January 1 in the years 2042, 2049 (with a yield of 2.65%) and 2055 (with a yield of 2.97%).

"Interest Account" means the respective accounts in the Senior Lien Debt Service Fund, the Subordinate Lien Debt Service Fund and the Junior Indebtedness Debt Service Fund and the TIFIA Interest Account created and so designated by the Trust Agreement.

"Interest Payment Date" means, with respect to any Series of Bonds, each of the interest payment dates provided for in the Supplemental Agreement relating to such Series, and with respect to any Parity Debt or Junior Indebtedness, each of the interest payment dates provided for in the Parity Debt Resolution or Junior Indebtedness Agreement relating to such Parity Debt or Junior Indebtedness. "Interest Payment Date" means, with respect to the Series 2019 Bonds, any January 1 or July 1, commencing July 1, 2020.

"Investment Obligations" means, to the extent permitted by law, any investment authorized by Section 159-30 of the General Statutes of North Carolina, as such statute may be amended from time to time, or any successor statute.

"June 2009 Trust Agreement" means the Trust Agreement dated as of June 1, 2009, between the Authority and the Trustee.

"Junior Indebtedness" means Indebtedness or obligations of the Authority secured by Revenues on a priority after Senior Lien Indebtedness and Subordinate Lien Indebtedness. No Junior Indebtedness, other than the TIFIA Series 2019 Bond, may be created except in compliance with the Trust Agreement. Junior Indebtedness is not secured by the Senior Lien Reserve Fund or the Subordinate Lien Reserve Fund.

"Junior Indebtedness Agreement" means the agreement or other document governing the issuance or incurrence of Junior Indebtedness, including in the case of TIFIA Indebtedness, the TIFIA Loan Agreement.

"Junior Indebtedness Debt Service Fund" means the fund created and designated the North Carolina Turnpike Authority Triangle Expressway Junior Indebtedness Debt Service Fund by the Trust Agreement.

"Junior Indebtedness Debt Service Reserve Account" means the special account in the Junior Indebtedness Debt Service Fund created and so designated by the Trust Agreement.

"Loan Life Coverage Ratio" means the ratio of (a) the present value of all Projected Revenues for the period from and including each Calculation Date to the final maturity of the TIFIA Indebtedness, to (b) the aggregate Outstanding principal amount of all Senior Lien Indebtedness, Subordinate Lien Indebtedness and Junior Indebtedness on such Calculation Date, all calculated as set forth in the TIFIA 2019 Loan Agreement.

"Local Government Commission" means the Local Government Commission, a division of the Department of the State Treasurer of the State.

"Long-Term Debt Service Requirement" means, for any period of twelve (12) consecutive calendar months for which such determination is made, the aggregate of the required deposits to be made in respect of Principal and interest (whether or not separately stated) on Outstanding Long-Term Indebtedness during such period, also taking into account:

(a) with respect to Balloon Long-Term Indebtedness, the amount of principal which would be payable in such period if such principal were amortized from the date of incurrence thereof over a period of twenty (20) years (or the actual number of years over which such Balloon Long-Term Indebtedness is being amortized, if greater than twenty (20) years, but in no event greater than forty (40) years) on a level debt service basis at an interest rate equal to the current market rate for an obligation with such assumed amortization as set forth in an opinion of a banking institution, a registered municipal advisor or an investment banking institution knowledgeable in financing of Triangle Expressway System delivered to the Trustee as the interest rate at which the Authority could reasonably expect to borrow the same by incurring Indebtedness with the same term as assumed above; provided, however, in the case of the Phase I BANs intended to be paid with proceeds of a draw on the TIFIA 2019 Loan Agreement, the payment terms contained in the TIFIA 2019 Loan Agreement will be utilized for purposes of calculating the Long-Term Debt Service Requirement with respect to the Phase I BANs;

(b) with respect to Long-Term Indebtedness which is Variable Rate Indebtedness, the interest on such Indebtedness will be calculated at the rate which is equal to the average of the actual interest rates which were in effect (weighted according to the length of the period during which each such interest rate was in effect) for the most recent twelve (12) month period immediately preceding the date of calculation for which such information is available (or shorter period if such information is not available for a twelve (12) month period), except that with respect to new Variable Rate Indebtedness proposed to be incurred, the interest rate for such Variable Rate Indebtedness will be equal to the running average of the SIFMA Municipal Index for the most recent 52 weeks immediately preceding the date of calculation for which such information is available;

(c) with respect to any Credit Facility, (i) to the extent that such Credit Facility has not been used or drawn upon, the principal and interest relating to such Credit Facility will not be included in the Long-Term Debt Service Requirement and (ii) to the extent that the Authority has reimbursed a Credit Provider for a drawing on a Credit Facility to pay principal or interest on Indebtedness that is already included in the Long-Term Debt Service Requirement, only the portion of the reimbursement payment that is in excess of the payment of principal and interest paid from the drawing will be included in the Long-Term Debt Service Requirement; and

(d) with respect to Derivative Indebtedness, during any Derivative Period and for so long as the provider of the Derivative Agreement has not defaulted on its payment obligations under the Derivative Agreement, the amount of interest payable on such Derivative Indebtedness will be calculated as follows:

(i) for any historical computation of the Long-Term Debt Service Requirement:

(A) if such Derivative Indebtedness bears interest at a variable rate, the amount derived by adding (1) the amount of interest paid by the Authority on such Derivative Indebtedness at such variable rate (calculated as provided in subparagraph (b) above) and (2) the amount paid by the Authority to the provider of the Derivative Agreement relating to such Derivative Indebtedness at the Synthetic Fixed Rate, and subtracting (3) the amount received by the Authority from the provider of such Derivative Agreement at the variable rate specified in the Derivative Agreement (calculated as provided in subparagraph (b) above); and

(B) if such Derivative Indebtedness bears interest at a fixed rate, the amount derived by adding (1) the amount of interest paid by the Authority on such Derivative Indebtedness at such fixed rate and (2) the amount paid by the Authority to the provider of the Derivative Agreement relating to such Derivative Indebtedness at the Synthetic Variable Rate (calculated as provided in subparagraph (b) above) and subtracting (3) the amount received by the Authority from the provider of such Derivative Agreement at the fixed rate specified in the Derivative Agreement; and

(ii) for any projected computation of the Long-Term Debt Service Requirement:

(A) if such Derivative Indebtedness bears interest at a variable rate, at the Synthetic Fixed Rate; and

(B) if such Derivative Indebtedness bears interest at a fixed rate, at the Synthetic Variable Rate (calculated as provided in subparagraph (b) above);

provided, however, that notwithstanding the foregoing, (a) accrued and capitalized interest will be excluded from the determination of Long-Term Debt Service Requirement to the extent the same is provided from the proceeds of the Long-Term Indebtedness or otherwise provided so as to be available for deposit into an account for capitalized interest or similar account not later than the date of delivery of and payment for such Long-Term Indebtedness; (b) the aggregate amount of payments made with respect principal or interest on Outstanding Long-Term Indebtedness will not include principal or interest payable from investment earnings on the Senior Lien Debt Service Fund, the Subordinate Lien Debt Service Fund, any Senior Lien Special Reserve Account, any Subordinate Lien Special Reserve Account or any other fund or account established by the Authority that are required to be used to pay the principal of or interest on Indebtedness; and (c) the aggregate of the payments to be made with respect to principal and interest on Outstanding Long-Term Indebtedness will not include principal or interest payable from Qualified Escrow Funds; and

(e) the deposits required to be made for any period in respect of interest on any Outstanding Senior Lien Bonds, Subordinate Lien Bonds or Junior Indebtedness issued or incurred under the Trust Agreement will be reduced by the amount of any investment earnings on the accounts created in the Senior Lien Debt Service Fund, the Subordinate Lien Debt Service Fund and the Junior Indebtedness Debt Service Fund, respectively.

"Long-Term Indebtedness" means all Indebtedness for any of the following:

(a) money borrowed for an original term, or renewable at the option of the Authority for a period from the date originally incurred, of longer than one year;

(b) leases which are required to be capitalized in accordance with generally accepted accounting principles having an original term, or renewable at the option of the Authority for a period from the date originally incurred, of longer than one year; and

(c) installment purchase, installment financing or conditional sale contracts having an original term in excess of one year.

Long-Term Indebtedness will include Short-Term Indebtedness if a Credit Facility exists to provide financing to retire such Short-Term Indebtedness and such Credit Facility provides for the repayment of principal on terms which would, if such commitment were implemented, constitute Long-Term Indebtedness. Long-Term Indebtedness will also include the current portion of Long-Term Indebtedness. Long-Term Indebtedness will only include the obligations described in (a), (b) and (c) to the extent that such obligations are Indebtedness, as defined in the Trust Agreement.

"Maximum Long-Term Debt Service Requirement" means the highest Long-Term Debt Service Requirement for the present and any succeeding Fiscal Year.

"Moody's" means Moody's Investors Service, Inc., a corporation organized and existing under the laws of the State of Delaware, its successors and assigns, and if such corporation will be dissolved or liquidated or will no longer perform the functions of a securities rating agency, "Moody's" will be deemed to refer to any other nationally recognized securities rating agency designated by the Authority by notice to the Trustee.

"NCDOT" means the North Carolina Department of Transportation, a department of the State, and any successor to its functions.

"NCGS" means the North Carolina General Statutes, as amended.

"Net Eminent Domain Proceeds" means the gross proceeds paid to the Authority or NCDOT as a final award for the taking by Eminent Domain of any of the Triangle Expressway System less payment of attorneys' and other fees and expenses properly incurred in the collection of such gross proceeds.

"Net Insurance Proceeds" means the gross proceeds paid to the Authority or NCDOT as a result of any casualty insurance policy with respect to the Triangle Expressway System or as a result of any liability insurance policy less payment of attorneys' and other fees and expenses properly incurred in the collection of such gross proceeds.

"Non-System Project" means any additions, acquisitions, improvements, betterments, land, buildings, structures or other facilities, including equipment, acquired or constructed, and the preparation and grading of land, relating to the Triangle Expressway System but which are specifically designated by resolution of the Authority Board as not being part of the Triangle Expressway System and are not otherwise thereafter designated as an Additional Project pursuant to the Trust Agreement and, if any TIFIA Indebtedness is Outstanding, the requirements of the TIFIA Loan Agreement.

"Officer's Certificate" means a certificate signed by an Authorized Officer.

"O&M Guaranty Agreement" means (a) the Operating and Maintenance Expense Guaranty Agreement, dated as of August 20, 2008, between the Authority and NCDOT, including any supplement or amendment thereto, and (b) NCDOT's obligations under the Trust Agreement to pay to the Trustee for deposit to the Operating Reserve Fund amounts equal to (i) the amount necessary to replenish the Operating Reserve Fund for any transfer so made up to the Operating Reserve Fund Requirement at the time the transfer is so made and (ii) the amount required to be transferred from the Operating Reserve Fund to the Operations and Maintenance Expense Fund to the extent that there are not sufficient Revenues held in the Operating Reserve Fund for such purpose.

"Operating Advance" means any payment received by the Authority from NCDOT pursuant to the terms of the O&M Guaranty Agreement to replenish amounts drawn from the Operating Reserve Fund pursuant to the Trust Agreement.

"Operating Expenses" means the Authority's current expenses for the operation, maintenance and repair of the Triangle Expressway System as determined in accordance with generally accepted accounting principles, except as modified by this definition, including, without limiting the generality of the foregoing:

(a) all ordinary and usual expenses of operation, toll collection, maintenance and repair, which may include expenses not annually recurring;

(b) direct administrative expenses;

(c) salaries, benefits and other compensation;

(d) operating lease payments;

(e) payments to any pension or retirement plan or plans properly chargeable to the Authority;

(f) insurance premiums and expenses;

(g) engineering and architectural expenses relating to the operation, maintenance or repair of the Triangle Expressway System;

(h) fees and expenses of the Trustee or its counsel, any Bond Registrar, Depositary, Traffic Consultant, tender agent, paying agent or Bond Insurer, fees and expenses payable to USDOT pursuant to the terms of any Junior Indebtedness Agreement, legal expenses, Credit Facility fees, remarketing fees and fees of consultants or professionals; and

(i) any other similar-type operating expenses required to be paid by the Authority under the Trust Agreement or by law;

but Operating Expenses will not include:

(a) any reserves for extraordinary replacements or repairs;

(b) any allowance for depreciation or any amortization of financing expense;

(c) any deposits to any fund, account and subaccount created under the Trust Agreement or any Supplemental Agreement, Parity Debt Resolution or Junior Indebtedness Agreement and payments of principal, premium, if any, and interest on Indebtedness from such funds, accounts and subaccounts;

(d) any debt service payments or reserves or deposits for debt service payments in respect of Indebtedness or any lease-purchase or installment financing contracts or any other indebtedness of the Authority not secured by a pledge of and lien on the Receipts or all or any portion of the Trust Estate; or

(e) any payments made under any Derivative Agreement, whether regularly scheduled payments, termination payments or other payments.

"Operating Reserve Fund" means the fund created and designated the North Carolina Turnpike Authority Triangle Expressway Operating Reserve Fund by the Trust Agreement.

"Operating Reserve Fund Requirement" means one-fourth (1/4) of the total budgeted Operating Expenses of the Triangle Expressway System for the current Fiscal Year, as set forth in the Annual Budget; provided if the Annual Budget for the next succeeding Fiscal Year has been adopted by the Authority, the Operating Reserve Fund Requirement will be the greater of (i) one-fourth (1/4) of the total budgeted Operating Expenses of the Triangle Expressway System for the succeeding Fiscal Year or (ii) one-fourth (1/4) of the total budgeted Operating Expenses of the Triangle Expressway System for the current Fiscal Year.

"Operations and Maintenance Expense Fund" means the fund created and designated the North Carolina Turnpike Authority Triangle Expressway Operations and Maintenance Expense Fund by the Trust Agreement.

"Original Trust Agreement" means the June 2009 Trust Agreement as supplemented by the First Supplemental Trust Agreement.

"Outstanding" when used with reference to Bonds means, as of a particular date, all Bonds theretofore authenticated and delivered under the Trust Agreement, except:

(a) Bonds theretofore canceled by the Bond Registrar or delivered to the Bond Registrar for cancellation;

(b) Bonds deemed to be no longer Outstanding pursuant to the redemption provisions set forth in the Trust Agreement and described in this Official Statement;

(c) Bonds in exchange for or in lieu of which other Bonds have been authenticated and delivered under the Trust Agreement;

(d) Bonds deemed to have been paid in accordance with the Trust Agreement and described in "THE TRUST AGREEMENT – Defeasance" below;

(e) Bonds constituting Put Indebtedness deemed to have been purchased in accordance with the provisions of the applicable Supplemental Agreement in lieu of which other Bonds have been delivered under such Supplemental Agreement; and

(f) For purposes of exercising rights under the TIFIA Loan Agreement, Bonds held by or for the benefit of the Authority or NCDOT.

When used with reference to Parity Debt or Junior Indebtedness, "Outstanding" means, as of a particular date, all Parity Debt and Junior Indebtedness except:

(a) Parity Debt and Junior Indebtedness theretofore canceled by the Authority;

(b) Parity Debt and Junior Indebtedness for the payment or redemption of which money, Defeasance Obligations, or a combination of both, in an amount sufficient to pay on the date when such Parity Debt and Junior Indebtedness is to be paid or redeemed the principal amount of or Redemption Price of, and the interest accruing to such date on, the Parity Debt and Junior Indebtedness to be paid or redeemed, has been deposited with an escrow agent in trust for the Holders of such Parity Debt and Junior Indebtedness; Defeasance Obligations will be deemed to be sufficient to pay or redeem Parity Debt and Junior Indebtedness on a specified date if the principal and the interest on such Defeasance Obligations, when due, together with any money left uninvested, will be sufficient to pay on such date the principal amount of or Redemption Price of, and the interest accruing on, such Parity Debt and Junior Indebtedness to such date;

(c) Parity Debt and Junior Indebtedness in exchange for or in lieu of which other Parity Debt or Junior Indebtedness has been delivered under the documentation securing such Parity Debt or Junior Indebtedness;

(d) Parity Debt and Junior Indebtedness deemed to have been paid in accordance with the defeasance or like provisions of the Parity Debt Resolution or Junior Indebtedness Agreement;

(e) Parity Debt and Junior Indebtedness constituting Put Indebtedness deemed to have been purchased in accordance with the provisions of the applicable Parity Debt Resolution or Junior

Indebtedness Agreement in lieu of which other Parity Debt or Junior Indebtedness has been incurred under the Parity Debt Resolution or Junior Indebtedness Agreement; and

(f) For purposes of exercising rights under a Parity Debt Resolution or Junior Indebtedness Agreement, Parity Debt or Junior Indebtedness held by or for the benefit of the Authority or NCDOT.

"Outstanding TIFIA Loan Balance" will have the meaning set forth in the TIFIA 2019 Loan Agreement.

"Owner" means a Person in whose name a Bond is registered in the registration books provided for in the Trust Agreement.

"Parity Debt" means, collectively, Senior Lien Parity Debt and Subordinate Lien Parity Debt.

"Parity Debt Resolution" means the resolution and any other documentation adopted or executed and delivered by the Authority providing for the incurrence of Parity Debt. If any Senior Lien Indebtedness is to be the subject of a Credit Facility providing for repayments for draws under the Credit Facility on a parity basis with such Senior Lien Indebtedness, then the term Parity Debt Resolution will include any reimbursement agreement or similar repayment agreement executed and delivered by the Authority in connection with the provision of a Credit Facility for such Senior Lien Indebtedness. If any Subordinate Lien Indebtedness is to be the subject of a Credit Facility providing for repayments for draws under the Credit Facility on a parity basis with such Subordinate Lien Indebtedness, then the term Parity Debt Resolution will include any reimbursement agreement or similar repayment agreement executed and delivered by the Authority in connection with the provision of a Credit Facility for such Subordinate Lien Indebtedness.

"Permitted Encumbrances" means in addition to any charge created or permitted by the Trust Agreement upon the Triangle Expressway System or any part thereof or on the Trust Estate:

(a) liens for taxes or other governmental charges or levies not delinquent or that are being contested in good faith by the Authority;

(b) (i) covenants, easements, encumbrances, defects of title, reservations, restrictions and conditions existing at the time of delivery of the Series 2009 Bonds and (ii) defects, irregularities, encumbrances, easements, including easements for roads and public utilities and similar easements, rights of way, mineral conveyances, mineral reservations, and clouds on title, none of which materially impairs the use of the property affected thereby for its intended purposes;

(c) mechanics', workers', repairmen's, architects', engineers', surveyors', or carriers' liens or other similar liens provided that the same will be discharged in the ordinary course of business and without undue delay or the validity of the same will be contested in good faith with any pending execution thereof appropriately stayed;

(d) other liens, charges and encumbrances that, in the written opinion of the Authority Attorney, a copy of which is filed with the Trustee, do not prevent or materially impair the use of the Triangle Expressway System (the Authority Attorney may rely upon a certificate of any engineer or any architect as to whether such liens, charges and encumbrances prevent or materially impair the use of the Triangle Expressway System);

(e) liens on any Non-System Projects;

(f) encumbrances on property, plant and equipment comprising a part of the Triangle Expressway System to the extent permitted by the Trust Agreement;

(g) the pledge of State Appropriated Revenues under the State Appropriation Revenue Bond Trust Agreement to secure the State Appropriation Revenue Bonds; and

(h) any contracts, leases or other agreements to the extent permitted by the Trust Agreement.

"Person" includes corporations, firms, associations, partnerships, joint ventures, joint stock companies, trusts, unincorporated organizations, and public bodies, as well as natural persons.

"Phase I BANs" means Revenue Bond Anticipation Notes issued to pay costs of the 2019 Additional Project which are intended to be paid by a draw on the TIFIA Series 2019 Bond.

"Predecessor Bonds" of any particular Bond means every previous Bond evidencing all or a portion of the same debt as that evidenced by such particular Bond; and, for purposes of this definition, any Bond authenticated and delivered under the Trust Agreement in lieu of a lost, destroyed or stolen Bond will be deemed to evidence the same debt as the lost, destroyed or stolen Bond.

"Principal" has the ordinary meaning for such term, except in the following contexts: (a) with respect to any Capital Appreciation Bond, "Principal" refers to the Accreted Amount thereof (the difference between the stated amount to be paid at maturity and the Accreted Amount being deemed unearned interest) except as used in connection with the authorization and issuance of Bonds and with the order of priority of payments of Bonds after an Event of Default, in which case "Principal" means the initial public offering price of a Capital Appreciation Bond and the difference between the Accreted Amount and the initial public offering price will be deemed to be interest, (b) with respect to any Current Interest Bond, "Principal" refers to the principal amount of such Bond or Indebtedness payable at maturity or in satisfaction of a Sinking Fund Requirement, if applicable, (c) with respect to any Convertible CAB Bond, "Principal" refers to the Accreted Amount thereof through and after the respective Convertible CAB Bond Conversion Date except as used in connection with the authorization and issuance of Bonds and with the order of priority of payments of Bonds after an Event of Default, in which cases "Principal" or "principal" means, if on or before the Convertible CAB Bond Conversion Date, the initial principal amount of a Convertible CAB Bond and the difference between the Accreted Amount and the initial principal amount will be deemed to be interest, or, if after the Convertible CAB Bond Conversion Date, the Accreted Amount as of such Convertible CAB Bond Conversion Date, and (d) with respect to the TIFIA Series 2019 Bond, "Principal" refers to the principal portions of the TIFIA Mandatory Debt Service and the TIFIA Scheduled Debt Service.

"Principal Account" means the respective accounts in the Senior Lien Debt Service Fund, the Subordinate Lien Debt Service Fund and the Junior Indebtedness Debt Service Fund and the TIFIA Principal Account created and so designated by the Trust Agreement.

"Principal Payment Date" means any date established by any Supplemental Agreement, Parity Debt Resolution or Junior Indebtedness Agreement for the payment of principal of Bonds, Parity Debt or Junior Indebtedness, whether at maturity or pursuant to an amortization requirement or otherwise.

"Prior Trust Agreement" means the Original Trust Agreement as supplemented and amended by the Second Supplemental Trust Agreement and the Third Supplemental Trust Agreement.

"Project Fund" means the fund created and designated the North Carolina Turnpike Authority Triangle Expressway Project Fund by the Trust Agreement.

"Put Indebtedness" means fixed or variable rate Long-Term Indebtedness 25% or more of the principal of which may, at the option of the Owner or Holder thereof, be tendered to the Authority, the Trustee, a Depositary or a paying agent or other fiduciary, or an agent of any of the foregoing, for payment or purchase at one time.

"Qualified Escrow Funds" means amounts deposited in a segregated escrow fund or other similar fund or account in connection with the issuance of Long-Term Indebtedness which fund or account is required by the documents establishing such fund or account to be applied toward the Authority's payment obligations with respect to principal or interest on (a) the Long-Term Indebtedness which is incurred under the documents establishing such fund or account or (b) Long-Term Indebtedness which is incurred prior to the establishment of such fund or account.

"Rate Coverage Test" means, so long as the TIFIA Indebtedness is Outstanding, a requirement that (i) Receipts were sufficient for the most recent Calculation Period (based on actual Receipts) to produce, and (ii) Projected Revenues shall be projected to produce (A) a Senior Debt Service Coverage Ratio of at least one hundred thirty percent (130%) in each such Calculation Period; (B) a Junior Indebtedness Debt Service Coverage Ratio of at least one hundred twenty-five percent (125%) in each such Calculation Period; and (C) a Total Debt Service Coverage Ratio of at least one hundred percent (100%) in each such Calculation Period, as all such terms are defined in the TIFIA 2019 Loan Agreement.

"Receipts" means all receipts, revenues, income, proceeds and money received in any period by or for the Authority in respect of the Triangle Expressway System, including, but without limiting the generality of the foregoing:

(a) all toll revenues, payments, proceeds, fees, charges, rents and all other income derived by or for the Authority from the ownership and operation of the Triangle Expressway System, and all other income derived by the Authority from the operation or ownership of the Triangle Expressway System, and all rights to receive the same, whether in the form of accounts receivable, contract rights or other rights, and the proceeds of such rights whether now owned or held or hereafter coming into existence;

(b) proceeds of use and occupancy or business interruption insurance and amounts received by the Authority from any contractor as liquidated damages for failures of such contractor to complete its contractual commitment in accordance with the terms of the contract;

(c) proceeds of any appropriation made by the federal government or any agency or instrumentality thereof or the State or any agency, instrumentality or political subdivision thereof for use in connection with the Triangle Expressway System, to the extent such proceeds are deposited in the Revenue Fund and are available for use in the same manner as other Receipts under the provisions of the Trust Agreement, including, without limitation, the State Appropriated Revenues; provided, however, that State Appropriated Revenues will not constitute Receipts under the Trust Agreement until such time as such amounts are withdrawn from the State Appropriation Revenue Bond Trust Agreement and deposited to the Revenue Fund;

(d) any Derivative Agreement Regularly Scheduled Payments or Derivative Agreement Additional Payments received by the Authority under any Derivative Agreement; and

(e) the investment income realized on, and the income and gains realized upon the maturity or sale of, securities held by or on behalf of the Authority in the Revenue Fund; provided, however, that such amounts will not be included in the calculation of Receipts for purposes of the Rate Coverage Test or the test with respect to the issuance of additional Indebtedness set forth in the TIFIA 2019 Loan Agreement;

but there will not be included in "Receipts":

(i) the proceeds of any gifts, grants, bequests, contributions or donations (except as provided in clause (c) above in this definition);

(ii) the proceeds from the sale or disposition of all or any part of the Triangle Expressway System;

(iii) reimbursements received by the Authority of advances made by it in respect of the Initial Project, any Additional Project, any refinancing of Indebtedness and any capital improvements;

(iv) the investment income realized on, and the income and gains realized upon the maturity or sale of, securities held by or on behalf of the Authority in any funds, accounts and subaccounts established pursuant to the Trust Agreement (other than the Revenue Fund), except to the extent that such investment income is transferred by the Authority to the Revenue Fund;

(v) any payments received or revenues derived from the ownership or operation of any Non-System Project, except to the extent expressly included as a Receipt by resolution adopted by the Authority Board;

(vi) Net Insurance Proceeds or Net Eminent Domain Proceeds other than the net proceeds of any use and occupancy or business interruption insurance;

(vii) proceeds of any appropriation made by the federal government or any agency or instrumentality thereof or the State or any agency, instrumentality or political subdivision thereof to the extent the use of such funds is limited to a use that is inconsistent with their use as Receipts under the provisions of the Trust Agreement;

(viii) the income from the investment of Qualified Escrow Funds to the extent such income is applied to the payment of the principal of or the interest on Long-Term Indebtedness which is excluded from the determination of the Long-Term Debt Service Requirement; and

(ix) the proceeds of any indebtedness of the Authority.

"Redemption Account" means the respective accounts in the Senior Lien Debt Service Fund and the Subordinate Lien Debt Service Fund created and so designated by the Trust Agreement.

"Redemption Price" means, with respect to any Indebtedness or portion thereof, the principal amount of such Indebtedness or portion called for redemption plus the applicable premium, if any, payable upon redemption thereof.

"Regular Record Date" means, with respect to any Series of Bonds, the regular record date, if any, provided for in the Supplemental Agreement relating to such Series.

"Regular Record Date" means, with respect to the Series 2019 Bonds, the 15th day of the month preceding any Interest Payment Date, whether or not a Business Day.

"Renewal and Replacement Expenses" means all expenses, on a cash basis, incurred or to be incurred by the Authority relating to all reasonably necessary periodic major overhaul and repair (excluding Operating Expenses and any other maintenance or repair of a routine or ordinary course nature) of the Triangle Expressway System, including the equipment and systems of the Triangle Expressway System and any expenditures and liabilities incurred for the acquisition of any assets, improvements or replacements thereof that have a useful life of more than one (1) year and that are capitalized in accordance with generally accepted accounting principles. "Renewal and Replacement Expenses" do not include costs of the 2019 Additional Project or any other Additional Project paid or to be paid with the proceeds of Bonds.

"Renewal and Replacement Fund" means the fund created and designated the North Carolina Turnpike Authority Triangle Expressway Renewal and Replacement Fund by the Trust Agreement.

"Renewal and Replacement Fund Requirement" means for each Fiscal Year commencing in the first full Fiscal Year after the Substantial Completion Date, an amount equal to (a) one hundred percent (100%) of the total Renewal and Replacement Expenses for the Triangle Expressway System set forth in the Annual Budget for the current Fiscal Year plus (b) one-tenth (1/10) of the total budgeted Renewal and Replacement Expenses for the Triangle Expressway System for each of the next succeeding nine Fiscal Years as set forth in (i) if the TIFIA Series 2019 Bond remains Outstanding, the Financial Plan (as defined in the TIFIA 2019 Loan Agreement) and (ii) if the TIFIA Series 2019 Bond is no longer Outstanding, the Annual Budget and Capital Improvement Plan adopted by the Authority.

"Reserve Alternative Instrument" means an unconditional insurance policy or surety bond or irrevocable letter of credit or guaranty deposited in the Senior Lien Parity Reserve Account, a Senior Lien Special Reserve Account, the Subordinate Lien Parity Reserve Account, a Subordinate Lien Special Reserve Account or the Junior Indebtedness Debt Service Reserve Account in lieu of or in partial substitution for the deposit of cash and Investment Obligations in satisfaction of all or a portion of the Senior Lien Parity Reserve Account Requirement, a Senior Lien Special Reserve Account Requirement, the Subordinate Lien Parity Reserve Account Requirement, a Subordinate Lien Special Reserve Account Requirement or the Junior Indebtedness Debt Service Reserve Account Requirement. The Reserve Alternative Instrument will be payable (upon the giving of notice as required thereunder) to remedy any deficiency in the appropriate subaccounts in the Interest Account, the Principal Account and the Sinking Fund Account of the Senior Lien Debt Service Fund, the Subordinate Lien Debt Service Fund or the Junior Indebtedness Debt Service Fund, as the case may be, in order to provide for the timely payment of interest and principal (whether at maturity or pursuant to Sinking Fund Requirements therefor). Except as may be provided in a Senior Lien Resolution providing for a Senior Lien Special Reserve Account, in a Subordinate Lien Resolution providing for a Subordinate Lien Special Reserve Account or in a Junior Indebtedness Agreement providing for a Junior Indebtedness special debt service reserve account, the provider of a Reserve Alternative Instrument will be (a) an insurer that has been assigned either (A) one of the two highest policyholder ratings accorded insurers by A. M. Best & Co. or any comparable service or (B) for bonds insured by the provider of the Reserve Alternative Instrument, a rating by Fitch, Moody's or S&P in one of the two highest rating categories (without regard to gradations within such categories) or (b) a commercial bank, insurance company or other financial institution the bonds payable or guaranteed by which have been assigned a rating by either Fitch, Moody's or S&P in one of the two highest rating categories (without regard to gradations within such categories).

"Restricted Account" means the account within the General Reserve Fund created and designated the Restricted Account by the Trust Agreement.

"Revenue Bond Anticipation Notes" means any revenue bond anticipation notes issued by the Authority in compliance with the provisions of the Trust Agreement.

"Revenue Fund" means the fund created and designated the North Carolina Turnpike Authority Triangle Expressway Revenue Fund by the Trust Agreement.

"Revenues" means revenues of the Triangle Expressway System, as determined in accordance with generally accepted accounting principles; provided, however, that revenues will include, without limiting the generality of the foregoing:

(a) proceeds of use and occupancy or business interruption insurance; and

(b) proceeds of any appropriation made by the federal government or any agency or instrumentality thereof or the State or any agency, instrumentality or political subdivision thereof for use in connection with the Triangle Expressway System, to the extent such proceeds are deposited in the Revenue Fund and are available for use in the same manner as other Receipts under the provisions of the Trust Agreement, including, without limitation, the State Appropriated Revenues; provided, however, that State Appropriated Revenues will not constitute Revenues under the Trust Agreement until such time as such amounts are withdrawn from the State Appropriation Revenue Bond Trust Agreement and deposited to the Revenue Fund; and

(c) the investment income realized on, and the income and gains realized upon the maturity or sale of, securities held by or on behalf of the Authority in the Revenue Fund;

but there will not be included in "Revenues":

(i) the proceeds of any gifts, grants, bequests, contributions or donations (except as provided in clause (b) above in this definition);

(ii) the proceeds from the sale or disposition of all or any part of the Triangle Expressway System;

(iii) reimbursements received by the Authority of advances made by it in respect of (i) the Initial Project, (ii) any Additional Project, (iii) any refinancing of Indebtedness and (iv) any capital improvements;

(iv) the investment income realized on, and the income and gains realized upon the maturity or sale of, securities held by or on behalf of the Authority in any funds, accounts and subaccounts established pursuant to the Trust Agreement (other than the Revenue Fund), except to the extent that such investment income is transferred by the Authority to the Revenue Fund.

(v) any payments received or revenues derived from the ownership or operation of any Non-System Project, except to the extent expressly included as a Receipt by resolution adopted by the Authority Board;

(vi) Net Insurance Proceeds or Net Eminent Domain Proceeds other than the net proceeds of any use and occupancy or business interruption insurance;

(vii) (proceeds of any appropriation made by the federal government or any agency or instrumentality thereof or the State or any agency, instrumentality or political subdivision thereof to the extent the use of such funds is limited to a use that is inconsistent with their use as Receipts under the provisions of the Trust Agreement;

(viii) the income from the investment of Qualified Escrow Funds to the extent such income is applied to the payment of the principal of or the interest on Long-Term Indebtedness which is excluded from the determination of the Long-Term Debt Service Requirement;

(ix) any payments received by the Authority under any Derivative Agreement;

(x) the proceeds of any security deposits or moneys received to make refunds to users of the Triangle Expressway System; and

(xi) the proceeds of any indebtedness of the Authority.

"S&P" means Standard & Poor's Ratings Services, a Division of The McGraw-Hill Companies, Inc., and its successors and assigns, and if such entity will be dissolved or liquidated or will no longer perform the functions of a securities rating agency, "S&P" will be deemed to refer to any other nationally recognized securities rating agency designated by the Authority by notice to the Trustee.

"Second Supplemental Trust Agreement" means the Second Supplemental Trust Agreement dated as of March 1, 2017, between the Authority and the Trustee.

"Securities Depository" means the Depository Trust Company, New York, New York, or any other recognized securities depository selected by the Authority, which maintains a book-entry system in respect of a Series of Bonds, and will include any substitute for or successor to the securities depository initially acting as Securities Depository.

"Securities Depository Nominee" means, as to any Securities Depository, such Securities Depository or the nominee of such Securities Depository in whose name there will be registered on the registration books maintained by the Bond Registrar the Bond certificates to be delivered to and immobilized at such Securities Depository during the continuation with such Securities Depository of participation in its book-entry system.

"Senior Lien Bonds" means any Bonds secured on a parity with each other and any Senior Lien Parity Debt and Senior Lien Derivative Agreement Regularly Scheduled Payment by the Trust Agreement, including, upon the occurrence of a Bankruptcy Related Event, the TIFIA Series 2019 Bond.

"Senior Lien Debt Service Fund" means the fund created and designated the North Carolina Turnpike Authority Triangle Expressway Senior Lien Debt Service Fund by the Trust Agreement.

"Senior Lien Derivative Agreement Regularly Scheduled Payments" means any Derivative Agreement Regularly Scheduled Payments with respect to Derivative Indebtedness constituting Senior Lien Indebtedness.

"Senior Lien Indebtedness" means, collectively, the Senior Lien Bonds and Senior Lien Parity Debt.

"Senior Lien Parity Debt" means all Indebtedness incurred by the Authority in respect of the Triangle Expressway System and not evidenced by Bonds which is secured on a parity (as so designated in the Parity Debt Resolution) with the Senior Lien Bonds by a pledge, charge and lien upon the Trust Estate as provided in the Trust Agreement, including, without limiting the generality of the foregoing, and described in "THE TRUST AGREEMENT – Security" below.

"Senior Lien Parity Reserve Account" means the account in the Senior Lien Debt Service Fund created and so designated by the Trust Agreement.

"Senior Lien Parity Reserve Account Requirement" means 50% of the least of (i) the Maximum Long-Term Debt Service Requirement for all Senior Lien Bonds and Senior Lien Parity Debt secured by the Senior Lien Parity Reserve Account, (ii) 125% of the average annual Long-Term Debt Service Requirement for all Senior Lien Bonds and Senior Lien Parity Debt secured by the Senior Lien Parity Reserve Account and (iii) 10% of the stated principal amount of all Senior Lien Bonds and Senior Lien Parity Debt secured by the Senior Lien Parity Reserve Account; provided, however, that if any Series of Senior Lien Bonds or Senior Lien Parity Debt secured by the Senior Lien Parity Reserve Account has original issue discount or premium that exceeds 2% of the stated redemption price at maturity plus any original issue premium attributable exclusively to underwriter's compensation, the initial offering prices to the public will be used in lieu of the stated principal amount for purposes of the 10% limitation. The Senior Lien Parity Reserve Account Requirement may be composed of cash, Investment Obligations or, subject to the restriction in the following sentence, Reserve Alternative Instruments, or any combination of the foregoing, as the Authority may determine. If the TIFIA Series 2019 Bond remains Outstanding, the Authority must obtain USDOT's written consent to the use of any Reserve Alternative Instrument to be procured other than (i) any Reserve Alternative Instrument relating to the Series 2009 Bonds, the Series 2017 Bonds, the Series 2018 Bonds and the Series 2019 Bonds (collectively, the "Existing Senior Bonds"), (ii) the extension of any Reserve Alternative Instrument relating to Existing Senior Bonds or (iii) any Reserve Alternative Instrument delivered in connection with the issuance of Senior Lien Bonds if (x) the proceeds of such Senior Lien Bonds will be used to pay costs of the Complete 540 Phase 2 Project and (y) such Reserve Alternative Instrument is substantially similar to the Reserve Alternative Instrument securing Existing Senior Bonds.

"Senior Lien Resolution" means any Supplemental Agreement for Senior Lien Bonds or Parity Debt Resolution for Senior Lien Parity Debt, or both, as the case may be, authorizing the issuance of a Series of Senior Lien Bonds or the incurrence of Senior Lien Parity Debt.

"Senior Lien Special Reserve Account" means a special debt service reserve account, if any, created by a Senior Lien Resolution as a debt service reserve account only for the particular Senior Lien Indebtedness authorized thereby.

"Senior Lien Special Reserve Account Requirement" means the amount required to be placed or maintained in a Senior Lien Special Reserve Account as may be required by the Senior Lien Resolution creating such account. The Senior Lien Special Reserve Account Requirement may be composed of cash, Investment Obligations or Reserve Alternative Instruments or any combination of the foregoing, as the Authority may determine.

"Serial Bonds" means the Bonds of any Series that are stated to mature in consecutive annual installments.

"Series," whenever used herein with respect to Bonds, means all of the Bonds designated as being of the same series.

"Series 2009 Bonds" means the Series 2009A Bonds and the Series 2009B Bonds.

"Series 2009A Bonds" means the North Carolina Turnpike Authority Triangle Expressway System Senior Lien Turnpike Revenue Bonds, Series 2009A, issued pursuant to the Original Trust Agreement.

"Series 2009B Bonds" means the North Carolina Turnpike Authority Triangle Expressway System Senior Lien Turnpike Revenue Bonds, Series 2009B, issued pursuant to the Original Trust Agreement.

"Series 2017 Bonds" means the North Carolina Turnpike Authority Triangle Expressway System Senior Lien Turnpike Revenue Refunding Bonds, Series 2017, issued pursuant to the Original Trust Agreement and the Second Supplemental Trust Agreement. The Series 2017 Bonds are Current Interest Bonds.

"Series 2018 Bonds" means the North Carolina Turnpike Authority Triangle Expressway System Senior Lien Turnpike Revenue Refunding Bonds, Series 2018, issued pursuant to the Prior Trust Agreement. The Series 2018 Bonds are Current Interest Bonds.

"Series 2019 Bonds" means the North Carolina Turnpike Authority Triangle Expressway System Senior Lien Turnpike Revenue Bonds, Series 2019, issued pursuant to the Trust Agreement. The Series 2019 Bonds are Current Interest Bonds.

"Series 2019 Cost of Issuance Fund" means the fund created and so designated by the Fourth Supplemental Trust Agreement.

"Series 2019 Subaccount of the Interest Account" means the subaccount created and so designated by the Fourth Supplemental Trust Agreement.

"Series 2019 Subaccount of the Principal Account" means the subaccount created and so designated by the Fourth Supplemental Trust Agreement.

"Series 2019 Subaccount of the Redemption Account" means the subaccount created and so designated by the Fourth Supplemental Trust Agreement.

"Short-Term Indebtedness" means all Indebtedness incurred for borrowed money other than the current portion of Long-Term Indebtedness for any of the following:

(a) money borrowed for an original term, or renewable at the option of the Authority for a period from the date originally incurred, of one year or less;

(b) leases which are capitalized in accordance with generally accepted accounting principles having an original term, or renewable at the option of the lessee for a period from the date originally incurred, of one year or less; and

(c) installment purchase, installment financing or conditional sale contracts having an original term of one year or less.

"SIFMA Municipal Index" means The Securities Industry and Financial Markets Association Municipal Swap Index or such other weekly, high-grade index comprised of seven-day, tax-exempt multi-modal notes produced by Municipal Market Data, Inc., or its successor, or as otherwise designated by The

Securities Industry and Financial Markets Association; provided, however, that if such index is no longer produced by Municipal Market Data, Inc. or its successor, then "SIFMA Municipal Index" means such other reasonably comparable index selected by the Authority.

"Sinking Fund Account" means the respective accounts in the Senior Lien Debt Service Fund and the Subordinate Lien Debt Service Fund created and so designated by the provisions of the Trust Agreement.

"Sinking Fund Requirement" means with respect to any Series of Bonds, the Sinking Fund Requirement provided in the Supplemental Agreement relating to such Series.

The Sinking Fund Requirements for the Term Bonds will be initially the respective principal amounts of such Term Bonds for retirement on each January 1 as fixed in the Supplemental Agreement.

If during any Bond Year, the total principal amount of Term Bonds retired by purchase or redemption under the provisions of the Supplemental Agreement will be greater than the amount of the Sinking Fund Requirement for such Term Bonds, the subsequent Sinking Fund Requirements for such Term Bonds will be reduced in such amount aggregating the amount of such excess as will be specified in an Officer's Certificate filed with the Trustee on or prior to July 15 of the next ensuing Bond Year.

"Special Record Date" means a date fixed by the Trustee for determining the Owner of Bonds for the payment of Defaulted Interest pursuant to the Trust Agreement.

"State" means the State of North Carolina.

"State Appropriation Revenue Bonds" means the bonds issued by the Authority under the State Appropriation Revenue Bond Trust Agreement.

"State Appropriation Revenue Bond Trust Agreement" means the Trust Agreement dated as of June 1, 2009, between the Authority and the Trustee as trustee thereunder, authorizing, among other things, the issuance of revenue bonds thereunder secured by the State Appropriated Revenues to pay a portion of the costs of the Initial Project.

"State Appropriated Revenues" means any funds appropriated by the State pursuant to Section 136-176 of the NCGS or other legislation enacted by the General Assembly of the State providing for the annual appropriation of funds to the Authority to pay debt service on bonds or other indebtedness issued or incurred to finance the Triangle Expressway System or to fund debt service reserves, operating reserves or similar reserves in connection therewith.

"Subordinate Lien Bonds" means any bonds issued under the provisions of the Trust Agreement and secured on a parity with each other and any Subordinate Lien Parity Debt and Subordinate Lien Derivative Agreement Regularly Scheduled Payment by the Trust Agreement.

"Subordinate Lien Debt Service Fund" means the fund created and designated the North Carolina Turnpike Authority Triangle Expressway Subordinate Lien Debt Service Fund by the Trust Agreement.

"Subordinate Lien Derivative Agreement Regularly Scheduled Payments" means any Derivative Agreement Regularly Scheduled Payments with respect to Derivative Indebtedness constituting Subordinate Lien Indebtedness.

"Subordinate Lien Indebtedness" means, collectively, the Subordinate Lien Bonds and Subordinate Lien Parity Debt.

"Subordinate Lien Parity Debt" means all Indebtedness incurred by the Authority in respect of the Triangle Expressway System and not evidenced by Subordinate Lien Bonds which is secured on a parity (as so designated in the Parity Debt Resolution) with the Subordinate Lien Bonds by a pledge, charge and lien upon the Trust Estate as provided in the Trust Agreement, including, without limiting the generality of the foregoing, as described in "THE TRUST AGREEMENT – Security" below.

"Subordinate Lien Parity Reserve Account" means the account in the Senior Lien Debt Service Fund created and so designated by the Trust Agreement.

"Subordinate Lien Parity Reserve Account Requirement" means the amount required to be placed or maintained in a Subordinate Lien Parity Reserve Account as may be required by the Subordinate Lien Resolution first providing for the funding of the Subordinate Lien Parity Reserve Account. The Subordinate Lien Parity Reserve Account Requirement may be composed of cash, Investment Obligations or Reserve Alternative Instruments, or any combination of the foregoing, as the Authority may determine.

"Subordinate Lien Resolution" means any Supplemental Agreement for Subordinate Lien Bonds or Parity Debt Resolution for Subordinate Lien Parity Debt, or both, as the case may be, authorizing the issuance of a Series of Subordinate Lien Bonds or the incurrence of Subordinate Lien Parity Debt.

"Subordinate Lien Special Reserve Account" means a special debt service reserve account, if any, created by a Subordinate Lien Resolution as a debt service reserve account only for the particular Subordinate Lien Indebtedness authorized thereby.

"Subordinate Lien Special Reserve Account Requirement" means the amount required to be placed or maintained in a Subordinate Lien Special Reserve Account as may be required by the Subordinate Lien Resolution creating such account. The Subordinate Lien Special Reserve Account Requirement may be composed of cash, Investment Obligations or Reserve Alternative Instruments or any combination of the foregoing, as the Authority may determine.

"Substantial Completion Date" means, as applicable, the date on which the Initial Project, the 2019 Additional Project and any other Additional Project is open to vehicular or passenger traffic.

"Supplemental Agreement" means an order or resolution of the Authority authorizing any particular Series of Bonds or TIFIA Indebtedness, together with a supplemental trust agreement executed and delivered by the Authority in connection with the issuance of such Series of Bonds or TIFIA Indebtedness that is required to be executed and delivered by the Trust Agreement prior to the issuance of any such Series or TIFIA Indebtedness.

"Synthetic Fixed Rate" means Synthetic Fixed Rate as defined in the definition of Derivative Indebtedness.

"Synthetic Variable Rate" means Synthetic Variable Rate as defined in the definition of Derivative Indebtedness.

"Term Bonds" means the Bonds of any Series, other than Serial Bonds, that are designated as such in the Supplemental Agreement for such Series.

"Third Supplemental Trust Agreement" means the Third Supplemental Trust Agreement dated as of December 1, 2018, between the Authority and the Trustee.

"TIFIA Debt Service" means, collectively, TIFIA Mandatory Debt Service and TIFIA Scheduled Debt Service.

"TIFIA Debt Service Reserve Account" means the special account in the Junior Indebtedness Debt Service Fund created and so designated by the Trust Agreement.

"TIFIA Debt Service Reserve Account Requirement" means an amount determined pursuant to the terms of the TIFIA Loan Agreement related to such TIFIA Indebtedness.

"TIFIA Indebtedness" means, if Outstanding, the TIFIA Series 2009 Bond, the TIFIA Series 2019 Bond and any additional bonds or other secured loan from USDOT, as lender, to the Authority, as borrower, pursuant the TIFIA Loan Agreement and to the Transportation Infrastructure Finance and Innovation Act of 1998, as codified as 23 U.S.C. §60l *et seq.,* as the same may be amended from time to time, with respect to the Triangle Expressway System, and secured by the pledge, charge and lien on the Trust Estate in the manner provided in the Trust Agreement.

"TIFIA Interest Account" means the special account in the Junior Indebtedness Debt Service Fund created and so designated by Section 501.

"TIFIA Loan Agreement" means the TIFIA 2009 Loan Agreement, the TIFIA 2019 Loan Agreement and any other comparable agreement between the Authority and USDOT, so long as the TIFIA Indebtedness related thereto is Outstanding. The TIFIA Series 2009 Bond is not Outstanding as of the date of the Amended and Restated Trust Agreement, and the TIFIA 2009 Loan Agreement has been terminated.

"TIFIA Mandatory Debt Service" will have the meaning set forth in the TIFIA 2019 Loan Agreement.

"TIFIA Principal Account" means the special account in the Junior Indebtedness Debt Service Fund created and so designated by Section 501.

"TIFIA Scheduled Debt Service" will have the meaning set forth in the TIFIA 2019 Loan Agreement.

"TIFIA Series 2009 Bond" means the North Carolina Turnpike Authority Triangle Expressway Revenue Bond, TIFIA Series 2009, issued by the Authority to USDOT pursuant to the Original Trust Agreement to evidence the obligation of the Authority to pay the loan repayments to USDOT, or its assigns, pursuant to the TIFIA 2009 Loan Agreement.

"TIFIA Series 2019 Bond" means the North Carolina Turnpike Authority Triangle Expressway Revenue Bond, TIFIA Series 2019, to evidence the obligation of the Authority to repay the loan under the TIFIA 2019 Loan Agreement.

"TIFIA 2009 Loan Agreement" means the loan agreement entered into between USDOT and the Authority, including any supplements or amendments thereto, with respect to the TIFIA Series 2009 Bond.

"TIFIA 2019 Loan Agreement" or "2019 TIFIA Loan Agreement" means the loan agreement entered into between USDOT and the Authority, including any supplements or amendments thereto, with respect to the TIFIA Series 2019 Bond.

"Traffic Consultant" means any traffic and revenue consultant or firm of traffic and revenue consultants of favorable reputation for skill and experience in performing the duties for which such consultant is required to be employed pursuant to the provisions of the Trust Agreement.

"Triangle Expressway System" means, collectively, the Initial Project and any Additional Projects, including the 2019 Additional Project.

"Trust Agreement" means the Amended and Restated Trust Agreement dated as of December 1, 2019, which is a restatement and compilation of the June 2009 Trust Agreement, as previously supplemented and amended by the First Supplemental Trust Agreement, the Second Supplemental Trust Agreement and the Third Supplemental Trust Agreement and as further supplemented and amended by the Fourth Supplemental Trust Agreement; provided, however, that the term Trust Agreement shall not include any Supplemental Agreement executed and delivered by the Authority and the Trustee with respect to a particular Series of Bonds or TIFIA Indebtedness.

"Trustee" means Wells Fargo Bank, N.A., a national banking association duly organized and existing under the laws of the United States of America and having a designated corporate trust office in Columbia, Maryland.

"Trust Estate" means, collectively, the (a) the money and Investment Obligations in the Project Fund (to the extent provided in the Trust Agreement), the Revenue Fund, the Senior Lien Debt Service Fund, the Subordinate Lien Debt Service Fund, the Junior Indebtedness Debt Service Fund, the Insurance and Condemnation Award Fund, the Renewal and Replacement Fund and the General Reserve Fund under the Trust Agreement and Accounts established under the Supplemental Agreements relating to their issuance, except that the Senior Lien Parity Reserve Account will be held solely for the benefit of the Senior Lien Parity Debt secured thereby notwithstanding any other provision of the Trust Agreement, the Subordinate Lien Parity Reserve Account will be held solely for the benefit of the Subordinate Lien Parity Debt secured thereby, the Junior Indebtedness Debt Service Reserve Account will be held for the benefit of the Junior Indebtedness secured thereby, the TIFIA Debt Service Reserve Account will be held solely for the benefit of the TIFIA Indebtedness secured thereby and any fund or account created by a Supplemental Agreement to the extent such Supplemental Agreement expressly excludes such fund or account, (b) the Receipts and the right to receive the same, except upon the disbursement of Receipts for deposit or credit to NCDOT or for deposit or credit to the Operations and Maintenance Expense Fund or the Operating Reserve Fund, (c) unless otherwise provided in a Supplemental Agreement, the rights to the amounts payable to the Authority under any Credit Facility, (d) the rights to amounts payable to the Authority or the Trustee pursuant to any Derivative Agreement, (e) proceeds of the sale or disposition of assets of the Triangle Expressway System, and (f) Net Insurance Proceeds and Net Eminent Domain Proceeds.

"Unrestricted Account" means the account within the General Reserve Fund created and designated the Unrestricted Account by the Trust Agreement.

"Unrestricted Account Deposit" means the amount on deposit in the General Reserve Fund on the date before the issuance of the Series 2019 Bonds.

"USDOT" means the United States Department of Transportation.

"2019 Additional Project" means the land acquisition, design, construction and equipping of an extension of the existing Triangle Expressway System from its existing eastern termination point to intersect with I-40.

THE TRUST AGREEMENT

Project Fund

A special fund is established with the Trustee and designated the "North Carolina Turnpike Authority Triangle Expressway Project Fund" and within the Project Fund there are established two special accounts designated the "Initial Project Account" and the "Additional Projects Account," respectively. The proceeds of the Series 2019 Bonds to be used for payment of the Costs of the 2019 Additional Project will be deposited by the Trustee in the Additional Projects Account. Unless otherwise provided in a Supplemental Agreement, the proceeds of any Series of Bonds to be used for providing any Additional Project will be deposited upon the delivery of such Series of Bonds into a separate subaccount in the Additional Projects Account to be created by the Supplemental Agreement providing for the issuance of the Bonds financing such Additional Project.

The moneys in the Project Fund are held by the Trustee in trust and, pending application to the payment of the refinancing of, the reimbursement for or the Costs of the Initial Project or the Cost of any Additional Project, as the case may be, or transfer as provided in the Trust Agreement or in the Supplemental Agreement, will, to the extent permitted by law, be subject to a lien and charge in favor of the Owners of Bonds issued with respect to the Initial Project or Additional Project and Outstanding under the Trust Agreement and the applicable Supplemental Agreement and will be held for the security of such Owners; provided, however, that any moneys on deposit in the Project Fund allocable to proceeds of TIFIA Indebtedness will, to the extent permitted by law, be subject to a lien and charge in favor of USDOT as Holder of such TIFIA Indebtedness issued with respect to the Initial Project or Additional Project and Outstanding under the Trust Agreement and the applicable Supplemental Agreement and will be held for the security of USDOT.

Establishment of Funds

In addition to the Project Fund, there are established the following funds:

(a) North Carolina Turnpike Authority Triangle Expressway Revenue Fund;

(b) North Carolina Turnpike Authority Triangle Expressway Senior Lien Debt Service Fund, in which there are established seven special accounts to be known as the Capitalized Interest Account, the Interest Account, the Principal Account, the Sinking Fund Account, the Redemption Account, the Senior Lien Parity Reserve Account and the Hedging Acquisition Account; provided that, if a Bankruptcy Related Event has occurred, the TIFIA Interest Account, the TIFIA Principal Account and the TIFIA Debt Service Reserve Account shall be moved to the Senior Lien Debt Service Fund;

(c) North Carolina Turnpike Authority Triangle Expressway Subordinate Lien Debt Service Fund, in which there are established six special accounts to be known as the Capitalized Interest Account, the Interest Account, the Principal Account, the Sinking Fund Account, the Redemption Account and the Subordinate Lien Parity Reserve Account;

(d) North Carolina Turnpike Authority Triangle Expressway Renewal and Replacement Fund;

(e) North Carolina Turnpike Authority Triangle Expressway Junior Indebtedness Debt Service Fund, in which there are established six special accounts to be known as the Interest Account, the Principal Account, the Junior Indebtedness Debt Service Reserve Account, the TIFIA Interest Account, the TIFIA Principal Account and the TIFIA Debt Service Reserve Account; provided that, if a Bankruptcy Related Event has occurred, the TIFIA Interest Account, the TIFIA Principal Account and the TIFIA Debt Service Reserve Account shall be moved to the Senior Lien Debt Service Fund;

(f) North Carolina Turnpike Authority Triangle Expressway Operations and Maintenance Expense Fund;

(g) North Carolina Turnpike Authority Triangle Expressway Operating Reserve Fund;

(h) North Carolina Turnpike Authority Triangle Expressway General Reserve Fund, in which there are established two accounts to be known as the Restricted Account and the Unrestricted Account; and

(i) North Carolina Turnpike Authority Triangle Expressway Insurance and Condemnation Award Fund.

The Revenue Fund, the Senior Lien Debt Service Fund, the Subordinate Lien Debt Service Fund, the Junior Indebtedness Debt Service Fund, the Renewal and Replacement Fund and the General Reserve Fund and the accounts and subaccounts therein and the Insurance and Condemnation Award Fund will be established with and held by the Trustee. The Operations and Maintenance Expense Fund and the Operating Reserve Fund will be established with and held by a Depositary selected by the Authority.

A Senior Lien Resolution may provide for the creation of a Senior Lien Special Reserve Account for the Senior Lien Indebtedness authorized by such Senior Lien Resolution and for the deposit of moneys to and withdrawal of moneys from such Account. A Senior Lien Special Reserve Account created for any Series of Bonds will be held and maintained by the Trustee; provided, however, that if a Series of Bonds is placed with the purchaser thereof and not publicly offered, then such purchaser or a Depositary may hold the Senior Lien Special Reserve Account created for such Senior Lien Indebtedness as provided for in the Senior Lien Resolution authorizing such Senior Lien Indebtedness.

A Subordinate Lien Resolution may provide for the creation of a Subordinate Lien Special Reserve Account for the Subordinate Lien Indebtedness authorized by such Subordinate Lien Resolution and for the deposit of moneys to and withdrawal of moneys from such Account. A Subordinate Lien Special Reserve Account created for any Series of Bonds will be held and maintained by the Trustee; provided, however, that if a Series of Bonds is placed with the purchaser thereof and not publicly offered, then such purchaser or a Depositary may hold the Subordinate Lien Special Reserve Account created for such Subordinate Lien Indebtedness as provided for in the Subordinate Lien Resolution authorizing such Subordinate Lien Indebtedness.

A Junior Indebtedness Agreement may provide for the creation of a Junior Indebtedness special debt service reserve account for the Junior Indebtedness authorized by such Junior Indebtedness Agreement and for the deposit of moneys to and withdrawal of moneys from such account. Additional provisions with respect to such account will be set forth in the Junior Indebtedness Agreement.

A Senior Lien Resolution may also provide for the creation of such other funds and accounts, as the Authority may determine, for the Senior Lien Indebtedness authorized by such Senior Lien

Resolution. A Subordinate Lien Resolution may also provide for the creation of such other funds and accounts, as the Authority may determine, for the Subordinate Lien Indebtedness authorized by such Subordinate Lien Resolution. A Junior Indebtedness Agreement may also provide for the creation of such other funds and accounts, as the Authority may determine, for the Junior Indebtedness authorized thereby.

The money in all of the funds, accounts and subaccounts established with and held by the Trustee pursuant to the Trust Agreement will be held in trust and applied as provided in the Trust Agreement and, pending such application, the money in such funds, accounts and subaccounts therein will be subject to a pledge, charge and lien in favor of the Owners of the respective Series of Bonds issued and Outstanding under the Trust Agreement and for the further security of such Owners, except as otherwise provided therein or in any Supplemental Agreement.

Each Supplemental Agreement will provide, to the extent applicable, for the creation of a separate subaccount within the Capitalized Interest Account, the Interest Account, the Principal Account, the Redemption Account and the Sinking Fund Account of the Senior Lien Debt Service Fund, the Subordinate Lien Debt Service Fund or the TIFIA Debt Service Fund, as the case may be, with respect to each Series of Bonds or any TIFIA Indebtedness, which subaccounts will bear the designation of such Series of Bonds or TIFIA Indebtedness. A Supplemental Agreement for Senior Lien Bonds may provide that such Senior Lien Bonds authorized thereby may be additionally secured by the Senior Lien Parity Reserve Account or a Senior Lien Special Reserve Account or it may provide that there will not be any debt service reserve fund in respect of such Series of Bonds. If a Series of Senior Lien Bonds is secured by a Senior Lien Special Reserve Account or is not secured by any debt service reserve fund, such Series of Senior Lien Bonds will have no claim on the Senior Lien Parity Reserve Account or any other Senior Lien Special Reserve Account established for other Senior Lien Indebtedness. A Supplemental Agreement for Subordinate Lien Bonds may provide that such Subordinate Lien Bonds authorized thereby may be additionally secured by the Subordinate Lien Parity Reserve Account or a Subordinate Lien Special Reserve Account or it may provide that there will not be any debt service reserve fund in respect of such Series of Bonds. If a Series of Subordinate Lien Bonds is secured by a Subordinate Lien Special Reserve Account or is not secured by any debt service reserve fund, such Series of Subordinate Lien Bonds will have no claim on the Subordinate Lien Parity Reserve Account or any other Subordinate Lien Special Reserve Account established for other Subordinate Lien Indebtedness. A Supplemental Agreement for TIFIA Indebtedness may provide that such TIFIA Indebtedness authorized thereby may be additionally secured by the TIFIA Debt Service Reserve Account or it may provide that there will not be any debt service reserve fund in respect of such TIFIA Indebtedness. TIFIA Indebtedness will have no claim on the Junior Indebtedness Debt Service Reserve Account.

Each Parity Debt Resolution for Senior Lien Parity Debt may provide for the creation of such funds and accounts as it may determine, including, without limiting the generality of the foregoing, an account for the payment of interest, an account or accounts for the payment of principal, whether at maturity or pursuant to an amortization requirement. A Parity Debt Resolution for Senior Lien Parity Debt may provide that the Senior Lien Parity Debt authorized thereby may be additionally secured by the Senior Lien Parity Reserve Account or a Senior Lien Special Reserve Account or it may provide that there will not be any debt service reserve account in respect of such Senior Lien Parity Debt. If Senior Lien Parity Debt is secured by a Senior Lien Special Reserve Account or is not secured by any debt service reserve account, such Senior Lien Parity Debt will have no claim on the Senior Lien Parity Reserve Account.

Each Parity Debt Resolution for Subordinate Lien Parity Debt may provide for the creation of such funds and accounts as it may determine, including, without limiting the generality of the foregoing, an account for the payment of interest, an account or accounts for the payment of principal, whether at maturity or pursuant to an amortization requirement. A Parity Debt Resolution for Subordinate Lien

Parity Debt may provide that the Subordinate Lien Parity Debt authorized thereby may be additionally secured by the Subordinate Lien Parity Reserve Account or a Subordinate Lien Special Reserve Account or it may provide that there will not be any debt service reserve account in respect of such Subordinate Lien Parity Debt. If Subordinate Lien Parity Debt is secured by a Subordinate Lien Special Reserve Account or is not secured by any debt service reserve account, such Subordinate Lien Parity Debt will have no claim on the Subordinate Lien Parity Reserve Account.

Each Junior Indebtedness Agreement may provide for the creation of such funds and accounts as it may determine, including, without limiting the generality of the foregoing, an account for the payment of interest and an account or accounts for the payment of principal, whether at maturity or pursuant to an amortization requirement. A Junior Indebtedness Agreement may provide that the Junior Indebtedness (other than TIFIA Indebtedness) authorized thereby may be additionally secured by the Junior Indebtedness Debt Service Reserve Account or a Junior Indebtedness special debt service reserve account or it may provide that there will not be any debt service reserve account in respect of such Junior Indebtedness. If Junior Indebtedness is secured by a Junior Indebtedness special debt service reserve account or is not secured by any debt service reserve account, such Junior Indebtedness will have no claim on the Junior Indebtedness Debt Service Reserve Account.

The Authority will provide to the Trustee a certified or otherwise authentic copy of each Parity Debt Resolution, each Junior Indebtedness Agreement and each Derivative Agreement adopted or entered into by the Authority and will otherwise provide the Trustee with such information and documents as the Trustee may request to assure that the Trustee is advised of the payments to be made pursuant to such Parity Debt Resolutions, Junior Indebtedness Agreements and Derivative Agreements as provided in the Trust Agreement.

Application of Receipts

Except as otherwise expressly provided for in the Trust Agreement, all Receipts will be deposited on a daily basis when received in the Revenue Fund.

All Derivative Agreement Regularly Scheduled Payments received by the Authority will be deposited in the Revenue Fund upon receipt. Any Derivative Agreement Additional Payments received by the Authority from any counterparty under a Derivative Agreement will be deposited in the General Reserve Fund upon receipt. The Authority will provide the Trustee with written schedules of all Derivative Agreement Regularly Scheduled Payments prior to any such deposits in the Reserve Fund.

The Authority has issued the State Appropriation Revenue Bonds pursuant to the State Appropriation Revenue Bond Trust Agreement to pay certain Costs of the Triangle Expressway System not being funded with the proceeds of Bonds and Parity Debt issued under the Trust Agreement. Pursuant to the State Appropriation Revenue Bond Trust Agreement, the Authority has provided that all State Appropriated Revenues will be deposited as received in the Revenue Fund of the State Appropriation Revenue Bond Trust Agreement to be used to pay principal and interest on the State Appropriation Revenue Bonds. The State Appropriation Revenue Bond Trust Agreement further provides that amounts in excess of the amount needed to pay such debt service is to be withdrawn from the State Appropriation Revenue Bond Trust Agreement and deposited to the Revenue Fund under the Trust Agreement. Upon such deposit, but not prior to such deposit, State Appropriated Revenues will constitute “Revenues” and “Receipts” for all purposes of the Trust Agreement including being subject to the lien and pledge of the Trust Estate as provided in the Trust Agreement.

In order to assure that the Authority will have sufficient funds to pay Operating Expenses as the same become due, the Authority and NCDOT have entered into the O&M Guaranty Agreement, pursuant to which NCDOT has agreed to provide additional funding for the deposits to be made to the Operating Reserve Fund in the event the Receipts are not sufficient to make the deposits thereto. In the event that funds from NCDOT are required to make the deposit to the Operating Reserve Fund, the Authority will provide such notices, financial information and additional documentation to NCDOT as may be needed or requested by NCDOT to provide for the timely payment by NCDOT of the amounts needed to fund such deposit. Such payments will be deposited as received to the Operating Reserve Fund and applied as provided in the Trust Agreement and described in "THE TRUST AGREEMENT – Application of Money in the Operating Reserve Fund" below.

In order to assure that the Authority will have sufficient funds to maintain the quality and sustainability of the Triangle Expressway System, the Authority and NCDOT have entered into the Construction and Renewal and Replacement Agreement, pursuant to which NCDOT has agreed to provide additional funding for the deposits to be made to the Renewal and Replacement Fund in the event the Receipts are not sufficient to make the deposits thereto as provided in the Trust Agreement. In the event that funds from NCDOT are required to make the deposit to the Renewal and Replacement Fund, the Authority will provide such notices, financial information and additional documentation to NCDOT as may be needed or requested to NCDOT to provide for the timely payment by NCDOT of the amounts needed to fund the deposit. Such payments will be deposited as received to the Renewal and Replacement Fund and applied as provided in the Trust Agreement and described in "THE TRUST AGREEMENT – Application of Money in the Renewal and Replacement Fund" below.

Application of Money in Interest Accounts and Capitalized Interest Accounts

Not later than 10:00 A.M. on each Interest Payment Date, date for the payment of Defaulted Interest or date upon which Bonds are to be redeemed, or on such other date as may be specified in the applicable Supplemental Agreement, the Trustee will withdraw from the applicable subaccount in the respective Interest Accounts and wire transfer to the Bond Registrar, in federal reserve or other immediately available funds, the amounts required for paying interest on the respective Bonds on such Interest Payment Date. The Bond Registrar will remit or otherwise set aside the amount due and payable to the Owners as provided in the Supplemental Agreements.

Unless otherwise provided by a Supplemental Agreement, on the date of issuance of any Series of Bonds, an Authorized Officer will deliver to the Trustee a schedule of transfers to be made from the applicable subaccount in the respective Capitalized Interest Accounts to the applicable subaccount of the respective Interest Accounts. The Trustee will make such transfers as required by the schedule of an Authorized Officer.

If the Authority fails to deposit with the Trustee the amounts required to be deposited in the applicable subaccount of the respective Interest Accounts as provided in the Trust Agreement, or if the balance in the applicable subaccount of the respective Interest Accounts on the Business Day next preceding an Interest Payment Date is insufficient to pay interest coming due on the Bonds or any Junior Indebtedness on such Interest Payment Date, the Trustee will notify the Authority of the amount of the deficiency and request the Authority to immediately cure such deficiency. Upon failure of the Authority to cure such deficiency and in any event not later than such Interest Payment Date, the Trustee will transfer an amount sufficient to cure the same, drawing only upon funds (a) in the case of Senior Lien Bonds secured by the Senior Lien Parity Reserve Account, from the Senior Lien Parity Reserve Account, (b) in the case of Senior Lien Bonds secured by a Senior Lien Special Reserve Account, from such Senior Lien Special Reserve Account, if any, securing such Series of Senior Lien Bonds, (c) in the case of Subordinate Lien Bonds secured by the Subordinate Lien Parity Reserve Account, from the Subordinate Lien Parity Reserve Account, (d) in the case of Subordinate Lien Bonds secured by a Subordinate Lien Special Reserve Account, from such Subordinate Lien Special Reserve Account, if any, securing such

Series of Subordinate Lien Bonds, (e) in the case of TIFIA Indebtedness secured by the TIFIA Debt Service Reserve Account, from the TIFIA Debt Service Reserve Account, (f) in the case of Junior Indebtedness secured by the Junior Indebtedness Debt Service Reserve Account, from the Junior Indebtedness Debt Service Reserve Account and (g) in the case of Junior Indebtedness secured by a Junior Indebtedness special debt service reserve account, from such Junior Indebtedness special debt service reserve account.

Application of Money in Principal Account

Not later than 10:00 A.M. on each Principal Payment Date, the Trustee will withdraw from the applicable subaccount in the respective Principal Accounts and wire transfer to the Bond Registrar, in federal reserve or other immediately available funds, the amount necessary to pay the principal of the respective Bonds at their respective maturities. The Bond Registrar will remit or otherwise set aside the amount due and payable to the Owners as provided in the Supplemental Agreements.

If on any date there is money in the Principal Account of the Senior Lien Debt Service Fund and no Serial Bonds are then Outstanding or if on any Principal Payment Date money remains therein after the payment of the principal of Serial Bonds then due, the Trustee will withdraw such money therefrom and will apply the same in the following order: (a) deposit into the Sinking Fund Account of the Senior Lien Debt Service Fund the amount then required to be paid thereto by the Authority pursuant to the Trust Agreement, (b) deposit, if and to the extent determined by the Authority, into the Senior Lien Parity Reserve Account or any Senior Lien Special Reserve Account such amounts as may be determined by the Authority in order to make the amounts on deposit therein equal to the Senior Lien Parity Reserve Account Requirement or the Senior Lien Special Reserve Account Requirement, as the case may be, and (c) otherwise make the deposits required by the Trust Agreement.

If on any date there is money in the Principal Account of the Subordinate Lien Debt Service Fund and no Serial Bonds are then Outstanding or if on any Principal Payment Date money remains therein after the payment of the principal of Serial Bonds then due, the Trustee will withdraw such money therefrom and will apply the same in the following order: (a) deposit into the Sinking Fund Account of the Subordinate Lien Debt Service Fund the amount then required to be paid thereto by the Authority pursuant to the Trust Agreement, (b) deposit, if and to the extent determined by the Authority, into the Subordinate Lien Parity Reserve Account or any Subordinate Lien Special Reserve Account such amounts as may be determined by the Authority in order to make the amounts on deposit therein equal to the Subordinate Lien Parity Reserve Account Requirement or the Subordinate Lien Special Reserve Account Requirement, as the case may be, and (c) otherwise make the deposits required by the Trust Agreement.

If the Authority fails to deposit with the Trustee the amounts required to be deposited in the applicable subaccounts of the respective Principal Accounts as provided in the Trust Agreement, or if the balance in the applicable subaccount of the respective Principal Accounts on the Business Day next preceding a Principal Payment Date is insufficient to pay the Principal coming due on the Bonds or any Junior Indebtedness on such Principal Payment Date, the Trustee will notify the Authority of the amount of the deficiency and request the Authority to immediately cure such deficiency. Upon failure of the Authority to cure such deficiency and in any event not later than such Principal Payment Date, the Trustee will transfer an amount sufficient to cure the same, drawing only upon funds (a) in the case of Senior Lien Bonds secured by the Senior Lien Parity Reserve Account, from the Senior Lien Parity Reserve Account, (b) in the case of Senior Lien Bonds secured by a Senior Lien Special Reserve Account, from such Senior Lien Special Reserve Account, if any, securing such Series of Senior Lien Bonds, (c) in the case of Subordinate Lien Bonds secured by the Subordinate Lien Parity Reserve Account, from the Subordinate Lien Parity Reserve Account, (d) in the case of Subordinate Lien Bonds secured by a Subordinate Lien

Special Reserve Account, from such Subordinate Lien Special Reserve Account, if any, securing such Series of Subordinate Lien Bonds, (e) in the case of TIFIA Indebtedness secured by the TIFIA Debt Service Reserve Account, from the TIFIA Debt Service Reserve Account, (f) in the case of Junior Indebtedness secured by the Junior Indebtedness Debt Service Reserve Account, from the Junior Indebtedness Debt Service Reserve Account and (g) in the case of Junior Indebtedness secured by a Junior Indebtedness special debt service reserve account, from such Junior Indebtedness special debt service reserve account.

Application of Money in Sinking Fund Account

Money held for the credit of the subaccounts in the Sinking Fund Account will be applied to the retirement, purchase, redemption or payment of Term Bonds in the manner provided in the applicable Supplemental Agreement.

If the Authority fails to deposit with the Trustee the amounts required to be deposited in the applicable subaccounts of the respective Sinking Fund Accounts as provided in the Trust Agreement, or if the balance in the applicable subaccount of the respective Sinking Fund Accounts on the Business Day next preceding a Principal Payment Date is insufficient to pay the Principal coming due on the Bonds on such Principal Payment Date, the Trustee will notify the Authority of the amount of the deficiency and request the Authority to immediately cure such deficiency. Upon failure of the Authority to cure such deficiency and in any event not later than such Principal Payment Date, the Trustee will transfer an amount sufficient to cure the same, drawing only upon funds (a) in the case of Senior Lien Bonds secured by the Senior Lien Parity Reserve Account, from the Senior Lien Parity Reserve Account, (b) in the case of Senior Lien Bonds secured by a Senior Lien Special Reserve Account, from such Senior Lien Special Reserve Account, if any, securing such Series of Senior Lien Bonds, (c) in the case of Subordinate Lien Bonds secured by the Subordinate Lien Parity Reserve Account, from the Subordinate Lien Parity Reserve Account and (d) in the case of Subordinate Lien Bonds secured by a Subordinate Lien Special Reserve Account, from such Subordinate Lien Special Reserve Account, if any, securing such Series of Subordinate Lien Bonds. Similar provisions may be established for any Junior Indebtedness in the applicable Junior Indebtedness Agreement.

Deposit and Application of Money in Senior Lien Parity Reserve Account, any Senior Lien Special Reserve Account, Subordinate Lien Parity Reserve Account and any Subordinate Lien Special Reserve Account; Determination of Deficiencies

(a) If a Senior Lien Resolution provides that the Senior Lien Indebtedness incurred thereunder is to be secured by the Senior Lien Parity Reserve Account, the Authority must fund, from the proceeds of such Senior Lien Indebtedness or from any other available sources, concurrently with the delivery of and payment for such Senior Lien Indebtedness, the Senior Lien Parity Reserve Account in an amount equal to the Senior Lien Parity Reserve Account Requirement. If a Senior Lien Resolution provides that the Senior Lien Indebtedness incurred thereunder is to be secured by a Senior Lien Special Reserve Account, the Authority must fund, from the proceeds of such Senior Lien Indebtedness or from any other available sources, at the time or times and in the manner specified in the applicable Senior Lien Resolution, such Senior Lien Special Reserve Account in an amount equal to the Senior Lien Special Reserve Account Requirement for such Senior Lien Indebtedness.

If a Subordinate Lien Resolution provides that the Subordinate Lien Indebtedness incurred thereunder is to be secured by the Subordinate Lien Parity Reserve Account, the Authority must fund, from the proceeds of such Subordinate Lien Indebtedness or from any other available sources, concurrently with the delivery of and payment for such Subordinate Lien Indebtedness, the Subordinate Lien Parity Reserve Account in an amount equal to the Subordinate Lien Parity Reserve Account

Requirement. If a Subordinate Lien Resolution provides that the Subordinate Lien Indebtedness incurred thereunder is to be secured by a Subordinate Lien Special Reserve Account, the Authority must fund, from the proceeds of such Subordinate Lien Indebtedness or from any other available sources, at the time or times and in the manner specified in the applicable Subordinate Lien Resolution, such Subordinate Lien Special Reserve Account in an amount equal to the Subordinate Lien Special Reserve Account Requirement for such Subordinate Lien Indebtedness.

(b) The Trustee will use amounts in the Senior Lien Parity Reserve Account to make transfers, or use moneys provided under a Reserve Alternative Instrument to make deposits, in the order specified in the Trust Agreement, in respect of all Senior Lien Indebtedness secured by the Senior Lien Parity Reserve Account, to the appropriate subaccounts of the Interest Account, the Principal Account and the Sinking Fund Account of the Senior Lien Debt Service Fund to remedy any deficiency therein as of any Interest Payment Date or Principal Payment Date (or any earlier date as set forth in a Senior Lien Resolution), or to pay the interest on or the principal of or amortization requirements in respect of any Senior Lien Parity Debt secured by the Senior Lien Parity Reserve Account when due, whenever and to the extent the money on deposit for such purposes is insufficient. The Trustee will use amounts in the Subordinate Lien Parity Reserve Account to make transfers, or use moneys provided under a Reserve Alternative Instrument to make deposits, in the order specified in the Trust Agreement, in respect of all Subordinate Lien Indebtedness secured by the Subordinate Lien Parity Reserve Account, to the appropriate subaccounts of the Interest Account, the Principal Account and the Sinking Fund Account of the Subordinate Lien Debt Service Fund to remedy any deficiency therein as of any Interest Payment Date or Principal Payment Date (or any earlier date as set forth in a Subordinate Lien Resolution), or to pay the interest on or the principal of or amortization requirements in respect of any Subordinate Lien Parity Debt secured by the Subordinate Lien Parity Reserve Account when due, whenever and to the extent the money on deposit for such purposes is insufficient. Moneys or Investment Obligations on deposit in the Senior Lien Parity Reserve Account, the Subordinate Lien Parity Reserve Account, any Senior Lien Special Reserve Account or any Subordinate Lien Special Reserve Account will be used to satisfy deficiencies prior to any draw on a Reserve Alternative Instrument.

(c) The Trustee will use amounts in any Senior Lien Special Reserve Account held by it to make transfers or use moneys provided under a Reserve Alternative Instrument to make deposits, in the order specified in the Trust Agreement, in respect of the particular Senior Lien Indebtedness secured by such Senior Lien Special Reserve Account, to the appropriate subaccounts of the Interest Account, the Principal Account and the Sinking Fund Account of the Senior Lien Debt Service Fund to remedy any deficiency therein as of any Interest Payment Date or Principal Payment Date (or any earlier date as set forth in a Senior Lien Resolution) or to pay the interest on or the principal of or amortization requirement in respect thereof on Senior Lien Parity Debt secured by such Senior Lien Special Reserve Account when due, whenever and to the extent the money on deposit for such purposes is insufficient. The Trustee will use amounts in any Subordinate Lien Special Reserve Account held by it to make transfers or use moneys provided under a Reserve Alternative Instrument to make deposits, in the order specified in the Trust Agreement, in respect of the particular Subordinate Lien Indebtedness secured by such Subordinate Lien Special Reserve Account, to the appropriate subaccounts of the Interest Account, the Principal Account and the Sinking Fund Account of the Subordinate Lien Debt Service Fund to remedy any deficiency therein as of any Interest Payment Date or Principal Payment Date (or any earlier date as set forth in a Subordinate Lien Resolution) or to pay the interest on or the principal of or amortization requirement in respect thereof on Subordinate Lien Parity Debt secured by such Subordinate Lien Special Reserve Account when due, whenever and to the extent the money on deposit for such purposes is insufficient.

(d) Any deficiency in the Senior Lien Parity Reserve Account, the Subordinate Lien Parity Reserve Account, any Senior Lien Special Reserve Account and any Subordinate Lien Special

Reserve Account resulting from the withdrawal of moneys therein will be made up over the twelve-month period immediately following the month in which such withdrawal is made by monthly deposits of one-twelfth (1/12) of the amount of such deficiency, such deposits to be made pursuant to the Trust Agreement. Any deficiency resulting from a draw on a Reserve Alternative Instrument will be made up as provided in such Reserve Alternative Instrument or documentation relating thereto, but any such deficiency must be made up by not later than the final date when such deficiency would have been required to be made up if there had been a withdrawal of moneys from the Senior Lien Parity Reserve Account, the Subordinate Lien Parity Reserve Account, any Senior Lien Special Reserve Account or any Subordinate Lien Special Reserve Account rather than a draw on a Reserve Alternative Instrument. Deficiencies may be satisfied through the deposit of additional moneys or the providing of an additional, or increase in a, Reserve Alternative Instrument.

(e) Unless a Reserve Alternative Instrument will be in effect, if on any date of valuation pursuant to the Trust Agreement as described in "THE TRUST AGREEMENT – Valuation" below, the amount on deposit in the Senior Lien Parity Reserve Account is less than 90% of the Senior Lien Parity Reserve Account Requirement, the Authority will deposit into the Senior Lien Parity Reserve Account monthly one-twelfth (1/12) of the amount required as of such date to bring the amount then on deposit in the Senior Lien Parity Reserve Account up to the Senior Lien Parity Reserve Account Requirement. Any such deficiency may be satisfied through the deposit of additional moneys or the providing of an additional, or increase in a, Reserve Alternative Instrument. Any deficiency in the Subordinate Lien Parity Reserve Account or any Senior Lien Special Reserve Account or Subordinate Lien Special Reserve Account resulting from a valuation of the Investment Obligations therein pursuant to the Trust Agreement as described in "THE TRUST AGREEMENT – Valuation" below will be made up as provided in the relevant Senior Lien Resolution or Subordinate Lien Resolution.

Application of Money in the Redemption Account

The Trustee will apply money in the respective Redemption Accounts of the Senior Lien Debt Service Fund and the Subordinate Lien Debt Service Fund, as the case may be, for the purchase or redemption of Senior Lien Bonds or Subordinate Lien Bonds, as applicable, as follows:

(a) Subject to the provisions of clause (c) below, and if instructed to do so in writing by an Authorized Officer, the Trustee will endeavor to purchase and cancel Bonds or portions thereof, whether or not such Bonds or portions thereof are then subject to redemption, at the written direction of an Authorized Officer, provided that the purchase price of each Bond, plus accrued interest to the date of purchase, will not exceed the Redemption Price that would be payable on the next redemption date to the Owners of such Bonds under the provisions of the applicable Supplemental Agreement plus accrued interest to the redemption date if such Bond or such portion thereof were called for redemption on such redemption date from the money in the applicable subaccount of the Redemption Account. The Trustee will pay the interest accrued on such Bonds or portions thereof to the date of settlement from the applicable subaccount of the respective Interest Account and the purchase price from the applicable subaccount of the respective Redemption Account, but no such purchase will be made by the Trustee from money in the applicable subaccount of the respective Redemption Account within the period of forty-five (45) days immediately preceding any date on which such Bonds or portions thereof are to be redeemed except from moneys other than the moneys set aside in the applicable subaccount of the respective Redemption Account for the redemption of Bonds.

(b) Subject to the provisions of clause (c) below, the Trustee will call for redemption on a date permitted by the applicable Supplemental Agreement such amount of Bonds or portions thereof as, with the redemption premium, if any, will exhaust the moneys then held in the applicable subaccount of the respective Redemption Account as nearly as may be; provided, however, that not less than Fifty

Thousand Dollars ($50,000) principal amount of Bonds will be called for redemption at any one time unless the Trustee is so instructed by the Authority. The Trustee will pay the accrued interest on the Bonds or portions thereof to be redeemed to the date of redemption from the applicable subaccount of the respective Interest Account or any other available funds of the Authority and the Redemption Price of such Bonds or portions thereof from the applicable subaccount of the respective Redemption Account. On or before the redemption date, the Trustee will withdraw from the applicable subaccounts of the respective Redemption Account and the Interest Account, as applicable, and transfer to the Bond Registrar the respective amounts required to pay the Redemption Price and accrued interest to the redemption date of the Bonds or portions thereof so called for redemption.

(c) Money in the respective Redemption Accounts may be applied by the Trustee in each Fiscal Year to the purchase or the redemption of Bonds of any one or more Series then Outstanding in accordance with the latest Officer's Certificate filed with the Trustee (i) designating one or more Series of Bonds to be purchased or redeemed, (ii) if more than one Series of Bonds is so designated, setting forth the aggregate principal amount of Bonds of each Series to be purchased or redeemed, and (iii) unless the Supplemental Agreement relating to the Bonds to be redeemed specifies the order of redemption, designating the Bonds to be redeemed within each Series, and if such Bonds are Term Bonds, the years in which future Sinking Fund Requirements are to be reduced as a result of such redemption and the amount of such reduction in each such year. In the event no such certificate is filed and unless the Supplemental Agreement relating to the Bonds to be redeemed specifies otherwise, (A) the Trustee will apply such money to the purchase of one or more Series of Bonds as it will determine or to the redemption of Bonds bearing the highest rate of interest, (B) if Bonds of more than one maturity bear the same interest rate, the Trustee will redeem such Bonds in the inverse order of maturities, and (C) if the Bonds bearing the highest rate of interest are Term Bonds, the Trustee will reduce Sinking Fund Requirements for such Term Bonds in inverse order of the scheduled redemption of such Term Bonds. All Bonds will be redeemed as provided in the applicable Supplemental Agreement.

Money held for the credit of the applicable subaccounts in the respective Redemption Accounts will be applied to the purchase or redemption of Bonds in the manner provided in the applicable Supplemental Agreement.

Similar provisions may be established for any Junior Indebtedness in the applicable Junior Indebtedness Agreement.

Application of Money in the Operations and Maintenance Expense Fund.

Moneys held for the credit of the Operations and Maintenance Expense Fund shall be used by the Authority only to pay all or a portion of the cost of any Operating Expenses in accordance with the applicable procedures used in the payment of Operating Expenses.

Application of Money in the Operating Reserve Fund

Moneys held for the credit of the Operating Reserve Fund will be used by the Authority only to pay all or a portion of the cost of any Operating Expenses in accordance with the applicable procedures used in the payment of Operating Expenses or as provided in the Capital Improvements Budget, but only to the extent that amount held in the Operations and Maintenance Expense Fund are not sufficient for such purpose.

In addition to the deposits required by the Trust Agreement, the Trustee will deposit to the credit of the Operating Reserve Fund any amounts received from NCDOT as an Operating Advance pursuant to the terms of the O&M Guaranty Agreement.

Application of Money in Renewal and Replacement Fund

(a) Moneys held for the credit of the Renewal and Replacement Fund will be used by the Authority only for the following:

(i) to pay Renewal and Replacement Expenses in accordance with the applicable procedures used in the payment of Operating Expenses or as provided in the Capital Improvements Budget;

(ii) in the Authority's sole discretion, (A) to make deposits to the appropriate subaccounts in the Interest Account, the Principal Account and the Sinking Fund Account of the Senior Lien Debt Service Fund or the Subordinate Lien Debt Service Fund, the Junior Indebtedness Debt Service Fund or the TIFIA Debt Service Fund to remedy any deficiency therein, (B) to make any required deposits or pay interest on or the principal of or amortization requirements in respect of any Senior Lien Parity Debt or Subordinate Lien Parity Debt when due or (C) to make any Senior Lien Derivative Agreement Regularly Scheduled Payments or Subordinate Lien Derivative Agreement Regularly Scheduled Payments when due, whenever moneys are insufficient for such purposes; provided, however, that amounts paid by NCDOT to the Authority under the Construction and Renewal and Replacement Guaranty Agreement may not be used for the purposes described in this subsection (ii); and

(iii) if an Event of Default has occurred, to make payments in accordance with the Trust Agreement as described in "Remedies" below.

(b) If at any time the amounts in the Renewal and Replacement Fund will not be equal to the Renewal and Replacement Fund Requirement, then pursuant to the Construction and Renewal and Replacement Guaranty Agreement, upon request of the Authority, NCDOT will pay the amount necessary so that amounts in the Renewal and Replacement Fund will be equal to the Renewal and Replacement Fund Requirement. If at any time the amounts in the Renewal and Replacement Fund are in excess of the Renewal and Replacement Fund Requirement, then, upon delivery of an Officer's Certificate making a request therefor, such excess will be transferred to the Revenue Fund.

(c) For purposes of this section, the portion of moneys on deposit in the Renewal and Replacement Fund allocable to payments from NCDOT under subsection (b), if any, will be determined as follows. To the extent any payments from NCDOT pursuant to subsection (b) have not been repaid in full in accordance with the Trust Agreement, an amount equal to the outstanding balance owed to NCDOT will be deemed to have been provided by NCDOT and not available for the purposes set forth in subsections (a)(ii) and (iii) above. The Authority will provide a statement of such outstanding balance, if any, as requested by the Trustee.

General Reserve Fund

Subject to the limitations set forth below, moneys held for the credit of the General Reserve Fund will be used for any legally available purpose, including, without limitation, the payment of Operating Expenses, the payment of capital improvements, payment of any Guarantee Repayments owed to NCDOT, the funding of any Non-System Project and the payment of any Derivative Agreement Additional Payments.

For so long as any TIFIA Indebtedness remains Outstanding and in accordance with the provisions of the Trust Agreement as described under "SECURITY AND SOURCES OF PAYMENT

FOR THE SERIES 2019 BONDS – Application of Receipts" in this Official Statement, moneys will be deposited in the General Reserve Fund as follows:

(i) except as provided in subsection (iii) below, prior to the Substantial Completion Date for the Complete 540 Phase 2 Project, all remaining moneys shall be deposited to the Restricted Account of the General Reserve Fund;

(ii) except as provided in subsection (iii) below, on and after the Substantial Completion Date for the Complete 540 Phase 2 Project, all remaining moneys shall be allocated between the Complete 540 Phase 2 Project and the other portions of the Triangle Expressway System pro rata based on the percentage of Receipts generated in each such portion and (A) the remaining moneys allocable to the Complete 540 Phase 2 Project shall be deposited in the Unrestricted Account of the General Reserve Fund and (B) the remaining moneys allocable to the other portions of the Triangle Expressway System shall be deposited in the Restricted Account of the General Reserve Fund; and

(iii) if no Additional Projects are identified in either (A) the most recent metropolitan transportation improvement program adopted by the Capital Area Metropolitan Planning Organization or (B) the State transportation plan, all remaining moneys shall be allocated between the Complete 540 Phase 2 Project and the other portions of the Triangle Expressway System pro rata based on the percentage of Receipts generated in each such portion and (X) the remaining moneys allocable to the Complete 540 Phase 2 Project shall be deposited in the Unrestricted Account of the General Reserve Fund and (Y)(I) half of the remaining moneys allocable to the other portions of the Triangle Expressway System shall be transferred to the TIFIA Interest Account and the TIFIA Principal Account to be used to pay interest and principal on any Outstanding TIFIA Indebtedness, and (II) the other half shall be deposited in the Unrestricted Account of the General Reserve Fund.

Notwithstanding any other limitations on, or requirements for, withdrawals from the General Reserve Fund, the amount therein on the date before issuance of the Series 2019 Revenue Bonds (the "Unrestricted Account Deposit") will be deposited in the Unrestricted Account. Interest earnings on the Unrestricted Account Deposit will be held in the Unrestricted Account within the General Reserve Fund but not credited to the Unrestricted Account Deposit.

For so long as the TIFIA Series 2019 Bond remains Outstanding, amounts on deposit in the Restricted Account and the Unrestricted Account will be disbursed and applied in accordance with the provisions of the TIFIA 2019 Loan Agreement.

Security

As security for the payment of all Indebtedness issued or incurred under the Trust Agreement and the interest thereon, and as security for the payments of amounts due under any Derivative Agreement, but in each case solely as provided therein, the Authority grants to the Trustee, for the benefit of the Owners and Holders of such Indebtedness and the counterparty to any such Derivative Agreement, a pledge, charge and lien upon the Trust Estate.

Any Receipts disbursed by the Trustee for deposit in the Operations and Maintenance Expense Fund or the Operating Reserve Fund, and any Receipts disbursed to NCDOT pursuant to the Trust Agreement, will no longer constitute Receipts within the meaning of the Trust Agreement and will no longer be subject to the pledge, charge and lien upon the Trust Estate created by the Trust Agreement.

The pledge, charge and lien upon the Trust Estate will be effective and operate immediately, without any recording or filing of any financing statement or other notice, and the Trustee will have the right to collect and receive the Receipts in accordance with the provisions of the Trust Agreement at all times during the period from and after the date of delivery of the Series 2009 Bonds issued thereunder until all Bonds, Parity Debt, Senior Lien Derivative Agreement Regularly Scheduled Payments, Subordinate Lien Derivative Agreement Regularly Scheduled Payments and Junior Indebtedness have been fully paid and discharged, including, without limitation, at all times after the institution and during the pendency of bankruptcy or similar proceedings.

The aforementioned pledge, charge and lien upon the Trust Estate will not inhibit the sale or disposition of any portion of the Triangle Expressway System in accordance with the Trust Agreement and the TIFIA 2019 Loan Agreement and will not impair or restrict the ability of the Authority to invest in securities and other forms of investment, subject to the provisions of the Trust Agreement.

The pledge, charge and lien upon the Trust Estate will be (1) first for the security for the payment of the Owners or Holder of Senior Lien Indebtedness (including TIFIA Indebtedness during any period where any TIFIA Indebtedness has become a Senior Lien Bond pursuant to the Trust Agreement), including the interest thereon, and the payment of any Senior Lien Derivative Agreement Regularly Scheduled Payments, (2) second for the security for the payment of the Subordinate Lien Bonds and Subordinate Lien Parity Debt, including the interest thereon, and the payment of all Subordinate Lien Derivative Agreement Regularly Scheduled Payments, for which such pledge, charge and lien upon the Trust Estate is junior and subordinate to the pledge charge and lien upon the Trust Estate securing the Senior Lien Bonds, the Senior Lien Parity Debt and the Senior Lien Derivative Agreement Regularly Scheduled Payments and (3) third, for the security for the payment of the Junior Indebtedness, including the interest thereon, which (other than during any period where any TIFIA Indebtedness has become a Senior Lien Bond pursuant to the Trust Agreement) is junior and subordinate to the pledge charge and lien upon the Trust Estate securing the Senior Lien Bonds, the Senior Lien Parity Debt, the Senior Lien Derivative Agreement Regularly Scheduled Payments, the Subordinate Lien Bonds, the Subordinate Lien Parity Debt and the Subordinate Lien Derivative Agreement Regularly Scheduled Payments.

Notwithstanding any of the foregoing to the contrary, in the case of the occurrence and continuance of a Bankruptcy Related Event, all TIFIA Indebtedness will automatically and without notice be deemed to constitute a Senior Lien Bond. The Holder of TIFIA Indebtedness that has become a Senior Lien Bond will be entitled to all rights of a Holder of a Senior Lien Bond, except that the Holders of TIFIA Indebtedness will have no rights in, or claim to, any amounts held in the Senior Lien Parity Reserve Account or any Senior Lien Special Reserve Account. Upon the occurrence of a Bankruptcy Related Event, the TIFIA Debt Service Reserve Account will be funded on a parity with the Senior Lien Parity Reserve Account and any Senior Lien Special Reserve Account in accordance with the provisions of the Trust Agreement as described in "SECURITY AND SOURCES OF PAYMENT FOR THE SERIES 2019 BONDS – Application of Receipts" in this Official Statement.

NCDOT Contingent Guarantees; Repayments Thereof.

The obligation of NCDOT under the O&M Guaranty Agreement is to be funded from amounts in the State Highway Fund, and the obligations of NCDOT under the Construction and Renewal and Replacement Guaranty Agreement are to be funded from the State Highway Fund or the State Highway Trust Fund. Each such payment is subject to appropriation by the State and the availability of amounts in the respective source fund. All such payments shall be repaid by the Authority to NCDOT as Guarantee Repayments. All amounts so repaid, as a part of the obligated Guarantee Repayments, shall include simple interest calculated at the rate determined pursuant to Section 136-176(b) of the NCGS. Any repayments made which are less than all of the Guarantee Repayments shall be credited to principal and interest components of Guarantee Repayments in proportion to the total of principal and interest owed on the date of repayment.

Security for Deposits

Any and all money received by the Authority under the provisions of the Trust Agreement will be deposited as received with the Trustee or one or more other Depositaries as provided in the Trust Agreement, and all money so deposited with the Trustee will be trust funds under the terms of the Trust Agreement, and, to the extent permitted by law in the case of the Project Fund, will not be subject to any lien or attachment by any creditor of the Authority.

All money deposited with the Trustee or any Depositary under the Trust Agreement in excess of the amount guaranteed by the Federal Deposit Insurance Corporation or other federal agency will be continuously secured, for the benefit of the Authority and the Owners and Holders of Bonds and Senior Lien Parity Debt, either (a) by lodging with a bank or trust company chosen by the Trustee or Depositary or, if then permitted by law, by setting aside under control of the trust department of the bank or trust company holding such deposit, as collateral security, Government Obligations or other marketable securities eligible as security for the deposit of trust funds under regulations of the Comptroller of the Currency of the United States or applicable State law or regulations, having a market value (exclusive of accrued interest) not less than the amount of such deposit, or (b) if the furnishing of security as provided in clause (a) above is not permitted by applicable law, then in such other manner as may then be required or permitted by applicable State or federal laws and regulations regarding the security for, or granting a preference in the case of, the deposit of trust funds; provided, however, that it will not be necessary for the Trustee or any Depositary to give security for the deposit of any money with it for the payment of the principal of or the redemption premium or the interest on any Bonds, or for the Trustee or any Depositary to give security for any money that will be represented by Investment Obligations purchased under the provisions of described in this clause as an investment of such money.

All money deposited with the Trustee or any Depositary will be credited to the particular fund, account or subaccount to which such money belongs.

Investment of Money

Money held for the credit of all funds, accounts and subaccounts will be continuously invested and reinvested by the Trustee or the Depositaries, whichever is applicable, in Investment Obligations or held as cash to the extent investment or reinvestment in Investment Obligations is not practicable. Except as described below with respect to the disposition of investment income, the particular investments to be made and other related matters in respect of investments may, as to each Series of Bonds, be provided in the applicable Supplemental Agreement.

Except as otherwise provided in (a) this section with respect to the Senior Lien Parity Reserve Account, Subordinate Lien Parity Reserve Account, Junior Indebtedness Debt Service Reserve Account and TIFIA Debt Service Reserve Account and (b) if the TIFIA Series 2019 Bond is Outstanding, the TIFIA 2019 Loan Agreement, Investment Obligations will mature or be redeemable at the option of the holder thereof not later than the respective dates when the money held for the credit of such funds, accounts and subaccounts will be required for the purposes intended.

Investment Obligations in the Senior Lien Parity Reserve Account, Subordinate Lien Parity Reserve Account, Junior Indebtedness Debt Service Reserve Account or TIFIA Debt Service Reserve Account will (a) mature or (b) be redeemable at the option of the holder of such Investment Obligation so that all such Investment Obligations will have an average life of not more than ten (10) years after the date of such investment.

Notwithstanding the forgoing, no Investment Obligations pertaining to any Series in any fund, account or subaccount will mature on a date beyond the latest maturity date of the respective Series of Bonds Outstanding at the time such Investment Obligations are deposited. For purposes of this clause, the maturity date of any repurchase agreement will be deemed to be the stated maturity date of such agreement and not the maturity dates of the underlying obligations.

An Authorized Officer or his designee will give to the Trustee or any Depositary written directions respecting the investment of any money required to be invested under the Trust Agreement, subject, however, to the provisions of the Trust Agreement and described in this clause, and the Trustee or such Depositary will then invest such money as so directed. The Trustee or any Depositary may request additional direction or authorization from the Authorized Officer or his designee in writing with respect to the proposed investment of money under the provisions of the Trust Agreement. Upon receipt of such directions, the Trustee or any Depositary will invest, subject to the provisions of the Trust Agreement, such money in accordance with such directions. If no such directions are given, then any uninvested funds will be invested by the Trustee in Government Obligations having the shortest maturity available, but in no event exceeding a maturity of thirty (30) days from the date of investment in the case of funds held in the Project Fund, and the date funds are required to be used to pay debt service on Bonds, Parity Debt or Junior Indebtedness in the case of funds held in the Senior Lien Debt Service Fund, the Subordinate Lien Debt Service Fund, the Junior Indebtedness Debt Service Fund or the Junior Indebtedness Debt Service Fund. The Trustee or any Depositary will have no liability for investments made in accordance with the Trust Agreement.

Investment Obligations acquired with money in or credited to any fund, account or subaccount established under the Trust Agreement will be deemed at all times to be part of such fund, account or subaccount. Any loss realized upon the disposition or maturity of such Investment Obligations will be charged against such funds, accounts or subaccounts. The interest accruing on any such Investment Obligations and any profit realized upon the disposition or maturity of such Investment Obligations will be credited to the particular fund, account or subaccount to which such Investment Obligation relates (and, if such account is part of the Trust Estate, will be subject to the pledge of the Trust Estate in accordance with the Trust Agreement as described in "THE TRUST AGREEMENT – Security" above, except as set forth in the following three paragraphs:

Any investment earnings received on amounts deposited in the Senior Lien Debt Service Fund (including the Senior Lien Parity Reserve Account, to the extent that the amount on deposit in the Senior Lien Parity Reserve Account is equal to the Senior Lien Parity Reserve Account Requirement), shall be transferred to the Interest Account of the Senior Lien Debt Service Fund. Any investment earnings received on amounts deposited in the Subordinate Lien Debt Service Fund shall be transferred to the Interest Account of the Subordinate Lien Debt Service Fund. Any investment earnings received on amounts deposited in the Subordinate Lien Parity Reserve Account, to the extent that the amount on deposit in the Subordinate Lien Parity Reserve Account is equal to the Subordinate Lien Parity Reserve Account Requirement shall be transferred to the Revenue Fund. Any investment earnings received on amounts deposited in the Junior Indebtedness Debt Service Fund shall be transferred to the Interest Account of the Junior Indebtedness Debt Service Fund. Any investment earnings received on amounts deposited in the Junior Indebtedness Debt Service Reserve Account, to the extent that the amount on deposit in the Junior Indebtedness Debt Service Reserve Account is equal to the Junior Indebtedness Debt Service Reserve Account Requirement, shall be transferred to the Revenue Fund. Any investment earnings received on amounts deposited in the TIFIA Interest Account and the TIFIA Principal Account shall be transferred to the Interest Account of the TIFIA Lien Debt Service Fund. Any investment earnings received on amounts deposited in the TIFIA Debt Service Reserve Account, to the extent that the amount on deposit in the TIFIA Debt Service Reserve Account is equal to the TIFIA Debt Service Reserve Account Requirement, shall be transferred to the Revenue Fund. Any investment earnings on any Special Reserve Account shall be transferred or deposited in the manner specified in the Supplemental Agreement or Parity Debt Resolution establishing such Special Reserve Account.

Any such interest accruing and any such profit realized will not be credited or transferred to any other fund, account or subaccount unless there will be no deficiency in the respective fund, account or subaccount. If there will be a deficiency in any fund, account or subaccount, any such interest or profit will remain in such fund, account or subaccount until such deficiency has been made up.

Any such interest accruing and any such profit realized that is required to be transferred to any other fund, account or subaccount will be transferred upon the receipt thereof by the Depositaries or the Trustee, as the case may be, pursuant to the provisions of the Trust Agreement.

The Trustee will sell or reduce to cash a sufficient amount of such Investment Obligations whenever it is necessary to do so to provide money to make any payment from any such fund, account or subaccount in accordance with the provisions of the Trust Agreement. The Trustee will not be liable or responsible for any loss resulting from any such action.

Whenever a transfer of money between two or more of the funds, accounts or subaccounts established under the Trust Agreement is permitted or required, such transfer may be made as a whole or in part by transfer of one or more Investment Obligations at a value determined at the time of such transfer in accordance with the Trust Agreement, provided that the Investment Obligations transferred are those in which money of the receiving fund, account or subaccount could be invested at the date of such transfer.

For purposes of making any investment under the Trust Agreement, the Trustee or any Depositary may consolidate money held by it in any fund, account or subaccount with money in any other fund, account or subaccount. Transfers from any fund, account or subaccount to the credit of any other fund, account or subaccount provided for in the Trust Agreement may be effectuated on the books and records of the Trustee, the Authority or any Depositary without any actual transfer of funds or liquidation of investments. Investment Obligations purchased with consolidated funds will be allocated to each fund, account or subaccount on a pro rata basis in accordance with the initial amount so invested from each such fund, account or subaccount.

Unless otherwise directed by the Authority, Investment Obligations may be purchased by the Trustee or any Depositary through its own investment division or other bank facilities established for such purpose.

Payment of Principal, Interest, Premium and Other Amounts

The Authority will cause to be paid, when due, the principal of (whether at maturity, by redemption or otherwise) and the premium, if any, and interest on the Bonds, Parity Debt and Junior Indebtedness and the Derivative Agreement Regularly Scheduled Payments at the places, on the dates and in the manner provided in the Trust Agreement and in the Bonds, Parity Debt and Junior Indebtedness and the documentation authorizing and securing such Bonds, Parity Debt and Junior Indebtedness and in any Derivative Agreement, according to the true intent and meaning thereof.

The Bonds, Parity Debt and Junior Indebtedness are special obligations of the Authority payable solely from the Trust Estate, including Receipts, the Authority's right to receive the same, and money, Investment Obligations and Reserve Alternative Instruments held in the applicable funds, accounts and subaccounts created hereunder for each such Series of Bonds and any Parity Debt and Junior Indebtedness and the income from Investment Obligations in such funds, accounts and subaccounts. The Bonds, Parity Debt and Junior Indebtedness will be secured as provided in the Trust Agreement. The Bonds, Parity Debt and Junior Indebtedness will not be deemed to a debt, liability or obligation of the State or of any other public body in the State secured by a pledge of the faith and credit of the State or of any other public body in the State, respectively, but will be payable solely from the Trust Estate. The Authority will not be obligated to pay the principal of, premium, if any, or interest on the Bonds, Parity Debt and Junior Indebtedness except from the Trust Estate, and neither the faith and credit nor the taxing power of the State or of any other public body in the State, including the Authority, is pledged for the payment of the principal of, premium, if any, or interest on the Bonds, Parity Debt and Junior Indebtedness. The Authority has no taxing power.

Valuation

For the purpose of determining the amount on deposit in any fund, account or subaccount, Investment Obligations in which money in such fund, account or subaccount is invested will be valued by the Trustee (a) at face value if such Investment Obligations mature within twelve (12) months from the date of valuation thereof and (b) if such Investment Obligations mature more than twelve (12) months after the date of valuation thereof, at the price at which such Investment Obligations are redeemable by the holder at its option, if so redeemable, or, if not so redeemable, at the lesser of (i) the cost of such Investment Obligations minus the amortization of any premium or plus the amortization of any discount thereon and (ii) the market value of such Investment Obligations.

All Investment Obligations in all of the funds, accounts and subaccounts created under the Trust Agreement, except the Renewal and Replacement Fund, the Operating Reserve Fund, the Operations and Maintenance Expense Fund and the General Reserve Fund, will be valued as of the last day of each Fiscal Year. When a valuation is made by the Trustee, the Trustee will report the result of such valuation to the Authority within thirty (30) days after such valuation. In addition, Investment Obligations will be valued at any time requested by the Authority on reasonable notice to the Trustee (which period of notice may be waived or reduced by the Trustee); provided, however, that the Trustee will not be required to value Investment Obligations more than once in any calendar month.

Whenever, following a valuation on the last day of each Fiscal Year as described above, the value of the cash and Investment Obligations in the Senior Lien Parity Reserve Account held by the Trustee, plus accrued interest to the date of valuation, is less than 90% of the Senior Lien Parity Reserve Account Requirement, the Trustee will compute the amount by which the Senior Lien Parity Reserve Account Requirement exceeds the balance in the Senior Lien Parity Reserve Account and will immediately give the Authority notice of such deficiency and the amount necessary to cure the same in accordance with the Trust Agreement.

Whenever the value of the cash and Investment Obligations in the Senior Lien Parity Reserve Account held by the Trustee, plus accrued interest to the date of valuation, is greater than the Senior Lien Parity Reserve Account Requirement, the Trustee will compute the amount by which the balance in the Senior Lien Parity Reserve Account exceeds the Senior Lien Parity Reserve Account Requirement, and the Authority will be entitled to transfer such excess to the credit of the Interest Account of the Senior Lien Debt Service Fund or to pay interest on Senior Lien Bonds or Senior Lien Parity Debt secured by the Senior Lien Parity Reserve Account in the manner directed by the Authority in an Officer's Certificate filed with the Trustee; provided, however, that nothing in the Trust Agreement will require the Authority to liquidate or sell any Investment Obligation held in the Senior Lien Parity Reserve Account for purposes of making such transfer.

Whenever the value of the cash and Investment Obligations in the Subordinate Lien Parity Reserve Account held by the Trustee, plus accrued interest to the date of valuation, is greater than the Subordinate Lien Parity Reserve Account Requirement, the Trustee will compute the amount by which the balance in the Subordinate Lien Parity Reserve Account exceeds the Subordinate Lien Parity Reserve Account Requirement, and the Authority will be entitled to transfer such excess to the credit of the Interest Account of the Subordinate Lien Debt Service Fund or to pay interest on Subordinate Lien Bonds or Subordinate Lien Parity Debt secured by the Subordinate Lien Parity Reserve Account in the manner directed by the Authority in an Officer's Certificate filed with the Trustee; provided, however, that nothing in the Trust Agreement will require the Authority to liquidate or sell any Investment Obligation held in the Subordinate Lien Parity Reserve Account for purposes of making such transfer.

Whenever the value of the cash and Investment Obligations in the Junior Indebtedness Debt Service Reserve Account held by the Trustee, plus accrued interest to the date of valuation, is greater than the Junior Indebtedness Debt Service Reserve Account Requirement, the Authority will be entitled to transfer such excess to the credit of the Interest Account of the Junior Indebtedness Debt Service Fund or to pay interest on Junior Indebtedness secured by the Junior Indebtedness Debt Service Reserve Account in the manner directed by the Authority in an Officer's Certificate filed with the Trustee; provided, however, that nothing in the Trust Agreement will require the Authority to liquidate or sell any Investment Obligation held in the Junior Indebtedness Debt Service Reserve Account for purposes of making such transfer.

Whenever the value of the cash and Investment Obligations in the TIFIA Debt Service Reserve Account held by the Trustee, plus accrued interest to the date of valuation, is greater than the TIFIA Debt Service Reserve Account Requirement, the Authority will be entitled to transfer such excess to the subaccount for the TIFIA Series 2019 Bond within the TIFIA Interest Account of the Senior Lien Debt Service Fund (if a Bankruptcy Related Event has occurred) or the subaccount for the TIFIA Series 2019 Bond within the TIFIA Interest Account of the Junior Indebtedness Debt Service Fund (if no Bankruptcy Related Event has occurred); provided, however, that nothing in the Trust Agreement will require the Authority to liquidate or sell any Investment Obligation held in the TIFIA Debt Service Reserve Account for purposes of making such transfer.

Rate Covenant

The Authority covenants to fix, charge and collect tolls, fees, rentals and other charges for the use of and for services furnished or to be furnished by the Triangle Expressway System, and that from time to time and as often as it shall appear necessary, to revise such tolls, fees, rentals and other charges as may be necessary or appropriate, in order that for each Fiscal Year, beginning with the first full Fiscal Year in which the Initial Project is in operation, the Revenues in such Fiscal Year will not be less than 130% of the Long-Term Debt Service Requirement for Senior Lien Indebtedness only for such Fiscal Year.

The Authority covenants to fix, charge and collect tolls, fees, rentals and other charges for the use of and for services furnished or to be furnished by the Triangle Expressway System, and that from time to time and as often as it shall appear necessary, to revise such tolls, fees, rentals and other charges as may be necessary or appropriate, in order that for each Fiscal Year, beginning with the first full Fiscal Year in which the Initial Project is in operation, the Revenues in such Fiscal Year will not be less than 110% of (x) the Long-Term Debt Service Requirement for Senior Lien Indebtedness, Subordinate Lien Indebtedness and Junior Indebtedness for such Fiscal Year and (y) the deposits to be made to the Senior Lien Parity Reserve Account, Subordinate Lien Parity Reserve Account, the Junior Indebtedness Debt Service Reserve Account and the TIFIA Debt Service Reserve Account for such Fiscal Year.

The Authority also covenants to fix, charge and collect tolls, fees, rentals and other charges for the use of and for services furnished or to be furnished by the Triangle Expressway System, and that from time to time and as often as it shall appear necessary, to revise such tolls, fees, rentals and other charges as may be necessary or appropriate, in order that the Receipts will be sufficient in each Fiscal Year to make all of the deposits required for payment of debt service and maintenance of debt service reserves, as described in the Official Statement under the heading "SECURITY AND SOURCES OF PAYMENT FOR THE SERIES 2019 BONDS – Application of Receipts."

The Authority covenants that all users will pay for use of and services furnished by the Triangle Expressway System at the tolls, rates, fees and charges established by the Authority from time to time in accordance with the Authority's customary tolling and billing practices and policies.

If the Authority fails to comply with the covenants described above, it will request a Traffic Consultant to make its recommendations, if any, as to a revision of the Authority's tolls, fees, rentals and charges, its Operating Expenses or the method of operation of the Triangle Expressway System in order to satisfy the foregoing requirements of this section. Copies of such request and of the recommendations of the Traffic Consultant, if any, will be filed by the Authority with the Trustee. Promptly upon its receipt of the recommendations of the Traffic Consultant, the Authority will, after giving due consideration to the recommendations, revise its tolls, fees, rentals and charges or its Operating Expenses or alter its methods of operation, which revisions or alterations need not comply with the Traffic Consultant's recommendations but which are projected by the Authority to result in compliance with the covenants. The Authority and the Traffic Consultant will advise the Trustee of the actions taken by the Authority with respect to the recommendations of the Traffic Consultant. If the Authority shall comply with all of the recommendations of the Traffic Consultant, failure to comply with the rate covenants will not constitute an Event of Default under the Trust Agreement. In the event of any failure to comply with the rate covenants and the failure of the Authority to comply with all of the recommendations of the Traffic Consultant, and in addition to the remedies elsewhere provided in the Trust Agreement, the Trustee or the Owners or Holders of not less than 25% in aggregate principal amount of the Senior Lien Indebtedness, Subordinate Lien Indebtedness or Junior Indebtedness then Outstanding may, and the Trustee will, upon the request of the Owners or Holders of not less than 25% in aggregate principal amount of the Senior Lien Indebtedness, Subordinate Lien Indebtedness or Junior Indebtedness then Outstanding and upon being indemnified to its satisfaction, institute and prosecute in a court of competent jurisdiction an appropriate action to compel the Authority to comply with all of the recommendations of the Traffic Consultant in order to satisfy the rate covenants. The Authority covenants that it will adopt and charge tolls, fees, rentals and charges and revise its Operating Expenses or the method of operation of the Triangle Expressway System in compliance with any final order, decree or judgment entered in any such proceeding or modification thereof.

For so long as the TIFIA Series 2019 Bond is Outstanding, the Authority also agrees to comply with the Rate Coverage Test set forth in the TIFIA 2019 Loan Agreement.

Limitation on Senior Lien Indebtedness

In addition to the incurrence of Long-Term Senior Lien Indebtedness by meeting the requirements described in the Official Statement under the heading "SECURITY AND SOURCES OF PAYMENT FOR THE SERIES 2019 BONDS – Parity and Subordinated Indebtedness," the Authority may incur additional Senior Lien Indebtedness as described in this section.

Completion Indebtedness constituting Senior Lien Indebtedness may be incurred in an amount not exceeding 5% of the aggregate principal amount of the Long-Term Indebtedness constituting Senior Lien Indebtedness originally incurred by the Authority to finance the costs of the Initial Project or any

Additional Project; provided, however, that prior to the incurrence of such Completion Indebtedness, the Authority will furnish to the Trustee (i) a certificate of a licensed architect or engineer estimating the costs of completing the facilities for which such Completion Indebtedness is to be incurred and (ii) an Officer's Certificate certifying that the amount of such Completion Indebtedness to be incurred will be sufficient, together with other funds, if applicable, to complete construction of the facilities as estimated by the architect or engineer in respect of which such Completion Indebtedness is to be incurred and (iii) evidence that such Senior Lien Indebtedness will be rated at an investment grade rating by such credit rating agency.

Long-Term Indebtedness constituting Senior Lien Indebtedness may be incurred for the purpose of refunding all or any part of any Outstanding Long-Term Indebtedness constituting Senior Lien Indebtedness so as to render it no longer Outstanding if prior to incurrence thereof, an Officer's Certificate is delivered to the Trustee (i) stating that the proceeds of such Long-Term Indebtedness, together with interest earnings on the Defeasance Obligations to be acquired and other available funds, will be sufficient to pay the principal of and interest and any premium on the Long-Term Indebtedness to be refunded to the redemption or maturity date or dates and the expenses incident to the refunding, and (ii) stating that either (A) the Long-Term Debt Service Requirement for any Fiscal Year thereafter on account of all Long-Term Indebtedness constituting Senior Lien Indebtedness to be Outstanding after the incurrence of such Long-Term Indebtedness to accomplish the refunding and after the refunding of such Long-Term Indebtedness will not be greater than (1) for Fiscal Years ending prior to the maturity of all TIFIA Indebtedness, the Long-Term Debt Service Requirement on account of all Long-Term Indebtedness constituting Senior Lien Indebtedness Outstanding immediately prior to the incurrence of such Long-Term Indebtedness to accomplish such refunding, including the Long-Term Indebtedness to be refunded and (2) for Fiscal Years ending after the maturity of all TIFIA Indebtedness, 110% of the Long-Term Debt Service Requirement on account of all Long-Term Indebtedness constituting Senior Lien Indebtedness Outstanding immediately prior to the incurrence of such Long-Term Indebtedness to accomplish such refunding, including the Long-Term Indebtedness to be refunded, provided that there is no limit for Fiscal Years beginning after the final maturity date of all Long-Term Indebtedness Outstanding prior to the proposed refunding or (B) the incurrence of such Long-Term Indebtedness to accomplish the refunding will satisfy the requirements of subsection (a) of this section and (iii) evidence that such Senior Lien Indebtedness will be rated at an investment grade rating by at least one nationally recognized securities credit rating agency.

Short-Term Indebtedness constituting Senior Lien Indebtedness may be incurred if, (i) immediately after the incurrence of such Short-Term Indebtedness, the Outstanding principal amount of all Short-Term Indebtedness constituting Senior Lien Indebtedness does not exceed $5,000,000; provided, however, that for a period of twenty (20) consecutive calendar days in each Fiscal Year, no such Short-Term Indebtedness will be Outstanding, (ii) the proceeds of the Short-Term Indebtedness are to be used to pay Operating Expenses, (iii) the Authority is then current in the payment of all debt service then due with respect to all TIFIA Indebtedness and (iv) evidence that such Senior Lien Indebtedness will be rated at an investment grade rating by Fitch, Moody's, S&P or any other nationally recognized securities credit rating agency.

Put Indebtedness constituting Senior Lien Indebtedness may be incurred if prior to the incurrence of such Put Indebtedness (i) the conditions for the incurrence of the Senior Lien Indebtedness are met and (ii) a Credit Facility exists to provide financing sufficient to pay the purchase price or principal of such Put Indebtedness on any date on which the Owner or Holder of such Put Indebtedness may demand payment thereof pursuant to the terms of such Put Indebtedness.

Whenever the Trust Agreement requires a certification for the most recent Fiscal Year preceding the date of incurrence of the Senior Lien Indebtedness in question for which audited financial statements are available, the Authority may, in its discretion, provide a certificate, opinion or report of an independent accountant, in lieu of the audit for such Fiscal Year, on financial statements covering twelve (12) consecutive calendar months of the eighteen (18) full consecutive calendar months preceding the date of incurrence of the Senior Lien Indebtedness in question.

The Authority may enter into Derivative Agreements with respect to Derivative Indebtedness constituting Senior Lien Indebtedness and providing for Derivative Agreement Regularly Scheduled Payments to be made as Senior Lien Derivative Agreement Regularly Scheduled Payments without compliance with any other test under the Trust Agreement.

Notwithstanding the foregoing provisions, so long as any TIFIA Indebtedness is Outstanding, the issuance of additional Senior Lien Indebtedness is also subject to the requirements set forth in the TIFIA 2019 Loan Agreement. Such requirements include that (i) such additional Senior Lien Indebtedness must receive an Investment Grade Rating, and (ii) the Authority shall certify that (A) the Senior Debt Service Coverage Ratio for each Calculation Period from the date of issuance of such additional Senior Lien Indebtedness through the final maturity date of the TIFIA Series 2019 Bond is not less than 175%, (B) the Junior Indebtedness Debt Service Coverage Ratio for each Calculation Period from the date of issuance of such additional Senior Lien Indebtedness through the final maturity date of the TIFIA Series 2019 Bond is not less than 150%, (C) the Loan Life Coverage Ratio for each Calculation Date from the date of issuance of such additional Senior Lien Indebtedness through the final maturity date of the TIFIA Series 2019 Bond is not less than 135% and (D) the Total Debt Service Coverage Ratio for each Calculation Date from the date of issuance of such additional Senior Lien Indebtedness through the final maturity date of the TIFIA Series 2019 Bond is not less than one hundred percent (100%) (in each case, based on a certified revenue forecast prepared by the Traffic Consultant and satisfactory to USDOT; all such ratios are as defined in the TIFIA 2019 Loan Agreement).

Limitation on Subordinate Lien Indebtedness

Long-Term Indebtedness constituting Subordinate Lien Indebtedness may be incurred if prior to incurrence there is delivered to the Trustee:

(i) an Officer's Certificate certifying that the Authority was in compliance with the rate covenants for the most recent Fiscal Year for which audited financial statements are available;

(ii) a report of a Traffic Consultant stating that for each Fiscal Year next succeeding the date on which such Long-Term Indebtedness is incurred through the final maturity date of any Long-Term Indebtedness, the forecasted Revenues in each such Fiscal Year is at least 120% the Long-Term Debt Service Requirement with respect to all Outstanding Senior Lien Indebtedness, Subordinate Lien Indebtedness and TIFIA Indebtedness (excluding any Long-Term Indebtedness to be refunded by the Long-Term Indebtedness to be incurred) and the Long-Term Indebtedness to be incurred and that the Loan Life Coverage Ratio is a least 130%; and

(iii) a report of a Traffic Consultant stating that (1) for each Fiscal Year next succeeding the date on which such Long-Term Indebtedness is incurred through the final maturity date of any Long-Term Indebtedness, the forecasted Receipts in each Fiscal Year will be sufficient to make all of the deposits in each such Fiscal Year described in (a) through (i), inclusive, of the Official Statement under the heading "SECURITY AND SOURCES OF PAYMENT FOR THE SERIES 2019 BONDS – Application of Receipts" and (2) that all Outstanding TIFIA Indebtedness will be fully retired by its final maturity date.

Completion Indebtedness constituting Subordinate Lien Indebtedness may be incurred in an amount not exceeding 5% of the aggregate principal amount of the Long-Term Indebtedness constituting Subordinate Lien Indebtedness originally incurred by the Authority to finance the costs of the Initial Project or any Additional Project; provided, however, that prior to the incurrence of such Completion Indebtedness, the Authority will furnish to the Trustee (i) a certificate of a licensed architect or engineer estimating the costs of completing the facilities for which such Completion Indebtedness is to be incurred and (ii) an Officer's Certificate certifying that the amount of such Completion Indebtedness to be incurred will be sufficient, together with other funds, if applicable, to complete construction of the facilities as estimated by the architect or engineer in respect of which such Completion Indebtedness is to be incurred.

Long-Term Indebtedness constituting Subordinate Lien Indebtedness may be incurred for the purpose of refunding all or any part of any Outstanding Long-Term Indebtedness constituting Senior Lien Indebtedness or Subordinate Lien Indebtedness so as to render it no longer Outstanding if prior to incurrence thereof, an Officer's Certificate is delivered to the Trustee (i) determining that the proceeds of such Long-Term Indebtedness, together with interest earnings on the Defeasance Obligations to be acquired and other available funds, will be sufficient to pay the principal of and interest and any premium on the Long-Term Indebtedness to be refunded to the redemption or maturity date or dates and the expenses incident to the refunding, and (ii) stating that either (A) the Long-Term Debt Service Requirement for any Fiscal Year thereafter on account of all Long-Term Indebtedness to be Outstanding after the incurrence of such Long-Term Indebtedness to accomplish the refunding and after the refunding of such Long-Term Indebtedness will not be greater by more than 10% than the Long-Term Debt Service Requirement on account of all Long-Term Indebtedness Outstanding immediately prior to the incurrence of such Long-Term Indebtedness to accomplish such refunding, including the Long-Term Indebtedness to be refunded, or (B) the incurrence of such Long-Term Indebtedness to accomplish the refunding will satisfy the requirements described in the first paragraph of this section.

Short-Term Indebtedness constituting Subordinate Lien Indebtedness may be incurred if, immediately after the incurrence of such Short-Term Indebtedness, the Outstanding principal amount of all Short-Term Indebtedness constituting Subordinate Lien Indebtedness does not exceed 25% of the General Reserve Fund balance at the end of the most recent Fiscal Year preceding the date of incurrence of such Short-Term Indebtedness for which audited financial statements are available; provided, however, that for a period of twenty (20) consecutive calendar days in each Fiscal Year, no such Short-Term Indebtedness will be Outstanding.

Put Indebtedness constituting Subordinate Lien Indebtedness may be incurred if prior to the incurrence of such Put Indebtedness (i) the conditions described in the first paragraph of this section are met and (ii) a Credit Facility exists to provide financing sufficient to pay the purchase price or principal of such Put Indebtedness on any date on which the Owner or Holder of such Put Indebtedness may demand payment thereof pursuant to the terms of such Put Indebtedness.

Whenever the Trust Agreement requires a certification for the most recent Fiscal Year preceding the date of incurrence of the Subordinate Lien Indebtedness in question for which audited financial statements are available, the Authority may, in its discretion, provide a certificate, opinion or report of an independent accountant, in lieu of the audit for such Fiscal Year, on financial statements covering twelve (12) consecutive calendar months of the eighteen (18) full consecutive calendar months preceding the date of incurrence of the Subordinate Lien Indebtedness in question.

Notwithstanding the foregoing, the Authority may enter into Derivative Agreements with respect to Derivative Indebtedness constituting Subordinate Lien Indebtedness and providing for Derivative Agreement Regularly Scheduled Payments to be made as Subordinate Lien Derivative Agreement

Regularly Scheduled Payments without compliance with any other requirements under the Trust Agreement.

The Authority agrees that it will not incur any Subordinate Lien Indebtedness while any TIFIA Indebtedness is Outstanding without the consent of USDOT unless the TIFIA Loan Agreement permits the incurrence of such Subordinate Lien Indebtedness without the consent of USDOT.

Covenants With Respect to Construction and Operation of the Triangle Expressway System

The Authority covenants to acquire, construct, equip and complete the Initial Project and any Additional Project in conformity with applicable law and all other requirements of all governmental authorities having jurisdiction thereover, and that the Authority will complete the acquisition, construction and equipping of the Initial Project and any Additional Project with all expedition practicable.

The Authority covenants to establish and enforce reasonable rules and regulations governing the operation and use of the Triangle Expressway System, operate the Triangle Expressway System in an efficient and economical manner, maintain the properties constituting the Triangle Expressway System in good repair and in sound operating condition for so long as the same are necessary for the operation of the Triangle Expressway System, and comply with all valid acts, rules, regulations, orders and directions of any legislative, executive, administrative or judicial body that are applicable to the Triangle Expressway System.

The Authority will adopt an Annual Budget for the Triangle Expressway System for each Fiscal Year. To the extent possible, the Authority will prepare its Annual Budget so that it will be possible to determine from such Annual Budget (a) the amount of State Appropriated Revenues budgeted for deposit in the Revenue Fund during such Fiscal Year, (b) the amount of Receipts budgeted for deposit in the Revenue Fund during such year, (c) the amounts to be deposited or paid from Receipts, including the Operating Expenses, (d) the amount of Operating Expenses budgeted to be paid from NCDOT pursuant to the O&M Guaranty Agreement, (e) the amount of any deposits to be made to the Renewal and Replacement Fund from Receipts and (f) the amount of any deposits to be made to the Renewal and Replacement Fund pursuant to the Construction and Renewal and Replacement Agreement.

The Authority will also adopt a Capital Improvements Budget for the Triangle Expressway System for each Fiscal Year which will show, in addition to such other matters as the Authority may determine to include, (a) the amounts, if any, to be expended during such Fiscal Year from moneys, if any, deposited to the credit of the Project Fund, the Renewal and Replacement Fund or the General Reserve Fund, together with a statement of the purposes for which such amounts are to be expended in each case and (b) the amount estimated by the Authority to be necessary for the renovation, extension, improvement, enlargement, renewal or replacement of the Triangle Expressway System, whether the same are to be commenced, continued or completed during such Fiscal Year or thereafter. The Capital Improvements Budget may be part of the Annual Budget.

The Authority will keep the funds, accounts, subaccounts, money and investments of the Triangle Expressway System separate from all other funds, accounts, money and investments, if any, of the Authority and will keep accurate records and accounts of all items of costs and of all expenditures relating to the Triangle Expressway System and of the revenues collected and the application of such revenues. Such records and accounts will be open to the inspection of the Trustee.

The Authority will cause its accountant, which may be the State Auditor, to prepare and deliver to the Authority within 180 days after the close of each Fiscal Year an audit of the Authority's books and accounts relating to the Triangle Expressway System. Reports of each such audit will be filed with the Trustee, the Local Government Commission and USDOT, and copies of each such report will be mailed by the Authority to any person requesting the same in writing and will be made available for inspection at the office of the Chief Financial Officer. Each such audit report will be accompanied by an opinion of the accountant stating that the examination of the financial statements was conducted in accordance with generally accepted auditing standards and stating whether such financial statements present fairly the financial position of the Triangle Expressway System and the results of its operations and a statement of cash flows for the period covered by such audit report in conformity with generally accepted accounting principles applied on a consistent basis. If for any reason beyond its control, the Authority is unable to obtain the foregoing opinion as to compliance with generally accepted accounting principles, the Authority will be deemed to be in compliance with this requirement if it is taking all reasonable and feasible action to obtain such opinion in subsequent Fiscal Years, and if, in lieu of a statement as to compliance and conformity, such opinion states the reasons for such noncompliance or non-conformity.

Insurance

The Authority covenants that it will maintain or cause to be maintained a practical insurance program, with reasonable terms, conditions, provisions and costs, which the Authority determines (i) will afford adequate protection against loss caused by damage to or destruction of the Triangle Expressway System or any part thereof and (ii) will provide the Authority reasonable protection from liability for bodily injury and property damage resulting from the construction or operation of the Triangle Expressway System. Furthermore, the Authority covenants that it will maintain use and occupancy insurance covering loss of Receipts by reason of necessary interruption, total or partial, in the use of the facilities of the Triangle Expressway System, due to loss or damage to any such facility in such amount as an Insurance Consultant determines will provide income during a period of interruption of not less than six months and computed on the basis of Revenues for the preceding Fiscal Year (or the estimated Revenues for the current Fiscal Year as estimated by the Insurance Consultant if the Triangle Expressway System was not in operation during the preceding Fiscal Year.

All insurance policies will be carried by a responsible insurance company or companies, whose claims paying ability is rated at least “A” by S&P, authorized and qualified to assume the risks thereof, or by the North Carolina Department of Insurance. The Authority may also participate in self-insurance programs (except with respect to use and occupancy insurance) so long as the types and levels of such self-insurance programs are determined in writing by an Insurance Consultant to be adequate coverage for the Authority.

Payment of Charges and Covenant Against Encumbrances

The Authority will not create or suffer to be created any lien or charge upon the Triangle Expressway System or any part thereof, or on the Receipts, except for Permitted Encumbrances. The Authority will discharge or cause to be discharged, or will make adequate provision to satisfy and discharge, within sixty (60) days after the same become due and payable, all lawful costs, expenses, liabilities and charges relating to the maintenance, repair, replacement or improvement of the properties constituting the Triangle Expressway System and the operation of the Triangle Expressway System and lawful claims and demands for labor, materials, supplies or other objects that might by law become a lien upon the Triangle Expressway System or Receipts if unpaid. Nothing contained in this paragraph will require the Authority to pay or cause to be discharged, or make provision for the payment, satisfaction and discharge of, any lien, charge, cost, liability, claim or demand so long as the validity thereof is contested in good faith and by appropriate legal proceedings.

Covenant Against Sale or Disposition

The Authority covenants that, except as described in this section, it will not sell, exchange or otherwise dispose of the Triangle Expressway System or any part thereof.

The Authority may from time to time sell, exchange or otherwise dispose of any equipment, motor vehicles, machinery, fixtures, apparatus, tools, instruments or other movable property if it determines that such articles are no longer needed or are no longer useful in connection with the Triangle Expressway System, and the proceeds thereof may be used for any lawful purpose determined by the Authority.

The Authority may from time to time sell, exchange or otherwise dispose of (but not lease, contract or agree for the use thereof) any other property of the Triangle Expressway System if it determines by resolution:

(a) that the sale, exchange or other disposition thereof would not materially adversely affect the operating efficiency of the Triangle Expressway System and would not materially reduce Receipts; or

(b) that the sale, exchange or other disposition thereof would not materially adversely affect the ability of the Authority to comply with the rate covenants for the current and next succeeding Fiscal Year.

If the fair market value of any item of real or personal property to be sold, exchanged or otherwise disposed of in any Fiscal Year in accordance with the provisions of this section will be in excess of 3% of net property, plant and equipment of the Triangle Expressway System calculated in accordance with generally accepted accounting principles, or if the fair market value of any such item together with the fair market value of all other such items so disposed of in such Fiscal Year will aggregate in excess of 3% of net property, plant and equipment of the Triangle Expressway System calculated in accordance with generally accepted accounting principles, then no such disposal will be effected without first obtaining the written approval of a Traffic Consultant of the determinations to be made by the Authority with respect to such disposition under the provisions of this section.

All buildings, structures and items of personal property that are constructed, placed or installed in or upon the properties constituting the Triangle Expressway System as an addition or improvement to, as a substitute for, or in renewal, replacement or alteration of, any buildings, structures, and personal property constituting part of the Triangle Expressway System, and all real property acquired as an addition to, in replacement of, or as a substitute for real property constituting a part of the Triangle Expressway System will thereupon become part of the Triangle Expressway System.

Any proceeds received by NCDOT from the sale of any Authority property pursuant to this section will be transferred to the Authority and applied in accordance with the provisions of this section.

Contracts, Leases and Other Agreements

The Authority may lease, as lessor, all or any part of the Triangle Expressway System, or contract or agree for the performance by others, of operations or services on or in connection with the Triangle Expressway System or any part thereof, for any lawful purpose, provided, that:

(a) the Authority will remain fully obligated and responsible under the Trust Agreement to the same extent as if such lease, contract or agreement, or any amendment or rescission thereof, had not been executed, and

(b) the obligation of the Authority under such lease, contract or agreement will not impair the performance of the Authority's obligations under the Trust Agreement.

Non-System Projects, Addition of Non-System Projects to the Triangle Expressway System

No Non-System Projects will be financed by the Authority unless there will be filed with the Authority and the Trustee:

(a) an opinion of counsel to the Authority to the effect that the Non-System Project or the indebtedness or other obligations incurred to finance such Non-System Project are not, directly or indirectly, secured by or payable from Receipts or issued under or secured by the Trust Agreement and that the financing of the Non-System Project will not materially conflict with or constitute on the part of the Authority a breach of or default under any of the covenants or provisions of the Trust Agreement,

(b) a statement, signed by a Traffic Consultant, to the effect that in its opinion the acquisition or construction of such Non-System Project will not materially adversely affect the Receipts or Revenues or impair the operating efficiency of the Triangle Expressway System, and

(c) a statement, signed by a Traffic Consultant, to the effect that in its opinion the estimated gross revenues to be received from the operation of the Non-System Project will be sufficient to pay the estimated operating and maintenance expenses of such Non-System Project, any debt service or reserve requirements with respect thereto and any other necessary related costs and expenses.

If Non-System Projects are financed by the Authority, the Authority will put in place necessary measures in order to account for, and keep separate and apart from Receipts and Operating Expenses, the gross revenues received from the operation of such Non-System Projects, as well as the operating and maintenance expenses of such Non-System Projects, any debt service or reserve requirements with respect thereto and any other necessary related costs and expenses.

Upon compliance with the following conditions, the Authority may determine that a Non-System Project will be redesignated as an Additional Project within the meaning of the Trust Agreement upon which such Non-System Project will become a part of the Triangle Expressway System:

(i) the Authority Board will adopt a resolution redesignating such Non-System Project as an Additional Project and a part of the Triangle Expressway System;

(ii) there will be filed with the Trustee a certificate or report of a Traffic Consultant stating that for the last succeeding Fiscal Year for which audited financial statements are available, the revenues received by the Authority with respect to such Non-System Project (to the extent that such revenues would have constituted Revenues if such Non-System Project were part of the Triangle Expressway System) equaled or exceeded for such period the sum of (A) the operating expenses paid by the Authority with respect to such Non-System Project (to the extent that such operating expenses would have constituted Current Expenses if such Non-System Project were part of the Triangle Expressway System), (B) any additional Current Expenses that would have been incurred by the Authority if such Non-System Project had been a part of the Triangle Expressway System (as estimated by the Traffic Consultant) and (C) a reasonable renewal and replacement reserve deposit with respect to such Non-System Project, as determined by such Traffic Consultant; and

(iii) an Officer's Certificate stating that any outstanding indebtedness relating to such Non-System Project has been duly paid or defeased; provided, however, that the Authority may incur Senior Lien Indebtedness or Subordinate Lien Indebtedness for the purpose of refinancing any outstanding indebtedness incurred to finance a Non-System Project upon compliance with the additional indebtedness limitations described above.

Calculations with respect to Capital Appreciation Bonds, Convertible CAB Bonds and the TIFIA Series 2019 Bond

Whenever in the Trust Agreement a vote or percentage test is applied to the principal amount of Outstanding Bonds, the Accreted Amount of each Outstanding Capital Appreciation Bond and Convertible CAB Bond will be used as its principal amount. The Outstanding TIFIA Loan Balance will be used as the principal amount of the TIFIA Series 2019 Bond.

Events of Default

Each of the following events is an Event of Default under the Trust Agreement:

(a) payment of the principal of and the redemption premium, if any, on any of the Bonds, is not made when the same are due and payable, either at maturity or by redemption or otherwise;

(b) payment of the interest on any of the Bonds is not made when the same is due and payable;

(c) final judgment for the payment of money in excess of $1,000,000 is rendered against the Triangle Expressway System as a result of the ownership, control or operation of the Triangle Expressway System, and any such judgment is not discharged within one hundred twenty (120) days from the entry thereof or an appeal is not taken therefrom or from the order, decree or process upon which or pursuant to which such judgment will have been granted or entered, in such manner as to stay the execution of or levy under such judgment, order, decree or process or the enforcement thereof;

(d) the occurrence of a Bankruptcy Related Event;

(e) receipt by the Trustee of written notice from the Holder of any Parity Debt or Junior Indebtedness that any event of default has occurred and is continuing under such Parity Debt or Parity Debt Resolution or such Junior Indebtedness or Junior Indebtedness Agreement, including the failure to pay when due and payable the principal of, premium, if any, and interest on such Parity Debt or Junior Indebtedness;

(f) the failure of the State to appropriate the State Appropriated Revenues or a failure of NCDOT to pay a payment required to be paid by NCDOT under the O&M Guaranty Agreement or the Construction and Renewal and Replacement Agreement;

(g) receipt by the Trustee of written notice from the counterparty under any Derivative Agreement that the Authority has failed to make any Senior Lien Derivative Agreement Regularly Scheduled Payment or Subordinate Lien Derivative Agreement Regularly Scheduled Payment when due; and

(h) the Authority defaults in the due and punctual performance of any other of the covenants, conditions, agreements and provisions contained in the Bonds or the Trust Agreement, including any Supplemental Agreement, and such default continues for thirty (30) days after receipt by the Authority of a written notice from the Trustee specifying such default and requesting that it be corrected, provided that if prior to the expiration of such 30-day period the Authority institutes action reasonably designed to cure such default, no "Event of Default" will be deemed to have occurred upon the expiration of such 30-day period for so long as the Authority pursues such curative action with reasonable diligence.

Remedies

Notwithstanding anything in the Trust Agreement or in any Supplemental Agreement, Parity Debt Resolution or Junior Indebtedness Agreement to the contrary, in no event will there be any acceleration of payment of principal of or interest on any Bonds, Parity Debt or Junior Indebtedness as a result of the occurrence of any Event of Default under the Trust Agreement or otherwise.

Upon the happening and continuance of any Event of Default, then and in every such case the Trustee may, and upon the written request of the Owners or Holders of not less than 25% in aggregate principal amount of the Bonds, Parity Debt and Junior Indebtedness then Outstanding will, proceed (subject to the provisions of the Trust Agreement) to protect and enforce its rights and the rights of the Owners or Holders of the Bonds, Parity Debt and Junior Indebtedness under applicable laws and under the Trust Agreement by such suits, actions or special proceedings in equity or at law, or by proceedings in the office of any board or officer having jurisdiction, either for the specific performance of any covenant or agreement contained in the Trust Agreement or in aid or execution of any power therein granted or for the enforcement of any proper legal or equitable remedy, as the Trustee, being advised by counsel, chosen by the Trustee, will deem most effectual to protect and enforce such rights.

In the enforcement of any remedy under the Trust Agreement, the Trustee will be entitled to sue for, enforce payment of and receive any and all amounts then or during any Event of Default becoming, and at any time remaining, due from the Authority for principal, interest or otherwise under any of the provisions of the Trust Agreement or of the Bonds, Parity Debt and Junior Indebtedness and unpaid, with interest on overdue payments of principal at the rate or rates of interest specified in such Bonds, Parity Debt and Junior Indebtedness, together with any and all costs and expenses of collection and of all proceedings under the Trust Agreement and under such Bonds, Parity Debt and Junior Indebtedness, without prejudice to any other right or remedy of the Trustee or of the Owners or Holders of the Bonds, Parity Debt and Junior Indebtedness (except to the extent provided in the Trust Agreement), and to recover and enforce any judgment or decree against the Authority, but solely as provided therein and in such Bonds, Parity Debt and Junior Indebtedness, for any portion of such amounts remaining unpaid and interest, costs and expenses as above provided, and to collect (but solely from moneys in the funds and accounts pledged to secure the Bonds, Parity Debt and Junior Indebtedness under the provisions of the Trust Agreement and any Supplemental Agreement, Parity Debt Resolution or Junior Indebtedness Agreement and any other moneys available for such purpose) in any manner provided by law, the moneys adjudged or decreed to be payable.

If an Event of Default will occur and be continuing, then, unless the same will then be prohibited under applicable law, a court of competent jurisdiction may appoint a receiver to administer and operate the Triangle Expressway System on behalf of the Authority, with full power to pay and to provide for the payment of principal of and interest on the Bonds, Parity Debt and Junior Indebtedness and Derivative Agreement Regularly Scheduled Payments as the same will become due, whether at maturity, pursuant to mandatory sinking fund redemption or otherwise, out of the funds and accounts available therefor, and the Operating Expenses of the Triangle Expressway System, to apply Receipts derived from such operation in accordance with the provisions of the Trust Agreement and any Supplemental Agreement, Parity Debt Resolution, Junior Indebtedness Agreement or Derivative Agreement, to apply other available moneys in the Trust Estate in accordance with the provisions of the Trust Agreement and any Supplemental Agreement, Parity Debt Resolution, Junior Indebtedness Agreement or Derivative Agreement and to take such action to the extent permitted by law to cause to be remedied any Event of Default which will occur or will have occurred and be continuing; and with such other powers, subject to the direction of said court, as are accorded to receivers in general equity cases and under the applicable provisions of the laws of North Carolina; provided, that the power of such receiver to make provisions for the payment of principal of and interest on Bonds, Parity Debt, Junior Indebtedness and Derivative Agreement Regularly Scheduled Payments as aforesaid will not be construed as including the power to pledge the general credit of the Authority to such payments. Any appointment of a receiver under the foregoing provision will not, by itself, constitute a separate Event of Default under the Trust Agreement.

If the time for the payment of the interest on any Bond, Parity Debt or Junior Indebtedness is extended, whether or not such extension is by or with the consent of the Authority, such interest so extended will not be entitled in case of default under the Trust Agreement to the benefit or security of the Trust Agreement and in such case the Owner of the Bond, Parity Debt or Junior Indebtedness for which the time for payment of interest was extended will be entitled only to the payment in full of the principal of all Bonds, Parity Debt and Junior Indebtedness then Outstanding and of interest for which the time for payment will not have been extended. The time for the payment of the interest on any Bond or Parity Debt will not be extended in respect of any Bond or Parity Debt covered by a Bond Insurance Policy or Credit Facility without the consent of the Bond Insurer or the Credit Provider.

Pro Rata Application of Funds

(a) Anything in the Trust Agreement to the contrary notwithstanding, if at any time the money in the Interest Account, the Principal Account and the Sinking Fund Account of the Senior Lien Debt Service Fund or, if a Bankruptcy Related Event has occurred, the TIFIA Debt Service Fund, as applicable, is not sufficient to pay the interest on or the principal of the Senior Lien Indebtedness or, if a Bankruptcy Related Event has occurred, the TIFIA Indebtedness, as the same become due and payable, such money, together with any money then available or thereafter becoming available for such purposes (except for such money that has already been deposited in subaccounts of the Interest Account, Principal Account or Sinking Fund Account for a particular Series of Senior Lien Indebtedness or any TIFIA Indebtedness pursuant to the provisions of the Trust Agreement), whether through the exercise of the remedies provided for in the Trust Agreement or otherwise, will be applied, after payment of the reasonable fees and expenses of the Trustee in exercising its rights and remedies thereunder:

<u>first</u>: to the payment to the persons entitled thereto of all installments of interest on Senior Lien Indebtedness and TIFIA Indebtedness then due and payable in the order in which such installments became due and payable and, if the amount available will not be sufficient to pay in full any particular installment, then to the payment, ratably according to the amounts due on such installment, to the persons entitled thereto, without any discrimination or preference except as to any difference in the respective rates of interest specified in such Senior Lien Indebtedness and TIFIA Indebtedness;

<u>second</u>: to the payment to the persons entitled thereto of the unpaid principal of any Senior Lien Indebtedness and TIFIA Indebtedness that will have become due and payable (other than Senior Lien Indebtedness or TIFIA Indebtedness deemed to have been paid pursuant to the provisions of the Trust Agreement described in "THE TRUST AGREEMENT – Defeasance" below), in the order of their due dates, with interest on the overdue principal at a rate equal to the

rate on such Senior Lien Indebtedness or TIFIA Indebtedness, and, if the amount available will not be sufficient to pay in full all of the amounts due on the Senior Lien Indebtedness and the TIFIA Indebtedness on any date, together with such interest, then to the payment ratably according to the amount of such principal due on such date, to the persons entitled thereto, without any discrimination or preference; and

third: to the payment of the interest on and the principal of Senior Lien Indebtedness and TIFIA Indebtedness, to the purchase and retirement of Senior Lien Indebtedness, and to the redemption of Senior Lien Indebtedness and TIFIA Indebtedness, all in accordance with the provisions of the Trust Agreement.

(b) Anything in the Trust Agreement to the contrary notwithstanding, if at any time the money in the Interest Account, the Principal Account and the Sinking Fund Account of the Subordinate Lien Debt Service Fund is not sufficient to pay the interest on or the principal of the Subordinate Lien Indebtedness as the same become due and payable, such money, together with any money then available or thereafter becoming available for such purposes (except for such money that has already been deposited in subaccounts of the Interest Account, Principal Account or Sinking Fund Account for a particular Series of Subordinate Lien Indebtedness pursuant to the provisions of the Trust Agreement), whether through the exercise of the remedies provided for in the Trust Agreement or otherwise, will be applied, after payment of the reasonable fees and expenses of the Trustee in exercising its rights and remedies thereunder:

first: to the payment to the persons entitled thereto of all installments of interest on Subordinate Lien Indebtedness then due and payable in the order in which such installments became due and payable and, if the amount available will not be sufficient to pay in full any particular installment, then to the payment, ratably according to the amounts due on such installment, to the persons entitled thereto, without any discrimination or preference except as to any difference in the respective rates of interest specified in such Subordinate Lien Indebtedness;

second: to the payment to the persons entitled thereto of the unpaid principal of any Subordinate Lien Indebtedness that will have become due and payable (other than Subordinate Lien Indebtedness deemed to have been paid pursuant to the provisions of the Trust Agreement described in "THE TRUST AGREEMENT – Defeasance" below), in the order of their due dates, with interest on the overdue principal at a rate equal to the rate on such Subordinate Lien Indebtedness, and, if the amount available will not be sufficient to pay in full all of the amounts due on the Subordinate Lien Indebtedness on any date, together with such interest, then to the payment ratably according to the amount of such principal due on such date, to the persons entitled thereto, without any discrimination or preference; and

third: to the payment of the interest on and the principal of Subordinate Lien Indebtedness, to the purchase and retirement of Subordinate Lien Indebtedness, and to the redemption of Subordinate Lien Bonds, all in accordance with the provisions of the Trust Agreement.

(c) Anything in the Trust Agreement to the contrary notwithstanding, if at any time the money in the Junior Indebtedness Debt Service Fund or, if no Bankruptcy Related Event has occurred, the TIFIA Debt Service Fund is not sufficient to pay the interest on or the principal of all Junior Indebtedness (including any TIFIA Indebtedness) as the same become due and payable, such money, together with any money then available or thereafter becoming available for such purposes, whether through the exercise of the remedies provided for in the Trust Agreement or otherwise, will be applied, after payment of the reasonable fees and expenses of the Trustee in exercising its rights and remedies thereunder:

first: to the payment of all installments of interest on the Junior Indebtedness (including any TIFIA Indebtedness) then due and payable in the order in which such installments became due and payable and, if the amount available will not be sufficient to pay in full any particular installment, then to the payment, ratably according to the amounts due on such installment, to the persons entitled thereto, without any discrimination or preference except as to any difference in the respective rates of interest specified in such Junior Indebtedness;

second: to the payment to the persons entitled thereto of the unpaid principal of any Junior Indebtedness (including any TIFIA Indebtedness) that will have become due and payable (other than TIFIA Indebtedness deemed to have been paid pursuant to the provisions of the Trust Agreement described in "THE TRUST AGREEMENT – Defeasance" below), in the order of their due dates, with interest on the overdue principal at a rate equal to the rate on such Junior Indebtedness, and, if the amount available will not be sufficient to pay in full all of the amounts due on the Junior Indebtedness on any date, together with such interest, then to the payment ratably according to the amount of such principal due on such date, to the persons entitled thereto, without any discrimination or preference.

(d) Whenever money is to be applied by the Trustee pursuant to the provisions of the Trust Agreement described under this clause, (i) such money will be applied by the Trustee at such times and from time to time as the Trustee in its sole discretion will determine, having due regard for the amount of money available for such application and the likelihood of additional money becoming available for such application in the future, (ii) setting aside such money as provided in the Trust Agreement in trust for the proper purpose will constitute proper application by the Trustee and (iii) the Trustee will incur no liability whatsoever to the Authority, to any Owner or to any other person for any delay in applying any such money so long as the Trustee acts with reasonable diligence, having due regard for the circumstances, and ultimately applies the same in accordance with such provisions of the Trust Agreement as may be applicable at the time of application by the Trustee. Whenever the Trustee exercises such discretion in applying such money, it will fix the date (which will be an Interest Payment Date unless the Trustee will deem another date more suitable) upon which such application is to be made and upon such date interest on the amounts of principal to be paid on such date will cease to accrue. The Trustee will give such notice as it may deem appropriate of the fixing of any such date and will not be required to make payment to the Owner of any Bond, Parity Debt or Junior Indebtedness until such Bond, Parity Debt or Junior Indebtedness is surrendered to the Trustee for appropriate endorsement or for cancellation if fully paid.

Control of Proceedings; Restrictions Upon Action; Notice of Default

Anything in the Trust Agreement to the contrary notwithstanding, the Owners or Holders of a majority in aggregate principal amount of Bonds, Parity Debt and Junior Indebtedness at any time Outstanding will have the right, subject to the provisions of the Trust Agreement, by an instrument or concurrent instruments in writing executed and delivered to the Trustee, to direct the method and place of conducting all remedial proceedings to be taken by the Trustee under the Trust Agreement, provided that such direction will be in accordance with law and the provisions of the Trust Agreement.

Except as provided in the Trust Agreement, no Owner or Holder of Bonds, Parity Debt or Junior Indebtedness will have any right to institute any suit, action or proceeding in equity or at law on any Bonds, Parity Debt or Junior Indebtedness or for the execution of any trust under the Trust Agreement or for any other remedy hereunder unless such Owner or Holder of Bonds, Parity Debt or Junior

Indebtedness previously (a) has given to the Trustee written notice of the Event of Default on account of which suit, action or proceeding is to be instituted, (b) has requested the Trustee to take action after the right to exercise such powers or right of action, as the case may be, will have accrued, (c) has afforded the Trustee a reasonable opportunity either to proceed to exercise the powers granted by the Trust Agreement or to institute such action, suit or proceedings in its or their name, and (d) has offered to the Trustee reasonable security and satisfactory indemnity against the costs, expenses and liabilities to be incurred therein or thereby, and the Trustee will have refused or neglected to comply with such request within a reasonable time. Such notification, request and offer of indemnity are declared in every such case, at the option of the Trustee, to be conditions precedent to the execution of the powers and trusts of the Trust Agreement or to any other remedy hereunder. Notwithstanding the foregoing provisions of this clause and without complying therewith, the Owners or Holders of not less than 25% in aggregate principal amount of Bonds, Parity Debt and Junior Indebtedness then Outstanding may institute any such suit, action or proceeding in their own names for the benefit of all Owners or Holders of Bonds, Parity Debt and Junior Indebtedness. It is understood and intended that, except as otherwise above provided, no one or more Owners or Holders of Bonds, Parity Debt or Junior Indebtedness will have any right in any manner whatsoever by his or their action to affect, disturb or prejudice the security of the Trust Agreement or to enforce any right under the Trust Agreement except in the manner provided, that all proceedings at law or in equity will be instituted, had and maintained in the manner therein provided and for the benefit of all Owners and Holders of Bonds, Parity Debt and Junior Indebtedness and that any individual rights of action or other right given to one or more of such Owners or Holders by law are restricted by the Trust Agreement to the rights and remedies therein provided.

The Trustee will mail to (a) all Owners of Bonds at their addresses as they appear on the registration books and (b) all Holders of Parity Debt or Junior Indebtedness and counterparties under Derivative Agreements providing for Derivative Agreement Regularly Scheduled Payments who shall have filed their name with the Trustee for such purpose, written notice of the occurrence of any Event of Default within thirty (30) days after the Trustee has notice of the same pursuant to the provisions of the Trust Agreement that any such Event of Default shall have occurred; provided, however, that in no event will the Trustee waive the occurrence of an event of default under the TIFIA Loan Agreement without the prior written consent of USDOT. The Trustee will not be subject to any liability to any such Owner, Holder or Derivative Agreement counterparty by reason of its failure to mail any such notice.

Concerning the Trustee

Prior to the occurrence of any Event of Default and after the curing of all such Events of Default that may have occurred, the Trustee will perform such duties and only such duties of the Trustee as are specifically set forth in the Trust Agreement. Upon the occurrence and during the continuation of any Event of Default, the Trustee will use the same degree of care and skill in their exercise as a prudent person would exercise or use under the circumstances in the conduct of such person's own affairs.

No provision of the Trust Agreement or any Indebtedness or Derivative Agreement will be construed to relieve the Trustee from liability for its own negligent action, its own negligent failure to act, or its own willful misconduct, except that:

(a) prior to any such Event of Default under the Trust Agreement, and after the curing of any Event of Default that may have occurred:

(i) the duties and obligations of the Trustee will be determined solely by the express provisions of the Trust Agreement, and the Trustee will not be liable except for the performance of such duties and obligations of the Trustee as are specifically set forth in the Trust Agreement, and no implied covenants or obligations will be read into the Trust Agreement against the Trustee and no permissive right of the Trustee under the Trust Agreement will impose any duty on the Trustee to take such action, and

(ii) in the absence of willful misconduct on its part, the Trustee may conclusively rely, as to the accuracy of the statements and the correctness of the opinions expressed therein, upon any certificate or opinion furnished to it conforming to the requirements of the Trust Agreement, but in the case of any such certificate or opinion by which any provision thereof is specifically required to be furnished to the Trustee, the Trustee will be under a duty to examine the same to determine whether or not on its face it conforms to the requirements of the Trust Agreement; and

(b) at all times, regardless of whether or not any such Event of Default will exist:

(i) the Trustee will not be liable for any error of judgment made in good faith by a responsible officer or officers of the Trustee unless it will be proved that the Trustee was negligent in ascertaining the pertinent facts, and

(ii) the Trustee will not be liable with respect to any action taken or omitted to be taken by it in accordance with the direction of the Owners and Holders of not less than 25% or a majority, as the Trust Agreement will require, in aggregate principal amount of the Bonds, Parity Debt and Junior Indebtedness then Outstanding relating to the time, method and place of conducting any proceeding for any remedy available to the Trustee, or exercising any power conferred upon the Trustee under the Trust Agreement.

None of the provisions contained in the Trust Agreement will require the Trustee to expend or risk its own funds or otherwise incur individual financial liability in the performance of any of its duties or in the exercise of any of its rights or powers.

The Trustee will be under no obligation to institute any suit or to take any remedial proceeding (including, but not limited to, the appointment of a receiver) or to enter any appearance or in any way defend in any suit in which it may be made defendant, or to take any steps in the execution of any of the trusts created by the Trust Agreement or in the enforcement of any rights and powers thereunder, until it will be indemnified to its satisfaction against any and all costs and expenses, outlays and counsel fees and other reasonable disbursements, and against all liability. The Trustee nevertheless may begin suit, or appear in and defend suit, or do anything else in its judgment proper to be done by it as such Trustee, without indemnity, and in such case the Authority, at the request of the Trustee, will reimburse the Trustee from Receipts for all costs, expenses, outlays and counsel fees and other reasonable disbursements properly incurred in connection therewith. If the Authority fails to make such reimbursement, the Trustee may reimburse itself from any money in its possession under the provisions of the Trust Agreement and will be entitled to a preference therefor over any Indebtedness Outstanding.

The Trustee will be under no obligation to effect or maintain insurance or to renew any policies of insurance or to inquire as to the sufficiency of any policies of insurance carried by the Authority, or to report, or make or file claims or proof of loss for, any loss or damage insured against or that may occur, or to keep itself informed or advised as to the payment of any taxes or assessments, or to require any such payment to be made. Except as to the acceptance of the trusts under the Trust Agreement, the Trustee will have no responsibility in respect of the validity or sufficiency of the Trust Agreement, or in respect of the validity of Bonds, Parity Debt and Junior Indebtedness or the due issuance or execution and delivery thereof. The Trustee will be under no obligation to see that any duties therein imposed upon the Authority, any Bond Registrar, any consultant, any Depositary (other than a Depositary in which money will have been deposited by the Trustee under the provisions of the Trust Agreement) or any party other than itself, or any covenants therein contained on the part of any party other than itself to be performed, will be done or performed, and the Trustee will be under no obligation for failure to see that any such duties or covenants are so done or performed.

The Trustee will not be liable or responsible because of the failure of the Authority or of any of its employees or agents to make any collections or deposits or to perform any act in the Trust Agreement required of the Authority or because of the loss of any money arising through the insolvency or the act or default or omission of any Depositary (other than the Trustee or a Depositary in which such money will have been deposited by the Trustee under the provisions of the Trust Agreement). The Trustee will not be responsible for the application of any of the proceeds of Bonds or any other money deposited with it and invested, paid out, withdrawn or transferred under the Trust Agreement if such application, investment, payment, withdrawal or transfer will be made in accordance with the provisions of the Trust Agreement. The immunities and exemptions from liability of the Trustee under the Trust Agreement will extend to its directors, officers, employees and agents.

Except upon the happening of any Event of Default specified in clauses (a), (b), (e) or (f) described in "THE TRUST AGREEMENT – Events of Default" above, or the explicit report of an Event of Default pursuant to the Trust Agreement, the Trustee will not be obliged to take notice or be deemed to have notice of any Event of Default under the Trust Agreement unless specifically notified in writing of such Event of Default by the Authority or the Owners and Holders of not less than 25% in aggregate principal amount of Bonds, Parity Debt and Junior Indebtedness then Outstanding.

Subject to the acceptance of appointment by a successor Trustee, the Trustee may resign and thereby become discharged from the trusts created by the Trust Agreement, by notice in writing given to the Authority, and mailed, postage prepaid, at the Trustee's expense, to each Owner and Holder of Bonds, Senior Lien Parity Debt and Junior Indebtedness, not less than sixty (60) days before such resignation is to take effect, but such resignation will take effect immediately upon the appointment of a new Trustee under the Trust Agreement if such new Trustee will be appointed before the time limited by such notice and will then accept the trusts under the Trust Agreement.

Supplemental Trust Agreements

The Authority and the Trustee may, from time to time and at any time, execute and deliver supplemental trust agreements (which supplemental trust agreements will thereafter form a part hereof) as will be substantially consistent with the terms and provisions of the Trust Agreement and, in the opinion of the Trustee, who may rely upon a written opinion of legal counsel, will not materially and adversely affect the interest of the Owners and Holders:

(a) to cure any ambiguity or formal defect or omission, to correct or supplement any provision in the Trust Agreement that may be inconsistent with any other provision therein, to make any other provisions with respect to matters or questions arising under the Trust Agreement, or to modify, alter, amend, add to or rescind any of the terms or provisions contained in the Trust Agreement, or

(b) to grant or to confer upon the Trustee, for the benefit of the Owners or Holders, any additional rights, remedies, powers, authority or security that may lawfully be granted to or conferred upon the Owners, the Holders or the Trustee, or

(c) to add to the provisions of the Trust Agreement other conditions, limitations and restrictions thereafter to be observed, or

(d) to add to the covenants and agreements of the Authority in the Trust Agreement other covenants and agreements thereafter to be observed by the Authority or to surrender any right or power therein reserved to or conferred upon the Authority, or

(e) to permit the qualification of the Trust Agreement under any federal statute now or hereafter in effect or under any state blue sky law, and, in connection therewith, if the Authority so determines, to add to the Trust Agreement or any supplemental trust agreement such other terms, conditions and provisions as may be permitted or required by such federal statute or blue sky law.

At least thirty (30) days prior to the execution and delivery of any supplemental trust agreement for any of the purposes set forth above, the Trustee will cause a notice of the proposed execution and delivery of such supplemental trust agreement to be mailed, postage prepaid, to all Owners of Bonds and Holders of Parity Debt and Junior Indebtedness. Such notice will briefly set forth in the nature of the proposed supplemental trust agreement and will state that copies thereof are on file at the designated corporate trust office of the Trustee for inspection by all Owners of Bonds and Holders of Parity Debt and Junior Indebtedness. A failure on the part of the Trustee to mail such notice will not affect the validity of such supplemental trust agreement.

The Owners and Holders of not less than a majority in aggregate principal amount of Senior Lien Indebtedness then Outstanding, the Owners and Holders of not less than a majority in aggregate principal amount of the Subordinate Lien Indebtedness then Outstanding and the Owners and Holders of not less than a majority in aggregate principal amount of the Junior Indebtedness then Outstanding will have the right, from time to time, anything contained in the Trust Agreement to the contrary notwithstanding, to consent to and approve the execution and delivery of such supplemental trust agreements as are deemed necessary or desirable by the Authority for the purpose of modifying, altering, amending, adding to or rescinding any of the terms or provisions contained in the Trust Agreement or in any supplemental trust agreement; provided, however, that nothing therein contained will permit, or be construed as permitting (a) an extension of the maturity of the principal of or the interest on any Senior Lien Indebtedness, Subordinate Lien Indebtedness or Junior Indebtedness without the consent of the Owner or Holder of such Senior Lien Indebtedness, Subordinate Lien Indebtedness or Junior Indebtedness, (b) a reduction in the principal amount of any Senior Lien Indebtedness, Subordinate Lien Indebtedness or Junior Indebtedness or the redemption premium or the rate of interest on any Senior Lien Indebtedness, Subordinate Lien Indebtedness or Junior Indebtedness without the consent of the Owner or Holder of such Senior Lien Indebtedness, Subordinate Lien Indebtedness or Junior Indebtedness, (c) the creation of a pledge, charge and lien upon the Receipts other than the pledge, charge and lien created by the Trust Agreement without the consent of all of the Owners and Holders of Senior Lien Indebtedness, Subordinate Lien Indebtedness or Junior Indebtedness then Outstanding, (d) a preference or priority of any Senior Lien Indebtedness, Subordinate Lien Indebtedness or Junior Indebtedness over any other Senior Lien Indebtedness, Subordinate Lien Indebtedness or Junior Indebtedness except as expressly provided by the Trust Agreement without the consent of all of the Owners and Holders of Senior Lien Indebtedness, Subordinate Lien Indebtedness or Junior Indebtedness then Outstanding or (e) a reduction in the aggregate principal amount of the any Senior Lien Indebtedness, Subordinate Lien Indebtedness or Junior Indebtedness required for consent to such supplemental trust agreement without the consent of all of the Owners and Holders of Senior Lien Indebtedness, Subordinate Lien Indebtedness or Junior Indebtedness then Outstanding. For purposes of clauses (a) through (e) of this paragraph, notwithstanding any provisions in the Trust Agreement or in any Supplemental Agreement or Parity Debt Resolution to the contrary, a Bond Insurer or Credit Provider will not be deemed to be the Owner or Holder of Senior Lien Indebtedness, Subordinate Lien Indebtedness or Junior Indebtedness.

Nothing contained in the Trust Agreement, however, will be construed as making necessary the approval by Owners or Holders of Senior Lien Indebtedness, Subordinate Lien Indebtedness or Junior

Indebtedness of the execution and delivery of any supplemental trust agreement as authorized in the Trust Agreement. Furthermore, notwithstanding for the foregoing provisions of this clause, to the extent that the Holders or Owners of Senior Lien Indebtedness, Subordinate Lien Indebtedness or Junior Indebtedness, as the case may be, are not "affected" by the proposed supplemental trust agreement as provided in the Trust Agreement described in "THE TRUST AGREEMENT – Senior Lien Indebtedness, Subordinate Lien Indebtedness and Junior Indebtedness Affected" below, the consent of such Owners and Holders of not less than a majority in aggregate principal amount of Senior Lien Indebtedness, Subordinate Lien Indebtedness and Junior Indebtedness then Outstanding, as the case may be, will not be required as described in the preceding paragraph.

If at any time the Authority and the Trustee determines that it is necessary or desirable to execute and deliver any supplemental trust agreement for any of the purposes described under this clause, the Trustee will cause notice of the proposed supplemental trust agreement to be mailed, postage prepaid, to all Owners Bonds affected thereby at their addresses as they appear on the registration books and to all Holders of Parity Debt and Junior Indebtedness affected thereby in accordance with the related Parity Debt Resolution or Junior Indebtedness Agreement as of the date of mailing such notice. Such notice will briefly set forth the nature of the proposed supplemental trust agreement and will state that copies thereof are on file at the designated corporate trust office of the Trustee for inspection by all such Owners and Holders of Bonds, Parity Debt and Junior Indebtedness. The Trustee will not, however, be subject to any liability to any Owner or Holder of Bonds, Parity Debt or Junior Indebtedness by reason of its failure to cause the notice required by the Trust Agreement to be mailed, and any such failure to cause the notice required by the Trust Agreement to be mailed and any such failure will not affect the validity of such supplemental trust agreement when consented to and approved as provided in the Trust Agreement.

Whenever, at any time within three (3) years after the date of the mailing of such notice, the Authority delivers to the Trustee an instrument or instruments in writing purporting to be executed by the Owners or Holders of not less than a majority in aggregate principal amount of Senior Lien Indebtedness, Subordinate Lien Indebtedness and Junior Indebtedness then Outstanding that are affected by a proposed supplemental trust agreement, which instrument or instruments will refer to the proposed supplemental trust agreement described in such notice and will specifically consent to and approve the execution and delivery thereof in substantially the form of the copy thereof referred to in such notice, thereupon, but not otherwise, the Authority and the Trustee may execute and deliver such supplemental trust agreement in substantially such form, without liability or responsibility to any Owner or Holder of any Senior Lien Indebtedness, Subordinate Lien Indebtedness or Junior Indebtedness whether or not such Owner or Holder will have consented thereto.

If the Owners or Holders of not less than a majority in aggregate principal amount of any Senior Lien Indebtedness, Subordinate Lien Indebtedness or Junior Indebtedness then Outstanding at the time of the execution and delivery of such supplemental trust agreement and that are affected, as defined in the Trust Agreement and described in "THE TRUST AGREEMENT – Senior Lien Indebtedness, Subordinate Lien Indebtedness and Junior Indebtedness Affected" below, by a proposed supplemental trust agreement have consented to and approved the execution and delivery thereof as provided in the Trust Agreement, to the extent permitted by law, no Owner or Holder of any Senior Lien Indebtedness, Subordinate Lien Indebtedness or Junior Indebtedness will have any right to object to the execution and delivery of such supplemental trust agreement, to object to any of the terms and provisions contained therein or the operation thereof, to question the propriety of the execution and delivery thereof, or to enjoin or restrain the Authority and the Trustee from executing and delivering the same or from taking any action pursuant to the provisions thereof.

Senior Lien Indebtedness, Subordinate Lien Indebtedness and Junior Indebtedness Affected

For purposes of the Trust Agreement, Senior Lien Indebtedness, Subordinate Lien Indebtedness or Junior Indebtedness will be deemed to be "affected" by a supplemental trust agreement if the same adversely affects or diminishes the rights of the Owners or Holders of such Senior Lien Indebtedness, Subordinate Lien Indebtedness or Junior Indebtedness against the Authority or the rights of such Owners or Holders in the security for such Senior Lien Indebtedness, Subordinate Lien Indebtedness or Junior Indebtedness. The Trustee who may rely upon a written opinion of legal counsel, may in its discretion determine whether any Senior Lien Indebtedness, Subordinate Lien Indebtedness or Junior Indebtedness would be affected by any supplemental trust agreement, and any such determination will be conclusive upon the Owners and Holders of all Senior Lien Indebtedness, Subordinate Lien Indebtedness or Junior Indebtedness, whether theretofore or thereafter issued or incurred. The Trustee will not be liable for any such determination made in good faith. For so long as any TIFIA Indebtedness remains Outstanding, such TIFIA Indebtedness will be deemed to be "affected" by any supplemental trust agreement.

Defeasance

When:

(a) the Bonds, Parity Debt and Junior Indebtedness secured by the Trust Agreement will have become due and payable in accordance with their terms or otherwise as provided in the Trust Agreement, and the whole amount of the principal and the interest and premium, if any, and other amounts so due and payable thereon will be paid; and

(b) if the Bonds, Parity Debt and Junior Indebtedness will not have become due and payable in accordance with their terms, the Trustee or any Bond Registrar will hold, sufficient (i) money or (ii) Defeasance Obligations or a combination of (i) and (ii) of this clause (b), the principal of and the interest on which, when due and payable, will provide sufficient money to pay the principal of, and the interest and redemption premium, if any, on all Bonds, Parity Debt and Junior Indebtedness then Outstanding to the maturity date or dates of such Bonds, Parity Debt and Junior Indebtedness or to the date or dates specified for the redemption thereof, as verified by a verification agent acceptable to the Trustee; and

(c) if Bonds, Parity Debt or Junior Indebtedness are to be called for redemption or prepayment, irrevocable instructions to call the Bonds, Parity Debt or Junior Indebtedness for redemption or prepayment will have been given by the Authority to the Trustee; and

(d) sufficient funds will also have been provided or provision made for paying all other obligations payable under the Trust Agreement by the Authority, including any Derivative Agreement Regularly Scheduled Payments;

then and in that case the right, title and interest of the Trustee in the funds, accounts and subaccounts mentioned in the Trust Agreement will thereupon cease, determine and become void and, upon being furnished with an opinion, in form and substance satisfactory to the Trustee, of counsel approved by the Trustee, to the effect that all conditions precedent to the release of the Trust Agreement have been satisfied, the Trustee will release the Trust Agreement and will execute such documents to evidence such release as may be required by such counsel, and the Trustee will turn over to the Authority any surplus in, and all balances remaining in, all funds, accounts and subaccounts other than money held for the redemption or payment of Bonds, Parity Debt or Junior Indebtedness. Otherwise, the Trust Agreement will be, continue and remain in full force and effect; provided, however, that in the event Defeasance Obligations will be deposited with and held by the Trustee or the Bond Registrar as provided in the Trust

Agreement, (i) in addition to the requirements set forth in the Trust Agreement with respect to redemption, the Trustee, within thirty (30) days after such Defeasance Obligations will have been deposited with it, will cause a notice signed by the Trustee to be mailed, postage prepaid, to all Owners and to all Holders of Bonds, Parity Debt and Junior Indebtedness, setting forth (a) the date or dates, if any, designated for the redemption of the Bonds, Parity Debt or Junior Indebtedness, (b) a description of the Defeasance Obligations so held by it, and (c) that the Trust Agreement has been released in accordance with the provisions of the Trust Agreement, and (ii) (a) the Trustee will nevertheless retain such rights, powers and privileges under the Trust Agreement as may be necessary and convenient in respect of the Bonds, Parity Debt and Junior Indebtedness for the payment of the principal, interest and any premium for which such Defeasance Obligations have been deposited and (b) each Bond Registrar will retain such rights, powers and privileges under the Trust Agreement as may be necessary and convenient for the registration, transfer and exchange of Bonds; provided, however, that failure to mail such notice to any Owner or to the Owners, or to any such Holder or to such Holders, or any defect in such notice so mailed, will not affect the validity of the release of the Trust Agreement.

All money and Defeasance Obligations held by the Trustee or any Bond Registrar pursuant to the Trust Agreement will be held in trust and applied to the payment, when due, of the obligations payable therewith.

Treatment of Derivative Agreements

Anything in the Trust Agreement to the contrary notwithstanding, the counterparty under any Derivative Agreement providing for Senior Lien Derivative Agreement Regularly Scheduled Payments, Subordinate Lien Derivative Agreement Regularly Scheduled Payments or otherwise will have no rights under the Trust Agreement to direct the method and place of conducting any remedial proceedings to be taken by the Trustee thereunder and will have no voting rights with respect thereto or for any other purpose under the Trust Agreement, but will only have the right to enforce those specific rights granted to such counterparties under the Trust Agreement, including, without limitation, those rights with respect to the application of moneys in the Revenue Fund.

Special TIFIA Provisions

So long as the TIFIA Series 2019 Bond remains Outstanding, the Authority shall comply with the provisions of the TIFIA 2019 Loan Agreement, including, but not limited to, the following:

(a) Required Notifications Prior to Changes. The Authority shall provide USDOT with the following notifications:

(i) The retention by the Authority of any General Engineering Consultant other than HNTB North Carolina, P.C. will not be effective if objected to by USDOT within fifteen (15) Business Days after receiving notice from the Authority of the name of the proposed General Engineering Consultant, together with supporting information regarding the qualifications of the proposed firm; and

(ii) The retention by the Authority of any firm as Traffic Consultant other than CDM Smith will not be effective if objected to by USDOT within fifteen (15) Business Days after receiving notice from the Authority of the name of the proposed Traffic Consultant, together with supporting information regarding the qualifications of the proposed firm.

(b) Required Approvals. The prior written approval of USDOT shall be required as follows:

(i) For the issuance or incurrence of any Senior Lien Indebtedness, Subordinate Lien Indebtedness or Junior Lien Indebtedness, as described in or otherwise permitted in the definition of "Additional Secured Indebtedness" in the TIFIA 2019 Loan Agreement;

(ii) For the use of any Reserve Alternative Instrument, provided that such approval shall not be required in connection with (A) any Reserve Alternative Instrument relating to the Series 2009 Bonds, the Series 2017 Bonds, the Series 2018 Bonds and the Series 2019 Bonds (collectively, the "Existing Senior Bonds"), (B) the extension of any such Reserve Alternative Instrument or (C) any Reserve Alternative Instrument delivered in connection with the issuance of Senior Lien Bonds if (1) the proceeds of such Senior Lien Bonds are used to pay costs of the Complete 540 Phase 2 Project and (2) such Reserve Alternative Instrument is substantially similar to the Reserve Alternative Instrument securing Existing Senior Bonds;

(iii) For any Credit Facility, other than any Bond Insurance Policy or Reserve Alternative Instrument provided in connection with the Series 2019 Bonds or any Senior Lien Bonds issued by the Authority and otherwise meeting the requirements of the Trust Agreement and the TIFIA 2019 Loan Agreement;

(iv) For any Derivative Agreement;

(v) The method of calculation of debt service on any Additional Bonds, Parity Debt or other Indebtedness including but not limited to Derivative Indebtedness, Grant Anticipation Notes, Long-Term Indebtedness, Put Indebtedness, Revenue Bond Anticipation Notes, Short-Term Indebtedness, and Variable Rate Indebtedness to be used when calculating debt service or determining reserve requirements or compliance with the covenants contained herein and in the TIFIA 2019 Loan Agreement;

(vi) The method of calculating payment obligations with respect to Derivative Agreement Additional Payments, Derivative Agreement Regularly Scheduled Payments, Reserve Alternative Instruments and Credit Facilities to be used when calculating debt service or determining reserve requirements or compliance with the covenants contained herein and in the TIFIA 2019 Loan Agreement;

(vii) Undertaking an Additional Project or the redesignation of a Non-System Project as an Additional Project under the Trust Agreement unless the Authority demonstrates compliance with the requirements of the TIFIA 2019 Loan Agreement, which requires a certificate of the Traffic Consultant which projects the total Projected Revenues for the Triangle Expressway System, including such Additional Project, for each Calculation Period to the final maturity date of the TIFIA Series 2019 Bond, and a certificate of the Authority that demonstrates, based on the projections of the Traffic Consultant, (A) the Senior Debt Service Coverage Ratio for each Calculation Period through the Final Maturity Date is not less than 175%, (B) the Junior Indebtedness Debt Service Coverage Ratio for each Calculation Period through the Final Maturity Date is not less than 150%, (C) the Loan Life Coverage Ratio for each Calculation Date through the Final Maturity Date is not less than 135%, and (D) the Total Debt Service Coverage Ratio for such Calculation Period through the Final Maturity Date is not less than one hundred percent (100%), as all such terms are defined in the TIFIA 2019 Loan Agreement.

(viii) The amendment or modification of the Trust Agreement Documents (as defined in the TIFIA 2019 Loan Agreement) or the Authority's organizational documents (other than any amendment or modification that is of a ministerial nature).

THE FOURTH SUPPLEMENTAL TRUST AGREEMENT

Establishment of Subaccounts

The following Subaccounts of the accounts of the Senior Lien Debt Service Fund are established by the Fourth Supplemental Trust Agreement:

(a) Series 2019 Subaccount of the Interest Account;

(b) Series 2019 Subaccount of the Capitalized Interest Account;

(c) Series 2019 Subaccount of the Principal Account;

(d) Series 2019 Subaccount of the Redemption Account; and

(e) Series 2019 Subaccount of the Sinking Fund Account.

The subaccounts mentioned above will be established with and held by the Trustee pursuant to the Trust Agreement and the Fourth Supplemental Trust Agreement.

Receipts; Proceeds

(a) The Trustee will deposit or cause to be deposited, from Receipts held in the Revenue Fund, to the various accounts and subaccounts specified in the Fourth Supplemental Trust Agreement the amounts provided by the Trust Agreement and described in "SECURITY AND SOURCES OF PAYMENT FOR THE SERIES 2019 BONDS – Application of Receipts" in this Official Statement.

(b) On the date of issuance of the Series 2019 Bonds, the Authority will cause to be deposited to the Series 2019 Subaccount of the Capitalized Interest Account, the amount of $66,932,076.12. On each Interest Payment Date, commencing July 1, 2020, the Trustee will apply such funds in the Series 2019 Subaccount of the Capitalized Interest Account for payment of interest due on the Series 2019 Bonds on such Interest Payment Date. On January 1, 2024, the Trustee will transfer the balance of any funds remaining in the Series 2019 Subaccount of the Capitalized Interest Account to the Series 2019 Subaccount of the Interest Account (to be applied to pay interest on the Series 2019 Bonds on July 1, 2024).

(c) The Trustee will deposit to the Series 2019 Subaccount of the Redemption Account all amounts as will be delivered to the Trustee by the Authority from time to time with instructions that such amounts be so deposited.

Application of Money in the Series 2019 Subaccount of the Sinking Fund Account

To the extent funds have been deposited to the Series 2019 Subaccount of the Sinking Fund Account and are available, the Trustee will, at the request of the Authority, endeavor to purchase and cancel Term Bonds or portions thereof subject to redemption by operation of the Series 2019 Subaccount of the Sinking Fund Account or maturing on the next ensuing January 1 at the direction of an Authorized Officer. The purchase price of each such Term Bond will not exceed par plus accrued interest to the date of purchase. The Trustee will pay the interest accrued on such Term Bonds to the date of settlement therefor from the Series 2019 Subaccount of the Interest Account and the purchase price from the Series 2019 Subaccount of the Sinking Fund Account. No such purchase will be made by the Trustee from money in the Series 2019 Subaccount of the Sinking Fund Account within the period of forty-five (45) days immediately preceding any January 1 on which such Term Bonds are subject to redemption. If in any Bond Year the sum of the amount on deposit in the Series 2019 Subaccount of the Sinking Fund Account for the payment of any Term Bonds and the principal amount of the Term Bonds that were purchased during such Bond Year pursuant to the provisions of this paragraph or delivered during such Bond Year to the Trustee by the Authority exceeds the Sinking Fund Requirement for the Outstanding Term Bonds for such Bond Year, the Trustee will endeavor to purchase Outstanding Term Bonds with such excess money.

The Trustee will call for redemption on January 1 the Term Bonds then subject to redemption in a principal amount equal to the aggregate Sinking Fund Requirement for the Term Bonds for such Bond Year, less the principal amount of any such Term Bonds retired since the prior January 1 by purchase pursuant to the preceding paragraph or delivered during such Bond Year to the Trustee by the Authority. If the amount available in the Series 2019 Subaccount of the Sinking Fund Account on a January 1 is not equal to the Sinking Fund Requirement for the Term Bonds for the corresponding Bond Year less the principal amount of any such Term Bonds so delivered or purchased and retired, the Trustee will apply the amount available in the Series 2019 Subaccount of the Sinking Fund Account to the redemption of Term Bonds then subject to redemption so as to exhaust, to the extent practicable, the amount available. On each redemption date the Trustee will withdraw from the Series 2019 Subaccount of the Sinking Fund Account the amount required to pay the Redemption Price of the Term Bonds so called for redemption. The amount of interest on the Term Bonds so called for redemption will be paid from the Series 2019 Subaccount of the Interest Account. If such date is the stated maturity date of any Term Bonds, the Trustee will not call those Term Bonds for redemption but, on such maturity, will withdraw the amount required for paying the principal of such Term Bonds when due and payable.

If on any date there is money in the Series 2019 Subaccount of the Sinking Fund Account and no Term Bonds are then Outstanding or if on any payment date money remains therein after the mandatory redemption of Term Bonds in accordance with the Sinking Fund Requirement therefor, the Trustee will withdraw such money therefrom and will apply the same as follows and in the following order: (a) deposit in the Series 2019 Subaccount of the Interest Account, the Series 2019 Subaccount of the Principal Account and the Senior Lien Parity Reserve Account, the amounts, if any, required to be paid thereto in such month and (b) deposit all remaining amounts to the Revenue Fund.

If, in any Bond Year, by the application of money in the Series 2019 Subaccount of the Sinking Fund Account, the Trustee should purchase or receive from the Authority and cancel Term Bonds in excess of the aggregate Sinking Fund Requirement for such Bond Year, the Trustee will file with the Authority not later than the twentieth (20th) day prior to the next January 1 on which Term Bonds are to be redeemed, a statement identifying the Term Bonds purchased or delivered during such Fiscal Year and the amount of such excess. The Authority will thereafter cause an Officer's Certificate to be filed with the Trustee not later than January 15 of the following Bond Year setting forth with respect to the amount of such excess the Fiscal Years in which the Sinking Fund Requirements with respect to Term Bonds are to be reduced and the amount by which the Sinking Fund Requirements so determined are to be reduced.

Upon the retirement of any Term Bonds by purchase and redemption pursuant to the provisions of this section, the Trustee will file with the Authority a statement identifying such Series 2019 Bonds and setting forth the date of purchase or redemption, the amount of the purchase price or the Redemption Price of such Term Bonds, and the amount paid as interest thereon. The expenses incurred in connection with the purchase or redemption of any such Term Bonds will be paid by the Authority from the Revenue Fund or from any other available moneys.

Application of Money in the Series 2019 Subaccount of the Redemption Account

The Trustee will apply money in the Series 2019 Subaccount of the Redemption Account to the purchase or redemption of Series 2019 Bonds as follows:

(a) Subject to the provisions of paragraph (c) below, the Trustee will endeavor to purchase and cancel Series 2019 Bonds or portions thereof, regardless of whether such Series 2019 Bonds or portions thereof are then subject to redemption, at the direction of an Authorized Officer, provided that the purchase price of each Series 2019 Bond will not exceed the Redemption Price that would be payable on the next redemption date to the Owner of such Series 2019 Bond under the provisions of the applicable Series 2019 Subaccount of the Redemption Account. The Trustee will pay the interest accrued on such Series 2019 Bonds or portions thereof to the date of settlement from the Series 2019 Subaccount of the Interest Account and the purchase price from the Series 2019 Subaccount of the Redemption Account, but no such purchase will be made by the Trustee from money in the Series 2019 Subaccount of the Redemption Account within the period of forty-five (45) days immediately preceding any date on which such Series 2019 Bonds or portions thereof are to be redeemed.

(b) Subject to the provisions of paragraph (c) below, the Trustee will call for redemption on a date permitted by the Fourth Supplemental Trust Agreement such amount of Series 2019 Bonds or portions thereof as, with the redemption premium, if any, will exhaust the money then held in the Series 2019 Subaccount of the Redemption Account as nearly as may be practicable; provided, however, that not less than Fifty Thousand Dollars ($50,000) in principal amount of the Series 2019 Bonds will be called for redemption at any one time unless the Trustee is so instructed by the Authority. The Trustee will pay the accrued interest on the Series 2019 Bonds or portions thereof to be redeemed to the date of redemption from the Series 2019 Subaccount of the Interest Account and the Redemption Price of such Series 2019 Bonds or portions thereof from the Series 2019 Subaccount of the Redemption Account. The Trustee will withdraw from the Series 2019 Subaccount of the Redemption Account and set aside the respective amounts required to pay the Redemption Price of the Series 2019 Bonds or portions thereof so called for redemption.

(c) Money in the Series 2019 Subaccount of the Redemption Account will be applied by the Trustee in each Fiscal Year to the purchase or the redemption of Series 2019 Bonds then Outstanding in accordance with the latest Officer's Certificate filed with the Trustee designating the Series 2019 Bonds to be redeemed. In the event no such certificate is filed (i) the Trustee will apply such money to the purchase of Series 2019 Bonds bearing the highest rate of interest and (ii) if Series 2019 Bonds of more than one maturity bear the same interest rate, the Trustee will redeem such Series 2019 Bonds in the inverse order of maturities.

Upon the retirement of any Series 2019 Bonds by purchase or redemption, pursuant to the provisions of the Fourth Supplemental Trust Agreement, the Trustee will file with the Authority a statement identifying such Series 2019 Bonds and setting forth the date of purchase or redemption, the amount of the purchase price or the Redemption Price of such Bonds and the amount paid as interest thereon. The expenses incurred by the Trustee in connection with the purchase or redemption of any such Series 2019 Bonds will be paid by the Authority from the Revenue Fund or from any other available moneys.

Payment of Principal, Interest and Premium and Pledge of Receipts

The Authority covenants that it will promptly pay the principal of and the interest on every Series 2019 Bond issued under the provisions of the Fourth Supplemental Trust Agreement at the places, on the dates and in the manner provided therein and in said Series 2019 Bonds, and any premium required for the retirement of said Series 2019 Bonds by purchase or redemption, according to the true intent and meaning thereof. The Authority further covenants that it will faithfully perform at all times all of its covenants, undertakings and agreements contained in the Fourth Supplemental Trust Agreement and the Trust Agreement, or in any Series 2019 Bond executed, authenticated and delivered under the Fourth Supplemental Trust Agreement or in any proceedings of the Authority pertaining thereto. The Authority represents and covenants that (a) it is duly authorized under the Constitution and laws of the State, particularly the Act, to issue the Series 2019 Bonds authorized hereby and to pledge the Receipts in the manner and to the extent in the Fourth Supplemental Trust Agreement and in the Trust Agreement set forth, (b) all action on its part for the issuance of the Series 2019 Bonds has been duly and effectively taken and (c) such Series 2019 Bonds in the hands of the Owners thereof are and will be valid and binding special obligations of the Authority payable according to their terms.

Supplemental Trust Agreements

The Authority may, from time to time and at any time, execute and deliver such trust agreements supplemental to the Fourth Supplemental Trust Agreement (which supplemental trust agreements will thereafter form a part hereof) as will be substantially consistent with the terms and provisions of the Fourth Supplemental Trust Agreement and, in the opinion of the Trustee, who may rely upon a written opinion of legal counsel, will not materially and adversely affect the interest of the Owners:

(a) to cure any ambiguity or formal defect or omission, to correct or supplement any provision in the Fourth Supplemental Trust Agreement that may be inconsistent with any other provision therein, to make any other provisions with respect to matters or questions arising under the Fourth Supplemental Trust Agreement or to modify, alter, amend, add to or rescind any of the terms or provisions contained in the Fourth Supplemental Trust Agreement;

(b) to grant or to confer upon the Trustee for the benefit of the Owners any additional rights, remedies, powers, authority or security that may lawfully be granted to or conferred upon the Owners or the Trustee;

(c) to add to the covenants and agreements of the Authority in the Fourth Supplemental Trust Agreement other covenants and agreements thereafter to be observed by the Authority or to surrender any right or power therein reserved to or conferred upon the Authority;

(d) to permit the qualification of the Fourth Supplemental Trust Agreement under any federal statute now or hereafter in effect or under any state Blue Sky law, and, in connection therewith, if the Authority so determines, to add to the Fourth Supplemental Trust Agreement or any supplemental trust agreement such other terms, conditions and provisions as may be permitted or required by such federal statute or Blue Sky law; or

(e) to provide for the issuance of Series 2019 Bonds in bearer form.

At least thirty (30) days prior to the execution and delivery of any supplemental trust agreement for any of the purposes described under this clause, the Trustee will cause at the Authority's expense a notice of the proposed supplemental trust agreement to be mailed first-class, postage prepaid, to the Local Government Commission and to all Owners of the Series 2019 Bonds. Such notice will briefly set forth the nature of the proposed supplemental trust agreement and will state that copies thereof are on file at the designated corporate trust office of the Trustee for inspection by all Owners of the Series 2019 Bonds. A failure on the part of the Trustee to mail such notice will not affect the validity of such supplemental trust agreement.

Subject to the terms and provisions contained in the Fourth Supplemental Trust Agreement and described under this clause, and not otherwise, the Owners of not less than a majority in aggregate principal amount of the Series 2019 Bonds then Outstanding that will be affected, as defined in the Trust Agreement, by a proposed supplemental trust agreement will have the right, from time to time, anything contained in the Fourth Supplemental Trust Agreement to the contrary notwithstanding, to consent to and approve the execution and delivery by the Authority and the Trustee of such supplemental trust agreement as will be deemed necessary or desirable by the Authority for the purpose of modifying, altering, amending, adding to or rescinding any of the terms or provisions contained in the Fourth Supplemental Trust Agreement or in any supplemental trust agreement; provided, however, that nothing therein contained will permit, or be construed as permitting (a) an extension of the maturity of the principal of or the interest on any Series 2019 Bond without the consent of the Owner of such Series 2019 Bond, (b) a reduction in the principal amount of any Series 2019 Bond or the redemption premium or the rate of interest thereon without the consent of the Owner of such Series 2019 Bond, (c) the creation of a pledge, charge and lien upon the Receipts other than the pledge, charge and lien created by the Trust Agreement without the consent of all Owners of the Series 2019 Bonds then Outstanding, (d) a preference or priority of any Series 2019 Bond over any other Series 2019 Bond without the consent of all Owners of the Series 2019 Bonds then Outstanding, or (e) a reduction in the aggregate principal amount of Series 2019 Bonds required for consent to such supplemental trust agreement without the consent of all Owners of the Series 2019 Bonds then Outstanding. Nothing contained in the Fourth Supplemental Trust Agreement, however, will be construed as making necessary the approval by the Owners of the execution and delivery of any supplemental trust agreement as authorized in the Fourth Supplemental Trust Agreement.

The Trustee will, at the expense of the Authority, such expense to be paid from the Revenue Fund or from any other available moneys and cause notice of the proposed supplemental trust agreement to be mailed, postage prepaid, to the Local Government Commission and all Owners of the Series 2019 Bonds as of the date such notice is mailed. Such notice will briefly set forth the nature of the proposed supplemental trust agreement and will state that copies thereof are on file at the principal corporate trust office of the Trustee for inspection by all Owners. The Trustee will not, however, be subject to any liability to any Owner by reason of its failure to mail such notice, and any such failure will not affect the validity of such supplemental trust agreement when approved and consented to as provided in the Fourth Supplemental Trust Agreement.

Whenever, at any time within three (3) years after the date of the mailing of such notice, the Authority will deliver to the Trustee an instrument or instruments in writing purporting to be executed by the Owners of not less than a majority in aggregate principal amount of Series 2019 Bonds then Outstanding that are affected, as defined in the Fourth Supplemental Trust Agreement, by a proposed supplemental trust agreement, which instrument or instruments will refer to the proposed supplemental trust agreement described in such notice and will specifically consent to and approve the execution and delivery thereof in substantially the form of the copy thereof referred to in such notice, thereupon, but not otherwise, the Authority and the Trustee may execute and deliver such supplemental trust agreement in substantially such form, without liability or responsibility to any Owner, whether or not such Owner will have consented thereto.

If the Owners of not less than a majority in aggregate principal amount of the Series 2019 Bonds Outstanding at the time of the execution and delivery of such supplemental trust agreement and that are affected, as defined in the Fourth Supplemental Trust Agreement, by a proposed supplemental trust agreement have consented to and approved the execution and delivery thereof as therein provided, to the extent permitted by law, no Owner will have any right to object to the execution and delivery of such supplemental trust agreement, to object to any of the terms and provisions contained therein or the operation thereof, to question the propriety of the execution and delivery thereof, or enjoin or restrain the

Authority or the Trustee from executing and delivering the same or from taking any action pursuant to the provisions thereof.

Upon the execution and delivery of any supplemental trust agreement pursuant to the provisions of the Fourth Supplemental Trust Agreement, the Fourth Supplemental Trust Agreement will be and be deemed to be modified and amended in accordance therewith, and the respective rights, duties and obligations under the Fourth Supplemental Trust Agreement of the Authority, the Trustee, all Owners and the Bond Insurer with respect to the Series 2017 Bonds and the Series 2018 Bonds will thereafter be determined, exercised and enforced in all respects pursuant to the provisions of the Fourth Supplemental Trust Agreement, as so modified and amended.

Provisions Relating to the Bond Insurer

Under the Fourth Supplemental Trust Agreement, Assured Guaranty Municipal Corp., the Bond Insurer with respect to the Insured Series 2019 Bonds (the "Series 2019 Bond Insurer"), has certain rights unless waived by the Series 2019 Bond Insurer in writing including the following:

(a) The Series 2019 Bond Insurer will be deemed to be the sole holder of the Insured Series 2019 Bonds for the purpose of exercising any voting right or privilege or giving any consent or direction or taking any other action that the holders of the Insured Series 2019 Bonds are entitled to take pursuant to the Trust Agreement pertaining to (i) defaults and remedies and (ii) the duties and obligations of the Trustee.

(b) The Series 2019 Bond Insurer will, to the extent it makes any payment of principal of or interest on the Insured Series 2019 Bonds, become subrogated to the rights of the recipients of such payments in accordance with the terms of the Bond Insurance Policy for the Series 2019 Bonds (which subrogation rights will also include the rights of any such recipients in connection with any Insolvency Proceeding).

(c) The Traffic Consultant is CDM Smith Inc. In the event that the Authority determines to consider engaging the services of another Traffic Consultant (or any successor thereto), the Authority will advise the Series 2019 Bond Insurer and will provide the Series 2019 Bond Insurer with the names of at least three firms that the Authority may engage to provide the services of a Traffic Consultant. Thereafter, unless the Series 2019 Bond Insurer objects within thirty (30) days to the use of any of the firms proposed as the Traffic Consultant (in which event the Authority will propose an alternative firm for approval), the Authority may engage any of the firms so proposed to be the Traffic Consultant.

(d) The Series 2019 Bond Insurer will be given written notice of any amendment of the Trust Agreement or the Fourth Supplemental Trust Agreement that does not require the consent of the Owners. Any amendments to the Trust Agreement or the Fourth Supplemental Trust Agreement that do require the consent of the Owners will also require the consent of the Series 2019 Bond Insurer.

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APPENDIX B

2019 TRAFFIC AND REVENUE STUDY

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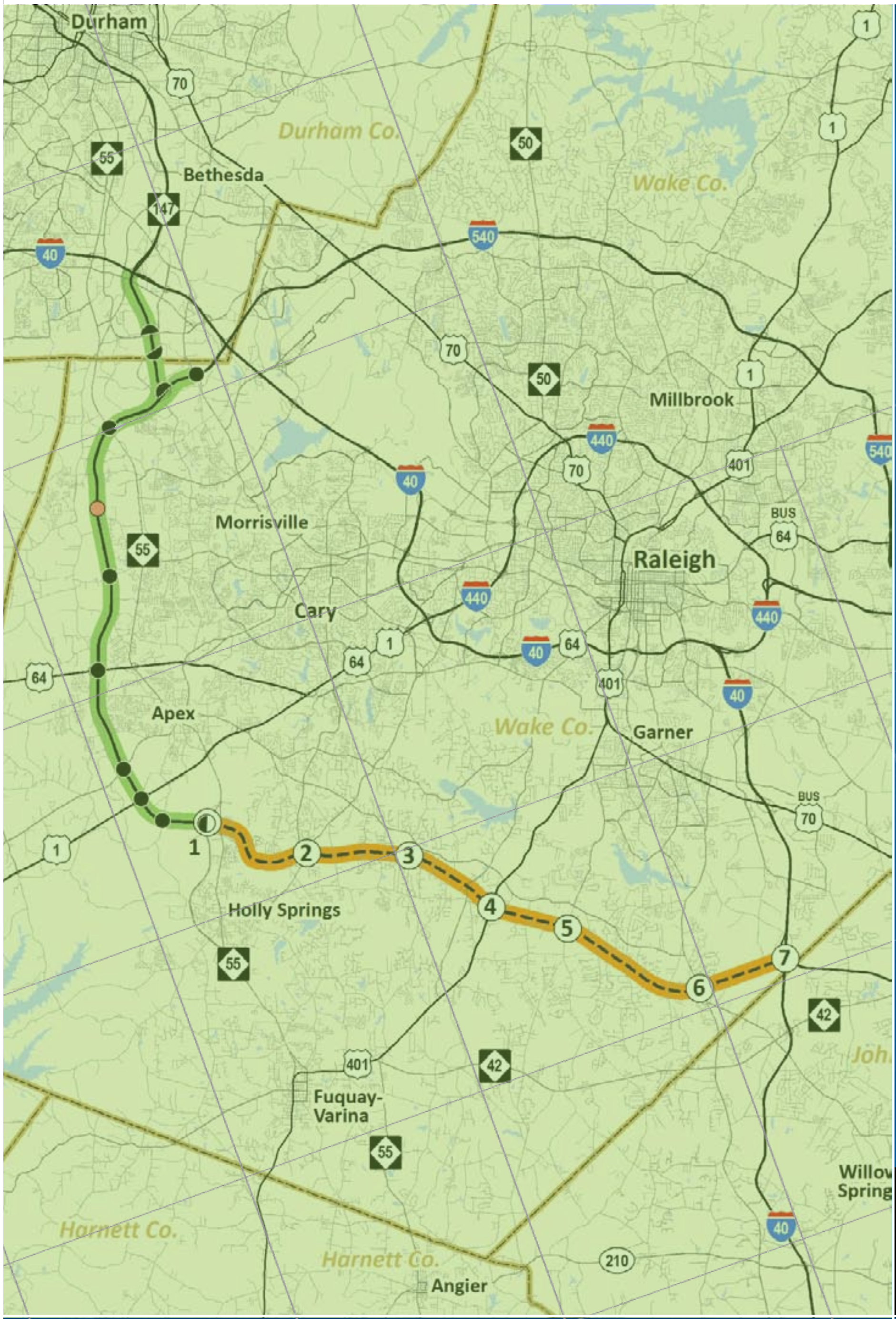
Final Report

Triangle Expressway and Complete 540 Phase 1 Traffic and Revenue Study

COMPLETE 540

TRIANGLE EXPRESSWAY SOUTHEAST EXTENSION



September 2019

Prepared for

NORTH CAROLINA Turnpike Authority

North Carolina Department of Transportation

CDM Smith

77 Hartland Street, Suite 201
East Hartford, Connecticut 06108
tel: 860 529-7615

September 27, 2019

Mr. David Roy
Director of Finance and Budget
North Carolina Turnpike Authority
1 South Wilmington Street
1578 Mail Service Center
Raleigh, NC 27601

Subject: NCTA Triangle Expressway and Complete 540 Phase 1 Traffic and Revenue Study

Dear Mr. Roy:

CDM Smith is pleased to provide the ***Triangle Expressway and Complete 540 Phase 1 Traffic and Revenue Study*** report dated September 2019 (T&R Study). It is our understanding that this letter and corresponding T&R Study are intended to support upcoming financing of the Triangle Expressway system including Complete 540 Phase 1.

The purpose of the study was to develop 40-year annual traffic and toll revenue forecasts for the following two scenarios:

Scenario 1: Triangle Expressway assuming Complete 540 is not constructed.

Scenario 2: Triangle Expressway assuming the planned Complete 540 Phase 1 is constructed. Complete 540 Phase 1 will extend the Triangle Expressway from its southern terminus at the NC 55 Bypass to Interstate 40 and US 70 (the Clayton Bypass).

The T&R Study was substantially complete in draft form in September 2018 and utilized the most recent available tools and data at that time. The T&R Study utilized the Triangle Regional Model version 6 (TRMv6), released May 2018. That model was reviewed and refined to better reflect actual traffic conditions in the study corridor. Key components of the work effort included calibration of the model with traffic counts, travel time data, motorists' value-of-time, trip characteristics, and an independent evaluation of the socioeconomic forecasts. The model reflected the most recently approved transportation improvement plans identified at that time. Other key inputs included historical Triangle Expressway transactions and revenue through June 2018, and assumed future toll rate adjustments developed in coordination with North Carolina Turnpike Authority (NCTA) staff. Motorists value-of-time in the study area was estimated via a stated preference survey conducted by Resource Systems Group, Inc. (RSG). TRMv6 socioeconomic forecasts were independently reviewed and adjusted where appropriate by Dr. Stephen Appold, an economist with local expertise.

Key Project Assumptions

Subsequent to the substantial completion of the T&R Study in draft form in September 2018, based on executed construction contracts, the anticipated opening date for Complete 540 Phase 1 was revised from January 1, 2024 to July 1, 2023. Correspondingly, the anticipated opening date for the planned relocation of existing Triangle Expressway ramp toll zones at Hopson Road and U.S. 64 to adjacent mainline segments was also assumed to change from January 1, 2024 to July 1, 2023. The traffic and revenue forecasts included in the T&R Study reflect this six-month advance in anticipated opening dates.

Forecast Review

Since substantial completion of the T&R Study in draft form in September 2018 an additional 12 months ending June 30, 2019 (FY 2019) of Triangle Expressway historical traffic and revenue data has become available. CDM Smith conducted a review of the forecasts in the T&R Study report taking into consideration actual FY 2019 Triangle Expressway transactions and revenue. Triangle Expressway FY 2019 historical data was used to analyze average weekday traffic growth by toll zone, method of payment distribution, processing fee revenue generation, annualization factors, and weather events.

The forecast review also included identifying changes to NCTA's planned roadway improvements on the Triangle Expressway. One notable change resulting from this review is a revised opening date for the planned Morrisville Parkway interchange with the Triangle Expressway. The new interchange was previously expected to be open to traffic on January 1, 2020 but is now expected to open no later than May 1, 2020.

We have assessed the potential impacts of the changes and information mentioned above and have concluded that the net overall effect of these changes on toll revenue would not be material to the Triangle Expressway and Complete 540 Phase 1 traffic and revenue estimates included in the T&R Study report. Therefore, the Triangle Expressway and Complete 540 Phase 1 traffic and revenue forecasts included in the T&R Study are appropriate for use in the support of project financing.

Sincerely,

Scott A. Allaire

Scott Allaire
Vice President
CDM Smith Inc.

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Chapter 1

Introduction

This report documents the ***Triangle Expressway and Complete 540 Phase 1 Traffic and Revenue Study*** conducted for the North Carolina Turnpike Authority (NCTA) and the North Carolina Department of Transportation (NCDOT). The purpose of the study was to develop a 40-year (fiscal years 2019 through 2058) annual traffic and toll revenue forecast for the following two scenarios:

Scenario 1: Triangle Expressway assuming Complete 540 Phase 1 is not constructed. This scenario will also be called the **Triangle Expressway Scenario** or forecast in this report. The Triangle Expressway is an existing toll road consisting of Toll NC 540 and Toll NC 147.

Scenario 2: Triangle Expressway assuming the proposed Complete 540 Phase 1. Phase 1 would extend the Triangle Expressway from its southern terminus at the NC 55 Bypass to Interstate 40 (I-40) and US 70 (the Clayton Bypass). This scenario will also be called the **Complete 540 Scenario** or forecast in this report. This study assumes that Complete 540 Phase 1 would open on July 1, 2023. In this report, the term Complete 540 always refers to Complete 540 Phase 1.

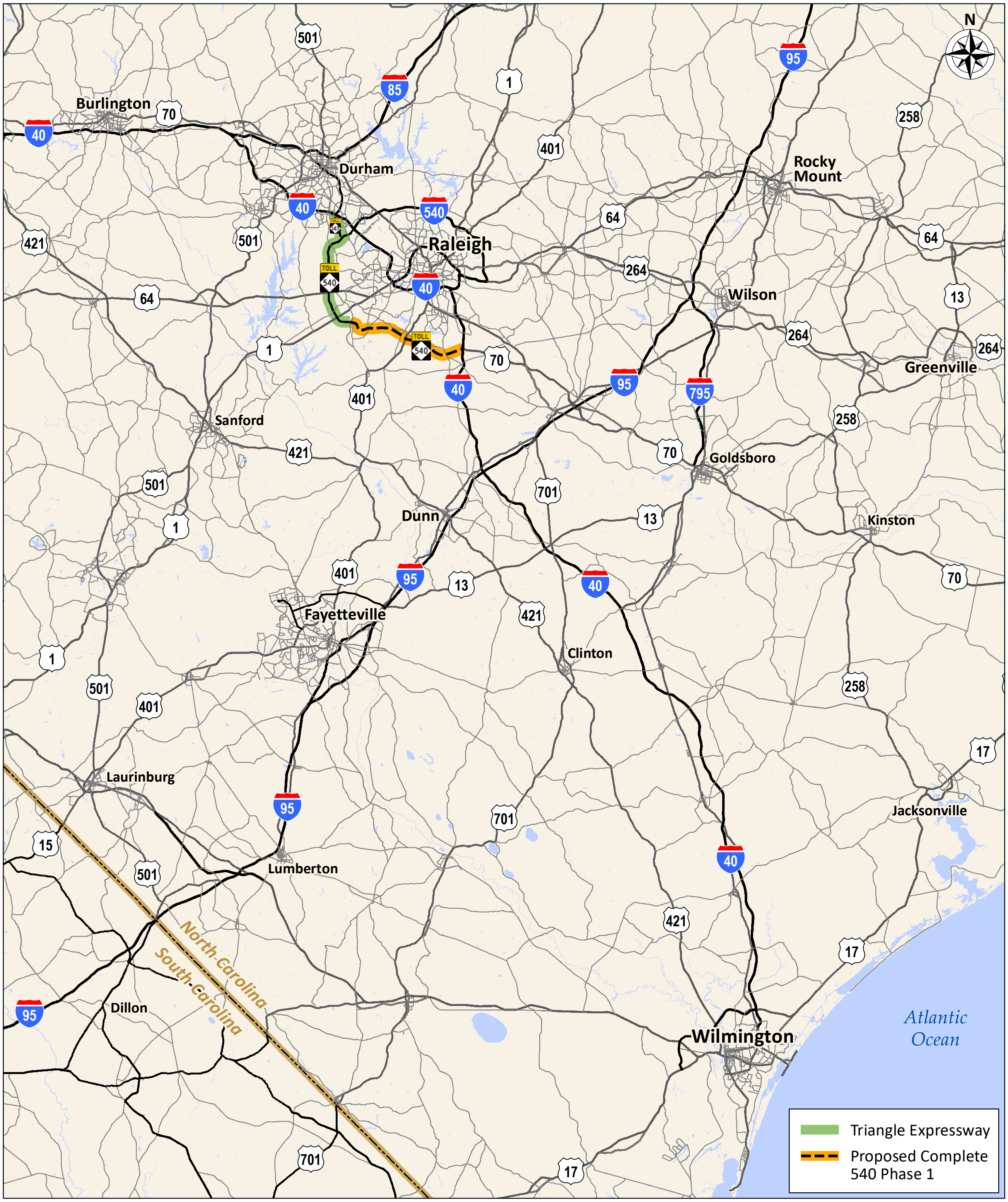
The traffic and toll revenue forecasts presented in this study for the two scenarios described above are suitable for use in support of project financing.

Figure 1.1 shows the location of the existing Triangle Expressway and the proposed Complete 540 Phase 1 within North Carolina and the connecting roadway system. The Triangle Expressway and Complete 540 are located in the greater Raleigh area. The completion of Complete 540 Phase 1 would substantially complete the 540 Outer Loop, which would consist of Interstate 540, the Triangle Expressway and Complete 540, also known as the Southeast Extension. Interstate 540, on the northern side of Raleigh is a toll-free roadway, while the Triangle Expressway is a toll road that opened in its entirety in early 2013. Complete 540 Phase 1 is planned as a toll road.

Complete 540 Phase 1 would extend the Triangle Expressway by about 17.1 miles from its current southern terminus at the NC 55 Bypass in Apex, NC to I-40 and US 70, south of Raleigh. Complete 540 Phase 1 is assumed to open on July 1, 2023. In central and eastern North Carolina, I-40 is an important road that connects inland communities such Winston-Salem, Greensboro, Durham, and Raleigh, to shore points, including Wilmington and numerous recreational areas in southwestern NC. Upon completion, the Triangle Expressway and Complete 540 Phase 1 would provide an alternative route for longer-distance trips, avoiding the more congested sections of I-40 serving local movements in the Raleigh area. Complete 540 Phase 1 would provide more connectivity for local residents, including those in Apex, Holly Springs, Williams Crossroads and Clayton.

The NCDOT lists two Complete 540 Phase 1 construction Segments in the ***State Transportation Improvement Program*** (STIP):

- Segment 1: **NC 55 Bypass to U.S. 401** (STIP# R-2721) – about 8.5 miles, and
- Segment 2: **U.S. 401 to I-40** (STIP# R-2828) – about 8.6 miles



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CDM Smith

REGIONAL MAP

FIGURE 1.1

As mentioned above, it is assumed that Complete 540 Phase 1 would open on July 1, 2023.

1.1 Project Description

Figure 1.2 shows the general alignment of the existing Triangle Expressway and the proposed Complete 540 Phase 1. The Triangle Expressway is a 6-lane, 18.5-mile toll road, consisting of Toll NC 540 and Toll NC 147. Toll NC 147 is about 3.4 miles in length and terminates at I-40 in the north and Toll NC 540 to the south. Toll NC 540 is about 15.1 miles in length and terminates at NC 54 in the north and NC 55 Bypass in the south. The posted speed limit is 70 mph.

Complete 540 is planned as a 6-lane, limited-access toll road. Phase 1 would extend from its northern terminus at the NC 55 Bypass to its southern terminus at the I-40/US 70 interchange, a total distance of about 8.6 miles. Five intermediate interchanges would be provided between the NC 55 Bypass and I-40/US 70 interchanges. The speed limit would be posted at 70 mph on Complete 540 Phase 1.

Tolls are currently collected on the Triangle Expressway at toll zones sited on a mix of mainline and ramp locations, via an electronic toll collection (ETC) program named NC Quick Pass®, and a license plate image program named Bill by Mail (BBM). There are no physical toll booths on the Triangle Expressway; all tolls are collected via equipment located on overhead gantries at each toll zone. ETC transactions, including NC Quick Pass®, require motorists to have a transponder. The transponder automatically deducts tolls from a pre-paid account. Transponders from the following programs are all accepted on the Triangle Expressway:

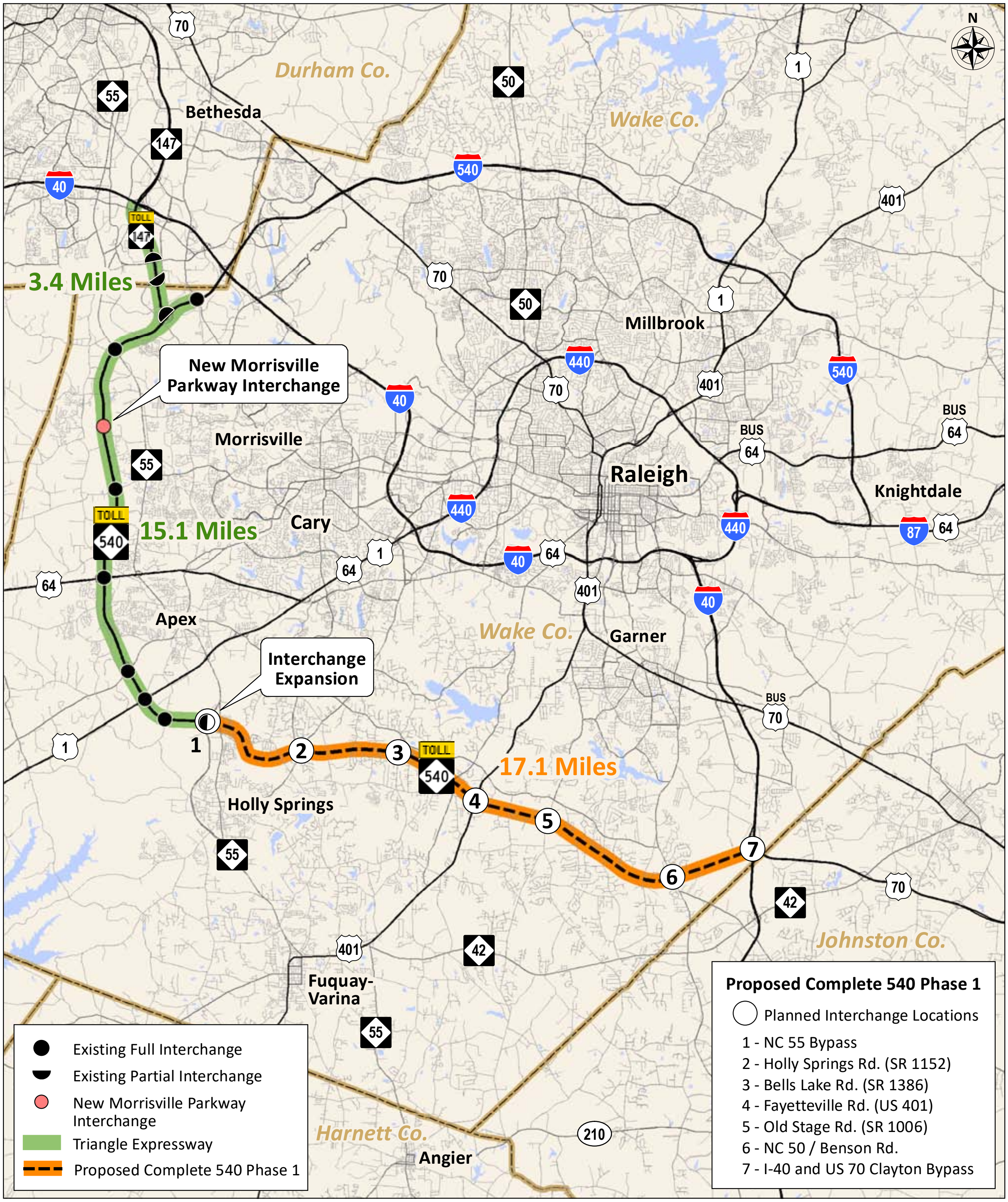
- NC Quick Pass®
- Florida SunPass®
- Georgia Peach Pass®
- E-ZPass®

If a motorist doesn't have a transponder, high-speed cameras mounted on gantries record the license plate and an invoice is mailed to the registered owner through the BBM program. ETC transactions receive an automatic 35 percent discount from the BBM toll. No toll-free movements are available on the Triangle Expressway.

Complete 540 Phase 1 would utilize the same payment system as the Triangle Expressway, with toll zones located on each of the six mainline sections. No toll-free movements would be permitted on Complete 540.

There are planned improvements to the Triangle Expressway during the forecast period which are shown in **Figure 1.3**, along with the current and planned toll zone locations. NCTA toll zone IDs are shown at each toll zone. Figure 1.3 is a functional schematic, not drawn to scale, and does not portray the actual ramp configurations. The planned Triangle Expressway improvements include:

1. A new controlled-access interchange at Morrisville Parkway and Toll NC 540. The NCTA plans on opening the interchange in early 2020. This study assumes the opening date is January 1, 2020.



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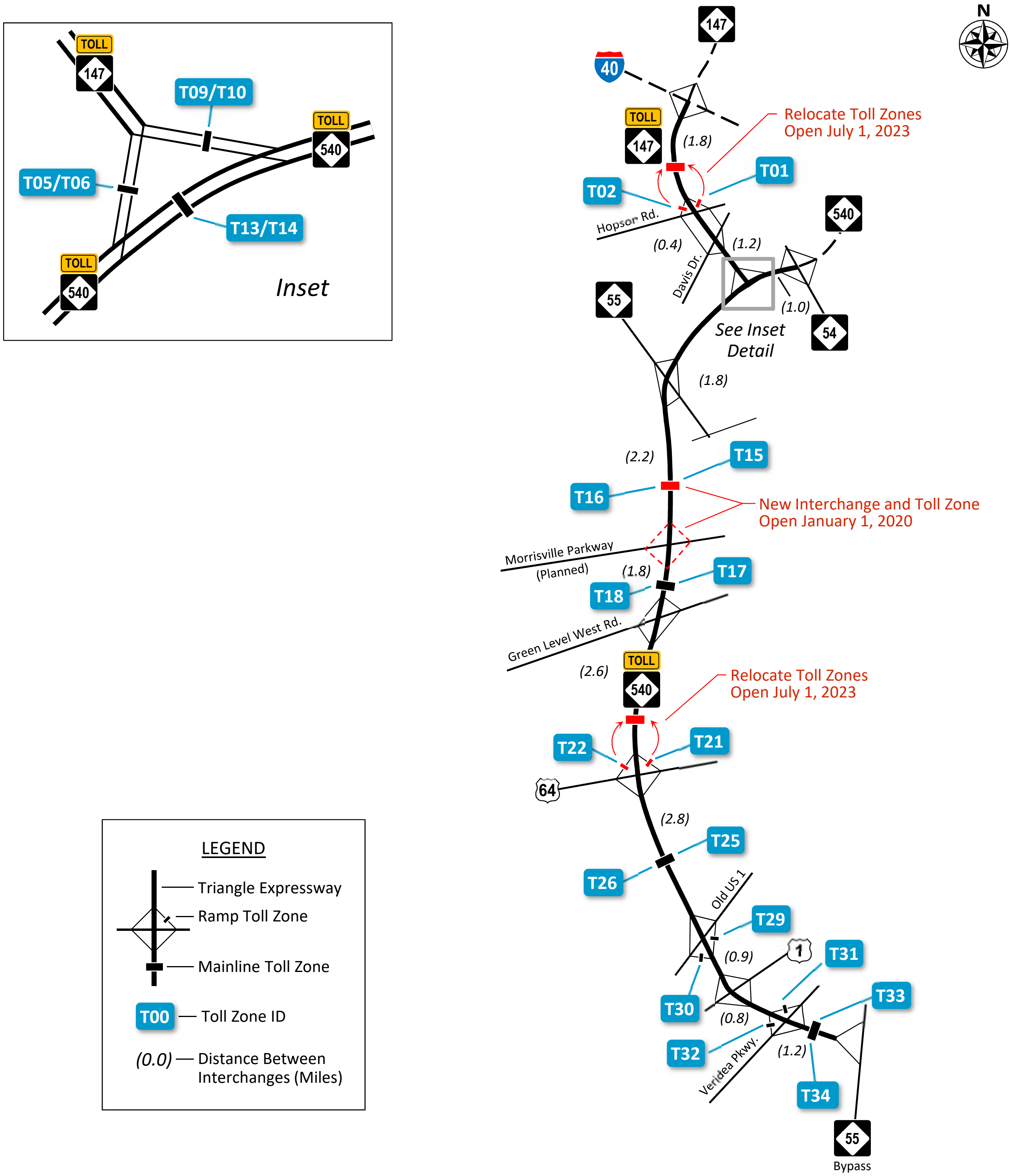
PROJECT LOCATION MAP

FIGURE 1.2



TRIANGLE EXPRESSWAY TOLL ZONES AND PLANNED MODIFICATIONS

FIGURE 1.3

2. Existing ramp toll zones on Hopson Road (T01 and T02) and US 64 (T21 and T22) will be relocated to adjacent mainline sections. This change is assumed to occur on July 1, 2023, concurrent with the opening of Complete 540 Phase 1. The purpose of the change is to achieve greater toll equity among movements on the Triangle Expressway.

1.2 Prior Work

CDM Smith issued the ***Complete 540 Planning Level Traffic and Revenue Study*** on May 31, 2017. It provided traffic and toll revenue forecasts for the existing Triangle Expressway and for three scenarios that included various assumptions regarding Complete 540 Phase 1 and Phase 2 (a completion of Complete 540 from I-40/U.S. 70 to U.S. 64/U.S. 264 Bypass). The traffic and revenue forecasts were intended for planning purposes and were not suitable for project financing. A substantial amount of data was collected for the Planning Level Study, including traffic counts, travel-speed data, travel-pattern data from StreetLight Data, Inc., historical traffic and toll revenue on the Triangle Expressway, and planned roadway improvements in the study area. The traffic and revenue projections were based on the Triangle Regional Model version 5 (TRMv5), including its assumptions regarding growth and location of future population, households and employment.

This ***Triangle Expressway and Complete 540 Phase 1 Traffic and Revenue Study*** used the data collected for the Planning Level Study, as well as additional traffic counts, updated travel-time data, updated historical Triangle Expressway traffic and toll revenue and updated plans for roadway improvements. In addition, this current study used the new version 6 of the Triangle Regional Model (TRMv6); engaged an independent economist to review and adjust forecasted socioeconomic variables assumed in the TRMv6; and had stated preference (SP) surveys conducted to estimate motorist values-of-time.

The following are other pertinent studies conducted by CDM Smith relating to the Triangle Expressway and Complete 540, listed in reverse chronological order (most recent first).

November 2018: ***Triangle Expressway 2018 Traffic and Revenue Study***
Provided a 40-year annual traffic and revenue forecast for the Triangle Expressway, from fiscal year (FY) 2019 through 2058. The forecast included a new planned interchange with Morrisville Parkway, and the relocation of ramp toll zones to mainline toll zones at the Hopson Road and U.S. 64 interchanges. The forecast was used for project financing.

3/22/2017: Revised transactions and toll revenue forecasts were prepared for the Triangle Expressway and for impacts due to the Veridea Parkway and Morrisville Parkway interchanges to reflect opening dates of April 1, 2017 and January 1, 2019, respectively. The revised transaction and revenue forecasts were used in the ***North Carolina Turnpike Authority Triangle Expressway Senior Lien Turnpike Revenue Refunding Bonds Official Statement***. The revised forecasts were based on the ***2009 Comprehensive Report***.

03/31/2016: ***Toll NC 540/Old Holly Springs-Apex Road Interchange Toll Schedule Recommendation***
Provided the recommended toll rate schedule for the Veridea Parkway Interchange (previously the Old Holly Springs-Apex Road Interchange). This toll rate schedule differed slightly from the assumed toll rates in the 9/9/2013 letter listed above. The recommended Veridea toll rate schedule was adopted by the NCTA.

9/9/2013: ***Impact of Morrisville Parkway and Old Holly Springs Road Interchanges***
Revised traffic and toll revenue forecasts are provided for the Triangle Expressway without the proposed interchanges, with each individual interchange, and with both interchanges. The Old Holly Springs-Apex Road Interchange was the current name for the Veridea Parkway Interchange at the time of the study. The revisions of the Triangle Expressway included adjustments for actual experience, and some toll schedule adjustments that reflected actual phased openings. Both interchanges were assumed to open on January 1, 2016. The forecasts were based on the ***2009 Comprehensive Report.***

4/25/2012: ***Technical Memorandum – 24 Month Monthly Transactions and Gross Toll Revenue Estimates for the Triangle Expressway***
This document presents revised traffic and toll revenue estimates from January 2012 through December 2014 to reflect changes in the actual phased opening of the Triangle Expressway. The estimates were based on the **2009 Comprehensive Report**. The Veridea Parkway and Morrisville Parkway interchanges were not included in the forecasts.

11/10/2011: ***Toll NC 147/McCrimmon Parkway Connector T&R Study***
This document presents planning level traffic and revenue estimates for the Toll NC 147 extension to McCrimmon Parkway. It was based on the ***2009 Comprehensive Report*** and did not assume the Veridea Parkway or Morrisville Parkway interchanges.

December 2010: ***Morrisville Parkway Interchange Test***
This document presents planning level traffic and revenue estimates for the Morrisville Parkway Interchange. It was based on the ***2009 Comprehensive Report.***

October 2010: ***Triangle Expressway Veridea Interchange Test***
This document presents planning level traffic and revenue estimates for the Veridea Parkway Interchange. It was based on the ***2009 Comprehensive Report***.

4/6/2009: ***Triangle Expressway Comprehensive Traffic and Revenue Study (2009 Comprehensive Report)***
This report contains a certified forecast of Triangle Expressway traffic and toll revenue. It contains forecasts for fiscal years (FY) 2012 through 2051 and was prepared prior to the opening of the Triangle Expressway. The forecasts did not include the Veridea Parkway or Morrisville Parkway interchanges.

1.3 Work Scope

The work scope was comprised of the following tasks.

Task 1: Data Collection and Summarization

Task 2: Corridor Growth Analysis

Task 3: Stated Preference Surveys

Task 4: Triangle Regional Model Refinement and Calibration

Task 5: Traffic and Toll Revenue Analysis

Task 6: Traffic and Toll Revenue Sensitivity Tests

Task 1: Data Collection and Summarization

CDM Smith used data collected for the ***Complete 540 Planning Level Traffic and Revenue Study*** and collected additional data.

Subtask 1.1: Obtain Available Traffic Counts and Toll Revenue Data

- CDM Smith obtained NCDOT traffic count data that was made available since the Planning Level Study was conducted.
- CDM Smith obtained updated toll transaction and revenue data for the Triangle Expressway from the NCTA. In addition, CDM Smith received data on leakage and fee revenue associated with BBM transactions on the Triangle Expressway.

Subtask 1.2: Conduct New Traffic Counts

- As part of the Planning Level Study, CDM Smith contracted The Traffic Group to conduct traffic counts at 63 locations. Traffic counts were conducted at 15 additional locations as part of the current study.

Subtask 1.3: HERE Travel Speed Data

- Updated travel speed data was obtained in the study area from HERE via the Regional Integrated Transportation Information System (RITIS) with the permission of the NCDOT.

Subtask 1.4: Future Roadway Improvements

- Future roadway improvement projects were reviewed and checked against assumed improvements in the TRMv6. The following sources were used to identify planned roadway improvements.
    - ***2018-2027 NC State Transportation Improvement Program (STIP)*** and interactive map.
    - NC Capital Area Metropolitan Planning Organization (CAMPO) and Durham - Chapel Hill – Carrboro Metropolitan Planning Organization (DCHC MPO) ***Transportation Improvement Program (TIP)*** and interactive map.

- CAMPO and DCHC MPO long range plan – the 2045 ***Metropolitan Transportation Plan*** and interactive map.
- Go Triangle ***Recommended Wake County Transit Plan***

CDM Smith coordinated with NCDOT/NCTA staff and/or MPO staff to identify needed changes to the TRMv6 model to reflect the current understanding of improvement completion dates or definitions.

Task 2: Corridor Growth Analysis

Economic growth forecasts are one of the most important elements of a traffic and toll revenue forecast, particularly for new toll facilities. Traffic demand and travel patterns in regional models, such as the TRMv6, are based on forecasts of socioeconomic variables such as population, number of households, and employment. CDM Smith employed Dr. Steven Appold, an economist with local expertise, to conduct an independent analysis of the land-use and socioeconomic growth forecasts assumed in the TRMv6. Dr. Appold reviewed the forecasts and recommended adjustments where appropriate. The resulting revised socioeconomic forecasts were used in adjusting the TRMv6 trip tables to reflect the changed assumptions in variables such as population, households, and employment. The economic review focused on the Triangle Expressway and Complete 540 corridors. Chapter 3 in this report summarizes Dr. Appold's work and socioeconomic forecasts.

Task 3: Stated Preference Surveys

Stated preference (SP) surveys are an integral part of investment-grade traffic and revenue studies to estimate motorists' willingness to pay tolls, or value of time (VOT), for different market segments. The surveys provide an important analytical tool in evaluating traffic and revenue potential and in enhancing the credibility of the study for presentation to the financial community. Past studies have shown that travelers' VOT are region-specific and depend in complex ways on characteristics of travelers and trip mix such as vehicle classification, personal incomes, trip purposes, and availability of discretionary time. These factors and others create wide variations in VOT among regions and facilities, and support the need for context-specific studies to accurately estimate these values.

CDM Smith contracted Resource Systems Group, Inc. (RSG) to conduct SP surveys to estimate VOT for motorists in the study area. Estimated VOT was developed for different market segments and geographic areas in the model area. This information was incorporated into the travel demand model to support the development of traffic and toll revenue forecasts.

Task 4: Triangle Regional Model Refinement and Calibration

The TRMv6 was used to analyze the traffic and toll revenue potential of the Triangle Expressway and Complete 540. Model supported years included 2013, 2025, 2035, and 2045.

The TRMv6 model years were reviewed to identify necessary changes to improve network detail and more accurate route choice in the immediate project vicinity. These reviews included planned roadway improvements, the size of traffic analysis zones, centroid locations, road capacities, and speed limits.

Trip tables were modified to reflect socioeconomic adjustments recommended by Dr. Appold, the economist.

A 2016 model year was created by CDM Smith to use as a calibration year. Traffic assignments were calibrated to reflect actual ground conditions including traffic volumes, travel speeds, ETC market share, and trip distance at selected locations. Calibration adjustments were carried through to future year assignments.

Task 5: Traffic and Toll Revenue Analysis

Traffic assignments were conducted using the refined and calibrated TRMv6, incorporating the adjusted trip tables, and using CDM Smith toll diversion algorithms. The assignments included model inputs developed by CDM Smith and RSG, including motorist VOTs, motor vehicle operating cost (VOC), toll rate schedules, and NC Quick Pass® and BBM market shares.

Annual traffic and gross toll revenue forecasts were developed for the model assignment years and the intermediate years. Net revenue was subsequently developed to incorporate adjustments reflecting expected toll-revenue leakage, and fee revenue. Estimated rates of revenue leakage and fee revenue were based on actual experience from the Triangle Expressway.

Task 6: Traffic and Toll Revenue Sensitivity Tests

There is considerable uncertainty in traffic forecasts as they are dependent on many variables, particularly on new facilities. It is standard practice in investment-grade traffic and revenue studies to include traffic and toll revenue sensitivity testing. The purpose is to help financial analysts assess the potential risk associated with the Project's traffic and revenue forecasts by testing the impact of changes to key variables. Key variables tested include lower economic growth, lower motorist VOTs, higher fuel prices, longer ramp-up periods, and lower truck traffic. The results of the sensitivity tests are documented in Chapter 8.

1.4 Report Structure

This report consists of eight chapters.

Chapter 1: Introduction

Describes the purpose of the study; a description of the project and traffic and revenue scenarios; the work scope; and structure of the report.

Chapter 2: Existing Conditions

Presents information regarding the existing conditions on the Triangle Expressway and other roads in the Complete 540 study area. Information provided for the Triangle Expressway includes its toll collection system and current toll schedule; historical traffic volumes and traffic characteristics; travel patterns; and historical transaction and toll revenue. Recent traffic volumes and travel times are provided for many area roads in the Triangle Expressway and Complete 540 study area.

Chapter 3: Independent Economic Review

This chapter summarizes the work of the independent economist, Dr. Stephen Appold, who reviewed socioeconomic assumptions in the TRMv6, and created revised socioeconomic inputs, including population, number of households and employment, for each of the supported model years. The revised socioeconomic inputs to the TRMv6 are summarized; and the changes, compared to the original inputs, are quantified. In addition, Dr. Appold developed a set of socioeconomic inputs to the TRMv6 to create a model year 2016 for calibration purposes. This chapter describes the process Dr. Appold used to develop the 2016 socioeconomic dataset.

Chapter 4: Stated Preference Survey

This chapter summarizes the Resource Systems Group (RSG) work in developing VOT for motorists in study area. RSG administered a SP survey, which is described, along with the survey analysis, and the resulting estimation of VOT by market segment.

Chapter 5: Model Refinement

The TRMv6 is described. Also provided is a summary of modifications made to the model by CDM Smith; the model calibration process and calibration metrics.

Chapter 6: Scenario 1: Triangle Expressway Traffic and Toll Revenue Forecast

Key inputs and assumptions are provided, including planned roadway improvements, toll schedules, and toll zone locations. A toll sensitivity curve is provided, demonstrating the revenue potential of the facility across various toll rate levels. The development of the traffic and toll revenue forecast is described, including how the model weekday traffic output is converted into annual traffic and toll revenue forecasts. Estimated annual toll transactions and toll revenue are provided from FY 2019 through FY 2058. Adjusted annual traffic and revenue forecasts are also provided that account for leakage and fee revenue associated with BBM transactions.

Chapter 7: Scenario 2: Complete 540 Phase 1 Traffic and Toll Revenue Forecast

The development of the traffic and toll revenue forecast is described, including the assumed toll schedule and toll sensitivity curve. The traffic and toll revenue forecasts for gross toll revenue and adjusted toll revenue are provided. In addition, time-distance comparisons are provided for selected movements, comparing travel on the Triangle Expressway and/or Complete 540 Phase 1 with a trip using the best toll-free alternative route.

Chapter 8: Sensitivity Tests

Six tests were conducted on Scenario 2 to determine the impact on forecast traffic and toll revenue if key assumptions were changed. All tests changed variables to negatively impact traffic and toll revenue. The five tests are:

1. Reduce the trip table by 30 percent to reflect lower economic growth.
2. Reduce the motorist VOT for all classes by 25 percent.
3. Increase fuel costs by 50 percent.
4. Reduce the truck market share by 25 percent. Total toll transactions are unchanged, but truck transactions are reduced by 25 percent and shifted into car transactions.
5. Assume a five-year ramp-up on Complete 540 Phase 1 instead of the three-year ramp-up assumed in Scenario 2.

Chapter 2

Existing Conditions

This Chapter describes existing and historical conditions on the Triangle Expressway, and in the Triangle Expressway and Complete 540 study area. Triangle Expressway traffic volumes, toll rates, toll revenue, travel patterns and other traffic characteristics are described. Traffic volumes and travel times by time period are described in the study corridor.

2.1 The Triangle Expressway

The Triangle Expressway is a six-lane, 18.5-mile toll road, consisting of Toll NC 540 and Toll NC 147 (please refer to Figure 1.2 in Chapter 1). Toll NC 147 is about 3.4 miles in length and extends from I-40 in the north to Toll NC 540 in the south. Toll NC 540 is about 15.1 miles in length and extends from NC 54 in the north to NC 55 Bypass in the south. The speed limit is posted at 70 miles per hour (mph). The road provides a high-speed connection from communities to the south and west of Raleigh (such as Fuquay-Varina, Holly Springs and Apex), to Interstate 40 (I-40), Research Triangle Park (RTP) and the Raleigh-Durham International Airport. Toll NC 540 is part of the 540 Outer Loop.

The primary competing roadway to the Triangle Expressway is NC 55 and the NC 55 Bypass, which closely parallels the Triangle Expressway. NC 55 and the Bypass generally provide two through travel lanes per direction, with the intermittent provision of left, right and center turn lanes. There are some single-lane sections of NC 55. Posted speed limits range from 35 to 55 mph on NC 55 in the Triangle Expressway corridor. There are 13 signalized intersections on NC 55 and the Bypass between the southern end of Toll NC 540 and U.S. 64, another 13 between U.S. 64 and the interchange with Toll NC 540 near Morrisville, and 10 between the Toll NC 540 interchange and I-40 near Research Triangle Park.

The Triangle Expressway opened in three segments, as shown in **Table 2.1**. The entire project was opened to tolled traffic on January 2, 2013. The most recent improvement to the Triangle Expressway was the full-access interchange with Veridea Parkway which opened on April 4, 2017.

Table 2.1
Triangle Expressway Construction History

Improvement	Opening Date	Tolling Began	Location
Segment 1	December 8, 2011	January 3, 2012	Toll NC 540 between NC 55 and NC 54 Toll NC 147 between I-40 and Toll NC 540
Segment 2	August 1, 2012	August 2, 2012	Toll NC 540 between NC 55 and U.S. 64 in Apex
Segment 3	December 12, 2012	January 2, 2013	Toll NC 540 between U.S. 64 and NC 55 Bypass near Holly Springs
Veridea Parkway Interchange	April 4, 2017	April 4, 2017	Full access interchange at Toll NC 540 and Veridea Parkway

2.1.1 Triangle Expressway Toll Collection, Toll Schedule and Historical Rate Increases

The Triangle Expressway features an all-electronic tolling system (AET), designed to reduce traffic delays and promote safety. This system allows motorists to pay their toll without stopping or slowing down. Tolls are collected via NC Quick Pass, NCTA's electronic toll collection (ETC) program, or by a video toll collection system named Bill by Mail (BBM). No conventional toll plazas are located on the Triangle Expressway; instead, toll collection equipment is located on overhead gantries.

The following describes the three toll classes on the Triangle Expressway:

- Class 1 (2-axle vehicles): includes all two-axle vehicles regardless of the number of tires.
- Class 2 (3-axle vehicles): includes all three-axle vehicles including two-axle vehicles towing a single-axle trailer.
- Class 3 (4-or-more axle vehicles): includes all vehicles with four-or-more axles (4+) including two-axle vehicles towing a dual-axle trailer.

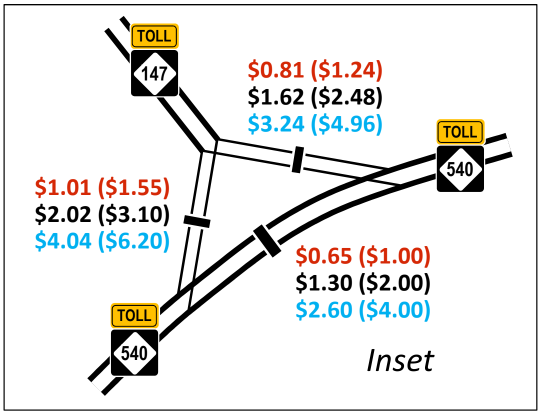
Class 2 toll rates are twice the Class 1 toll rate, and Class 3 toll rates are four times the Class 1 toll rate.

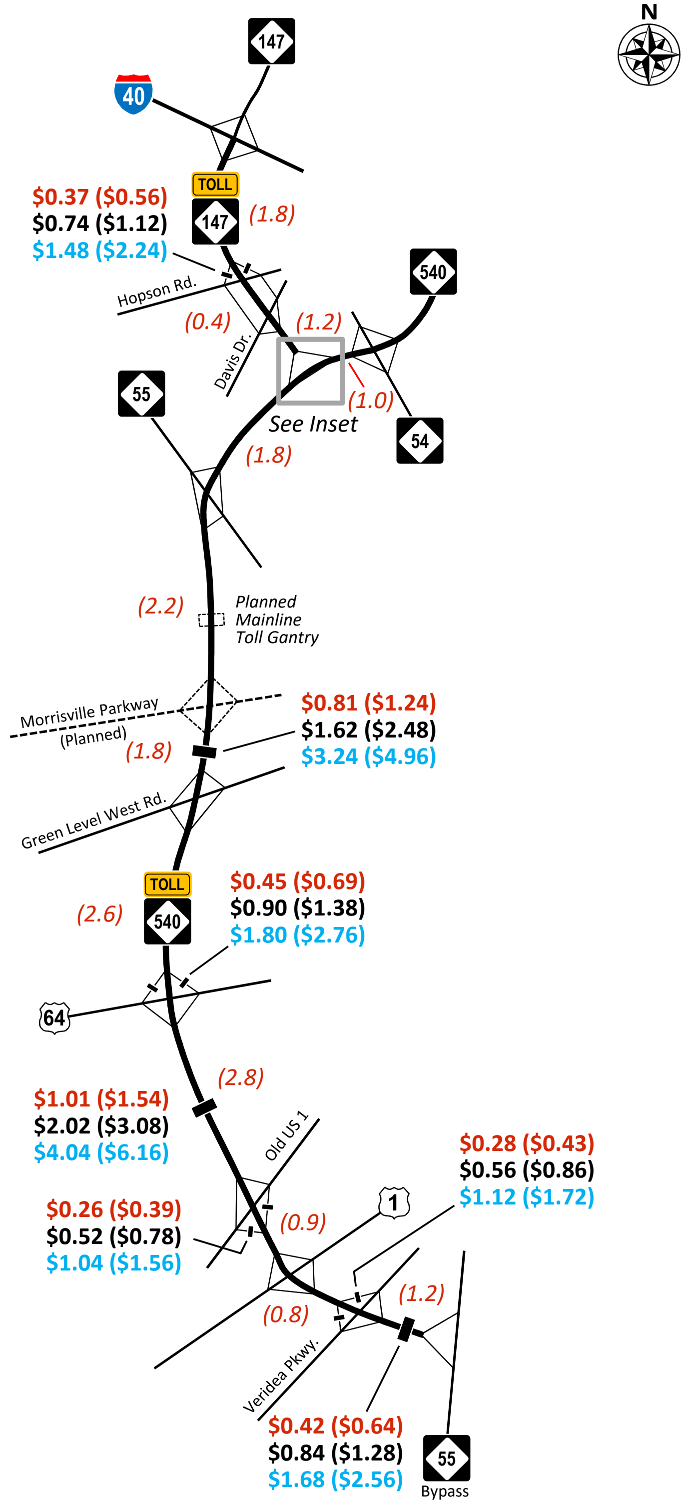
Motorists who pay with NC Quick Pass (or E-ZPass, Florida SunPass, or Georgia Peach Pass) receive an automatic 35 percent discount from the BBM toll rates for all vehicle classes. **Figure 2.1** illustrates all the states that have interoperable transponder programs with NC Quick Pass.

Figure 2.1
NC Quick Pass Interoperability

Beginning in August 2017, motorists were able to obtain a **NC Quick Pass Sticker Transponder** at no cost. It is accepted for toll-road payment in North Carolina, and where Florida SunPass and Georgia Peach Pass are accepted. For $7.40 plus tax, motorists may obtain a **NC Quick Pass E-ZPass Interior Transponder** that is valid for toll-road payment in North Carolina and wherever E-ZPass, Florida SunPass or Georgia Peach Pass are accepted.

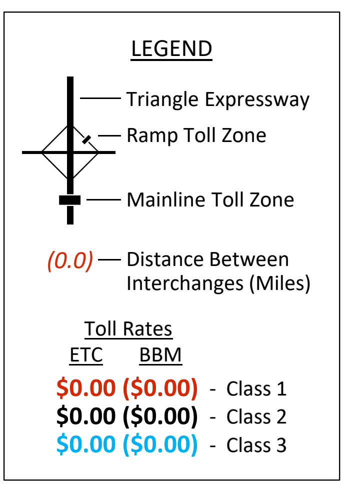
Triangle Expressway toll zones, and 2018 ETC and BBM toll rates are shown in **Figure 2.2**. A through trip on Toll NC 540 (15.1 miles between NC 55 Bypass and NC 54) in 2018 costs $2.89 for a passenger car with a transponder, which is equal to $0.191 per mile. A 5-axle truck with a transponder, making the same trip, would pay $11.56, or $0.766 per mile.





2018
Through Trip ETC Toll Rates

	Via Toll NC 540	
Vehicle Class	Toll	Toll Per Mile
Class 1	**$2.89**	**$0.191**
Class 2	**$5.78**	**$0.383**
Class 3	**$11.56**	**$0.766**



TRIANGLE EXPRESSWAY:
2018 ETC AND BBM TOLL RATES

FIGURE 2.2

Toll rates increase annually in accordance with an approved toll schedule adopted by the NCTA Board of Directors. **Table 2.2** shows the annual historical toll rate increases on the Triangle Expressway from 2013 to 2018 for an ETC-equipped passenger car. It also shows the cost of a through trip on Toll NC 540 for an ETC-equipped passenger car, and the equivalent per-mile toll rate. A through trip on Toll NC 540 incurs tolls at four locations. Minor variations in the annual rate-of-increase of the though-trip toll between 2013 and 2018 result from rounding to the nearest penny at each of the four locations. Annual toll rate increases in future years are provided in Chapter 6.

Table 2.2
Historical Toll Rate Increases on the Triangle Expressway (1)

Calendar Year	Passenger-Car ETC Through Trip Toll on Toll NC 540: Toll (2)	Passenger-Car ETC Through Trip Toll on Toll NC 540: Per-mile Toll Rate	Percent Annual Toll Increase
2013	$ 2.34	$ 0.155	
2014	2.46	0.163	5.1 %
2015	2.59	0.172	5.3
2016	2.70	0.179	4.2
2017	2.78	0.184	3.0
2018	2.89	0.191	4.0

(1) Tolls increase on January 1st of each year.
(2) Class 1 Toll (2-axle vehicle) on the 15.1 mile Toll NC 540 portion of the Triangle Expressway.

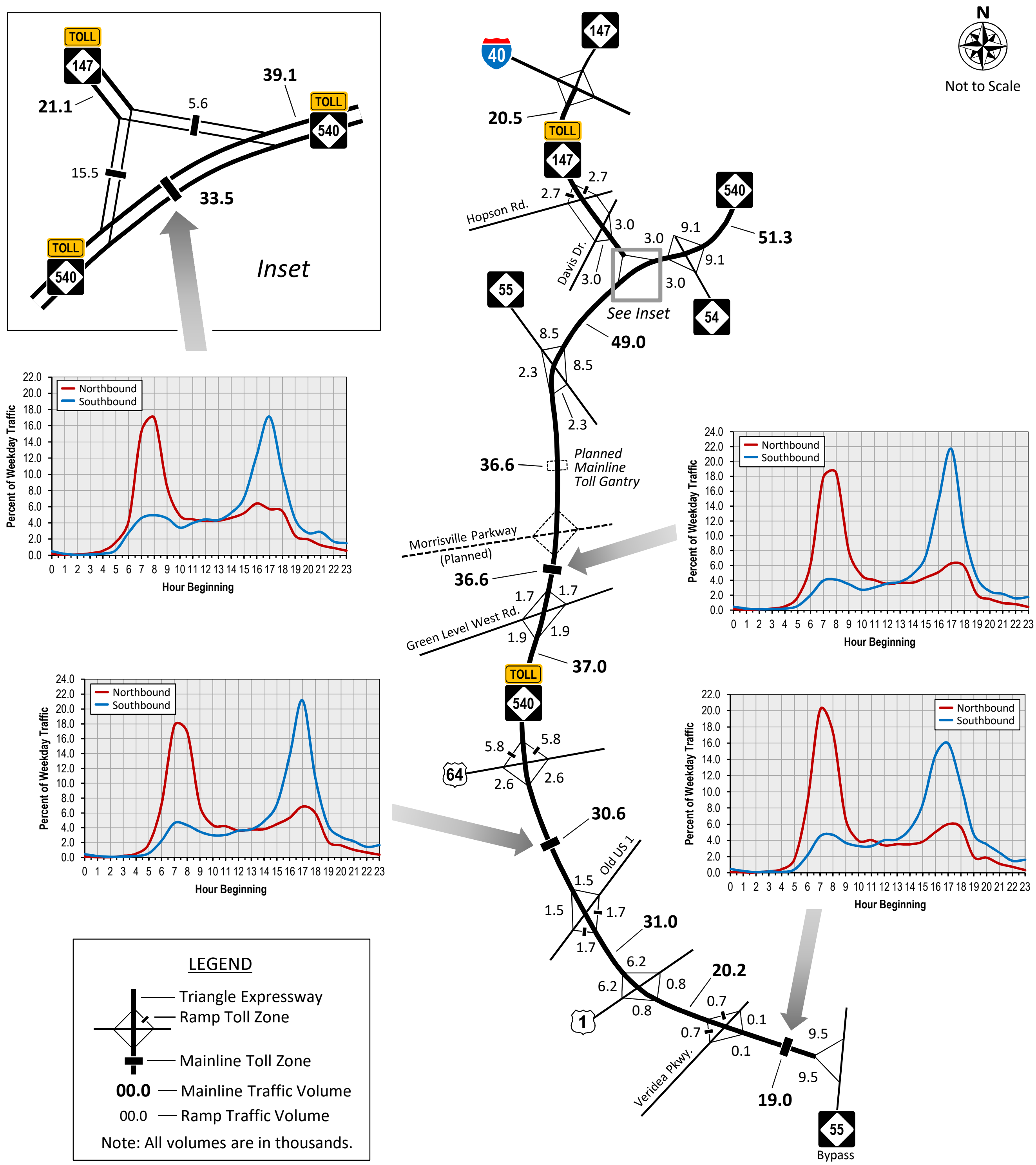
2.1.2 Triangle Expressway Traffic Volumes and Characteristics

Based on data provided by NCTA, CDM Smith developed a balanced profile of 2016 and 2017 average weekday traffic on the Triangle Expressway. 2017 annual average weekday traffic (AAWDT) volumes are shown in **Figure 2.3**. Weekday traffic is important because about 83 percent of all Triangle Expressway toll transactions occur on weekdays. Traffic volumes build steadily from the south to the north on the Triangle Expressway, ranging from 19,000 vehicles per weekday at the southernmost mainline section to 49,000 on the mainline section between NC 55 and Toll NC 147.

Also shown in Figure 2.3 is the hourly weekday traffic distribution, by direction, at each of the four mainline toll-zone locations. The hourly traffic distributions are based on traffic data from Thursday, November 10, 2016. There is a sharp peaking characteristic to Triangle Expressway traffic, consistent with a commuter-based road. Northbound traffic peaks in the morning, while southbound traffic peaks in the afternoon. There is relatively low traffic demand during the midday.

Northbound traffic at the four selected mainline sections peaks between 7 AM and 9 AM, comprising from 32 to 37 percent of total weekday traffic volumes at each location. Northbound peak-hour (7 AM – 8 AM) traffic volumes comprise 15 to 20 percent of the total weekday volumes at each of the selected mainlines.

Southbound mainline traffic on the Triangle Expressway peaks sharply between 5 PM and 6 PM, comprising 16 to 22 percent of the weekday southbound traffic, as seen at the selected locations. PM peak-period traffic, between 4 PM and 7 PM in the southbound direction, accounts for 40 to 47 percent of weekday southbound traffic at these locations.



TRIANGLE EXPRESSWAY: 2017 AVERAGE WEEKDAY TRAFFIC AND HOURLY DISTRIBUTION

CDM Smith

FIGURE 2.3

Monthly traffic variations on the Triangle Expressway are shown in **Figure 2.4** and daily variations are shown in **Figure 2.5**. Cars and trucks show similar monthly patterns, with traffic volumes highest in the spring, summer and fall, and somewhat lower from December through February. Cars and trucks also have similar daily-variation patterns, with the highest traffic volumes occurring on Tuesdays, Wednesdays and Thursdays. Weekend traffic volumes for both passenger cars and trucks are lower than the weekday volumes.

Table 2.3 shows the proportion of cars and trucks on the Triangle Expressway from 2013 through 2017. Passenger cars have consistently comprised 96 to 97 percent of total transactions. Truck transactions totaled approximately three percent in 2013, and approximately four percent in 2017. Large trucks (four-or-more axles) represented 65 percent of total truck transactions in 2013, and 68 percent in 2017.

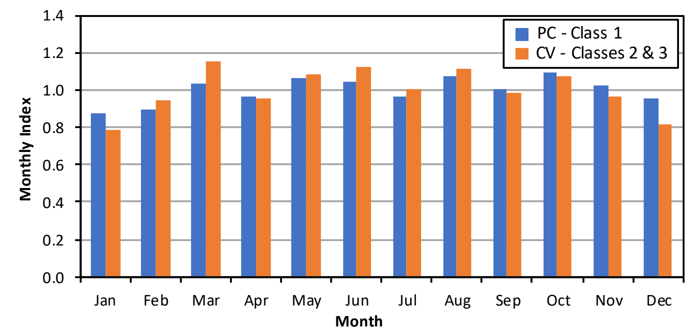


Figure 2.4
Seasonal Variation of Toll Transactions on Triangle Expressway

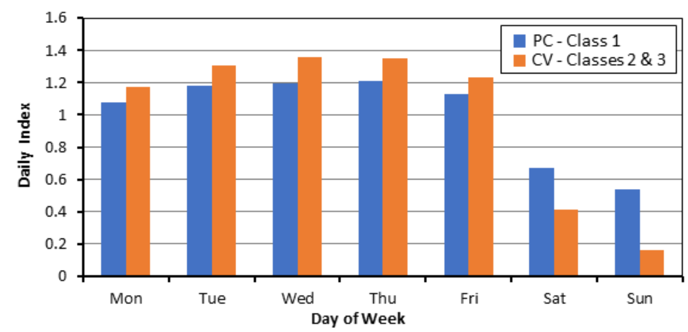


Figure 2.5
Daily Variation of Toll Transactions on Triangle Expressway

Table 2.3
Annual Vehicle Class Distribution on The Triangle Expressway by Toll Class
(all transactions in thousands)

	Passenger-Car Transactions		Truck Transactions						All Transactions	
Calendar Year	Class 1 2-axle Vehicles	Percent of Total Vehicles	Class 2 3-axle Vehicles	Percent of Total Vehicles	Class 3 4 or-more Axle Vehicles	Percent of Total Vehicles	Class 2 & 3 All Trucks	Percent of Total Vehicles	All Vehicles	Percent of Total Vehicles
2013	22,298	96.7 %	268	1.2 %	493	2.1 %	761	3.3 %	23,059	100.0 %
2014	29,641	96.7	357	1.2	652	2.1	1,010	3.3	30,650	100.0
2015	37,050	96.7	427	1.1	842	2.2	1,268	3.3	38,319	100.0
2016	43,568	96.3	566	1.3	1,110	2.5	1,676	3.7	45,244	100.0
2017	47,599	96.2	602	1.2	1,258	2.5	1,861	3.8	49,460	100.0

Source: NCTA

2.1.3 Travel Patterns on the Triangle Expressway

StreetLight Data, Inc. provided CDM Smith with a year of vehicle-matching data for 2016 at the 31 collection points shown in **Figure 2.6** and described in **Table 2.4**. The collection points were selected to obtain trip-distance and travel-pattern information on the Triangle Expressway, and to determine whether vehicles observed on roads intersecting the proposed Complete 540 were also identified on I-40, US 1, US 70, or the Triangle Expressway. This data provided insights into travel patterns and was available for discrete time periods as well as average days. Similar to license-plate matching surveys, geospatial information is gathered from sources such as mobile phones, GPS devices, connected cars and commercial vehicles. Unique identifiers are used to determine individual trips.

The StreetLight data helped determine what proportion of trips on the Triangle Expressway are either long-distance or through trips. **Figures 2.7 and 2.8** illustrate samples of the StreetLight data. The data is used in a similar manner to a "select link" analysis, where the selected link is identified by a star in each figure.

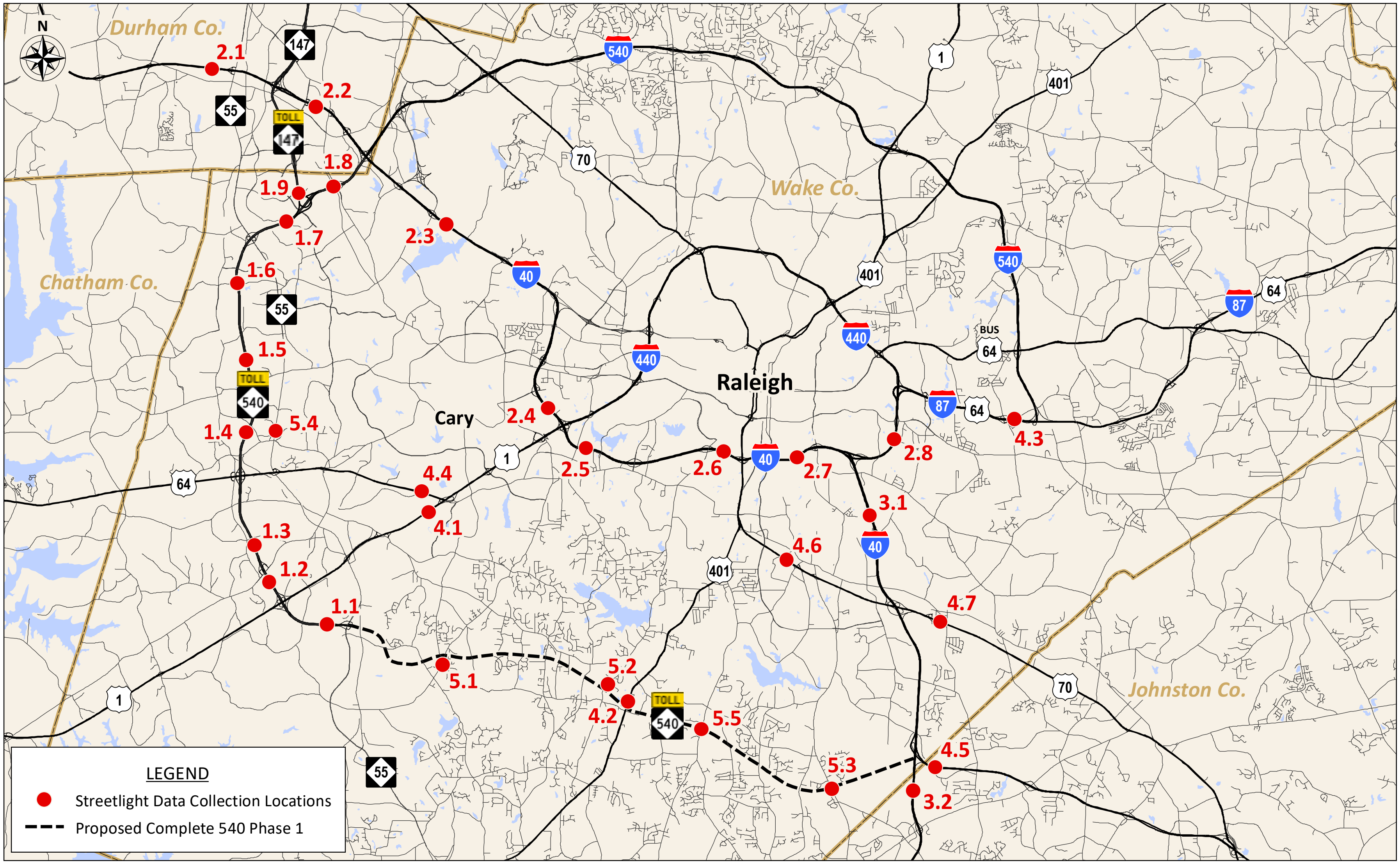
Figure 2.7 illustrates northbound Triangle Expressway travel patterns during an average weekday, based on all vehicles identified on the mainline section between the NC 55 Bypass and U.S. 1. This section of roadway has the lowest weekday traffic volume of any mainline section. Figure 2.7 shows the percent of all vehicles detected at the select link, at each of the mainline locations to the north of the select link. For example, 69.9 percent of all vehicles identified at the select link location were also identified on the mainline section between Green Level West Road and NC 55, and 30.6 percent were identified on the mainline section between Toll NC 147 and NC 54. Over half of the northbound vehicles (52.4 percent) detected on the southernmost section of the Triangle Expressway made a trip of approximately 15 miles, past the NC 55 interchange and continuing on either Toll NC 147 or Toll NC 540.

Figure 2.8 illustrates weekday travel patterns in the southbound direction from the select link location on Toll NC 540 between NC 54 and Toll NC 147. This point is marked by a star. This mainline section has the second highest weekday traffic volume on the Triangle Expressway. As shown, the majority of traffic identified at this location made short trips on the Triangle Expressway, with 54.7 percent of vehicles not traveling past the NC 55 interchange, and 8.3 percent of the trips traveling all the way to the southernmost mainline section.

The data provided by Streetlight assisted in identifying travel patterns but does not necessarily represent all vehicle trips. It is limited to the vehicles/motorists that are equipped with active devices that connect to cell towers or satellites.

2.1.4 Triangle Expressway Transactions and Toll Revenue

The Triangle Expressway opened in three phases to tolled traffic, with the final section opening to traffic on December 12, 2012. Tolling began on January 3, 2013, on the last section. Annual toll transactions and collected toll revenue from 2013 through 2017 are shown in **Table 2.5**. Strong growth in transactions and toll revenue occurred from 2013 through 2017. During this period transactions increased, on average, by 21.0 percent per year and collected toll revenue increased, on average, by 30.1 percent per year. Transactions increased quickly due to a long ramp-up period as motorists became familiar with the new road and its benefits, and to positive economic conditions.

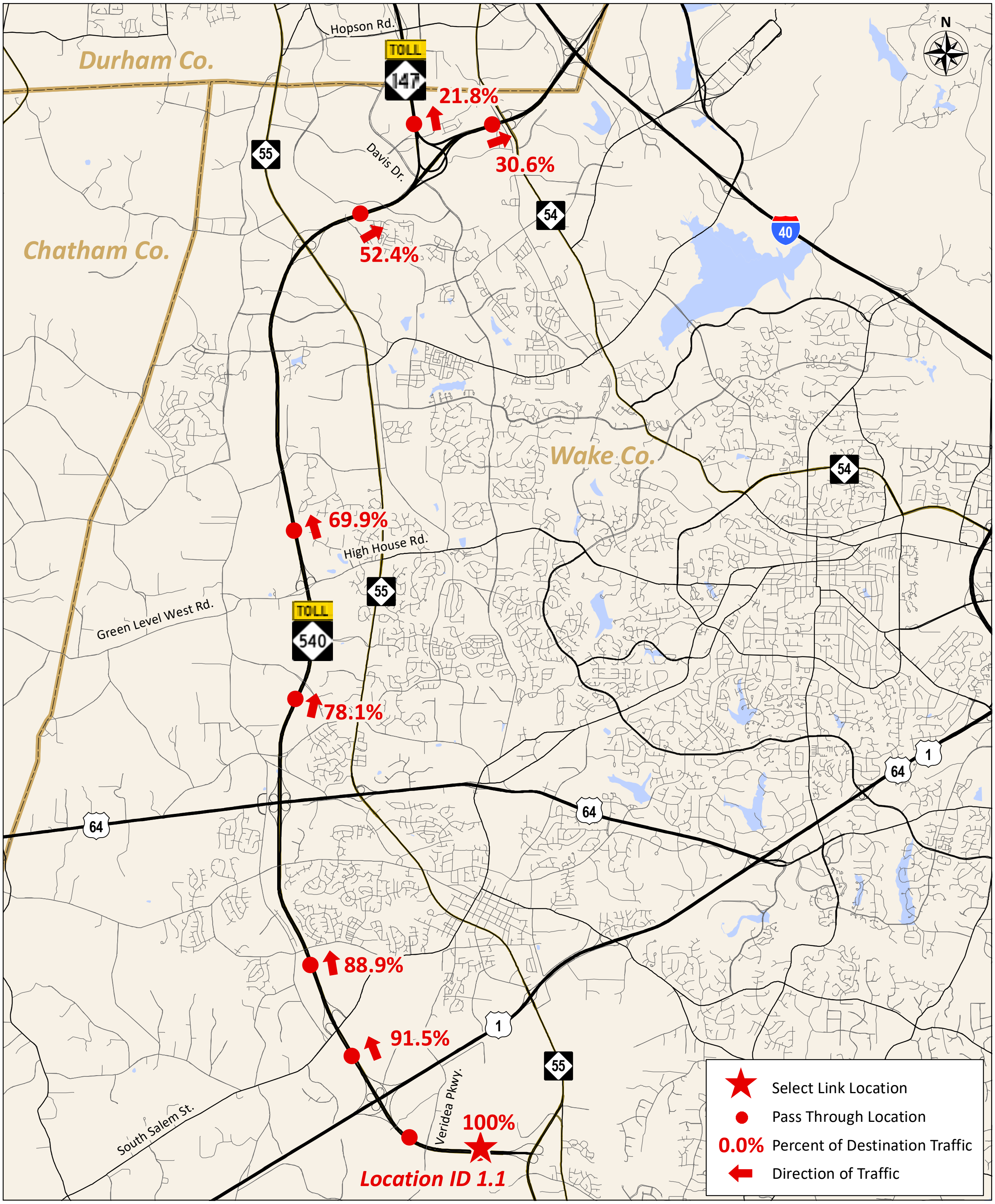


STREETLIGHT DATA COLLECTION LOCATIONS

FIGURE 2.6

Table 2.4
StreetLight Data Collection Locations

Location #	Direction	Roadway	Data Collected Between These Crossroads: Crossroad 1	Data Collected Between These Crossroads: Crossroad 2
Corridor 1: Triangle Expressway				
1.1	NB / SB	Toll NC 540	US 1	NC 55 Bypass
1.2	NB / SB	Toll NC 540	Old US Hwy 1	US 1
1.3	NB / SB	Toll NC 540	US Hwy 64	Old US Hwy 1
1.4	NB / SB	Toll NC 540	Green Level Rd W	US Hwy 64
1.5	NB / SB	Toll NC 540	Green Hope School Rd	Green Level Rd W
1.6	NB / SB	Toll NC 540	NC 55	Green Hope School Rd
1.7	NB / SB	Toll NC 540	Toll NC 147	NC 55
1.8	NB / SB	Toll NC 540	NC 54	Toll NC 147
1.9	NB / SB	Toll NC 147	Davis Dr	I-540
Corridor 2: I-40 / I-440				
2.1	EB / WB	I-40	NC 54	NC 55
2.2	EB / WB	I-40	Davis Dr	S Miami Blvd
2.3	EB / WB	I-40	Aviation Parkway	N Harrison Ave
2.4	EB / WB	I-40	Cary Towne Blvd	US 1 / I-440
2.5	EB / WB	I-40	US 1 / I-440	Gorman St
2.6	EB / WB	I-40	Lake Wheeler Rd	US 401 / S Saunders St
2.7	EB / WB	I-40	Hammond Rd	Rock Quarry Rd
2.8	EB / WB	I-440	Poole Rd	I-40
3.1	NB / SB	I-40	Jones Sausage Rd	I-440
3.2	NB / SB	I-40	NC 42	US 70 Clayton Bypass
Selected Bi-Directional Locations				
4.1	EB / WB	US 1	Ten Ten Rd	US 64
4.2	NB / SB	US 401	Donny Brook Rd	Ten Ten Rd
4.3	EB / WB	US 64 Bypass	Hodge Rd	I-540
4.4	EB / WB	US 64	Lake Pine Dr	US 1
4.5	EB / WB	US 70 Clayton Bypass	I-40	Cornwallis Rd
4.6	EB / WB	US 70	Yeargan Rd	Vandora Springs Rd
4.7	EB / WB	US 70 Business	I-40 / US 70	Auburn-Knightdale Rd
Selected Combined Direction Locations				
5.1	NB + SB	Holly Springs Rd	Sunset Lake Rd	Kildaire Farm
5.2	NB + SB	Lake Wheeler Rd	Optimist Farm Rd	Ten Ten Rd
5.3	NB + SB	NC 50	Cleveland School Rd	Ten Ten Rd
5.4	NB + SB	NC 55	Jenks Rd	Green Level Rd W
5.5	NB + SB	Old Stage Rd	Banks Rd	Ten Ten Rd



SOURCE: Streetlight Data, average 2016 all day Tuesday-Thursday traffic.

WEEKDAY TRAVEL PATTERN DISTRIBUTION AT LOCATION 1.1 NB

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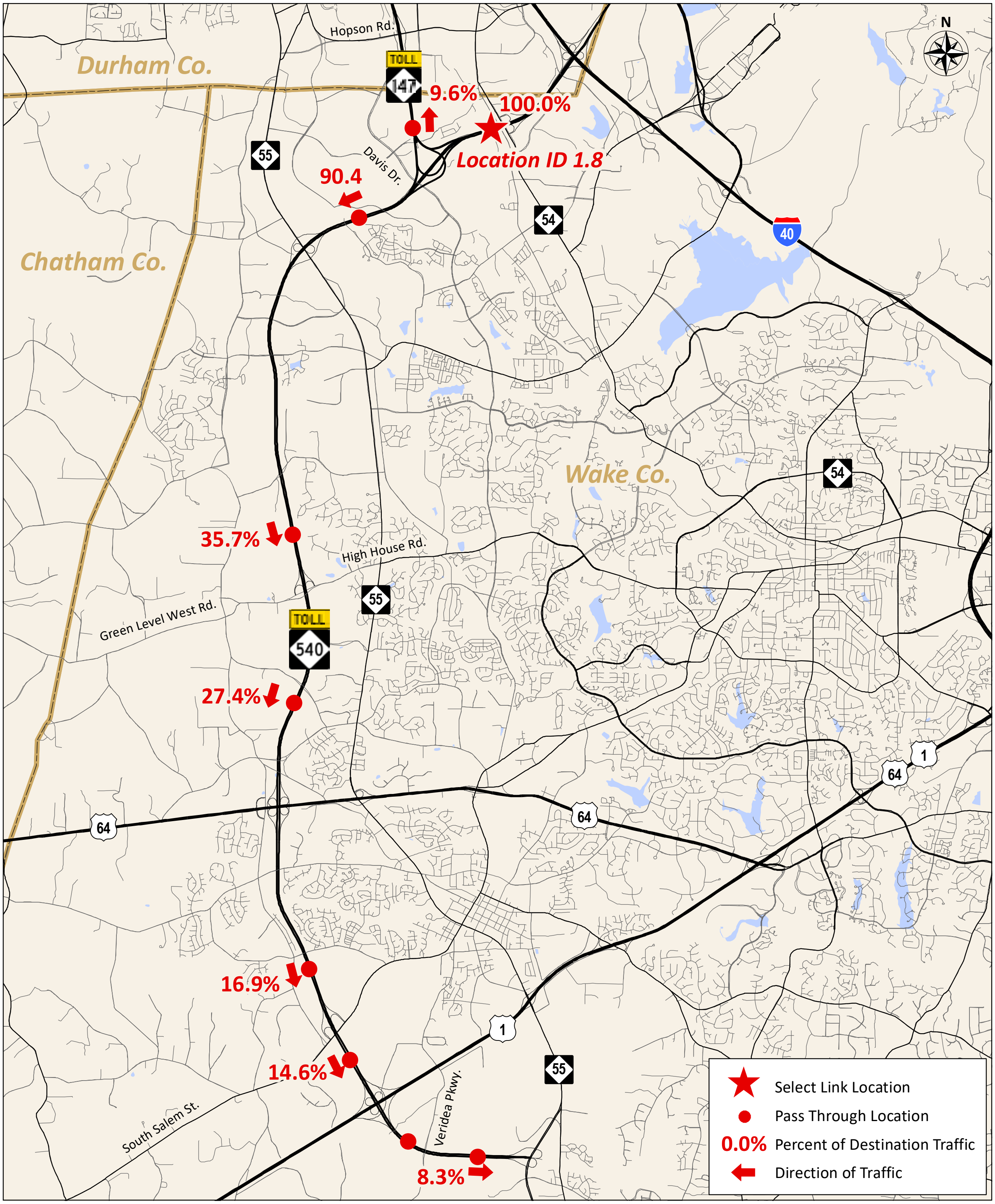
FIGURE 2.7



SOURCE: Streetlight Data, average 2016 all day Tuesday-Thursday traffic.

WEEKDAY TRAVEL PATTERN DISTRIBUTION AT LOCATION 1.8 SB

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FIGURE 2.8

Annual collected toll revenue increased at a faster rate than transactions in part due to programmed toll rate increases, and because the average weighted toll increased faster than the programmed toll rate increases. The average weighted toll is influenced each year by 1) the mix of ETC and BBM, 2) the mix of the vehicle classes, and 3) the average trip distance made on the Triangle Expressway.

Table 2.5
Triangle Expressway Annual Transactions and Collected Toll Revenue
(transactions and revenue in thousands)

Calendar Year	Toll Transactions and Year-over-Year Percent Growth: Transactions	Growth	Collected Toll Revenue and Year-over-Year Percent Growth (2): Revenue	Growth	Average Weighted Toll Rate and Year-over-Year Percent Growth (1): Toll Rate	Growth	Percent Annual Toll Increase
2013	23,059		$ 14,238		$ 0.62		
2014	30,650	32.9 %	21,045	47.8 %	0.69	11.2 %	5.3 %
2015	38,319	25.0	28,779	36.7	0.75	9.4	4.2
2016	45,244	18.1	35,393	23.0	0.78	4.2	3.0
2017	49,460	9.3	40,792	15.3	0.82	5.4	4.0
Average Annual Percent Change							
2013-2017		21.0		30.1		7.5	4.4

(1) The average weighted toll rate is calculated by dividing total toll revenue for the year by total toll transactions for the year.
(2) This is toll revenue collected during the indicated year. It does not include fee revenue.

Source: NCTA

Monthly transactions and collected toll revenue are provided in **Table 2.6** from January 2013 through June 2018. In the first six months of 2018, passenger-car transactions and toll revenue increased by 7.3 percent and 11.7 percent respectively, compared to the same period in 2017. Truck transactions and toll revenue increased by 6.9 percent and 8.1 percent, respectively. In total, transactions in the first half of 2018 increased by 7.3 percent, and collected toll revenue increased by 11.4 percent compared to the first half of 2017.

Table 2.7 shows the 2017 systemwide percent of transactions and collected toll revenue attributed to cars and trucks. Cars comprised 96.2 percent of total transactions, and 91.4 percent of toll revenue. Truck transactions totaled 3.8 percent of total transactions and 8.6 percent of total toll revenue.

Table 2.6

Triangle Expressway - Monthly Transaction and Collected Toll Revenue Trends

(transactions and revenue in thousands)

Passenger Cars (Class 1: 2-Axle Vehicles)

Toll Transactions (000s)

Month	2013	% Chg	2014	% Chg	2015	% Chg	2016 (2)	% Chg	2017 (3)	% Chg	2018
January	1,523	28.9	1,964	34.0	2,632	15.9	3,049	14.4	3,488	5.1	3,665
February	1,517	24.2	1,884	19.1	2,244	45.6	3,267	8.3	3,540	8.5	3,840
March	1,730	31.3	2,271	30.3	2,959	25.2	3,703	10.4	4,087	5.2	4,298
April	1,806	32.1	2,387	28.1	3,057	19.5	3,652	4.9	3,829	10.7	4,239
May	1,917	34.8	2,585	21.4	3,138	18.9	3,732	12.6	4,204	8.5	4,560
June	1,820	40.6	2,559	25.3	3,207	17.8	3,777	9.9	4,152	6.2	4,409
July	1,870	36.3	2,549	25.7	3,205	10.2	3,532	8.4	3,830		
August	2,009	31.1	2,634	25.0	3,293	18.8	3,912	9.0	4,263		
September	1,949	37.9	2,687	21.2	3,257	12.8	3,676	8.6	3,993		
October	2,178	33.8	2,915	20.8	3,522	12.4	3,957	9.8	4,347		
November	2,000	27.7	2,555	26.1	3,221	15.8	3,730	9.2	4,074		
December	1,978	34.1	2,652	25.0	3,316	8.0	3,580	5.9	3,793		
Total Year	22,298	32.9	29,641	25.0	37,050	17.6	43,568	9.3	47,599		
Jan-June	10,314	32.3	13,649	26.3	17,236	22.9	21,181	10.0	23,300	7.3	25,012

Toll Revenue (000s) (1)

Month	2013	% Chg	2014	% Chg	2015	% Chg	2016 (2)	% Chg	2017 (3)	% Chg	2018
January	$ 756	75.9	$ 1,329	43.6	$ 1,908	24.0	$ 2,366	24.2	$ 2,938	6.5	$ 3,129
February	857	44.1	1,235	44.1	1,779	40.4	2,499	9.4	2,734	15.7	3,163
March	975	47.1	1,434	51.7	2,175	20.0	2,610	24.2	3,243	7.7	3,493
April	1,022	40.3	1,434	45.5	2,088	24.2	2,592	10.8	2,871	15.7	3,323
May	1,112	44.3	1,605	28.0	2,053	29.0	2,649	18.3	3,135	14.7	3,596
June	1,011	60.4	1,622	45.6	2,362	12.2	2,649	21.6	3,222	10.4	3,559
July	1,088	54.1	1,677	33.9	2,246	13.5	2,550	19.6	3,050		
August	1,199	47.2	1,764	36.9	2,416	20.3	2,905	15.3	3,350		
September	1,165	56.3	1,820	27.7	2,324	22.1	2,837	10.7	3,141		
October	1,305	40.3	1,830	31.8	2,412	22.2	2,947	13.0	3,328		
November	1,236	37.8	1,703	37.6	2,343	18.4	2,774	14.7	3,182		
December	1,240	45.7	1,807	26.4	2,284	26.1	2,879	6.9	3,078		
Total Year	$12,965	48.5	$19,259	37.0	$26,390	22.2	$32,257	15.6	$37,275		
Jan-June	5,733	51.0	8,658	42.8	12,366	24.3	15,366	18.1	18,145	11.7	$20,263

Commercial Vehicles (Classes 2 and 3: 3-or-more Axle Vehicles)

Toll Transactions (000s)

Month	2013	% Chg	2014	% Chg	2015	% Chg	2016 (2)	% Chg	2017 (3)	% Chg	2018
January	37	58.2	59	25.5	74	37.4	102	20.0	122	1.8	124
February	39	44.6	57	4.5	59	77.7	105	38.5	146	(2.7)	142
March	57	25.1	72	34.2	96	49.3	143	24.3	178	(8.5)	163
April	62	41.0	87	24.3	109	28.6	140	5.7	148	20.7	178
May	66	46.9	97	19.6	116	20.8	140	20.2	168	17.7	198
June	64	47.7	95	27.6	121	29.1	156	12.1	175	12.1	196
July	69	34.5	92	27.7	118	20.3	142	9.1	155		
August	76	23.4	94	27.3	120	41.2	169	1.7	172		
September	78	20.7	94	29.1	121	14.9	139	10.1	153		
October	81	27.4	104	18.3	123	31.1	161	3.5	166		
November	68	15.5	78	30.7	102	43.5	147	2.4	150		
December	63	28.2	81	35.2	110	20.5	132	(4.0)	127		
Total Year	761	32.7	1,010	25.6	1,268	32.2	1,676	11.0	1,861		
Jan-June	326	43.1	466	23.3	575	36.8	786	19.2	937	6.9	1,002

Toll Revenue (000s) (1)

Month	2013	% Chg	2014	% Chg	2015	% Chg	2016 (2)	% Chg	2017 (3)	% Chg	2018
January	$ 64	55.8	$ 99	52.9	$ 152	28.4	$ 195	8.2	$ 211	5.7	$ 223
February	66	50.0	99	11.1	109	79.6	197	39.8	275	(4.6)	262
March	98	25.8	123	44.0	178	53.2	272	26.4	344	(9.5)	311
April	104	49.9	157	24.2	194	36.4	265	8.1	287	23.0	353
May	112	52.9	171	28.3	220	21.9	268	22.6	328	18.3	388
June	112	48.7	166	30.3	216	38.8	300	11.1	334	15.6	386
July	118	40.7	166	36.0	226	20.5	273	9.1	298		
August	123	40.9	173	35.1	234	29.6	303	5.5	320		
September	130	21.9	159	45.2	231	14.3	264	14.8	303		
October	138	43.8	198	19.6	237	20.5	285	5.1	300		
November	109	34.6	147	28.0	189	44.5	273	4.3	284		
December	99	29.1	128	58.3	203	19.2	242	(2.9)	235		
Total Year	$ 1,273	40.3	$ 1,787	33.7	$ 2,389	31.3	$ 3,136	12.1	$ 3,517		
Jan-June	556	46.7	815	31.2	1,070	40.0	1,497	18.8	1,778	8.1	$ 1,923

Total Vehicles (Classes 1 through 3)

Toll Transactions (000s)

Month	2013	% Chg	2014	% Chg	2015	% Chg	2016 (2)	% Chg	2017 (3)	% Chg	2018
January	1,561	29.6	2,023	33.8	2,705	16.5	3,151	14.6	3,610	5.0	3,789
February	1,556	24.7	1,941	18.7	2,303	46.4	3,373	9.3	3,686	8.0	3,982
March	1,787	31.1	2,342	30.4	3,055	25.9	3,847	10.9	4,265	4.6	4,461
April	1,868	32.4	2,474	27.9	3,165	19.8	3,792	4.9	3,977	11.1	4,417
May	1,983	35.2	2,682	21.3	3,254	19.0	3,872	12.9	4,372	8.8	4,758
June	1,884	40.8	2,654	25.4	3,328	18.2	3,933	10.0	4,326	6.4	4,605
July	1,938	36.3	2,642	25.8	3,323	10.6	3,674	8.5	3,985		
August	2,086	30.8	2,728	25.1	3,413	19.6	4,081	8.7	4,435		
September	2,026	37.2	2,781	21.5	3,378	12.9	3,815	8.7	4,146		
October	2,260	33.6	3,018	20.7	3,644	13.0	4,118	9.6	4,513		
November	2,068	27.3	2,633	26.2	3,324	16.6	3,876	9.0	4,224		
December	2,041	33.9	2,733	25.3	3,426	8.4	3,712	5.6	3,920		
Total Year	23,059	32.9	30,650	25.0	38,319	18.1	45,244	9.3	49,460		
Jan-June	10,640	32.7	14,115	26.2	17,811	23.3	21,967	10.3	24,237	7.3	26,013

Toll Revenue (000s) (1)

Month	2013	% Chg	2014	% Chg	2015	% Chg	2016 (2)	% Chg	2017 (3)	% Chg	2018
January	$ 819	74.3	$ 1,428	44.3	$ 2,060	24.3	$ 2,561	23.0	$ 3,149	6.4	$ 3,352
February	923	44.5	1,333	41.7	1,889	42.7	2,696	11.6	3,009	13.8	3,425
March	1,073	45.2	1,557	51.1	2,353	22.5	2,883	24.4	3,587	6.1	3,804
April	1,127	41.2	1,591	43.4	2,282	25.2	2,857	10.5	3,158	16.4	3,676
May	1,224	45.1	1,776	28.0	2,273	28.3	2,917	18.7	3,463	15.0	3,985
June	1,123	59.2	1,788	44.2	2,578	14.4	2,950	20.6	3,556	10.9	3,944
July	1,207	52.8	1,843	34.1	2,472	14.2	2,823	18.6	3,348		
August	1,322	46.6	1,937	36.7	2,650	21.1	3,208	14.4	3,669		
September	1,295	52.8	1,979	29.1	2,555	21.4	3,101	11.1	3,443		
October	1,442	40.6	2,028	30.6	2,649	22.0	3,232	12.3	3,628		
November	1,345	37.5	1,850	36.9	2,532	20.3	3,046	13.8	3,467		
December	1,339	44.5	1,935	28.5	2,487	25.5	3,121	6.2	3,313		
Total Year	$14,238	47.8	$21,045	36.7	$28,779	23.0	$35,393	15.3	$40,792		
Jan-June	6,288	50.6	9,473	41.8	13,435	25.5	16,863	18.1	19,923	11.4	$22,186

(1) Programmed toll increases occurred every year on January 1st. Refer to Table 2.2 for details.
(2) Leap year occurred in 2016, resulting in negative traffic and toll revenue impacts in February 2017 compared to February 2016.
(3) A new interchange, Veridea Parkway, opened in April 2017.

Source: NCTA

Table 2.7
2017 Annual Transactions and Collected Toll Revenue By Vehicle Class
(traffic and revenue in thousands)

	Cars	Trucks			Total
	Class 1	Class 2	Class 3	Class 2 & 3	Vehicles
Transactions	47,599	602	1,258	1,861	49,460
Percent of Total	96.2 %	1.2 %	2.5 %	3.8 %	100.0 %
Collected Toll Revenue	$37,275	$743	$2,774	$3,517	$40,792
Percent of Total	91.4 %	1.8 %	6.8 %	8.6 %	100.0 %

Source: NCTA systemwide monthly transactions and revenue by toll class data

The percent of systemwide ETC transactions has been stable over the last five years, as shown in **Table 2.8**. Among passenger cars, ETC transactions ranged from 57.8 percent in 2013 to 59.1 percent in 2017. Truck ETC transactions averaged around 48 to 49 percent from 2013 to 2017.

Table 2.8
ETC Market Share on the Triangle Expressway

Calendar	Percent Transactions by Vehicle Type and Method of Payment								
	Cars			Trucks (2)			Total		
Year	ETC	BBM	Total	ETC	BBM	Total	ETC	BBM	Total
2013	57.8	42.2	100.0	48.8	51.2	100.0	57.5	42.5	100.0
2014	58.4	41.6	100.0	48.7	51.3	100.0	58.1	41.9	100.0
2015	58.0	42.0	100.0	48.1	51.9	100.0	57.6	42.4	100.0
2016	58.6	41.4	100.0	49.0	51.0	100.0	58.3	41.7	100.0
2017 (1)	59.1	40.9	100.0	48.0	52.0	100.0	58.7	41.3	100.0

(1) NCTA began offering free NC Quick Pass sticker transponders August 30, 2017.
Previously the cost was $5.00.
(2) Cars are Toll Class 1 (2-axle vehicles).
Trucks are Toll Classes 2 and 3 (3-or-more axle vehicles).

Source: NCTA

It should be noted that transaction data by payment type (ETC and BBM) is based on information provided by NCTA that represents monthly transactions by vehicle class and payment type as detected at roadside. During the processing of detected roadside transactions, two issues occur that alter the distribution of transactions into ETC and BBM categories from that shown in Table 2.8.

First, some transactions recorded at roadside as BBM are later identified as NC Quick Pass or E-ZPass tag holders during the license plate image review. These transactions, called ITOLs, were recorded as BBM transactions in the data provided by NCTA when they were actually ETC transactions. After the image review process, the toll revenue associated with the ITOL transactions was reported as ETC toll revenue, but the transaction volumes were not adjusted to reflect the shift into ETC.

Second, interoperable ETC transactions with Florida SunPass and Georgia Peach Pass transponders are recorded as BBM in the data provided by NCTA. The agencies that issue these transponders provide license plate files to NCTA and upon image review the transactions are associated with the SunPass and Peach Pass accounts and the appropriate toll is charged. All toll revenue associated with SunPass and Peach Pass transponders is reported as Class 1 ETC toll revenue in the NCTA data.

NCTA monthly transaction data are not changed to account for the portion of transactions initially identified as BBM, but subsequently identified as ITOLs or interoperable ETC and reported as ETC revenue. Upon review of NCTA data on ITOL transactions, and SunPass and Peach Pass transactions, the percentage of Triangle Expressway transactions associated with ETC accounts, and paying ETC toll rates, is higher than reflected in the data provided by NCTA. In 2017, after accounting for ITOLs and interoperable ETC transactions, cars had an ETC market share of about 64.1 percent compared to the 59.1 percent calculated from NCTA monthly transaction data and shown in Table 2.8. Trucks had an ETC market share of about 54.9 percent compared to the 48.0 percent in Table 2.8.

2.2 Study Area Traffic Volumes and Travel Time

The following describes traffic volumes and travel times in the study area.

2.2.1 Traffic Volume Data Collection

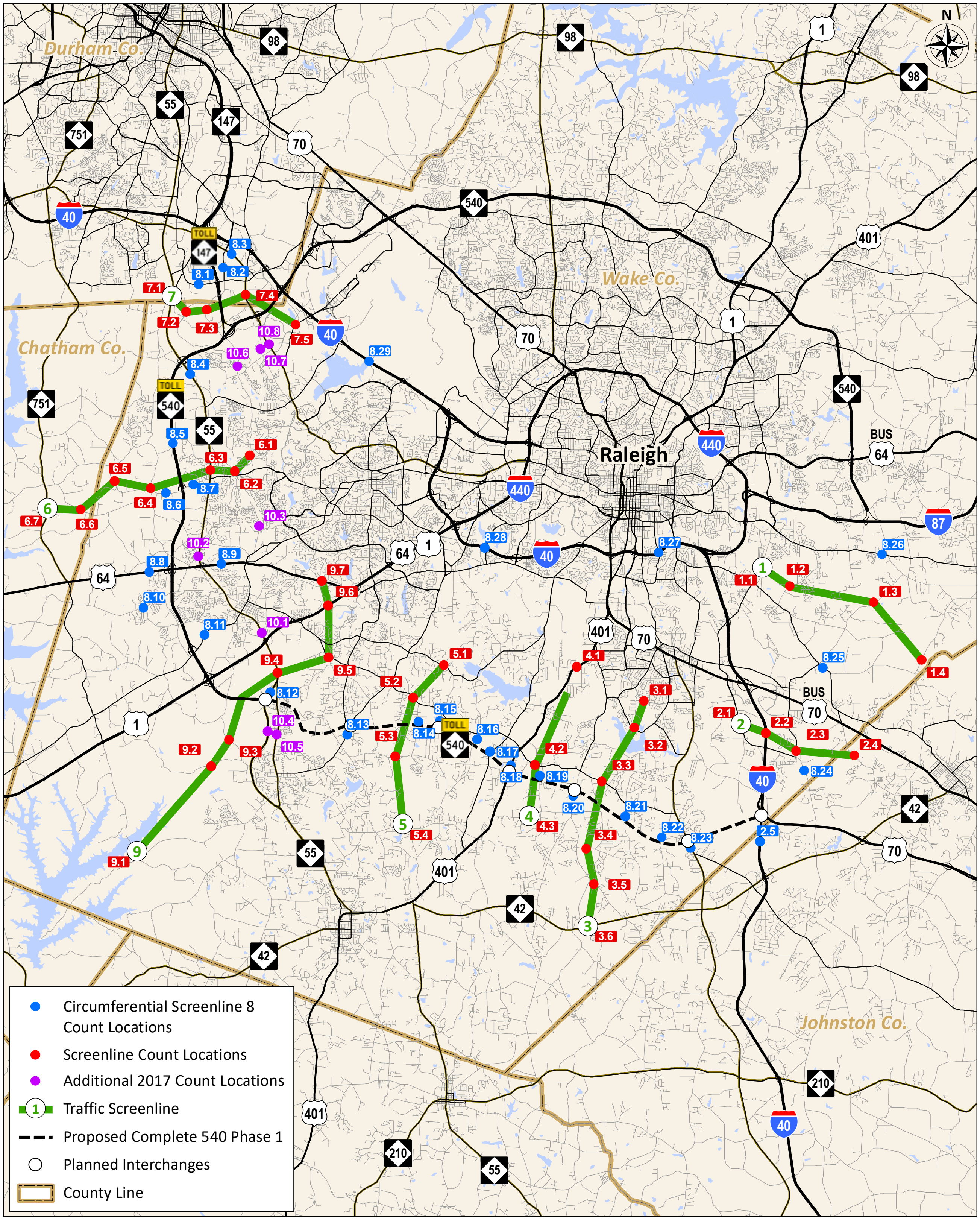
CDM Smith collected a variety of traffic counts from different sources to validate TRMv6 assigned weekday traffic volumes at locations in the study area. The following sources of traffic counts were used in this study:

1. CDM Smith had The Traffic Group conduct traffic counts at 63 locations in the fall of 2016. In the fall of 2017, counts were conducted by The Traffic Group at an additional 15 locations.
2. Average annual daily traffic volumes were obtained from the NCDOT's Interactive Traffic Volume Map, located on the NCDOT website.
3. As described in Section 2.1.2, the NCTA provided CDM Smith with traffic volume data on the Triangle Expressway at tolled and non-tolled locations.

2.2.2 Traffic Counts Conducted by The Traffic Group

The Traffic Group conducted traffic counts at 63 locations in the fall of 2016, and an additional 15 locations in the fall of 2017. Counts were collected by direction in 15-minute increments via tubes or by Wavetronix radar detectors where tubes were not appropriate. Tube counts were collected by FHWA vehicle classifications. Wavetronix counts were collected by length categories. All counts were subsequently summarized into existing NCTA toll classes and TRMv6 time periods. Counts were conducted for at least three continuous weekdays (Tuesday, Wednesday and Thursday). At 12 locations, counts were conducted for seven consecutive days to obtain weekday and weekend-day traffic volumes.

All 78 traffic count locations are shown in **Figure 2.9** and **Table 2.9**. Traffic count locations that closely parallel either the Triangle Expressway or the proposed Complete 540 are grouped into screenlines, shown as green lines in Figure 2.9.



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CDM Smith

TRAFFIC COUNT LOCATIONS

FIGURE 2.9

Table 2.9 (Page 1 of 3)
Summary of Weekday and Weekend-Day Traffic Volumes at Count Locations
Based on Traffic Counts Conducted in the Fall of 2016

Location #	Count Location	Average Weekday Traffic (1)	Average Weekend Day Traffic (2)	Percent Trucks Weekday (3)	Percent Trucks Weekend Day (3)
Screenline 1: East Side of Raleigh, South of Poole Road					
1.1	S New Hope Rd	17,400	- -	2.7%	- -
1.2	Barwell Rd	6,000	- -	0.5%	- -
1.3	Auburn Knightdale Rd	2,900	- -	2.3%	- -
1.4	Mial Plantation Rd	4,600	- -	1.1%	- -
Screenline 2: East side of Raleigh, South of Business 70					
2.1	White Oak Rd (NC 2547)	14,400	- -	1.0%	- -
2.2	Interstate 40	90,100	88,100	12.5%	5.8%
2.3	Raynor Rd (NC 2555)	4,900	- -	1.1%	- -
2.4	Guy Rd (NC 2558)	7,600	- -	0.8%	- -
2.5	Interstate 40	67,000	64,900	14.5%	8.0%
Screenline 3: South of Raleigh, West of NC 50					
3.1	Timber Dr.	18,400	- -	0.4%	- -
3.2	Buffalo Rd	2,900	- -	0.1%	- -
3.3	Ten Ten Rd	13,100	- -	1.5%	- -
3.4	Pagan Rd	1,700	- -	0.3%	- -
3.5	Rock Service Station Rd	4,100	- -	7.2%	- -
3.6	NC 42	10,400	8,800	2.9%	1.5%
Screenline 4: South of Raleigh, East of US 401					
4.1	US 401	36,500	24,300	2.2%	0.9%
4.2	Ten Ten Rd	17,900	- -	1.4%	- -
4.3	Banks Rd	6,600	- -	1.1%	- -
Screenline 5: Southwest of Raleigh, East of Holly Springs Road					
5.1	Penny Rd	9,800	- -	0.6%	- -
5.2	Ten Ten Rd	19,400	- -	1.7%	- -
5.3	Optimist Farm Rd	9,600	- -	0.3%	- -
5.4	Hilltop Needmore Rd	9,300	- -	2.0%	- -
Screenline 6: West of Raleigh, North of High House Road					
6.1	Davis Dr	30,600	- -	1.0%	- -
6.2	Louis Stephens Dr	3,400	- -	0.0%	- -
6.3	NC 55	31,400	24,800	19.8%	13.0%
6.4	Green Level Church Rd	8,900	- -	0.8%	- -
6.5	White Oak Church Rd	700	- -	0.1%	- -
6.6	Green Level Rd	1,200	- -	1.6%	- -
6.7	NC 751	7,600	- -	2.5%	- -

(Continued on next page)

Table 2.9 (Page 2 of 3)
Summary of Weekday and Weekend-Day Traffic Volumes at Count Locations
Based on Traffic Counts Conducted in the Fall of 2016

Location #	Count Location	Average Weekday Traffic (1)	Average Weekend Day Traffic (2)	Percent Trucks Weekday (3)	Percent Trucks Weekend Day (3)
Screenline 7: West of Raleigh, South of Interstate 40					
7.1	NC 55 (Apex Highway)	24,100	15,000	1.3%	0.6%
7.2	Louis Stephens Dr	5,400	- -	0.1%	- -
7.3	Davis Dr	23,500	- -	0.7%	- -
7.4	NC 54	23,000	11,900	1.2%	0.7%
7.5	Airport Blvd	24,200	- -	2.6%	- -
Screenline 8: Circumferential Locations Adjacent to Complete 540 Route					
8.1	Hopson Rd.	10,600	- -	0.4%	- -
8.2	Davis Dr	20,500	- -	0.8%	- -
8.3	NC 54	12,100	- -	0.4%	- -
8.4	NC 55	34,500	- -	1.9%	- -
8.5	Green Hope School Rd	5,700	- -	1.0%	- -
8.6	Green Level West Rd	6,500	- -	1.9%	- -
8.7	Green Level West Rd	10,000	- -	1.3%	- -
8.8	US 64	27,100	- -	6.3%	- -
8.9	US 64	46,500	37,700	2.5%	1.0%
8.10	Olive Chapel Rd	5,000	- -	2.1%	- -
8.11	Old US Highway 1	7,400	- -	5.2%	- -
8.12	NC 55	31,000	24,400	3.5%	1.3%
8.13	Holly Springs Rd	20,800	- -	0.4%	- -
8.14	West Lake Rd	8,600	- -	0.8%	- -
8.15	Bells Lake Rd	5,800	- -	0.5%	- -
8.16	Johnson Pond Rd	4,000	- -	0.7%	- -
8.17	Lake Wheeler Rd	7,700	- -	0.7%	- -
8.18	US 401	26,000	14,400	1.6%	0.8%
8.19	Fanny Brown Rd	4,700	- -	0.3%	- -
8.20	Old Stage Rd	9,800	- -	1.0%	- -
8.21	Sauls Rd	4,500	- -	0.9%	- -
8.22	Jordan Rd	2,000	- -	0.2%	- -
8.23	NC 50	16,200	14,700	1.2%	0.7%
8.24	White Oak Rd.	11,100	- -	0.6%	- -
8.25	Rock Quarry Rd	5,200	- -	1.8%	- -
8.26	Poole Rd (NC 2555)	9,900	- -	1.4%	- -
8.27	Interstate 40	107,100	72,900	8.5%	2.6%
8.28	Interstate 40	125,000	- -	11.6%	- -
8.29	Interstate 40	185,600	- -	13.3%	- -

(Continued on next page)

Table 2.9 (Page 3 of 3)
Summary of Weekday and Weekend-Day Traffic Volumes at Count Locations
Based on Traffic Counts Conducted in the Fall of 2017

Location #	Count Location	Average Weekday Traffic (1)	Average Weekend Day Traffic (2)	Percent Trucks Weekday (3)	Percent Trucks Weekend Day (3)
Screenline 9: South of US 1					
9.1	New Hill Holleman Road	5,900	- -	4.2%	- -
9.2	Holly Springs New Hill Road	2,400	- -	1.2%	- -
9.3	Veridea Parkway	4,400	- -	0.3%	- -
9.4	NC 55	47,500	- -	2.2%	- -
9.5	Ten Ten Road	26,000	- -	1.5%	- -
9.6	US 1	79,200	- -	7.4%	- -
9.7	US 64	54,300	- -	2.6%	- -
Additional 2017 Counts					
10.1	NC 55	31,900	- -	6.1%	- -
10.2	NC 55	32,400	- -	1.6%	- -
10.3	Davis Drive	14,600	- -	0.7%	- -
10.4	NC 55 Bypass	45,000	- -	3.1%	- -
10.5	NC 55 - North of Easton St.	15,100	- -	0.5%	- -
10.6	Davis Drive	25,700	- -	0.4%	- -
10.7	Church Street	8,600	- -	0.6%	- -
10.8	Chapel Hill Road	17,700	- -	2.3%	- -

(1) Represents the average of Tuesday, Wednesday and Thursday traffic count volumes.
(2) Represents the average of Saturday and Sunday traffic count volumes.
(3) Trucks are defined as vehicles with three or more axles.

Source: Traffic counts were conducted by The Traffic Group

The traffic volumes in Table 2.9 include the average weekday traffic, the average weekend-day traffic, and the percent of trucks out of the average weekday or weekend-day traffic. Obtaining weekday traffic volumes by 15-minute increments was important in model calibration as the model represents weekday traffic and the small time-periods allowed for the aggregation of traffic into the model time periods.

2.2.3 Historical Traffic Growth in the Study Area

Traffic growth on I-40 and selected highways and arterials from 2009 to the most currently available year are shown in **Figure 2.10**. The traffic volumes are annual average daily traffic (AADT) volumes provided by the NCDOT Traffic Survey Group. Traffic volumes are shown on I-40, Davis Drive, NC 42, NC 55, and Ten Ten Road for 2009, 2011, 2013 and 2015. Volumes are also shown at 2016 levels on I-40 locations.

Several roadway improvements occurred between 2009 and 2016 that impacted traffic volumes on area roads. Segment 1 of the Triangle Expressway (Toll NC 147 and Toll NC 540 from NC 54 to NC 55 near Morrisville) opened in January 2012, and Segment 2 (Toll NC 540 from NC 55 near Morrisville to U.S. 64) opened in August 2012. In January 2013, the rest of the Triangle Expressway opened, from U.S. 64 to NC 55 Bypass near Holly Springs. It appears that the opening of the Triangle Expressway dampened traffic growth on Davis Drive and NC 55/NC 55 Bypass as evidenced by the 2013 AADTs.

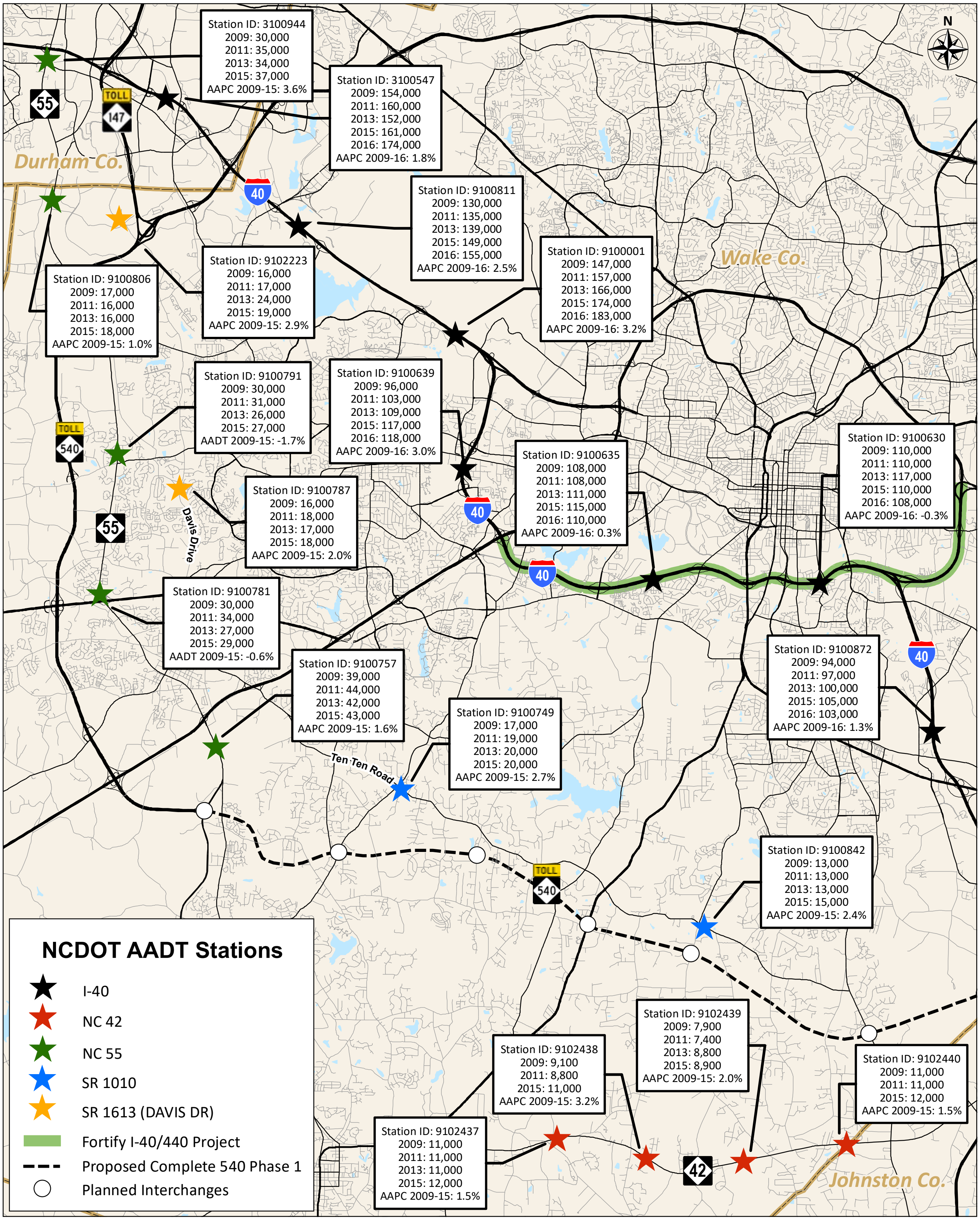
In addition, Project Fortify I-40/I-440 was underway starting in early 2015. The project consisted of replacing the pavement on I-40 from U.S. 1/64 to the I-40/I-440 split. The work required the closing of one travel lane per direction during parts of 2015, all of 2016, and most of 2017. This work temporarily dampened traffic growth on sections of I-40 from 2015 through 2017. All travel lanes were re-opened by 2018, although some resurfacing and pavement work were completed in 2018.

2.2.4 Travel Times in the Study Area

Travel speed data was obtained from HERE via Regional Integrated Transportation Information System (RITIS) with permission from NCDOT. Travel speed data was collected for the entire year of 2016. The data consisted of travel speeds and distance by roadway segment based on GPS data, from which travel time can be calculated. CDM Smith reviewed North Carolina-specific data validation reports produced for the I-95 Corridor Coalition for HERE. Based on that review, and prior experience using and validating INRIX data, CDM Smith found the HERE data to be an acceptable indicator of current travel speeds for this study.

CDM Smith compiled and summarized travel speeds for selected road segments in the study area and used that information to calculate travel times. **Figure 2.11** shows 2016 average free-flow travel times by segment and direction for a sampling of the selected routes. It should be noted that minor differences in free-flow travel time by direction on a given segment can be attributed to directional variances in the distances provided by HERE. For comparison purposes, **Figure 2.12** and **Figure 2.13** show 2016 average travel times by segment and direction for the same routes during the AM peak hour (7 AM – 8 AM) and the PM peak hour (5 PM – 6 PM). For example, northbound travel times on NC 55 between U.S. 64 and Toll NC 540 averaged 8.5 minutes under free-flow conditions, 9.7 minutes during the AM peak hour, and 10.5 minutes during the PM peak hour.

The travel times in Figures 2.11 through 2.13 are high-level summaries. For use in calibrating to 2016, travel times were available in smaller-distance segments.



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CDM Smith

HISTORICAL TRAFFIC GROWTH ON AREA ROADWAYS

FIGURE 2.10

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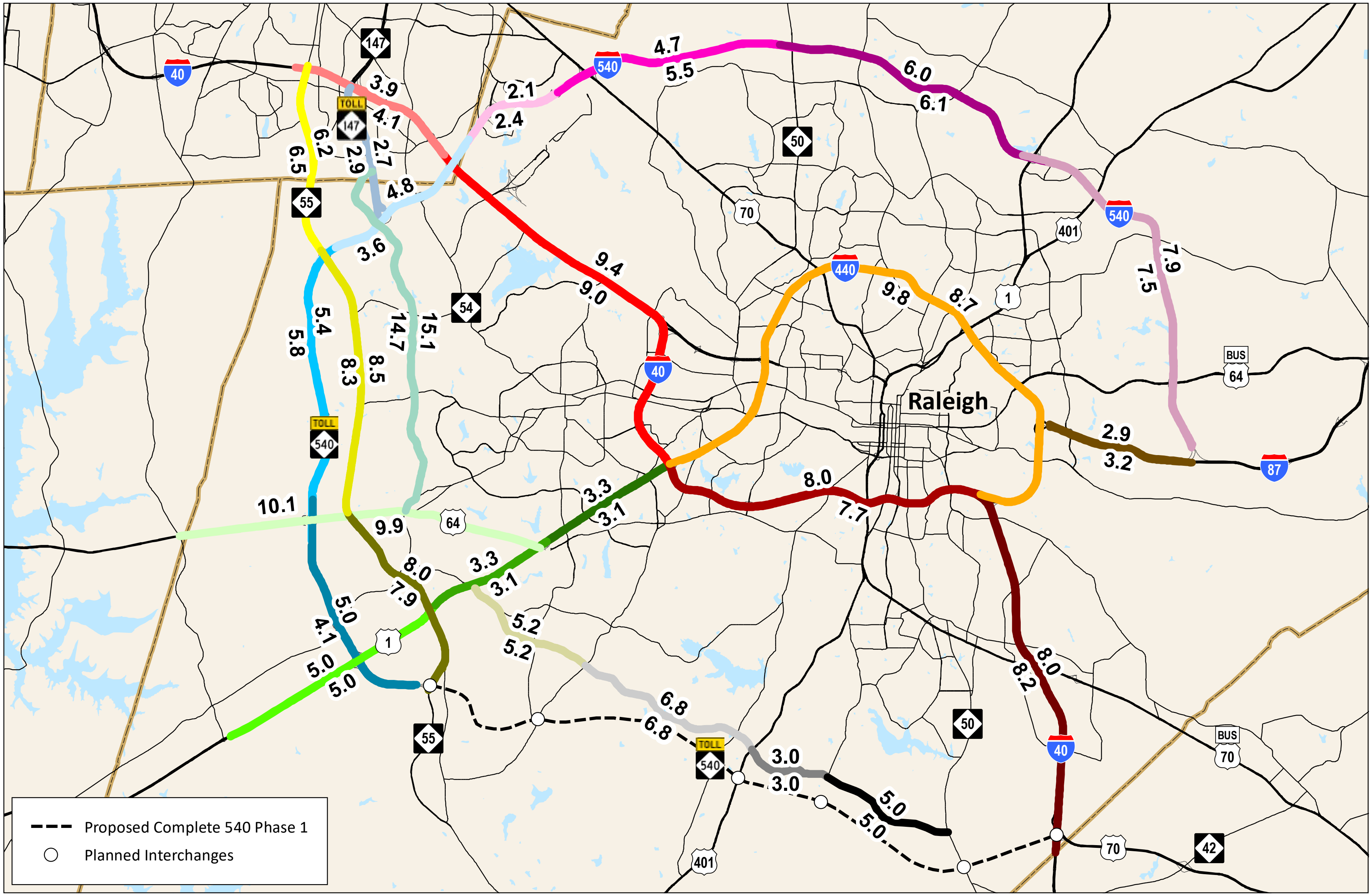

2016 FREEFLOW TRAVEL TIME (IN MINUTES)

FIGURE 2.11

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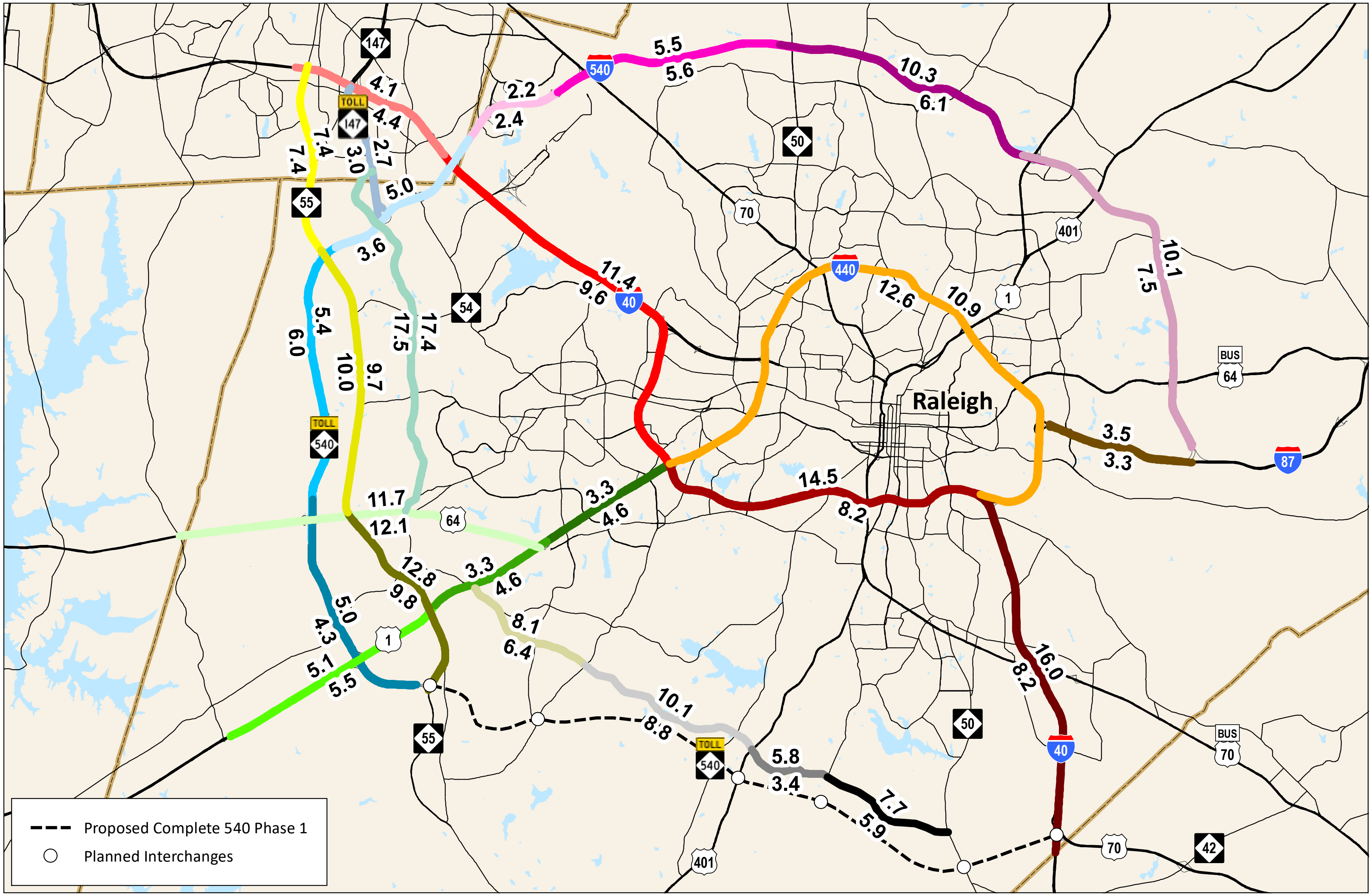

2016 AVERAGE WEEKDAY AM-PEAK HOUR TRAVEL TIMES (IN MINUTES)

FIGURE 2.12

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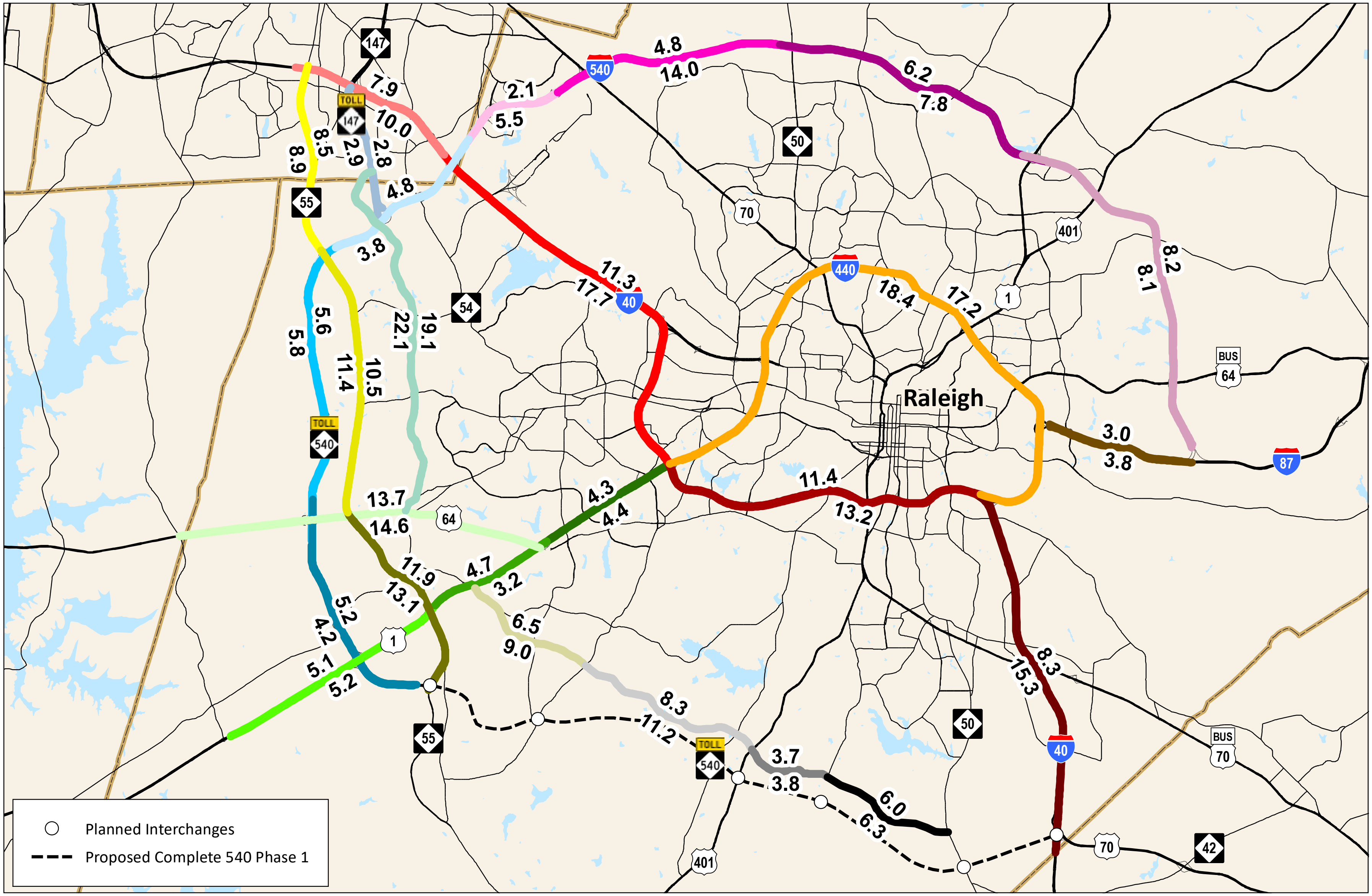

2016 AVERAGE WEEKDAY PM-PEAK HOUR TRAVEL TIMES (IN MINUTES)

FIGURE 2.13

Chapter 3

Independent Economic Review

3.1 Introduction

Economic growth forecasts are one of the most critical elements of any traffic and revenue forecast. Because of the inherent uncertainty in the economic forecasting process, this has also become an area of considerable review and scrutiny by rating agencies and others in the financial community. As such, CDM Smith engaged Dr. Stephen J. Appold, an economist with local expertise, to conduct an independent analysis of the economic growth forecasts assumed in the Triangle Regional Model version 6 (TRMv6), a key tool for evaluating future travel demand in the region.

The goal of this effort was to evaluate the reasonableness of regional and corridor growth rates contained in the TRMv6 and to adjust where appropriate. In this process Dr. Appold identified and analyzed major employers, employment centers, housing developments, and commercial and retail developments in order to derive an understanding of the economic drivers of the region. He also conducted an analysis of regional and corridor growth rates based on the latest available historic trends and forecasts.

The TRMv6 model uses 2013 as its base year, and supports additional model years 2025, 2035 and 2045. Dr. Appold created forecasts for population, households, and employment for 2016, 2025, 2035 and 2045. CDM Smith requested 2016 socioeconomics to create a Base Year 2016 for model calibration. The resulting socioeconomic forecasts were used as input to the TRMv6 to develop revised trip tables for 2016 and the officially supported TRMv6 years of 2025, 2035 and 2045.

This chapter describes the socioeconomic projections assumed in the TRMv6 and the forecasts developed by Dr. Appold. The chapter also briefly describes Dr. Appold's process to create 2016 Base Year socioeconomic forecasts that were used by CDM Smith to develop a calibrated 2016 model.

CDM Smith reviewed Dr. Appold's methodology and forecasts and adopted his forecasts as input to the travel demand modeling conducted in support of this study. A detailed description of Dr. Appold's methodology and conclusions can be found in his July 2018 study titled, ***Evaluation of the Socioeconomic Conditions and Forecasts in the Complete 540 Study Area***.

3.2 Socioeconomics for Calibration Year 2016

The TRMv6 model uses 2013 as its base year for socioeconomic data inputs into the model. CDM Smith created a 2016 Base Year for model calibration, using socioeconomic inputs developed by Dr. Appold. The model required estimates of six subsets of socioeconomic data which are described in the following subsections. Dr. Appold developed these inputs to the model independently of the TRMv6 2013 datasets.

3.2.1 Households and Population

To estimate the number of households, Dr. Appold consulted 2010 Census data at the block level[1] and added the estimated number of housing units added between 2010 and 2016. The number of housing units added was estimated using Certificates of Occupancy data for Chatham, Durham, and Orange Counties; county parcel files for Harnett County; county parcel files augmented with supplemental information for Johnston and Wake Counties; and 2010 Census block-level household counts increased by a uniform overall county growth rate for the peripheral counties of Franklin, Granville, Nash, and Person.

After the block level estimates were calculated, the block-level data was allocated to the 2,857 Traffic Analysis Zones (TAZs) contained in the TRMv6. Most Census Blocks fell within a TAZ, but 265 Census Blocks were split into multiple TAZs. After the data was allocated to TAZs, all estimates were then rounded to the nearest whole number. The resulting estimate of 2016 households was then multiplied by the latest then-available (2011-2015) American Community Survey (ACS) estimates of housing occupancy rates and rounded to the nearest whole number to develop an estimated population.

3.2.2 Group Quarters Population

In 2010, approximately three percent of the population in the TRMv6 region lived in group quarters. Of those, 38 percent were in institutional quarters, mostly correctional facilities and nursing facilities. The institutionalized population does not contribute significantly to travel demand, and therefore, is not included in the population dataset. The other 62 percent, comprising less than two percent of the regional population, are not institutionalized and are represented by two group quarters fields included in the 2016 socioeconomic data set.

The first group, covering about 85 percent of the non-institutionalized group quarters population, are students living in public and private dormitories at each of the TRMv6 region's four major universities: North Carolina State University in Raleigh, the University of North Carolina at Chapel Hill, and Duke University and North Carolina Central University in Durham. The student population in the 2016 dataset was not changed from the TRMv6 2013 dataset, because the totals appear to remain relatively constant based on the available information.

The second group quarters field is for non-student, non-institutionalized population. Because a detailed categorization of group quarters population is only available in the decennial Census, the proportion of total block group population that lived in non-student, non-institutionalized group quarters was calculated, and that same proportion applied to the total 2016 block group population to estimate the number for 2016. This procedure assumes that the number of students living in group quarters has remained constant since 2013 but that the non-student, non-institutionalized group quarters population has grown.

3.2.3 Mean Household Income

Mean household income estimates were calculated for each TAZ in the model. This was accomplished by using Census Block data (number of households by income category) from the 2012-2016 ACS, aggregating this data into TAZs, and taking the household mean for each TAZ. The calculated 2016

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[1] Census blocks are the smallest geographic area from which the Census Bureau collects data, with a minimum size of 30,000 square feet (0.69 acres).

value was translated into 2013 dollars by using the Consumer Price Index Research Series Using Current Methods (CPI-U-RS) all-city average, as the TRMv6 model requires household income to be translated to 2013 dollars.

3.2.4 Employment

There are three components of TAZ-level employment estimates: county-level totals, sectoral distribution, and geographic distribution. Dr. Appold used the Quarterly Census of Employment and Wages (QCEW) to generate county-level totals and, following TRMv6 practice, adjusted by $^{25}/_{23}$ (an approximately eight percent increase) to account for employment not covered by unemployment insurance in order to generate county control totals. Dr. Appold agrees that the adjustment is reasonable as the QCEW number is conservative compared to Bureau of Economic Analysis (BEA) employment estimates.

The TRMv6 data further classifies employment by five sectors: industry, office, high-volume service, low-volume service and retail. Employment is separated out by sectoral category because each is thought to have different propensities to generate customer (client) traffic. Dr. Appold distributed 2016 employment into the five sectors based on QCEW data for four-digit North American Industry Classification System (NAICS) codes at the county-level.

Geographic distribution is the most challenging portion of developing employment estimates, as there are few sources of data at the sub-county level. Dr. Appold based employment distribution on three sets of information, including 1) InfoUSA; 2) the 2013 TRMv6 geographic distributions of employment, and 3) block-level longitudinal employer-household dynamics (LEHD) origin-destination employment statistics (LODES) data.

Using the three sources generated realistic results which compared well with observation and with each other. The TAZ-level estimates of sector employment correlated moderately well, and all relationships are highly statistically significant.

3.2.5 Earnings

Besides the TAZ-level inputs of employment by the five employment sectors (industry, office, high-volume service, low-volume service and retail), the TRMv6 model requires an allocation of employment by sector into two earning categories, high and low-wage. Industry and office sectors were combined, as were the high-volume and low-volume service sectors. High and low-wage employment counts are split near the median salary point for each sector. TRMv6 estimated these values for their 2010 and 2013 estimates using the 2010 CTPP version of the ACS data. The 2016 data applied the same proportional TAZ-level split found in those earlier estimates to the 2016 employment estimates.

3.2.6 Enrollment

Pre-kindergarten through 12th grade student enrollment was estimated from two Department of Instruction reports: month two of the Principal's Monthly Reports for the 2016-2017 school year for public and charter school students and the North Carolina Directory of Non-Public Schools, Conventional Schools Edition, with information for the 2016–2017 school term. The separate enrollment estimates were aggregated and linked to TAZs using public and private school location data obtained from the North Carolina open data portal.

3.3 Socioeconomic Forecasts and Adjustments

This section describes the three principal socioeconomic inputs to the TRMv6 model that drive travel demand forecasts; population, households and employment. The forecasts assumed in the TRMv6 are described, along with the adopted forecasts used in this study. The adopted forecasts were developed by Dr. Appold. The socioeconomic forecasts are described by various geographic areas described in the following subsection.

3.3.1 TRMv6 Model Area

The TRMv6 includes 10 North Carolina counties comprising 3,379 square miles: Chatham, Durham, Franklin, Graham, Harnett, Johnston, Nash, Orange, Person and Wake. Of the 10 counties, only Durham, Orange and Wake are fully contained within the model area; the other seven counties are only partially included. The area encompassed by the TRMv6 boundary, referred to as the "model area," is shown in **Figure 3.1**. Year 2013 is the official base year. Future year socio-economic and land-use assumptions in the TRMv6 are forecasts.

The TRMv6 contains 2,857 geographic units called Traffic Analysis Zones (TAZs). CDM Smith identified 983 zones in the vicinity of the Triangle Expressway and the proposed Complete 540 as residing in the "Detailed Study Area" or "Study Area". For purposes of summarization, TAZs in the Detailed Study Area were grouped into 43 Superzones and six Regions. **Figure 3.2** illustrates the Superzones and Regions within the Detailed Study Area. The Regions are identified by a color and name, while the Superzones are identified by a number. The following subsections describe the socioeconomic forecasts by County and Region, with figures provided at the Superzone level.

3.3.2 Population Forecasts

Table 3.1 presents TRMv6 population forecasts by county for each model year. The upper portion of Table 3.1 shows the original data set contained in the TRMv6. The lower portion shows the data set adjusted by Dr. Appold and adopted by CDM Smith for use in this study. Population growth rates for each ten-year interval are calculated using average annual percent change (AAPC).

The official base year for the TRMv6 is 2013. CDM Smith created a 2016 model for calibration, and, as described in Section 3.2, asked Dr. Appold to develop the 2016 socioeconomic variables required by the model, including population, households and employment for each TAZ. The 2016 socioeconomic dataset developed by Dr. Appold is used as a common benchmark to measure growth for both the TRMv6 future-year socioeconomic forecasts and Dr. Appold's.

The populations shown reflect the portions of the listed counties that are in the TRMv6 model area. Only Durham, Orange and Wake counties are included in their entirety in the TRMv6 model area. The Triangle Expressway is located in Wake County except for a small portion of Toll 147 that is located in southern Durham County. Complete 540 Phase 1 is located in southern Wake County, although the southeastern terminus of the road is very close to northern Johnston County.

Population growth rates are very similar, in total, between the TRMv6 and adopted forecasts. Compared to the TRMv6 forecasts, the annual rates of adopted population growth are lower in Wake and Durham counties for all model years and higher in Johnston County for all model years. Harnett County adopted population growth rates are higher than the original rates between 2016 and 2025.

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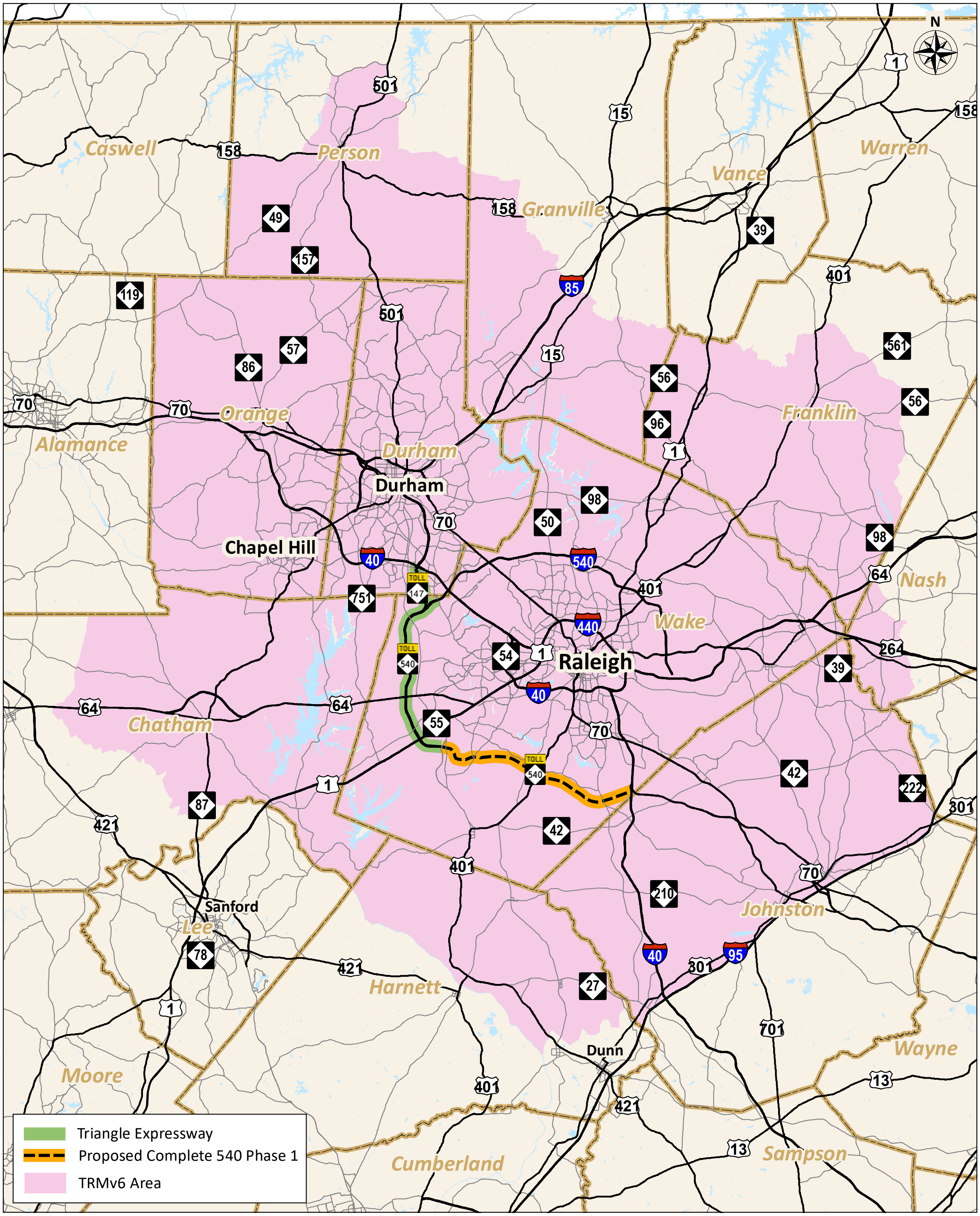
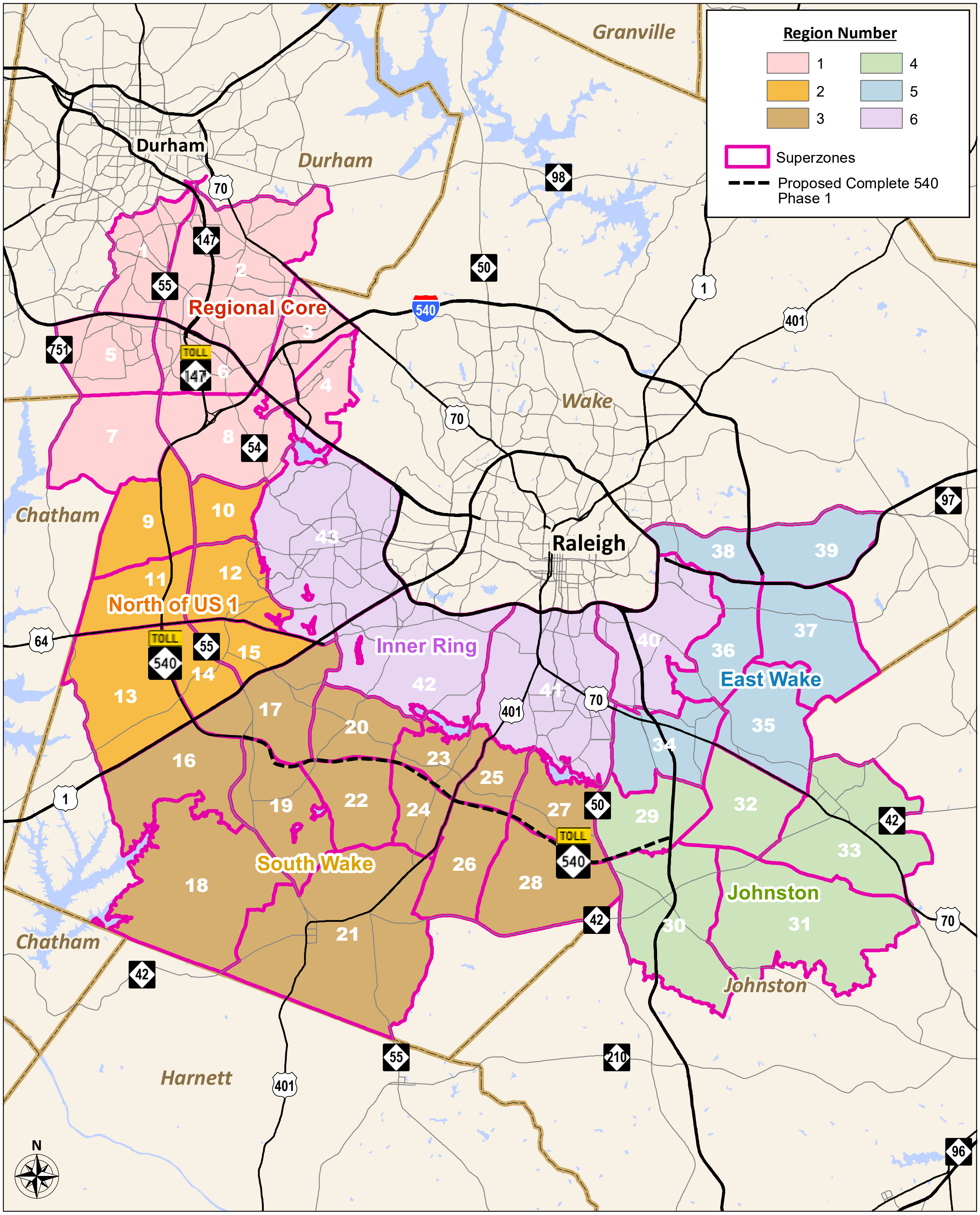


CDM Smith

TRMV6 MODEL AREA

FIGURE 3.1



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CDM Smith

REGIONS AND SUPERZONES

FIGURE 3.2

Table 3.1
Model Area Population Forecasts by County - TRMv6 and Adopted Values
(population in thousands)

	TRMv6 Values							
County (1)	2016	AAPC 2016-25	2025	AAPC 2025-35	2035	AAPC 2035-45	2045	AAPC 2016-45
Chatham	46.4	2.5 %	58.0	2.2 %	71.8	1.7 %	85.4	2.1 %
Durham (1)	291.7	1.5	334.2	1.4	384.5	1.2	431.9	1.4
Franklin	54.0	1.9	64.2	1.5	74.5	1.2	84.3	1.5
Granville	31.2	1.4	35.4	1.3	40.3	1.1	44.8	1.3
Harnett	39.4	1.4	44.8	1.7	53.0	1.4	60.7	1.5
Johnston	159.9	3.0	208.8	2.3	262.3	1.8	313.1	2.3
Nash	3.6	3.0	4.7	1.1	5.3	2.9	7.0	2.3
Orange (1)	131.2	1.3	147.7	1.0	162.6	0.8	176.7	1.0
Person	31.2	0.6	32.8	0.3	33.7	0.2	34.3	0.3
Wake (1)	1,029.9	2.0	1,234.6	1.8	1,476.7	1.5	1,710.8	1.8
Total	1,818.6	2.0	2,165.3	1.7	2,564.5	1.4	2,948.9	1.7

	Adopted Values							
County (1)	2016	AAPC 2016-25	2025	AAPC 2025-35	2035	AAPC 2035-45	2045	AAPC 2016-45
Chatham	46.4	3.1 %	61.0	2.2 %	76.0	2.0 %	92.3	2.4 %
Durham (1)	291.7	1.3	329.0	1.3	373.7	1.1	418.3	1.3
Franklin	54.0	2.2	65.6	1.6	76.8	1.4	88.5	1.7
Granville	31.2	3.2	41.4	1.8	49.6	1.7	58.6	2.2
Harnett	39.4	2.2	47.7	1.6	56.0	1.4	64.6	1.7
Johnston	159.9	3.3	214.4	2.5	274.4	2.1	338.5	2.6
Nash	3.6	2.7	4.6	1.1	5.1	1.0	5.7	1.6
Orange (1)	131.2	1.1	144.6	0.9	158.6	0.8	172.5	0.9
Person	31.2	0.0	31.2	0.0	31.3	0.0	31.3	0.0
Wake (1)	1,029.9	1.8	1,208.1	1.7	1,435.7	1.5	1,663.5	1.7
Total	1,818.6	1.9	2,147.7	1.7	2,537.2	1.5	2,933.6	1.7

(1) Only Durham, Orange and Wake counties are entirely contained in the TRMv6 model area. The population in the remaining counties represents only the portion within the TRM model boundaries.

Note: AAPC is an abbreviation for Average Annual Percent Change

The adjustments to population forecasts at a county level are shown in **Table 3.2**. In the model area, total population was consistently adjusted downward by Dr. Appold, largely due to recent revisions of county-level population forecasts by the North Carolina Office of State Budget and Management (OSBM). Both the TRMv6 and adopted forecasts use OSBM projections as their basis for population projections. However, TRMv6 used OSBM figures dating from October 2015, while Dr. Appold used a more recent projection.

When compared with total model-area TRMv6 projections, the adopted population forecast shows approximately 17,600 fewer residents in 2025 and 15,400 fewer in 2045. These adjustments include lower population growth in the core counties (Durham, Orange and Wake) and more growth in the suburban counties over the next 20 years. Wake County adopted forecasts include approximately 26,500 fewer residents in 2025 and 47,400 fewer in 2045. Johnston County adopted forecasts in the model area include approximately 5,600 more residents in 2025 and 25,400 more in 2045.

Table 3.2
Model Area Population Adjustments by County
(population in thousands)

	2025			2035			2045		
County (1)	TRMv6	Adopted	Adjustment	TRMv6	Adopted	Adjustment	TRMv6	Adopted	Adjustment
Chatham	58.0	61.0	3.1	71.8	76.0	4.2	85.4	92.3	6.9
Durham (1)	334.2	329.0	(5.2)	384.5	373.7	(10.8)	431.9	418.3	(13.5)
Franklin	64.2	65.6	1.3	74.5	76.8	2.3	84.3	88.5	4.2
Granville	35.4	41.4	6.0	40.3	49.6	9.3	44.8	58.6	13.7
Harnett	44.8	47.7	2.9	53.0	56.0	3.0	60.7	64.6	3.8
Johnston	208.8	214.4	5.6	262.3	274.4	12.1	313.1	338.5	25.4
Nash	4.7	4.6	(0.1)	5.3	5.1	(0.1)	7.0	5.7	(1.3)
Orange (1)	147.7	144.6	(3.1)	162.6	158.6	(4.0)	176.7	172.5	(4.3)
Person	32.8	31.2	(1.6)	33.7	31.3	(2.5)	34.3	31.3	(3.1)
Wake (1)	1,234.6	1,208.1	(26.5)	1,476.7	1,435.7	(40.9)	1,710.8	1,663.5	(47.4)
Total	2,165.3	2,147.7	(17.6)	2,564.5	2,537.2	(27.3)	2,948.9	2,933.6	(15.4)

(1) Only Durham, Orange and Wake counties are entirely contained in the TRMv6 model area. The population in the remaining counties represents only the portion within the TRM model boundaries.

Note: AAPC is an abbreviation for Average Annual Percent Change

The distribution of population growth by small geographic areas within the model area is very important, as population growth proximate to Complete 540 or the Triangle Expressway impacts potential travel more than population growth further away.

Table 3.3 presents the population projections within the Detailed Study Area by region for each model year. The Detailed Study Area represents the geography that surrounds the Triangle Expressway and Complete 540 corridor (both Phase 1 and the potential future Phase 2). The upper portion of Table 3.3 shows the original TRMv6 data set. The lower portion shows the adopted data set.

Most notably, the adopted population growth rate was reduced in the adopted forecast for the South Wake region (which encompasses Complete 540 Phase 1) between 2016 and 2025. This resulted in a reduced population forecast in the South Wake region in 2025, 2035 and 2045 compared to the TRMv6 values. Adopted population growth rates were increased in the Johnston region between all model years, resulting in increased population forecasts.

The population adjustments in the Detailed Study Area between the TRMv6 and the adopted values are shown in **Table 3.4**. Population was reduced in the South Wake region by approximately 11,800 (6.0 percent) in 2025, 15,400 (6.0 percent) in 2035, and 18,900 (6.0 percent) in 2045. The Johnston region population was increased by approximately 3,500, 5,100 and 7,800 in 2025, 2035 and 2045 respectively compared to the TRMv6 values. These population increases represent an increase of 5.2 percent in 2025, 6.0 percent in 2035 and 7.5 percent in 2045.

Table 3.3
Detailed Study Area Population Forecasts by Region - TRMv6 and Adopted Values
(population in thousands)

TRMv6 Values

Region Number and Name	2016	AAPC 2016-25	2025	AAPC 2025-35	2035	AAPC 2035-45	2045	AAPC 2016-45
1 Regional Core	116.7	0.5 %	122.0	1.2 %	137.9	1.1 %	153.7	1.0 %
2 North of US 1	104.8	0.6	110.6	1.3	125.4	1.1	140.1	1.0
3 South Wake	140.5	3.7	195.6	2.7	254.4	2.1	313.3	2.8
4 Johnston	53.3	2.6	67.4	2.4	85.6	2.0	103.9	2.3
5 East Wake	48.7	4.5	72.3	3.0	97.1	2.3	121.9	3.2
6 Inner Ring	171.0	1.0	186.2	1.2	210.4	1.1	234.6	1.1
Total	635.1	1.9	754.2	1.9	910.8	1.6	1,067.5	1.8

Adopted Values

Region Number and Name	2016	AAPC 2016-25	2025	AAPC 2025-35	2035	AAPC 2035-45	2045	AAPC 2016-45
1 Regional Core	116.7	1.1 %	128.7	1.1 %	143.1	1.0 %	157.6	1.0 %
2 North of US 1	104.8	1.1	115.7	1.1	129.6	1.0	143.5	1.1
3 South Wake	140.5	3.0	183.8	2.7	239.1	2.1	294.4	2.6
4 Johnston	53.3	3.2	70.9	2.5	90.7	2.1	111.7	2.6
5 East Wake	48.7	3.6	67.1	3.0	90.4	2.3	113.8	3.0
6 Inner Ring	171.0	1.1	188.8	1.1	211.5	1.0	234.3	1.1
Total	635.1	1.9	754.9	1.8	904.4	1.6	1,055.3	1.8

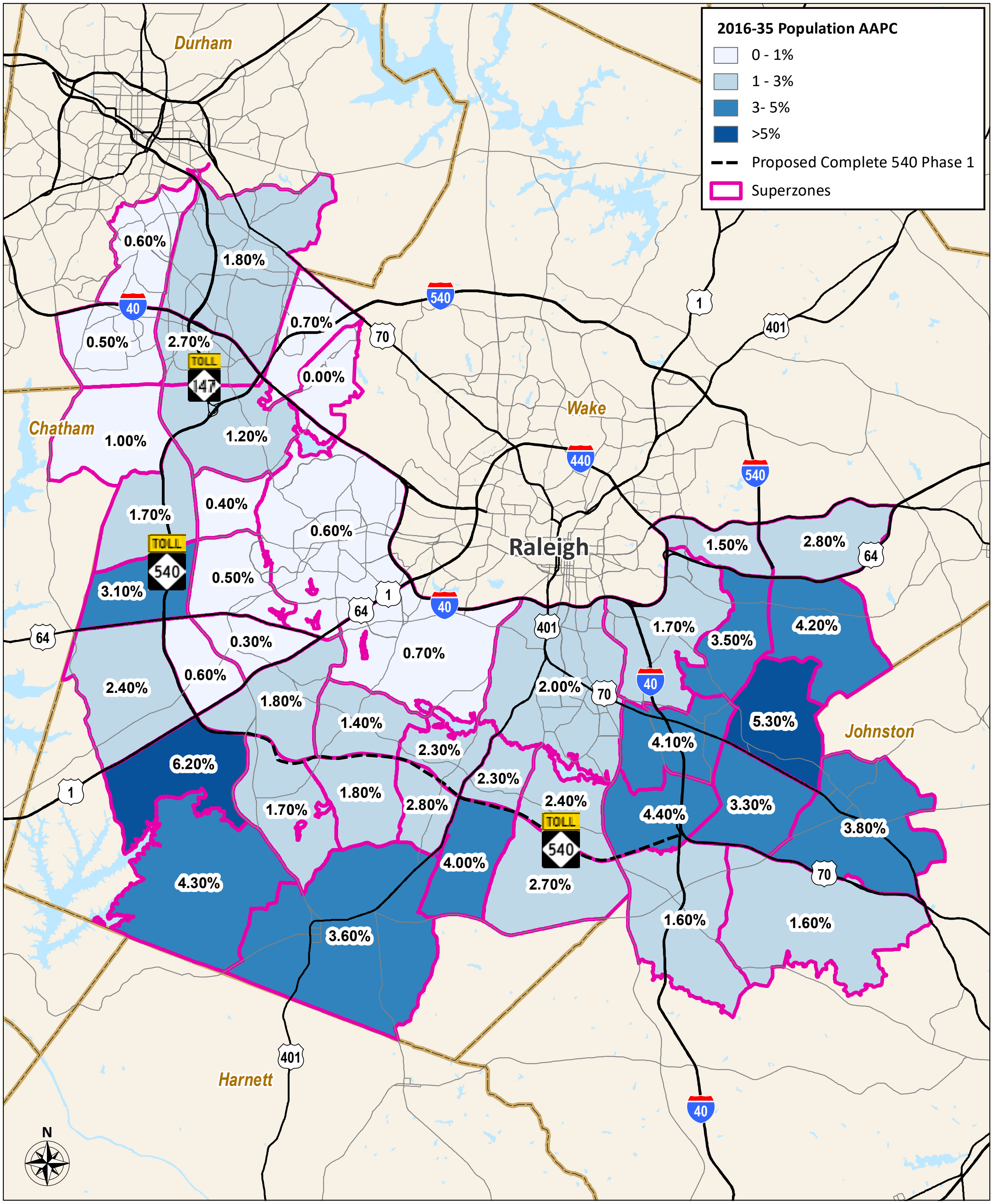
Note: TRMv6 is the Triangle Regional Model version 6
AAPC is an abbreviation for Average Annual Percent Change

Table 3.4
Detailed Study Area Population Adjustments by Region
(population in thousands)

Region Number	2025			2035			2045		
and Name	TRMv6	Adopted	Adjustment	TRMv6	Adopted	Adjustment	TRMv6	Adopted	Adjustment
1 Regional Core	122.0	128.7	6.6	137.9	143.1	5.2	153.7	157.6	3.9
2 North of US 1	110.6	115.7	5.1	125.4	129.6	4.2	140.1	143.5	3.3
3 South Wake	195.6	183.8	(11.8)	254.4	239.1	(15.4)	313.3	294.4	(18.9)
4 Johnston	67.4	70.9	3.5	85.6	90.7	5.1	103.9	111.7	7.8
5 East Wake	72.3	67.1	(5.3)	97.1	90.4	(6.7)	121.9	113.8	(8.1)
6 Inner Ring	186.2	188.8	2.6	210.4	211.5	1.1	234.6	234.3	(0.3)
Total	754.2	754.9	0.7	910.8	904.4	(6.4)	1,067.5	1,055.3	(12.3)

Note: AAPC is an abbreviation for Average Annual Percent Change

Figure 3.3 illustrates the adopted AAPC increase in population by superzone in the Detailed Study Area from 2016 to 2035. These years were selected to illustrate the growth in the near term, as opposed to growth through 2045. Recall the proposed Complete 540 Phase 1 is assumed to open in July 2023. The highest growth rates in population are forecast to occur in the southwestern superzones of Wake County, south of the proposed Complete 540, and in superzones located southeast of Raleigh in Wake and Johnston counties.



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2016 - 2035 AVERAGE ANNUAL PERCENT GROWTH IN POPULATION, BY SUPERZONE (ADJUSTED FORECAST)

FIGURE 3.3

3.3.3 Household Forecasts

Table 3.5 presents TRMv6 household forecasts by county for each model year. The upper portion of Table 3.5 shows the original data set contained in the TRMv6. The lower portion shows the data set adjusted by Dr. Appold and adopted by CDM Smith for use in this study. Household growth rates for each ten-year interval are calculated using average annual percent change (AAPC).

As seen in Table 3.5, there were nearly 714,000 households in the total model area in 2016 and about 66 percent of those households (472,800) are located in Wake County or in the portions of Johnston and Harnett counties in the model area.

In the adopted forecast (model years 2025, 2035 and 2045), household growth rates are higher in the total model area compared to the TRMv6 forecast. Adopted household growth rates in Wake County and in the portions of Johnston and Harnett counties in the model area are forecast to be higher compared to assumptions in the TRMv6, resulting in higher estimated numbers of households.

Table 3.5
Model Area Household Forecasts by County - TRMv6 and Adopted Values
(number of households in thousands)

TRMv6 Values

County (1)	2016	AAPC 2016-25	2025	AAPC 2025-35	2035	AAPC 2035-45	2045	AAPC 2016-45
Chatham	19.4	2.6 %	24.5	2.0 %	30.0	1.7 %	35.5	2.1 %
Durham (1)	122.0	1.5	139.0	1.3	158.5	1.2	178.0	1.3
Franklin	20.3	2.3	25.0	1.5	29.0	1.3	33.1	1.7
Granville	11.5	1.8	13.5	1.3	15.3	1.1	17.0	1.4
Harnett	14.3	1.9	16.9	1.6	19.8	1.4	22.7	1.6
Johnston	58.6	2.9	76.0	2.2	94.9	1.8	113.8	2.3
Nash	1.5	1.6	1.8	1.1	2.0	1.0	2.2	1.2
Orange (1)	53.5	1.4	60.9	1.0	67.0	0.9	73.2	1.1
Person	12.8	0.5	13.4	0.2	13.7	0.2	14.0	0.3
Wake (1)	399.9	2.0	479.3	1.8	570.3	1.5	661.3	1.7
Total	713.8	2.0	850.3	1.6	1,000.5	1.4	1,150.7	1.7

Adopted Values

County (1)	2016	AAPC 2016-25	2025	AAPC 2025-35	2035	AAPC 2035-45	2045	AAPC 2016-45
Chatham	19.4	4.1 %	27.8	2.4 %	35.3	2.3 %	44.4	2.9 %
Durham (1)	122.0	0.5	128.0	1.4	146.6	1.2	165.2	1.1
Franklin	20.3	3.5	27.6	1.7	32.8	1.7	38.8	2.3
Granville	11.5	5.6	18.8	2.0	22.8	2.0	27.7	3.1
Harnett	14.3	2.6	18.0	1.8	21.5	1.6	25.2	2.0
Johnston	58.6	4.2	84.5	2.6	109.3	2.3	137.7	3.0
Nash	1.5	2.4	1.9	1.1	2.1	1.2	2.4	1.5
Orange (1)	53.5	1.5	61.2	1.1	68.5	1.2	77.0	1.3
Person	12.8	0.0	12.8	0.0	12.8	0.0	12.9	0.0
Wake (1)	399.9	2.1	483.9	2.0	591.2	1.8	707.2	2.0
Total	713.8	2.1	864.4	1.9	1,043.1	1.7	1,238.4	1.9

(1) Only Durham, Orange and Wake counties are entirely contained in the TRMv6 model area. The population in the remaining counties represents only the portion within the TRM model boundaries.

Note: AAPC is an abbreviation for Average Annual Percent Change

The adjustments to the household forecasts at a county level are shown in **Table 3.6**. In total, the number of households was increased by about 14,100 in 2025, 42,600 in 2035 and 87,800 in 2045. The adopted forecast increased the households in Wake County by 4,600 (1.0 percent) in 2025, 20,900 (3.7 percent) in 2035 and 45,900 (6.9 percent) in 2045. Households in the Johnston County area were increased by 8,500 (11.2 percent) in 2025, 14,400 (15.2 percent) in 2035, and 24,000 (21.2 percent) in 2045 compared to the TRMv6 values.

Table 3.6
Model Area Household Adjustments by County
(number of households in thousands)

	2025			2035			2045		
County (1)	TRMv6	Adopted	Adjustment	TRMv6	Adopted	Adjustment	TRMv6	Adopted	Adjustment
Chatham	24.5	27.8	3.2	30.0	35.3	5.3	35.5	44.4	8.9
Durham (1)	139.0	128.0	(11.0)	158.5	146.6	(11.9)	178.0	165.2	(12.8)
Franklin	25.0	27.6	2.6	29.0	32.8	3.8	33.1	38.8	5.7
Granville	13.5	18.8	5.3	15.3	22.8	7.6	17.0	27.7	10.7
Harnett	16.9	18.0	1.1	19.8	21.5	1.7	22.7	25.2	2.5
Johnston	76.0	84.5	8.5	94.9	109.3	14.4	113.8	137.7	24.0
Nash	1.8	1.9	0.1	2.0	2.1	0.2	2.2	2.4	0.2
Orange (1)	60.9	61.2	0.3	67.0	68.5	1.5	73.2	77.0	3.9
Person	13.4	12.8	(0.6)	13.7	12.8	(0.9)	14.0	12.9	(1.2)
Wake (1)	479.3	483.9	4.6	570.3	591.2	20.9	661.3	707.2	45.9
Total	850.3	864.4	14.1	1,000.5	1,043.1	42.6	1,150.7	1,238.4	87.8

(1) Only Durham, Orange and Wake counties are entirely contained in the TRMv6 model area. The population in the remaining counties represents only the portion within the TRM model boundaries.

Note: AAPC is an abbreviation for Average Annual Percent Change

As discussed in Section 3.3.2, population estimates were adjusted downward in several counties or portions of counties in the model area. The downward adjustment in population occurred, particularly in Wake County, despite the number of households being adjusted upwards. This occurs because the TRMv6 model holds the population's age distribution constant to a 2010 distribution. Due to an expected aging of the population over time, household composition is also expected to change, resulting in a gradual lowering of average household size in Dr. Appold's adjustments. Both the TRMv6 model and Dr. Appold's projections use the same source information to calculate population estimates, which are then used to estimate the number of households. Because the adjusted numbers estimate a smaller household size as compared to TRMv6, the number of households must increase to reach the estimated population numbers.

Table 3.7 presents the Detailed Study Area household projections by region for each model year. The upper portion of Table 3.7 shows the original data set. The lower portion shows the adjusted data set.

In the detailed study area, the adopted forecast has a higher rate of annual growth between all model years compared to the TRMv6 forecast. The higher rates of average annual growth are also seen in the South Wake region between 2025 and 2035 and between 2035 and 2045, and in the Johnston region between all model years.

Table 3.7
Detailed Study Area Household Forecasts by Region - TRMv6 and Adopted Values
(number of households in thousands)

Region Number	**TRMv6 Values** 2016	AAPC 2016-25	2025	AAPC 2025-35	2035	AAPC 2035-45	2045	AAPC 2016-45
1 Regional Core	48.2	0.5 %	50.6	1.3 %	56.6	1.1 %	62.7	0.9 %
2 North of US 1	36.3	0.9	39.2	1.5	44.6	1.3	50.0	1.1
3 South Wake	49.0	3.8	68.6	3.0	89.1	2.3	109.6	2.8
4 Johnston	18.9	2.9	24.5	2.7	31.0	2.1	37.5	2.4
5 East Wake	17.3	4.7	26.0	3.3	34.8	2.5	43.4	3.2
6 Inner Ring	66.1	1.2	73.9	1.3	83.2	1.2	92.6	1.2
Total	235.7	2.0	282.7	2.0	339.3	1.7	395.8	1.8

Region Number	**Adopted Values** 2016	AAPC 2016-25	2025	AAPC 2025-35	2035	AAPC 2035-45	2045	AAPC 2016-45
1 Regional Core	48.2	0.7 %	51.5	1.3 %	57.8	1.2 %	64.3	1.0 %
2 North of US 1	36.3	1.4	41.3	1.6	47.7	1.5	54.6	1.4
3 South Wake	49.0	3.7	67.9	3.4	92.1	2.8	118.2	3.1
4 Johnston	18.9	4.1	27.3	3.0	35.7	2.7	45.2	3.0
5 East Wake	17.3	4.3	25.4	3.9	35.6	3.1	46.8	3.5
6 Inner Ring	66.1	1.4	74.7	1.5	85.8	1.5	97.7	1.4
Total	235.7	2.3	288.0	2.3	354.6	2.1	426.8	2.1

Note: AAPC is an abbreviation for Average Annual Percent Change

Adjustments made to the TRMv6 household forecasts in the Detailed Study Area are shown by region in **Table 3.8**. At a regional level, all household forecasts were adjusted upward, except for South Wake (Region 3) and East Wake (Region 5) in 2025, which both had slight downward adjustments. In 2035 and 2045, however, these regions had upward adjustments. Within the adjusted data set, the most notable changes were made to Region 4 (Johnston), at the east end of Complete 540 Phase 1, where household projections were adjusted upward by about 11.5 percent in 2025, 15.2 percent in 2035 and 20.5 percent in 2045. Household projections for all other regions stayed within 10 percent of the TRMv6 model.

Table 3.8
Detailed Study Area Household Adjustments by Region
(number of households in thousands)

Region Number and Name		2025 TRMv6	2025 Adopted	2025 Adjustment	2035 TRMv6	2035 Adopted	2035 Adjustment	2045 TRMv6	2045 Adopted	2045 Adjustment
1	Regional Core	50.6	51.5	0.9	56.6	57.8	1.2	62.7	64.3	1.7
2	North of US 1	39.2	41.3	2.1	44.6	47.7	3.1	50.0	54.6	4.6
3	South Wake	68.6	67.9	(0.7)	89.1	92.1	3.0	109.6	118.2	8.6
4	Johnston	24.5	27.3	2.8	31.0	35.7	4.7	37.5	45.2	7.7
5	East Wake	26.0	25.4	(0.7)	34.8	35.6	0.9	43.4	46.8	3.3
6	Inner Ring	73.9	74.7	0.9	83.2	85.8	2.6	92.6	97.7	5.2
	Total	282.7	288.0	5.3	339.3	354.6	15.4	395.8	426.8	31.0

Note: AAPC is an abbreviation for Average Annual Percent Change

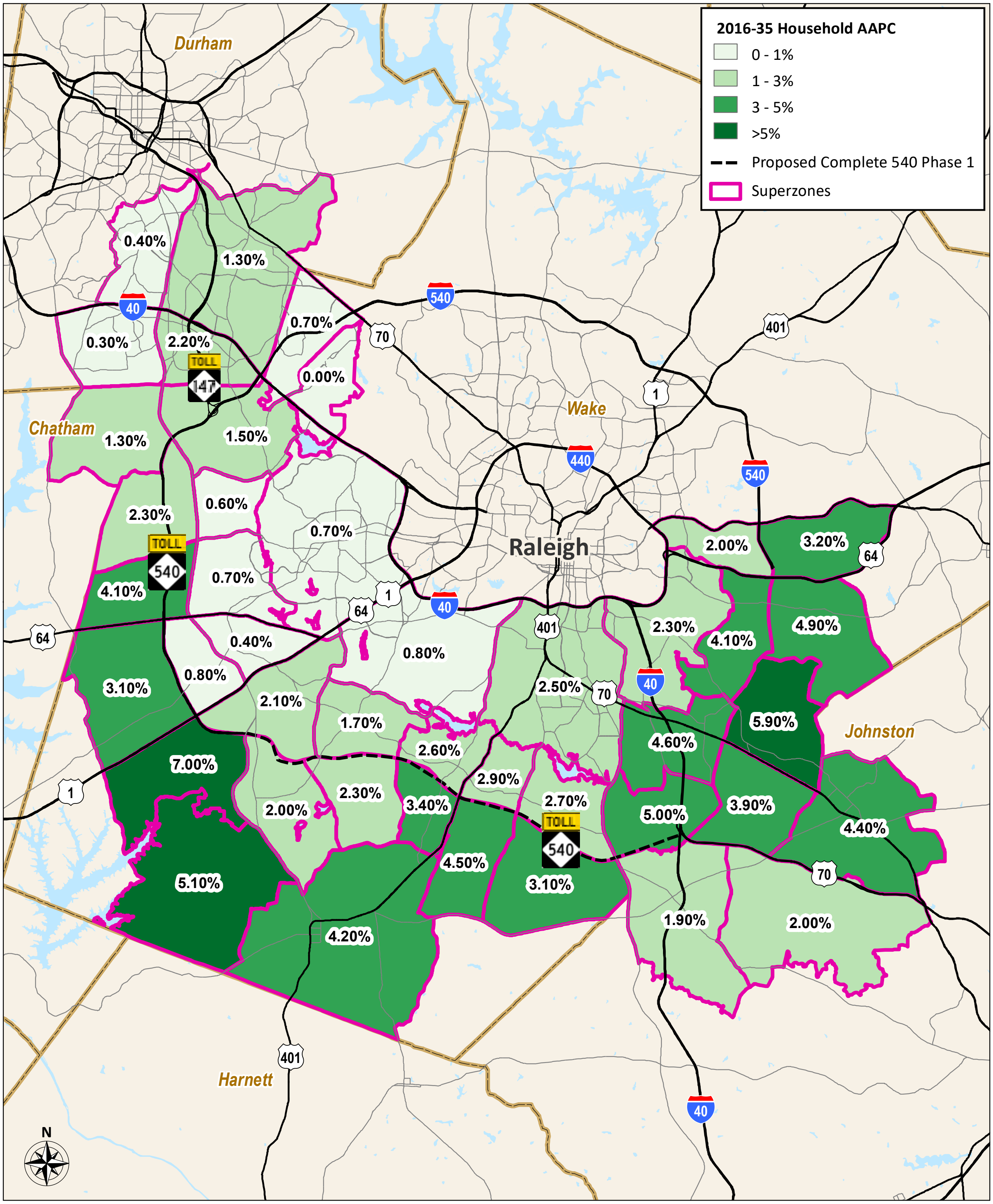
Figure 3.4 displays the forecasted average annual growth rate in households within the Detailed Study Area for the adopted data set between 2016 and 2035 by superzone. As with population, forecasted household growth rates are smallest in the northwest superzones, which is the portion of the study area that is already the most densely developed and populated. The highest annualized rates of growth are forecast to occur on the eastern and southern sides of the Detailed Study Area, in southern and southeastern Wake County and portions of northern Johnston County. Due to an anticipated decrease in average household size, households are forecasted to grow slightly faster than population in many of the superzones.

3.3.4 Employment Forecasts

Table 3.9 presents TRMv6 employment projections by county for each model year. The upper portion of Table 3.9 shows the original data set. The lower portion shows the data set adjusted by Dr. Appold. Population growth rates for each ten-year interval are calculated using AAPC.

In total, employment forecasts were adjusted downward in each future year (2025, 2035 and 2045). The employment growth averaged 1.6 percent per year from 2016 to 2045 in the TRMv6 compared to the adopted 1.1 percent per year. The adopted employment forecast results in about 218,100 fewer employed people in 2045 compared to the original forecast. Rates of growth in employment were reduced in Wake County and increased in Johnston County.

The adjustments to employment made by Dr. Appold at the county level are shown in **Table 3.10**. Wake County employment was reduced by 100 in 2025; 54,100 in 2035; and 114,400 in 2045, representing decreases of about 0.0 percent, 6.7 percent, and 12.2 percent respectively compared to the TRMv6 values. In contrast, employment was adjusted upward in Johnston County (in the portion within the model), by 5,500 in 2015; 6,100 in 2035; and 7,000 in 2045. This represents increases of approximately 11 percent in each model year compared to the TRMv6 values.



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2016 - 2035 AVERAGE ANNUAL PERCENT GROWTH IN HOUSEHOLDS, BY SUPERZONE (ADJUSTED FORECAST)

FIGURE 3.4

Table 3.9
Model Area Employment Forecasts by County - TRMv6 and Adopted Values
(employment in thousands)

TRMv6 Values

County (1)	2016	AAPC 2016-25	2025	AAPC 2025-35	2035	AAPC 2035-45	2045	AAPC 2016-45
Chatham	9.8	2.8 %	12.6	2.2 %	15.2	1.8 %	17.9	2.1 %
Durham (1)	212.6	1.8	249.2	1.9	296.2	1.6	343.1	1.7
Franklin	12.1	3.6	16.5	1.8	19.5	1.6	22.5	2.2
Granville	10.2	(0.5)	9.8	1.2	10.9	1.1	12.0	0.6
Harnett	7.5	(0.3)	7.3	1.8	8.5	1.4	9.6	0.9
Johnston	46.4	1.0	50.6	1.7	58.8	1.5	67.1	1.3
Nash	0.8	(8.7)	0.3	1.1	0.4	1.9	0.4	(1.9)
Orange (1)	76.3	0.6	80.3	1.7	93.7	1.5	107.1	1.2
Person	10.2	0.4	10.6	0.5	11.2	0.5	11.7	0.5
Wake (1)	576.6	1.7	668.6	2.1	804.1	1.7	939.5	1.7
Total	962.5	1.6	1,105.8	2.0	1,318.5	1.7	1,530.9	1.6

Adopted Values

County (1)	2016	AAPC 2016-25	2025	AAPC 2025-35	2035	AAPC 2035-45	2045	AAPC 2016-45
Chatham	9.8	2.1 %	11.8	1.2 %	13.1	0.7 %	13.9	1.2 %
Durham (1)	212.6	0.6	224.0	1.0	245.7	0.5	257.8	0.7
Franklin	12.1	1.0	13.2	0.9	14.3	0.8	15.3	0.8
Granville	10.2	0.1	10.3	(0.0)	10.2	0.0	10.2	0.0
Harnett	7.5	1.0	8.2	1.2	9.1	0.7	9.7	0.9
Johnston	46.4	2.1	56.1	1.6	65.0	1.5	74.2	1.6
Nash	0.8	0.3	0.8	0.3	0.8	0.3	0.8	0.3
Orange (1)	76.3	0.8	81.7	0.8	88.0	0.8	94.2	0.7
Person	10.2	0.8	10.9	0.4	11.3	0.4	11.7	0.5
Wake (1)	576.6	1.7	668.5	1.3	750.0	1.1	825.0	1.2
Total	962.5	1.3	1,085.5	1.2	1,207.5	0.9	1,312.8	1.1

(1) Only Durham, Orange and Wake counties are entirely contained in the TRMv6 model area. The population in the remaining counties represents only the portion within the TRM model boundaries.

Note: AAPC is an abbreviation for Average Annual Percent Change

Dr. Appold adjusted employment downward largely because of two characteristics of the TRMv6 model that he believed resulted in unrealistically high employment growth rates. First; the TRMv6 employment projections assume an employment growth rate based upon a data source with a higher population growth rate than used elsewhere in the model. Second, the TRMv6 model does not account for an aging population that will include fewer adults of prime working age and participating in the labor force. The adopted employment forecasts still assume employment growth but assume that the older population distribution will not require as many jobs as the younger population distribution required in the TRMv6. Johnston County employment was adjusted upward because the TRMv6 uses an employment growth trajectory based on 2013 data. Johnston County was slow to recover from recession-based employment losses and had just returned to 2007 employment levels in 2013. Dr. Appold adjusted the Johnston County employment forecast to reflect anticipated continued employment growth.

Table 3.10
Model Area Employment Adjustments by County
(employment in thousands)

	2025			2035			2045		
County (1)	TRMv6	Adopted	Adjustment	TRMv6	Adopted	Adjustment	TRMv6	Adopted	Adjustment
Chatham	12.6	11.8	(0.8)	15.2	13.1	(2.1)	17.9	13.9	(4.0)
Durham (1)	249.2	224.0	(25.2)	296.2	245.7	(50.5)	343.1	257.8	(85.3)
Franklin	16.5	13.2	(3.3)	19.5	14.3	(5.2)	22.5	15.3	(7.1)
Granville	9.8	10.3	0.5	10.9	10.2	(0.7)	12.0	10.2	(1.8)
Harnett	7.3	8.2	0.9	8.5	9.1	0.6	9.6	9.7	0.0
Johnston	50.6	56.1	5.5	58.8	65.0	6.1	67.1	74.2	7.0
Nash	0.3	0.8	0.4	0.4	0.8	0.4	0.4	0.8	0.4
Orange (1)	80.3	81.7	1.4	93.7	88.0	(5.7)	107.1	94.2	(12.9)
Person	10.6	10.9	0.3	11.2	11.3	0.2	11.7	11.7	0.0
Wake (1)	668.6	668.5	(0.1)	804.1	750.0	(54.1)	939.5	825.0	(114.4)
Total	1,105.8	1,085.5	(20.3)	1,318.5	1,207.5	(111.1)	1,530.9	1,312.8	(218.1)

(1) Only Durham, Orange and Wake counties are entirely contained in the TRMv6 model area. The population in the remaining counties represents only the portion within the TRM model boundaries.

Note: AAPC is an abbreviation for Average Annual Percent Change

Table 3.11 presents the original and adopted employment growth forecasts by region in the Detailed Study Area, and **Table 3.12** shows the corresponding adjustments made to employment in the TRMv6. Employment forecasts were reduced in the total Detailed Study Area in each future model year. In the TRMv6, employment growth in the Detailed Study Area was forecast to average 2.0 percent per year from 2016 to 2045, while the adopted forecast assumes an average annual growth rate of 1.3 percent per year. In 2045 the reduced growth rates result in 92,800 fewer employed people, a 17.0 percent decrease compared to the TRMv6 values in the Detailed Study Area. The largest reductions occur in Region 1, the Regional Core, where the average annual employment growth was reduced from 2.0 percent from 2016 to 2045, to 1.0 percent in the adopted model.

Employment growth rate projections in the Detailed Study Area between 2016 and 2035 are shown by the 43 Superzones in **Figure 3.5**. The fastest rates of growth are projected to occur on the west side of the Triangle Expressway corridor, and in the area east of I-40 and south of downtown Raleigh.

Table 3.11
Detailed Study Area Employment Forecasts by Region - TRMv6 and Adopted Values
(employment in thousands)

TRMv6 Values

Region Number and Name	2016	AAPC 2016-25	2025	AAPC 2025-35	2035	AAPC 2035-45	2045	AAPC 2016-45
1 Regional Core	115.4	2.8 %	148.4	1.9 %	176.2	1.6 %	203.9	2.0 %
2 North of US 1	28.6	0.6	30.1	1.6	34.7	1.4	39.3	1.1
3 South Wake	39.9	2.7	50.7	2.3	62.4	1.9	74.1	2.2
4 Johnston	15.1	3.7	21.0	2.9	27.1	2.3	33.2	2.8
5 East Wake	13.1	6.2	22.6	3.9	31.9	2.9	41.1	4.0
6 Inner Ring	97.5	1.6	112.1	2.0	133.5	1.7	154.9	1.6
Total	309.6	2.4	384.9	2.1	465.8	1.8	546.6	2.0

Adopted Values

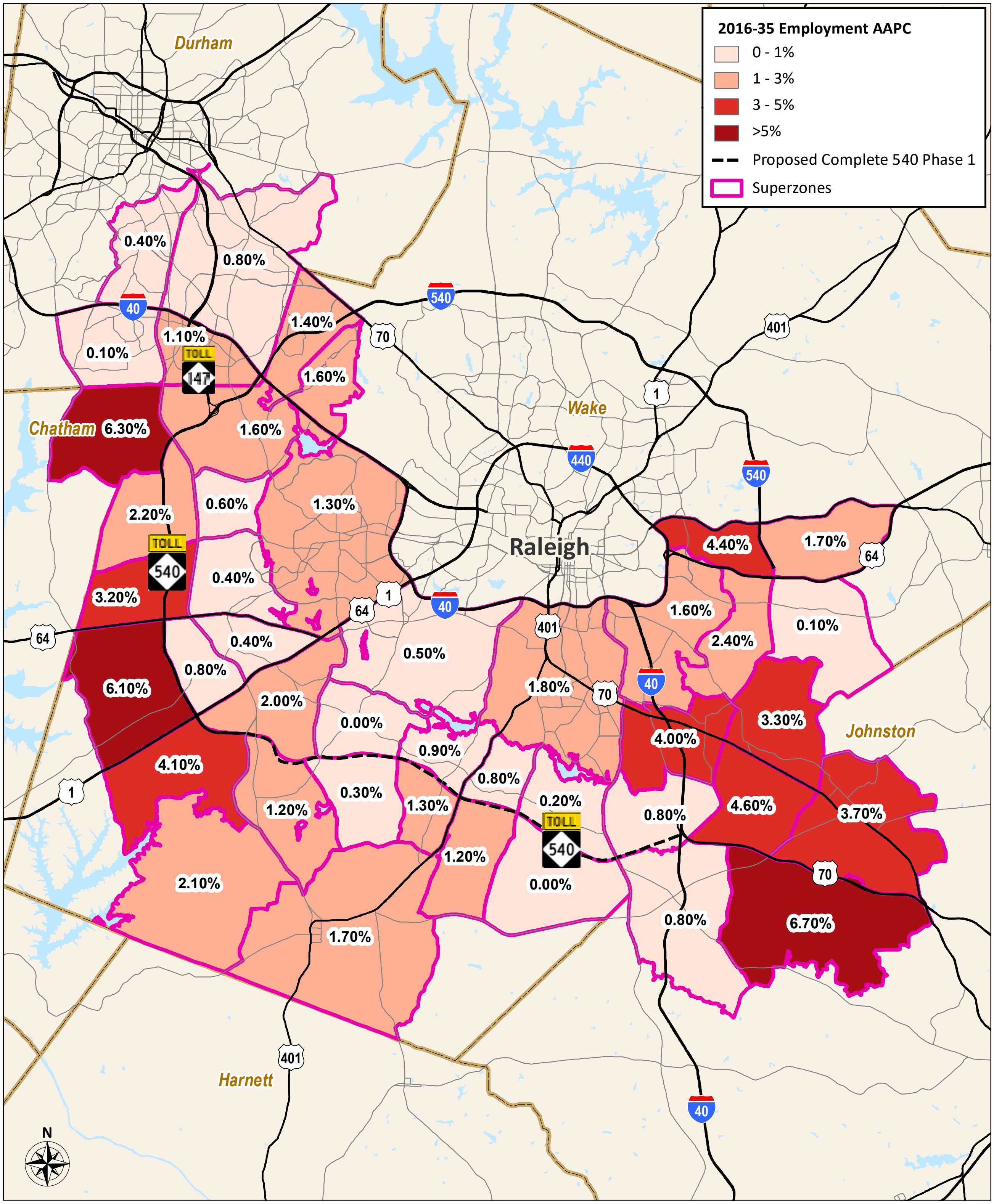
Region Number and Name	2016	AAPC 2016-25	2025	AAPC 2025-35	2035	AAPC 2035-45	2045	AAPC 2016-45
1 Regional Core	115.4	1.1 %	127.4	1.2 %	142.0	0.8 %	152.8	1.0 %
2 North of US 1	28.6	1.1	31.7	0.9	34.5	0.8	37.0	0.9
3 South Wake	39.9	2.0	47.9	1.5	54.9	1.2	61.4	1.5
4 Johnston	15.1	4.4	22.3	2.9	28.8	2.4	35.6	3.0
5 East Wake	13.1	4.5	19.4	2.9	25.0	2.1	30.2	2.9
6 Inner Ring	97.5	1.6	112.0	1.2	124.9	1.0	136.8	1.2
Total	309.6	1.7	360.7	1.4	410.1	1.1	453.8	1.3

Note: AAPC is an abbreviation for Average Annual Percent Change

Table 3.12
Detailed Study Area Employment Adjustments by Region
(employment in thousands)

Region Number and Name	2025 TRMv6	2025 Adopted	2025 Adjustment	2035 TRMv6	2035 Adopted	2035 Adjustment	2045 TRMv6	2045 Adopted	2045 Adjustment
1 Regional Core	148.4	127.4	(21.0)	176.2	142.0	(34.2)	203.9	152.8	(51.2)
2 North of US 1	30.1	31.7	1.6	34.7	34.5	(0.2)	39.3	37.0	(2.3)
3 South Wake	50.7	47.9	(2.8)	62.4	54.9	(7.5)	74.1	61.4	(12.7)
4 Johnston	21.0	22.3	1.3	27.1	28.8	1.7	33.2	35.6	2.4
5 East Wake	22.6	19.4	(3.2)	31.9	25.0	(6.9)	41.1	30.2	(10.9)
6 Inner Ring	112.1	112.0	(0.1)	133.5	124.9	(8.6)	154.9	136.8	(18.2)
Total	384.9	360.7	(24.2)	465.8	410.1	(55.7)	546.6	453.8	(92.8)

Note: AAPC is an abbreviation for Average Annual Percent Change



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CDM Smith

2016 - 2035 AVERAGE ANNUAL PERCENT GROWTH IN EMPLOYMENT BY SUPERZONE (ADJUSTED FORECAST)

FIGURE 3.5

3.3.5 Summary of Socioeconomic Forecasts and Adjustments

Table 3.13 summarizes the TRMv6 and adopted socioeconomic forecasts by model year in the Detailed Study Area. The largest differences between the TRMv6 and adopted forecasts can be traced to the models' different age distribution of the population. TRMv6 holds age distribution constant at 2010 levels throughout the model period, while the adjusted numbers assume forecasts based on an aging population. This aging population results in an upward adjustment of the number of households from the TRMv6 model, while leaving forecasted population relatively unchanged. The aging population also accounts for the downward adjustments to employment, as the number of people of working age are expected to increase more slowly than the population as a whole. Therefore, the total employment within the study area was adjusted downward by 6.3 percent in 2025, 12.0 percent in 2035, and 17.0 percent in 2045.

Table 3.13
Detailed Study Area - Summary of Socioeconomic Adjustments
(Values in thousands)

	Forecast Year				AAPC	AAPC	AAPC	AAPC
Economic Input	2016	2025	2035	2045	2016-25	2025-35	2035-45	2016-45
Population								
TRMv6 Values	635.1	754.2	910.8	1067.5	1.9%	1.9%	1.6%	1.8%
Adopted Values	635.1	754.9	904.4	1055.3	1.9%	1.8%	1.6%	1.8%
Difference	-	0.7	(6.4)	(12.3)				
Percent Difference	-	0.1%	-0.7%	-1.2%				
Households								
TRMv6 Values	235.7	282.7	339.3	395.8	2.0%	1.8%	1.6%	1.8%
Adopted Values	235.7	288.0	354.6	426.8	2.3%	2.1%	1.9%	2.1%
Difference	-	5.3	15.4	31.0				
Percent Difference	-	1.9%	4.5%	7.8%				
Employment								
TRMv6 Values	309.6	384.9	465.8	546.6	2.4%	1.9%	1.6%	2.0%
Adopted Values	309.6	360.7	410.1	453.8	1.7%	1.3%	1.0%	1.3%
Difference	-	(24.2)	(55.7)	(92.8)				
Percent Difference	-	-6.3%	-12.0%	-17.0%				

Note: AAPC is an abbreviation for Average Annual Percent Change

A visual comparison of the population, household and employment forecasts is presented in **Figure 3.6, Figure 3.7** and **Figure 3.8**, between the TRMv6 and the adopted forecast. As shown the adopted forecasts contain small downward adjustment to population, upward adjustments to households, and downward adjustments to employment.

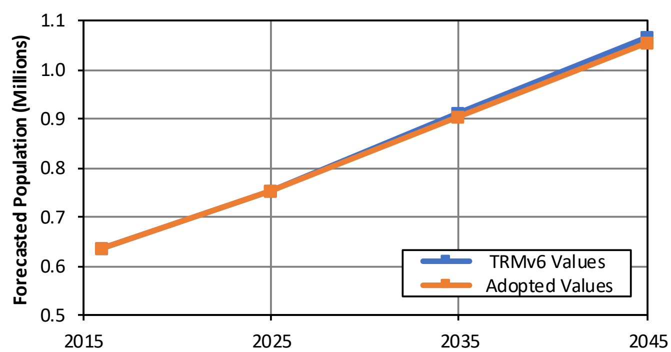


Figure 3.6
Population Growth in Study Area

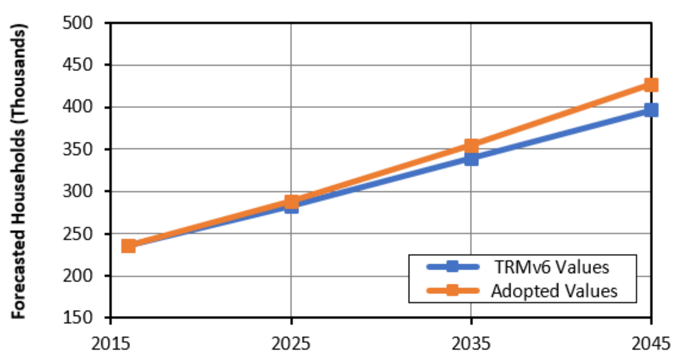


Figure 3.7
Household Growth in Study Area

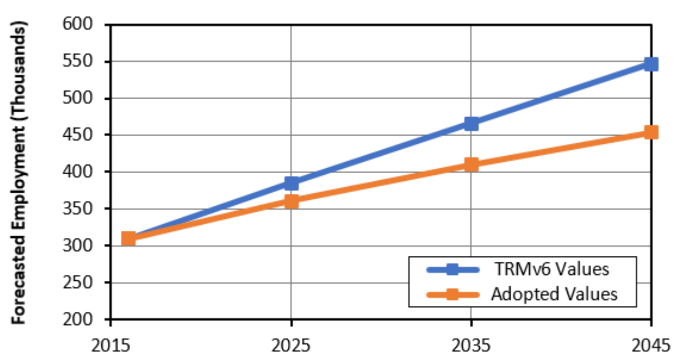


Figure 3.8
Employment Growth in Study Area

Chapter 4

Stated Preference Survey

Resource Systems Group, Inc. (RSG) conducted stated preference (SP) surveys in January and February of 2018 as part of the data collection effort for this traffic and revenue study. The data collected was used to estimate values of time for travelers that currently use or could potentially use the Triangle Expressway, as well as the proposed Complete 540 1. The estimated values of time were incorporated into the travel demand model to reflect the effects of tolls and road pricing.

This chapter summarizes the stated preference survey report provided by RSG, ***Report: Complete 540 Stated Preference Survey (May 2018).***

4.1 Survey Approach

The survey approach used a computer-assisted self-interview technique developed by RSG, and implemented within their proprietary software, rSurvey™. This software allowed the questionnaire to be customized for each respondent by modifying questions and language based on respondents' specific answers, allowing the presentation of realistic future conditions that correspond with the respondents' previous answers.

Respondents were recruited to take this online survey using multiple methods:

- Postcard invitations mailed to residents of ZIP codes in the study area;
- E-mail invitations sent to members of an online research panel residing in ZIP codes in the study area;
- In-person postcard invitation handout at the Raleigh-Durham International Airport (RDU);
- Invitations mailed with billing statements to NC Quick Pass Bill by Mail customers;
- Invitations mailed with Transponder Fulfillment packets to new NC Quick Pass transponder owners;
- Postcard invitations available at the NC Quick Pass customer service center in Morrisville, North Carolina; and
- Outreach to local businesses and organizations in the study area.

A total of 1,673 travelers completed the stated preference survey in total for all methods. After cleaning the dataset for outliers, completed surveys from 1,542 respondents were used for analysis. Data from these travelers were analyzed using accepted statistical methods to estimate travelers' sensitivity to travel time and toll cost, while considering other specific traveler characteristics.

4.2 Survey Questionnaire

RSG worked closely with NCTA and CDM Smith to develop a questionnaire to meet the objectives of this traffic and revenue study. The questionnaire collected data regarding current travel behaviors and use (or not) of the Triangle Expressway for a recent trip, provided participants with information regarding the Complete 540 project, and used stated preference questions to estimate travelers' value of time and potential to use the proposed Complete 540 Phase 1.

4.2.1 Introduction and Qualification Questions

All respondents were initially provided an introductory screen detailing the purpose of the study, the estimated time it will take to complete the survey, and instructions on how to navigate the online survey. Following the introduction, participants were shown trip qualification criteria to determine whether they were eligible to participate in the survey. Qualifying trips met the following conditions:

- Made within the past two months
- Traveled into, around, or through the highlighted area on a map of the Complete 540 Phase 1 corridor, including the existing Triangle Expressway
- Took at least 10 minutes in total door-to-door travel time
- Made on a weekday

To determine if participants' most recent trip was eligible for the survey, they were provided a map highlighting the study area and were asked to confirm if their trip occurred in this region. Respondents who indicated that they did not meet any of the criteria listed above were directed to the survey exit screen and thanked for their participation.

4.2.2 Trip Characteristics and Travel Pattern Questions

Respondents were then asked to focus on this recent trip as they continued through the survey. This trip, also known as their reference trip, formed the basis for constructing the rest of the questions in the survey. Respondents were specifically asked to think about their most recent trip and not a typical or average trip that they might make to ensure that the sample included a diverse range of trip types and travel characteristics.

Respondents were asked a series of questions regarding the following characteristics of a one-way portion of their reference trip:

- Vehicle type and number of axles
- Roads used
- Day of week of travel
- Trip purpose
- Airport trip details (if applicable)
- Beginning and ending locations (home, work, or other)
- Trip origin and destination
- Start time of travel
- Triangle Expressway entrance and exit interchanges

- Travel time (trip duration)
- Delays encountered (and delay duration, if any)
- Perceived travel time if an alternative route was used
- Toll costs on the Triangle Expressway
- Vehicle occupancy
- Trip frequency
- Electronic Toll Collection (ETC) transponder ownership

The trip information was used to inform the details of the SP scenarios presented later in the survey.

4.2.3 Stated Preference Questions

Participants were next provided a short description of the proposed Complete 540 project and brief instructions for the stated preference questions. The stated preference section involved eight exercises that provided respondents with two choices for making their reference trip again in the future under hypothetical conditions:

- Tolled Route Alternative using the Triangle Expressway, Complete 540, or both
- Toll-Free Route Alternative

In each of the eight SP exercises, travel times and toll costs were varied, and the respondent was asked to pick their preferred option. These exercises allowed RSG to collect quantitative data that can be used to estimate respondents' travel preferences and behavioral responses. An example of this stated preference screen is shown in **Figure 4.1**.

Source: Resource Systems Group, Inc.

Figure 4.1

Sample Survey Screen – Stated Preference Question

The travel times presented in each exercise were varied around the user's reported travel time from their reference trip. The toll costs varied based on the user reported trip distance and vehicle axles. By varying the travel time and toll cost independently from each other in each experiment, the survey allowed respondents to demonstrate their travel preferences across a range of values of time.

4.2.4 Debrief and Opinion Questions

After finishing the SP questions, respondents were asked to answer questions that will help assess the underlying rationale for their choices and to allow RSG to identify any potential strategic bias in their responses. These questions included asking respondents who never chose the tolled alternative for their primary reason, as well as asking respondents how they felt about the proposed Complete 540 project and why they felt that way. Respondents were also asked for their general attitudes on tolls and taxes for highway improvements. Additionally, questions related to the following demographic topics were asked: home ZIP code, gender, age, employment status, household size, household vehicle ownership, and 2017 household income before taxes.

Responses to these questions were used to confirm diversity of the sample respondents, as well as to classify and organize the data to identify any behavioral trends by population. Lastly, respondents were given opportunity to provide comments and feedback regarding the survey and the proposed project. The answers are provided in the full RSG report.

4.3 Survey Administration

RSG worked with CDM Smith and NCTA to develop a sampling plan that would produce a comprehensive sample of travelers in the Triangle region. The goal of this plan was to provide representation from different trip purposes, household incomes, and geographies, to accurately reflect behavioral differences. The project team recruited travelers to participate in the SP survey using the distribution methods highlighted in Section 4.1. The survey was administered online through RSG's proprietary software, rSurvey™, from January 17, 2018 through February 19, 2018, and yielded 1,673 completed surveys and 1,542 valid/usable surveys. **Table 4.1** below shows the breakdown of respondents by method of recruitment.

Table 4.1
Completed Surveys by Recruitment Method

Administration Method	Completed Surveys	Invalid Surveys	Final Count	Percent
Postcard invitations to area residents	965	40	925	60%
Email invitations to online research panel	377	55	322	21%
Postcard handout at RDU Airport	236	30	206	13%
Invitations to Bill by Mail customers	45	5	40	3%
Invitations in Transponder Fulfillment packets	17	1	16	1%
Postcard invitations at customer service center	5	0	5	0%
Outreach to local businesses and organizations	28	0	28	2%
Total	1,673	131	1,542	100%

Postcard invitations to area residents generated the most responses, with 60 percent of the total 1,542 usable surveys, while postcard invitations at customer service centers generated the lowest responses with five usable surveys.

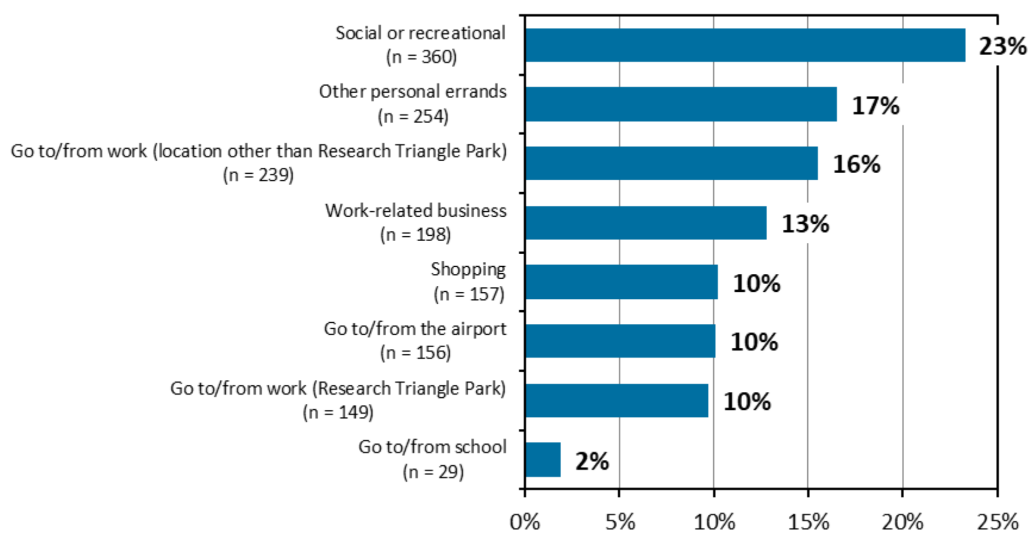
4.4 Trip Characteristic Analysis

Table 4.2 shows the number of respondents who reported reference trips that used the Triangle Expressway and/or the proposed Complete 540 Phase 1, could have used the Triangle Expressway, or didn't use the Triangle Expressway but could use the Complete 540 project. More than half of all respondents (53 percent) completed their reference trip in the potential Complete 540 corridor only, while 40 percent used the Triangle Expressway at some point during their trip. Of the remaining 7 percent that could have used the Triangle Expressway but chose not to, a majority stated they did not want to pay a toll and a third reported that the toll on the Triangle Expressway was not worth the time savings for their trip.

Table 4.2
Corridor Use Type

User Type	Count	Percent
Triangle Expressway User	614	40%
Potential Triangle Expressway User	110	7%
Potential Complete 540 User	818	53%
Total	1,542	100%

Around a quarter of respondents reported their trip purpose was commuting for work (26 percent), with 10 percent traveling to Research Triangle Park (RTP) and 16 percent traveling to work outside RTP. The second most frequent trip purpose category was social or recreational trips, accounting for 23 percent of all trips surveyed. **Figure 4.2** provides a distribution for all trip purposes in detail. For the purposes of the value of time analysis, responses were divided into market segments representing work commute trips, work-related/business trips, airport trips, and other trips.



Source: Resource Systems Group, Inc.

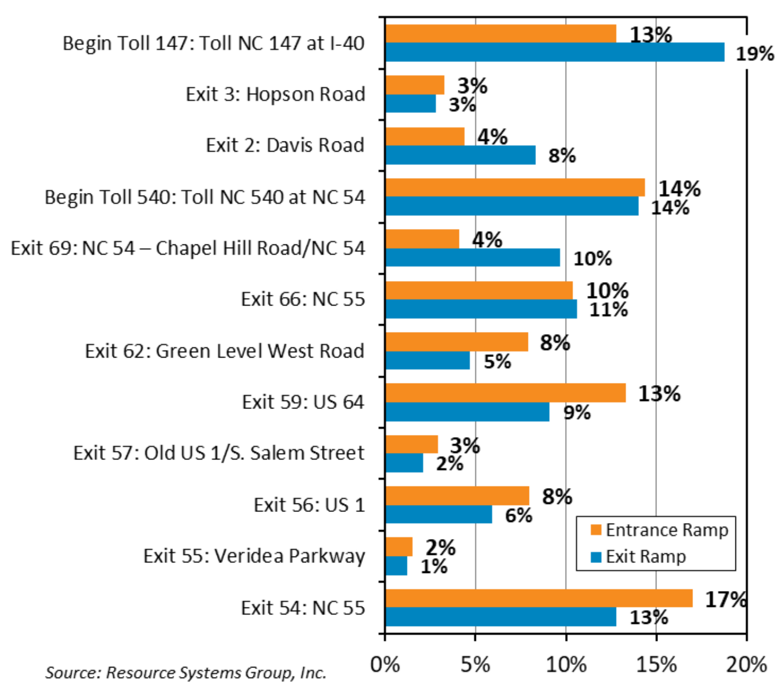
Figure 4.2
Trip Purpose

Using the latitude and longitude provided by respondents, estimated trip distances were calculated using a Google Maps route-planning algorithm. From this summary, the average calculated trip distance for all respondents was 25 miles, and the average reported travel time for all respondents was 42 minutes. **Table 4.3** shows the mean and median values for both distance and travel time for all respondents by market segment.

Table 4.3
Mean and Median Trip Distance and Reported Travel Time, By Market Segment

	Distance (miles)		Reported Travel Time (minutes)	
Market Segment	Mean	Median	Mean	Median
Work	24	20	42	40
Work-Related	26	21	46	40
Airport	26	20	39	30
Other	25	17	42	35
All	25	19	42	35

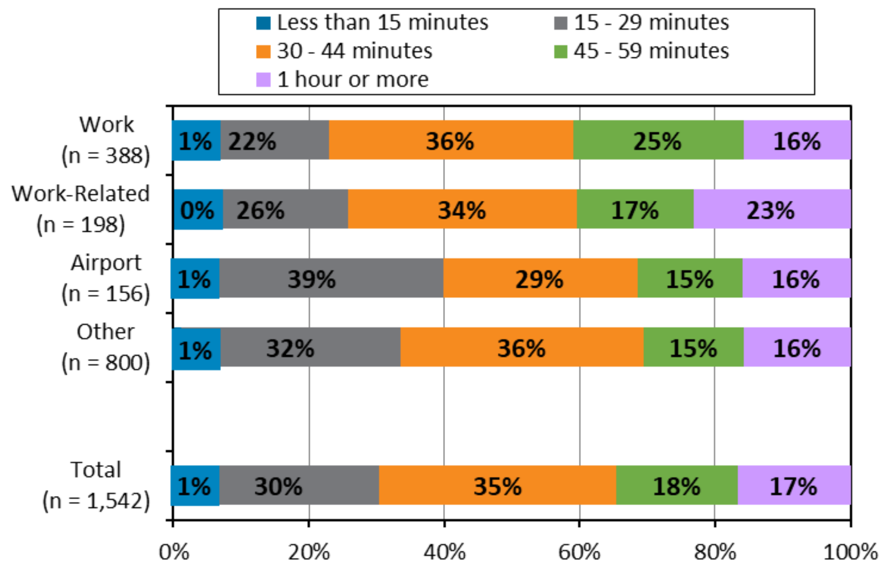
Respondents were asked to provide their entry and exit ramps on the Triangle Expressway, or the ramps they would have used, had they used the Triangle Expressway. **Figure 4.3** shows the distribution of trips to each interchange by entry and exit. The project termini, at NC 55 and at Toll NC 147/ I-40 were the most commonly used, accounting for 30 percent and 32 percent, respectively, of all entries or exits.



Source: Resource Systems Group, Inc.

Figure 4.3
Triangle Expressway Entrance and Exit Locations

Figure 4.4 and **Figure 4.5** provide the distribution of reported travel time and amount of perceived delay by market segment, respectively.



Source: Resource Systems Group, Inc.

Figure 4.4
Reported Travel Time By Market Segment

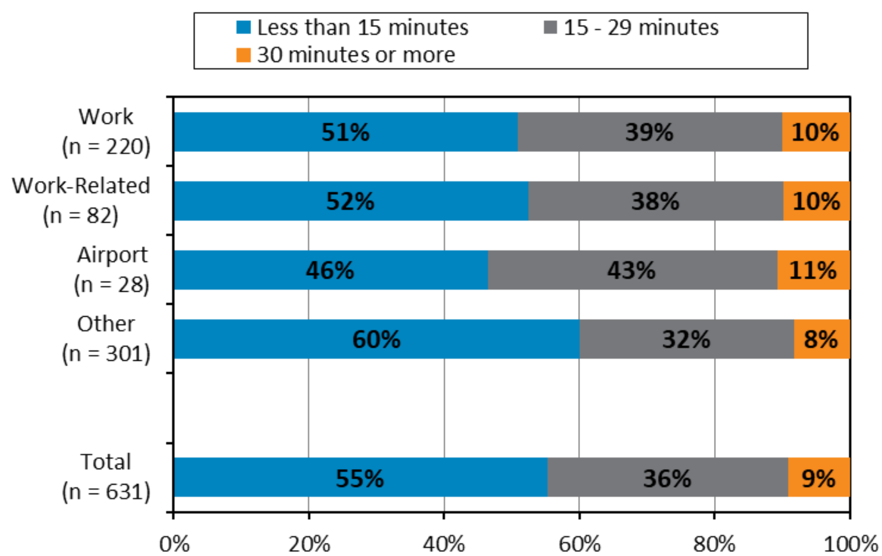


Figure 4.5
Amount of Reported Delay By Market Segment

Work and work-related trips experienced the longest travel times with about 40 percent of each of these trips taking travelers 45 minutes or longer. These same market segments also reported the highest delay on their trip, with 57 percent of all work trips reporting delays.

Figure 4.6 shows the trip frequency by market segment. Trip frequency had significant variation among the four market segments. As expected, work trips are made with the highest frequency, with 69 percent of all work respondents traveling the reference trip four or more times a week. Airport trips had the lowest frequency, with 53 percent traveling the reference trip less than once per month. Interestingly, work-related/business trips similar to the reference trip were made four or more times per week by 17 percent of the respondents in this category.

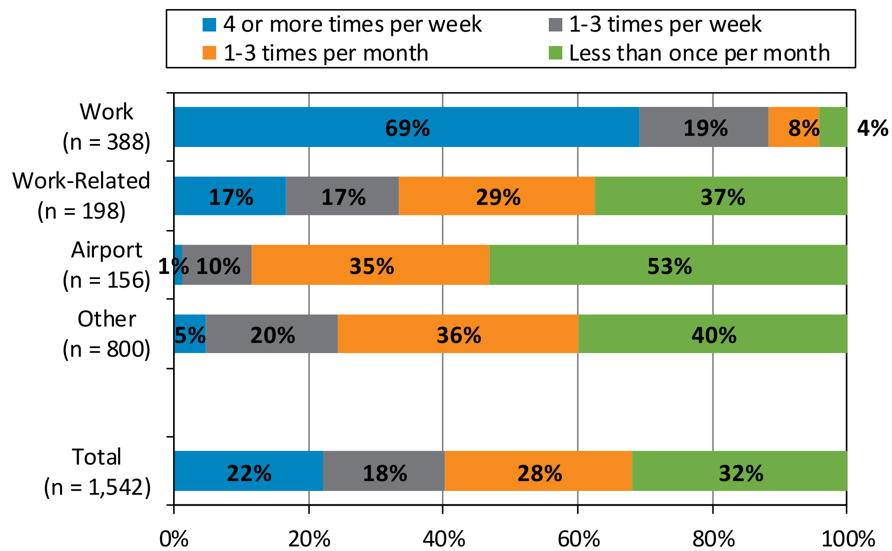


Figure 4.6
Trip Frequency By Market Segment

4.5 Debrief and Opinion Analysis

In the last section of the survey, respondents were asked to answer a series of debrief questions to provide insight on the underlying reasons for their choices in the SP question. Out of all the respondents, 491 (32 percent) never chose a tolled route for their trip. They were asked to identify their primary reason for never choosing a tolled route. **Table 4.4** provides a summary of their responses; about 44 percent said the time savings presented in the experiments were not worth the toll cost, while 31 percent were opposed to paying tolls.

Table 4.4
Reason for Never Choosing a Tolled Alternative

Reason	Count	Percent
Time savings not worth the toll cost	219	44%
Opposed to paying tolls	153	31%
Other	46	9%
Tolls presented were too high	29	6%
Current route is more convenient	23	5%
Opposed to toll roads for other reasons	14	3%
Opposed to new roads (if potential Complete 540 user)	4	1%
Opposed to electonic payment	3	1%
Total	491	100%

In response to the attitudinal question about whether they support or oppose the Complete 540 project, 61 percent said they somewhat favor or strongly favor the project (see **Table 4.5**). These respondents cited less congestion (44 percent) and shorter travel times (34 percent) as primary reasons for their support. The most common reason for those opposed to Complete 540 was general opposition to toll roads (53 percent).

4.6 Demographic Analysis

Of the 1,542 survey respondents, more than half of the respondents identified as male (56 percent), and the median age range was 45-54 years old. Most respondents were employed full-time (66 percent), less than half (43 percent) lived in a two-person household, and 52 percent had two household vehicles.

Table 4.5
Project Opinion

Project Opinion	Count	Percent
Strongly favor	547	36%
Somewhat favor	388	25%
Neutral	400	26%
Somewhat opposed	107	7%
Strongly opposed	100	7%
Total	1,542	100%

Table 4.6 provides the distribution of 2017 household income of respondents who chose to answer this question. The median income category of respondents for this survey was in the $100,000 - $124,999 range.

Table 4.6
Reported 2017 Annual Household Income

Income Category	Count	Percent
Less than $15,000	12	1%
$15,000-$24,999	27	2%
$25,000-$34,999	37	2%
$35,000-$49,999	93	6%
$50,000-$74,999	202	13%
$75,000-$99,999	230	15%
$100,000-$124,999	214	14%
$125,000-$149,000	145	9%
$150,000-$199,999	182	12%
$200,000 or more	155	10%
Not provided	245	16%
Total	1,542	100%

4.7 Model Estimation for Value of Time

The primary purpose of this survey was to estimate value of time for travelers in the Triangle Expressway and Complete 540 corridors. RSG performed statistical analysis and discrete choice model estimation using the SP survey data. The statistical estimation and specification testing were completed using a conventional maximum likelihood procedure that estimated coefficients for a set of multinomial logit (MNL) models. The coefficients are a numerical representation of respondents' sensitivities to variables from the SP experiments (travel time and toll cost) and can be used to calculate value of time for travelers in the study corridor.

4.7.1 Specification and Segmentation

Respondents were presented with the following two options in the SP scenarios, based on the details of their reference trips:

- **Use a tolled route** (parts of Triangle Expressway or Complete 540 Phase 1 or both)
- **Use a toll-free route** (respondent's current route, or an alternate toll-free route if they used a toll route in their reference trip)

The MNL model estimates a choice probability for each alternative presented in the SP trade-off exercises. Several model forms were tested using different variables collected from the data. In addition to the travel times and toll costs presented in the SP experiments; trip characteristics, transponder ownership, attitudinal indicators, income, and demographic variables, among others, were tested to determine whether they influence respondents' choices in the SP scenarios. More details on the variables tested within the MNL model are provided in Sections 5.2 and 5.3 of the full RSG report

The final model specification was selected based on model fit, intuitiveness and reasonableness of the model coefficients, and the expected application of the model results. The data was divided into four market segments, to be carried forth into the traffic and revenue analysis: work commute, work-related, airport, or other. The interaction between toll cost and household income was significant. The relationship indicates that as household income increases, sensitivity to toll prices decreases, but at a rate that is not directly proportional.

4.7.2 Willingness to Pay for Travel Time Savings (Value of Time)

In economic theory, the marginal rate of substitution is the amount of one good (i.e., money) that a person would exchange for a second good (i.e., travel time) while maintaining the same level of utility, or satisfaction. The marginal rate of substitution of the travel time and toll cost coefficients from the MNL model provides the implied toll value that travelers would be willing to pay for a given amount of travel time savings.

The resulting value of time by market segment and income level are presented in **Table 4.7**. As expected, work-related/business trips had the highest value of time, followed by trips to/from the airport. Work commute trips have a higher value of time than trips for other purposes. At the survey sample median income of $112,500, work-related trips have a value of time of $24.70 per hour, while commute trips are valued at $18.59 per hour, and trips for other purposes are valued at $17.55.

Table 4.7
Value of Time, By Market Segment and Income

Household Income	Work Commute Trips	Work-Related Trips	Airport Trips	Other Trips
$15,000	$10.66	$14.16	$11.79	$10.07
$20,000	$11.79	$15.67	$13.04	$11.13
$30,000	$13.39	$17.79	$14.81	$12.64
$42,500	$14.76	$19.61	$16.32	$13.94
$62,500	$16.27	$21.62	$18.00	$15.37
$87,500	$17.60	$23.38	$19.47	$16.62
$112,500	$18.59	$24.70	$20.56	$17.55
$137,500	$19.38	$25.75	$21.43	$18.30
$175,000	$20.33	$27.01	$22.48	$19.20
$200,000	$20.85	$27.71	$23.07	$19.69

4.8 Summary and Conclusions

An SP Survey was conducted to estimate value of time for drivers who currently travel in the Triangle region and could potentially use the Triangle Expressway or Phase 1 of the proposed Complete 540. The travel preferences from 1,542 drivers were used to develop models to produce estimates of value of time for four trip purpose market segments. The magnitude of the parameters of these models was reasonable, and their signs were intuitively correct. The value of time that was estimated is within the ranges found in other major metropolitan areas across the country, and similar to results from surveys conducted previously in Raleigh prior to the opening of Triangle Expressway and reported in the ***Triangle Expressway Comprehensive Traffic and Revenue Study (2009)***.

RSG developed multinomial logit choice models using the survey data to generate value of time estimates by trip purpose. At the median income level of the sample ($112,500), the value of time estimates were in the range of $17.55 to $24.70 per hour, depending on trip purpose.

Chapter 5

Model Calibration

CDM Smith received the latest version of the Triangle Regional Model (TRM v6) from the Institute of Transportation Research and Education (ITRE) at North Carolina State University for use in the traffic forecasting efforts of this study. The inputs to the model were adopted in April 2018, and the final components of the model were received in June 2018.

TRMv6 is a trip-based, four-step travel demand model that uses socioeconomic data and transportation network (roadway and transit) characteristics as primary inputs. The model was originally developed using population, housing, and employment data for 2010, but has been revalidated to a base year of 2013; future years that are supported by ITRE for the model are 2025, 2035, and 2045. CDM Smith and Dr. Steven Appold used this information as a starting point to develop the 2016 base year model and interim year 2020 used for this study. **Figure 5.1** outlines the steps used in refining the TRMv6 for the traffic and revenue study; the boxes shaded in gray describe the four-step modeling process used in TRMv6, while the blue boxes describe the specific steps used by CDM Smith to refine and run the model for the traffic and revenue study.

5.1 Refinements to Model Inputs

The independent economic forecast, including socioeconomic estimates for 2016, were input to the TRMv6 and revised future trip tables were developed for 2016, 2020, 2025, 2035 and 2045. The TRMv6 traffic assignment process was calibrated first against 2016 traffic volumes and then for observed travel speeds using data collected in 2016 and 2017. Calibration involves modifying the model parameters related to roadway capacity and speeds to reflect observed conditions.

Refinements to the highway network included the review and disaggregation of traffic analysis zones within the project study area, resulting in 30 additional traffic analysis zones; changes to zonal connectors to improve how traffic is loaded onto the roadway network from traffic analysis zones; and changes to the highway network to simulate 2016 roadway conditions, most notably reducing the number of lanes on I-40 between Lake Wheeler Road and Rock Quarry Road to three lanes in each direction to reflect the construction activity as part of the Fortify I-40/I-440 project as well as the addition of other minor roads within the project study area.

5.2 Calibration

The TRMv6 model was used with Dr. Steven Appold’s estimates of socioeconomic data for 2016 to develop regional travel patterns at 2016 levels. Additional calibration efforts involving traffic assignments were then conducted. The calibration process involved adjustments to the model to confirm that it sufficiently represents observed traffic volumes, speeds, and origin-destination travel patterns, prior to being used to predict future traffic conditions.

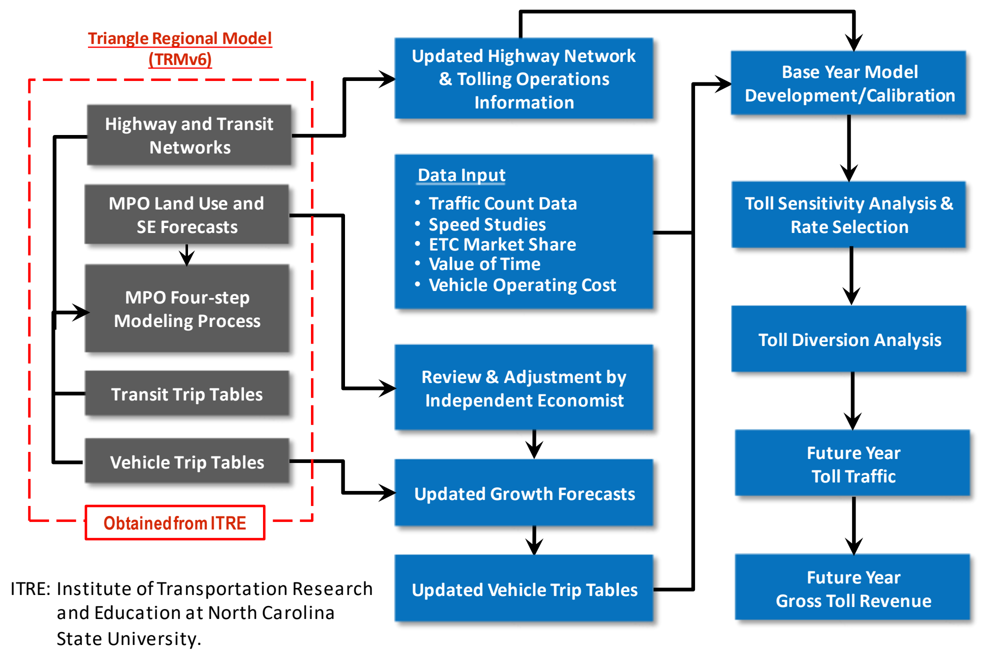


Figure 5.1
Modeling Process for Toll Road Analysis

In order to demonstrate that the 2016 base-year model sufficiently represents existing conditions, the following comparisons were made between model results and observed field data:

- Model traffic volume output compared to traffic counts at locations along nine screenlines;
- Model traffic volume output compared to existing traffic volumes on Triangle Expressway;
- Model travel speed output compared to observed 2016 HERE[1] travel speeds; and
- Model travel patterns compared to Streetlight data.

Details of the calibration results are provided below.

5.3 Traffic Volume Screenline Calibration Results

The goal of traffic volume calibration was to obtain model-estimated traffic volumes in the study area that match reasonably the actual ground counts on those roadways by direction and for weekday and peak vs. off-peak periods (AM, PM, Midday, and Overnight). In addition to adjustments to roadway network free-flow speeds and capacities, CDM Smith utilized a matrix adjustment procedure that adjusts the trip table in such a way to obtain model-estimated volumes closer to observed traffic counts. This process allowed the directional peaking patterns of individual links and screenlines to be adjusted to better match observations.

The traffic counts collected for this project are grouped into nine screenlines, depicted in Figure 2.9. Although the level of difference between counts and assigned volume may vary between individual

[1] HERE is geospatial travel time data obtained under NCDOT license.

links, if the total assigned volume crossing the screenline is close to actual counts, the general level of traffic and travel patterns is considered to be well represented by the model.

Table 5.1 shows the volume calibration results at the weekday level for each screenline. **Table 5.2** shows the percent difference between model volumes and observed counts by time period for each of the screenlines. In total, the model volumes are within two percent of the counts at the weekday level, with all but one screenline varying by less than five percent. On a time period basis, most screenlines were calibrated to within five percent of counts. There was a 21 percent differential at screenline 1 during the midday period, but this on a fairly small base traffic volume. Traffic volume comparisons for individual links by time period and direction are included in **Appendix A**.

Table 5.1
Daily Volume Calibration Results on Screenlines

			Modeled Volume			
Screenline	**Number of Links**	**Observed Count**	Before Calibration	Percent Difference	After Calibration	Percent Difference
1	8	30,947	28,712	-7%	33,032	7%
2	10	184,041	171,343	-7%	187,496	2%
3	12	50,369	40,649	-19%	48,511	-4%
4	6	60,967	52,901	-13%	59,196	-3%
5	8	48,087	49,686	3%	49,992	4%
6	12	104,053	89,884	-14%	99,260	-5%
7	16	116,979	97,592	-17%	117,864	1%
8	12	118,711	111,707	-6%	118,956	0%
9	74	929,872	812,982	-13%	901,140	-3%
Total	158	1,644,026	1,455,455	-11%	1,615,446	-2%

Source: Counts conducted by CDM Smith in 2016 and 2017 and travel demand model output.

Table 5.2
Volume Calibration Results by Time Period on Screenlines

		AM			PM			MD			NT		
Screenline	**Number of Links**	**Observed Count**	**Modeled Volume**	**Percent Difference**	**Observed Count**	**Modeled Volume**	**Percent Difference**	**Observed Count**	**Modeled Volume**	**Percent Difference**	**Observed Count**	**Modeled Volume**	**Percent Difference**
1	8	8,310	8,696	5%	10,056	10,115	1%	7,648	9,254	21%	4,933	4,967	1%
2	10	42,761	44,769	5%	53,379	52,925	-1%	55,148	57,392	4%	32,753	32,409	-1%
3	12	12,723	12,176	-4%	16,340	15,008	-8%	14,728	14,616	-1%	6,578	6,712	2%
4	6	16,403	16,547	1%	18,612	17,882	-4%	17,977	16,905	-6%	7,975	7,862	-1%
5	8	12,824	13,623	6%	15,607	15,551	0%	14,056	14,732	5%	5,600	6,086	9%
6	12	28,627	26,775	-6%	32,301	29,977	-7%	29,097	28,468	-2%	14,028	14,039	0%
7	16	32,817	32,755	0%	40,330	37,153	-8%	30,342	33,461	10%	13,490	14,495	7%
8	12	35,538	34,940	-2%	38,374	37,993	-1%	32,175	32,150	0%	12,624	13,874	10%
9	74	248,364	235,448	-5%	278,612	260,104	-7%	276,643	273,945	-1%	126,253	131,643	4%
Total	158	438,367	425,730	-3%	503,611	476,708	-5%	477,814	480,923	1%	224,234	232,086	4%

Source: Counts conducted by CDM Smith in 2016 and 2017 and TRMv6 output.

5.4 Triangle Expressway Traffic Volume Calibration Results

Table 5.3 shows the traffic volumes (assigned vs. observed) on the existing Triangle Expressway toll facility by direction for an average weekday. As part of the calibration process, select link adjustments were made to the trip tables to better replicate traffic volumes on ramps and mainlines. Any remaining differences between modeled volumes and observed counts were used to develop adjustments that were applied to future year model output.

Table 5.3
Volume Calibration Results by Time Period on Triangle Expressway

		Weekday		
Link Description	**Links**	**Observed Count**	**Modeled Volume**	**Percent Difference**
NB On From NC 55 NB	NB Ramp	8,088	8,653	7%
NB On From NC 55 SB	NB Ramp	938	1,696	81%
NB Mainline Between NC 55 SB On and US 1 NB Off	**NB Mainline**	**9,026**	**10,350**	**15%**
NB Off to US 1 NB	NB Ramp	444	816	84%
NB Off to US 1 SB	NB Ramp	371	334	-10%
NB On From US 1 SB	NB Ramp	2,217	2,016	-9%
NB On From US 1 NB	NB Ramp	3,017	2,352	-22%
NB Mainline Between US 1 On NB and S Salem St Off	**NB Mainline**	**13,445**	**13,568**	**1%**
NB Off to S Salem St	NB Ramp	1,454	1,450	0%
NB On From S Salem St	NB Ramp	1,221	1,869	53%
NB Mainline Between Salem St NB On and US 64 NB Off	**NB Mainline**	**13,212**	**13,987**	**6%**
NB Off to US 64 EB	NB Ramp	857	1,377	61%
NB On From US 64 EB	NB Ramp	2,606	3,146	21%
NB Off to US 64 WB	NB Ramp	1,092	1,592	46%
NB On From US 64 WB	NB Ramp	2,554	3,039	19%
NB Mainline Between US 64 SB On and Green Level W Off	**NB Mainline**	**16,423**	**17,204**	**5%**
NB Off to Green Level West	NB Ramp	1,404	1,752	25%
NB On From Green Level West	NB Ramp	1,267	2,256	78%
NB Mainline Between Green Level W On and NC 55 Off NB	**NB Mainline**	**16,286**	**17,707**	**9%**
NB Off to NC 55	NB Ramp	284	111	-61%
NB Off to NC 55 - Loop	NB Ramp	2,039	1,769	-13%
NB On From NC 55	NB Ramp	8,874	7,295	-18%
NB Mainline Between NC 55 On and Toll NC 147 Off	**NB Mainline**	**22,837**	**23,121**	**1%**
NB Off to Toll NC 147	NB Ramp	6,995	9,201	32%
NB Mainline Between Toll NC 147 Off and Toll NC 147 On	**NB Mainline**	**15,842**	**13,921**	**-12%**
NB On From Toll NC 147	NB Ramp	2,687	3,434	28%
NB Mainline Between Toll NC 147 On and NC 54 Off	**NB Mainline**	**18,529**	**17,354**	**-6%**
NB Off to NC 54	NB Ramp	2,612	3,471	33%
NB On From NC 54	NB Ramp	9,830	12,071	23%
NB North Of NC 54	NB Ramp	25,747	25,954	1%
NB Mainline Between NC 540 On and Davis Off	**NB Mainline**	**9,019**	**12,421**	**38%**
NB Off to Davis Dr	NB Ramp	2,415	3,635	51%
NB On From Hopson Rd	NB Ramp	2,589	2,901	12%
NB Off to I-40 SB	NB Ramp	179	0	-100%
NB Off to I-40 NB	NB Ramp	2,398	3,168	32%
SB North Of NC 54	**SB Mainline**	**24,343**	**23,135**	**-5%**
SB Off to NC 54	SB Ramp	9,456	10,500	11%
SB On From NC 54	SB Ramp	2,924	3,402	16%
SB Mainline Between NC 54 On and Toll NC 147 Off	**SB Mainline**	**17,811**	**16,037**	**-10%**
SB Off to Toll NC 147	SB Ramp	2,024	3,221	59%
SB Mainline Between Toll NC 147 Off and Toll NC 147 On	**SB Mainline**	**15,787**	**12,816**	**-19%**
SB On From Toll NC 147	SB Ramp	6,756	8,898	32%
SB Mainline Between Toll NC 147 On and NC 55 Off	**SB Mainline**	**22,543**	**21,715**	**-4%**
SB Off to NC 55	SB Ramp	3,602	3,630	1%
SB Off to NC 55 - Loop	SB Ramp	4,255	2,822	-34%
SB On From NC 55	SB Ramp	2,322	2,250	-3%
SB Mainline Between NC 55 On and Green Level W Off	**SB Mainline**	**17,008**	**17,513**	**3%**
SB Off to Green Level West	SB Ramp	1,680	2,193	31%
SB On From Green Level West	SB Ramp	1,402	1,823	30%
SB Mainline Between Green Level W On and US 64 Off	**SB Mainline**	**16,730**	**17,143**	**2%**
SB Off to US 64 WB	SB Ramp	2,705	3,212	19%
SB On From US 64 WB	SB Ramp	835	1,752	110%
SB Off to US 64 EB	SB Ramp	2,701	3,101	15%
SB On From US 64 EB	SB Ramp	1,247	1,716	38%
SB Mainline Between US 64 NB On and S Salem St Off	**SB Mainline**	**13,406**	**14,297**	**7%**
SB Off to S Salem St	SB Ramp	1,350	1,929	43%
SB On From S Salem St	SB Ramp	1,551	1,718	11%
SB Mainline Between S Salem St On and US 1 Off SB	**SB Mainline**	**13,607**	**14,086**	**4%**
SB Off to US 1 SB	SB Ramp	2,941	2,654	-10%
SB On From US 1 SB	SB Ramp	267	986	269%
SB Off to US 1 NB	SB Ramp	2,482	3,474	40%
SB On From US 1 NB	SB Ramp	351	436	24%
SB Mainline Between US 1 NB On and NC 55 SB Off	**SB Mainline**	**8,802**	**9,381**	**7%**
SB Off to NC 55 SB	SB Ramp	7,617	7,644	0%
SB Off to NC 55 NB	SB Ramp	1,185	1,737	47%
SB On From I-40 NB	SB Ramp	139	0	-100%
SB On From I 40 SB	SB Ramp	2,600	3,488	34%
SB Off to Hopson Rd	SB Ramp	2,348	2,961	26%
SB On From Davis Dr	SB Ramp	2,981	3,562	19%
SB Mainline Betweeen Davis On and NC 540 Off	**SB Mainline**	**9,443**	**12,332**	**31%**
Percent Root Mean Squared Error (%RMSE)				17%

Source: Counts conducted by CDM Smith in 2016 and 2017 and TRMv6 output.

5.5 Speed Calibration

The primary objective of speed calibration was to ensure that the speeds estimated by the travel demand model closely replicate the observed speeds and that the model exhibits congestion at locations where there is actual congestion, while not showing congestion where there is no congestion in the field. CDM Smith compiled observed directional travel speed data from HERE for the year 2016 along the major roadways in the study area and summarized it for the eight time periods in the model, by segment. The resulting speed profiles (color-coded "heat" maps) served as the basis for comparison with the model-estimated speeds.

In addition to changes in the free-flow speeds of selected roadways, adjustments were made to the volume-delay curves at key bottleneck locations to enable the model to better reflect the congestion on the roadways based on observed speed data from HERE. The model calibration process was an iterative process recognizing that adjustments to speed affected the assigned traffic volumes, and changes to assigned traffic volumes resulted in changes in speeds on roadways. The iterative process ensured that adjustments made to improve speeds were not detrimental to the estimated volumes. **Table 5.4** shows the results of the speed calibration by roadway by direction. In general, most of the model-estimated speeds are within five miles per hour (MPH) at the overall corridor level, although there were a few segments where this could not be achieved without considerably affecting the volume calibration.

5.6 Travel Pattern Validation

Once the model calibration to speeds and volumes was completed, a final check against the Streetlight travel pattern data was made. Two sample movements from the Streetlight data are shown in Figures 2.7 and 2.8. The observed share of trips that travel from the southern end of the existing Triangle Expressway to a point just north of NC 55 is about 50 percent in the case of both the Streetlight data and the model. The Streetlight data shows 31 percent of the trips from the southern end of the project travel to the northern end of Toll NC 540 (north of the Toll NC 147 interchange), while the model shows 19 percent. Similarly, in the southbound direction, **Table 5.5** shows a comparison from the link at the northern end of the Triangle Expressway to multiple points south. From this point, Streetlight data shows about 27 percent of the traffic travels as far as US 64 while the model shows 39 percent. Streetlight data shows about eight percent of the total traffic from the northern end of the Triangle Expressway travels to the southern end, the entire length of the project, while the model shows 11 percent make this movement.

These, and other comparisons, indicate that the travel patterns within the model for the study area zones reasonably replicate the travel patterns observed from the Streetlight data, and are within the tolerance limits of both the data and the model.

Table 5.4
Speed Calibration Results by Roadway and Direction

Road Name	From	To	Dir.	Length (miles)	Observed Speed (HERE) (1) Free Flow	AM1	AM2	AM3	MD	PM1	PM2	PM3	Modeled Speed (1) Free Flow	AM1	AM2	AM3	MD	PM1	PM2	PM3	Speed Difference (Modeled - Observed) (1) Free Flow	AM1	AM2	AM3	MD	PM1	PM2	PM3
US 64/US 1	I-40	US 64/Tryon Rd/Exit 98	WB	3.6	66	66	65	64	65	62	50	58	66	63	62	62	62	55	55	60	0	-3	-3	-2	-3	-7	5	3
US 64/US 1	US 64/Tryon Rd/Exit 98	I-40	EB	3.3	65	65	44	38	62	59	45	52	68	56	44	34	62	57	44	53	3	-9	1	-4	0	-2	-1	1
US 64	US 1/Tryon Rd	NC 751/Chapel Rd	WB	9.0	54	51	46	44	46	45	40	43	57	52	47	49	50	42	43	48	4	1	1	4	4	-2	3	5
US 64	NC 751/Chapel Rd	US 1/Tryon Rd	EB	9.0	55	53	45	41	47	46	37	41	58	48	39	42	48	42	44	47	3	-5	-6	1	1	-4	7	6
US 401	S Saunders St	NC 55/NC 42	SB	13.8	47	43	40	38	40	37	33	36	48	46	45	45	44	33	26	40	1	3	6	6	4	-5	-7	4
US 401	NC 55/NC 42	S Saunders St	NB	13.1	48	44	33	33	39	39	39	40	49	37	30	37	44	43	44	45	1	-7	-3	4	4	4	5	5
US 1	US 64/Tryon Rd/Exit 98	New Hill/Exit 89	SB	9.5	69	69	69	68	68	65	59	65	71	69	68	69	68	61	62	66	2	0	0	1	1	-4	3	1
US 1	New Hill/Exit 89	US 64/Tryon Rd/Exit 98	NB	9.4	70	70	56	58	67	68	68	67	71	65	59	63	69	66	67	68	1	-5	3	4	1	-2	-1	1
Ten Ten Rd	Old Stage Rd	US 1	WB	10.7	43	36	27	28	36	35	35	36	39	29	26	29	35	33	33	35	-4	-7	-1	1	-1	-2	-2	-1
Ten Ten Rd	US 1	Old Stage Rd	EB	8.5	43	39	34	34	36	30	25	26	39	37	35	35	35	27	24	30	-3	-2	1	1	-1	-3	-2	4
NC 55 Byp	NC 55 Byp/E Williams St	NC 55/S Main St	SB	4.4	51	48	44	43	41	33	25	28	51	50	49	48	47	38	32	39	0	2	5	6	6	5	8	11
NC 55 Byp	NC 55/S Main St	NC 55 Byp/E Williams St	NB	4.4	52	48	38	40	42	41	41	41	52	44	34	37	47	46	46	48	0	-4	-4	-3	5	5	6	7
NC 55	US 401/N Main St	MLK Pkwy	WB	27.6	42	39	32	31	33	32	31	32	42	34	28	31	37	35	34	36	0	-5	-5	0	3	2	3	4
NC 55	MLK Pkwy	US 401/N Main St	EB	27.7	41	38	34	32	33	30	27	29	41	38	35	36	36	30	28	33	0	0	1	4	3	-1	1	4
NC 540	I-40/Exit 1	NC 55 Byp	WB	15.1	71	70	69	68	69	70	71	70	74	73	73	73	73	72	71	72	3	4	4	5	5	1	0	2
NC 540	NC 55 Byp	I-40/Exit 1	EB	16.5	72	71	71	70	68	69	69	69	73	71	70	71	72	72	72	72	1	0	-1	2	4	3	3	4
NC 42	US 70/S Lombard St	US 401/N Main St	WB	18.0	47	42	38	38	40	37	35	36	44	39	38	39	39	36	34	38	-3	-3	0	1	0	-1	-1	2
NC 42	US 401/N Main St	US 70/S Lombard St	EB	18.1	46	42	38	38	40	37	35	36	44	39	36	38	40	37	37	39	-2	-3	-2	-1	1	0	2	3
NC 147	TW Alexander Dr/ Exit 7	NC 540	SB	4.9	68	68	64	60	66	56	60	65	66	65	64	64	64	62	61	64	-2	-3	-1	4	-2	6	1	-2
NC 147	NC 540	TW Alexander Dr/Exit 7	NB	5.2	69	69	60	59	67	66	51	57	66	63	60	53	64	63	54	65	-3	-6	0	-6	-2	-3	3	8
I-540	US 64/US 264	I-40/Exit 1	WB	26.0	70	70	52	49	68	69	68	68	75	69	58	65	71	70	70	72	5	-1	5	16	3	2	2	4
I-540	I-40/Exit 1	US 64/US 264	EB	24.9	69	69	69	68	69	59	42	52	74	73	71	71	71	64	58	71	5	3	2	3	2	5	16	19
I-440	I-40/Exit 16	US 64	WB	3.5	63	62	54	54	62	62	60	62	61	58	56	58	59	57	57	60	-2	-4	2	4	-3	-5	-3	-2
I-440	US 64	I-40/Exit 16	EB	4.0	62	61	43	45	61	53	43	55	63	61	61	62	61	54	49	60	0	1	18	16	0	1	6	6
I-40	NC 210/Exit 319	Fayetteville Rd/ Exit 276	WB	42.7	68	60	45	46	65	64	53	58	68	54	51	55	60	55	56	62	0	-6	7	8	-5	-8	3	4
I-40	Fayetteville Rd/ Exit 276	NC 210/Exit 319	EB	36.2	67	67	64	61	65	47	36	45	66	62	55	57	58	42	41	55	-1	-5	-9	-4	-6	-4	5	10
Davis Dr	E Cornwallis Rd	US 64	SB	11.6	44	42	37	35	37	35	30	32	44	42	39	39	40	34	32	37	0	1	1	4	4	-1	2	5
Davis Dr	US 64	E Cornwallis Rd	NB	11.6	44	42	38	35	37	36	35	36	44	39	32	34	41	39	38	40	0	-3	-7	-1	3	3	3	4

(1) Time periods correspond to the following hours:

- AM1 = 0600-0700
- AM2 = 0700-0800
- AM3 = 0800-0900
- MD = 0900-1600
- PM1 = 1600-1700
- PM2 = 1700-1800
- PM3 = 1800-1900

Legend:
- >50 mph
- 40-50 mph
- 30-40 mph
- 20-30 mph
- 10-20 mph
- 0-10 mph

Table 5.5
Through Trip Comparison - Model vs. Streetlight

Direction	Origin Segment	Destination Segment	Streetlight	Model
Northbound	NC 55 Byp to US 1	North of US64	78%	60%
		North of NC55	52%	50%
		North of Toll NC 147	31%	19%

Location	Origin Segment	Destination Segment	Streetlight	Model
Southbound	NC 54 to Toll NC 147	North of NC 55	90%	80%
		North of US64	27%	39%
		North of NC 55 Byp	8%	11%

Chapter 6

Scenario 1: Triangle Expressway Traffic and Revenue Forecast

As described in Chapter 1, this Traffic and Revenue Study develops two discrete forecast scenarios:

- **Scenario 1**: Triangle Expressway assuming Complete 540 is not constructed. This scenario will also be called the **Triangle Expressway Scenario** or forecast in this report. The Triangle Expressway is an existing toll road consisting of Toll NC 540 and Toll NC 147.

- **Scenario 2**: Triangle Expressway assuming the proposed Complete 540 Phase 1. Phase 1 would extend the Triangle Expressway from its southern terminus at the NC 55 Bypass to Interstate 40 (I-40) and U.S. 70 (the Clayton Bypass). This scenario will also be called the **Complete 540 Scenario** or forecast in this report. This study assumes that Complete 540 Phase 1 would open on July 1, 2023.

This chapter presents Scenario 1, the Triangle Expressway traffic and revenue forecast from Fiscal Year 2019 through 2058 and the toll sensitivity analysis. The forecast includes a new planned interchange with Morrisville Parkway, and planned toll-zone relocations at the Hopson Road and U.S. 64 interchanges, from the current ramp locations to mainline locations. No further additions or expansions to the Triangle Expressway are assumed in the forecast presented in this chapter. Important assumptions to the forecast are provided in this chapter.

Also included in this chapter is a description of the forecasting approach that was common to both Scenarios 1 and 2.

6.1 Forecasting Approach

For each of the two forecasting scenarios, traffic and revenue projections were developed for calendar years 2019 through 2058, and then converted to fiscal years (FY), which extend from July 1st through June 30th. In developing the long-range forecasts, the recently released Triangle Regional Model Version 6 (TRMv6) was used; this model has a long-range horizon year of 2045. In developing the estimates, travel demand model runs were made at 2020, 2025, 2035 and 2045. Projections for years 2018 and 2019 were based on historical traffic and toll revenue trends on the Triangle Expressway, available through June 2018. The forecast for 2020 was developed by using model impacts in combination with recent historical trend data. Forecasts between 2020 and 2045 were developed primarily through interpolation between model year control points. Estimates for years following 2045 were based on assumed nominal growth in traffic, and annual toll rate increases of approximately 2.0 percent.

The forecast period in this study extends beyond the year 2040. With progressive developments in vehicle technology, it is widely anticipated there will likely be modifications in urban mobility patterns in the long term. In particular, it is anticipated that there will be a gradual increasing shift toward “shared mobility” travel and ultimately, fully autonomous driverless vehicles. While it is increasingly accepted that mobility change is coming, there remains considerable uncertainty regarding exactly what will occur and when the transition will happen.

As such, the modeling methodology and the overall forecasting process used in this study does not explicitly assume any specific change in how people and goods will travel in the future. Based on research now underway, it is likely that over the long term we may see a reduction in the number of vehicles on the road but an actual increase in vehicle miles of travel, depending on the level of shift to shared mobility services.

On balance, the impact on potential traffic and toll revenue may prove to be negligible. However, it is noted that the forecasts included in this report do not assume any specific change in travel patterns and characteristics, beyond modest assumed increases in telecommuting. If disruptive technology change does ultimately have a significant impact on urban mobility, it will likely occur after the year 2040; hence, relatively late in the forecast period covered by this study.

6.1.1 Planned Triangle Expressway Interchange and Tolling Configuration Changes

As discussed previously in Chapter 1, a new full-access interchange will be added to the Triangle Expressway at Morrisville Parkway, north of the existing interchange at Green Level West Road. This study assumes the interchange will open to tolled traffic on January 1, 2020. With the opening of the Morrisville Parkway Interchange, a new mainline toll zone will be located north of the interchange, as shown in Figure 1.3. This will, in turn, require an adjustment to the toll rate at the existing mainline toll zone north of Green Level West Road to maintain per-mile toll rates on the Triangle Expressway.

Two other toll-system changes are planned for the Triangle Expressway. Existing ramp toll zones, to-and-from the north at Hopson Road and U.S. 64 will be removed and replaced by new mainline toll zones to the north of each interchange (as shown in Figure 1.3). The net result will be the substitution of two new mainline toll points for two pairs of ramp toll locations. These toll system changes are assumed to be implemented on January 1, 2024. At that time, adjustments will be required at adjacent mainline toll points to maintain the overall per-mile rates for through trips.

The new Morrisville Parkway Interchange and changes in toll-zone locations will result in an increased number of toll transactions, and a slight decrease in overall average toll rates per transaction. These changes will be apparent beginning in the traffic and revenue forecasts for FY 2020 and FY 2024. These are the only changes to the current Triangle Expressway physical configuration assumed in the traffic and revenue forecast presented in this chapter. The same Triangle Expressway improvements are also assumed in Scenario 2.

6.2 Future Transportation Improvements

A critical element in any comprehensive traffic and revenue study is assumptions regarding competing and complementary transportation improvements which may be expected to occur during the forecast period. As part of this study, CDM Smith reviewed the planned and proposed roadway improvement programs in the study area from the following sources:

1. The adopted ***2018-2027 NCDOT State Transportation Improvement Program*** (STIP). These are projects that have an identified funding and construction schedule. Projects in the STIP were all scored and prioritized through the NCDOT's Strategic Prioritization Office (SPOT) program, which is the methodology used to evaluate and score all transportation projects.

2. The ***2045 Metropolitan Transportation Plan*** (MTP). This is the long-range plan for transportation in the Triangle region. It includes roadway, transit, rail, bicycle, and pedestrian projects to be implemented through the year 2045. This plan is coordinated by the two Metropolitan Planning Organizations (MPOs) in the study area; the Capital Area MPO (CAMPO) and the Durham Chapel-Hill Carrboro MPO (DCHC MPO). Roadway improvements in the 2045 MTP include the current STIP projects. Future projects not included in the STIP do not have current schedules and are not financially committed but were developed recognizing overall future fiscal sources and constraints.

Roadway improvements in the STIP and the 2045 MTP were included in the newly developed and released TRMv6. The TRMv6 is developed and supported by the Institute for Transportation Research and Education (ITRE), a division of North Carolina State University. The TRMv6 model supports future years 2025, 2035 and 2045, so road improvements were incorporated into the appropriate completion year.

CDM Smith reviewed the STIP and MTP transportation projects and compared them to the projects in the TRMv6 for consistency. NCDOT personnel were contacted by CDM Smith to verify estimated project completion dates for modeling purposes.

A very large number of highway improvements were assumed in this study, many of which would be competitive to the Triangle Expressway or Complete 540 Phase 1. While many of these projects are not yet funded, it was considered appropriate and conservative to assume the completion of the projects for developing long-range forecasts for Triangle Expressway (and Complete 540 discussed in Chapter 7). The shorter-term projects identified in the NCDOT STIP were included in the 2025 travel demand model networks. The longer-range improvements covered in the MTP were included in either the 2035 or 2045 TRMv6 networks as received by CDM Smith.

The following subsections describe many of the roadway improvement projects assumed in the TRMv6 roadway networks in the study area (and included in the STIP and MTP). The improvements discussed are limited to planned additional capacity (increased number of through travel lanes) and new interchanges on limited access roadways. There are additional roadway improvements assumed in the TRMv6 that include work such as pavement repair and maintenance, signalization improvements, turning lane additions, and grade separations.

6.2.1 Assumed 2025 Roadway Improvements

Figure 6.1 shows roadway improvements included in the TRMv6 2025 highway networks in the Triangle Expressway and Complete 540 corridors. These improvements were assumed in the modeling and in development of traffic and toll revenue forecasts. All the improvements shown are either road widenings, a new interchange, or, in a few cases, a new road segment. The improvements are generally competitive with the Triangle Expressway and Complete 540, as they improve traffic flow and connectivity through the area on toll-free routes. A notable exception would be the planned widening of NC 147 north of I-40 from four to eight lanes (STIP # U-5934) which does not compete with the Triangle Expressway or Complete 540.

Table 6.1 provides more detail on each of the proposed improvements; the project ID number is shown for each improvement and can be related to the numbers shown in Figure 6.1. Of particular significance with respect to the planned Complete 540 Phase 1 is the assumed widening of I-40 from six to eight lanes on the north-south segment between U.S. 70 and I-440 and on the east -west segment between U.S. 401 and U.S. 1. Overall, a significant amount of increased capacity is assumed to

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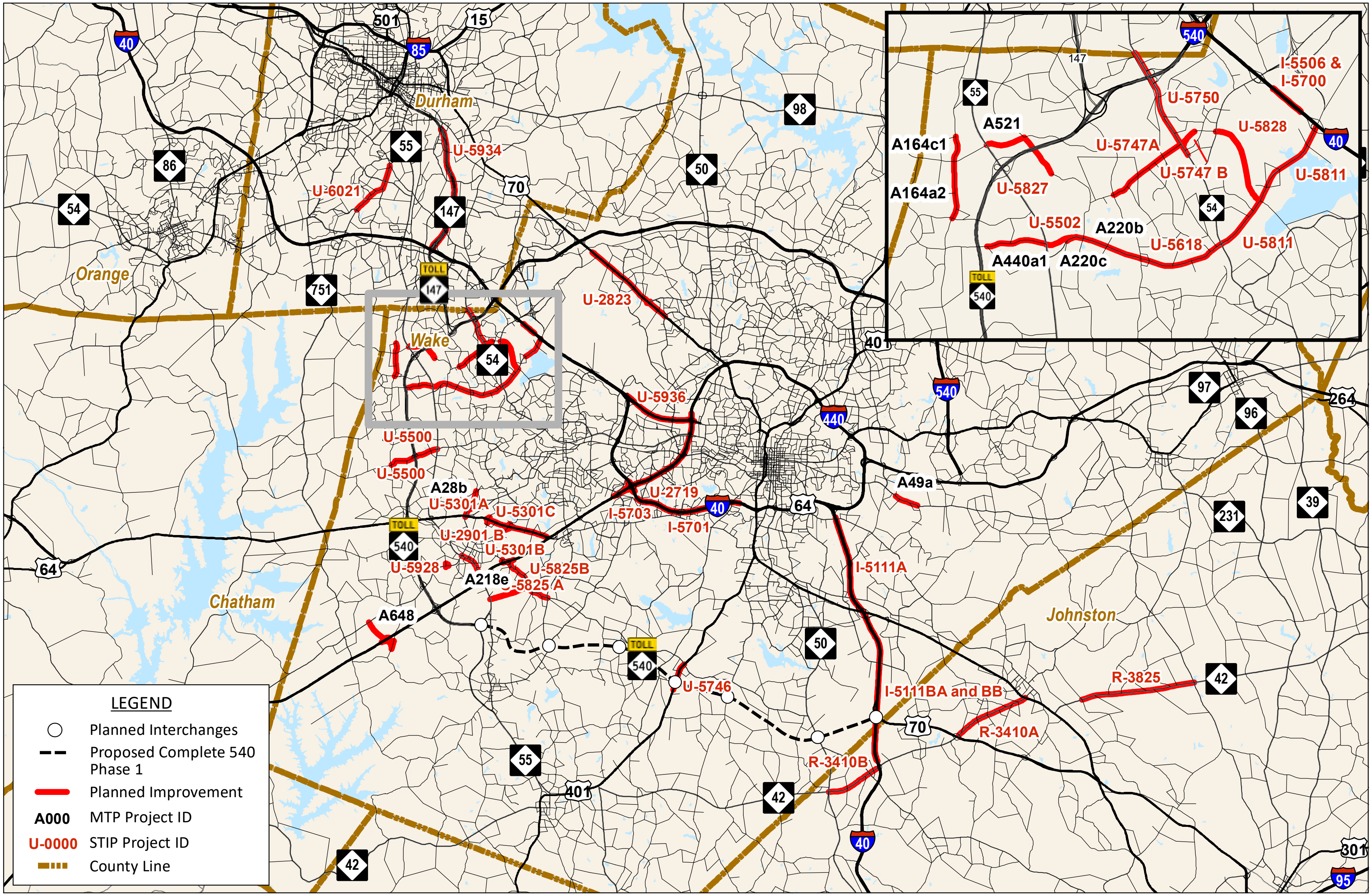

ASSUMED LONG-RANGE HIGHWAY IMPROVEMENTS - 2025

FIGURE 6.1

Table 6.1
2025 STIP Roadway Improvements
Assumed in the TRMv6

Project STIP/MTP ID	Roadway	Location	Description
A164a2	Green Level Church Rd	O'Kelly Chapel Rd to McCrimmon Parkway	Widen from 2 to 4 lanes
A164c1	Green Level Church Rd	Folklore Way to O'Kelly Chapel Rd	Widen from 2 to 4 lanes
A218e	Jessie Dr (part NL)	NC 55 to Ten Ten Rd	Construct 2 lanes on new location
A220b	Morrisville Carpenter Rd	Davis Dr to Louis Stephens Dr	Widen from 2 to 4 lanes
A220c	Morrisville Carpenter Rd	Louis Stephens Dr to Good Hope Church Rd	Widen from 2 to 4 lanes
A28b	Davis Dr	Farm Pond Rd to US 64	Widen from 2 to 4 lanes
A440a1	Carpenter Fire Station Rd	Cameron Pond Dr to NC 55	Widen from 2 to 4 lanes
A49a	Poole Rd	Maybrook Dr to Barwell Rd	Widen from 2 to 4 lanes
A521	O'Kelley Chapel Rd	Louis Stephens Dr to NC 55	Construct 4 lanes on new location
A648	US 1/Friendship Interchange	Ols US 1 Highway to Friendship Rd	Interchange
I-5111A	I-40 (East)	I-440 to US 70 Buisness	Widen from 6 to 8 lanes
I-5111BA & BB	I-40 (East)	US 70 Business to NC 42	Widen from 4 to 8 lanes
I-5506	Aviation Parkway Interchange (Impr)	National Guard Dr to I-40	Interchange
I-5700	Airport Blvd Interchange (Impr)	I-540 to Aviation Parkway	Construct auxillary lanes
I-5701	I-40	US 1/64 to Lake Wheeler Rd	Widen from 6 to 8 lanes
I-5703	I-40/US 1/US 64 Interchange	I-40/US 1/US 64	Interchange
R-3410A	NC 42 West	US 70 Business to US 70 Bypass	Widen from 2 to 4 lanes
R-3410B	NC 42	NC 50 to I-40	Widen from 2 to 4 lanes
R-3410B	NC 42 West Widening	US 70 Bypass to I-40	Widen from 2 to 4 lanes
R-3825	NC 42 East Widening	Glen Laurel Rd to Buffaloe Rd	Widen from 2 to 4 lanes
U-2719	I-440 Widening	US 1/64 to Wade Avenue	Widen from 4 to 6 lanes
U-2823	US 70	Lumley/Westgate Rd to Duraleigh/Millbrook	Widen from 4 to 6 lanes
U-2901B	NC 55	Apex Peakway (South) to Salem St	Widen from 2 to 4 lanes
U-2901B	NC 55	Salem St to Bryan Dr	Widen from 2 to 4 lanes
U-5301A	US 64/Laura Duncan Interchange (New)	US 64 to Laura Duncan Rd	Interchange
U-5301B	US 64/Lake Pine Interchange (New)		Interchange
U-5301C	US 64/Lake Pine Interchange (New)	US 1 to Lake Pine Dr	Interchange
U-5500	Green Level West Rd	NC 55 to I-540	Widen from 2 to 4 lanes
U-5500	Green Lvl W Rd Widening	NC 540 to Green Level Church Rd	Widen from 2 to 4 lanes
U-5502	Carpenter Fire Station Ext	NC 55 to Morrisville Carpenter Rd	Construct 4 lanes on new location
U-5618	Morrisville Carpenter Rd	Page St to Davis Dr	Widen from 2 to 4 lanes
U-5747A	McCrimmon Parkway Ext	NC 54 to Davis Dr	Widen from 2 to 4 lanes
U-5747B	McCrimmon Parkway	Airport Blvd to NC 54	Widen from 2 to 4 lanes
U-5750	NC 54	Perimeter Park Dr to Northern Twn Limits	Widen from 2 to 6 lanes
U-5811	Aviation Parkway	Gateway Centre Blvd to Dominion Dr	Widen from 2 to 4 lanes
U-5811	Aviation Parkway	Evans Rd to NC 54	Widen from 2 to 4 lanes
U-5811	Aviation Parkway	I-40 to Gateway Centre Blvd	Widen from 4 to 6 lanes
U-5825A	Ten Ten Rd	US 1	Interchange
U-5825B	Ten Ten Rd	Kildare Farm Rd to US 1	Widen from 2 to 4 lanes
U-5827	Louis Stephens Dr Ext (NL)	Little Drive to Poplar Pike Lane	Construct 4 lanes on new location
U-5828	McCrimmon Parkway	Airport Blvd to Aviation Parkway	Widen from 2 to 4 lanes
U-5928	Apex Peakway/Salem St Interchange		Interchange
U-5934	NC 147	East End Connector to I-40	Widen from 4 to 8 lanes
U-5936	Wade Ave Widening	I-40 to I-440	Widen from 4 to 6 lanes

be provided by 2025; a relatively conservative assumption for purposes of projecting future traffic and revenue on the overall Toll NC 540 corridor.

6.2.2 Longer Range Roadway Improvements

Figure 6.2 and **Table 6.2** present additional roadway improvements assumed to be completed by 2035. Many of the improvements are in the Triangle Expressway and Complete 540 corridors. The improvements are primarily road widenings, generally from two to four lanes.

There are many planned improvements on I-40, comprised primarily of roadway widening to address future anticipated traffic demand. Included in the planned improvements is a capacity increase on I-40 of an additional lane in each direction from the Durham County line, southward to NC 210 in Johnston County. This improvement may be implemented as either a managed lane, or possibly, an additional toll-free lane. The TRMv6 model assumes the additional capacity increase as a tolled, managed lane. This study also assumes the proposed capacity increase will be managed lanes, tolled at a level to preserve free-flow traffic conditions in the managed lanes. Managed lanes are also assumed to be implemented on I-540, north of Raleigh.

Figure 6.3 and **Table 6.3** provide information on long-range improvements assumed to be in place by 2045. The projects shown are mostly roadway widenings, and most are located in the southern Triangle Expressway and Complete 540 corridors. Most notable would be the assumed widening of Ten Ten Road from two to four lanes. Again, improvements shown in Figure 6.3 and Table 6.3 are assumed to be in place by 2045, relatively late in the traffic and revenue projection period.

6.2.3 Excluded Improvement in the Base Case

One planned improvement was excluded from the Scenario 1: Triangle Expressway traffic and revenue analysis and forecast. Included in the STIP and MTP, and in the original TRMv6 2025, 2035 and 2045 networks are the planned improvement to build an approximately 1.6-mile toll-free extension of NC 147, from the southern end of Toll NC 147 to McCrimmon Parkway and Little Road. The improvement would include modifications to the existing interchange between Toll NC 540 and Toll NC 147 and associated toll zone and toll schedule modifications. This project is identified as TIP number U-5966.

This improvement, while planned, does not have current committed funding, and the completion of the project does have estimated positive transaction and toll revenue impacts on the Triangle Expressway. For conservative purposes, the Scenario 1 and Scenario 2 forecasts assume that this project does not occur during the forecast period.

6.3 Basic Assumptions

Traffic and revenue estimates for the Triangle Expressway are predicated on the following basic assumptions, which are considered reasonable for purpose of the base case forecasts:

1. For purposes of Scenario 1, no portion of Complete 540 is assumed to be implemented during the projection period. Scenario 1 envisions only the continued operation of the existing Triangle Expressway with certain interchange and toll zone location modifications as enumerated herein.

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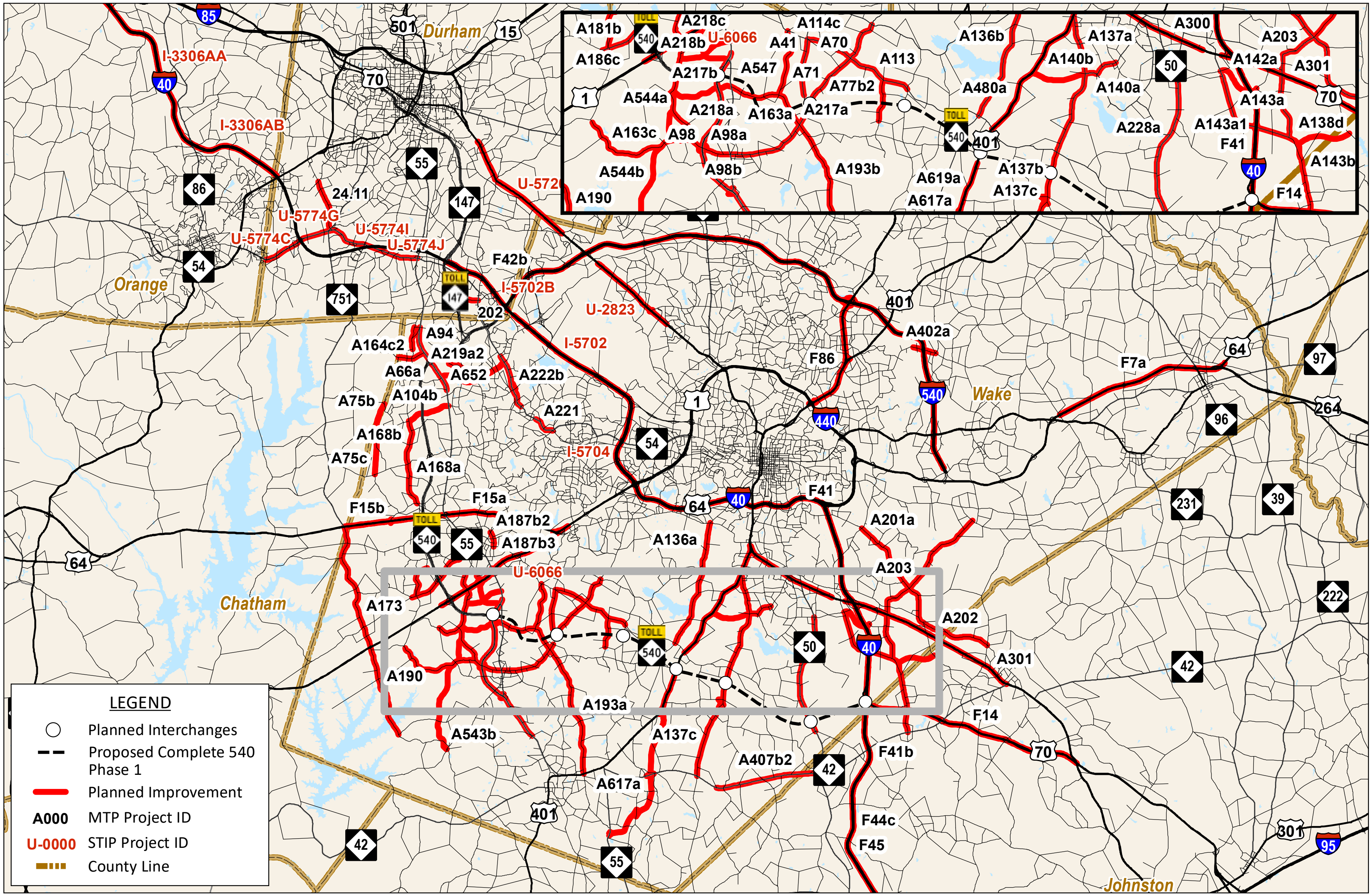


ASSUMED LONG-RANGE HIGHWAY IMPROVEMENTS - 2035

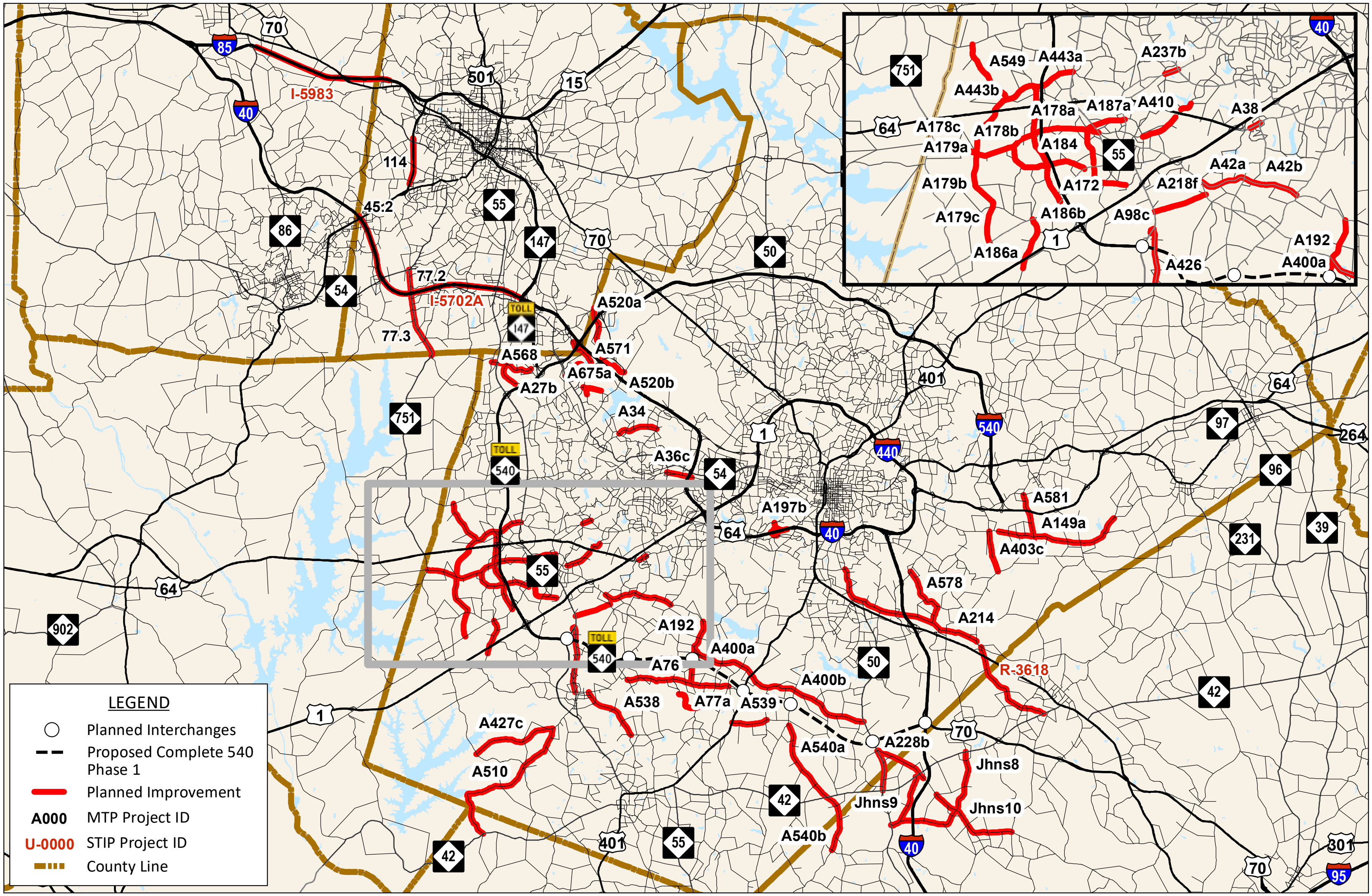
FIGURE 6.2

Table 6.2 (Page 1 of 2)
Year 2035 Roadway Improvements
Assumed in the Complete 540 Forecast Model

Project STIP/MTP ID	Roadway	Location	Description
24.11	Garrett Rd	NC 751 to Old Durham Rd	Widen from 2 to 4 lanes
202	Hopson Rd	Davis Dr to S Miami Blvd (NC 54)	Widen from 2 to 4 lanes
A104b	Morrisville Parkway	Green Level Church Rd to NC 55	Widen from 2 to 4 lanes
A113	Ten Ten Rd	Holly Springs Rd to Bells Lake Rd	Widen from 2 to 4 lanes
A114c	Ten Ten Rd	Holly Springs Rd and Kildare Farm Rd	Widen from 2 to 4 lanes
A136a	Lake Wheeler Rd	Tryon Rd to Penny Rd	Widen from 2 to 4 lanes
A136b	Lake Wheeler Rd	Penny Rd to Ten Ten Rd	Widen from 2 to 4 lanes
A136c	Lake Wheeler Rd	Ten Ten Rd to Hilltop-Needmore Rd	Widen from 2 to 4 lanes
A137a	Old Stage Rd	US 40 to Ten Ten Rd	Widen from 2 to 4 lanes
A137b	Old Stage Rd	Ten Ten Rd to Rock Service Station	Widen from 2 to 4 lanes
A137c	Old Stage Rd	Rock Service Station to NC 42	Widen from 2 to 4 lanes
A138d	White Oak-Guy Rd Connector	White Oak Rd to Guy Rd	Construct 4 lanes on new location
A140a	Vandora Springs Rd & Extension	Timber Dr to Old Stage Rd	Widen from 2 to 4 lanes
A140b	Vandora Springs Rd & Extension	Old Stage Rd to US 401	Widen from 2 to 4 lanes
A142a	Timber Dr East	Waterfiled Rd to White Oak Rd	Construct 4 lanes on new location
A143a	White Oak Rd	US 70 to I-540	Widen from 2 to 4 lanes
A143a1	I-40/White Oak Interchange		Interchange
A143b	White Oak Rd	I-540 to NC 42 (Johnston Co)	Widen from 2 to 4 lanes
A163a	Holly Springs Rd	Old Holly Springs Rd to N of NC 540 Interchange	Widen from 2 to 4 lanes
A163c	Friendship Rd	Richardson Rd to Old Holly Springs Apex	Widen from 2 to 4 lanes
A164c2	Green Level Church Rd	Kit Creek Rd to Precept Way	Widen from 2 to 4 lanes
A165a2	Airport Blvd Extension	Garden Square Lane to NC 54	Construct 4 lanes on new location
A165b	Airport Blvd Extension	Davis Dr to Louis Stephens Rd	Construct 2 lanes on new location
A168a	Green Level Church Rd	Green Level West to Jenks Rd	Widen from 2 to 4 lanes
A168b	Green Level Church Rd	Green Level West to Morrisville Parkway	Widen from 2 to 4 lanes
A173	New Hill Olive Chapel Rd	Old US 1 to Chatham Co.	Widen from 2 to 3 lanes
A187b2	Apex Peakway (East)	Laura Duncan to Old Raleigh Rd	Widen from 2 to 4 lanes
A187b3	Apex Peakway (East)	Old Raleigh Rd to Center Street	Widen from 2 to 4 lanes
A190	New Hill Holleman Rd	Old US 1 to Avent Ferry Rd	Widen from 2 to 4 lanes
A193a	Sunset Lake Rd	US 401 to Hilltop-Needmore Rd	Widen from 2 to 4 lanes
A193b	Sunset Lake Rd	Hilltop-Needmore Rd to Optimist Farm Rd	Widen from 2 to 4 lanes
A201a	Rock Quarry Rd	New Hope Rd to Battle Bridge Rd	Widen from 2 to 4 lanes
A202	East Garner Rd	Rock Quarry Rd to Shotwell Rd	Widen from 2 to 4 lanes
A203	Auburn-Knightdale Rd	Grasshopper Rd to Raynor Rd	Widen from 2 to 4 lanes
A217a	Sunset Lake Rd	Main St to Optimist Farm Rd	Widen from 2 to 4 lanes
A217b	Sunset Lake Rd Extension	Old Holly Springs Apex to Main St	Construct 4 lanes on new location
A218a	Old Holly Springs Apex Rd	Holly Springs Rd to Jessie Dr	Widen from 2 to 4 lanes
A218b	Jessie Dr (part NL)	Veridea Parkway to NC 55	Construct 4 lanes on new location
A218c	Veridea Parkway	Tingen Rd to Jessie Dr	Widen from 2 to 3 lanes (turn lane)
A218d	Tingen Rd	Apex Peakway to Old Holly Springs Apex Rd	Widen from 2 to 3 lanes (turn lane)
A219a2	McCrimmon Parkway Extension	Davis Dr to Louis Stephens Rd	Widen from 2 to 4 lanes
A219b	McCrimmon Parkway Extension	Louis Stephens Rd to NC 55	Construct 4 lanes on new location
A221	NC 54	N.W. Maynard Rd to Wilson Rd	Widen from 2 to 6 lanes
A222b	NC 54	Weston Parkway to McCrimmon Pkwy	Widen from 2 to 4 lanes
A228a	NC 50	Timber Dr to I-540	Widen from 2 to 4 lanes
A27d	Louis Stephens Dr Ext (part existing)	Poplar Pike Lane to Airport Blvd	Widen from 2 to 4 lanes

Table 6.2 (Page 2 of 2)
Year 2035 Roadway Improvements
Assumed in the Complete 540 Forecast Model

Project STIP/MTP ID	Roadway	Location	Description
A300	US 70	US 401 to I-40	Widen from 4 to 6 lanes
A301	US 70	I-40 to NC 42	Widen from 4 to 6 lanes
A402a	Buffaloe Rd	Spring Forest Rd Ext to Forestville Rd	Widen from 2 to 4 lanes
A407b2	NC 42	John Adams Rd to NC 50	Widen from 2 to 4 lanes
A41	Kildare Farm Rd	Ten Ten Rd to Kildare Farm Connector	Widen from 2 to 4 lanes
A449	Perry Rd Extension	Apex Peakway to NC 55 Bypass	Construct 4 lanes on new location
A480a	US 401 (South)	US 70 to Ten Ten Rd	Widen from 4 to 6 lanes
A543b	Rex Rd Realignment	Avent Ferry Connector to Cass Holt Rd	Construct 4 lanes on new location
A544a	Avent Ferry Connector	Old Holly Springs Apex to Holly Springs Rd	Construct 4 lanes on new location
A544b	Avent Ferry Connector	Holly Springs Rd to Rex Rd	Construct 4 lanes on new location
A547	Stephenson Rd	Ten Ten Rd to Sunset Lake Rd	Widen from 2 to 4 lanes
A617a	US 401 Bypass	US 401 (East of Fuquay-Varina) to NC 55	Construct 6 lanes on new location
A619a	US 401	NC 540 to US 401 Bypass	Widen from 4 to 6 lanes
A619b	US 401	US 401 Bypass to NC 55/NC 42	Widen from 4 to 6 lanes
A652	NC 55	Morrisville Carpenter Rd to NC 540	Widen from 4 to 6 lanes
A66a	O'Kelley Chapel Rd	Alston Avenue to NC 55	Widen from 2 to 4 lanes
A66b	O'Kelley Chapel Rd	Alston Avenue to NC 751	Widen from 2 to 4 lanes
A70	Holly Springs Rd	Penny Rd to Ten Ten Rd	Widen from 2 to 4 lanes
A71	Holly Springs Rd	Ten Ten Rd to Kildaire Farm Rd Connector	Widen from 2 to 4 lanes
A75b	Yates Store Rd	Yates Store Rd to Morrisville Parkway	Construct 4 lanes on new location
A75c	Wimberley Rd	Morrisville Parkway to Green Level West Rd	Construct 4 lanes on new location
A77b2	West Lake Rd	Ten Ten Rd and Middle Creek Park Ave	Widen from 2 to 4 lanes
A94	NC 55	NC 540 to Kit Creek Rd	Widen from 4 to 6 lanes
A98	NC 55 Bypass	North Main St to Honeycutt Connector	Widen from 4 to 6 lanes
F14	Clayton Bypass Widening	I-40 to US 70	Widen from 4 to 6 lanes
F15A	US 64 West conversion to expressway	Laura Duncan Rd to I-540	Widen from 4 to 6 lanes
F15B	US 64 West conversion to expressway	NC 540/TriEx to NC 751	Widen from 4 to 6 lanes
F41	I-40 Managed Lanes	Wade Avenue to Johnston County	Construct 2 Managed Lanes
F41b	I-40 Managed Lanes	Johnston County to Cornwallis Rd	Construct 2 Managed Lanes
F42b	I-540 Managed Lanes	I-40 to US 64 Bypass	Construct 2 Managed Lanes
F44c	I-40 (East)	NC 42 to NC 210	Widen from 4 to 6 lanes
F44d	I-40 (East)	NC 210 to CAMPO MAB	Widen from 4 to 6 lanes
F45	I-40 Managed Lanes	Cornwallis Rd to NC 210	Construct 2 Managed Lanes
F7a	US 64 East	US 64 Bypass to US 64/US 264 to	Widen from 4 to 6 lanes
F86	Capital Blvd	I-440 to I-540	Corridor Upgrades on new location
I-3306AA	I-40	NC 86 to I-85	Widen from 4 to 6 lanes
I-3306AB	I-40	US 15-501 to NC 86	Widen from 4 to 6 lanes
I-5702	I-40 Managed Lanes	Durham County Line to Wade Avenue	Construct 2 Managed Lanes
I-5702B	I-40 Managed Lanes	Wake County Line to NC 147	
I-5704	I-40	Wade Avenue to US 1/64	Widen from 6 to 8 lanes
U-5774C	US 70 (freeway conversion)	S Miami Blvd to Northern Durham Parkway	Widen from 4 to 6 lanes
U-5774G	NC 54	I-40 Interchange to NC 751	Widen from 2 to 4 lanes
U-5774H	NC 54	NC 751 to Highgate Dr	Widen from 2 to 4 lanes
U-5774I	NC 54	Fayetteville to Barbee	Widen from 2 to 4 lanes
U-5774J	NC 54	Barbee to NC 55	Widen from 2 to 4 lanes
U-6066	US 1	US 64 to NC 540	Widen from 4 to 6 lanes



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ASSUMED LONG-RANGE HIGHWAY IMPROVEMENTS - 2045

FIGURE 6.3

Table 6.3
Year 2045 Roadway Improvements
Assumed in the Complete 540 Forecast Model

Project STIP/MTP	Roadway	Location	Description
A149a	Poole Rd	I-540 to Martin Pond Rd	Widen from 2 to 4 lanes
A172	Kelly Rd	Jenks Rd to Old US 1	Widen from 2 to 4 lanes
A178a	Olive Chapel Rd	Kelly Rd to NC 55	Widen from 2 to 4 lanes
A178b	Olive Chapel Rd	Richardson Rd to Kelly Rd	Widen from 2 to 3 lanes (turn
A178c	Olive Chapel Rd	New Hill Olive Chapel Rd to Richardson	Widen from 2 to 3 lanes (turn
A179a	Richardson Rd	US 64 (West) to Olive Chapel Rd	Construct 4 lanes on new
A179b	Richardson Rd	Olive Chapel Rd to Humie Olive Rd	Widen from 2 to 4 lanes
A179c	Richardson Rd	Humie Olive Rd to Old US 1 Highway	Construct 4 lanes on new
A184	Apex Barbecue Rd	Old US 1 to Olive Chapel Rd	Widen from 2 to 3 lanes (turn
A186a	Friendship Rd	Friendship Rd to Winding Way	Widen from 2 to 3 lanes (turn
A186b	Friendship Rd	Winding Rd to Old US 1	Widen from 2 to 3 lanes (turn
A187a	Apex Peakway	Olive Chapel Rd to Laura Duncan Rd	Widen from 2 to 4 lanes
A187c	Apex Peakway	Broadstone Way to Old US 1	Widen from 2 to 4 lanes
A187d	Apex Peakway	Old US 1 to Olive Chapel Rd	Widen from 2 to 4 lanes
A192	Graham Newton Rd	Penny Rd to Optimist Farm Rd	Widen from 2 to 4 lanes
A197b	Center Campus	Main Campus Dr Connector to I-40	Const. 4 lanes on new location
A214	Garner Rd	Tryon Rd to Rock Quarry Rd	Widen from 2 to 3 lanes (turn
A218f	Jessie Dr	NC 55 to Ten Ten Rd	Widen from 2 to 4 lanes
A228b	NC 50	I-540 to NC 42	Widen from 2 to 4 lanes
A237b	Old Apex Rd	Cary Parkway to Laura Duncan Rd	Widen from 2 to 4 lanes
A27a	Louis Stephens Dr Extension	Wake County Line to Kit Creek Rd	Widen from 2 to 4 lanes
A27b	Louis Stephens Dr Extension	Kit Creek Rd to O'Kelly Chapel Rd	Widen from 2 to 4 lanes
A34	Cary Parkway	Evans Rd to Harrison Ave	Widen from 2 to 4 lanes
A36c	Chatham St	N.E. Maynard Rd to I-40 Bridge	Widen from 2 to 4 lanes
A38	Tryon Rd	US 64 to Kildare Farm Rd	Widen from 2 to 6 lanes
A400a	Ten Ten Rd	Bells Lake Rd to Old Stage Rd	Widen from 2 to 4 lanes
A400b	Ten Ten Rd	Old Stage Rd to NC 50	Widen from 2 to 4 lanes
A403c	Hodge Rd	Auburn-Knightdale Rd to Poole Rd	Widen from 2 to 4 lanes
A410	Lake Pine Dr/Old Raleigh Rd	Cary Parkway to Apex Peakway	Widen from 2 to 4 lanes
A426	NC 55 (Main St)	Holly Springs Rd to Technology Dr	Widen from 2 to 4 lanes
A427c	Avent Ferry Rd	New Hill Holleman to Cass Holt	Widen from 2 to 4 lanes
A42a	Penny Rd	Ten Ten Rd to Kildaire Farm Rd	Widen from 2 to 4 lanes
A42b	Penny Rd	Kildaire Farm Rd to Holly Springs Rd	Widen from 2 to 4 lanes
A443a	Jenks Rd	NC 55 to Wimberly Rd	Widen from 2 to 3 lanes (turn
A443b	Jenks Rd	Wimberly Rd to US 64	Widen from 2 to 4 lanes
A510	Cass Holt Rd	Avent Ferry Rd to NC 42	Widen from 2 to 4 lanes
A520a	Pleasant Grove Church Rd	Nelson Rd to Airport Blvd	Widen from 2 to 4 lanes
A520b	Pleasant Grove Church Rd	Airport Blvd to Aviation Parkway	Construct 2 lanes on new
A538	Bass Lake Rd	Holly Springs Rd to Hilltop-Needmore Rd	Widen from 2 to 4 lanes
A539	Banks Rd	US 401 to Fanny Brown Rd	Widen from 2 to 3 lanes (turn
A540a	Rock Service Station	Old Stage Rd to NC 42	Widen from 2 to 3 lanes (turn
A540b	Rock Service Station	NC 42 to Mt Pleasant Rd	Widen from 2 to 3 lanes (turn
A549	Wimberley Rd	Jenks Rd to Green Level West Rd	Widen from 2 to 3 lanes
A568	Kit Creek Rd	Davis Dr to Green Level Church Rd	Widen from 2 to 3 lanes (turn
A571	Slater Rd	Airport Blvd to West of NC 540	Widen from 2 to 3 lanes (turn
A578	Auburn Church Rd	Jones Sausage Rd to Garner Rd	Widen from 2 to 3 lanes (turn
A581	Bethlehem Rd	Old Faison Rd to Grasshopper Rd	Widen from 2 to 3 lanes (turn
A675a	Morrisville East Connector	Trans Air Dr/Airport Blvd to Int'l Dr/Nova	Construct 2 lanes on new
A677	Marcom Dr Extension	Watkins Rd to Sorrell Grove Church Rd	Construct 2 lanes on new
A76	Optimist Farm Rd	Lake Wheeler Rd to Sunset Lake Rd	Widen from 2 to 4 lanes
A77a	West Lake Rd	Larboard Rd to Bells Lake Rd	Construct 2 lanes on new
A98c	Technology Drive	Technology Drive and NC 55 Bypass	Interchange
R-3618	Guy Rd	US 70 Bus to NC 42	Widen from 2 to 4 lanes
Jhns8	Cornwallis Rd	NC 42 to Old Drugstore Rd	Widen from 2 to 4 lanes
Jhns9	Old Drugstore Rd	NC 42 to NC 50	Widen from 2 to 4 lanes
Jhns10	Cleveland Rd	NC 50 to Barber Mill Rd	Widen from 2 to 4 lanes
45	I-40 Managed Lanes	NC 54 to US 15-501	Widen from 6 to 8 lanes
45	I-40 Managed Lanes	NC 147 to NC 54	Widen from 6 to 10 lanes
48	I-85	Sparger Rd to US 70	Widen from 4 to 6 lanes
48	I-85	US 70 to I-40	Widen from 4 to 6 lanes
77.2	NC 751	NC 54 to Renaissance Pkwy	Widen from 2 to 4 lanes
77.3	NC 751	Renaissance Pkwy to O'Kelly Chapel Rd	Widen from 2 to 4 lanes
114	US 15-501 Bypass	MLK Parkway to I-85	Widen from 4 to 6 lanes

2. A new interchange at Morrisville Parkway will be open to traffic on January 1, 2020. Associated with this new interchange will be a new mainline toll zone, north of the new Morrisville interchange, and associated adjustments in toll rates at the existing mainline toll zones, T17/T18, north of Green Level West Road. Triangle Expressway toll zones are shown in Figure 1.3 in Chapter 1.

3. Existing ramp toll zones at Hopson Road and U.S. 64 will be removed and replaced with two new mainline tolling zones immediately north of these respective interchanges. Associated toll rate adjustments also occurred to maintain consistent through-trip per-mile toll rates. The toll-collection system changes are assumed to begin on July 1, 2023.

4. Tolls on the Triangle Expressway will continue to be charged for three vehicle classes, using a cashless all-electronic toll collection methodology. Two payment types will continue to be offered; electronic toll collection with transponders (ETC) and Bill by Mail (BBM), utilizing video imaging of license plates for those vehicles not equipped with transponders. Toll rates for each year of the forecast period will be as shown in Table 6.5, which assumes continued annual increases in toll rates. Any changes in the assumed rates of annual increase, or discontinuation of annual rate increases, will impact traffic and revenue forecasts.

5. Highway and other transportation improvements as set forth in Tables 6.1, 6.2 and 6.3 will be implemented within the time frames assumed in those tables. No other transportation improvement projects, particularly new roads, additional road capacity or new interchanges will be constructed during the forecast period, other than those shown in Table 6.1, 6.2, and 6.3.

6. For purposes of the Scenario 1 forecast, no other planned or potential extensions or connections to Triangle Expressway are assumed during the projection period, other than the modifications described in numbers 2 and 3 above.

7. The annual rate of inflation and estimated method-of-payment market shares among ETC and BBM will be as shown in Table 6.7 for purposes of the forecast. Any change in inflation rates could affect traffic and revenue even if toll rates continue to be adjusted in accordance with assumptions shown in Table 6.5.

8. Economic growth in the project study area will generally occur as forecasted by the independent economist used in the study, whose work is summarized in Chapter 3.

9. Leakage and fee revenue adjustments are applied to the estimated gross toll revenue forecasts. The adjustments are based on 5 ½ years of actual experience on the Triangle Expressway, provided by NCTA. The forecast assumes that toll revenue collection, particularly as related to BBM transactions and processing fee revenue, will continue to be collected at similar rates over the forecast period.

10. The Triangle Expressway will continue to be well maintained, efficiently operated, effectively signed and promoted to encourage maximum usage.

11. Motor fuel will remain in adequate supply throughout the forecast period. Fuel price increases will not significantly exceed the overall rate of inflation. Fuel price forecasts provided by the U.S. Energy Information Administration through 2050 will generally be experienced.

12. No national, state or regional emergency will arise that would abnormally restrict the use of motor vehicles. Future transportation technology changes will not significantly negatively impact traffic and revenue on Triangle Expressway over the projection period.

Any significant departure from these basic assumptions could materially affect traffic and revenue potential on the Triangle Expressway.

6.4 Historical Trends and Short-Term Projections

Table 6.4 shows recent trends in toll transactions, toll revenue and average tolls on the Triangle Expressway. Historical data is shown between calendar 2013, the first full year of operation for Triangle Expressway, and 2017. Near-term projections are shown for calendar 2018 and 2019.

The trend data shows a classic pattern of ramp-up on a new, urban toll facility. Transactions in 2014 exceeded opening year transactions by almost 33 percent, with transaction growth in the following years decreasing to 25.0, 18.1 and 9.3 percent, respectively. This very high level of early year transaction growth is consistent with ramp up patterns on other toll facilities. It is particularly strong,

Table 6.4
Triangle Expressway Annual Transactions and Gross Toll Revenue
Historical Trends and Short-Term Projections
(transactions and revenue in thousands)

Calendar	Toll Transactions and Year-over-Year Percent Growth		Average Weighted Toll Rate and Year-over-Year Percent Growth (1)		Gross Toll Revenue and Year-over-Year Percent Growth (2)	
Year	Transactions	Growth	Toll Rate	Growth	Revenue	Growth
2013	23,059		$0.617		$14,238	
2014	30,650	32.9 %	0.687	11.2 %	21,045	47.8 %
2015	38,319	25.0	0.751	9.4	28,779	36.7
2016	45,244	18.1	0.782	4.2	35,393	23.0
2017	49,460	9.3	0.825	5.4	40,792	15.3
2018 (3)	52,922	7.0	0.855	3.6	45,231	10.9
2019 (4)	55,410	4.7	0.886	3.7	49,100	8.6
Average Annual Percent Change						
2013-2017		21.0		7.5		30.1
2013-2019		15.7		6.2		22.9

(1) The average weighted toll rate is calculated by dividing total toll revenue for the year by total toll transactions for the year.
(2) This is toll revenue collected during the indicated year. It does not include fee revenue.
(3) Based on data through June 2018.
(4) Estimated based on trend data.
Source: NCTA

however, recognizing that toll rates were increased annually, resulting in revenue growth which averaged more than 30 percent per year over the first five years of operation. Specifically, the average annual growth in transactions between 2013 and 2017 was 21.0 percent per year, together with the increase in average tolls, yielding a 30.1 percent per year average increase in revenue.

It is important to note that the rate of growth in the average toll per transaction is a function of both programmed rate increases (generally around 3 percent per year) as well as shifts in the distribution of transactions between local ramps and mainline tolling points, and changes in the mix of ETC versus BBM transactions.

Year-end estimates of annual transactions and revenue for calendar year 2018 were developed by extrapolating actual data from January through June of 2018. Transaction growth is expected to reach about 7.0 percent in 2018, with revenue increasing by about 10.9 percent. The projection for 2019 shows a 4.7 percent increase in annual transactions and an 8.6 percent increase in toll revenue growth compared to the prior calendar year. Toll transactions in calendar 2019 are expected to reach about 55 million while gross toll revenue, prior to adjustment for leakage and not including additional fee revenue, is expected to reach just over $49 million.

6.5 Toll Sensitivity Assessment

As part of this traffic and revenue study, an updated toll sensitivity analysis was conducted at 2025 levels for the Triangle Expressway. Future toll rates and rate increases assumed in this study follow previously established patterns which have been adopted by the NCTA Board. The updated toll sensitivity analysis included herein is simply to provide an indication of where current and assumed future toll rates fall within the overall rate sensitivity curve; providing an indication of the ability to increase revenue, if ever needed, with future toll rate increases above those already assumed.

Figure 6.4 shows the toll sensitivity curve at 2025 levels. The horizontal scale shows the per-mile toll rate levels which were tested in the analysis, for ETC and BBM payment methods. The prior relationship between ETC and BBM is assumed to remain constant, with ETC rates priced at 35 percent less than BBM rates. ETC rates tested ranged from $0.170 per mile to $0.430 per mile, at 2025 levels. As shown, maximum revenue potential would be generated at a per mile ETC toll rate of about $0.35 per mile. The Scenario 1 forecast assumes the 2025 rates would be approximately $0.245

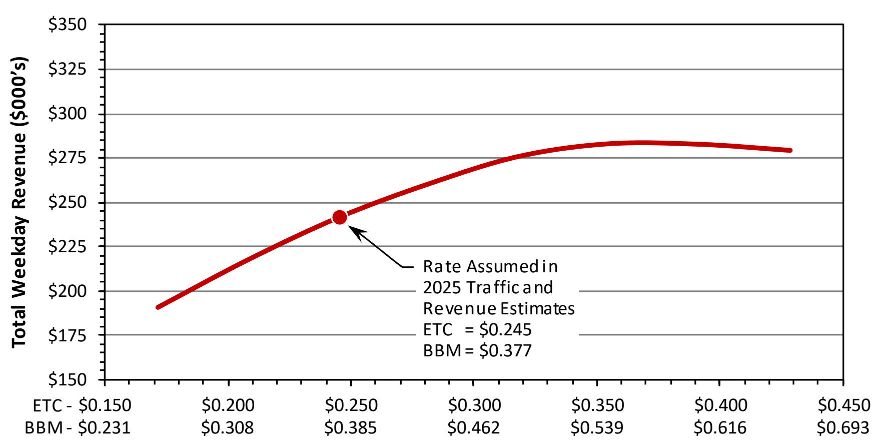


Figure 6.4
Triangle Expressway Toll Sensitivity Curve

per mile, well below the revenue maximizing rate. This indicates there is considerable ability to raise revenues by increasing toll rates above the assumed rates.

In the curve shown in Figure 6.4, revenue is expressed in average weekday terms, and includes both ETC and BBM revenue elements. On a weekday basis, in 2025, the current assumed toll rate of $0.245 per mile would yield about $242,000 revenue per weekday. At revenue maximizing rates, revenue would be increased to about $283,000 per day, an increase of about 17 percent. However, given the relatively flat shape of the curve, this 17 percent revenue increase would be achieved through a 45 to 50 percent increase in toll rates.

Figure 6.5 shows equivalent assumed 2025 toll rates by toll zones and vehicle class on the Triangle Expressway. As noted previously, by 2025 a new interchange will be added at Morrisville Parkway and three new mainline toll zones will be added north of the Hopson Road, Morrisville Parkway and U.S. 64 interchanges. Existing ramp toll zones will be removed at the Hopson Road and U.S. 64 interchanges.

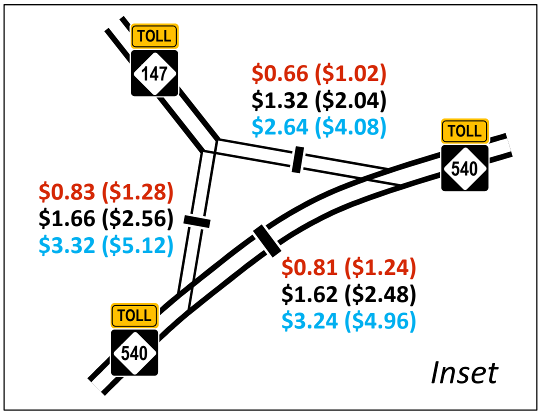
Computed toll rates are shown separately for ETC and BBM rates, for each of the three vehicle classes. As is current practice, it is assumed that the Class 2 toll will be twice the Class 1 toll while the Class 3 toll, which represents vehicles with more than three axles, would be set at four times the Class 1 rate.

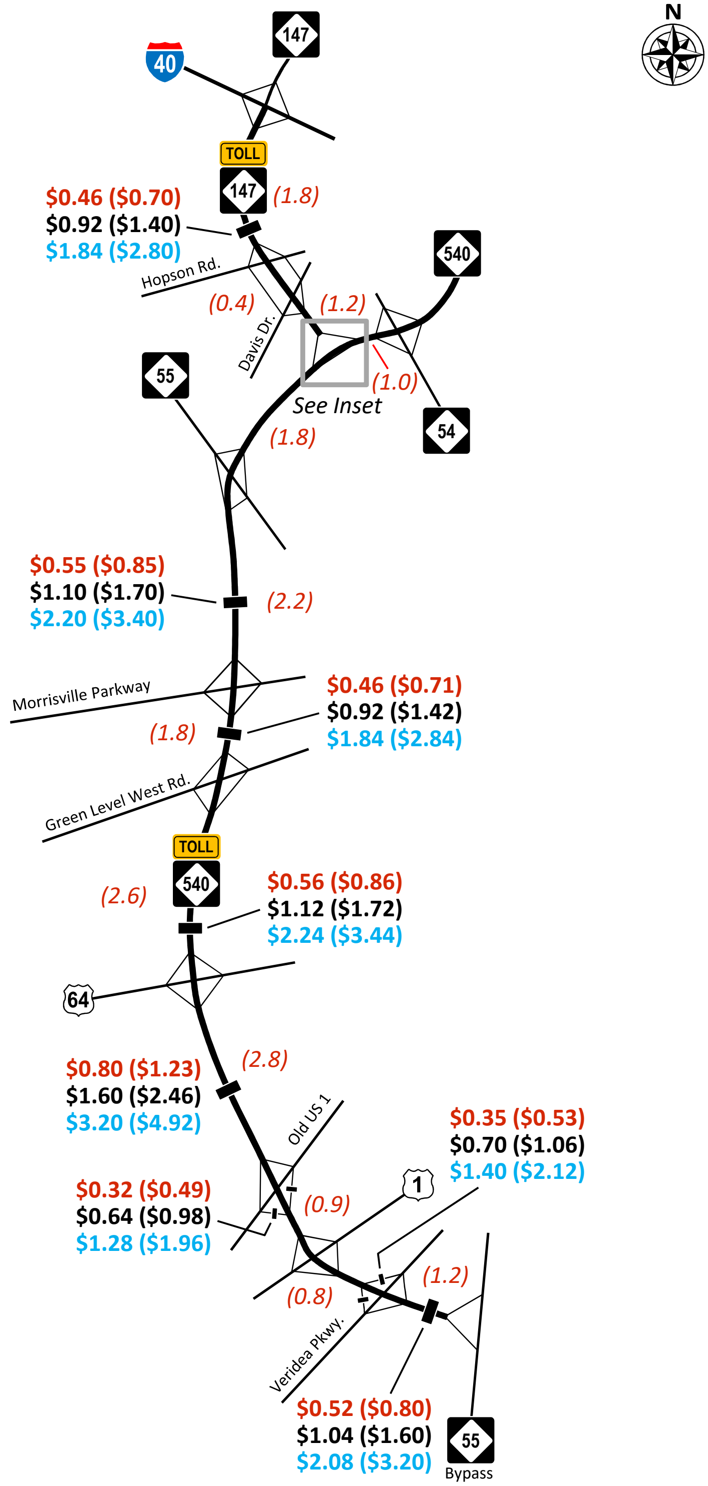
Figure 6.5 also shows the equivalent through-trip toll via Toll NC 540. Note these through-trip rates exclude the Toll NC 147 portion of the toll facility, and instead cover travel on Toll NC 540 between NC 54 on the north and NC 55 Bypass on the south. By 2025, the through-trip toll for passenger cars would be $3.70 for the 15.1-mile trip. This is equivalent to $0.245 per mile. Class 2 vehicles would be charged $7.40 for the full trip while Class 3 vehicles would be charged $14.80, a per-mile rate of almost $1.00 per mile for the heaviest vehicles. It is important to recognize that the toll rates shown in Figure 6.5 reflect 2025 conditions, after seven years of annual rate increases from current day levels.

Table 6.5 shows assumed Class 1 toll rates by year for the toll zones on Triangle Expressway. Rates are shown separately for ETC and BBM transactions at each location. Location T15/T16 is the new mainline toll point associated with the Morrisville Parkway interchange, that is assumed to open on January 1, 2020. Toll rate adjustments were made at the adjacent mainline toll zone (T17/T18) to maintain relatively consistent through-trip per-mile toll rates.

New mainline toll points are also introduced in 2024. The new mainlines toll zones replace ramp tolls at locations T01/T02 and T21/T22. These toll zone relocations necessitated adjustments to the toll schedule at adjacent mainline sections to maintain or improve consistent per-mile toll rates for both through-trips and shorter distance trips. Overall, the average through trip per mile toll rate for ETC Class 1 transactions will increase from $0.191 in 2018 to $0.245 in 2025 and to $0.330 in 2035.

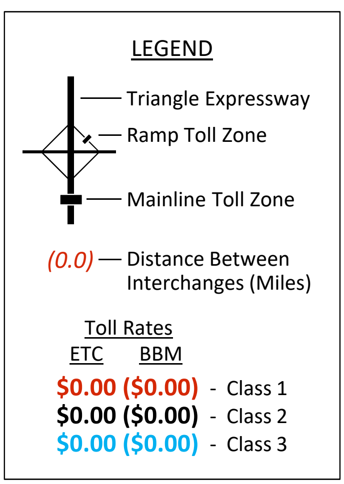
Table 6.5 also shows the assumed average annual percent increase in toll rates for each tolling point and payment category on Triangle Expressway. Using the through-trip rate as an overall measure, toll rates will increase by an average of 3.2 percent per year between 2018 and 2023, 3.0 percent per year between 2024 and 2035 and about 2.0 percent per year after 2035. Overall, between 2018 and 2058, toll rates will increase by an average annual amount of 2.6 percent. The values in Table 6.5 are assumed to be in place in each of the future years shown.





2025
Through Trip ETC Toll Rates

	Via Toll NC 540	
Vehicle Class	Toll	Toll Per Mile
Class 1	**$3.70**	**$0.245**
Class 2	**$7.40**	**$0.490**
Class 3	**$14.80**	**$0.980**



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ASSUMED 2025 TOLL RATES BY TOLL ZONE AND VEHICLE CLASS - TRIANGLE EXPRESSWAY

FIGURE 6.5

Table 6.5
Assumed Class 1 Toll Rates By Year
Triangle Expressway Toll Zones

Calendar	T01/T02		T09/T10		T05/T06		T13/T14		T15/T16		T17/T18		T21/T22		T25/T26		T29/T30		T31/T32		T33/T34		ETC Through Trip via Toll NC 540	
Year (1)	ETC	BBM	ETC	BBM	ETC	BBM	ETC	BBM	ETC	BBM	ETC	BBM	ETC	BBM	ETC	BBM	ETC	BBM	ETC	BBM	ETC	BBM	Toll Rate (4)	Per-mile Rate (4)
2018	$0.37	$0.56	$0.81	$1.24	$1.01	$1.55	$0.65	$1.00	--	--	$0.81	$1.24	$0.45	$0.69	$1.01	$1.54	$0.26	$0.39	$0.28	$0.43	$0.42	$0.64	$2.89	$0.191
2019	0.38	0.58	0.84	1.29	1.05	1.61	0.67	1.03	--	--	0.84	1.29	0.47	0.71	1.04	1.60	0.26	0.40	0.29	0.44	0.44	0.67	2.99	$0.198
2020 (2)	0.39	0.60	0.87	1.33	1.08	1.66	0.70	1.07	0.48	0.73	0.39	0.60	0.48	0.73	1.08	1.65	0.28	0.42	0.30	0.46	0.45	0.69	3.10	$0.205
2021	0.41	0.62	0.90	1.38	1.12	1.72	0.72	1.10	0.49	0.76	0.41	0.63	0.50	0.76	1.11	1.70	0.28	0.43	0.31	0.47	0.47	0.71	3.20	$0.212
2022	0.42	0.64	0.93	1.42	1.16	1.77	0.74	1.13	0.51	0.78	0.42	0.65	0.51	0.78	1.14	1.75	0.30	0.45	0.32	0.49	0.48	0.73	3.29	$0.218
2023 (3)	0.43	0.66	0.95	1.46	1.19	1.82	0.77	1.17	0.52	0.80	0.43	0.66	0.53	0.81	1.17	1.80	0.30	0.46	0.33	0.50	0.49	0.75	3.38	$0.224
2023 (4)	0.43	0.66	0.62	0.95	0.79	1.22	0.77	1.17	0.52	0.80	0.43	0.66	0.53	0.81	0.76	1.17	0.30	0.46	0.33	0.50	0.49	0.75	3.50	$0.232
2024 (5)	0.45	0.68	0.64	0.99	0.81	1.25	0.79	1.20	0.54	0.83	0.45	0.69	0.54	0.83	0.78	1.20	0.31	0.47	0.34	0.52	0.51	0.78	3.61	$0.239
2025	0.46	0.70	0.66	1.02	0.83	1.28	0.81	1.24	0.55	0.85	0.46	0.71	0.56	0.86	0.80	1.23	0.32	0.49	0.35	0.53	0.52	0.80	3.70	$0.245
2026	0.47	0.72	0.68	1.05	0.85	1.31	0.84	1.28	0.57	0.88	0.47	0.72	0.58	0.88	0.82	1.26	0.33	0.50	0.36	0.55	0.54	0.82	3.82	$0.253
2027	0.49	0.74	0.70	1.08	0.88	1.36	0.86	1.31	0.59	0.90	0.49	0.75	0.60	0.91	0.84	1.29	0.34	0.52	0.37	0.57	0.56	0.85	3.94	$0.261
2028	0.50	0.76	0.72	1.11	0.91	1.40	0.88	1.35	0.61	0.93	0.50	0.77	0.61	0.93	0.87	1.34	0.35	0.53	0.38	0.58	0.57	0.87	4.04	$0.268
2029	0.52	0.79	0.74	1.14	0.94	1.45	0.91	1.39	0.62	0.96	0.52	0.80	0.63	0.96	0.90	1.39	0.36	0.55	0.39	0.60	0.59	0.90	4.17	$0.276
2030	0.53	0.81	0.76	1.17	0.97	1.49	0.94	1.44	0.64	0.99	0.53	0.82	0.65	0.99	0.93	1.43	0.37	0.57	0.40	0.62	0.61	0.93	4.30	$0.285
2031	0.54	0.83	0.78	1.20	1.00	1.54	0.97	1.48	0.66	1.01	0.55	0.85	0.67	1.02	0.96	1.48	0.38	0.59	0.42	0.64	0.63	0.96	4.44	$0.294
2032	0.56	0.85	0.80	1.23	1.03	1.59	0.99	1.52	0.68	1.05	0.57	0.88	0.69	1.05	0.99	1.52	0.39	0.60	0.43	0.66	0.65	0.99	4.57	$0.303
2033	0.58	0.88	0.82	1.26	1.06	1.63	1.03	1.57	0.70	1.07	0.58	0.89	0.71	1.08	1.02	1.57	0.40	0.62	0.44	0.68	0.67	1.02	4.71	$0.312
2034	0.60	0.91	0.84	1.29	1.09	1.68	1.06	1.62	0.72	1.11	0.60	0.92	0.73	1.11	1.05	1.62	0.41	0.63	0.45	0.70	0.69	1.05	4.85	$0.321
2035	0.61	0.93	0.87	1.34	1.12	1.72	1.09	1.67	0.74	1.14	0.62	0.95	0.75	1.15	1.08	1.66	0.43	0.66	0.47	0.72	0.71	1.08	4.99	$0.330
2036	0.62	0.95	0.89	1.37	1.14	1.76	1.11	1.71	0.76	1.17	0.63	0.97	0.77	1.19	1.10	1.69	0.44	0.68	0.48	0.74	0.72	1.11	5.09	$0.337
2037	0.64	0.99	0.91	1.40	1.16	1.79	1.14	1.76	0.77	1.19	0.65	1.00	0.78	1.20	1.12	1.72	0.45	0.69	0.49	0.75	0.74	1.14	5.20	$0.344
2038	0.65	1.00	0.93	1.43	1.18	1.82	1.16	1.79	0.79	1.22	0.66	1.02	0.80	1.23	1.14	1.76	0.46	0.71	0.50	0.77	0.76	1.17	5.31	$0.352
2039	0.66	1.02	0.95	1.46	1.20	1.85	1.18	1.82	0.80	1.23	0.68	1.05	0.82	1.26	1.16	1.79	0.47	0.72	0.51	0.79	0.77	1.19	5.41	$0.358
2040	0.68	1.05	0.97	1.49	1.23	1.89	1.21	1.86	0.82	1.26	0.69	1.06	0.83	1.28	1.18	1.82	0.48	0.74	0.52	0.80	0.79	1.22	5.52	$0.366
2041	0.69	1.06	0.99	1.52	1.26	1.94	1.23	1.89	0.84	1.29	0.70	1.08	0.85	1.31	1.20	1.85	0.49	0.75	0.53	0.82	0.80	1.23	5.62	$0.372
2042	0.71	1.09	1.01	1.56	1.29	1.99	1.26	1.94	0.86	1.32	0.71	1.09	0.87	1.34	1.23	1.89	0.50	0.77	0.54	0.83	0.82	1.26	5.75	$0.381
2043	0.72	1.11	1.03	1.59	1.32	2.03	1.29	1.99	0.87	1.34	0.74	1.14	0.89	1.37	1.26	1.94	0.51	0.79	0.56	0.86	0.84	1.29	5.89	$0.390
2044	0.74	1.14	1.05	1.62	1.35	2.08	1.31	2.02	0.89	1.37	0.75	1.16	0.90	1.39	1.29	1.99	0.52	0.80	0.57	0.88	0.86	1.32	6.00	$0.397
2045	0.75	1.16	1.07	1.65	1.38	2.13	1.34	2.06	0.91	1.40	0.76	1.17	0.92	1.42	1.32	2.03	0.53	0.82	0.58	0.89	0.87	1.34	6.12	$0.405
2046	0.77	1.19	1.09	1.68	1.41	2.17	1.37	2.11	0.93	1.43	0.77	1.19	0.94	1.45	1.35	2.08	0.54	0.83	0.59	0.91	0.89	1.37	6.25	$0.414
2047	0.78	1.20	1.11	1.71	1.44	2.22	1.39	2.14	0.95	1.46	0.79	1.22	0.96	1.48	1.38	2.13	0.55	0.85	0.60	0.92	0.91	1.40	6.38	$0.423
2048	0.80	1.23	1.13	1.74	1.47	2.26	1.42	2.19	0.97	1.49	0.80	1.23	0.98	1.51	1.41	2.17	0.56	0.86	0.62	0.95	0.92	1.42	6.50	$0.430
2049	0.81	1.25	1.15	1.77	1.50	2.31	1.45	2.23	0.99	1.52	0.82	1.26	1.00	1.54	1.44	2.22	0.57	0.88	0.63	0.97	0.94	1.45	6.64	$0.440
2050	0.83	1.28	1.17	1.80	1.53	2.36	1.48	2.28	1.00	1.54	0.84	1.29	1.02	1.57	1.47	2.26	0.59	0.91	0.64	0.99	0.96	1.48	6.77	$0.448
2051	0.85	1.31	1.19	1.83	1.56	2.40	1.51	2.33	1.02	1.57	0.86	1.32	1.04	1.60	1.50	2.31	0.60	0.92	0.65	1.00	0.98	1.51	6.91	$0.458
2052	0.86	1.32	1.21	1.86	1.59	2.45	1.54	2.37	1.04	1.60	0.87	1.34	1.06	1.63	1.53	2.36	0.61	0.94	0.67	1.03	1.00	1.54	7.04	$0.466
2053	0.88	1.36	1.23	1.89	1.62	2.49	1.57	2.42	1.06	1.63	0.89	1.37	1.08	1.66	1.56	2.40	0.63	0.97	0.68	1.05	1.02	1.57	7.18	$0.475
2054	0.90	1.39	1.25	1.93	1.65	2.54	1.60	2.46	1.08	1.66	0.91	1.40	1.10	1.69	1.59	2.45	0.64	0.99	0.69	1.06	1.04	1.60	7.32	$0.485
2055	0.92	1.42	1.28	1.97	1.68	2.59	1.63	2.51	1.10	1.69	0.93	1.43	1.13	1.74	1.62	2.49	0.65	1.00	0.71	1.09	1.06	1.63	7.47	$0.495
2056	0.93	1.43	1.31	2.02	1.71	2.63	1.67	2.57	1.13	1.74	0.94	1.45	1.15	1.77	1.65	2.54	0.66	1.02	0.72	1.11	1.08	1.66	7.62	$0.505
2057	0.95	1.46	1.34	2.06	1.74	2.68	1.70	2.62	1.15	1.77	0.96	1.48	1.17	1.80	1.68	2.59	0.68	1.05	0.74	1.14	1.10	1.69	7.76	$0.514
2058	0.97	1.49	1.37	2.11	1.77	2.73	1.73	2.66	1.17	1.80	0.99	1.52	1.20	1.85	1.71	2.63	0.69	1.06	0.75	1.16	1.12	1.72	7.92	$0.525
Average Annual Percent Change in Toll Rates																								
2018-2023	3.1	3.3	3.2	3.3	3.3	3.3	3.4	3.2			-11.9	-11.8	3.3	3.3	3.0	3.2	2.9	3.4	3.3	3.1	3.1	3.2	3.2	
2024-2035	2.8	2.9	2.8	2.8	3.0	2.9	3.0	3.1	2.9	2.9	3.0	2.9	3.0	3.0	3.0	3.0	3.0	3.1	3.0	3.0	3.1	3.0	3.0	
2035-2045	2.1	2.2	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.2	2.1	2.1	2.1	2.2	2.1	
2045-2057	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.1	2.0	1.9	2.0	
2018-2058	2.4	2.5	1.3	1.3	1.4	1.4	2.5	2.5			0.5	0.5	2.5	2.5	1.3	1.3	2.5	2.5	2.5	2.5	2.5	2.5	2.6	

(1) Annual toll rate increases are assumed to be implemented on January 1st of each year.
(2) Assumes new Morrisville interchange and associated new mainline toll zones north of Morrisville Road open on January 1, 2020.
(3) Represents the toll rates from January 1 through June 30, 2023, prior to the conversion of ramp toll zones to mainline toll zones at Hopson Road and U.S. 64.
(4) Represents the toll rates from July 1 through Decmeber 31, 2023, that reflect the conversion of ramp toll zones to mainline toll zones at Hopson Road and U.S. 64, assumed to occur on July 1, 2023.
(5) Through-trip toll rates and distances, shown in this table, exclude the Toll NC 147 portion of Triangle Expressway.

Finally, **Table 6.6** provides a comparison of through-trip toll rates on Triangle Expressway, by vehicle class and payment method for each of the four primary modeling years. For example, in 2020, the through trip Class 1 toll for electronic toll collection would be $3.10, or an average of about $0.21 per mile. The through-trip toll for a vehicle without a transponder (BBM) would be $4.74, or $0.31 per mile. By 2025, the Class 1 ETC through trip toll would increase to $3.70, and to $4.99 by 2035. Through-trip tolls for Class 3 vehicles in 2035 would reach almost $20.00, with a per-mile rate of $1.32.

Table 6.6
Through-Trip Toll Rates By Toll Class - Triangle Expressway

Calendar	Toll	Through-Trip Toll		Per-MileToll Rate	
Year	Class	ETC	BBM	ETC	BBM
2020	Class 1	$ 3.10	$ 4.74	$ 0.21	$ 0.31
	Class 2	6.20	9.48	0.41	0.63
	Class 3	12.40	18.96	0.82	1.26
2025	Class 1	$ 3.70	$ 5.69	$ 0.25	$ 0.38
	Class 2	7.40	11.38	0.49	0.75
	Class 3	14.80	22.76	0.98	1.51
2035	Class 1	$ 4.99	$ 7.65	$ 0.33	$ 0.51
	Class 2	9.98	15.30	0.66	1.01
	Class 3	19.96	30.60	1.32	2.03
2045	Class 1	$ 6.12	$ 9.42	$ 0.41	$ 0.62
	Class 2	12.24	18.84	0.81	1.25
	Class 3	24.48	37.68	1.62	2.50

6.6 Modeling Assumptions and Inputs

As noted above, travel demand model runs were made at 2020, 2025, 2035 and 2045. **Table 6.7** provides a concise summary of modeling assumptions and inputs used in each of the assignment years.

A critical parameter in any traffic and revenue analysis relates to value of time (VOT). This is a measure of motorist's willingness to pay for time savings, and the values in Table 6.7 are shown in terms of dollars per minute. VOT information was derived from stated preference (SP) surveys conducted in early 2017 by RSG and summarized in Chapter 4.

Values in Table 6.7 reflect regionwide average-weighted VOT, by primary categories of trip purpose, and further segregated by non-airport and airport-related trips.

The VOT was developed at 2016 levels and used in the model calibration. Values shown for subsequent years were adjusted in proportion to inflation assumptions, also shown in the table.

Table 6.7
Model Inputs (VOT, VOC and CPI)

	2016	2020	2025	2035	2045
Value Of Time ($/minute)					
Non-Airport					
Commute	$0.289	$0.319	$0.357	$0.442	$0.550
Work-Based Other	0.373	0.411	0.460	0.570	0.708
Other	0.267	0.295	0.330	0.409	0.510
Airport					
Commute	$0.321	$0.355	$0.396	$0.491	$0.611
Work-Based Other	0.310	0.341	0.382	0.473	0.588
Other	0.313	0.346	0.386	0.479	0.596
Vehicle Operating Cost ($/mile)					
Toll Class 1	$0.163	$0.211	$0.220	$0.257	$0.318
Toll Class 2 & 3	0.489	0.633	0.660	0.771	0.954

	2016-2020	2020-2025	2025-2035	2035-2045
Annual Inflation (1)	2.25%	2.24%	2.13%	2.18%

(1) Moody's Analytics Raleigh MSA Forecast

It is important to recognize that the VOT information in Table 6.7 reflects weighted regionwide averages. As part of the study, a relationship was established between VOT and estimated household income by Traffic Analysis Zone (TAZ). Hence, VOT in individual traffic zones also varied from the averages shown based on median household income in each traffic zone. The mean household income forecasts included a component for real income growth by TAZ.

Vehicle operating costs (VOC) are shown in dollars per mile. Estimates were derived for toll Class 1; (2-axle vehicles) and toll Classes 2 and 3 combined representing vehicles with three or more axles. As might be expected, vehicle operating costs are considerable higher for larger vehicles, primarily due to lower fuel efficiency. The operating costs were based on fuel costs for gasoline and diesel, fuel efficiency standards and inflation.

Finally, the bottom of Table 6.7 shows assumptions regarding annual inflation rates in the Raleigh Metropolitan Statistical Area (MSA). From 2016 to 2020, inflation is estimated at 2.25 percent per year, and slightly lower from 2020 to 2025. Forecast CPI averages 2.13 percent per year from 2025 to 2035, and 2.18 percent per from 2035 to 2045. The CPI forecasts were obtained from Moody's Analytics. VOT and VOC projections were increased to reflect changes in CPI. Toll rates on the Triangle Expressway are increased annually through 2035 by a previously adopted toll schedule. Annual rate increases beginning in 2036 are indexed to the forecast CPI. After 2045, toll rates increase by an assumed 2.0 percent per year.

6.7 Estimated 2020 Weekday Traffic and Revenue

Estimated weekday traffic on Triangle Expressway at 2020 levels is shown in **Figure 6.6**. The larger bold numbers reflect two-directional traffic on each mainline section. The smaller numbers at each interchange reflect balanced ramp volumes. All values are shown in thousands, and all reflect average weekday conditions. Average daily traffic would be lower than the volumes shown in Figure 6.6, given that weekend day traffic is considerably lower than weekday traffic on the Triangle Expressway.

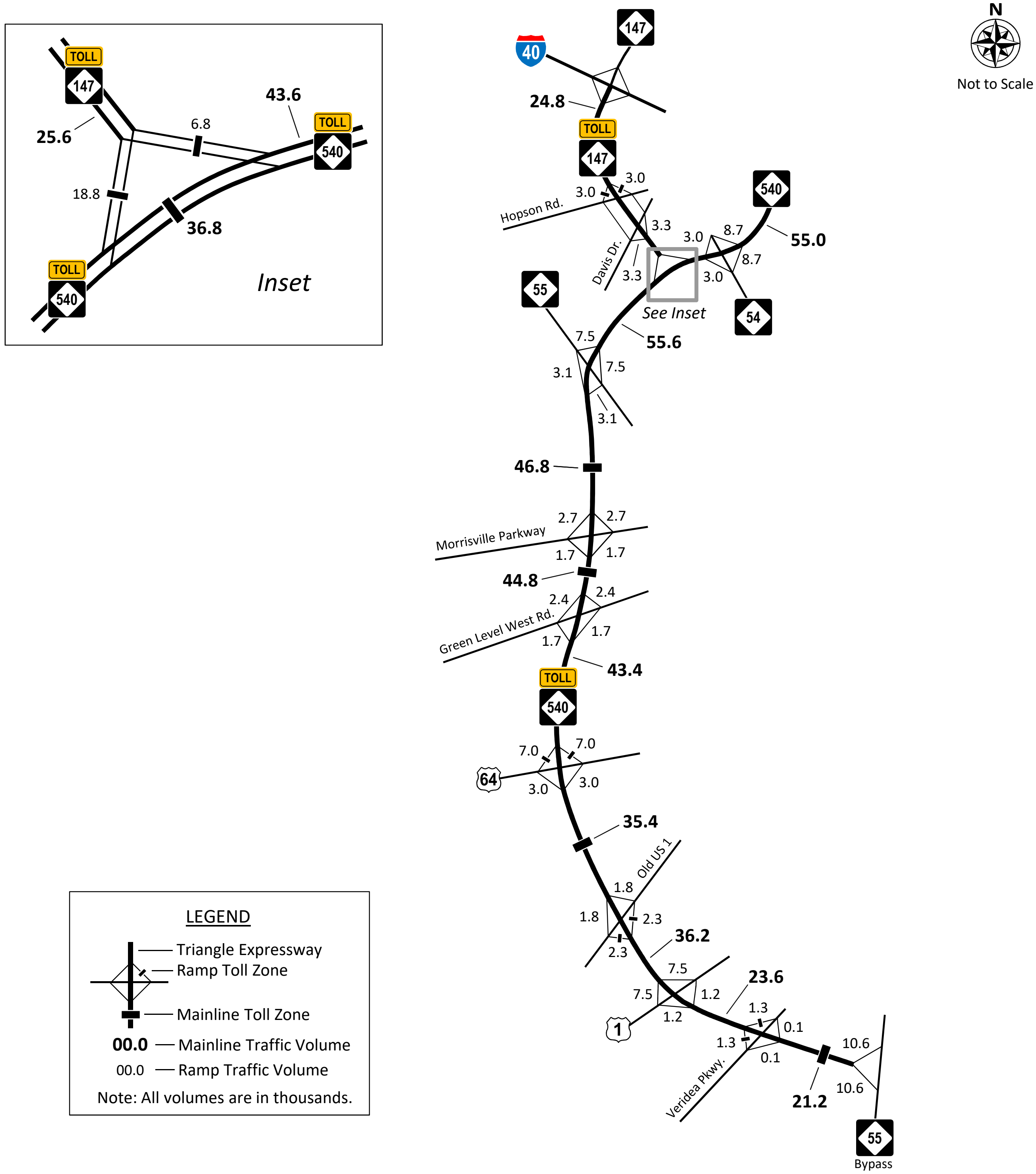
As discussed previously, by January 1, 2020 the Morrisville Parkway interchange is assumed to be in operation. A new mainline tolling zone located just north of Morrisville Parkway will also be in place, but ramp tolls at U.S. 64 and Hopson Road would remain in operation. Weekday traffic is estimated to peak just north of the NC 55 interchange, estimated at 55,600. Of this, about 18,800 vehicles would use Toll NC 147 and the remaining 36,800 would continue on Toll NC 540 to NC 54 and beyond. Weekday mainline traffic on most of the Triangle Expressway would average between 35,000 and 55,000, as far south as U.S. 1. South of that point, volumes drop off considerably, with weekday traffic estimated at 21,200 at the southern end of the project near the NC 55 Bypass.

Gross weekday toll revenue in 2020 is calculated in **Table 6.8**, based on the weekday traffic volumes shown in Figure 6.6, by toll zone, method-of-payment and toll class. The calculated toll revenue is prior to any adjustment for leakage or fee revenue. Traffic volumes in Table 6.8 may not exactly match traffic volumes in Figure 6.6 due to rounding.

The right portion of the Table 6.8 summarizes average weekday transactions and revenue by ETC and BBM. The average weighted toll is provided by toll location. It is influenced by the mix of vehicle classes and the distribution of payment modes.

In total, it is estimated that there will be a total of 237,565 transactions on Triangle Expressway on an average weekday in 2020, producing an average weekday revenue estimated at $196,065. This revenue reflects gross or “expected” revenue and has not yet been adjusted to reflect leakage or other uncollectable revenue, particularly from BBM customers.

The bottom row of Table 6.8 converts the estimated weekday values at 2020 levels to estimated annual transaction and revenues. In this case, the figures shown are rounded to thousands. Hence, total annual transactions are estimated at 72.5 million. Of these, an estimated 48.1 million would be ETC and 24.3 million would be BBM. Annual gross revenue is estimated at $59.8 million. In moving from average weekday to average day an effective annualization factor of 305 days has been used. This annualization factor reflects the relationship between weekday and weekend day transactions and revenue. Since weekend day transactions and revenue are considerably lower than weekdays, the annualization factor, as applied to average weekday conditions, is less than the 365 days per year.



ESTIMATED WEEKDAY TRAFFIC
TRIANGLE EXPRESSWAY - 2020

FIGURE 6.6

Table 6.8
Estimated 2020 Weekday Transactions and Revenue by Toll Zone
Scenario 1 - Triangle Expressway

Toll Zone		Class 1 Vehicles						Class 2 and 3 Vehicles						Total Weekday Transactions			Total Weekday Revenue			Average Weekday Toll per Transaction
		ETC			BBM			ETC			BBM									
Number	Location	Trans.	Toll	Revenue	Trans.	Toll	Revenue	Trans.	Toll	Revenue	Trans.	Toll	Revenue	ETC	BBM	Total	ETC	BBM	Total	(all vehicles and payment types)
01/02	Ramps North at Hopson Rd.	3,870	$0.39	$1,509	1,982	$0.60	$1,189	54	$1.33	$72	47	$1.96	$92	3,924	2,029	5,953	$1,581	$1,281	$2,862	$0.481
05/06	SR 147/SR 540 Jct. NW Connection	12,239	$1.08	$13,218	5,669	$1.66	$9,411	441	$3.59	$1,582	368	$5.78	$2,126	12,680	6,037	18,717	$14,800	$11,537	$26,337	$1.407
09/10	SR 147/SR 540 Jct. NE Connection	3,989	$0.87	$3,470	2,602	$1.33	$3,461	95	$3.05	$290	93	$4.27	$395	4,084	2,695	6,779	$3,760	$3,856	$7,616	$1.124
13/14	SR 147/SR 540 Jct. 540 Thru Mvt.	23,318	$0.70	$16,322	12,054	$1.07	$12,898	743	$2.28	$1,694	615	$3.52	$2,166	24,061	12,669	36,730	$18,017	$15,064	$33,081	$0.901
15/16	Mainline N of Morrisville Pky	30,715	$0.48	$14,743	14,082	$0.73	$10,280	1,155	$1.62	$1,872	790	$2.42	$1,911	31,871	14,872	46,742	$16,615	$12,191	$28,806	$0.616
17/18	Mainline N. of Green Level Rd	28,333	$0.39	$11,050	14,428	$0.60	$8,657	1,132	$1.31	$1,482	895	$1.99	$1,781	29,465	15,323	44,788	$12,532	$10,438	$22,970	$0.513
21/22	Ramps North at U.S. 64	9,147	$0.48	$4,391	4,327	$0.73	$3,159	289	$1.68	$486	281	$2.41	$678	9,436	4,608	14,045	$4,876	$3,837	$8,713	$0.620
25/26	Mainline S of US 64	21,872	$1.08	$23,622	11,692	$1.65	$19,292	982	$3.66	$3,595	777	$5.65	$4,392	22,854	12,469	35,324	$27,216	$23,684	$50,900	$1.441
29/30	Ramps South at S. Salem St.	3,205	$0.28	$897	1,295	$0.42	$544	69	$0.96	$66	29	$1.37	$40	3,273	1,324	4,597	$963	$584	$1,547	$0.336
31/32	Ramps North at Veridea Pky	1,762	$0.30	$529	867	$0.46	$399	37	$1.03	$38	26	$1.50	$39	1,799	893	2,692	$567	$438	$1,005	$0.373
33/34	Mainline N of SR 55 Bypass	13,908	$0.45	$6,259	6,449	$0.69	$4,450	503	$1.49	$750	339	$2.27	$770	14,411	6,788	21,200	$7,008	$5,220	$12,228	$0.577
Weekday Total Triangle Expressway		**152,358**		**$96,010**	**75,447**		**$73,738**	**5,499**		**$11,926**	**4,261**		**$14,391**	**157,858**	**79,707**	**237,565**	**$107,936**	**$88,129**	**$196,065**	$0.825
Annual Total Triangle Expressway (000) Assumes Annualization Factor of 305 Days		**46,469**		**$29,283**	**23,011**		**$22,490**	**1,677**		**$3,637**	**1,300**		**$4,389**	**48,147**	**24,311**	**72,457**	**$32,921**	**$26,879**	**$59,800**	

Note: Transactions by toll zone in this table may not match transactions shown in Figure 6.6 due to rounding by direction in the figure.

6.8 Estimated 2025 Weekday Traffic and Revenue

Figure 6.7 shows estimated weekday traffic on the Triangle Expressway at 2025 levels. These estimated traffic volumes include the impacts associated with the planned relocation of the ramp toll zones at the Hopson Road and U.S. 64 interchanges to the mainline sections north of each interchange. The traffic volumes also reflect the toll schedule adjustments required to maintain the Triangle Expressway's per-mile rate structure. Weekday traffic at the south end of the project is estimated at 23,600, increasing to a peak of 58,800 north of NC 55. Weekday traffic volumes on the U.S. 64 interchange ramps to and from the south are projected to decrease between 2020 and 2025. A similar decrease is projected for the U.S. 1 interchange ramps to and from the north over the same 5-year period. These changes are the result of minor changes in travel patterns on the southern portion of the Triangle Expressway due primarily to roadway widening on nearby NC 55, U.S. 64 and Ten Ten Road, among others.

Table 6.9 shows the calculation of estimated 2025 weekday transactions and gross toll revenue by toll zone. Again, both transactions and revenue are broken out by payment category and overall vehicle class. Weekday revenue is estimated at $243,760, resulting in estimated annual gross toll revenue of $74.3 million. Of this, about $43.3 million would be attributed to ETC transactions, while the remaining $31.1 million would come from BBM collections. Systemwide, the overall average toll per transaction would be about $0.78, reflecting the overall mix of toll rates by location, payment type and vehicle class.

6.9 Estimated 2035 Weekday Traffic and Revenue

Figure 6.8 shows estimated weekday traffic on the Triangle Expressway in 2035. Traffic is expected to reach a peak of 66,600 vehicles just north of NC 55. Of this, about 25,000 vehicles would use Toll NC 147, while about 41,600 vehicles per weekday would continue on Toll NC 540 to NC 54 and beyond.

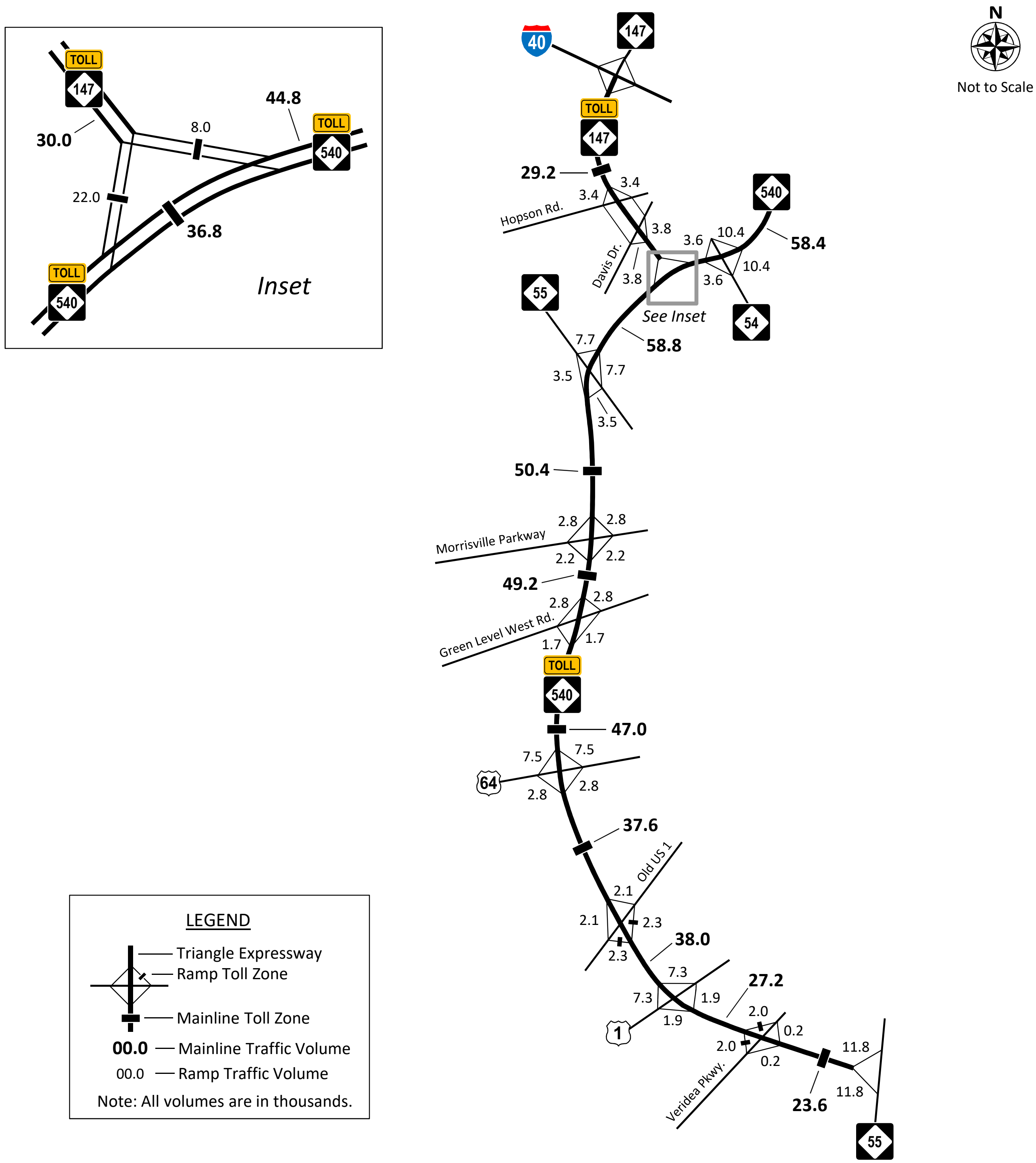
Toll revenue calculations for 2035 are shown in **Table 6.10**. In 2035, average weekday gross revenue from ETC is estimated at $255,369 per day. This compares with $130,860 per day from BBM, resulting in total revenue of about $386,229 per weekday. The weekday traffic and revenue was annualized, using the 305-day annualization factor to produce estimated annual revenue of almost $118 million. Of this, about $78 million would come from electronic toll collection while about $40 million would come from BBM.

6.10 Estimated 2045 Weekday Traffic and Revenue

Finally, **Figure 6.9** presents estimated weekday traffic for Triangle Expressway at in year 2045. Estimated weekday traffic would increase from 36,000 at the south end of the project to 70,400 per weekday north of US 64, to 80,400 north of NC 55.

Table 6.11 provides estimated 2045 weekday transactions and gross toll revenue by toll zone. It is estimated that an average of almost 475,000 transactions will be recorded systemwide, each weekday, yielding more than $567,000. This results in an overall average toll per transaction, systemwide, of $1.20.

On an annual basis, almost 145 million annual transactions can be expected by 2045, of which 116 million would be ETC and about 28 million would be BBM. Total annual expected revenue, before leakage adjustment, is estimated at more than $173 million for Triangle Expressway.



ESTIMATED WEEKDAY TRAFFIC
TRIANGLE EXPRESSWAY - 2025

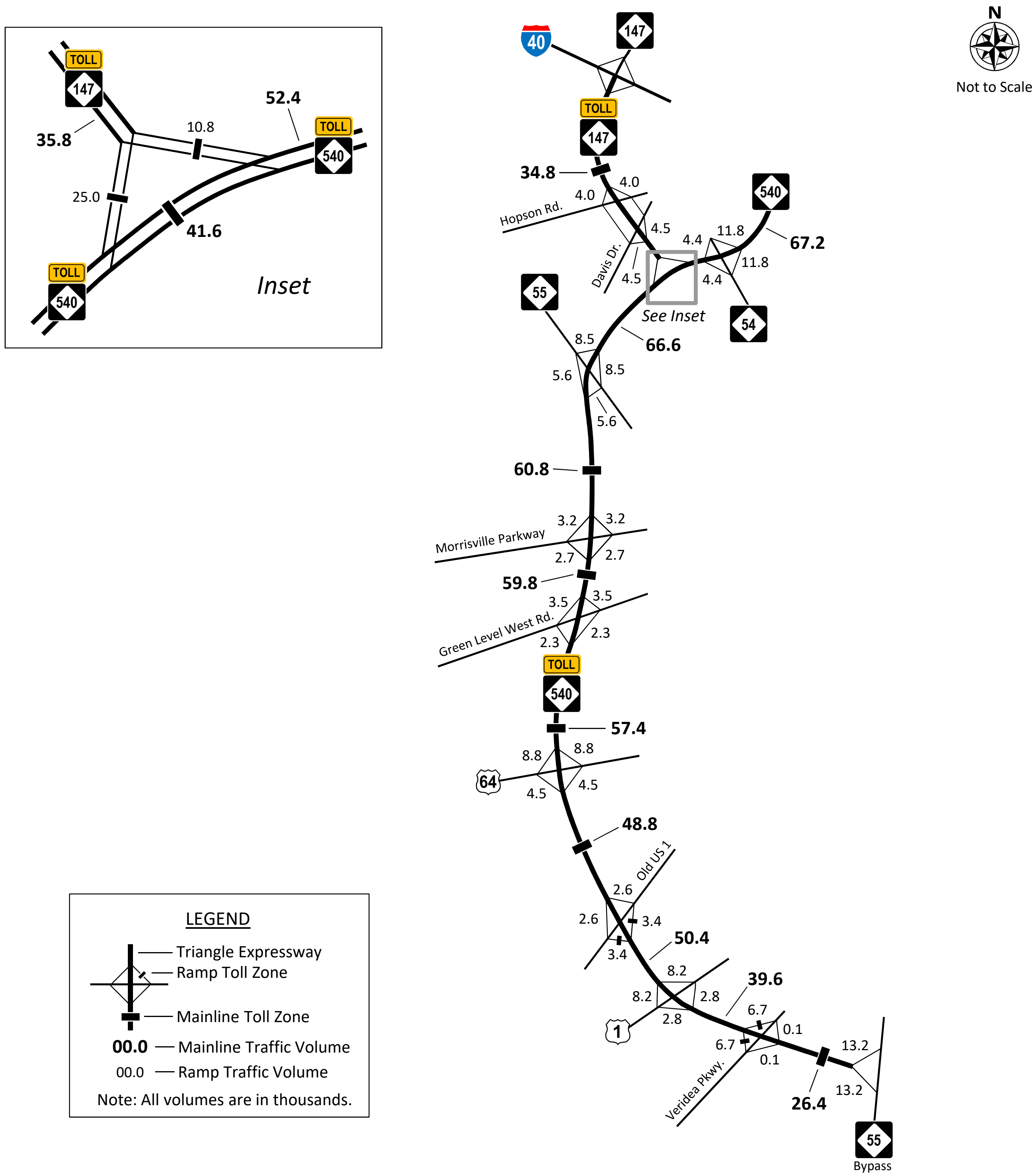
CDM Smith

FIGURE 6.7

Table 6.9
Estimated 2025 Weekday Transactions and Revenue by Toll Zone
Scenario 1 - Triangle Expressway

Toll Zone		Class 1 Vehicles						Class 2 and 3 Vehicles						Total Weekday Transactions			Total Weekday Revenue			Average Weekday Toll per Transaction
		ETC			BBM			ETC			BBM									
Number	Location	Trans.	Toll	Revenue	Trans.	Toll	Revenue	Trans.	Toll	Revenue	Trans.	Toll	Revenue	ETC	BBM	Total	ETC	BBM	Total	(all vehicles and payment types)
01/02	Ramps North at Hopson Rd.	19,856	$0.46	$9,134	8,224	$0.70	$5,757	699	$1.57	$1,098	482	$2.29	$1,103	20,556	8,706	29,262	$10,232	$6,860	$17,092	$0.584
05/06	SR 147/SR 540 Jct. NW Connection	15,152	$0.83	$12,577	5,950	$1.28	$7,616	544	$2.76	$1,502	431	$4.46	$1,920	15,697	6,381	22,077	$14,079	$9,536	$23,615	$1.070
09/10	SR 147/SR 540 Jct. NE Connection	4,980	$0.66	$3,287	2,757	$1.02	$2,813	188	$2.31	$434	160	$3.27	$524	5,168	2,918	8,086	$3,721	$3,336	$7,057	$0.873
13/14	SR 147/SR 540 Jct. 540 Thru Mvt.	24,057	$0.81	$19,486	11,275	$1.24	$13,981	780	$2.63	$2,051	635	$4.08	$2,590	24,836	11,910	36,746	$21,536	$16,571	$38,107	$1.037
15/16	Mainline N of Morrisville Pky	34,312	$0.55	$18,872	13,886	$0.85	$11,803	1,289	$1.85	$2,385	869	$2.82	$2,449	35,601	14,754	50,355	$21,256	$14,252	$35,509	$0.705
17/18	Mainline N. of Green Level Rd	32,585	$0.46	$14,989	14,383	$0.71	$10,212	1,270	$1.55	$1,969	974	$2.36	$2,298	33,856	15,357	49,213	$16,958	$12,510	$29,469	$0.599
21/22	Ramps North at U.S. 64	31,926	$0.56	$17,878	12,975	$0.86	$11,158	1,278	$1.96	$2,505	904	$2.84	$2,568	33,204	13,879	47,083	$20,384	$13,726	$34,110	$0.724
25/26	Mainline S of US 64	24,307	$0.80	$19,446	11,379	$1.23	$13,996	1,055	$2.71	$2,859	818	$4.21	$3,445	25,362	12,197	37,559	$22,305	$17,441	$39,746	$1.058
29/30	Ramps South at S. Salem St.	3,263	$0.32	$1,044	1,184	$0.49	$580	86	$1.10	$95	39	$1.59	$63	3,349	1,223	4,572	$1,139	$643	$1,782	$0.390
31/32	Ramps North at Veridea Pky	2,629	$0.35	$920	1,174	$0.53	$622	68	$1.20	$82	48	$1.72	$83	2,697	1,222	3,919	$1,002	$705	$1,708	$0.436
33/34	Mainline N of SR 55 Bypass	16,028	$0.52	$8,334	6,594	$0.80	$5,275	554	$1.72	$953	380	$2.64	$1,004	16,581	6,974	23,556	$9,287	$6,280	$15,567	$0.661
Weekday Total Triangle Expressway		**209,094**		**$125,966**	**89,780**		**$83,813**	**7,813**		**$15,933**	**5,740**		**$18,048**	**216,907**	**95,521**	**312,428**	**$141,899**	**$101,860**	**$243,760**	$0.780
Annual Total Triangle Expressway (000)		**63,774**		**$38,420**	**27,383**		**$25,563**	**2,383**		**$4,860**	**1,751**		**$5,504**	**66,157**	**29,134**	**95,290**	**$43,279**	**$31,067**	**$74,347**	
Assumes Annualization Factor of 305 Days																				

Note: Transactions by toll zone in this table may not match transactions shown in Figure 6.7 due to rounding by direction in the figure.



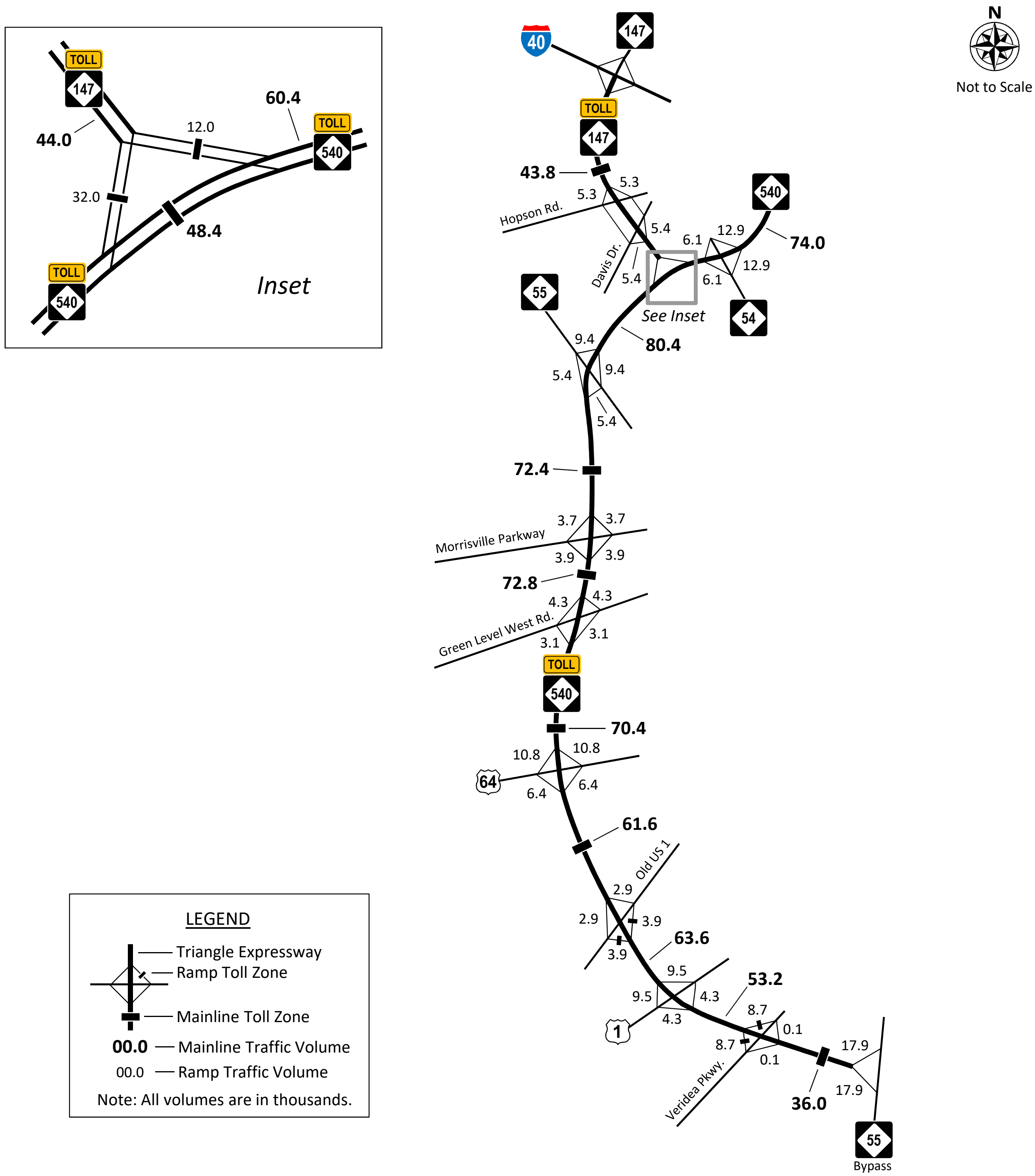
ESTIMATED WEEKDAY TRAFFIC TRIANGLE EXPRESSWAY - 2035

FIGURE 6.8

Table 6.10
Estimated 2035 Weekday Transactions and Revenue by Toll Zone
Scenario 1 - Triangle Expressway

Toll Zone		Class 1 Vehicles						Class 2 and 3 Vehicles						Total Weekday Transactions			Total Weekday Revenue			Average Weekday Toll per Transaction
		ETC			BBM			ETC			BBM									
Number	Location	Trans.	Toll	Revenue	Trans.	Toll	Revenue	Trans.	Toll	Revenue	Trans.	Toll	Revenue	ETC	BBM	Total	ETC	BBM	Total	(all vehicles and payment types)
01/02	Ramps North at Hopson Rd.	25,493	$0.61	$15,551	7,801	$0.93	$7,255	1,025	$2.08	$2,132	429	$3.04	$1,304	26,518	8,230	34,748	$17,683	$8,559	$26,242	$0.755
05/06	SR 147/SR 540 Jct. NW Connection	18,915	$1.12	$21,185	5,017	$1.72	$8,629	709	$3.72	$2,636	355	$5.99	$2,129	19,624	5,372	24,996	$23,821	$10,758	$34,580	$1.383
09/10	SR 147/SR 540 Jct. NE Connection	7,651	$0.87	$6,657	2,786	$1.34	$3,733	322	$3.05	$982	127	$4.30	$547	7,973	2,913	10,886	$7,638	$4,279	$11,918	$1.095
13/14	SR 147/SR 540 Jct. 540 Thru Mvt.	29,405	$1.09	$32,051	10,493	$1.67	$17,524	1,057	$3.54	$3,741	598	$5.49	$3,283	30,462	11,091	41,553	$35,792	$20,807	$56,599	$1.362
15/16	Mainline N of Morrisville Pky	44,839	$0.74	$33,181	13,342	$1.14	$15,209	1,756	$2.49	$4,374	801	$3.79	$3,036	46,595	14,143	60,738	$37,554	$18,246	$55,800	$0.919
17/18	Mainline N. of Green Level Rd	43,444	$0.62	$26,935	13,789	$0.95	$13,100	1,753	$2.09	$3,663	880	$3.15	$2,771	45,197	14,669	59,866	$30,599	$15,871	$46,470	$0.776
21/22	Ramps North at U.S. 64	42,311	$0.75	$31,733	12,532	$1.15	$14,412	1,743	$2.63	$4,584	817	$3.80	$3,105	44,054	13,350	57,404	$36,318	$17,518	$53,835	$0.938
25/26	Mainline S of US 64	34,910	$1.08	$37,702	11,655	$1.66	$19,346	1,445	$3.66	$5,289	779	$5.68	$4,423	36,355	12,433	48,788	$42,992	$23,769	$66,761	$1.368
29/30	Ramps South at S. Salem St.	5,121	$0.43	$2,202	1,489	$0.66	$983	140	$1.47	$205	34	$2.15	$73	5,261	1,523	6,784	$2,407	$1,056	$3,463	$0.510
31/32	Ramps North at Veridea Pky	9,802	$0.47	$4,607	3,266	$0.72	$2,351	217	$1.61	$350	104	$2.34	$243	10,019	3,370	13,389	$4,957	$2,595	$7,551	$0.564
33/34	Mainline N of SR 55 Bypass	19,746	$0.71	$14,020	5,727	$1.08	$6,185	676	$2.35	$1,589	342	$3.56	$1,218	20,422	6,069	26,492	$15,608	$7,404	$23,012	$0.869
Weekday Total Triangle Expressway		**281,637**		**$225,824**	**87,896**		**$108,727**	**10,843**		**$29,545**	**5,266**		**$22,133**	**292,479**	**93,162**	**385,642**	**$255,369**	**$130,860**	**$386,229**	$1.002
Annual Total Triangle Expressway (000) Assumes Annualization Factor of 305 Days		**85,899**		**$68,876**	**26,808**		**$33,162**	**3,307**		**$9,011**	**1,606**		**$6,751**	**89,206**	**28,415**	**117,621**	**$77,888**	**$39,912**	**$117,800**	

Note: Transactions by toll zone in this table may not match transactions shown in Figure 6.8 due to rounding by direction in the figure.



ESTIMATED WEEKDAY TRAFFIC
TRIANGLE EXPRESSWAY - 2045

FIGURE 6.9

Table 6.11
Estimated 2045 Weekday Transactions and Revenue by Toll Zone
Scenario 1 - Triangle Expressway

Toll Zone		Class 1 Vehicles						Class 2 and 3 Vehicles						Total Weekday Transactions			Total Weekday Revenue			Average Weekday Toll per Transaction
		ETC			BBM			ETC			BBM									
Number	Location	Trans.	Toll	Revenue	Trans.	Toll	Revenue	Trans.	Toll	Revenue	Trans.	Toll	Revenue	ETC	BBM	Total	ETC	BBM	Total	(all vehicles and payment types)
01/02	Ramps North at Hopson Rd.	33,904	$0.75	$25,428	8,061	$1.16	$9,350	1,452	$2.55	$3,703	373	$3.80	$1,418	35,356	8,434	43,790	$29,131	$10,768	$39,899	$0.911
05/06	SR 147/SR 540 Jct. NW Connection	25,551	$1.38	$35,260	5,035	$2.13	$10,724	1,023	$4.59	$4,696	328	$7.41	$2,434	26,574	5,363	31,937	$39,956	$13,158	$53,114	$1.663
09/10	SR 147/SR 540 Jct. NE Connection	9,037	$1.07	$9,670	2,480	$1.65	$4,092	400	$3.75	$1,502	70	$5.30	$371	9,438	2,550	11,988	$11,172	$4,463	$15,635	$1.304
13/14	SR 147/SR 540 Jct. 540 Thru Mvt.	36,230	$1.34	$48,549	10,420	$2.06	$21,466	1,318	$4.36	$5,749	525	$6.77	$3,551	37,549	10,945	48,494	$54,297	$25,017	$79,314	$1.636
15/16	Mainline N of Morrisville Pky	56,448	$0.91	$51,367	13,072	$1.40	$18,301	2,248	$3.06	$6,880	686	$4.65	$3,188	58,696	13,758	72,454	$58,247	$21,489	$79,737	$1.101
17/18	Mainline N. of Green Level Rd	56,024	$0.76	$42,578	13,691	$1.17	$16,018	2,264	$2.56	$5,795	752	$3.89	$2,925	58,287	14,443	72,730	$48,373	$18,943	$67,316	$0.926
21/22	Ramps North at U.S. 64	54,854	$0.92	$50,466	12,661	$1.42	$17,979	2,232	$3.22	$7,188	691	$4.69	$3,243	57,086	13,353	70,439	$57,654	$21,222	$78,876	$1.120
25/26	Mainline S of US 64	46,955	$1.32	$61,981	12,095	$2.03	$24,552	1,863	$4.48	$8,345	696	$6.95	$4,839	48,818	12,791	61,609	$70,326	$29,391	$99,717	$1.619
29/30	Ramps South at S. Salem St.	6,186	$0.53	$3,278	1,396	$0.82	$1,145	173	$1.81	$313	13	$2.67	$36	6,359	1,410	7,768	$3,591	$1,180	$4,772	$0.614
31/32	Ramps North at Veridea Pky	13,462	$0.58	$7,808	3,513	$0.89	$3,126	295	$1.99	$587	92	$2.89	$267	13,756	3,605	17,361	$8,394	$3,393	$11,787	$0.679
33/34	Mainline N of SR 55 Bypass	28,339	$0.87	$24,655	6,426	$1.34	$8,611	851	$2.88	$2,450	308	$4.42	$1,363	29,190	6,735	35,924	$27,105	$9,975	$37,079	$1.032
Weekday Total Triangle Expressway		**366,989**		**$361,040**	**88,850**		**$135,365**	**14,120**		**$47,207**	**4,536**		**$23,635**	**381,109**	**93,386**	**474,495**	**$408,247**	**$159,000**	**$567,247**	$1.195
Annual Total Triangle Expressway (000) Assumes Annualization Factor of 305 Days		**111,932**		**$110,117**	**27,099**		**$41,286**	**4,306**		**$14,398**	**1,383**		**$7,209**	**116,238**	**28,483**	**144,721**	**$124,515**	**$48,495**	**$173,010**	

Note: Transactions by toll zone in this table may not match transactions shown in Figure 6.9 due to rounding by direction in the figure.

6.11 Estimated Annual Transactions and Revenue

The weekday transaction and revenue estimates calculated at 2020, 2025, 2035 and 2045 levels, based on travel demand model assignments, were used to develop annual transaction and revenue forecasts over a 40-year projection period. As noted previously, estimates for 2018 and 2019 were based on a review of recent historical trends through mid-2018. Forecasts for 2020 were developed using model output and recent historical trends. Intermediate years were developed by interpolating between model years 2020 and 2025, 2025 and 2035, and 2035 and 2045. After the last model year of 2045, traffic growth was assumed to occur at a nominal 0.6 percent per year.

Estimated annual transactions and revenue for the Triangle Expressway are shown in **Table 6.12** from FY 2019 through FY 2058. The toll revenue in Table 6.12 represents expected toll revenue based on forecast traffic volumes and does not include adjustments for leakage associated with BBM or anticipated fee revenue.

Annual transactions are expected to increase from 54.2 million in FY 2019 to 94.2 million in FY 2025, an average annual increase of 9.7 percent per year. However, a significant part of this transaction growth results from the new Morrisville Parkway interchange and its associated mainline toll zones that open on January 1, 2020 and the relocation of the ramp toll zones at the Hopson Road and U.S. 64 interchanges to mainline toll zones on July 1, 2023. Toll revenue from FY 2019 to 2025 is projected to increase by 5.5 percent per year, increasing from $52.8 million in FY 2019 to $72.8 million in FY 2025. During this period, programmed annual toll rate increases will occur, but the average toll per transaction will decrease. This is due to the increase in transactions associated with toll zone relocations and the corresponding revisions to toll rates on mainline sections.

After 2025, transaction and toll revenue growth are not impacted by any additional interchanges or toll zone relocations on the Triangle Expressway. Annual transactions are expected to increase from 94.2 million in FY 2025 to 116.3 million in FY 2035, an average annual increase of 2.1 percent per year. Revenue in that same period is expected to increase by 4.7 percent per year, resulting from increased transactions and annual toll rate increases. The average toll per transaction will have increased by 2.5 percent per year. ETC average toll rates will increase by 2.9 percent per year, however, the share of BBM versus ETC transactions will decrease between 2025 and 2035. Specifically, ETC transactions will increase by 3.0 percent per year over those 10 years, while BBM transactions will decrease by an average of 0.2 percent per year.

Over the 30-year interval between FY 2025 and FY 2055, in which no toll system changes or new interchanges are assumed to be added, overall annual transactions are forecast to increase by 1.6 percent per year while expected toll revenue will increase by 3.7 percent per year. Annual revenue is expected to reach $218.7 million in FY 2055.

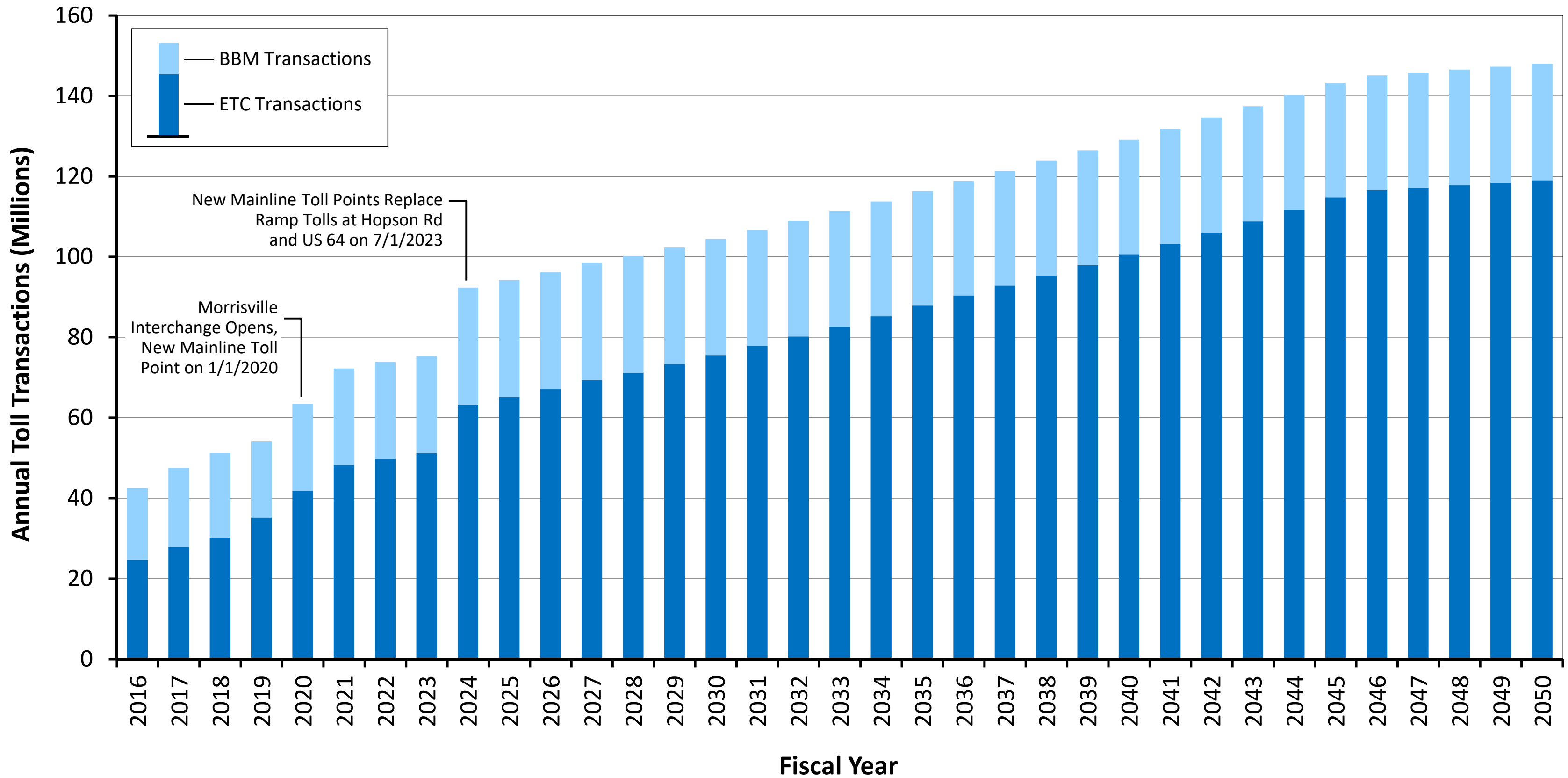
Figure 6.10 provides a graphic depiction of forecasted annual transactions on the Triangle Expressway, including the distribution of transactions between ETC and BBM. The number of BBM transactions remain fairly constant over time, but they comprise a smaller and smaller proportion of total transactions.

Table 6.12
Estimated Annual Transactions and Revenue
Scenario 1 - Triangle Expressway

Fiscal	Estimated Annual Transactions (000)				Estimated Annual Revenue (000)				Average Toll Per Transaction		
Year	ETC	BBM	Total	% ETC	ETC	BBM	Total	% ETC	ETC	BBM	Overall
2019	35,142	19,024	54,166	64.9	$28,238	$24,580	$52,818	53.5	$0.804	$1.292	$0.975
2020 (1,2)	41,835	21,564	63,399	66.0	31,243	26,056	57,299	54.5	0.747	1.208	0.904
2021 (2)	48,219	24,018	72,237	66.8	33,832	27,286	61,118	55.4	0.702	1.136	0.846
2022 (2)	49,742	24,114	73,856	67.4	35,783	28,129	63,912	56.0	0.719	1.167	0.865
2023 (2)	51,170	24,135	75,304	68.0	37,726	28,882	66,608	56.6	0.737	1.197	0.885
2024 (2,3)	63,268	29,057	92,326	68.5	39,994	29,770	69,763	57.3	0.632	1.025	0.756
2025 (2)	65,125	29,085	94,210	69.1	42,203	30,642	72,844	57.9	0.648	1.054	0.773
2026 (2)	67,056	29,082	96,138	69.7	44,567	31,419	75,987	58.7	0.665	1.080	0.790
2027	69,308	29,152	98,460	70.4	47,481	32,316	79,797	59.5	0.685	1.109	0.810
2028	71,195	29,030	100,224	71.0	50,182	33,091	83,273	60.3	0.705	1.140	0.831
2029	73,327	28,974	102,301	71.7	53,165	34,035	87,200	61.0	0.725	1.175	0.852
2030	75,533	28,910	104,443	72.3	56,418	34,995	91,412	61.7	0.747	1.210	0.875
2031	77,817	28,838	106,655	73.0	59,860	35,890	95,750	62.5	0.769	1.245	0.898
2032	80,186	28,758	108,944	73.6	63,525	36,801	100,326	63.3	0.792	1.280	0.921
2033	82,644	28,669	111,313	74.2	67,368	37,659	105,026	64.1	0.815	1.314	0.944
2034	85,196	28,573	113,769	74.9	71,432	38,543	109,975	65.0	0.838	1.349	0.967
2035	87,852	28,469	116,320	75.5	75,704	39,473	115,177	65.7	0.862	1.387	0.990
2036	90,406	28,442	118,848	76.1	79,749	40,412	120,161	66.4	0.882	1.421	1.011
2037	92,836	28,493	121,329	76.5	83,595	41,360	124,955	66.9	0.900	1.452	1.030
2038	95,330	28,533	123,864	77.0	87,620	42,249	129,868	67.5	0.919	1.481	1.048
2039	97,890	28,564	126,454	77.4	91,739	43,072	134,811	68.1	0.937	1.508	1.066
2040	100,517	28,584	129,101	77.9	96,080	43,854	139,934	68.7	0.956	1.534	1.084
2041	103,213	28,593	131,806	78.3	100,625	44,631	145,256	69.3	0.975	1.561	1.102
2042	105,980	28,590	134,570	78.8	105,504	45,463	150,967	69.9	0.996	1.590	1.122
2043	108,819	28,575	137,394	79.2	110,852	46,437	157,288	70.5	1.019	1.625	1.145
2044	111,734	28,547	140,281	79.6	116,256	47,366	163,622	71.1	1.040	1.659	1.166
2045	114,724	28,506	143,230	80.1	121,711	48,135	169,846	71.7	1.061	1.689	1.186
2046	116,543	28,539	145,083	80.3	126,186	49,100	175,286	72.0	1.083	1.720	1.208
2047	117,155	28,653	145,808	80.3	129,525	50,280	179,806	72.0	1.106	1.755	1.233
2048	117,770	28,767	146,537	80.4	132,868	51,416	184,284	72.1	1.128	1.787	1.258
2049	118,389	28,881	147,270	80.4	136,305	52,594	188,899	72.2	1.151	1.821	1.283
2050	119,010	28,996	148,006	80.4	139,823	53,826	193,649	72.2	1.175	1.856	1.308
2051	119,635	29,111	148,746	80.4	143,434	55,080	198,514	72.3	1.199	1.892	1.335
2052	120,263	29,227	149,490	80.4	147,026	56,320	203,346	72.3	1.223	1.927	1.360
2053	120,894	29,343	150,237	80.5	150,670	57,568	208,238	72.4	1.246	1.962	1.386
2054	121,529	29,459	150,989	80.5	154,479	58,870	213,349	72.4	1.271	1.998	1.413
2055	122,167	29,576	151,743	80.5	158,454	60,225	218,680	72.5	1.297	2.036	1.441
2056	122,808	29,694	152,502	80.5	162,495	61,622	224,117	72.5	1.323	2.075	1.470
2057	123,453	29,812	153,265	80.5	166,489	63,006	229,495	72.5	1.349	2.113	1.497
2058	124,101	29,930	154,031	80.6	170,725	64,421	235,147	72.6	1.376	2.152	1.527
Average Annual Percent Change											
2019-25	10.8%	7.3%	9.7%		6.9%	3.7%	5.5%		-3.5%	-3.3%	-3.8%
2025-35	3.0%	-0.2%	2.1%		6.0%	2.6%	4.7%		2.9%	2.8%	2.5%
2035-45	2.7%	0.0%	2.1%		4.9%	2.0%	4.0%		2.1%	2.0%	1.8%
2045-55	0.6%	0.4%	0.6%		2.7%	2.3%	2.6%		2.0%	1.9%	2.0%
2025-55	2.1%	0.1%	1.6%		4.5%	2.3%	3.7%		2.3%	2.2%	2.1%

(1) Assumes new Morrisville Parkway Interchange is opened January 1, 2020. Also, a new mainline toll zone north of the Morrisville Parkway Interchange is put into operation January 1, 2020.
(2) Ramp up is applied to the first 36-month period of transaction and revenue impacts associated with new toll zones.
(3) Assumes ramp tolls at U.S. 64 and Hopson Road on the Triangle Expressway are removed and replaced by new mainline toll zones north of each interchange, on July 1, 2023.

Note: Annual revenue comprises gross or expected toll revenue, not accounting for leakage associated with BBM, or fee revenue.



ESTIMATED ANNUAL TRANSACTIONS BY PAYMENT METHOD
TRIANGLE EXPRESSWAY

FIGURE 6.10

The transactions in Figure 6.10 are actual for FY 2016 through FY 2018. The increase in transactions seen in FY 2020 and FY 2021 is associated with the opening of the Morrisville Parkway interchange and its mainline toll zone on January 1, 2020 in addition to normal growth. The normal growth pattern is also impacted in FY 2024 when two new mainline toll zones replace existing ramp tolls at the Hopson Road and U.S. 64 interchanges.

After FY 2025, traffic and toll revenue growth is not impacted by any new interchanges or toll zone relocations. As seen in Figure 6.10, transaction growth levels off after FY 2045. This is because 2045 was the last supported model year, and transactions were assumed to increase at a nominal 0.6 percent per year.

Figure 6.11 provides a visual depiction of forecasted expected toll revenue, by ETC and BBM, for FY 2016 through FY 2050. The forecast toll revenue shown in this figure has not been adjusted for leakage or fee revenue. FY 2016 through FY 2018 reflect actual collected toll revenues. In the case of toll revenue, one doesn't see the same large increases evidenced in transactions in FYs 2020 and 2021, and FY 2024. This is because the new toll revenue associated with the Morrisville Parkway interchange is relatively small compared to the total toll revenue, and the increase in toll transactions due to toll zone relocations was intended to be toll revenue neutral, which was accomplished by modifying toll rates on mainline sections to maintain a uniform per-mile rate on the Triangle Expressway. Hence, the addition of new mainline toll zones adds to transactions but does not have an equivalent impact on revenue. Figure 6.11 also demonstrates the increasing share of total revenue expected to come from electronic toll collection. Annual toll revenue estimates shown in Figure 6.11 and Table 6.12 do not yet reflect any adjustment for leakage, nor do they include estimates of fee revenue associated with the BBM collection process.

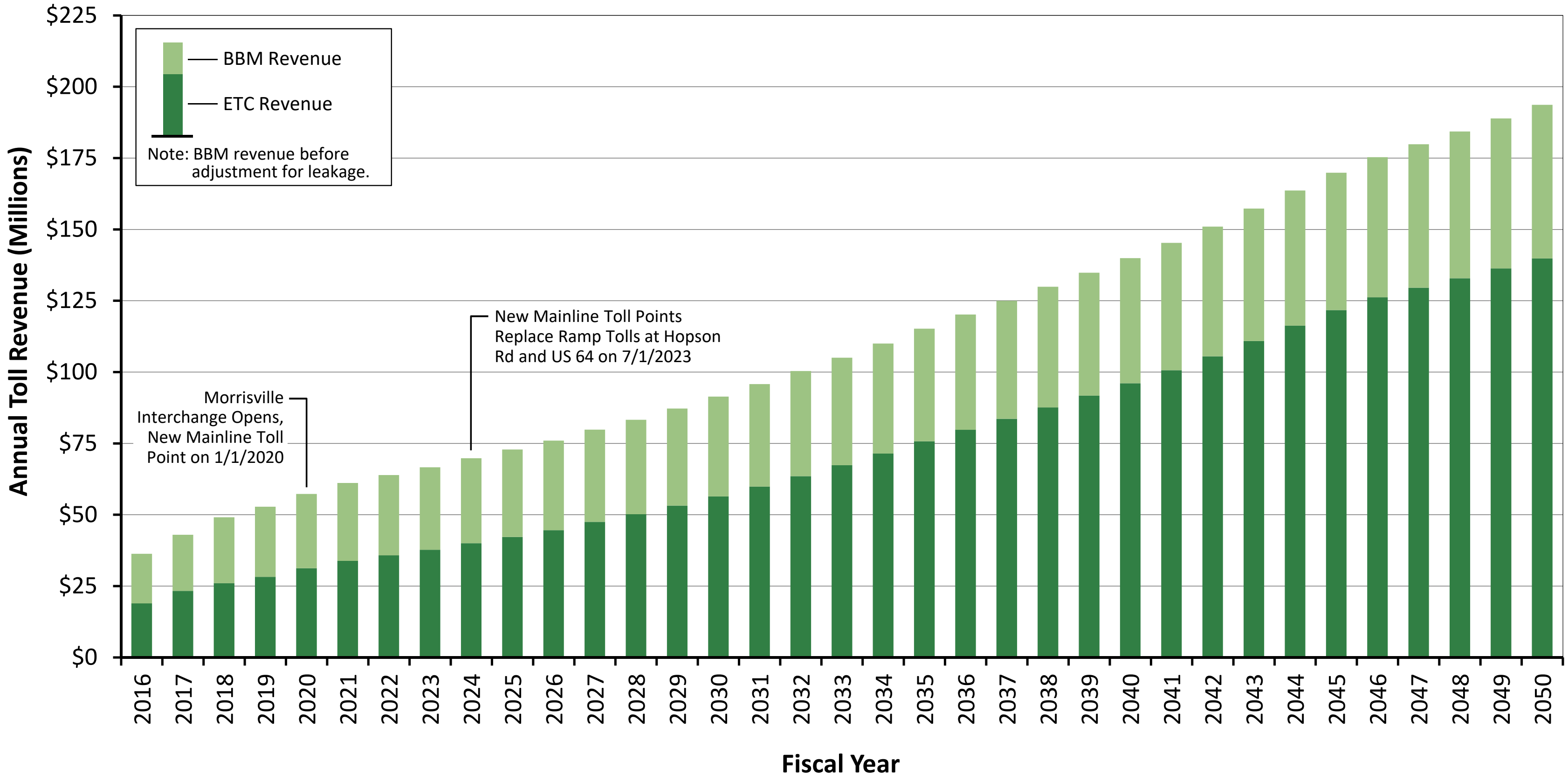
6.11.1 Estimated Adjusted Annual Revenue

The final step in the forecast process was to adjust gross toll revenue estimates for leakage and potential additional processing fee revenue associated with the BBM collections process. Annual forecasts of adjusted total revenue are provided in **Table 6.13**. Estimated gross revenue for FY 2019 is shown at $52.8 million. Of this, $24.6 million is estimated to come from BBM transactions.

As with other all-electronic toll collection facilities in the United States, there is always some portion of BBM revenue which may not be collected. This is generally referred to as "leakage" and is a result of a variety of factors, including:

- Unreadable or obscured license plates at the time of the transaction;
- Incomplete, unavailable or inaccurate information about vehicle owner name and address; and,
- Non-payment of billed BBM transactions.

Based on actual Triangle Expressway experience, estimates of BBM leakage were applied for each year in Table 6.13. This was applied only to the BBM share of gross revenue. In 2019, for example, losses due to BBM leakage were estimated at $5.7 million, resulting in adjusted annual revenue of $47.2 million. Leakage adjustments are expected to increase over time in proportion with the increase in computed BBM revenue. Even though the number of BBM transactions were estimated to grow only slightly over the forecast period, the amount of revenue, and hence the BBM leakage estimate, was assumed to increase over time because of assumptions regarding annual increases in toll rates per



ESTIMATED ANNUAL REVENUE BY PAYMENT METHOD TRIANGLE EXPRESSWAY

FIGURE 6.11

Table 6.13
Estimated Adjusted Annual Revenue
Scenario 1 - Triangle Expressway

Fiscal Year	Computed Gross Revenue ETC	Computed Gross Revenue BBM	Computed Gross Revenue Total	BBM Leakage	Adjusted Toll Revenue	Processing Fees	Total Collected Revenue
2019	$ 28,238	$ 24,580	$ 52,818	$ (5,652)	$ 47,166	$ 5,657	$ 52,823
2020 (1,2)	31,243	26,056	57,299	(5,991)	51,308	5,778	57,086
2021 (2)	33,832	27,286	61,118	(6,274)	54,844	5,870	60,714
2022 (2)	35,783	28,129	63,912	(6,468)	57,444	5,893	63,337
2023 (2)	37,726	28,882	66,608	(6,641)	59,966	5,898	65,865
2024 (2,3)	39,994	29,770	69,763	(6,845)	62,918	5,934	68,852
2025 (2)	42,203	30,642	72,844	(7,046)	65,798	5,940	71,738
2026 (2)	44,567	31,419	75,987	(7,225)	68,762	5,939	74,701
2027	47,481	32,316	79,797	(7,431)	72,366	5,953	78,320
2028	50,182	33,091	83,273	(7,609)	75,664	5,928	81,592
2029	53,165	34,035	87,200	(7,826)	79,374	5,917	85,291
2030	56,418	34,995	91,412	(8,047)	83,365	5,904	89,269
2031	59,860	35,890	95,750	(8,253)	87,497	5,889	93,386
2032	63,525	36,801	100,326	(8,462)	91,864	5,873	97,737
2033	67,368	37,659	105,026	(8,659)	96,367	5,855	102,222
2034	71,432	38,543	109,975	(8,863)	101,112	5,835	106,948
2035	75,704	39,473	115,177	(9,077)	106,100	5,814	111,914
2036	79,749	40,412	120,161	(9,293)	110,868	5,808	116,677
2037	83,595	41,360	124,955	(9,511)	115,445	5,819	121,263
2038	87,620	42,249	129,868	(9,715)	120,153	5,827	125,981
2039	91,739	43,072	134,811	(9,904)	124,907	5,833	130,740
2040	96,080	43,854	139,934	(10,084)	129,850	5,837	135,687
2041	100,625	44,631	145,256	(10,263)	134,994	5,839	140,833
2042	105,504	45,463	150,967	(10,454)	140,513	5,839	146,352
2043	110,852	46,437	157,288	(10,678)	146,611	5,836	152,446
2044	116,256	47,366	163,622	(10,892)	152,730	5,830	158,560
2045	121,711	48,135	169,846	(11,069)	158,777	5,822	164,599
2046	126,186	49,100	175,286	(11,290)	163,996	5,828	169,824
2047	129,525	50,280	179,806	(11,562)	168,244	5,851	174,095
2048	132,868	51,416	184,284	(11,823)	172,461	5,875	178,336
2049	136,305	52,594	188,899	(12,094)	176,805	5,898	182,703
2050	139,823	53,826	193,649	(12,377)	181,272	5,922	187,193
2051	143,434	55,080	198,514	(12,666)	185,848	5,945	191,794
2052	147,026	56,320	203,346	(12,951)	190,396	5,969	196,364
2053	150,670	57,568	208,238	(13,238)	195,001	5,992	200,993
2054	154,479	58,870	213,349	(13,537)	199,812	6,016	205,828
2055	158,454	60,225	218,680	(13,849)	204,831	6,040	210,871
2056	162,495	61,622	224,117	(14,170)	209,947	6,064	216,011
2057	166,489	63,006	229,495	(14,488)	215,007	6,088	221,095
2058	170,725	64,421	235,147	(14,813)	220,333	6,112	226,446

(1) Assumes new Morrisville Parkway Interchange is opened January 1, 2020. Also, a new mainline toll zone north of the Morrisville Parkway Interchange is put into operation January 1, 2020.
(2) Ramp up is applied to the first 36-month period of transaction and revenue impacts associated with new toll zones.
(3) Assumes ramp tolls at US 64 and Hopson Road on the Triangle Expressway are removed, and replaced by new mainline toll zones north of each interchange, on July 1, 2023.

transaction. After adjusting for leakage, adjusted annual revenue would be expected to increase from $47.2 million in 2019 to $65.8 million in 2025 and $106.1 million in FY 2035.

Also shown in Table 6.13 are estimates of processing fee revenue. This relates to processing fees which are added to BBM invoices which are not paid within the first payment interval. These fees, $6.00 per unpaid invoice, are estimated to generate about $5.7 million in 2019, increasing to about $5.9 million in 2025 and remain around that level in subsequent years. Relatively little growth is shown in processing fee revenue, because BBM transactions are forecast to remain fairly stable and no annual increase in the $6.00 processing fee is assumed in this forecast.

The rightmost column of Table 6.13 shows estimated total collected revenue, which includes the adjusted revenue plus processing fee revenue. Total collected revenue from the Triangle Expressway is expected to grow from $52.8 million in FY 2019 to $164.6 million in FY 2045.

6.12 Disclaimer

Current accepted professional practices and procedures were used in the development of these updated traffic and revenue forecasts. However, as with any forecast of the future, there may be differences between forecasted and actual results caused by events and circumstances beyond the control of CDM Smith. In formulating its forecasts, CDM Smith has reasonably relied upon the accuracy and completeness of information provided (both written and oral) by the NCDOT/NCTA and other local and state agencies. CDM Smith also has relied upon the reasonable assurances of some independent parties and is not aware of any facts that would make such information misleading.

CDM Smith has made qualitative judgments related to several key variables in the development and analysis of the traffic and revenue forecasts that must be considered as a whole; therefore, selecting portions of any individual result without consideration of the intent of the whole may create a misleading or incomplete view of the results and the underlying methodologies used to obtain the results. CDM Smith gives no opinion as to the value or merit to partial information extracted from this report. All forecasts and projections reported herein are based on CDM Smith's experience and judgment and on a review of information obtained from multiple state and local agencies, including NCDOT/NCTA. These estimates and projections may not be indicative of actual or future values and are therefore subject to substantial uncertainty. Future developments, economic conditions, and changes in travel behavior resulting from advances in automotive technology cannot be predicted with certainty and may affect the forecasts or projections expressed in this report, such that CDM Smith does not specifically guarantee or warrant any estimate or projection contained within this report.

While CDM Smith believes that some of the projections or other forward-looking statements contained within the report are based on reasonable assumptions as of the date in the report, such forward looking statements involve risks and uncertainties that may cause actual results to differ materially from the results predicted. Therefore, following the date of this report, CDM Smith will take no responsibility or assume any obligation to advise of changes that may affect its assumptions contained within the report, as they pertain to: socioeconomic and demographic forecasts, proposed residential or commercial land use development projects and/or potential improvements to the regional transportation network.

CDM Smith is not, and has not been, a municipal advisor as defined in Federal law (the Dodd Frank Bill) to NCDOT/NCTA and does not owe a fiduciary duty pursuant to Section 15B of the Exchange Act to NCDOT/NCTA with respect to the information and material contained in this report. CDM Smith is not recommending and has not recommended any action to NCDOT/NCTA. NCDOT/NCTA should discuss the information and material contained in this report with any and all internal and external advisors that it deems appropriate before acting on this information.

Chapter 7

Scenario 2: Complete 540 Phase 1 Traffic and Revenue Forecast

Chapter 6 provided a detailed description of traffic and revenue forecasts for Scenario 1, the existing Triangle Expressway without Complete 540 Phase 1. This chapter provides the forecast for Scenario 2, Complete 540 Phase 1, which assumes the Triangle Expressway and its planned improvements in addition to Complete 540 Phase 1. Phase 2, a possible future completion of Complete 540 from I-40/U.S. 70 to U.S. 64/U.S. 264/Knightdale Bypass, is contained in the ***State Transportation Improvement Program*** (STIP); but impacts from that portion of the project are *not* assumed in Scenario 2.

As shown previously in Figure 1.2 (Chapter 1), Complete 540 Phase 1 will extend the Triangle Expressway from its southern terminus at the NC 55 Bypass to I-40 and U.S. 70 (the Clayton Bypass). This study assumes that Complete 540 Phase 1 would open on July 1, 2023. In combination with the existing Triangle Expressway, Complete 540 Phase 1 would provide an alternative to congested areas on I-40 south of Raleigh. Scenario 2 will also be called the Complete 540 Scenario or Complete 540 forecast.

It is anticipated that through trips will be a small component of total travel on the combined Triangle Expressway and Complete 540 Phase 1. Rather, Complete 540 will provide access into the Holly Springs, Apex and western Cary areas from the lower portion of the I-40 corridor.

There will be seven interchanges on Complete 540 Phase 1, including the end points at I-40 and NC 55 Bypass at the southern terminus of the existing Triangle Expressway. Toll zones will be located on each of the six new mainline sections. Toll collection will be all electronic, using ETC and BBM, the same methods employed on the Triangle Expressway. For purposes of this study, it is assumed that the per-mile toll rates assessed on Complete 540 will be equal to the through-trip per-mile rate charged on the Toll NC 540 portion of the Triangle Expressway in any given year. The Complete 540 toll rates at each mainline section will be calculated by multiplying the per-mile toll rate by the distance between the adjacent interchanges. As with the Triangle Expressway, ETC toll rates will be 35 percent lower than the BBM toll.

Complete 540 Phase 1 is assumed to be open to traffic by July 1, 2023. Beyond traffic and revenue generated on the Complete 540 project itself, its completion is expected to add incremental traffic to the existing Triangle Expressway. Transaction and revenue estimates, including the incremental amount on the existing Triangle Expressway were forecast and will be presented in this Chapter.

Note that the wide range of highway improvements, described previously in Chapter 6, are still assumed to be in place in the years 2025, 2035 and 2045 for Scenario 2. As noted previously, several of these projects are likely competitive to the proposed Complete 540 project, particularly the planned widening on I-40 through much of the study area, and the widening of Ten Ten Road, which closely parallels Complete 540 Phase 1.

7.1 Analytical Approach

Traffic and revenue forecasts for Scenario 2 followed the same methodology described in Chapter 6. Specifically, assignments with Complete 540 Phase 1 were conducted at 2025, 2035 and 2045 levels. Transaction and revenue estimates for intermediate years were developed through interpolation. Transaction and revenue forecasts for the combined project were developed over a total 40-year period, ending in FY 2058. Estimates for years subsequent to 2045 were based on nominal and conservative annual traffic growth forecasts, assuming continuing annual increases in toll rates after 2045. Additionally, analysis was conducted to identify the transaction and revenue impacts on the existing Triangle Expressway attributable to the opening of Complete 540 Phase 1.

7.2 Basic Assumptions

The traffic and revenue estimates for Scenario 2, including both Triangle Expressway and Complete 540 Phase 1, are predicated on the basic assumptions which have been defined previously in Chapter 6. Additional assumptions with respect to the Complete 540 analysis are set forth below; these are considered reasonable for purposes of the Scenario 2 forecast:

1. The proposed Complete 540 Phase 1 will be open to traffic on July 1, 2023.

2. The configuration, number of lanes and number and location of interchanges on Complete 540 Phase 1 will be as defined in this report and will not change during the forecast period.

3. Tolls on Complete 540 will be collected in a manner identical to Triangle Expressway, with three vehicle classes and two payment options, as defined in Chapter 6. Toll rates for each of the six new mainline toll zones will be based on the same per-mile through-trip rates planned for the Toll NC 540 portion of the existing Triangle Expressway in any given year.

4. Complete 540 Phase 3 is not included at any point during the forecast period of Scenario 2.

All other basic assumptions defined previously in Chapter 6 also apply to the Scenario 2 forecast. Any significant departure from these basic assumptions could materially affect traffic and revenue potential on the Triangle Expressway and Complete 540 Phase 1.

7.3 Toll Sensitivity Assessment

A toll sensitivity analysis was conducted for Scenario 2, assuming both Triangle Expressway and Complete 540 Phase 1 were in place. As discussed in Chapter 6, the expanded toll sensitivity analysis was conducted at 2025 levels. The results of the analysis are depicted in **Figure 7.1**.

The horizontal axis shows Class 1, per-mile toll rates for ETC and BBM payment modes. ETC rates are 35 percent lower than BBM rates at each of the discrete levels tested. The red dot shows the per-mile toll rate assumed for 2025 traffic and revenue estimates included in this report. In that year, the nominal per-mile rate for ETC transactions on both Complete 540 Phase 1 and the Triangle Expressway is assumed at $0.245 per mile. The equivalent per-mile rate for BBM travel (Class 1) would be $0.377 per mile. These rates are assumed for Complete 540, as they match the existing, planned per-mile rates for a through trip on the Toll NC 540 portion of the Triangle Expressway.

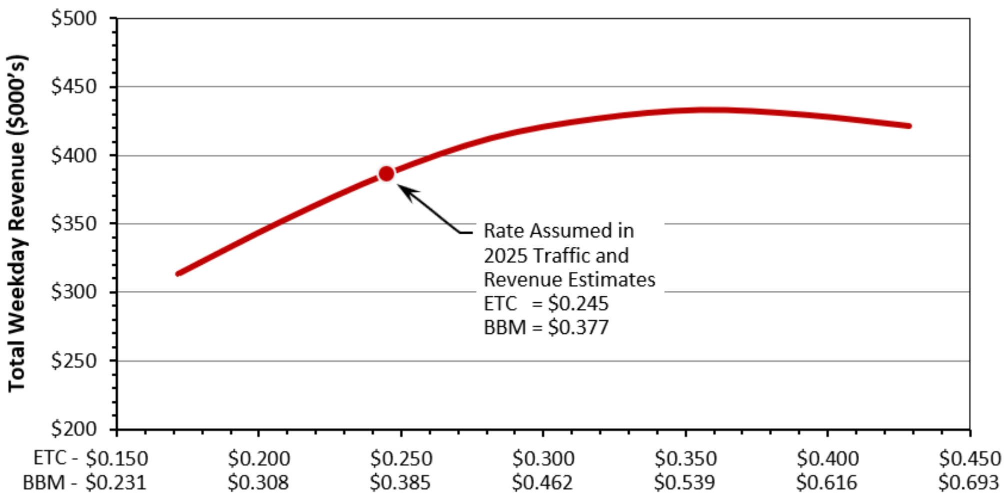


Figure 7.1

Combined Triangle Expressway and Complete 540 Phase 1 Toll Sensitivity Curve

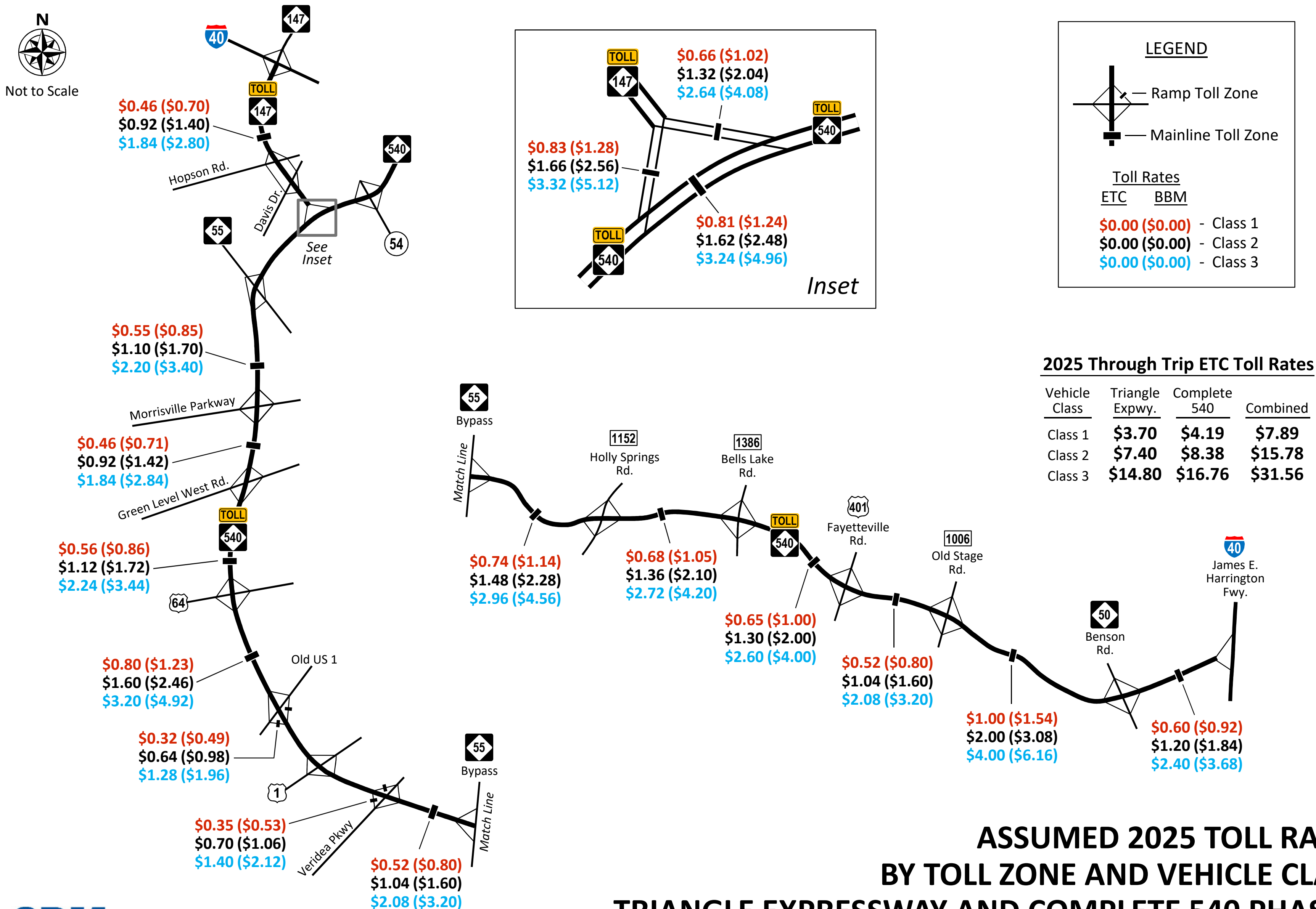
Under the full project configuration, including both the Triangle Expressway and Complete 540 Phase 1, maximum revenue would be achieved at per-mile rates between $0.35 and $0.40 per mile. The assumed 2025 rate, $0.245 per mile, is considerably below the maximum rate. If revenue maximizing tolls were used, revenue would be increased by about 13 percent versus the assumed rate. This indicates that the selected per-mile rates would provide an opportunity to increase revenue in future years by rate increase levels above those assumed in the study, if ever needed.

7.3.1 Assumed 2025 Toll Rates

Figure 7.2 shows assumed toll rates by vehicle class and payment category at each tolling point in the year 2025. The left side of the graphic shows the 2025 toll configuration of the Triangle Expressway. The remaining portion shows the toll configuration and toll rates on the proposed Complete 540 Phase 1.

For example, at the eastern-most mainline toll point located just west of I-40, the ETC toll rate for Class 1 vehicles would be $0.60, shown in red. At the same location, a Class 1 vehicle without an ETC transponder would be charged $0.92. Higher toll rates are shown at the mainline toll point immediately to the west; this is because of a longer distance between interchanges at Old Stage Road and NC 50 as compared with the eastern-most section of the project. As described previously in Chapter 6, it is assumed that the Class 2 toll will be twice the Class 1 toll while the Class 3 toll, which represents vehicles with more than three axles, would be set at four times the Class 1 rate.

Figure 7.2 also shows through-trip rates for ETC vehicles on both the Triangle Expressway and Complete 540 Phase 1 at 2025 levels. For a Class 1 vehicle, using ETC, a through trip on the Triangle Expressway portion of the project would be charged $3.70. The through-trip toll for the Complete 540 Phase 1 portion of the project, which is about one mile longer than the Triangle Expressway trip, would be $4.19. A through trip on the entire Triangle Expressway and Complete 540 Phase 1, a distance of more than 32 miles, would cost a Class 1 ETC vehicle $7.89 in tolls in 2025.



2025 Through Trip ETC Toll Rates

Vehicle Class	Triangle Expwy.	Complete 540	Combined
Class 1	$3.70	$4.19	$7.89
Class 2	$7.40	$8.38	$15.78
Class 3	$14.80	$16.76	$31.56

CDM Smith

ASSUMED 2025 TOLL RATES BY TOLL ZONE AND VEHICLE CLASS TRIANGLE EXPRESSWAY AND COMPLETE 540 PHASE 1

FIGURE 7.2

7.3.2 Future Toll Increases

As described in Chapter 6, the NCTA has an adopted toll schedule for the Triangle Expressway that assumes an annual increase in toll rates through 2035. These toll rate increases are not indexed to current CPI. After 2035, annual toll rate increases are assumed on both the Triangle Expressway and Complete 540 that are indexed to CPI inflation forecasts. **Table 7.1** shows assumed Class 1 toll rates for ETC and BBM at each of the six new mainline toll zones on Complete 540. Toll rates are shown for the entire forecast period from the assumed opening year of the project in 2023 through 2058.

The through-trip toll for Phase 1 of Complete 540, for a Class 1 ETC vehicle, is shown on the right side of Table 7.1. Through-trip rates would increase from $4.19 in 2025 to $5.65 in 2035, an average annual increase of 3.0 percent per year. A through-trip Class 1 ETC toll would total $6.93 by 2045, an increase of about 2.1 percent per year between 2035 and 2045.

Table 7.2 provides a summary of through-trip toll rates by toll class on both the Triangle Expressway and Complete 540. Values are shown at each of the modeling years, including 2020, 2025, 2035 and 2045, for each of the three toll classes. The 2020 values include only the Triangle Expressway since Complete 540 Phase 1 is not assumed to open until July 1, 2023. The first model year in Table 7.2 with the entire project in place would be 2025 which shows a full length through-trip ETC toll of $7.89 for Class 1, $15.78 for Class 2 and $31.56 for Class 3. Through-trip toll rates for BBM transactions are also shown in Table 7.2.

7.4 Estimated 2025 Weekday Transactions and Revenue

Estimated weekday traffic volumes on the Triangle Expressway and Complete 540 Phase 1 are shown in **Figure 7.3**. Mainline traffic is the sum of both directions, and the ramp traffic is posted by entry and exit ramps, balanced by reciprocal movements. The traffic volumes on the Triangle Expressway include the impact of additional trips associated with Complete 540.

As shown in Figure 7.3, average weekday traffic in calendar 2025 at the far eastern end of Complete 540 is estimated at 19,800. This would increase to about 29,000 just east of U.S. 401. Traffic at the south end of the existing Triangle Expressway would total 43,400. Weekday traffic on the Triangle Expressway peaks at 65,600 on the mainline north of NC 55.

Figure 7.4 illustrates the net impacts of Complete 540 on Triangle Expressway in 2025. The traffic volumes and net impacts are prior to the application of ramp-up factors. They represent traffic demand prior to ramp-up. The black numbers in Figure 7.4 represent estimated weekday traffic on the Triangle Expressway in 2025 with Complete 540 Phase 1 in place. The red numbers are the estimated traffic impacts on the Triangle Expressway due solely to Complete 540 Phase 1.

Complete 540 draws more traffic onto the Triangle Expressway, with the largest positive impacts occurring on the southern sections. As might be expected, the biggest impact would occur at the southernmost mainline of the Triangle Expressway, where traffic just west of the NC 55 Bypass would increase by almost 20,000 vehicles per day.

Table 7.1
Assumed Class 1 Toll Rates By Year
Complete 540 Phase 1

Calendar	NC 55 Bypass Holly Springs		Holly Springs - Bells lake Rd.		Bells Lake Rd. - U.S. 401		U.S. 401 - Old Stage Rd.		Old Stage Rd. - NC 50		NC 50 I-40		Through Trip	Through Trip Rate Per
Year (1)	ETC	BBM	ETC	BBM	ETC	BBM	ETC	BBM	ETC	BBM	ETC	BBM	ETC Toll	Mile
2023 (2)	$0.70	$1.08	$0.64	$0.99	$0.61	$0.94	$0.49	$0.75	$0.94	$1.45	$0.57	$0.88	$3.95	$0.231
2024	0.72	1.11	0.66	1.02	0.63	0.97	0.51	0.79	0.97	1.49	0.58	0.89	4.07	0.238
2025	0.74	1.14	0.68	1.05	0.65	1.00	0.52	0.80	1.00	1.54	0.60	0.92	4.19	0.245
2026	0.77	1.19	0.70	1.08	0.67	1.03	0.54	0.83	1.03	1.59	0.62	0.95	4.33	0.253
2027	0.79	1.22	0.73	1.12	0.69	1.06	0.55	0.85	1.06	1.63	0.64	0.99	4.46	0.261
2028	0.81	1.25	0.74	1.14	0.71	1.09	0.57	0.88	1.09	1.68	0.65	1.00	4.57	0.267
2029	0.84	1.29	0.77	1.19	0.73	1.12	0.59	0.91	1.12	1.72	0.67	1.03	4.72	0.276
2030	0.86	1.32	0.79	1.22	0.75	1.16	0.60	0.92	1.16	1.79	0.69	1.06	4.85	0.284
2031	0.89	1.37	0.82	1.26	0.78	1.20	0.62	0.95	1.20	1.85	0.72	1.11	5.03	0.294
2032	0.92	1.42	0.84	1.29	0.80	1.23	0.64	0.99	1.23	1.89	0.74	1.14	5.17	0.302
2033	0.95	1.46	0.87	1.34	0.83	1.28	0.66	1.02	1.27	1.96	0.76	1.17	5.34	0.312
2034	0.97	1.49	0.89	1.37	0.85	1.31	0.68	1.05	1.31	2.02	0.78	1.20	5.48	0.320
2035	1.00	1.54	0.92	1.42	0.88	1.36	0.70	1.08	1.34	2.06	0.81	1.25	5.65	0.330
2036	1.02	1.57	0.94	1.45	0.89	1.37	0.71	1.09	1.37	2.11	0.82	1.26	5.75	0.336
2037	1.04	1.60	0.96	1.48	0.91	1.40	0.73	1.12	1.40	2.16	0.84	1.29	5.88	0.344
2038	1.07	1.65	0.98	1.51	0.93	1.43	0.75	1.16	1.43	2.20	0.86	1.32	6.02	0.352
2039	1.09	1.68	1.00	1.54	0.95	1.46	0.76	1.17	1.46	2.25	0.87	1.34	6.13	0.358
2040	1.11	1.71	1.02	1.57	0.97	1.49	0.77	1.19	1.49	2.29	0.89	1.37	6.25	0.365
2041	1.13	1.74	1.03	1.59	0.99	1.52	0.79	1.22	1.51	2.33	0.91	1.40	6.36	0.372
2042	1.15	1.77	1.06	1.63	1.01	1.56	0.81	1.25	1.55	2.39	0.93	1.43	6.51	0.381
2043	1.18	1.82	1.08	1.66	1.03	1.59	0.83	1.28	1.59	2.45	0.95	1.46	6.66	0.389
2044	1.20	1.85	1.10	1.69	1.05	1.62	0.84	1.29	1.62	2.49	0.97	1.49	6.78	0.396
2045	1.23	1.89	1.13	1.74	1.07	1.65	0.86	1.32	1.65	2.54	0.99	1.52	6.93	0.405
2046	1.25	1.93	1.15	1.77	1.10	1.69	0.88	1.36	1.68	2.59	1.01	1.56	7.07	0.413
2047	1.28	1.97	1.17	1.80	1.12	1.72	0.90	1.39	1.72	2.65	1.03	1.59	7.22	0.422
2048	1.30	2.00	1.20	1.85	1.14	1.76	0.91	1.40	1.75	2.70	1.05	1.62	7.35	0.430
2049	1.33	2.05	1.22	1.88	1.17	1.80	0.93	1.43	1.79	2.76	1.07	1.65	7.51	0.439
2050	1.36	2.09	1.25	1.93	1.19	1.83	0.95	1.46	1.82	2.80	1.09	1.68	7.66	0.448
2051	1.39	2.14	1.27	1.96	1.21	1.86	0.97	1.49	1.86	2.86	1.12	1.72	7.82	0.457
2052	1.41	2.17	1.30	2.00	1.24	1.91	0.99	1.52	1.90	2.93	1.14	1.76	7.98	0.467
2053	1.44	2.22	1.32	2.03	1.26	1.94	1.01	1.56	1.94	2.99	1.16	1.79	8.13	0.475
2054	1.47	2.26	1.35	2.08	1.28	1.97	1.03	1.59	1.97	3.03	1.18	1.82	8.28	0.484
2055	1.50	2.31	1.38	2.13	1.31	2.02	1.05	1.62	2.01	3.10	1.21	1.86	8.46	0.495
2056	1.53	2.36	1.40	2.16	1.34	2.06	1.07	1.65	2.05	3.16	1.23	1.89	8.62	0.504
2057	1.56	2.40	1.43	2.20	1.36	2.09	1.09	1.68	2.09	3.22	1.25	1.93	8.78	0.513
2058	1.59	2.45	1.46	2.25	1.39	2.14	1.11	1.71	2.13	3.28	1.28	1.97	8.96	0.524
Average Annual Percent Change in Toll Rates														
2023-2035	3.0	3.0	3.1	3.1	3.1	3.1	3.0	3.1	3.0	3.0	3.0	3.0	3.0	3.0
2035-2045	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.0	2.1	2.1	2.0	2.0	2.1	2.1
2045-2058	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
2024-2045	2.6	2.6	2.6	2.6	2.6	2.6	2.5	2.5	2.6	2.6	2.6	2.6	2.6	2.6

(1) Annual toll rate increases are assumed to be implemented on January 1st of each year.
(2) Complete 540 Phase 1 is assumed to open on July 1, 2023.

Table 7.2
Through-Trip Toll Rates By Toll Class (1)
Triangle Expressway (Toll 540) and Complete 540 Phase 1

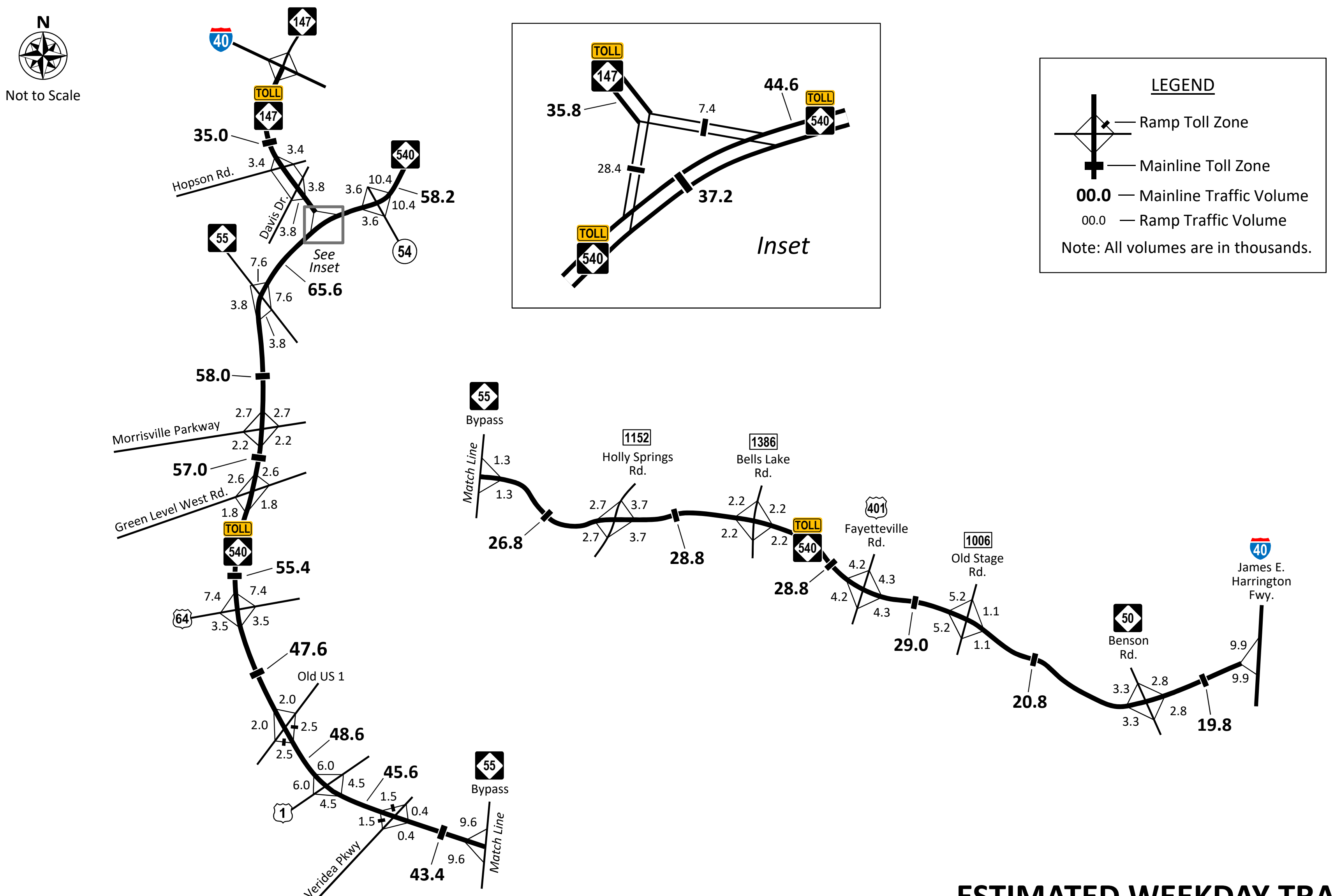
Calendar Year	Toll Class	Triangle Expressway ETC	Triangle Expressway BBM	Complete 540 Phase 1 ETC	Complete 540 Phase 1 BBM	Total ETC	Total BBM
2020	Class 1	$ 3.10	$ 4.74	$ -	$ -	$ 3.10	$ 4.74
	Class 2	6.20	9.48	-	-	6.20	9.48
	Class 3	12.40	18.96	-	-	12.40	18.96
2025	Class 1	$ 3.70	$ 5.69	$ 4.19	$ 6.45	$ 7.89	$ 12.14
	Class 2	7.40	11.38	8.38	12.90	15.78	24.28
	Class 3	14.80	22.76	16.76	25.80	31.56	48.56
2035	Class 1	$ 4.99	$ 7.65	$ 5.65	$ 8.71	$ 10.64	$ 16.36
	Class 2	9.98	15.30	11.30	17.42	21.28	32.72
	Class 3	19.96	30.60	22.60	34.84	42.56	65.44
2045	Class 1	$ 6.12	$ 9.42	$ 6.93	$ 10.66	$ 13.05	$ 20.08
	Class 2	12.24	18.84	13.86	21.32	26.10	40.16
	Class 3	24.48	37.68	27.72	42.64	52.20	80.32

(1) The Triangle Expressway through trip is comprised of a through movement on Toll 540 and does not include any travel on Toll 147.

There would be some increases in ramp traffic, primarily to and from the south, especially south of U.S. 64. There would also be some decreases in traffic on ramps to and from the north, as motorists access the Triangle Expressway via Complete 540 as opposed to other local roadways. Estimated traffic impacts drop to about 8,400 vehicles per day north of U.S. 64 and to 6,800 vehicles per day just north of NC 55. At that point, most of the net increase would continue onto Toll NC 147.

Much of the net impact on the northern-most sections of the Triangle Expressway would reflect through-trip diversions; shifts from the I-40 corridor to use the full length of the combined Triangle Expressway and Complete 540 Phase 1. Based on this analysis, through trips are estimated to total about 5,500 vehicles per weekday at 2025 levels. While not insignificant, it is important to recognize that these 5,500 through trips would represent a very small portion of traffic on most portions of I-40, generally in the range of 2 to 4 percent of I-40 traffic.

Table 7.3 presents estimated weekday transactions and revenue by toll zone and payment method. Total weekday transactions on the entire system are estimated at more than 531,000, before adjustment for ramp-up, of which over 154,000, or 29.0 percent, would occur at the 6 new mainline toll zones of Complete 540 Phase 1. The remaining 71.0 percent of transactions would take place at toll zones located on the Triangle Expressway.



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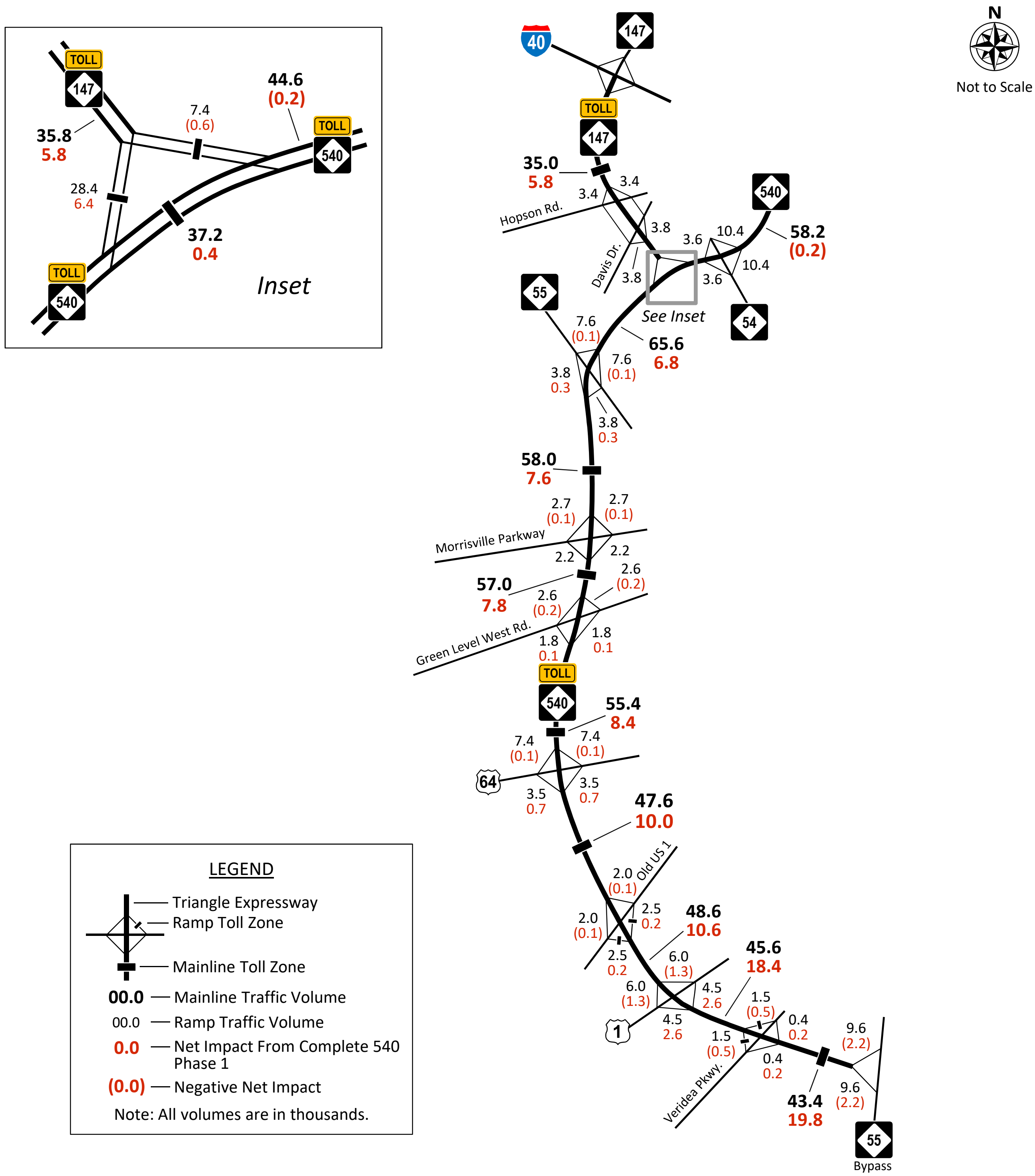
ESTIMATED WEEKDAY TRAFFIC
TRIANGLE EXPRESSWAY AND COMPLETE 540 PHASE 1 - 2025

FIGURE 7.3



ESTIMATED TRIANGLE EXPRESSWAY NET WEEKDAY TRAFFIC IMPACTS FROM COMPLETE 540 PHASE 1 - 2025

FIGURE 7.4

Table 7.3
Estimated 2025 Weekday Transactions and Revenue by Toll Zone
Scenario 2 - Triangle Expressway and Complete 540 Phase 1

Toll Zone		Class 1 Vehicles ETC			Class 1 Vehicles BBM			Class 2 and 3 Vehicles ETC			Class 2 and 3 Vehicles BBM			Total Weekday Transactions			Total Weekday Revenue			Average Weekday Toll per Transaction
Number	Location	Trans.	Toll	Revenue	Trans.	Toll	Revenue	Trans.	Toll	Revenue	Trans.	Toll	Revenue	ETC	BBM	Total	ETC	BBM	Total	(all vehicles and payment types)
Triangle Expressway																				
01/02	SR 147 Mainline N of Hopson Rd.	22,801	$0.46	$10,488	9,798	$0.70	$6,858	1,370	$1.57	$2,150	989	$2.29	$2,264	24,170	10,787	34,957	$12,639	$9,123	$21,761	$0.623
05/06	SR 147/SR 540 Jct. NW Connection	18,521	$0.83	$15,373	7,494	$1.28	$9,592	1,341	$2.76	$3,701	1,010	$4.46	$4,506	19,862	8,504	28,366	$19,073	$14,097	$33,171	$1.169
09/10	SR 147/SR 540 Jct. NE Connection	4,449	$0.66	$2,936	2,700	$1.02	$2,754	124	$2.31	$286	123	$3.27	$401	4,573	2,822	7,395	$3,222	$3,154	$6,376	$0.862
13/14	SR 147/SR 540 Jct. 540 Thru Mvt.	24,043	$0.81	$19,475	11,917	$1.24	$14,777	648	$2.63	$1,704	595	$4.08	$2,426	24,691	12,512	37,202	$21,179	$17,203	$38,382	$1.032
15/16	Mainline N of Morrisville Pky	38,292	$0.55	$21,061	16,136	$0.85	$13,715	2,029	$1.85	$3,753	1,468	$2.82	$4,141	40,321	17,604	57,925	$24,814	$17,856	$42,670	$0.737
17/18	Mainline N. of Green Level Rd	36,759	$0.46	$16,909	16,583	$0.71	$11,774	2,053	$1.55	$3,182	1,587	$2.36	$3,745	38,812	18,170	56,982	$20,091	$15,519	$35,610	$0.625
21/22	Mainline N. of US 64	36,550	$0.56	$20,468	15,293	$0.86	$13,152	2,052	$1.96	$4,022	1,520	$2.84	$4,318	38,602	16,813	55,415	$24,489	$17,470	$41,959	$0.757
25/26	Mainline S of US 64	30,416	$0.80	$24,333	13,925	$1.23	$17,128	1,901	$2.71	$5,150	1,456	$4.21	$6,128	32,317	15,381	47,698	$29,484	$23,256	$52,740	$1.106
29/30	Ramps South at S. Salem St.	3,564	$0.32	$1,141	1,353	$0.49	$663	68	$1.10	$75	32	$1.59	$51	3,633	1,385	5,018	$1,216	$714	$1,930	$0.385
31/32	Ramps North at Veridea Pky	1,924	$0.35	$673	942	$0.53	$499	39	$1.20	$47	31	$1.72	$53	1,963	973	2,936	$720	$553	$1,273	$0.433
33/34	Mainline N of SR 55 Bypass	29,040	$0.52	$15,101	11,716	$0.80	$9,373	1,531	$1.72	$2,634	1,088	$2.64	$2,871	30,571	12,804	43,375	$17,735	$12,244	$29,979	$0.691
Subtotal Triangle Expressway		**246,359**		**$147,957**	**107,856**		**$100,285**	**13,155**		**$26,704**	**9,898**		**$30,904**	**259,514**	**117,754**	**377,268**	**$174,661**	**$131,190**	**$305,851**	$0.811
Complete 540 Phase 1 (C540 Phase 1)																				
35/36	Mainline East of SR 55 Bypass	17,965	$0.74	$13,294	6,811	$1.14	$7,765	1,201	$2.46	$2,954	831	$3.80	$3,158	19,166	7,642	26,808	$16,248	$10,922	$27,171	$1.014
37/38	Mainline East of Holy Springs Rd.	19,132	$0.68	$13,010	7,603	$1.05	$7,983	1,225	$2.26	$2,768	852	$3.50	$2,982	20,357	8,455	28,812	$15,778	$10,965	$26,743	$0.928
39/40	Mainline East of Bells Lake Rd.	18,955	$0.65	$12,321	7,771	$1.00	$7,771	1,233	$2.16	$2,663	859	$3.34	$2,869	20,188	8,630	28,818	$14,984	$10,640	$25,624	$0.889
41/42	Mainline East U.S. 401	18,916	$0.52	$9,836	8,055	$0.80	$6,444	1,235	$1.73	$2,137	873	$2.67	$2,331	20,151	8,928	29,079	$11,973	$8,775	$20,747	$0.713
43/44	Mainline East of Old Stage Rd.	13,250	$1.00	$13,250	5,483	$1.54	$8,444	1,220	$3.32	$4,050	862	$5.14	$4,431	14,470	6,345	20,815	$17,300	$12,875	$30,175	$1.450
45/46	Mainline East of SR 50	12,499	$0.60	$7,499	5,486	$0.92	$5,047	1,092	$1.99	$2,173	778	$3.07	$2,388	13,591	6,264	19,855	$9,672	$7,436	$17,108	$0.862
Subtotal Complete 540 Phase 1		**100,717**		**$69,210**	**41,209**		**$43,453**	**7,206**		**$16,746**	**5,055**		**$18,159**	**107,923**	**46,264**	**154,186**	**$85,956**	**$61,612**	**$147,569**	$0.957
Weekday Total Triangle Exp. Plus C540 Phase 1		**347,076**		**$217,167**	**149,065**		**$143,739**	**20,361**		**$43,450**	**14,953**		**$49,063**	**367,436**	**164,018**	**531,454**	**$260,617**	**$192,802**	**$453,419**	$0.853
Annual Total Triangle Exp. Plus C540 Phase 1 (000) Assumes Annualization Factor of 305 Days		**105,858**		**$66,236**	**45,465**		**$43,840**	**6,210**		**$13,252**	**4,561**		**$14,964**	**112,068**	**50,025**	**162,094**	**$79,488**	**$58,805**	**$138,293**	

Note: Transactions by toll zone in this table may not match transactions shown in Figure 7.4 due to rounding by direction in the figure.

Estimated weekday revenue in 2025 is computed at more than $453,000, with the average toll per transaction estimated at about $0.853 over the entire system. The average toll per transaction would be slightly higher at toll points on Complete 540, estimated at $0.957. This would produce almost $148,000 in average weekday revenue on Complete 540 itself, representing about 32.5 percent of systemwide revenue.

After applying the annualization factor of 305 “typical weekdays”, annual transactions in 2025 on the combined Triangle Expressway and Complete 540 are estimated to total 162.1 million, of which 112.1 million would be ETC transactions and about 50.0 million would be BBM transactions. This represents an overall ETC transaction share of just over 69 percent. Annual revenue in 2025, before adjustment for ramp-up and before adjusting for leakage, is estimated at $138.3 million, for Scenario 2, Triangle Expressway and Complete 540 Phase 1.

7.4.1 Time Distance Relationships

Figure 7.5 provides a comparison of time and distance relationships for selected movements along Triangle Expressway and Complete 540 Phase 1 as compared with the best alternative non-tolled routing. Information shown in Figure 7.5 was derived from travel demand modeling performed at 2025 levels, under a network configuration which assumed both Triangle Expressway and Complete 540 Phase 1.

Four control points were identified for purposes of this analysis:

- A: A location on I-40 west of NC 55 south of Durham;
- B: A location within the city of Apex;
- C: A location within the city of Holly Springs; and,
- D: A location on I-40 just south of the NC 42 interchange.

A total of five movements were selected for comparison, as shown in the lower right-hand corner of Figure 7.5. These included two movements (A-B and A-C) which primarily use the existing Triangle Expressway for toll road travel. Two other movements (D-B and D-C) would primarily use only Complete 540. The fifth movement, from A to D, would be a through movement and would use both Triangle Expressway and Complete 540.

The toll paths used for each of these movements are depicted in darker colors, with a unique color for each of the five movements. The best alternative non-tolled route for the respective movements is illustrated using a lighter shade of the same color. The table in the upper right-hand corner of Figure 7.5 provides a comparison of distance and travel times, for both AM peak and PM peak period conditions. It also shows the Class 1, ETC toll rate for each movement.

In all cases, using the tolled path would save time, with the specific amount varying in some cases between morning and afternoon peak periods. For example, a trip from Location A, I-40 North, to Location C, Holly Springs, via the Triangle Expressway would save about 15 minutes, although it would require about 3.1 miles of additional driving. A trip from Location D, I-40 South, to Location B, Apex, would save 15 to 21 minutes (depending on time-period) by using the new Complete 540, in addition to distance savings. This is because the fastest alternative route was more circuitous, using I-40 and U.S. 64. For the through movement from Location A to Location D, a passenger-car using the toll facility would save up to 16.9 minutes during the PM peak period in 2025 for a toll of $8.23.

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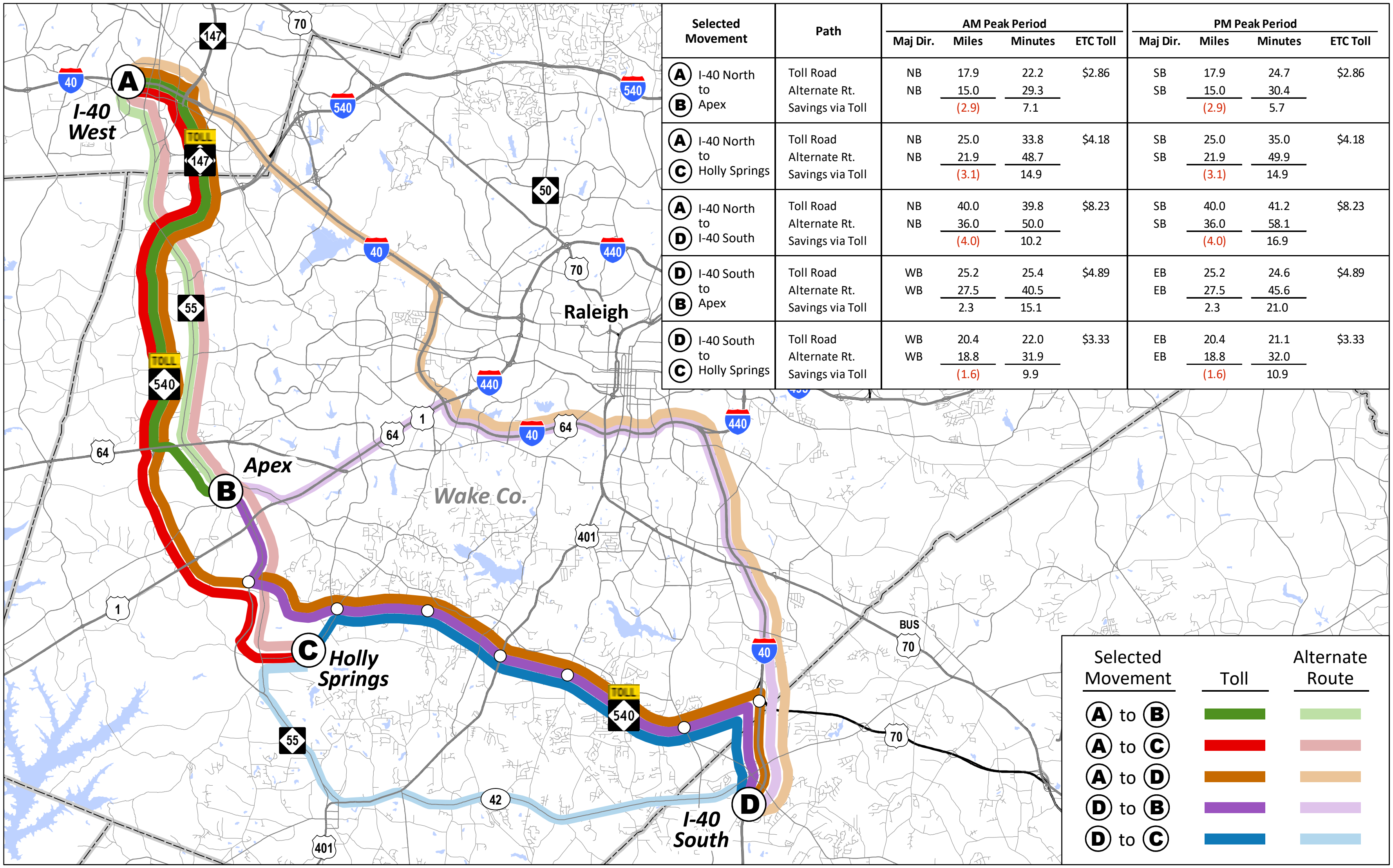

Selected Movement	Path	AM Peak Period Maj Dir.	AM Miles	AM Minutes	AM ETC Toll	PM Peak Period Maj Dir.	PM Miles	PM Minutes	PM ETC Toll
A I-40 North to B Apex	Toll Road	NB	17.9	22.2	$2.86	SB	17.9	24.7	$2.86
	Alternate Rt.	NB	15.0	29.3		SB	15.0	30.4	
	Savings via Toll		(2.9)	7.1			(2.9)	5.7	
A I-40 North to C Holly Springs	Toll Road	NB	25.0	33.8	$4.18	SB	25.0	35.0	$4.18
	Alternate Rt.	NB	21.9	48.7		SB	21.9	49.9	
	Savings via Toll		(3.1)	14.9			(3.1)	14.9	
A I-40 North to D I-40 South	Toll Road	NB	40.0	39.8	$8.23	SB	40.0	41.2	$8.23
	Alternate Rt.	NB	36.0	50.0		SB	36.0	58.1	
	Savings via Toll		(4.0)	10.2			(4.0)	16.9	
D I-40 South to B Apex	Toll Road	WB	25.2	25.4	$4.89	EB	25.2	24.6	$4.89
	Alternate Rt.	WB	27.5	40.5		EB	27.5	45.6	
	Savings via Toll		2.3	15.1			2.3	21.0	
D I-40 South to C Holly Springs	Toll Road	WB	20.4	22.0	$3.33	EB	20.4	21.1	$3.33
	Alternate Rt.	WB	18.8	31.9		EB	18.8	32.0	
	Savings via Toll		(1.6)	9.9			(1.6)	10.9	

TYPICAL TIME-DISTANCE RELATIONSHIPS SELECTED MOVEMENTS AT 2025 LEVELS

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FIGURE 7.5

7.5 Estimated 2035 Weekday Transactions and Revenue

Figure 7.6 shows estimated weekday traffic on both the Triangle Expressway and Complete 540 Phase 1 at 2035 levels. Mainline weekday traffic volumes on Complete 540 would range from 25,200 to 36,600. The peak load point would be just west of the U.S. 401 interchange. With the positive impact of Complete 540, estimated traffic on Triangle Expressway peaks at 73,600 vehicles on a typical weekday in 2035, at a point just north of NC 55. This is still within the existing roadway capacity available at that location. Traffic on the northern end of Toll NC 147 is estimated at 40,400 per weekday.

Table 7.4 shows estimated weekday transactions and revenue computed by toll location, vehicle class and payment method at 2035 levels. Subtotals are provided for the existing Triangle Expressway and Complete 540 Phase 1. Total weekday transactions on Triangle Expressway are estimated at nearly 457,000, about 75 percent of which would use the ETC payment mode. The remaining 25 percent of transactions would use BBM.

On Complete 540 Phase 1, total weekday transactions were estimated at just under 190,000 in 2035; about 76 percent of which are estimated to use ETC.

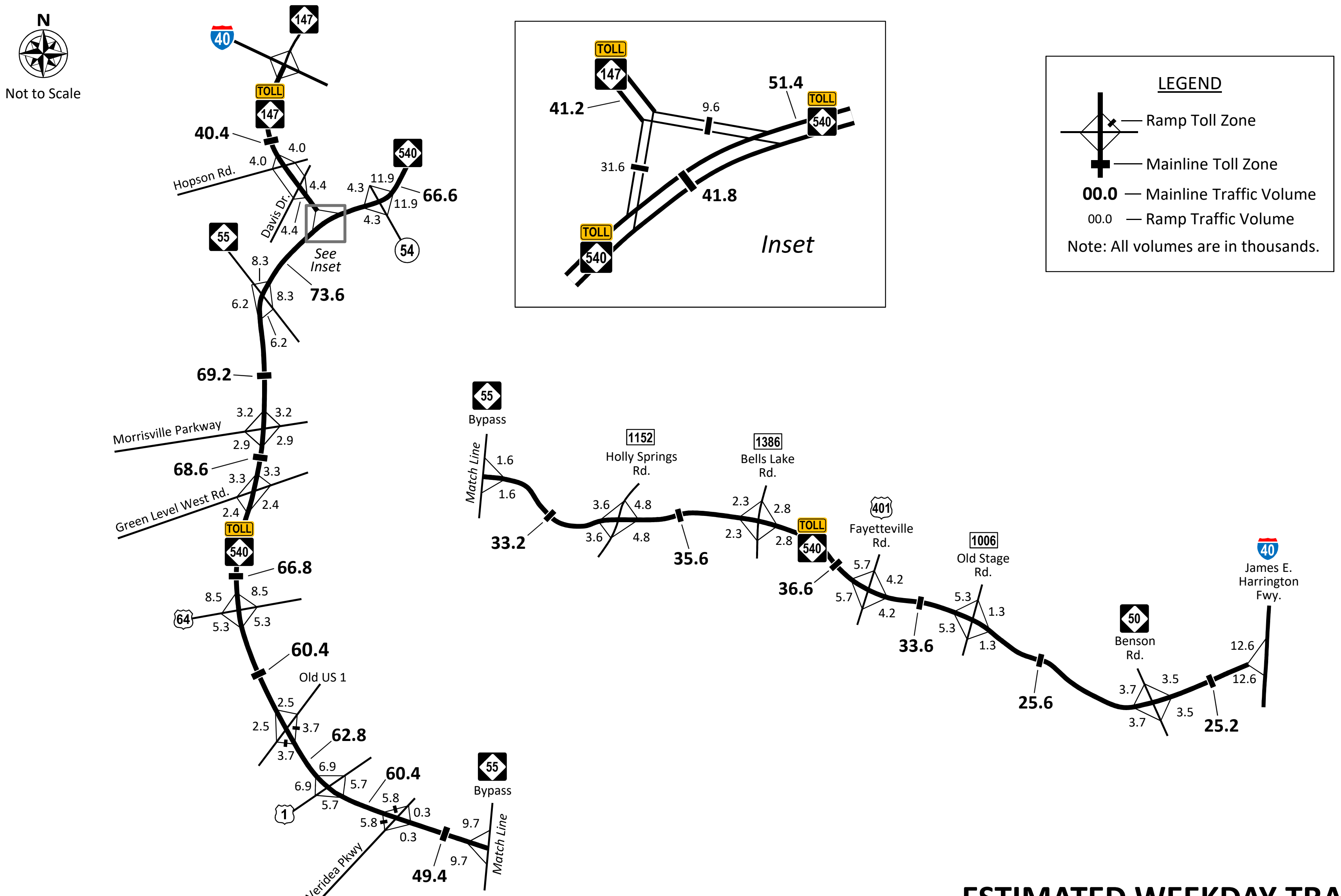
Weekday revenue, from all classes and all payment types, is estimated at $713,367 per weekday. After annualization, this is equivalent to more than $217.6 million in annual revenue. The overall average toll per transaction on the full project, for all vehicle classes and all payment modes, is estimated at $1.103 in 2035.

It is important to recognize that all figures in Table 7.4, and other similar weekday traffic and revenue tables in this report are expressed on a "*calendar year*" basis. The figures in Table 7.4 represent, therefore, estimates for calendar year 2035. In subsequent annual transaction and revenue tables, the calendar year estimates are converted to fiscal year, so there are slight differences when compared with annual traffic and revenue estimates in the weekday tables.

7.6 Estimated 2045 Weekday Transactions and Revenue

Figure 7.7 shows estimated average weekday transactions for calendar 2045. This is the most distant future year which was modeled in developing the long-range forecasts. It represents the horizon year of the most recent regional travel demand model for the greater Raleigh-Durham area (TRMv6). Traffic on Complete 540 Phase 1 is expected to peak at about 48,800 vehicles per day west of Bells Lake Road. Weekday traffic is expected to reach a maximum of 90,000 on the Triangle Expressway section just north of NC 55.

Table 7.5 summarizes the calculations to develop the weekday expected or gross toll revenue in 2045 for Scenario 2. Again, these figures are shown on a calendar year basis. Overall, total average weekday revenue in the year 2045 is estimated at $1,096,169. This would represent an average toll per transaction of $1.332, which reflects continued annual increases in toll rates at each toll collection location. After annualization, annual revenue for calendar 2045 is estimated at more than $334.3 million. As noted previously, all revenue estimates shown in Table 7.5 are not yet adjusted to reflect anticipated leakage of the BBM category, or the inclusion of anticipated revenue from BBM invoice processing fees.



ESTIMATED WEEKDAY TRAFFIC
TRIANGLE EXPRESSWAY AND COMPLETE 540 PHASE 1 - 2035

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Table 7.4
Estimated 2035 Weekday Transactions and Revenue by Toll Zone
Scenario 2 - Triangle Expressway and Complete 540 Phase 1

Toll Zone		Class 1 Vehicles						Class 2 and 3 Vehicles						Total Weekday Transactions			Total Weekday Revenue			Average Weekday Toll per Transaction
		ETC			BBM			ETC			BBM									
Number	Location	Trans.	Toll	Revenue	Trans.	Toll	Revenue	Trans.	Toll	Revenue	Trans.	Toll	Revenue	ETC	BBM	Total	ETC	BBM	Total	(all vehicles and payment types)
Triangle Expressway																				
01/02	SR 147 Mainline N of Hopson Rd.	28,726	$0.61	$17,523	9,078	$0.93	$8,442	1,793	$2.08	$3,729	813	$3.04	$2,470	30,518	9,890	40,408	$21,251	$10,912	$32,163	$0.796
05/06	SR 147/SR 540 Jct. NW Connection	22,834	$1.12	$25,574	6,376	$1.72	$10,967	1,652	$3.72	$6,145	813	$5.99	$4,867	24,486	7,189	31,675	$31,720	$15,834	$47,554	$1.501
09/10	SR 147/SR 540 Jct. NE Connection	6,735	$0.87	$5,859	2,623	$1.34	$3,515	211	$3.05	$642	80	$4.30	$345	6,945	2,703	9,649	$6,501	$3,860	$10,362	$1.074
13/14	SR 147/SR 540 Jct. 540 Thru Mvt.	29,425	$1.09	$32,074	10,890	$1.67	$18,186	905	$3.54	$3,204	561	$5.49	$3,080	30,331	11,451	41,782	$35,278	$21,267	$56,545	$1.353
15/16	Mainline N of Morrisville Pky	49,765	$0.74	$36,826	15,280	$1.14	$17,419	2,784	$2.49	$6,933	1,343	$3.79	$5,089	52,549	16,623	69,172	$43,759	$22,508	$66,267	$0.958
17/18	Mainline N. of Green Level Rd	48,632	$0.62	$30,152	15,728	$0.95	$14,942	2,824	$2.09	$5,903	1,431	$3.15	$4,507	51,456	17,159	68,615	$36,054	$19,449	$55,503	$0.809
21/22	Mainline N. of US 64	48,097	$0.75	$36,073	14,581	$1.15	$16,769	2,811	$2.63	$7,393	1,374	$3.80	$5,220	50,908	15,955	66,863	$43,465	$21,988	$65,454	$0.979
25/26	Mainline S of US 64	42,462	$1.08	$45,859	13,967	$1.66	$23,186	2,607	$3.66	$9,543	1,356	$5.68	$7,702	45,070	15,323	60,393	$55,403	$30,888	$86,290	$1.429
29/30	Ramps South at S. Salem St.	5,577	$0.43	$2,398	1,640	$0.66	$1,082	116	$1.47	$170	26	$2.15	$55	5,693	1,665	7,358	$2,568	$1,137	$3,705	$0.504
31/32	Ramps North at Veridea Pky	8,359	$0.47	$3,929	2,985	$0.72	$2,149	144	$1.61	$232	76	$2.34	$179	8,503	3,061	11,564	$4,161	$2,328	$6,489	$0.561
33/34	Mainline N of SR 55 Bypass	36,057	$0.71	$25,601	10,323	$1.08	$11,148	2,049	$2.35	$4,816	997	$3.56	$3,549	38,107	11,320	49,426	$30,417	$14,698	$45,114	$0.913
Subtotal Triangle Expressway		**326,668**		**$261,867**	**103,471**		**$127,805**	**17,896**		**$48,710**	**8,869**		**$37,064**	**344,565**	**112,339**	**456,904**	**$310,577**	**$164,869**	**$475,446**	$1.041
Complete 540 Phase 1 (C540 Phase 1)																				
35/36	Mainline East of SR 55 Bypass	24,020	$1.00	$24,020	6,730	$1.54	$10,364	1,682	$3.32	$5,584	777	$5.14	$3,994	25,702	7,507	33,209	$29,604	$14,358	$43,962	$1.324
37/38	Mainline East of Holy Springs Rd.	25,604	$0.92	$23,556	7,500	$1.42	$10,650	1,728	$3.05	$5,270	801	$4.74	$3,797	27,332	8,301	35,633	$28,826	$14,447	$43,273	$1.214
39/40	Mainline East of Bells Lake Rd.	26,189	$0.88	$23,047	7,949	$1.36	$10,811	1,739	$2.92	$5,078	807	$4.54	$3,664	27,928	8,756	36,685	$28,125	$14,475	$42,599	$1.161
41/42	Mainline East U.S. 441	23,702	$0.70	$16,591	7,360	$1.08	$7,949	1,752	$2.32	$4,065	826	$3.60	$2,974	25,454	8,186	33,639	$20,656	$10,922	$31,578	$0.939
43/44	Old Stage Rd.	17,582	$1.34	$23,560	5,384	$2.06	$11,091	1,747	$4.45	$7,774	826	$6.87	$5,675	19,329	6,210	25,539	$31,334	$16,766	$48,100	$1.883
45/46	Mainline East of SR 50	17,163	$0.81	$13,902	5,566	$1.25	$6,958	1,608	$2.69	$4,326	773	$4.17	$3,223	18,771	6,339	25,110	$18,228	$10,181	$28,409	$1.131
Subtotal Complete 540 Phase 1		**134,260**		**$124,676**	**40,489**		**$57,822**	**10,256**		**$32,097**	**4,810**		**$23,326**	**144,516**	**45,299**	**189,815**	**$156,772**	**$81,148**	**$237,921**	$1.253
Weekday Total Triangle Exp. Plus C540 Phase 1		**460,929**		**$386,542**	**143,960**		**$185,628**	**28,153**		**$80,807**	**13,679**		**$60,390**	**489,081**	**157,638**	**646,720**	**$467,349**	**$246,018**	**$713,367**	$1.103
Annual Total Triangle Exp. Plus C540 Phase 1 (000)		**140,583**		**$117,895**	**43,908**		**$56,616**	**8,587**		**$24,646**	**4,172**		**$18,419**	**149,170**	**48,080**	**197,249**	**$142,542**	**$75,035**	**$217,577**	

Assumes Annualization Factor of 305 Days

Note: Transactions by toll zone in this table may not match transactions shown in Figure 7.6 due to rounding by direction in the figure.

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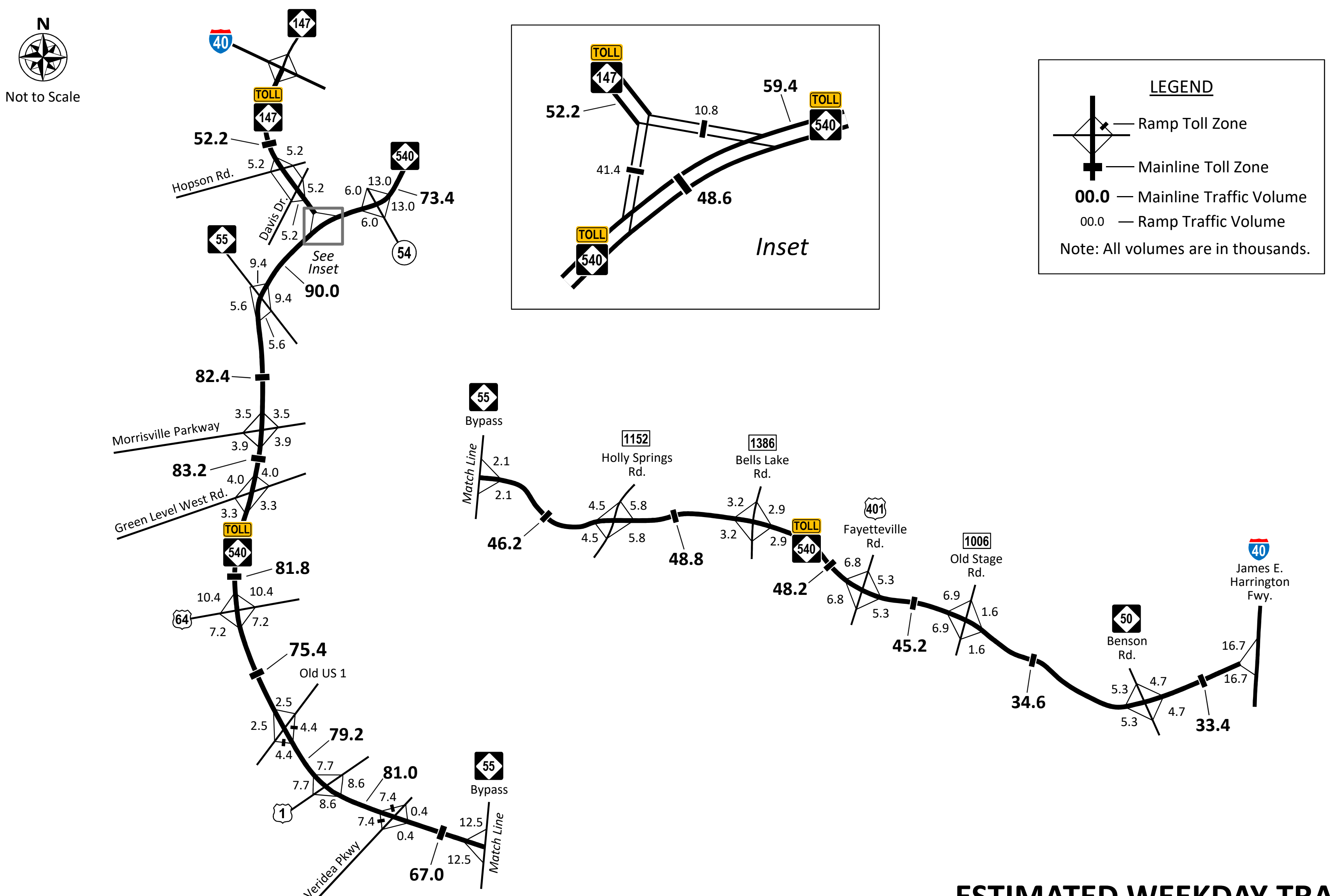


ESTIMATED WEEKDAY TRAFFIC
TRIANGLE EXPRESSWAY AND COMPLETE 540 PHASE 1 - 2045

FIGURE 7.7

Table 7.5
Estimated 2045 Weekday Transactions and Revenue by Toll Zone
Scenario 2 - Triangle Expressway and Complete 540 Phase 1

Toll Zone		Class 1 Vehicles						Class 2 and 3 Vehicles						Total Weekday Transactions			Total Weekday Revenue			Average Weekday Toll per Transaction
		ETC			BBM			ETC			BBM									
Number	Location	Trans.	Toll	Revenue	Trans.	Toll	Revenue	Trans.	Toll	Revenue	Trans.	Toll	Revenue	ETC	BBM	Total	ETC	BBM	Total	(all vehicles and payment types)
Triangle Expressway																				
01/02	SR 147 Mainline N of Hopson Rd.	38,741	$0.75	$29,056	9,515	$1.16	$11,037	3,005	$2.55	$7,663	886	$3.80	$3,368	41,746	10,401	52,147	$36,719	$14,405	$51,123	$0.980
05/06	SR 147/SR 540 Jct. NW Connection	31,065	$1.38	$42,870	6,566	$2.13	$13,985	2,788	$4.59	$12,797	904	$7.41	$6,698	33,853	7,469	41,323	$55,667	$20,683	$76,350	$1.848
09/10	SR 147/SR 540 Jct. NE Connection	8,144	$1.07	$8,714	2,356	$1.65	$3,888	298	$3.75	$1,119	40	$5.30	$214	8,442	2,397	10,839	$9,833	$4,102	$13,935	$1.286
13/14	SR 147/SR 540 Jct. 540 Thru Mvt.	36,296	$1.34	$48,636	10,733	$2.06	$22,110	1,156	$4.36	$5,041	487	$6.77	$3,295	37,452	11,220	48,672	$53,677	$25,405	$79,082	$1.625
15/16	Mainline N of Morrisville Pky	62,348	$0.91	$56,737	14,881	$1.40	$20,833	3,916	$3.06	$11,982	1,252	$4.65	$5,821	66,264	16,132	82,396	$68,719	$26,654	$95,373	$1.157
17/18	Mainline N. of Green Level Rd	62,354	$0.76	$47,389	15,544	$1.17	$18,186	3,981	$2.56	$10,191	1,327	$3.89	$5,160	66,335	16,870	83,205	$57,580	$23,347	$80,927	$0.973
21/22	Mainline N. of US 64	61,911	$0.92	$56,958	14,606	$1.42	$20,741	3,950	$3.22	$12,720	1,270	$4.69	$5,958	65,861	15,877	81,738	$69,678	$26,699	$96,377	$1.179
25/26	Mainline S of US 64	56,186	$1.32	$74,166	14,296	$2.03	$29,022	3,686	$4.48	$16,511	1,288	$6.95	$8,949	59,872	15,584	75,456	$90,677	$37,971	$128,648	$1.705
29/30	Ramps South at S. Salem St.	6,987	$0.53	$3,703	1,586	$0.82	$1,301	145	$1.81	$262	7	$2.67	$19	7,132	1,594	8,725	$3,965	$1,320	$5,285	$0.606
31/32	Ramps North at Veridea Pky	11,363	$0.58	$6,591	3,168	$0.89	$2,820	208	$1.99	$415	71	$2.89	$205	11,572	3,239	14,811	$7,006	$3,025	$10,030	$0.677
33/34	Mainline N of SR 55 Bypass	51,515	$0.87	$44,818	11,592	$1.34	$15,534	2,999	$2.88	$8,637	986	$4.42	$4,357	54,514	12,578	67,093	$53,456	$19,891	$73,347	$1.093
Subtotal Triangle Expressway		**426,911**		**$419,638**	**104,844**		**$159,455**	**26,132**		**$87,338**	**8,518**		**$44,045**	**453,043**	**113,361**	**566,405**	**$506,976**	**$203,500**	**$710,477**	$1.254
Complete 540 Phase 1 (C540 Phase 1)																				
35/36	Mainline East of SR 55 Bypass	35,155	$1.23	$43,241	7,758	$1.89	$14,663	2,583	$4.08	$10,539	799	$6.30	$5,034	37,738	8,557	46,295	$53,779	$19,696	$73,476	$1.587
37/38	Mainline East of Holy Springs Rd.	36,885	$1.13	$41,680	8,406	$1.74	$14,626	2,656	$3.75	$9,960	825	$5.80	$4,785	39,541	9,231	48,772	$51,640	$19,411	$71,051	$1.457
39/40	Mainline East of Bells Lake Rd.	36,194	$1.07	$38,727	8,517	$1.65	$14,053	2,672	$3.55	$9,486	831	$5.50	$4,570	38,866	9,348	48,214	$48,213	$18,623	$66,836	$1.386
41/42	Mainline East U.S. 441	33,523	$0.86	$28,829	8,068	$1.32	$10,650	2,710	$2.85	$7,724	853	$4.40	$3,753	36,233	8,921	45,154	$36,553	$14,403	$50,956	$1.129
43/44	Old Stage Rd.	24,980	$1.65	$41,218	5,974	$2.54	$15,174	2,706	$5.47	$14,801	861	$8.47	$7,293	27,686	6,835	34,521	$56,019	$22,466	$78,485	$2.274
45/46	Mainline East of SR 50	24,136	$0.99	$23,895	6,113	$1.52	$9,292	2,388	$3.28	$7,833	763	$5.07	$3,868	26,524	6,876	33,400	$31,727	$13,160	$44,887	$1.344
Subtotal Complete 540 Phase 1		**190,873**		**$217,590**	**44,836**		**$78,457**	**15,715**		**$60,342**	**4,932**		**$29,303**	**206,588**	**49,768**	**256,355**	**$277,931**	**$107,761**	**$385,692**	$1.505
Weekday Total Triangle Exp. Plus C540 Phase 1		**617,783**		**$637,228**	**149,679**		**$237,913**	**41,847**		**$147,680**	**13,450**		**$73,348**	**659,631**	**163,129**	**822,760**	**$784,908**	**$311,261**	**$1,096,169**	$1.332
Annual Total Triangle Exp. Plus C540 Phase 1 (000) Assumes Annualization Factor of 305 Days		**188,424**		**$194,354**	**45,652**		**$72,563**	**12,763**		**$45,042**	**4,102**		**$22,371**	**201,187**	**49,754**	**250,942**	**$239,397**	**$94,935**	**$334,332**	

Note: Transactions by toll zone in this table may not match transactions shown in Figure 7.7 due to rounding by direction in the figure.

7.7 Complete 540 Phase 1 Corridor Share Comparison

Examining the Complete 540's share of total corridor traffic is useful in reviewing the reasonableness of the traffic forecasts. **Figure 7.8** shows two corridor share "screenlines". Screenline A is between U.S. 401 and I-40 and Screen Line B is between the existing Triangle Expressway and U.S. 401. Each of the screenlines covers a "travel shed" from which Complete 540 would draw traffic. The screenlines include all significant routes between NC 42 on the south and I-40 on the north.

Table 7.6 provides a corridor-share comparison for model years 2025, 2035 and 2045. In 2025, total traffic crossing Screenline A is estimated at 269,172 on a typical weekday. Of this, almost 60 percent would be on I-40. On Complete 540, traffic is estimated at 20,800, or about 7.7 percent of the total screenline. At Screenline B, located west of U.S. 401, traffic on Complete 540 is estimated at about 28,800 on a typical weekday in 2025. This represents about 9.1 percent of the total model forecasted traffic. On this screenline, I-40 carries almost half of the total traffic. Estimated Complete 540 weekday traffic volumes in Table 7.6 do not reflect ramp-up adjustments.

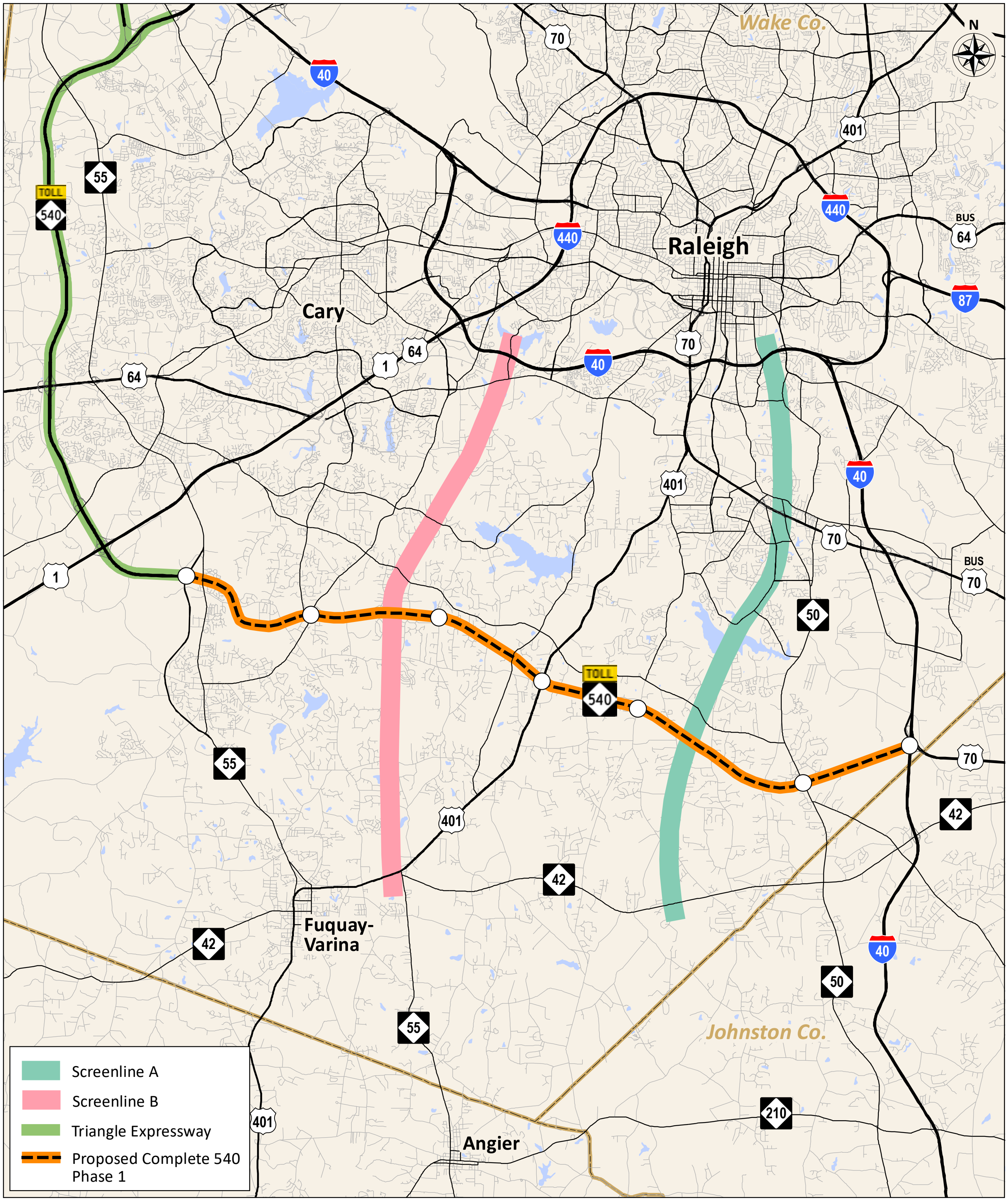
Similar corridor share patterns are shown at 2035 and 2045 levels. On Screenline A, the Complete 540 screenline share remains at 7.7 percent in 2035 and increases by 1.1 percentage point, to total 8.8 percent 2045. This consistent screenline share is partly due to the assumed widening of I-40, which would provide additional capacity and congestion relief on that competing route.

Complete 540 screenline shares in 2045 increase slightly, to about 8.8 percent on Screenline A and 11.5 percent on Screenline B. The increased corridor share after 2035 is, in part, due to anticipated economic growth in the immediate project corridor itself. Overall, traffic along the two screenlines would grow by an average of 1.5 to 2.0 percent per year depending on location. Projected traffic along Complete 540 is estimated to grow around 2.5 percent per year between 2025 and 2045.

7.8 Estimated Annual Transactions and Revenue – Forecast Scenario 2

Estimated annual transactions and revenue for Scenario 2 are presented in **Table 7.7**. This Scenario assumes full construction of Complete 540 Phase 1 and includes transactions and revenue from all tolling points on both Triangle Expressway and the new Complete 540. All transaction and revenue figures shown in Table 7.7 reflect annual totals, rounded to thousands. Information is shown on a fiscal year basis, with each fiscal year representing the 12 months ending June 30. Forecasts are provided for FY 2019 through 2058. Complete 540 Phase 1 is assumed to come online July 1, 2023, so it would be open through the entire FY 2024.

As noted at the bottom of the table, estimates of transactions and revenue on Complete 540, as well as the net incremental transactions and revenue on the Triangle Expressway, have been adjusted downward to reflect "ramp-up", since this portion of the facility would be newly opened to traffic. Ramp-up adjustments are applied as net reduction factors to the modeled forecasts; generally intended to reflect the transition period where it takes time for motorists to become aware of new toll facilities; to initially try and eventually modify travel habits.



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CORRIDOR SHARE SCREENLINES
COMPLETE 540 PHASE 1

FIGURE 7.8

Table 7.6
Complete 540 Weekday Corridor-Share Comparison

	2025 (1)		2035		2045	
Road Name	Weekday Traffic	Screenline Market Share	Weekday Traffic	Screenline Market Share	Weekday Traffic	Screenline Market Share
Screenline A						
I-40	157,758	58.6%	197,738	59.6%	225,585	57.2%
Garner Rd	9,323	3.5%	9,926	3.0%	12,724	3.2%
US 70	27,094	10.1%	32,291	9.7%	38,981	9.9%
Lakeside Dr	2,137	0.8%	2,197	0.7%	2,805	0.7%
Timber Dr.	21,427	8.0%	27,594	8.3%	30,701	7.8%
Buffalo Rd.	1,437	0.5%	2,075	0.6%	2,555	0.6%
Ten Ten Rd.	9,684	3.6%	10,732	3.2%	15,812	4.0%
Toll NC 540	**20,815**	**7.7%**	**25,539**	**7.7%**	**34,521**	**8.8%**
Pagan Rd	4,142	1.5%	3,917	1.2%	6,854	1.7%
Rock Service Station Rd	3,677	1.4%	4,752	1.4%	5,426	1.4%
NC 42	11,679	4.3%	14,754	4.5%	18,499	4.7%
Total	269,172	100.0%	331,513	100.0%	394,464	100.0%
Screenline B						
I-40	152,658	48.2%	187,148	51.0%	206,866	48.6%
Tryon Rd	33,231	10.5%	36,611	10.0%	39,838	9.4%
Yates Mill Pond Rd	13,936	4.4%	13,972	3.8%	15,774	3.7%
Penny Rd	9,687	3.1%	8,367	2.3%	10,553	2.5%
Ten Ten Rd	24,783	7.8%	36,299	9.9%	43,553	10.2%
Toll NC 540	**28,812**	**9.1%**	**35,633**	**9.7%**	**48,772**	**11.5%**
Optimist Farm Rd	8,717	2.8%	9,306	2.5%	11,717	2.8%
Hilltop Needmore Rd	9,518	3.0%	10,697	2.9%	16,735	3.9%
US 401	35,227	11.1%	28,821	7.9%	32,001	7.5%
Total	316,569	100.0%	366,854	100.0%	425,808	100.0%

(1) 2025 traffic estimates are prior to ramp-up adjustments on Complete 540.

Ramp-up reflects the patterns typically experienced on new toll facilities, in which transaction and revenue growth over the first several years considerably exceeds long-term averages. Significant ramp-up was observed on the Triangle Expressway over its first 3 to 4 years of operation. The weekday estimates provided in Tables 7.3, 7.4 and 7.5 do not include any adjustments for ramp-up. However, the ramp-up adjustments were applied in the annual forecasts shown in Table 7.7, using the following downward adjustment factors over the first 36-months of Complete 540 Phase 1 operation:

- Months 1-12: 0.618
- Months 13-24: 0.814
- Months 25-36: 0.945

Ramp-up adjustments were also made to forecasted transactions and revenue on the existing Triangle Expressway for that incremental portion of demand which would be attributable directly to the implementation of Complete 540 Phase 1.

Annual toll revenue is estimated to increase from about $52.8 million in FY 2019 to $66.6 million by FY 2023, the fiscal year immediately prior to opening of Complete 540. Annual revenue is estimated to increase to $123 million in FY 2025, reflecting the impacts of Complete 540, even after adjustment for ramp-up. By FY 2027, the effect of ramp-up adjustments has been completed and annual revenue is estimated at $147.9 million. This is projected to increase to almost $213 million by 2035 and $327 million by 2045.

Table 7.7
Estimated Annual Transactions and Revenue
Scenario 2 - Triangle Expressway Combined with Complete 540 Phase 1

Fiscal	Estimated Annual Transactions (000)				Estimated Annual Revenue (000)				Average Toll Per Transaction		
Year	ETC	BBM	Total	% ETC	ETC	BBM	Total	% ETC	ETC	BBM	Overall
2019	35,142	19,024	54,166	64.9	$28,238	$24,580	$52,818	53.5	$ 0.804	$ 1.292	$ 0.975
2020 (1,2)	41,835	21,564	63,399	66.0	31,243	26,056	57,299	54.5	0.747	1.208	0.904
2021 (2)	48,219	24,018	72,237	66.8	33,832	27,286	61,118	55.4	0.702	1.136	0.846
2022 (2)	49,742	24,114	73,856	67.4	35,783	28,129	63,912	56.0	0.719	1.167	0.865
2023 (2)	51,170	24,135	75,304	68.0	37,726	28,882	66,608	56.6	0.737	1.197	0.885
2024 (2,3,4)	89,100	41,286	130,386	68.3	59,547	45,263	104,810	56.8	0.668	1.096	0.804
2025 (2)	101,516	45,837	147,353	68.9	70,518	52,536	123,054	57.3	0.695	1.146	0.835
2026 (2)	110,951	48,732	159,683	69.5	79,769	57,897	137,666	57.9	0.719	1.188	0.862
2027	116,870	49,804	166,675	70.1	86,903	61,011	147,914	58.8	0.744	1.225	0.887
2028	120,312	49,703	170,015	70.8	92,104	62,634	154,739	59.5	0.766	1.260	0.910
2029	123,779	49,545	173,324	71.4	97,547	64,301	161,848	60.3	0.788	1.298	0.934
2030	127,353	49,369	176,722	72.1	103,452	66,016	169,468	61.0	0.812	1.337	0.959
2031	131,038	49,175	180,213	72.7	109,773	67,691	177,464	61.9	0.838	1.377	0.985
2032	134,842	48,963	183,805	73.4	116,506	69,391	185,897	62.7	0.864	1.417	1.011
2033	138,771	48,733	187,504	74.0	123,510	71,003	194,513	63.5	0.890	1.457	1.037
2034	142,832	48,485	191,317	74.7	130,858	72,603	203,461	64.3	0.916	1.497	1.063
2035	147,033	48,218	195,251	75.3	138,552	74,223	212,775	65.1	0.942	1.539	1.090
2036	151,436	48,202	199,638	75.9	146,238	76,027	222,265	65.8	0.966	1.577	1.113
2037	156,037	48,439	204,476	76.3	154,009	78,036	232,044	66.4	0.987	1.611	1.135
2038	160,777	48,661	209,438	76.8	162,374	80,098	242,472	67.0	1.010	1.646	1.158
2039	165,660	48,868	214,528	77.2	170,934	82,039	252,973	67.6	1.032	1.679	1.179
2040	170,691	49,057	219,748	77.7	179,842	83,874	263,716	68.2	1.054	1.710	1.200
2041	175,874	49,229	225,103	78.1	189,189	85,716	274,906	68.8	1.076	1.741	1.221
2042	181,214	49,381	230,595	78.6	199,323	87,703	287,026	69.4	1.100	1.776	1.245
2043	186,715	49,514	236,229	79.0	210,468	89,949	300,417	70.1	1.127	1.817	1.272
2044	192,383	49,626	242,008	79.5	221,760	92,057	313,817	70.7	1.153	1.855	1.297
2045	198,223	49,715	247,938	79.9	233,365	93,969	327,334	71.3	1.177	1.890	1.320
2046	201,716	49,854	251,569	80.2	242,587	96,137	338,724	71.6	1.203	1.928	1.346
2047	202,775	50,052	252,827	80.2	249,030	98,485	347,515	71.7	1.228	1.968	1.375
2048	203,839	50,252	254,091	80.2	255,373	100,721	356,094	71.7	1.253	2.004	1.401
2049	204,910	50,452	255,362	80.2	261,908	103,045	364,953	71.8	1.278	2.042	1.429
2050	205,986	50,653	256,638	80.3	268,761	105,471	374,232	71.8	1.305	2.082	1.458
2051	207,067	50,854	257,922	80.3	275,723	107,925	383,649	71.9	1.332	2.122	1.487
2052	208,154	51,057	259,211	80.3	282,724	110,425	393,148	71.9	1.358	2.163	1.517
2053	209,247	51,260	260,507	80.3	289,778	112,941	402,719	72.0	1.385	2.203	1.546
2054	210,346	51,464	261,810	80.3	297,016	115,479	412,495	72.0	1.412	2.244	1.576
2055	211,450	51,669	263,119	80.4	304,644	118,171	422,816	72.1	1.441	2.287	1.607
2056	212,560	51,875	264,435	80.4	312,407	120,927	433,333	72.1	1.470	2.331	1.639
2057	213,676	52,081	265,758	80.4	320,025	123,591	443,616	72.1	1.498	2.373	1.669
2058	214,798	52,289	267,087	80.4	328,108	126,383	454,491	72.2	1.528	2.417	1.702
Average Annual Percent Change											
2019-25	19.3%	15.8%	18.2%		16.5%	13.5%	15.1%		-2.4%	-2.0%	-2.6%
2025-35	3.8%	0.5%	2.9%		7.0%	3.5%	5.6%		3.1%	3.0%	2.7%
2035-45	3.0%	0.3%	2.4%		5.4%	2.4%	4.4%		2.3%	2.1%	1.9%
2045-55	0.6%	0.4%	0.6%		2.7%	2.3%	2.6%		2.0%	1.9%	2.0%
2025-55	2.5%	0.4%	2.0%		5.0%	2.7%	4.2%		2.5%	2.3%	2.2%

(1) Assumes new Morrisville Parkway Interchange is opened January 1, 2020. Also, a new mainline toll zone north of the Morrisville Parkway Interchange is put into operation January 1, 2020.
(2) Ramp up is applied to the first 36-month period of transaction and revenue impacts associated with new toll zones.
(3) Assumes ramp tolls at US 64 and Hopson Road on Triangle Expressway are removed, and replaced by new mainline toll zones north of each interchange, on July 1, 2023.
(4) Assumes Complete 540 Phase 1 opens on July 1, 2023.

Table 7.7 provides estimates of transactions and revenue by payment type, and also shows average annual percent change for major increments during the forecast period along the bottom.

Growth in BBM transactions is estimated to be quite low, increasing 0.4 percent per year over the 30-year period extending from FY 2025 to FY 2055. This compares with an annual average increase of ETC transactions of 2.5 percent per year.

Annual revenue is expected to grow by 15.1 percent per year between FY 2019 and FY 2025. Much of this exceptionally high growth relates to the net impact of the assumed opening of Complete 540 Phase 1 in FY 2024. Between FY 2025 and FY 2035, annual revenue increases would average about 5.6 percent per year, slowing to a 4.4 percent average annual rate of increase between 2035 and 2045.

It should be kept in mind that revenue increases are influenced both by traffic growth and the assumption of continued annual increases in toll rates. The right three columns of Table 7.7 show estimated average toll per transaction, by payment category and overall. The overall average toll per transaction increases at 2.2 percent per year between 2025 and 2055.

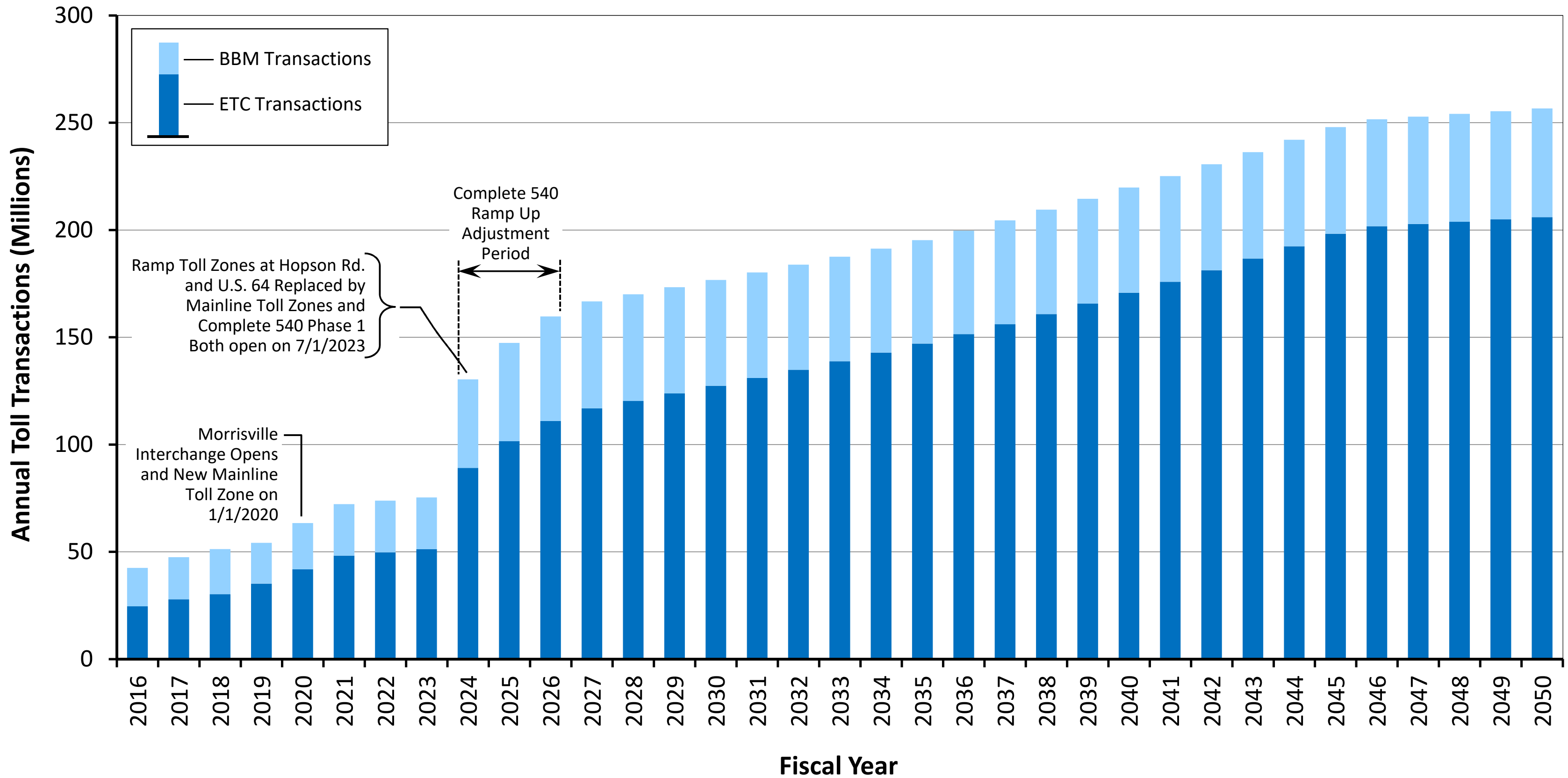
Estimated annual transactions by payment method are presented graphically in **Figure 7.9**. Fiscal years 2016 through 2018 represent actual Triangle Expressway transactions; subsequent years represent forecasts. The darker shade of each column represents estimated ETC transactions while the lighter shade represents BBM transactions. The significant impacts of the Complete 540 Phase 1, together with assumed changes in toll zone locations on Triangle Expressway, result in a significant increase in traffic between fiscal years 2023 and 2025. The graphic also shows the years in which ramp-up adjustments have been applied.

The number of estimated BBM annual transactions remains relatively constant over the long-term forecast. Most of the growth occurs in the darker shaded ETC transaction category. By 2050, ETC transactions represent about 80 percent of total systemwide toll transactions.

Figure 7.10 graphically displays the annual revenue forecasts. Again, we see a significant increase in annual revenue over the fiscal year period between 2023 and 2026. This is attributable to the assumed opening of Complete 540 Phase 1. The magnitude of change in annual revenue estimates is not as large as annual transactions. This difference relates to the fact that a portion of the steep increase in transactions is associated with changes from ramp to mainline toll locations on Triangle Expressway, which actually result in a net reduction in average toll per transaction. This does not, however, significantly impact anticipated revenue. The revenue estimates shown in Figure 7.10 are estimates of expected revenue prior to any adjustment for leakage. They also do not include estimates of BBM invoice processing fee revenue.

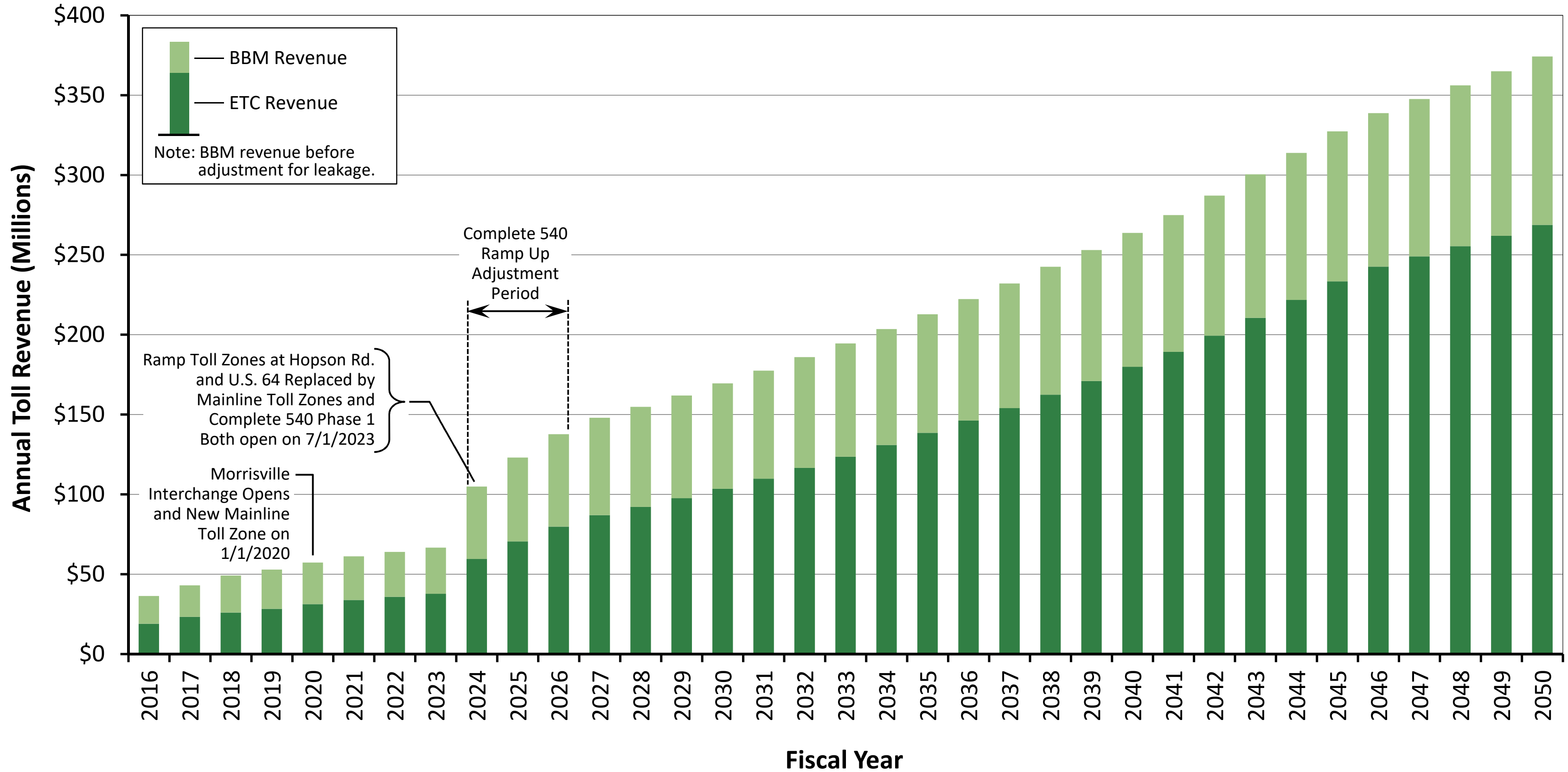
Figure 7.11 also shows estimates of annual revenue by primary source. Three components of revenue are depicted in the illustration:

- The blue portion of the bars reflect estimated revenue on the Triangle Expressway which would be expected without the implementation of Complete 540;
- The green portion of the bars reflects estimated incremental revenue from Triangle Expressway toll zones attributable to the opening of Complete 540; and,
- The yellow portion of each bar represents estimated revenue from toll zones on Complete 540 itself.



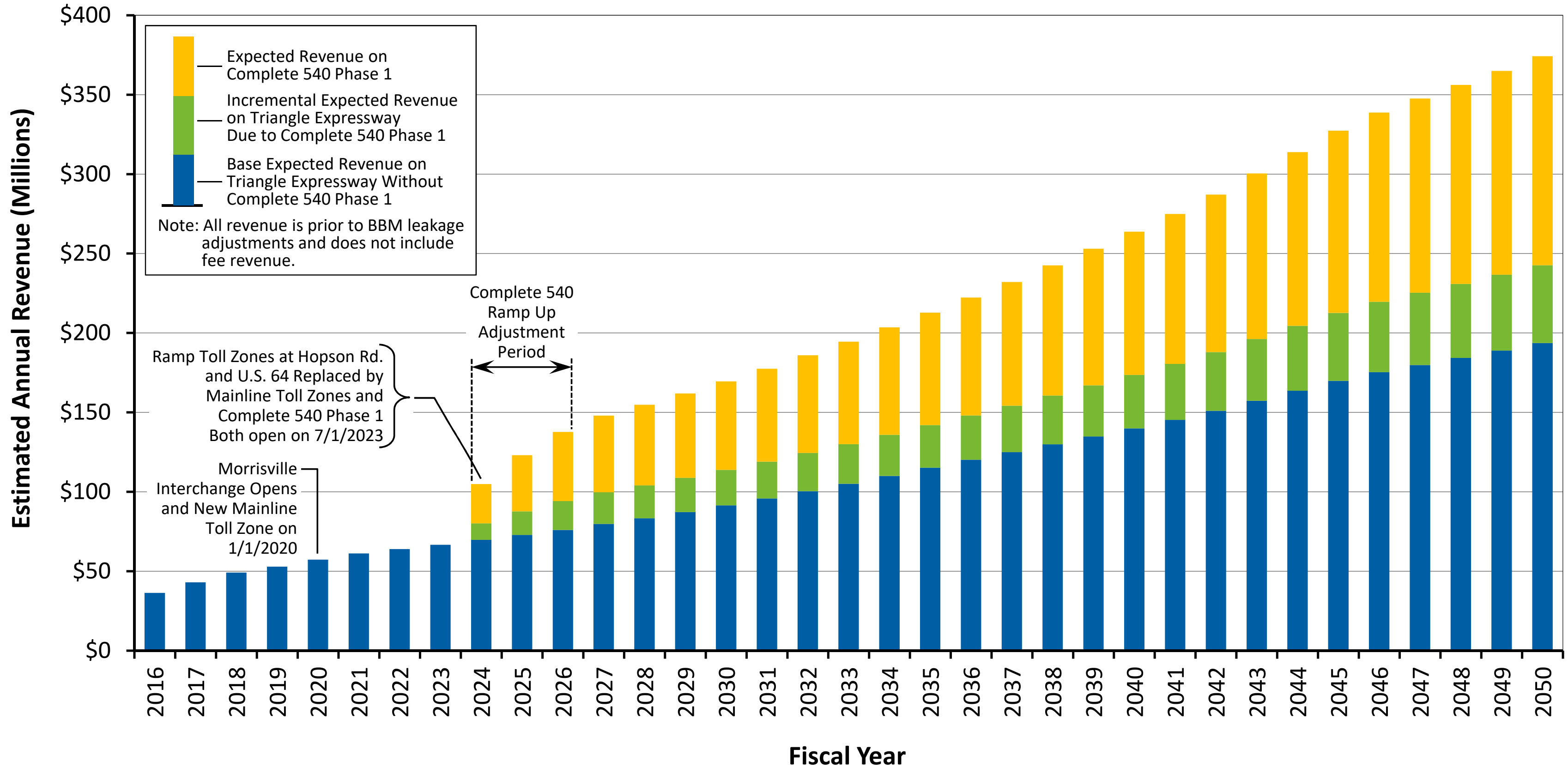
ESTIMATED ANNUAL TRANSACTIONS BY PAYMENT METHOD
TRIANGLE EXPRESSWAY PLUS COMPLETE 540 PHASE 1

FIGURE 7.9



ESTIMATED ANNUAL REVENUE BY PAYMENT METHOD
TRIANGLE EXPRESSWAY PLUS COMPLETE 540 PHASE 1

FIGURE 7.10



ESTIMATED ANNUAL REVENUE BY SOURCE

FIGURE 7.11

The ramp-up adjustment process was applied to both the green and yellow portions of revenue shown on each bar in Figure 7.11. Overall, the combined forecasts of annual revenue projects total expected revenue would reach around $374 million by FY 2050. More than half of this is represented by the forecast of revenue on Triangle Expressway without Complete 540. Almost 13 percent of the total projected revenue is represented by incremental revenue on the existing Triangle Expressway. Revenue from Complete 540 toll zones represent the remaining 35.7 percent of the total.

7.8.1 Estimated Annual Adjusted Revenue

Finally, **Table 7.8** presents estimated adjusted annual revenue for Triangle Expressway and Complete 540 Phase 1. Computed gross revenue estimates are summarized by ETC and BBM components. In developing adjusted toll revenue estimates, anticipated losses due to uncollectable BBM revenue, referred to as "leakage" are subtracted from the total. After leakage, adjusted annual toll revenue is expected to increase from $47.2 million in FY 2019 to $111.0 million in FY 2025 and $195.7 million in FY 2035. In addition, NCTA receives a relatively significant amount annually from processing fees; these are fees associated with the BBM billing process. Processing fee revenue is estimated to increase from almost $5.7 million in FY 2019 to $8.7 million in FY 2035. The growth in processing fee revenue is related to the growth in BBM transactions. No change in the current processing fee rate of $6.00 per unpaid invoice is assumed over the forecast period. Hence, the increase in processing fees does not keep pace with the increase in leakage amounts, which increase over time by virtue of assumed annual increases in BBM toll rates.

The right-most column shows estimated total collected revenue in thousands. This is expected to increase from $52.8 million in FY 2019 to $119.2 million in FY 2025, and $204.4 million in FY 2035.

Scenario 2 estimated gross toll revenue and adjusted toll revenue is shown in **Table 7.9** by fiscal year. The gross toll revenue is split into the revenue generated by Triangle Expressway toll zones, and Complete 540 Phase 1 toll zones. In FY 2025, gross toll revenue generated on the Triangle Expressway is about 75 percent of the total system toll revenue (Triangle Expressway and Complete 540). The Triangle Expressway's share of gross toll revenue decreases to about 67 percent in 2035 and 65 percent in 2045 as toll revenue on Complete 540 increases. Also shown is the assumed leakage, adjusted toll revenue and fee revenue for each forecast fiscal year.

7.9 Disclaimer

The disclaimer setting forth the conditions and limitations of the traffic and revenue forecast presented at the end of Chapter 6 also apply to traffic and revenue forecasts included in Chapter 7 and other areas of this report.

Table 7.8
Estimated Adjusted Annual Revenue
Scenario 2 - Triangle Expressway with Complete 540 Phase 1

Fiscal Year	Computed Gross Revenue ETC	Computed Gross Revenue BBM	Computed Gross Revenue Total	BBM Leakage	Adjusted Toll Revenue	Processing Fees	Total Collected Revenue
2019	$ 28,238	$ 24,580	$ 52,818	$ (5,652)	$ 47,166	$ 5,657	$ 52,823
2020 (1,2)	31,243	26,056	57,299	(5,991)	51,308	5,778	57,086
2021 (2)	33,832	27,286	61,118	(6,274)	54,844	5,870	60,714
2022 (2)	35,783	28,129	63,912	(6,468)	57,444	5,893	63,337
2023 (2)	37,726	28,882	66,608	(6,641)	59,966	5,898	65,865
2024 (2,3,4)	59,547	45,263	104,810	(10,408)	94,402	7,442	101,844
2025 (2)	70,518	52,536	123,054	(12,080)	110,974	8,262	119,236
2026 (2)	79,769	57,897	137,666	(13,313)	124,352	8,784	133,137
2027	86,903	61,011	147,914	(14,029)	133,885	8,978	142,862
2028	92,104	62,634	154,739	(14,403)	140,336	8,959	149,295
2029	97,547	64,301	161,848	(14,786)	147,062	8,931	155,993
2030	103,452	66,016	169,468	(15,180)	154,288	8,899	163,187
2031	109,773	67,691	177,464	(15,565)	161,899	8,864	170,763
2032	116,506	69,391	185,897	(15,956)	169,941	8,826	178,767
2033	123,510	71,003	194,513	(16,327)	178,186	8,784	186,971
2034	130,858	72,603	203,461	(16,695)	186,766	8,740	195,506
2035	138,552	74,223	212,775	(17,067)	195,708	8,692	204,399
2036	146,238	76,027	222,265	(17,482)	204,783	8,689	213,472
2037	154,009	78,036	232,044	(17,944)	214,100	8,731	222,832
2038	162,374	80,098	242,472	(18,418)	224,054	8,771	232,825
2039	170,934	82,039	252,973	(18,864)	234,108	8,809	242,917
2040	179,842	83,874	263,716	(19,287)	244,429	8,843	253,272
2041	189,189	85,716	274,906	(19,710)	255,196	8,874	264,070
2042	199,323	87,703	287,026	(20,167)	266,859	8,901	275,760
2043	210,468	89,949	300,417	(20,684)	279,734	8,925	288,659
2044	221,760	92,057	313,817	(21,168)	292,649	8,945	301,594
2045	233,365	93,969	327,334	(21,608)	305,726	8,961	314,687
2046	242,587	96,137	338,724	(22,106)	316,618	8,986	325,604
2047	249,030	98,485	347,515	(22,646)	324,869	9,022	333,891
2048	255,373	100,721	356,094	(23,160)	332,934	9,058	341,992
2049	261,908	103,045	364,953	(23,695)	341,258	9,094	350,353
2050	268,761	105,471	374,232	(24,253)	349,979	9,130	359,110
2051	275,723	107,925	383,649	(24,817)	358,832	9,167	367,998
2052	282,724	110,425	393,148	(25,392)	367,757	9,203	376,960
2053	289,778	112,941	402,719	(25,970)	376,749	9,240	385,989
2054	297,016	115,479	412,495	(26,554)	385,941	9,277	395,218
2055	304,644	118,171	422,816	(27,173)	395,642	9,314	404,956
2056	312,407	120,927	433,333	(27,807)	405,527	9,351	414,877
2057	320,025	123,591	443,616	(28,419)	415,197	9,388	424,585
2058	328,108	126,383	454,491	(29,061)	425,430	9,425	434,855

(1) Assumes new Morrisville Parkway Interchange is opened January 1, 2020. Also, a new mainline toll zone north of the Morrisville Parkway Interchange is put into operation January 1, 2020.

(2) Ramp up is applied to the first 36-month period of transaction and revenue impacts associated with new toll zones.

(3) Assumes ramp tolls at U.S. 64 and Hopson Road on Triangle Expressway are removed and replaced by new mainline toll zones north of each interchange on July 1, 2023.

(4) Assumes Complete 540 Phase 1 is opened on July 1, 2023.

Table 7.9
Estimated Adjusted Annual Revenue
Scenario 2 - Triangle Expressway With Complete 540 Phase 1

	Computed Gross Revenue												
Fiscal	Triangle Expressway Toll Zones			Complete 540 Toll Zones			Systemwide			BBM	Adjusted	Processing	Total
Year	ETC	BBM	Total	ETC	BBM	Total	ETC	BBM	Total	Leakage	Revenue	Fees	Collected
2019	$ 28,238	$ 24,580	$ 52,818	$ -	$ -	$ -	$ 28,238	$ 24,580	$ 52,818	$ (5,652)	$ 47,166	$ 5,657	$ 52,823
2020 (1,2)	31,243	26,056	57,299	-	-	-	31,243	26,056	57,299	(5,991)	51,308	5,778	57,086
2021 (2)	33,832	27,286	61,118	-	-	-	33,832	27,286	61,118	(6,274)	54,844	5,870	60,714
2022 (2)	35,783	28,129	63,912	-	-	-	35,783	28,129	63,912	(6,468)	57,444	5,893	63,337
2023 (2)	37,726	28,882	66,608	-	-	-	37,726	28,882	66,608	(6,641)	59,966	5,898	65,865
2024 (2,3,4)	45,342	34,750	80,092	14,204	10,513	24,718	59,547	45,263	104,810	(10,408)	94,402	7,442	101,844
2025 (2)	49,960	37,646	87,606	20,558	14,890	35,448	70,518	52,536	123,054	(12,080)	110,974	8,262	119,236
2026 (2)	54,260	39,896	94,156	25,509	18,001	43,510	79,769	57,897	137,666	(13,313)	124,352	8,784	133,137
2027	58,266	41,406	99,673	28,637	19,604	48,241	86,903	61,011	147,914	(14,029)	133,885	8,978	142,862
2028	61,607	42,400	104,007	30,498	20,234	50,732	92,104	62,634	154,739	(14,403)	140,336	8,959	149,295
2029	65,193	43,522	108,715	32,354	20,779	53,133	97,547	64,301	161,848	(14,786)	147,062	8,931	155,993
2030	69,108	44,655	113,763	34,344	21,361	55,705	103,452	66,016	169,468	(15,180)	154,288	8,899	163,187
2031	73,239	45,699	118,938	36,534	21,991	58,526	109,773	67,691	177,464	(15,565)	161,899	8,864	170,763
2032	77,638	46,761	124,399	38,868	22,631	61,498	116,506	69,391	185,897	(15,956)	169,941	8,826	178,767
2033	82,233	47,742	129,975	41,278	23,260	64,538	123,510	71,003	194,513	(16,327)	178,186	8,784	186,971
2034	87,071	48,751	135,822	43,787	23,852	67,639	130,858	72,603	203,461	(16,695)	186,766	8,740	195,506
2035	92,142	49,799	141,941	46,410	24,423	70,833	138,552	74,223	212,775	(17,067)	195,708	8,692	204,399
2036	97,083	50,952	148,035	49,155	25,075	74,230	146,238	76,027	222,265	(17,482)	204,783	8,689	213,472
2037	101,972	52,220	154,192	52,037	25,815	77,852	154,009	78,036	232,044	(17,944)	214,100	8,731	222,832
2038	107,123	53,421	160,544	55,251	26,677	81,929	162,374	80,098	242,472	(18,418)	224,054	8,771	232,825
2039	112,394	54,542	166,937	58,540	27,497	86,036	170,934	82,039	252,973	(18,864)	234,108	8,809	242,917
2040	117,954	55,618	173,572	61,887	28,256	90,143	179,842	83,874	263,716	(19,287)	244,429	8,843	253,272
2041	123,793	56,689	180,482	65,397	29,027	94,424	189,189	85,716	274,906	(19,710)	255,196	8,874	264,070
2042	130,065	57,831	187,897	69,258	29,872	99,130	199,323	87,703	287,026	(20,167)	266,859	8,901	275,760
2043	136,948	59,162	196,110	73,520	30,788	104,307	210,468	89,949	300,417	(20,684)	279,734	8,925	288,659
2044	143,947	60,452	204,399	77,814	31,605	109,418	221,760	92,057	313,817	(21,168)	292,649	8,945	301,594
2045	151,017	61,552	212,569	82,349	32,416	114,765	233,365	93,969	327,334	(21,608)	305,726	8,961	314,687
2046	156,714	62,844	219,558	85,873	33,293	119,166	242,587	96,137	338,724	(22,106)	316,618	8,986	325,604
2047	160,890	64,373	225,263	88,140	34,112	122,252	249,030	98,485	347,515	(22,646)	324,869	9,022	333,891
2048	165,023	65,835	230,858	90,350	34,887	125,237	255,373	100,721	356,094	(23,160)	332,934	9,058	341,992
2049	169,257	67,344	236,602	92,651	35,700	128,351	261,908	103,045	364,953	(23,695)	341,258	9,094	350,353
2050	173,644	68,934	242,578	95,118	36,537	131,654	268,761	105,471	374,232	(24,253)	349,979	9,130	359,110
2051	178,143	70,550	248,694	97,580	37,375	134,955	275,723	107,925	383,649	(24,817)	358,832	9,167	367,998
2052	182,607	72,151	254,757	100,117	38,274	138,391	282,724	110,425	393,148	(25,392)	367,757	9,203	376,960
2053	187,136	73,760	260,897	102,641	39,181	141,822	289,778	112,941	402,719	(25,970)	376,749	9,240	385,989
2054	191,873	75,441	267,313	105,144	40,038	145,182	297,016	115,479	412,495	(26,554)	385,941	9,277	395,218
2055	196,793	77,190	273,983	107,852	40,981	148,833	304,644	118,171	422,816	(27,173)	395,642	9,314	404,956
2056	201,774	78,972	280,746	110,633	41,954	152,587	312,407	120,927	433,333	(27,807)	405,527	9,351	414,877
2057	206,702	80,741	287,443	113,323	42,850	156,174	320,025	123,591	443,616	(28,419)	415,197	9,388	424,585
2058	211,940	82,564	294,503	116,169	43,819	159,988	328,108	126,383	454,491	(29,061)	425,430	9,425	434,855

(1) Assumes new Morrisville Parkway Interchange is opened January 1, 2020. Also new mainline toll zone north of the Morrisville Pkwy is put into operation January 1, 2020.
(2) Ramp up is applied to the first 36-month period of transaction and revenue impacts associated with new toll zones.
(3) Assumes ramp tolls at U.S. 64 and Hopson Road on Triangle Expressway are removed and replaced by new mainline toll zones north of each interchange on July 1, 2023.
(4) Assumes Complete 540 Phase 1 is opened on July 1, 2023.

Chapter 8
Sensitivity Tests

Five hypothetical tests were conducted to determine the sensitivity of the Scenario 2 annual transaction and toll revenue forecasts detailed in Chapter 7 to changes in key study assumptions. The sensitivity tests were conducted for calendar modeled years 2025 and 2045. The results were converted to fiscal year (FY) and are reported for FY 2025 and FY 2045. The following describes the five sensitivity tests:

1. **Reduced Economic Growth** – trip table growth was reduced by 30 percent.
2. **Reduced Value of Time** - passenger car (Class 1) and truck (Classes 2 and 3) values of time were reduced by 25 percent.
3. **Increased Motor Fuel Prices** – motor fuel prices were increased by 50 percent.
4. **Reduced Truck Market Share** – 25 percent of the forecasted truck transactions were converted to be passenger cars. Total toll transactions remained unchanged.
5. **Increase ramp-up to 5 years** – ramp-up on Complete 540 Segments Phase 1 increased from 3 years to 5 years.

Table 8.1 presents the estimated impacts on Scenario 2 transactions and revenue associated with the five sensitivity tests described above. Scenario 2 forecasts of toll transactions, gross toll revenue, and total collected revenue for fiscal years 2025 and 2045 are shown across the top of the table. The results of tests 1 through 4 are also shown for FY 2025 and FY 2045, including the difference and percent impact between the sensitivity test forecast and the Scenario 2 forecast. The percent impact on total collected revenue for each of these sensitivity tests compared to Scenario 2 is shown graphically in **Figure 8.1.** Since sensitivity test number 5 relates to ramp-up assumptions of Phase 1, the results for that test are shown at the bottom of Table 8.1 as a cumulative impact between FY 2024 and FY 2028 (the first 5 years of operation of Complete 540 Phase 1).

8.1 Reduced Economic Growth

The rate of trip table growth was reduced by 30 percent between our base year calibration year 2016 and future year 2045 to simulate slower economic growth than assumed in the trip tables used for Scenario 2. Because of the slower assumed regional growth, toll transactions would be lower by 10.3 percent in FY 2025 and 21.4 percent in FY 2045. Similarly, total collected revenue decreased by 10.4 percent in FY 2025 and 21.9 percent in FY 2045. The percent impacts in 2045 are larger compared to those estimated for 2025 because of the compounding nature of the reduced annual growth rates.

8.2 Reduced Value of Time

Motorist value of time (VOT) is an important factor in the modeling process, as it influences a driver's willingness to pay a toll to achieve a time savings by using the toll road. The VOT is based in part on the median household income in each traffic analysis zone in the TRMv6 model. Base Condition VOTs were reduced by 25 percent in calendar years 2025 and 2045, resulting in an estimated 12.6 percent and 11.1 percent decrease in transactions in FY 2025 and FY 2045, respectively. Annual total collected revenue estimates were reduced by 11.9 and 10.5 percent in FY 2025 and FY 2045, respectively.

Table 8.1
Summary of Sensitivity Test Results on Fiscal Year Transaction and Toll Revenue Estimates
On Scenario 2: Triangle Expressway and Complete 540 Phase 1
(in thousands)

		Annual Toll Transactions		Annual Gross Toll Revenue (7)		Annual Total Collected Revenue (8)	
	Scenario 2 and Sensitivity Scenarios	2025 (6)	2045	2025 (6)	2045	2025 (6)	2045
	Scenario 2	147,353	247,938	$123,054	$327,334	$119,236	$314,687
	Sensitivity Scenarios						
1	Overall Economic Growth Reduced by 30% (1)	132,135	194,770	$110,229	$255,465	$106,814	$245,692
	Difference	(15,218)	(53,168)	(12,825)	(71,869)	(12,422)	(68,996)
	Percent Difference	-10.3%	-21.4%	-10.4%	-22.0%	-10.4%	-21.9%
2	Value of Time Reduced by 25% (2)	128,809	220,434	$108,457	$292,714	$105,022	$281,761
	Difference	(18,544)	(27,504)	(14,597)	(34,620)	(14,214)	(32,926)
	Percent Difference	-12.6%	-11.1%	-11.9%	-10.6%	-11.9%	-10.5%
3	Fuel Price Increased by 50% (3)	135,440	229,593	$114,216	$305,359	$110,555	$293,349
	Difference	(11,913)	(18,345)	(8,838)	(21,975)	(8,681)	(21,339)
	Percent Difference	-8.1%	-7.4%	-7.2%	-6.7%	-7.3%	-6.8%
4	Truck Market Share Reduced by 25% (4)	147,353	247,938	$118,819	$315,710	$115,519	$303,965
	Difference	0	0	(4,235)	(11,623)	(3,717)	(10,723)
	Percent Difference	0.0%	0.0%	-3.4%	-3.6%	-3.1%	-3.4%

		5-year Total Toll Transactions 2024-2028	5-year Total Gross Toll Revenue (7) 2024-2028	5-year Total Collected Toll Revenue (8) 2024-2028
	Scenario 2	774,111	$668,182	$646,374
5	Extended Ramp-up Period (5)	747,840	$642,380	$621,647
	Difference	(26,271)	(25,802)	(24,728)
	Percent Difference	-3.4%	-3.9%	-3.8%

(1) 30 percent global reduction in TRM trip table growth from base year 2016 through 2045.
(2) Value of time is reduced by 25 percent for cars and trucks.
(3) Fuel price is increased by 50 percent.
(4) Truck transactions forecast for Triangle Expressway and Complete 540 Phase 1 are reduced by 25 percent. Those same transactions are assumed to be car transactions. Total transactions remain unchanged.
(5) 5-year ramp-up period applied to traffic and revenue impacts due to Complete 540 Phase 1.
(6) Includes a dampening factor (ramp-up) on traffic and revenue.
(7) Total expected toll revenue for all toll transactions, prior to accounting for leakage or fee revenue.
(8) Total collected toll revenue and processing fee revenue.

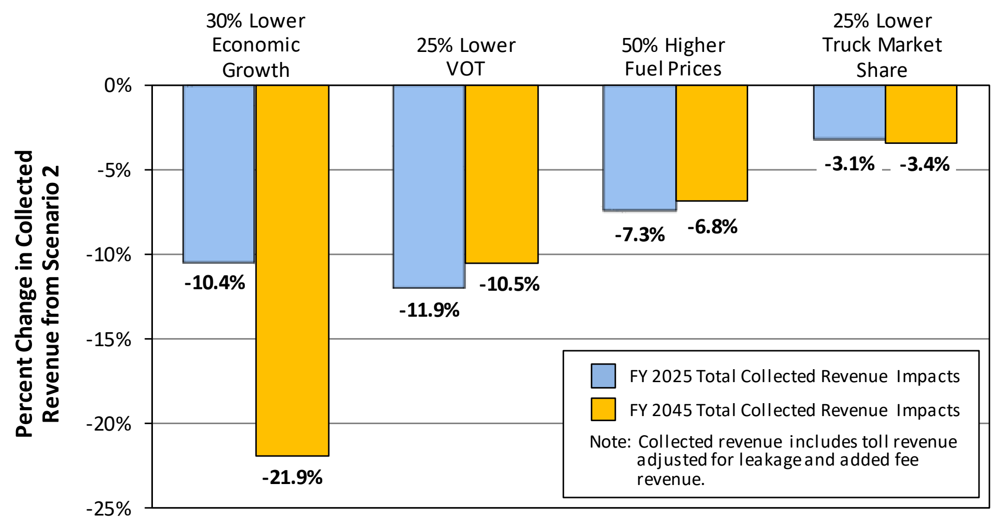


Figure 8.1
Sensitivity Tests: Collected Revenue Impacts on Scenario 2 (Triangle Expressway with Complete 540 Phase 1)

8.3 Increased Motor Fuel Prices

Motor fuel prices can be volatile over a long-term forecast, and this test assumes that Scenario 2 motor fuel prices increase by 50 percent. This change would result in higher operating costs for the motorist and likely result in reduced travel demand. To reflect the reduced travel demand, the trip tables were reduced by five percent representing an elasticity of -0.10. The motor vehicle operating cost used in the tolling assignment was also increased to reflect the increase in motor fuel prices. Under this test, annual toll transactions decreased by 8.1 percent in FY 2025 and by 7.4 percent in FY 2045. Total collected revenue decreased by 7.3 percent and by 6.8 percent for FY 2025 and FY 2045, respectively.

8.4 Reduced Truck Market Share

Truck toll rates are significantly higher than passenger car toll rates. Class 2 vehicles (those with 3 axles) pay twice the Class 1 (2-axle vehicles) toll rates, and Class 3 vehicles (those with 4 or more axles) pay four times the Class 1 toll rates. For this sensitivity test, 25 percent of the Class 2 and 3 vehicles forecast to use the facility were converted into Class 1 vehicles. The total number of transactions remain unchanged from the Scenario 2. Annual total collected revenue decreased by 3.1 percent and by 3.4 percent for 2025 and 2045, respectively.

8.5 Increased Ramp-Up

Scenario 2 assumes that Complete 540 Phase 1 will experience ramp-up over a three-year period. This test assumes the ramp-up period to extend over a five-year period before reaching a normal growth rate. By the sixth year and beyond, annual transactions and revenue would match those estimated for Scenario 2. Under this test, cumulative toll transactions between FY 2024 and FY 2028 are lower by 3.4 percent. Cumulative total collected revenue between 2024 and 2028 is lower by 3.8 percent.

Appendix A

Volume Calibration Results by Time Period and Direction on Screenlines

Appendix A
Volume Calibration Results by Time Period and Direction on Screenlines

Screen-line	Roadname	Dir.	AM Observed Count	AM Modeled Volume	AM Percent Difference	PM Observed Count	PM Modeled Volume	PM Percent Difference	MD Observed Count	MD Modeled Volume	MD Percent Difference	NT Observed Count	NT Modeled Volume	NT Percent Difference
1	S. New Hope Rd	NB	2,710	2,261	-17%	2,305	2,035	-12%	2,146	2,380	11%	1,448	1,355	-6%
1	S. New Hope Rd	SB	1,920	1,981	3%	3,174	2,680	-16%	2,195	2,507	14%	1,530	1,589	4%
1	Barwell Rd	NB	718	503	-30%	948	1,006	6%	679	750	10%	540	399	-26%
1	Barwell Rd	SB	803	960	20%	1,034	768	-26%	723	807	12%	523	435	-17%
1	Auburn Knightdale Rd	NB	373	627	68%	479	729	52%	412	563	37%	194	252	30%
1	Auburn Knightdale Rd	SB	405	547	35%	514	815	58%	394	590	50%	157	234	49%
1	Mial Plantation Rd	NB	800	988	24%	669	970	45%	532	845	59%	271	325	20%
1	Mial Plantation Rd	SB	581	828	42%	933	1,112	19%	567	811	43%	270	379	40%
2	White Oak Rd (NC 2547)	NB	3,098	2,716	-12%	1,513	1,530	1%	2,057	2,282	11%	671	705	5%
2	White Oak Rd (NC 2547)	SB	983	1,044	6%	2,910	2,901	0%	2,088	2,240	7%	1,088	1,091	0%
2	I-40	NB	7,456	7,842	5%	14,797	15,109	2%	13,401	13,932	4%	9,306	9,255	-1%
2	I-40	SB	12,878	13,886	8%	10,694	10,046	-6%	14,269	14,402	1%	7,314	7,291	0%
2	Raynor Rd (NC 2555)	NB	1,442	1,536	7%	383	899	135%	549	975	78%	302	448	48%
2	Raynor Rd (NC 2555)	SB	256	669	161%	1,045	1,367	31%	597	882	48%	348	511	47%
2	Guy Rd (NC 2558)	NB	1,930	1,652	-14%	657	825	26%	791	1,022	29%	412	373	-10%
2	Guy Rd (NC 2558)	SB	345	412	20%	1,986	1,770	-11%	835	953	14%	685	622	-9%
2	I-40	NB	8,963	9,478	6%	7,799	7,767	0%	10,391	10,706	3%	5,516	5,407	-2%
2	I-40	SB	5,410	5,534	2%	11,595	10,712	-8%	10,170	9,998	-2%	7,111	6,707	-6%
3	Timber Dr.	EB	1,202	1,532	27%	4,250	3,614	-15%	2,709	2,825	4%	1,241	1,250	1%
3	Timber Dr.	WB	3,415	3,499	2%	1,990	2,803	41%	2,664	3,605	35%	969	1,077	11%
3	Buffalo Rd.	EB	289	140	-51%	558	302	-46%	488	150	-69%	231	96	-58%
3	Buffalo Rd.	WB	329	264	-20%	449	212	-53%	429	192	-55%	147	100	-32%
3	Ten Ten Rd.	EB	1,076	1,006	-7%	2,446	2,082	-15%	2,025	1,904	-6%	961	1,041	8%
3	Ten Ten Rd.	WB	1,991	1,948	-2%	1,592	1,441	-9%	1,910	1,701	-11%	817	825	1%
3	Pagan Rd	EB	233	149	-36%	297	434	46%	213	280	31%	101	110	9%
3	Pagan Rd	WB	293	330	13%	234	195	-17%	247	203	-18%	102	98	-4%
3	Rock Service Station Rd	NB	1,000	581	-42%	372	389	5%	434	485	12%	189	196	4%
3	Rock Service Station Rd	SB	316	225	-29%	943	591	-37%	516	469	-9%	282	278	-1%
3	NC 42	EB	1,127	1,127	0%	1,738	1,612	-7%	1,567	1,413	-10%	737	778	5%
3	NC 42	WB	1,452	1,375	-5%	1,471	1,333	-9%	1,526	1,390	-9%	801	861	7%
4	US 401	NB	6,348	7,441	17%	4,091	4,268	4%	5,616	5,725	2%	2,184	2,279	4%
4	US 401	SB	3,576	3,171	-11%	6,797	6,847	1%	5,304	4,817	-9%	2,553	2,559	0%
4	Ten Ten Rd	EB	1,161	1,185	2%	3,630	3,404	-6%	2,933	2,683	-9%	1,536	1,611	5%
4	Ten Ten Rd	WB	3,181	3,466	9%	1,953	1,997	2%	2,589	2,631	2%	944	977	3%
4	Banks Rd	EB	455	402	-12%	1,367	881	-36%	752	644	-14%	423	243	-43%
4	Banks Rd	WB	1,682	882	-48%	774	486	-37%	783	405	-48%	335	192	-43%
5	Penny Rd	EB	609	498	-18%	2,535	1,973	-22%	1,252	1,019	-19%	675	631	-7%
5	Penny Rd	WB	2,013	1,630	-19%	1,033	922	-11%	1,345	1,083	-20%	356	352	-1%
5	Ten Ten Rd	EB	1,967	2,204	12%	3,325	4,026	21%	3,061	3,661	20%	1,371	1,666	22%
5	Ten Ten Rd	WB	2,890	3,693	28%	2,437	2,967	22%	3,260	3,821	17%	1,091	1,223	12%
5	Optimist Farm Rd	EB	1,174	1,987	69%	1,839	1,331	-28%	1,137	1,391	22%	489	576	18%
5	Optimist Farm Rd	WB	1,705	1,166	-32%	1,406	1,674	19%	1,376	1,429	4%	476	562	18%
5	Hilltop Needmore Rd	EB	1,400	1,350	-4%	1,493	1,359	-9%	1,322	1,199	-9%	523	530	1%
5	Hilltop Needmore Rd	WB	1,066	1,095	3%	1,539	1,299	-16%	1,303	1,131	-13%	619	546	-12%
6	New Hill Holleman Rd	NB	1,898	2,511	32%	434	557	28%	526	695	32%	227	170	-25%
6	New Hill Holleman Rd	SB	311	280	-10%	1,738	2,248	29%	583	704	21%	209	255	22%
6	Holly Springs Rd	NB	425	696	64%	394	363	-8%	273	415	52%	117	71	-39%
6	Holly Springs Rd	SB	294	180	-39%	451	657	46%	306	297	-3%	113	252	123%
6	Old Holly Springs Apex Rd	NB	1,187	1,558	31%	444	642	45%	444	720	62%	131	185	41%
6	Old Holly Springs Apex Rd	SB	245	316	29%	1,305	1,347	3%	448	638	42%	185	260	41%
6	**NC 540 / Triangle Expressway**	**NB**	**4,748**	**5,343**	**13%**	**1,682**	**1,751**	**4%**	**1,829**	**2,350**	**28%**	**767**	**906**	**18%**
6	**NC 540 / Triangle Expressway**	**SB**	**1,332**	**1,237**	**-7%**	**4,035**	**4,879**	**21%**	**2,098**	**2,223**	**6%**	**1,337**	**1,042**	**-22%**
6	NC 55	NB	7,859	6,702	-15%	5,266	5,767	10%	7,185	7,731	8%	3,438	3,613	5%
6	NC 55	SB	3,829	3,318	-13%	8,581	6,055	-29%	7,290	6,617	-9%	4,082	4,324	6%
6	Ten Ten Rd	NB	4,172	3,297	-21%	3,416	2,442	-29%	4,371	3,339	-24%	1,576	1,434	-9%
6	Ten Ten Rd	SB	2,327	1,339	-42%	4,555	3,272	-28%	3,744	2,740	-27%	1,846	1,527	-17%
7	Davis Dr.	NB	5,232	4,460	-15%	4,059	3,913	-4%	4,242	4,488	6%	2,048	2,073	1%
7	Davis Dr.	SB	2,748	2,987	9%	6,252	4,677	-25%	4,312	4,600	7%	1,670	2,104	26%
7	Louis Stephenson Dr.	NB	423	487	15%	619	161	-74%	509	183	-64%	164	44	-73%
7	Louis Stephenson Dr.	SB	305	190	-38%	685	493	-28%	467	242	-48%	195	58	-70%
7	NC 55	NB	5,375	4,813	-10%	4,256	4,319	1%	4,526	4,968	10%	2,112	2,148	2%
7	NC 55	SB	3,195	3,519	10%	5,800	5,154	-11%	4,397	5,063	15%	1,705	2,303	35%
7	**NC 540 / Triangle Expressway**	**NB**	**8,205**	**8,267**	**1%**	**3,198**	**3,626**	**13%**	**3,512**	**4,282**	**22%**	**1,371**	**1,532**	**12%**
7	**NC 540 / Triangle Expressway**	**SB**	**2,307**	**2,650**	**15%**	**8,736**	**8,396**	**-4%**	**3,575**	**4,307**	**20%**	**2,390**	**2,161**	**-10%**
7	Green Level Church Rd	NB	981	1,113	13%	1,586	1,056	-33%	1,138	1,010	-11%	581	487	-16%
7	Green Level Church Rd	SB	1,202	946	-21%	1,718	1,338	-22%	1,238	1,056	-15%	429	497	16%
7	White Oak Church Rd	NB	103	119	16%	152	168	10%	90	150	66%	30	69	130%
7	White Oak Church Rd	SB	135	172	28%	114	162	42%	101	154	52%	18	74	310%
7	Green Level Rd	EB	151	291	92%	213	402	89%	138	297	116%	55	89	61%
7	Green Level Rd	WB	175	296	69%	239	450	88%	141	315	123%	43	70	63%
7	NC 751	NB	1,495	1,650	10%	931	1,166	25%	906	1,151	27%	303	285	-6%
7	NC 751	SB	785	796	1%	1,772	1,673	-6%	1,050	1,196	14%	376	502	34%
8	NC 55 (Apex Highway)	NB	5,400	4,129	-24%	2,775	2,969	7%	3,124	3,098	-1%	1,350	1,191	-12%
8	NC 55 (Apex Highway)	SB	1,985	1,594	-20%	4,890	4,069	-17%	2,989	2,676	-10%	1,555	1,381	-11%
8	Louis Stephens Dr.	NB	565	462	-18%	1,324	129	-90%	715	70	-90%	173	33	-81%
8	Louis Stephens Dr.	SB	1,215	101	-92%	562	279	-50%	710	65	-91%	125	41	-67%
8	Davis Dr.	NB	5,007	5,023	0%	3,130	4,261	36%	3,055	3,587	17%	946	1,352	43%
8	Davis Dr.	SB	2,773	3,393	22%	4,736	4,762	1%	2,860	3,685	29%	1,026	1,878	83%
8	**NC 147/Triangle Expressway**	**NB**	**4,504**	**6,380**	**42%**	**2,132**	**2,501**	**17%**	**1,767**	**2,503**	**42%**	**616**	**1,038**	**68%**
8	**NC 147/Triangle Expressway**	**SB**	**1,131**	**1,904**	**68%**	**5,354**	**6,593**	**23%**	**1,835**	**2,499**	**36%**	**1,123**	**1,336**	**19%**
8	NC 54	NB	3,938	2,292	-42%	2,979	2,112	-29%	3,900	2,540	-35%	1,471	1,065	-28%
8	NC 54	SB	1,752	2,087	19%	4,393	2,830	-36%	3,482	2,531	-27%	1,121	1,002	-11%
8	Airport Blvd	NB	1,812	2,634	45%	3,508	4,034	15%	3,670	4,213	15%	1,535	1,635	7%
8	Airport Blvd	SB	5,456	4,942	-9%	2,591	3,454	33%	4,068	4,683	15%	1,583	1,921	21%

Appendix A (continued)
Volume Calibration Results by Time Period and Direction on Screenlines

			AM			PM			MD			NT		
Screen-line	Roadname	Dir.	Observed Count	Modeled Volume	Percent Difference	Observed Count	Modeled Volume	Percent Difference	Observed Count	Modeled Volume	Percent Difference	Observed Count	Modeled Volume	Percent Difference
9A	I-40	EB	21,828	19,663	-10%	27,273	25,529	-6%	29,452	27,849	-5%	14,881	15,863	7%
9A	I-40	WB	26,475	24,564	-7%	22,909	22,222	-3%	28,524	28,826	1%	14,269	13,987	-2%
9A	NC 54	EB	1,071	835	-22%	2,110	744	-65%	1,801	1,087	-40%	583	264	-55%
9A	NC 54	WB	1,579	646	-59%	2,499	1,036	-59%	1,971	972	-51%	522	269	-48%
9A	Davis Dr.	NB	4,719	3,294	-30%	2,622	2,175	-17%	2,594	1,922	-26%	677	700	3%
9A	Davis Dr.	SB	2,236	1,684	-25%	4,316	2,917	-32%	2,331	1,839	-21%	997	1,307	31%
9A	Hopson Rd	EB	2,074	1,687	-19%	1,273	969	-24%	1,338	1,393	4%	419	409	-2%
9A	Hopson Rd	WB	1,159	594	-49%	2,374	1,710	-28%	1,388	1,146	-17%	573	530	-7%
9A	NC 55	NB	7,367	5,769	-22%	4,093	3,449	-16%	4,697	4,200	-11%	1,864	1,817	-3%
9A	NC 55	SB	3,004	1,909	-36%	6,906	4,987	-28%	4,259	2,831	-34%	2,266	1,981	-13%
9A	Green Hope School Rd	EB	733	695	-5%	1,041	674	-35%	745	730	-2%	312	262	-16%
9A	Green Hope School Rd	WB	640	535	-16%	1,170	702	-40%	739	696	-6%	357	243	-32%
9A	Green Level West Rd	EB	1,367	1,262	-8%	2,150	1,797	-16%	1,299	1,146	-12%	397	321	-19%
9A	Green Level West Rd	WB	1,429	1,617	13%	1,518	1,534	1%	1,298	1,208	-7%	480	380	-21%
9A	US 64	EB	6,837	6,177	-10%	7,282	5,881	-19%	7,096	7,012	-1%	2,184	2,283	5%
9A	US 64	WB	5,315	4,502	-15%	7,826	6,046	-23%	7,164	6,417	-10%	2,843	2,955	4%
9A	Old US Highway 1	NB	992	803	-19%	1,292	715	-45%	1,150	654	-43%	297	406	37%
9A	Old US Highway 1	SB	1,075	747	-31%	1,138	1,007	-11%	1,134	798	-30%	367	582	59%
9A	NC 55	NB	4,950	4,336	-12%	4,202	4,586	9%	4,722	4,965	5%	2,267	2,551	13%
9A	NC 55	SB	3,052	2,696	-12%	4,891	4,032	-18%	4,310	4,375	2%	2,616	2,771	6%
9B	Green Level West Rd	EB	976	813	-17%	1,161	791	-32%	962	756	-21%	258	177	-31%
9B	Green Level West Rd	WB	611	533	-13%	1,211	992	-18%	919	768	-16%	386	392	1%
9B	US 64	EB	3,947	3,344	-15%	4,083	3,533	-13%	3,825	3,338	-13%	1,237	1,142	-8%
9B	US 64	WB	3,584	2,961	-17%	4,685	3,704	-21%	4,157	3,316	-20%	1,547	1,456	-6%
9B	Olive Chapel Rd	EB	688	845	23%	821	767	-7%	736	831	13%	208	381	83%
9B	Olive Chapel Rd	WB	598	470	-21%	846	971	15%	763	874	15%	318	549	73%
9C	Holly Springs Rd	NB	4,096	3,258	-20%	2,328	2,549	9%	2,993	3,370	13%	964	992	3%
9C	Holly Springs Rd	SB	1,539	1,721	12%	4,030	3,184	-21%	3,352	3,479	4%	1,475	1,881	28%
9C	Bells Lake Rd	NB	1,174	1,654	41%	575	936	63%	767	1,171	53%	257	344	34%
9C	Bells Lake Rd	SB	339	511	51%	1,418	1,770	25%	811	1,194	47%	468	642	37%
9C	Johnson Pond Rd	NB	188	982	423%	1,100	430	-61%	439	537	22%	283	134	-53%
9C	Johnson Pond Rd	SB	1,015	214	-79%	335	1,099	228%	469	429	-9%	175	191	9%
9C	Lake Wheeler Rd	NB	1,592	1,839	16%	672	428	-36%	890	575	-35%	402	270	-33%
9C	Lake Wheeler Rd	SB	601	270	-55%	1,990	1,550	-22%	1,012	658	-35%	543	402	-26%
9C	US 401	NB	5,560	6,000	8%	4,019	4,239	5%	6,104	5,915	-3%	2,150	2,282	6%
9C	US 401	SB	2,075	2,957	43%	2,731	5,633	106%	2,624	4,278	63%	768	1,483	93%
9C	Fanny Brown Rd	NB	926	1,724	86%	450	940	109%	611	1,137	86%	259	384	48%
9C	Fanny Brown Rd	SB	215	483	124%	1,036	1,577	52%	728	1,165	60%	518	662	28%
9C	Old Stage Rd	NB	727	1,172	61%	2,136	1,263	-41%	1,283	1,214	-5%	797	657	-18%
9C	Old Stage Rd	SB	1,946	1,115	-43%	1,068	1,425	33%	1,298	1,012	-22%	554	596	8%
9C	Sauls Rd	NB	997	441	-56%	492	408	-17%	579	482	-17%	214	170	-20%
9C	Sauls Rd	SB	305	286	-6%	890	488	-45%	608	455	-25%	377	229	-39%
9C	Jordan Rd	NB	453	491	8%	211	356	68%	246	423	72%	102	141	38%
9C	Jordan Rd	SB	125	187	50%	449	590	31%	275	396	44%	182	205	13%
9C	NC 50	NB	2,792	2,410	-14%	1,956	2,095	7%	2,211	2,448	11%	971	904	-7%
9C	NC 50	SB	1,154	1,309	13%	3,326	2,518	-24%	2,479	2,289	-8%	1,286	1,213	-6%
9D	White Oak Rd	NB	3,267	2,288	-30%	966	1,160	20%	1,206	1,434	19%	527	411	-22%
9D	White Oak Rd	SB	444	585	32%	2,478	2,352	-5%	1,380	1,164	-16%	798	664	-17%
9D	Rock Quarry Road	EB	377	743	97%	1,217	1,732	42%	650	1,205	85%	368	582	58%
9D	Rock Quarry Road	WB	1,050	1,525	45%	594	1,094	84%	623	1,199	92%	306	388	27%
9D	Poole Rd (NC 2555)	EB	692	574	-17%	2,272	2,389	5%	1,199	1,178	-2%	779	750	-4%
9D	Poole Rd (NC 2555)	WB	2,383	2,415	1%	950	1,103	16%	1,113	1,247	12%	551	513	-7%
9E	I-40	EB	12,366	13,777	11%	16,295	18,220	12%	16,900	17,997	6%	9,374	9,476	1%
9E	I-40	WB	15,548	18,022	16%	12,699	14,365	13%	15,875	16,986	7%	8,079	8,444	5%
9F	NC 55	NB	8,832	8,724	-1%	4,508	4,922	9%	6,355	6,615	4%	2,740	3,093	13%
9F	NC 55	SB	3,588	2,979	-17%	8,622	7,496	-13%	6,792	5,897	-13%	3,522	3,450	-2%
9F	Main St	NB	2,412	2,269	-6%	1,981	1,928	-3%	2,086	2,458	18%	1,022	960	-6%
9F	Main St	SB	1,194	1,291	8%	3,241	2,177	-33%	1,999	2,085	4%	1,152	1,174	2%
9F	US 1	NB	12,954	13,138	1%	10,547	10,656	1%	11,815	12,316	4%	4,754	4,922	4%
9F	US 1	SB	7,631	7,259	-5%	12,719	12,217	-4%	11,314	11,033	-2%	7,446	7,220	-3%
9F	US 64	NB	6,844	5,632	-18%	7,849	7,138	-9%	9,217	8,615	-7%	3,478	3,748	8%
9F	US 64	SB	6,957	7,008	1%	7,593	6,579	-13%	9,264	8,811	-5%	3,081	3,245	5%
9F	NC 55	NB	4,693	3,747	-20%	4,640	3,857	-17%	5,224	4,772	-9%	2,261	2,319	3%
9F	NC 55	SB	3,289	3,374	3%	5,109	4,238	-17%	5,212	4,713	-10%	1,928	1,884	-2%
9F	Davis Dr.	NB	2,184	2,420	11%	2,041	2,380	17%	1,964	3,009	53%	892	1,333	49%
9F	Davis Dr.	SB	1,567	2,034	30%	2,856	2,641	-8%	2,250	3,025	34%	875	1,440	65%
9F	Davis Dr.	NB	5,943	4,729	-20%	2,306	2,454	6%	3,270	3,096	-5%	1,268	1,277	1%
9F	Davis Dr.	SB	1,710	2,084	22%	6,330	4,462	-30%	3,600	3,454	-4%	1,296	1,671	29%
9F	Church St	NB	805	672	-17%	1,372	1,167	-15%	1,012	1,023	1%	748	640	-14%
9F	Church St	SB	1,170	1,113	-5%	1,942	929	-52%	1,104	997	-10%	451	488	8%
9F	NC 54	NB	2,654	2,811	6%	2,342	2,763	18%	3,242	3,558	10%	1,306	1,825	40%
9F	NC 54	SB	1,685	2,233	33%	2,239	2,740	22%	2,824	3,486	23%	1,381	1,969	43%
1	Total		8,310	8,696	5%	10,056	10,115	1%	7,648	9,254	21%	4,933	4,967	1%
2	Total		42,761	44,769	5%	53,379	52,925	-1%	55,148	57,392	4%	32,753	32,409	-1%
3	Total		12,723	12,176	-4%	16,340	15,008	-8%	14,728	14,616	-1%	6,578	6,712	2%
4	Total		16,403	16,547	1%	18,612	17,882	-4%	17,977	16,905	-6%	7,975	7,862	-1%
5	Total		12,824	13,623	6%	15,607	15,551	0%	14,056	14,732	5%	5,600	6,086	9%
6	Total		28,627	26,775	-6%	32,301	29,977	-7%	29,097	28,468	-2%	14,028	14,039	0%
7	Total		32,817	32,755	0%	40,330	37,153	-8%	30,342	33,461	10%	13,490	14,495	7%
8	Total		35,538	34,940	-2%	38,374	37,993	-1%	32,175	32,150	0%	12,624	13,874	10%
9	Total		248,364	235,448	-5%	278,612	260,104	-7%	276,643	273,945	-1%	126,253	131,643	4%

Source: Counts conducted by CDM Smith in 2016 and 2017 and travel demand model output.

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APPENDIX C

GEC REPORT

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NORTH CAROLINA
Turnpike Authority

Complete 540
Phase I
Engineering Report

NORTH CAROLINA
PROFESSIONAL
SEAL
26972
ENGINEER
JENNIFER H. HARRIS

9·26·2019

September 26, 2019

Prepared by:

HNTB

North Carolina Turnpike Authority

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North Carolina Turnpike Authority
Complete 540 – Phase I
Engineering Report

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LIST OF EXHIBITS

North Carolina Turnpike Authority
Complete 540 – Phase I Engineering Report

EXECUTIVE SUMMARY

Introduction

This report documents and describes the location, preliminary engineering design features, total project cost estimate, projected operation and maintenance expenses, projected renewal and replacement expenses, and the Design-Build procurement schedule for Phase I of the proposed Complete 540 project (the "Project"). The project is a new location All-Electronic Toll (AET) facility that will be funded, constructed, operated and maintained by the North Carolina Turnpike Authority (NCTA), within the North Carolina Department of Transportation (NCDOT).

NCTA was created from a need to implement alternative financing to provide for key transportation projects during a time of rapid growth, dwindling resources and escalating construction costs. In October 2002, North Carolina Session Law 2002-133 created NCTA. Since then, legislation has been enacted to further define the powers of NCTA. NCTA is currently authorized to study, plan, develop, and undertake preliminary design work on Turnpike Projects. At the conclusion of these activities, NCTA is authorized to design, establish, finance, purchase, construct, operate and maintain up to eleven projects.

Functional design plans have been developed and Complete 540 - Phase I has been scheduled for construction by NCTA as the third constructed turnpike project by the Authority. The first project, which was substantially completed and opened to traffic in December 2012, is the Triangle Expressway located in Wake and Durham Counties. The second project, which opened in November 2018, is the Monroe Expressway located in Mecklenburg and Union Counties. Complete 540 - Phase I will be an extension of the first project constructed, the Triangle Expressway.

The funding sources identified to finance the design and construction of the Complete 540 project are: toll revenue bonds, GARVEEs, State Transportation Improvement Program (STIP) funds and a TIFIA loan. The "Draft North Carolina Triangle Expressway and Complete 540 Segments 1 and 2 Traffic and Revenue Study," completed by CDM Smith has been used to quantify the forecasted toll revenue of the Project.

Design and highway construction of the Project will be accomplished through new Design-Build contracts specific for the Project. There are three separate Design-Build contracts for highway construction (including highway, Intelligent Transportation Systems (ITS) and toll gantry infrastructure). Landscaping and toll integration will be accomplished via separate contracts. The Design-Build contracts require guaranteed prices and completion schedules as part of the process, thus allowing the Project to be completed more quickly than a traditionally funded and implemented NCDOT project.

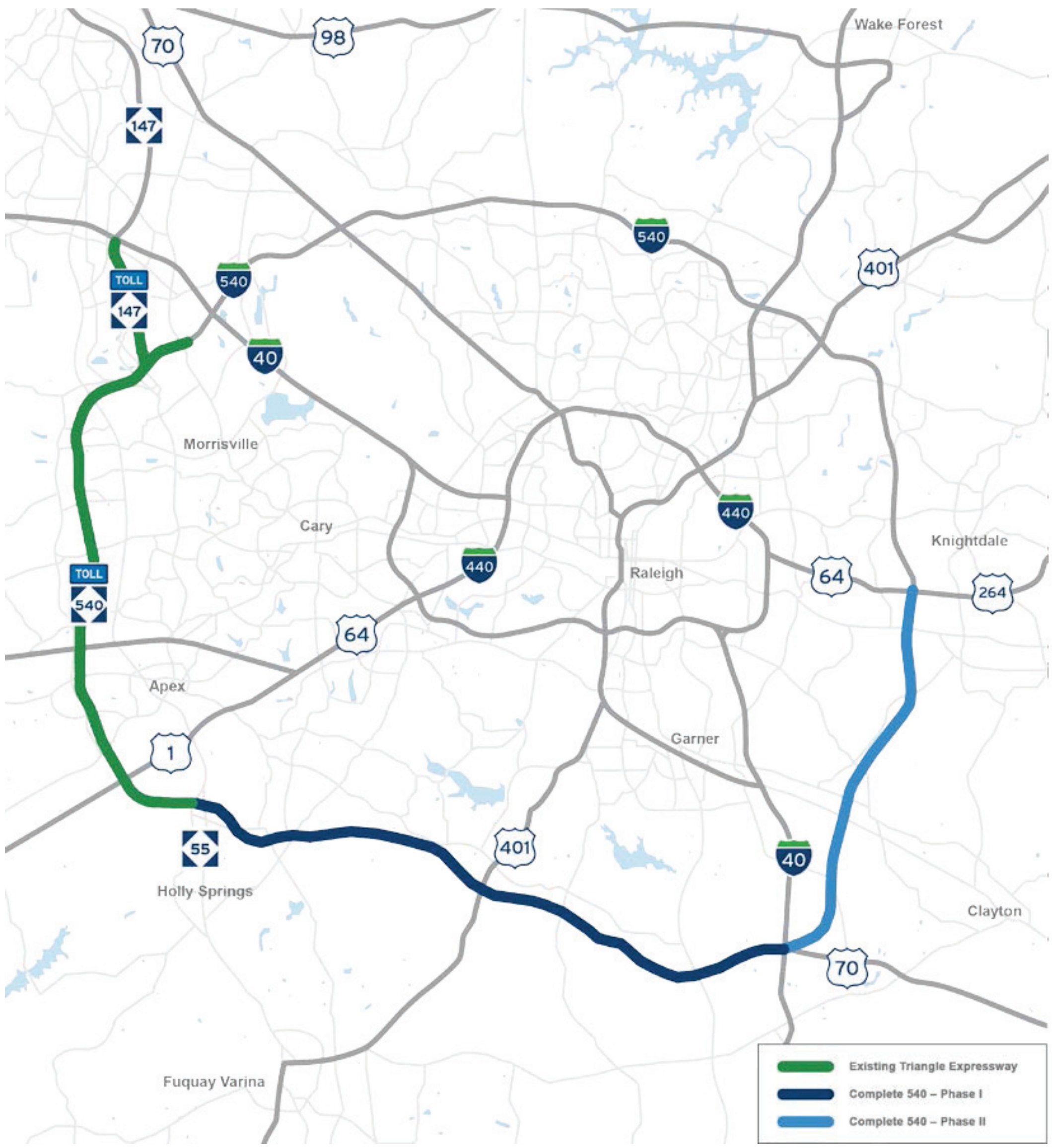
Project Description

Complete 540 is a greenfield project in the greater Raleigh area in North Carolina, that would link the towns of Apex, Cary, Clayton, Garner, Fuquay-Varina, Holly Springs, Knightdale and Raleigh. In addition to connecting these towns and cities, the project is anticipated to ease congestion on area roadways, including I-440, I-40, NC 42, NC 55 and Ten-Ten Road. The Complete 540 project is the extension of the existing Triangle Expressway (Toll NC 540) and will provide the final segments of the 540 Outer Loop around the greater Raleigh area, from the southern terminus of Triangle Expressway to the US 64/US 264 Bypass (I-87) interchange in Knightdale. Phase I of proposed Complete 540 is being implemented now (the "Project"); Phase II is planned as a future tolled facility to complete the Outer Loop.

Complete 540, like the Triangle Expressway, will be constructed as a six-lane controlled-access toll facility. Tolls will be collected by an AET collection system and there will be no cash toll booths.

The Project is comprised of three separate projects as stated in the NCDOT's State Transportation Improvement Program (STIP):

- STIP project R-2721A: from NC 55 Bypass to east of Holly Springs Road;
- STIP Project R-2721B: from east of Holly Springs Road to east of US 401; and
- STIP project R-2828: from east of US 401 to I-40.



Project Cost Estimate

The projected capital cost of the Project are listed below. The table includes actual Design-Build Contract values, other project cost categories, as well as reasonable project contingencies.

Phase I Capital Cost Breakdown

Project Element	R-2721A Cost ($M)	R-2721B Cost ($M)	R-2828 Cost ($M)	Total Cost ($M)
Highway Design-Build Contract	$ 183.76	$ 161.14	$ 406.12	$ 751.02
Third Party Delay Contingency	$ 13.17	$ 11.55	$ 29.11	$ 53.83
Change Order Contingency	$ 12.83	$ 12.53	$ 28.47	$ 53.83
Construction Engr. & Inspection	$ 11.93	$ 10.38	$ 26.06	$ 48.37
Incentives	$ 0.54	$ 0.72	$ 2.25	$ 3.51
Landscaping	$ 2.67	$ 2.32	$ 5.84	$ 10.83
Right of Way	$ 54.89	$ 79.08	$ 71.62	$ 205.59
Utilities	$ 8.39	$ 26.41	$ 24.40	$ 59.20
Toll Integration Vendors	$ 3.96	$ 6.98	$ 10.30	$ 21.24
Agency Labor and Administration	$ 3.37	$ 3.29	$ 7.33	$ 14.00
Administrative Contingency	$ 8.05	$ 8.37	$ 16.81	$ 33.22
Diesel & AC Price Adj. Reserve Fund	$ 3.90	$ 2.20	$ 3.30	$ 9.40
Mussel Prop. & Env. Prot. Measures	$ -	$ -	$ 31.40	$ 31.40
Total Cost ($M)	**$ 307.46**	**$ 324.97**	**$ 663.01**	**$ 1,295.44**

North Carolina Turnpike Authority
Complete 540 - Phase I Engineering Report

INTRODUCTION

By statute, the North Carolina Turnpike Authority (NCTA) is authorized to study, plan, finance, develop and undertake design work on toll facilities in the State of North Carolina. The state's first modern toll road, the Triangle Expressway in Wake and Durham Counties, was substantially completed in 2012. The Monroe Expressway was the second turnpike project to be constructed in North Carolina; the road was substantially completed and opened to traffic in November 2018. The proposed Complete 540 project is an extension of the Triangle Expressway.

The Complete 540 project is a proposed greenfield project in the greater Raleigh area in North Carolina, that would link the towns of Apex, Cary, Clayton, Garner, Fuquay-Varina, Holly Springs, Knightdale and Raleigh. In addition to connecting these towns and cities, the Project is anticipated to ease congestion on area roadways, including I-440, I-40, NC 42, NC 55 and Ten-Ten Road. Complete 540 is the extension of the existing Triangle Expressway (Toll NC 540) and will provide the final segments of the 540 Outer Loop around the greater Raleigh area, from the southern terminus of Triangle Expressway to the US 64/US 264 Bypass (I-87) interchange in Knightdale. The new facility is planned as a six-lane, controlled-access toll facility with a 70-foot wide median and a posted speed limit of 70 miles per hour. Tolls will be collected by an All-Electronic Toll (AET) system and there will be no cash toll booths. The Complete 540 project, sometimes referred to as the Triangle Expressway Southeast Extension, is comprised of four separate segments as stated in the NCDOT State Transportation Improvement Program (STIP) and as shown in **Exhibit 1**. Complete 540 is scheduled to be constructed in two phases. Phase I contains three segments (R-2721A, R-2721B, and R-2828) that are currently programmed in the State Transportation Improvement Program (STIP); Phase II construction (R-2829) is programmed for 2029. Phase I construction will include a new interchange with I-40 and allow the southern portion of the Expressway to open to traffic without Phase II being completed. Projects R-2721A, R-2721B and R-2828 will be delivered as Design-Build projects. All three projects are heretofore collectively referred to as the "Project."

The Complete 540 segments are described more fully as follows:

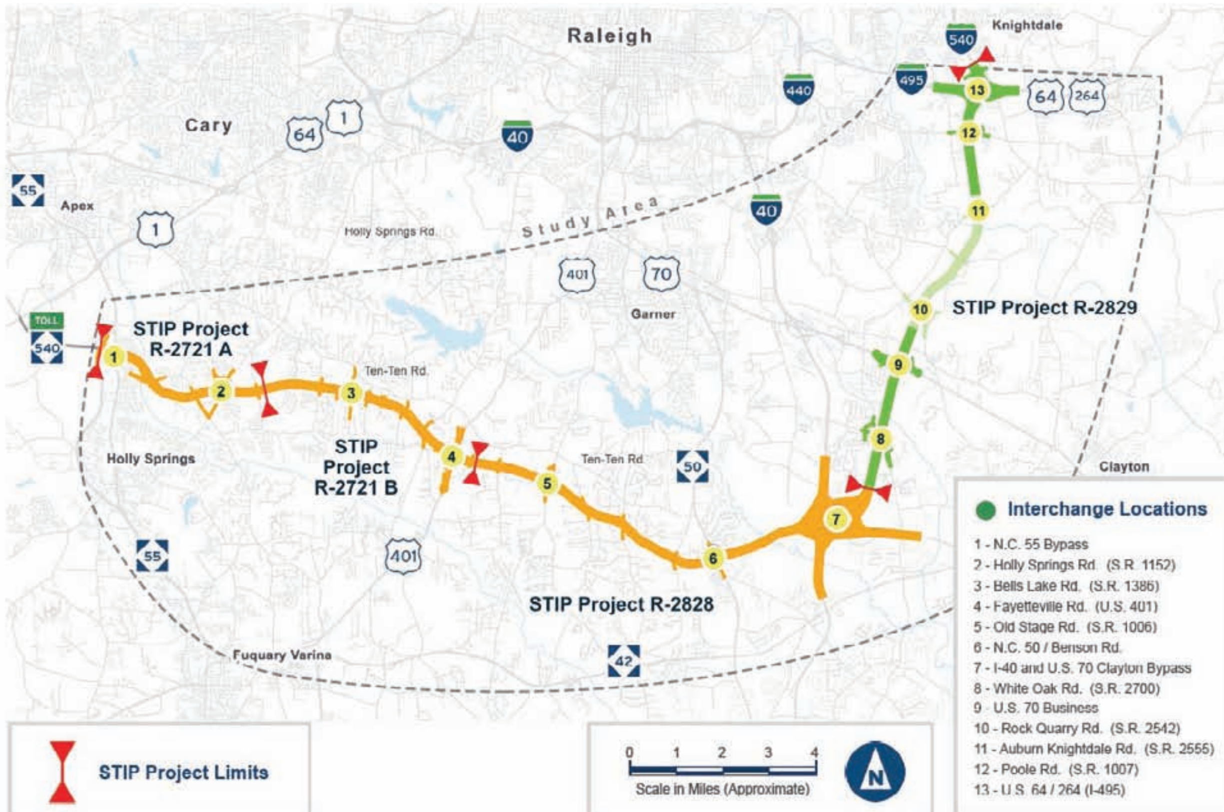
Phase I (Construction as described in this Engineering Report):

- STIP Project R-2721A: from NC 55 Bypass to east of Holly Springs Road;
- STIP Project R-2721B: from east of Holly Springs Road to east of US 401; and
- STIP Project R-2828: from east of US 401 to I-40.

Phase II:

- STIP Project R-2829: from I-40 to US 64/US 264 Bypass (I-87)

Exhibit 1: Complete 540 Project Location Map



North Carolina Turnpike Authority Organization

In October 2002, legislation was passed authorizing the creation of the North Carolina Turnpike Authority (NCTA, or Authority) with the purpose to study, design, plan, construct, own, finance and operate a system of toll roads, bridges, and/or tunnels supplementing the traditional non-toll transportation system serving the citizens of North Carolina (NC General Statute [GS] §136-89.182). By action of the North Carolina General Assembly, effective July 27, 2009, the Authority became a part of the North Carolina Department of Transportation (NCDOT, or Department), a public agency of the State of North Carolina.

NCTA is governed by a nine-member Authority Board. The General Assembly appoints four representatives: two based upon the recommendation of the President Pro Tempore of the Senate, and two based upon the recommendation of the Speaker of the House of Representatives. The remaining members consist of the Secretary of Transportation, and four members appointed by the Governor. The following powers have been delegated by the Secretary to the Authority Board (see **Appendix A**):

- Fix, revise, charge, and collect tolls and fees for Turnpike Projects pursuant to NCGS §136-89.183 (a)(5);
- Issue bonds or notes of NCTA pursuant to NCGS §136-89.183(a)(6);
- Invest the proceeds of bonds or notes of NCTA that are pending disbursement or other idle funds of the Authority in any investment authorized by NCGS §159-30 pursuant to NCGS §136-89.183 (6a); and,

- Exercise such additional powers as shall be necessary for the financing of Turnpike Projects through compliance with the associated bond documentation, including complying with any arbitrage, rebate or other federal tax filings and providing for secondary market disclosure; provided any such additional power may be subjected to conditions, including the involvement and participation of other portions of the North Carolina Department of Transportation, which are stated within the bond documentation and executed by the Secretary acting as the Secretary.

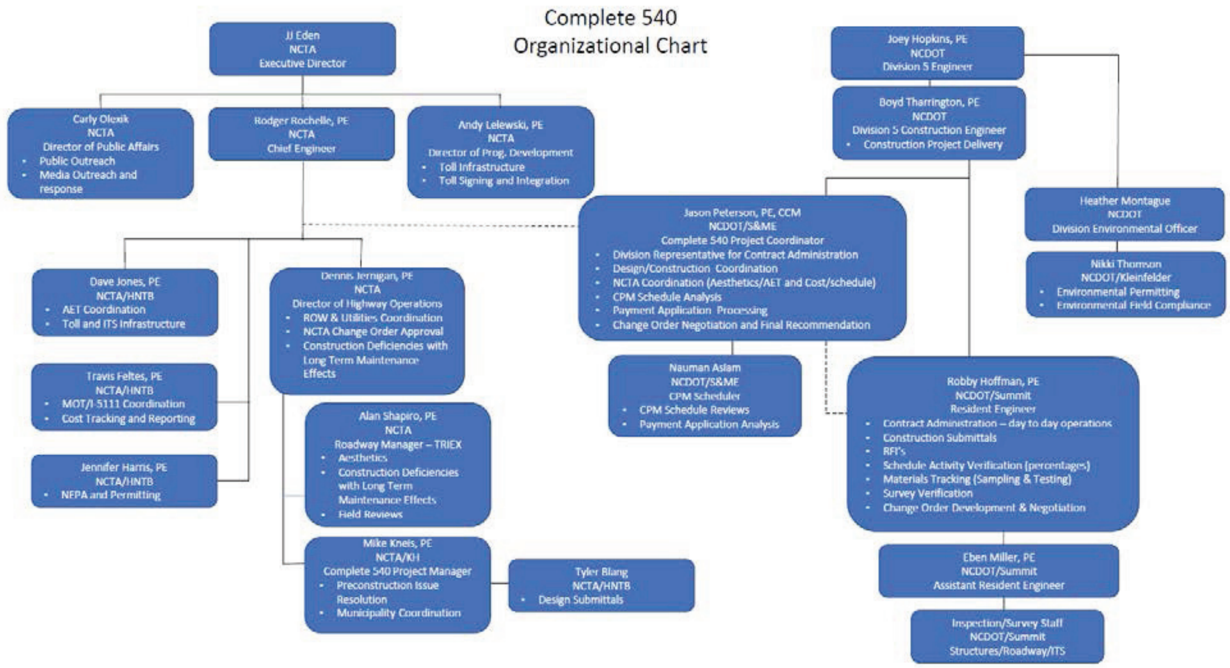
The Authority Board selects the Chair. MG(R) James H. Trogdon, III, P.E. is the Secretary of Transportation, a position to which he was appointed to by Governor Roy Cooper, is the current Chair.

The following describes the key leadership roles and responsibilities of the NCTA organization.

- The NCDOT Secretary of Transportation is responsible for the oversight and management of NCDOT operations and currently serves as the chair of the NCTA Board of Directors.
- The NCTA Executive Director reports directly to the NCDOT Secretary of Transportation and is charged with the overall operations of the North Carolina Turnpike Authority.
- The NCTA Chief Engineer reports to NCTA Executive Director and is responsible for the oversight of all project delivery, and operations and maintenance (O&M) of turnpike projects.
- The NCTA Director of Public Affairs manages community outreach efforts in concert with the NCDOT Communications office.
- The NCTA Chief Technology Officer oversees the day to day operations of the roadside toll collection system and the back-office system.
- The NCTA Director of Toll Operations oversees the day to day operations of the customer service center.
- The NCTA Director of Finance and Budget is responsible for all NCTA financial activities.

The following exhibit displays the organizational structure for the Project team, including both NCTA and NCDOT staff.

Exhibit 2: Organizational Chart



Management and Administration

Management and administrative policies and procedures have been established to ensure that NCTA operations are carried out in accordance with State law and the requirements of the trust indenture securing the bond financing. NCTA staff is ultimately responsible for the operation of all NCTA facilities, including Complete 540. Each aspect of operations, including administration, finance, auditing and accounting, purchasing, toll collection, enforcement, safety and security, and maintenance will have its own policies and procedures.

In order for a project to be considered for development as a toll facility, the legislation requires that the project be included in a locally adopted comprehensive transportation plan and be shown in the current NCDOT State Transportation Improvement Program (STIP) (GS§ 136-89.183[a][2]). Any toll road developed in the state must have a free alternate route (GS §136-89.197). All revenues from tolls are to be used to cover the cost of financing, operating and maintaining the road. Current legislation requires that when the toll revenue backed debt is retired, and financial obligations of the road are met, then tolls will be removed (GS §136-89.196).

The rapid growth in the greater Raleigh area and the State of North Carolina has led to challenges in the funding allocation, development and implementation of transportation projects due to the many needs and competing priorities. Enacted in 2013, the Strategic Transportation Investments (STI) law (North Carolina General Statute §136-189.10) allows NCDOT to use its funding more efficiently and effectively to improve the state's infrastructure. STI establishes a Strategic Mobility Formula, which allocates available revenues based on data-driven scoring and local input. It is used to develop NCDOT's State Transportation Improvement Program, which identifies the transportation projects, including NCTA projects, that will receive funding during a specified 10-year period. For more information on

Strategic Transportation Investments and the Strategic Mobility Formula, refer to NCDOT's STI webpage at:

https://www.ncdot.gov/strategictransportationinvestments/.

PROJECT HISTORY

Complete 540

A summary of the history of the Complete 540 project planning efforts is located in **Exhibit 3.**

Exhibit 3: Project History

Date	Milestone
June 2018	NCTA received the Record of Decision from the Federal Highway Administration (FHWA), signifying final federal approval of the Complete 540 route.
February 2018	NCTA and the NCDOT held a series of public meetings to provide information on Complete 540, share the preliminary design and gather feedback from the public.
December 2017	FHWA approved the Final Environmental Impact Statement that was prepared for the Complete 540 project.
April 2016	NCDOT selected Detailed Study Alternative 2 (orange-green-mint-green route) as the Preferred Alternative for the Complete 540 project.
February 2016	NCDOT recommended Detailed Study Alternative 2 as the Preferred Alternative for the Complete 540 project.
December 2015	NCDOT held public meetings and a public hearing regarding the Draft Environmental Statement.
November 2015	The Complete 540 Draft Environmental Impact Statement was published and followed by a public comment period (Nov. 9 until Jan. 8).
2014	Various engineering, planning and environmental studies were completed for the Detailed Study Alternatives.

December 2013	NCDOT announced the alternatives that it would study in detail in the Draft Environmental Impact Statement. These alternatives are known as the Detailed Study Alternatives.
October 2013	NCDOT presented all alternatives to the public to review and comment on during a series of public meetings. Based on the comments received from the public, state and federal agencies as well as the Capital Area Metropolitan Planning Organization, NCDOT decided to study all of the recommended alternatives in detail. These alternatives are known as the Detailed Study Alternatives and are shown on the Detailed Study Alternatives Map.
September 2013	NCDOT published the Draft Alternatives Development and Analysis Report, which included a list of recommended Detailed Study Alternatives.
July 2013	NCDOT resumed all environmental study activities for the Complete 540 project.
June 2013	North Carolina General Assembly enacted House Bill 10 (Session Law 2013-94) and House Bill 817 (Session Law 2013-183) to remove previous restrictions on studying the Red Corridor. These bills were signed into law, allowing NCDOT to resume the environmental study.
December 2012	FHWA and The U.S. Army Corps of Engineers (USACE) issued a letter requiring full evaluation of the Red Corridor to remain eligible for federal funds and to meet the requirements of the National Environmental Policy Act and Section 404 of the Clean Water Act. The Complete 540 project could not be built without meeting these requirements.
March 2011	North Carolina Session Law 2011-7 restricted NCDOT's ability to evaluate the Red Corridor.
Late 2009	Environmental study began.
1996-1997	In accordance with the North Carolina Transportation Corridor Official Map Act, NCDOT established a protected corridor for the portion of 540 between N.C. 55 Bypass in Apex and I-40 near the Johnston-Wake county line. A protected corridor preserves the location of a new road from encroaching development.

Complete 540 Studies

A Draft Environmental Impact Statement (EIS) was prepared and approved in November 2015. The document was circulated for review and comment by environmental resource and regulatory agencies and the public. In addition, Corridor/Design Public Hearings were held in December 2015. Comments on the Draft EIS and public hearings were accepted through January 2016. The majority of public comments received during the comment period supported the Complete 540 project.

Based on public support, and with the concurrence of the environmental agencies, NCTA selected the Preferred Alternative for the Complete 540 project in April 2016. A Final EIS was prepared for the Preferred Alternative and approved in December 2017, followed by FHWA's issuance of the Record of Decision in June 2018.

PROJECT DESCRIPTION

The proposed Complete 540 project is a greenfield project in the greater Raleigh area in North Carolina, that would link the towns of Apex, Cary, Clayton, Garner, Fuquay-Varina, Holly Springs, Knightdale and Raleigh. In addition to connecting these towns and cities, the Complete 540 project is anticipated to ease congestion on area roadways, including I-440, I-40, NC 42, NC 55 and Ten-Ten Road. The Complete 540 project is the extension of the existing Triangle Expressway (Toll NC 540) and will provide the final segments of the 540 Outer Loop around the greater Raleigh area, from the southern terminus of Triangle Expressway to the US 64/US 264 Bypass (I-87) interchange in Knightdale. Phase I of Complete 540 is being implemented now and is referred to throughout this report as the "Project"; Phase II is planned as a future tolled facility to complete the Outer Loop.

Complete 540, like the Triangle Expressway, will be constructed as a six-lane controlled-access toll facility. Tolls will be collected by an AET collection system and there will be no cash toll booths.

The Complete 540 - Phase I Project is comprised of three separate projects as stated in the NCDOT's State Transportation Improvement Program (STIP):

- STIP project R-2721A: from NC 55 Bypass to east of Holly Springs Road;
- STIP Project R-2721B: from east of Holly Springs Road to east of US 401; and
- STIP project R-2828: from east of US 401 to I-40.

The proposed cross section on new alignment will consist of six mainline travel lanes with inside and outside shoulders divided by a depressed grass median. Mainline travel lanes will be 12' in width, with 14' minimum inside and outside shoulders (12' Paved). The median is 70' in width and will be capable of accommodating one additional lane in each direction if deemed prudent at some later date.

The Phase I of the Complete 540 project will have controlled access interchanges with the following roads:

- NC 55 Bypass
- Holly Springs Road
- Bells Lake Road
- Fayetteville Road (US 401)
- Old Stage Road
- NC 50
- US 70/I-40

Grade separations will be provided between the toll road and several local roads and streams, as well as an existing mainline Norfolk Southern Railway Company (NSRR) rail line. The construction of the Project is expected to be typical for the area with structures limited to normal grade separations and flyovers.

Phase I of the Compete 540 project will contain six mainline toll collection zones:

- Between existing NC 55 Bypass interchange and Holly Springs Road interchange (R-2721A),
- Between Holly Springs Road interchange and Bells Lake Road interchange (R-2721B),
- Between Bells Lake Road interchange and US 401 interchange (R-2721B),
- Between US 401 interchange and Old Stage Road interchange (R-2828),
- Between Old Stage Road interchange and NC 50 interchange (R-2828), and
- Between NC 50 interchange and existing I-40/US-70 Bypass interchange (R-2828).

Project Implementation

The construction of Phase I of Complete 540 will be completed using the Design-Build method of contracting. A summary of the procurement timeline is listed in **Exhibit 4**.

Exhibit 4: Procurement Schedule

	R-2721A	R-2721B	R-2828
RFQ Advertisement	September 4, 2018	July 2, 2018	April 16, 2018
Short-Listed Teams Announced	October 18, 2018	August 14, 2018	May 24, 2018
Price Proposals Opened	April 16, 2019	February 19, 2019	November 20, 2018

A summary of the price proposals and technical scores is shown in **Exhibit 5**. The results of the best value procurements resulted in the following joint ventures being awarded the contracts.

- R-2721A: Flatiron-Branch Civil, A Joint Venture with the lead design firm of Gannett Fleming, Inc.
- R-2721B: Flatiron-Branch Civil, A Joint Venture with the lead design firm of HDR Engineering, Inc. of the Carolinas
- R-2828: The Lane-Blythe Construction Joint Venture with the lead design firm of WSP USA Inc.

Exhibit 5: Quality Adjusted Price Rankings for Highway Design-Build Contracts

R-2828

Vendor	Technical Score	Quality Credit (%)	Price Proposal ($)	Quality Value ($)	Adjusted Price ($)
Archer/United	92.3	18.582	$402,282,800.00	$74,752,189.90	$327,530,610.10
Lane/Blythe	96.4	22.002	$403,200,000.00	$88,712,064.00	$314,487,936.00
Zachry/Wooten	86.7	13.918	$399,348,360.00	$55,581,304.74	$343,767,055.26
ENGINEER'S ESTIMATE			$355,208,000.00		

R-2721B

Vendor	Technical Score	Quality Credit (%)	Price Proposal ($)	Quality Value ($)	Adjusted Price ($)
Archer/United	94.4	16.268	$181,937,000.00	$29,597,511.16	$152,339,488.84
Lane/Blythe	94.5	16.335	$209,350,000.00	$34,197,322.50	$175,152,677.50
Flatiron/Branch	93.4	15.598	$159,983,000.00	$24,954,148.34	$135,028,851.66
Granite/Fred Smith	91.5	14.335	$204,785,000.00	$29,355,929.75	$175,429,070.25
ENGINEER'S ESTIMATE			$220,497,000.00		

R-2721A

Vendor	Technical Score	Quality Credit (%)	Price Proposal ($)	Quality Value ($)	Adjusted Price ($)
Archer/United	96	17.33	$202,470,000.00	$35,088,051.00	$167,381,949.00
Lane/Blythe	94.2	16.134	$206,486,852.00	$33,314,588.70	$173,172,263.30
Flatiron/Branch	95.2	16.802	$183,459,000.00	$30,824,781.18	$152,634,218.82
Granite/Fred Smith	90.9	13.933	$184,085,000.00	$25,648,563.05	$158,436,436.95
ENGINEER'S ESTIMATE			$204,838,000.00		

The following project substantial completion dates were proposed:

- October 21, 2022 was proposed by Flatiron/Branch for R-2721A
- August 29, 2022 was proposed by Flatiron/Branch for R-2721B
- October 24, 2022 was proposed by Lane/Blythe for R-2828

Incentives and disincentives to the selected Design-Build team to meet certain schedule milestones are included in the construction contracts. In the event that substantial completion is achieved prior to the proposed completion dates, and toll collection and enforcement technology is fully implemented, a bonus based on the graduated schedule in **Exhibit 6** will be paid to the respective team. In the event that the substantial completion date is not met, then the Design-Build team will be liable for liquidated damages in the amount of $20,000 per calendar day for each day of delay in reaching this milestone and $5,000 per calendar day for each day of delay in reaching final completion. In the unlikely event that the project does not reach substantial completion by September 1, 2023, the liquidated damages increase to $30,000 per calendar day for each day of delay in reaching this milestone.

Exhibit 6: Substantial Completion Bonus Payment Schedule

	If the difference between the Substantial Completion Date Proposed in the Technical Proposal and the actual date the project is deemed to have achieved Substantial Completion is:	Then the incentive payment for each day of early Substantial Completion will be:	Provided, however that the aggregate incentive paid will not exceed:
R-2721A	1-28 Days	$ 2,000.00	$ 56,000.00
	29 days to 60 days	$ 2,500.00	$ 150,000.00
	61 days to 180 days	$ 3,000.00	$ 540,000.00
R-2721B	1-13 days	$ 2,000.00	$ 26,000.00
	14-28 days	$ 3,000.00	$ 84,000.00
	29 days to 60 days	$ 3,500.00	$ 210,000.00
	61 days to 180 days	$ 4,000.00	$ 720,000.00
R-2828	1-13 days	$ 5,000.00	$ 65,000.00
	14-28 days	$ 7,500.00	$ 210,000.00
	29 days to 60 days	$ 10,000.00	$ 600,000.00
	61 days to 180 days	$ 12,500.00	$ 2,250,000.00

Right-of-way plans were provided to the Design-Build teams for the R-2721A and R-2721B projects. Functional plans were provided to the Design-Build team for the R-2828 project. The contractors are responsible for all final designs of the Project that meet the project criteria and specifications.

NCTA is implementing a comprehensive and proactive Project Management and Compliance Monitoring Plan for the Project, designed to ensure that planning, design, right-of-way acquisition, construction, operation and maintenance of the Project meet all applicable federal, state and local laws and regulations (including the requirements generated by the NEPA process, as well as the design and construction standards and specifications). NCTA will continue to implement and maintain this comprehensive and proactive Project Management and Compliance Monitoring Plan using several procedures, policies and oversight measures. The Plan includes the following concepts:

- Planning

  The initial planning completed for the Project was conducted by NCTA with support from other units of NCDOT. The regional FHWA office has been heavily involved in these efforts. Representatives from the regional FHWA office have attended all formal project public meetings and hearings. Frequent discussions have also been held with FHWA to ensure project planning and environmental documents are in compliance with applicable federal statutes and regulations.

- Preliminary/Right-of-Way Design

  For R-2721A and R-2721B, preliminary designs and right-of-way plans were completed by an external consultant contracted with NCTA. For R-2828, the preliminary designs and right-of-way plans will be prepared by the Design-Build team's lead engineering firm, WSP USA Inc. Enhancements to the overall design, full definition of the right-of-way requirements, utility designs, and coordination with the Design-Build teams will continue throughout the development of right-of-way plans and construction. NCTA is coordinating closely with NCDOT's division personnel and design groups.

- Final Design

  Final design will be completed by Gannett Fleming, Inc. for R-2721A, HDR Engineering, Inc. of the Carolinas for R-2721B, and WSP USA Inc. for R-2828 as part of the design scope of the Design-Build contracts. As part of the management process, NCTA will conduct frequent "over-the-shoulder" design reviews and audits of the Project with FHWA and other units of NCDOT to ensure that the Project is in compliance with applicable design criteria from the earliest stages of design. NCTA will utilize other units of NCDOT and external consultants as necessary to provide direct oversight of the Design-Build team's design activities. The Design-Build teams will be required to complete and document an extensive design review program. NCTA will be responsible for ensuring proper interagency coordination and oversight of these functions.

- Right-of-Way Acquisition

  Preliminary right-of-way plans for R-2721A and R-2721B were completed by an external consultant contracted with NCTA. Preliminary right-of-way limits have been established based on construction limits from functional roadway design plans for the R-2828 project. These limits are subject to change based on the final design plans prepared by the Design-Build teams; however, the teams have been encouraged to minimize the right of way and easements required for construction.

  Approximately $60 million of advanced STIP funding is currently available for early right-of-way acquisition activities prior to financial close. NCDOT/NCTA is acquiring parcels that are clearly impacted by the Project to the extent that the entire parcels will be required regardless of the status of final design plans.

  The remainder of the right of way will be acquired during the Design-Build phase. NCDOT has the statutory authority to acquire land, real estate easements, and other interests in real estate by negotiated purchase and by eminent domain for construction, operation, and maintenance of the facility.

  NCDOT/NCTA has selected two professional services firms to handle the right-of-way acquisition process on their behalf for R-2721A and R-2721B. The two firms and their sections include:

  - THC Inc.: R-2721A: NC 55 Bypass to east of Holly Springs Road.
  - Vistibution, LLC: R-2721B: East of Holly Springs Road to east of US 401.

  The Design-Build team for R-2828 is responsible for right-of-way acquisition on R-2828 and has a right-of-way firm, American Acquisitions Group, on their team.

  Each of the firms have extensive experience in the field of right-of-way acquisition, relocations, and related services and will adhere to the provisions of the Uniform Relocation and Real Property Acquisition Act of 1970, as well as all appropriate state and federal guidelines.

- <u>Construction Oversight and QA/QC Testing</u>

  NCDOT has hired the firm S&ME, Inc. to be an extension of the Division 5 staff and Division 5 Construction Engineer. S&ME, Inc. will be directly responsible for construction management/construction oversight of the Project which includes overseeing the Construction Engineering and Inspection (CEI) firm. Summit Design and Engineering Services, PLLC was hired as the CEI firm. The activities of the CEI firm will include inspection, erosion control inspection, materials sampling and testing, surveying grade verification, documentation of pay quantities, and claims avoidance. The Division 5 Construction Engineer will be responsible for overseeing these contracts. The S&ME, Inc. project manager was the NCTA Resident Engineer for the construction of the existing Triangle Expressway.

- <u>Environmental and Permit Monitoring</u>

  NCTA will require the selected Design-Build teams to procure an independent consultant to provide impartial environmental and permit monitoring services in conjunction with the Project. This will include the monitoring of items during each phase of the construction, including construction runoff water quality device inspections, hazardous material spill reporting and response, compliance with US Army Corps of Engineers Section 404 permit requirements and NCDEQ-DWR 401 permit requirements, and notification of archaeological discoveries. NCTA will designate an internal environmental coordinator to review and supervise this monitoring program. NCDOT will assist with erosion and sedimentation compliance during design reviews and during construction.

- <u>Toll Integration</u>

  In order to enable tolling of Complete 540, NCTA recently procured the Roadside Toll Collection System (RTCS) and will amend existing contracts for the Back-Office System (BOS), Electronic Toll Collection System (ETCS), and Customer Service Center Operations (OPS).

  Since opening the Triangle Expressway, NCTA has recently procured new and additional toll integration and toll collection services to adapt to changes in technology and to prepare for program expansion (including the extension of the Triangle Expressway). The toll implementation cost estimates for Complete 540 were developed based, impart, on the actual contract costs for the Triangle Expressway.

  In early October 2018, NCTA awarded a competitively-bid contract for the Complete 540 RTCS to Kapsch TrafficCom, USA (Kapsch). Kapsch is responsible for the design, development, installation and maintenance of a fully-automated toll collection system.

- Customer Service and Public Outreach

  NCTA has customer service and public outreach staff responsible for supporting the NC Quick Pass transponder-based program and for usage of the state's toll road system. The customer service and public outreach initiatives for Complete 540 will mirror that of the Triangle Expressway and the Monroe Expressway. These initiatives consist of outreach programs to local businesses, creative services, advertising, branding, as well as sales and other promotional activities. The outreach has and will continue to include meetings with municipalities, neighborhood and community groups, and other stakeholders.

- Other

  To date, NCTA has had frequent internal and external coordination meetings with key project stakeholders and team members to ensure that all potential problem areas are identified and resolved as early as possible.

  The Design-Build teams will be required to hold periodic progress meetings and submit monthly progress/status reports to NCTA. These efforts will be maintained throughout the duration of the Project to ensure advanced notice of potential issues and early identification of related solutions.

  NCTA will encourage local FHWA participation throughout development of the Project. This intention to work closely with local and national FHWA personnel is consistent with project development to date, which has benefited significantly by local FHWA input. To affect the desired FHWA involvement, NCTA plans to develop a regular meeting schedule with the local FHWA officials, as well as establish the reporting process in a format acceptable to FHWA.

Design Details

Roadway

The design criteria for the Complete 540 project are consistent with the current practices and standards of NCDOT and the American Association of State Highway and Transportation Officials (AASHTO). The criteria for the geometric design are presented in summary form in **Appendix B**. Design criteria and typical sections were established for the preliminary engineering designs based on existing (2018) and projected (2040) traffic forecasts and the long-range vision for the NC 540 corridor as defined by the NC Strategic Highway Corridor program and the NC Intrastate Corridor System. Future traffic projections for the facility are based on a design year of 2040 and assume the facility is tolled. Design guidelines were based on desirable roadway standards from latest version of AASHTO's *A Policy on Geometric Design of Highways and Streets*, the *NCDOT Roadway Design Manual* and the *NCDOT Roadway Standard Drawings*.

The typical roadway section for NC 540 will be three 12' lanes with a 70' median including 12' median paved shoulders and 14' outside shoulders (12' paved). In areas where ramps are present, auxiliary lanes are added where necessary to provide adequate distance to allow vehicles to merge into traffic. The right of way required for this section will be generally 350 feet. The typical section is depicted in **Appendix C**.

The design speed for the tolled highway is 75 miles per hour, which will accommodate a posted speed limit of 70 miles per hour.

The design and construction of all local cross streets (-Y-Lines), ramps, service roads and cul-de-sacs, widening and improvements will be of sufficient length to tie to existing facilities based upon the current guidelines and standards. The -Y-Lines will be designed for the appropriate speed based upon the functional classification and for a speed consistent with the currently posted speed limits.

Intelligent Transportation Systems

The Intelligent Transportation Systems (ITS) design elements proposed by the three-highway Design-Build teams will be reviewed by NCTA, the toll integrator, NCDOT ITS Design, and local NCDOT ITS Operations staff to ensure that the design approach accommodates the overall tolls operational scheme and the ITS operational plan for the Raleigh metro area.

It is crucial that ITS video feeds and data are transmitted seamlessly to NCTA, both to the NCTA office in the NCDOT Highway Building, and to the State Transportation Operations Center (STOC) in west Raleigh. It is also crucial to establish a reliable and secure connection to transmit tolls transaction data to the NC Quick Pass customer service center in Morrisville.

The Project will include ITS infrastructure and operational systems to support overall management of traffic flow to assist with timely response to incidents. ITS deployment will complement similar NCDOT activities on interstate highways in the region, the deployment on the existing Triangle Expressway, and will meet or exceed the State's ITS performance requirements. ITS will be constructed by the respective highway Design-Build contractors for each of the three Design-Build projects. The project elements comprising the ITS include:

- A fiber-optic (backbone) network (FON), (approximately 20 miles in length), to provide a redundant communication network for the toll systems and the ITS. The communication network will be configured to connect toll zones, ITS devices and NCTA and NCDOT traffic management centers (TMCs).
- Approximately 42 Microwave Vehicle Detector (MVD) locations on approximately 3/4-mile intervals in each direction on the mainline and one on each ramp directly connecting other facilities to the Expressway.
- Approximately 25 closed-circuit television (CCTV) camera locations with approximately one-mile spacing sufficient to provide full viewing of the Complete 540 mainline and of the crossing roads at interchanges.
- Eight full-color Dynamic Message Sign (DMS) locations in advance of key decision points relative to major cross routes or alternative routes. Five DMS's will be located on toll gantries and three will be on standalone pedestals.
- Infrastructure on interchange ramps and at toll sites to support the deployment of a wrong-way detection and notification system, with the technology provided by the toll system integrator.

Toll Infrastructure

Toll infrastructure is included in the Design-Build lump sum prices of each of the Design-Build contracts, and is comprised of mainline gantry frames, AET space frame foundations and dynamic messaging sign structures. Toll gantries will be designed for six-lane mainline space frames.

Pavement

For each of the three sections, the NCDOT Pavement Management Unit has prepared five 30-year designs to allow maximum flexibility in pavement type selection for the Design-Build teams. These design options include the following pavement types:

- Concrete Pavement with Tied Concrete Shoulders
- Concrete Pavement with Asphalt Shoulders
- Concrete Pavement with Roller Compacted Concrete Shoulders (selected by Lane-Blythe for R-2828)
- Asphalt Pavement, Full Depth Asphalt (selected by Flatiron for R-2721A and R-2721B)
- Asphalt Pavement with Aggregate Base Course

Bridge and Wall Structures

Bridge design and construction criteria will conform to the most current versions of the AASHTO "*Load and Resistance Factor Design (LRFD) Bridge Design Specification*", NCDOT "*Structure Design Manual*" (including policy memos) and "*NCDOT Bridge Policy Manual*". Construction and materials shall be in accordance with *NCDOT Standard Specifications for Roads and Structures* (January 2018), NCDOT Structure Design Unit Project Special Provisions, NCDOT Structure Design Unit Standard Drawings and any special provisions included in the project requirements. Bridge materials will be non-prestressed cast-in-place concrete, prestressed precast concrete, or steel, based on the Design-Build team's design and subject to NCTA approval. The Design-Build teams shall submit structure recommendations and design criteria for NCTA, NCDOT and FHWA review and acceptance prior to submittal of the preliminary plans.

Hydraulics

All designs shall be in accordance with criteria provided in the North Carolina Division of Highways "Guidelines for Drainage Studies and Hydraulics Design-1999", the addendum "Handbook of Design for Highway Drainage Studies", NCDOT "Stormwater Best Management Practices Toolbox" and North Carolina Division of Highways Hydraulics Unit guidelines,

NCTA will provide the following material:

- US Army Corps of Engineers (USACE) Individual Section 404 Permit – ***For R-2721A and R-2721B***
- NC Department of Environmental Quality (NCDEQ)-Division of Water Resources (DWR) Section 401 Water Quality Certification – ***For R-2721A and R-2721B***

The Design-Build teams shall be required to do the following:

- USACE Individual Section 404 Permit – ***For R-2828***

- NCDEQ-DWR Section 401 Water Quality Certification– ***For R-2828***
- Provide any necessary permit modification drawings and calculations
- Hold a pre-design meeting with NCTA and NCDOT Hydraulic Review Engineer upon acceptance of the Preliminary Roadway Plans
- Design and install all storm drainage systems within the project limits
- Provide Stormwater Management Plan using Best Management Practices
- Provide Culvert or Bridge Survey Reports for structures
- Ensure all County ordinances are observed
- Analyze existing culverts and cross pipes adjacent to the Project and within existing right of way. Replace any deficient (structurally and/or hydraulically) pipes and/or culverts
- Prepare a Conditional Letter of Map Revision (CLOMR) or Memorandum of Agreement (MOA) package for any Federal Emergency Management Agency (FEMA) regulated stream impacted by the design
- Use pipes with minimum 18” diameter for open-ended pipes and minimum 15” diameter for pipes in enclosed drainage systems throughout the Project.

Lighting

The design criteria for all illumination systems will conform to the latest edition of the AASHTO “*Roadway Lighting Design Guide”* and amended by NCTA’s specific requirements. The design will be performed as part of the Design-Build contracts. All lighting will be reviewed by NCTA and other units of NCDOT for conformance with the project requirements.

On the R-2721A project, complete interchange lighting will be installed at the Holly Springs Road interchange. Additional lighting will be added to supplement the existing lighting at the NC 55 Bypass interchange.

On the R-2721B project, complete interchange lighting will be installed at the Bells Lake Road and the Fayetteville Road interchanges.

Finally, on the R-2828 project, complete interchange lighting will be installed at the I-40/US 70 interchange, as well as the NC 50 (Benson Road) and Old Stage Road interchanges.

Standard design documents have been developed by NCTA and will be utilized for the Project. The Design-Build team will design the systems for economy of installation and maintenance. High mast lighting will be used wherever possible. Pole top lighting standards will be used where required to keep light levels from spilling outside of the right of way. At a minimum, pole lighting will be utilized where right of way does not allow for standard installation of high mast lighting, and where high mast lighting standards are not found to be the most economical option.

Signing

Distinctive and adequate signing is a necessity for major highway facilities. Signs will provide a means by which the user can readily be guided throughout the Complete 540 corridor. Large, legible, directional signage, as well as regulatory and warning signs, will be provided. Signs along existing intersecting highways and thoroughfares will be modified as necessary to provide clear directions to

Complete 540. Special signing in advance of the toll zones will be used to inform drivers of the various payment options.

The Signing Plans shall be prepared by the Design-Build teams in accordance with the latest editions of the *Manual on Uniform Traffic Control Devices (MUTCD)*, the *NC Supplement to the MUTCD*, *NCDOT Standard Specifications for Roads and Structures*, the *NCDOT Roadway Standard Drawings,* AASHTO's *Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals*, "Guidelines for Preparation of Signing Plans for Design-Build Projects", and the "Design-Build Submittal Guidelines". NCTA toll collection signing standards have been developed and will be utilized by the Design-Build teams for these specific signs. All electrical installations and coordination are the responsibility of the Design-Build teams and must meet NEC, State and local codes. All electrical/electronic equipment and devices must be Underwriters Laboratory (UL) approved and listed. NCTA has provided the Design-Build teams with a Signing Schematic of the toll road corridor for use in developing the signing plans.

In addition to the required signage, NCTA will provide mile markers every one-half mile on the mainline. Each mile marker location shall have two mile-marker identifiers mounted back to back on one u-post to permit easy visual identification and promote safety.

All overhead sign assemblies shall be designed, fabricated, and installed by the Design-Build teams and shall meet all NCDOT and NCTA requirements. The wind speed for overhead sign assembly design is 90 miles per hour.

The Design-Build teams shall use Type IX reflective sheeting for the legends (text) and background on all overhead signs. No overhead sign lighting is required for advance guide, toll related signing or exit directional overhead signs.

Signals

The Design-Build teams shall design and prepare plans for the traffic signal installations. This work shall include, but not be limited to, the preparation of Traffic Signal Plans, Electrical and Programming Details, Utility Make-Ready Plans, Communications Cable & Conduit Routing Plans and Project Special Provisions. These plans shall be prepared in accordance with the "*Design-Build Submittal Guidelines*" and the "*Guidelines for Preparation of Traffic Signal & Intelligent Transportation System Plans on Design-Build Projects*" available on the NCDOT Design-Build website.

The Design-Build team shall be responsible for ensuring that all plans and designs conform to the current design standards of the NCDOT Intelligent Transportation Systems & Signals Unit and NCTA. All plans and associated design material and specifications must be reviewed and approved by NCTA before installation.

On the R-2721A project, the Design-Build team shall provide six new traffic signals and modify three existing traffic signals. The modifications will occur to the existing signals on Holly Springs Road at Kildaire Farm Road, the existing signals on Holly Springs Road at Sunset Lake Road, and the existing signals on NC 55 Bypass at E. Williams Street and Technology Drive. The new signals will be installed on Holly Springs Road at Kildaire Farm Road. New signals will also be installed on Holly Springs Road at the Toll NC 540 East Bound and West Bound ramps and at Lockley Road.

On the R-2721B project, the Design-Build team shall provide three new traffic signals and modify four existing traffic signals. The modifications will occur to the existing signals on Ten-Ten Road at Bells Lake Road/Graham Newton Road, the existing signals on Fayetteville Road at Donny Brook Road and Old McCullers Road, the existing signals on Fayetteville Road at Wake Tech Community College/Chandler

Ridge Circle, and the existing signals on Fayetteville Road at Ten Ten Road. New signals will be installed on Fayetteville Road at the Toll NC 540 WB ramps, on Bells Lake Road at the Toll NC 540 EB and WB ramps and on NC 55 Bypass at the Toll NC 540 EB and WB Ramps.

Finally, on the R-2828 project, the Design-Build team shall provide four new traffic signals and modify two existing traffic signals. The modifications will occur to the existing signals on NC 50 (Benson Road) at Cleveland School Road and Stevens Oak Dr. as well as the existing signals on Old Stage Road at Ten-Ten Road. The new signals will be installed on Old Stage Road at the Toll NC 540 EB and WB ramps. New signals will also be installed on Benson Road at the Toll NC 540 EB and WB ramps.

Landscape and Aesthetics

Pursuant to NCTA standards, landscaping and special aesthetics treatments will be provided along Complete 540 and are budgeted to account for a combined total of approximately 2-3% of the total construction cost. The aesthetics theme for the corridor was provided via an aesthetic design guide issued to the Design-Build proposers. The historical and natural features of the area (including building patterns, style, colors, native stone and native plants) have been identified to support a design image that reflects the surrounding natural environment.

The Triangle Expressway has a distinctive aesthetic character, making it a distinguishable road within North Carolina. NCTA's purposes in setting a high aesthetic standard for the facility are to:

- Encourage the attraction of initial users, by giving the road a distinguishable "brand";
- Provide an enhanced travel experience to users that will be paying to use the road; and
- Create a community amenity with the potential to attract public support and possibly some financial contribution for landscape, amenities, maintenance and public art.

The Complete 540 Aesthetic Design Guide includes architectural guidelines and was developed by Atkins, a member of the SNC Lavalin Group, in close coordination with NCTA staff. The Complete 540 Aesthetic Design Guide follows the aesthetic scheme developed and implemented on the existing Triangle Expressway.

For the Triangle Expressway, an architectural review committee of community representatives was consulted to assure that the design was appropriate for the context in which the Triangle Expressway is located. The style and detailing of the aesthetic themes were inspired by regional architectural themes. The selected theme used primarily brick, supported by concrete formwork, and was incorporated into bridge walls, end bents, center piers, retaining walls, sound walls, toll gantries and overhead sign structures.

Green space planning is included in the Aesthetic Design Guide to demonstrate the anticipated landscape approach to the Design-Build team. NCTA intends to award a separate landscape installation contract in the future, the completion of which will coincide with the opening of the Project to traffic. The Design-Build team will need to protect existing vegetation as shown in the prototypical locations, and to allow for the types of planting schemes shown in the guideline examples.

Utility Adjustments

To facilitate utility coordination for Projects R-2721A and R-2721B, NCTA/NCDOT has engaged Hinde Engineering. The Hinde Engineering team is responsible for coordinating project development with all public and private utilities that may be affected by the Projects. Hinde Engineering has confirmed the location and type of the utilities and identified the utility owners in order to coordinate the relocation of all utilities in conflict with the Project. Now that the contracts have been executed the Design-Build teams are responsible for completing the utility coordination efforts.

The Design-Build team will be responsible for all utility coordination for the R-2828 project from contract award to the completion of the project.

The Design-Build teams will follow the guidelines as listed below:

- *NCDOT Utility Manual - Policies & Procedures for Accommodating Utilities on Highway Rights of Way*
- *Federal Aid Policy Guide- Subchapter G, Part 645, Subparts A & B*
- *Federal Highway Administration's Program Guide, Utility Adjustments & Accommodations on Federal Aid Highway Projects*
- *NCDOT Construction Manual Section 105-8*
- *NCDOT Right of way Manual - Chapter 16 Utility Relocations*
- *NCDENR Public Water Supply - Rules governing public water supply*
- *NCDENR Division of Water Quality - Title 15A - Environment and Natural Resources*

The NCDOT will be responsible for utility relocation costs when the utility owner has prior rights of way/compensable interest. The Design-Build Team shall be responsible for all costs associated with utility relocations due to haul roads and/or any other temporary conditions resulting from the Design-Build Team's methods of operation or sequence of work. The Design-Build Team shall also be responsible for all costs associated with relocating or adjusting utilities, due to the Design-Build Team's construction methods or their design change, that have already been relocated once, or have been authorized to be relocated, to accommodate the design shown on the right-of-way plans provided by the NCTA.

Toll Collection Operations

Toll collection operations include the collection of the correct toll amounts from patrons in accordance with the established toll rate schedule, accounting of the toll revenue, transfer of the funds into the appropriate toll revenue accounts held with the Trustee and among interoperable agencies, and documentation of the toll collection activities.

As it is an integral part of NCTA's Triangle Expressway, the Project will be exclusively operated as an AET system. AET is the collection of toll revenue through the use of electronic toll collection (ETC) devices, otherwise referred to as transponders, and/or through the capture of license plate images. The proposed AET system will collect tolls as vehicles pass through tolling zones at highway speeds. A toll zone is defined as the area on the roadway under the toll site gantry where the toll collection system equipment is located and performs tolling functions such as transponder reads, license plate image capture and automatic vehicle classification (AVC).

The basic components for any AET toll collection program are the roadside toll collection system (RTCS), back office system (BOS), the operations centers, and overall operations and maintenance. For NCTA, the primary operations center is the NC Quick Pass Customer Service Center (CSC), located in Morrisville; however, traffic operations are managed from a different facility, the State Transportation Operations Center (STOC).

Toll collection will utilize pre-paid and post-paid payment methods. For the former, patrons have the option of establishing pre-paid toll accounts and purchasing transponders, which are mounted within the vehicle for automatic deduction of tolls when passing through a toll zone. For customers who do not pre-pay, video tolling camera equipment will process license plate captures and they will be subsequently billed for the tolls in accordance with established NCTA policies pertaining to video toll invoicing or post-paid tolls.

Session Law 2008-225 was ratified by the North Carolina General Assembly on July 18, 2008 and requires payment of outstanding turnpike tolls and applicable fees or fines prior to vehicle registration renewal. This bill was revised in July 2010 as Session Law 2010-133 as it pertains to the video toll collection process.

Roadside Toll Collection System (RTCS), Electronic Toll Collection System (ETCS) and Back Office System (BOS)

The RTCS, ETCS and BOS includes toll-related hardware and software located on the roadway and offsite at the operations center, such as ETCS readers and antennas, optical character recognition and automated license plate recognition and processing software, the main toll collection system computer server and database, and the hardware and software necessary to support the customer service center and interoperability with out-of-state toll agencies.

In order to enable tolling of the Project, NCTA recently procured the RTCS and will amend existing contracts for the BOS, the ETCS, and OPS.

Since opening the Triangle Expressway, NCTA has recently procured new and additional toll integration and toll collection services to adapt to changes in technology and to prepare for program expansion (including the extension of the Triangle Expressway).

Back Office System (BOS) services for the Triangle Expressway are currently provided by Conduent State and Local Solutions (Conduent). In October 2018, NCTA executed a new BOS contract with TransCore, with system turnover expected in early 2020. As such, TransCore is expected to be the BOS provider for the Project. The contractor’s responsibilities include the design, development, installation, and implementation of hardware, software, and telecommunication networks for customer account processing, billing processing, necessary system interfaces, and maintenance.

The function of the RTCS is to detect vehicles at the toll zones, build the proper transaction, and transmit a fully formed transaction with supporting data to the toll facility host located in the NC Quick Pass CSC. The RTCS being developed for the Project is a state-of-the-art fully automated toll zone, plaza, toll facility host and database. It includes ETC and video systems, through the capture of transponders using ETC readers and antennas or license plate images utilizing front and rear cameras and multiple levels of optical character recognition/automated license plate recognition software. Upon detection of a vehicle, the RTCS begins to build a transaction by detecting and classifying the vehicle; reading a transponder if present; and capturing the front and rear images of the vehicle to begin the image process.

If a transponder is detected, the transaction information is sent to the BOS for validation of account status and debiting of the account for the correct toll amount. The video collection system will capture an image of the license plate of every vehicle. In the event that a vehicle does not have a transponder, the images will be handled via the video processing center (VPC), which is a part of the RTCS. License plate numbers not associated with any prepaid accounts will be sent to the appropriate state DMV to obtain their demographic information through the BOS. All transactions for a given billing period will be billed to the registered owner of the vehicle through an invoicing process. Additionally, each toll zone will be equipped with CCTV cameras for roadway overview, traffic and system audit and site security.

NCTA contracted with Kapsch to provide the ETC subsystems and transponders for the entire NC Quick Pass program. The ETC system is a multiprotocol solution that has capability to read all three protocols being considered for national interoperability. NCTA is able to read NCTA-issued transponders, transponders interoperable with the E-Z Pass Group, and transponders from Florida SunPass and Georgia Peach Pass. This system is a statewide system and NCTA-issued transponders will be used on all projects.

The BOS is made up of the system host, databases, and the customer service center (CSC) module, which includes the necessary interfaces to payment systems and commercial establishments. The BOS developed for the Project is a state-of-the-art toll system management and toll account management system based on ETC and video identification of vehicles that has been configured and sized to support the Project as well as other current and future NCTA toll projects. The BOS is located at the NC Quick Pass CSC. The system's overriding functions include acceptance of transactions and roadway data, managing prepaid toll accounts, collecting revenue through these accounts, reporting revenue collection activities, and interfacing with external contacts (retail, interoperable agencies, financial institutions, and DMVs).

Operations Centers

The NC Quick Pass CSC, located at 200 Sorrell Grove Church Road in Morrisville, NC, houses the BOS and NCTA customer service functions for statewide tolling operations. The primary CSC is supplemented by smaller regional CSC's located around the state.

NCTA has contracted with AECOM to provide staffing for the CSC's statewide and managing all functions for the statewide ETC and video billing programs. These functions include customer service at walk-in centers, the call center, mail and email responses, ETC account opening, transponder sales and inventory management, account management, video billing, interoperability/reciprocity with out-of-state toll facilities, and collection efforts. Additionally, a traffic management station is located within the Morrisville CSC and is staffed by AECOM for the Triangle Expressway.

The STOC (housed at the Joint Forces Headquarters, or JFHQ), located at 1636 Gold Star Drive in Raleigh, monitors all traffic activities on NC toll facilities, as well as non-toll routes. Traffic management operators verify roadway incidents, dispatch Incident Management Assistance Patrol (IMAP) and other emergency resources, and monitor, control and disseminate data to and from roadside cameras, traffic detectors and dynamic messages signs.

NCTA operations personnel are co-located with traffic management staff within the STOC and will oversee the various toll operation contracts, monitor performance requirements, and provide audit and accounting for these operations.

Operations, Maintenance, Renewal and Replacement

The Project is part of the overall Triangle Expressway system, as such operations, maintenance, renewal, and replacement will be incorporated into the overall maintenance plan for the corridor.

Toll Collection System Operation and Maintenance (O&M)

Operations and maintenance of the Toll Collection System will be provided by the RTCS and BOS integrators with oversight by NCTA personnel. The operations and maintenance of the system includes all preventive, predictive and corrective maintenance and will ensure the highest level of accuracy and availability as required through established performance measures. The up-front and ongoing costs for customer service and sales of transponders are included in the O&M estimate.

In addition to normal maintenance, the requirements also include 24-hour, seven days per week on-call maintenance services. Minimum response times, depending on time of day and on priority of the malfunction, will be specified. The toll collection system will be required to generate its own system malfunction and maintenance messages, which will be used in conjunction with toll collection staff reports, to alert maintenance staff of problems. The mandate of this program is to maintain the capability of the system to collect tolls 24 hours per day, 365 days per year.

Intelligent Transportation System and Traffic Management Operations

NCTA will monitor video and data feeds from the Complete 540 corridor for traffic management, maintenance, and security concerns. Staff will work closely with local NCDOT personnel, the maintenance contractors, and the toll integrators to proactively address any needs detected. IMAP will also be included as part of the ITS and Operations program. Dedicated IMAP vehicles are currently assigned to the Triangle Expressway corridor to aid stranded motorists, provide temporary traffic control, and assist in incident clearance of disabled vehicles and debris. These services will extend to cover the Complete 540 extension upon opening to traffic. IMAP operations are closely coordinated with local IMAP patrol routes and procedures. IMAP drivers are involved in spotting and reporting maintenance and security concerns. Dedicated North Carolina State Highway Patrol (NCSHP) officers are assigned to patrol the corridor. IMAP and NCSHP communications hardware and procedures will be consistent with current NCDOT/NCSHP practices.

Routine Roadway Maintenance

Routine roadway maintenance costs include recurring and routine maintenance activities associated with the highway, such as annual bridge inspections, snow and litter removal, and regular repairs to the pavement structure.

NCTA has developed an in-house model for estimating operations and maintenance costs by utilizing the actual contract values procured for the Triangle Expressway wherever possible, available cost data for certain administrative costs, as well as data available to NCTA for contracted maintenance services for similar roadway facilities. In addition, the cost projections are based on NCTA's Business Policies and Procedures Manual and have been adjusted to reflect anticipated organizational changes. HNTB assisted in the development and review of the operations and maintenance model. Sound management practices and an effective program of inspection and maintenance will be essential in maintaining the facilities in good repair and working condition. These baseline costs have been projected to the year 2058 and are presented in **Exhibit 7**.

The plan of finance assumes that operations and maintenance costs will be funded by toll revenues. If, at any time toll revenue fails to cover operations and maintenance expenses, the NCDOT Board of Transportation has agreed to cover these costs through other funding sources. For more information on the contingent guarantees of NCDOT as to initial construction, operations and maintenance, and renewal and replacement expenses, see **Appendix D**.

NCTA is mandated by State law and the terms of the Trust Agreement to maintain a safe highway facility in sound condition. An effective maintenance policy will contribute significantly to ensure a safe highway for system users, as well as preserving the investment. Routine maintenance for the new facilities is anticipated to include, but not be limited to, maintenance of the following items:

- Concrete and asphalt pavement surfaces
- Bridge deck, superstructure, and substructure
- Pavement markings and signage
- Mowing and landscaping
- Snow and ice removal
- Drainage, stormwater systems and slopes
- Roadside protection (guardrail, barrier, attenuation)
- Lighting appurtenances
- Tolling and ITS equipment
- Litter and obstruction removal
- Building infrastructure
- Traffic control
- Emergency maintenance services

NCTA has developed maintenance performance standards to which maintenance contractors are required to adhere. NCTA will be responsible for preparing an annual operations and maintenance plan and budget along with routine maintenance assessments. The maintenance contractors will be required to perform maintenance activities in a safe and efficient manner with a minimum effect on traffic operations.

Renewal and Replacement (R&R)

During the initial years of operation, the new facility should require relatively minor renewal and replacement activities. However, as the many elements of the facility are subjected to aging and wear, increasing amounts of maintenance and rehabilitation will be required. In addition to being responsible for building Complete 540, operating and maintaining the facility, paying off its bond indebtedness, and operating with a positive cash flow, NCTA is also required to protect, preserve and maintain the properties it constructs. In order to protect the investments in its properties, revenues are to be allocated annually to a Renewal and Replacement Account established in connection with the issuance of bonds to finance the Project. Amounts in the Renewal and Replacement Account can be disbursed only for the purpose of paying for the cost of:

- Unusual or extraordinary maintenance or repairs, maintenance or repairs not recurring annually, and renewals and replacements, including major items of equipment. Examples include asphalt overlays, pavement marking and toll equipment upgrades.
- Repairs or replacements resulting from an emergency caused by some extraordinary occurrence, so characterized by a certificate signed by an Authorized Representative of NCTA and filed with the Trustee stating that the moneys in the Revenue Fund and insurance proceeds, if any, available therefore are insufficient to meet such emergency.
- Paying any part or all of the cost of any capital improvement to the facility.

The assumed inflation rates of 2.5% for O&M and 2.5% for R&R costs reflect historical averages within the toll road and highway construction industries, respectively. It is what can reasonably be anticipated in view of the natural aging and wear of the Project subject to the traffic and climatic conditions of the region. It is our opinion that the costs projected for the operation and maintenance of the Project are reasonable estimations of future costs assuming that the Project facility is operated and maintained under procedures and practices typical for the toll road industry. Sound management practices and an effective program of inspection and maintenance will be essential in maintaining the facilities in good repair and working condition.

In light of the fact that the Project will be an entirely new facility, covered in part by warranties for the initial operations under terms of the Design-Build contracts, deposit amounts shall be appropriate to meet the projected needs listed in **Exhibit 5**. The amounts in **Exhibit 5** reflect an asphalt pavement design for R-2721A and R-2721B and a concrete pavement design for R-2828, as selected by the Design-Build teams. The projected amounts will be reviewed on an annual basis by NCTA in conjunction with the annual inspections and updated as appropriate to meet the needs of the preservation of the facility. In addition, the NCDOT is also approved through a resolution to provide contingent funding support for construction, operations and maintenance, and renewal and replacement expenses. Such guarantees of support are contained in the Trust Agreement.

Exhibit 7: Projected O&M and R&R Expenses (2024 – 2058)

O&M and R&R Summary Existing Triangle Expressway & Complete 540 R-2721A, R-2721B & R-2828				
FY	Operations	Maintenance	R&R	Total
2024	$ 38,316,000	$ 4,247,000	$ 3,893,000	$ 46,456,000
2025	$ 42,990,000	$ 4,354,000	$ 1,196,000	$ 48,540,000
2026	$ 46,227,000	$ 4,463,000	$ 1,226,000	$ 51,916,000
2027	$ 47,842,000	$ 4,574,000	$ 18,617,000	$ 71,033,000
2028	$ 48,380,000	$ 4,688,000	$ 11,392,000	$ 64,460,000
2029	$ 48,892,000	$ 4,806,000	$ 5,951,000	$ 59,649,000
2030	$ 49,417,000	$ 4,924,000	$ 4,623,000	$ 58,964,000
2031	$ 49,954,000	$ 5,048,000	$ 51,862,000	$ 106,864,000
2032	$ 50,504,000	$ 5,176,000	$ 23,557,000	$ 79,237,000
2033	$ 51,070,000	$ 5,304,000	$ 4,428,000	$ 60,802,000
2034	$ 51,652,000	$ 5,437,000	$ 10,472,000	$ 67,561,000
2035	$ 52,253,000	$ 5,572,000	$ 2,171,000	$ 59,996,000
2036	$ 53,040,000	$ 5,712,000	$ 33,050,000	$ 91,802,000
2037	$ 54,018,000	$ 5,854,000	$ 5,950,000	$ 65,822,000
2038	$ 55,017,000	$ 6,000,000	$ 2,238,000	$ 63,255,000
2039	$ 56,036,000	$ 6,151,000	$ 18,521,000	$ 80,708,000
2040	$ 57,077,000	$ 6,304,000	$ 23,632,000	$ 87,013,000
2041	$ 58,142,000	$ 6,463,000	$ 65,699,000	$ 130,304,000
2042	$ 59,228,000	$ 6,623,000	$ 39,359,000	$ 105,210,000
2043	$ 60,338,000	$ 6,789,000	$ 6,446,000	$ 73,573,000
2044	$ 61,473,000	$ 6,958,000	$ 39,008,000	$ 107,439,000
2045	$ 62,633,000	$ 7,133,000	$ 2,112,000	$ 71,878,000
2046	$ 63,434,000	$ 7,311,000	$ 2,111,000	$ 72,856,000
2047	$ 63,865,000	$ 7,494,000	$ 8,374,000	$ 79,733,000
2048	$ 64,300,000	$ 7,681,000	$ 59,822,000	$ 131,803,000
2049	$ 64,738,000	$ 7,873,000	$ 9,640,000	$ 82,251,000
2050	$ 20,171,000	$ 4,002,000	$ 1,112,000	$ 25,285,000
2051	$ 20,309,000	$ 4,102,000	$ 83,423,000	$ 107,834,000
2052	$ 20,449,000	$ 4,203,000	$ 1,826,000	$ 26,478,000
2053	$ 20,590,000	$ 4,309,000	$ 1,810,000	$ 26,709,000
2054	$ 20,732,000	$ 4,416,000	$ 46,842,000	$ 71,990,000
2055	$ 20,875,000	$ 4,527,000	$ 1,901,000	$ 27,303,000
2056	$ 21,019,000	$ 4,640,000	$ 27,303,000	$ 52,962,000
2057	$ 21,165,000	$ 4,756,000	$ 896,000	$ 26,817,000
2058	$ 21,312,000	$ 4,874,000	$ 917,000	$ 27,103,000

ENVIRONMENTAL CONSIDERATIONS

The Project will provide several benefits to the Raleigh region. While a project of this magnitude cannot be developed without some impacts to the environment, steps are being taken to avoid, minimize and mitigate those impacts to the greatest extent possible. Some of the steps being implemented to protect the environment are listed below.

<u>Stormwater</u>: Stormwater drainage systems for the Project will be designed in accordance with the requirements of the National Pollutant Discharge Elimination System (NPDES) program. The Project will also utilize NCDOT's Best Management Practices for the protection of surface waters during construction. Other design features such as vegetated berms and swales will be considered and incorporated into the roadway design where appropriate to mitigate any potential transfer of toxins or other nutrients into surface waters. In lieu of concrete pipes, grass-lined ditches will be used, where possible, to maximize nutrient and particulate removal. Detention and retention facilities will be utilized, as required, to maintain appropriate water discharge rates into existing tributaries. These measures will assist in the preservation of the existing ecosystem.

<u>Wetlands and Streams</u>: A rigorous evaluation was undertaken to avoid and minimize the Project's impacts on wetlands and streams. Mitigation will be required for all unavoidable impacts to jurisdictional wetlands and streams. Mitigation needs for the Project will be provided through the North Carolina Ecosystem Enhancement Program's (NCEEP) In-Lieu Fee Program or through private mitigation banks. Bridges will be utilized where practical and feasible to span wetlands and streams.

<u>Protected Species</u>: Formal Section 7 Consultation with the US Fish and Wildlife Service was completed to determine the effect of the Project on federally-protected species in the project area, in accordance with the Endangered Species Act of 1973. The US Fish and Wildlife Service issued a letter of concurrence with NCTA's Biological Assessment and associated biological conclusions.

<u>Air</u>: The project study area is located within the Raleigh air quality region. The projects are located almost entirely in Wake County, which is a maintenance area for carbon monoxide. Compliance of an individual project with the ozone and carbon monoxide National Ambient Air Quality Standards (NAAQS) is demonstrated if the project is included in a conforming transportation plan, which considers the urban area as a whole.

<u>Noise</u>: Traffic noise studies have been conducted as part of the environmental study process to identify impacted receptors and how best to mitigate potential traffic noise from the Project. Noise walls will be constructed where feasible and reasonable. There were 16 locations identified where preliminary noise barriers were determined to be potentially reasonable and feasible on the R-2721 projects and four on the R-2828 project. The determination of feasibility and reasonableness is preliminary and subject to change based upon final design, building permits issued as of the Date of Public Knowledge, and the completion of the public involvement process. A Design Noise Study will be prepared during final design of the Preferred Alternative using updated traffic forecasts and more refined engineering. NCTA may also incorporate aesthetic treatment into the noise walls.

<u>Hazardous Materials</u>: NCTA is ensuring that all state and federal laws will be strictly adhered to in the abatement of hazardous materials located on the Project's right of way, if encountered. The identification and remediation of these sites that would otherwise remain unidentified is of incalculable benefit to the environment.

<u>Hazardous Spills</u>: These facilities would be designed to help capture the spill of a tanker truck to prevent contamination from entering the stream, river or aquifer recharge system. All hazardous spill

basins will be designed according to the requirements stipulated in the NCDOT document entitled *Best Management Practices for Protection of Surface Waters* and *Guidelines for the Location and Design of Hazardous Spill Basins*.

Permitting: NCTA is obtaining a permit for the Project from USACE for the R-2721A and R-2721B projects. The R-2828 Design-Build team is responsible for obtaining the permit from the USACE. Any required coordination with the environmental agencies, approvals from the environmental agencies, public involvement and/or permit modifications resulting from a variation in NCTA's proposed design and/or construction method, or utility relocation/construction will be the sole responsibility of the Design-Build teams and will be coordinated with NCTA.

Extensive coordination was conducted between FHWA, NCTA, NCDOT, and other governmental entities to develop environmental documents for Complete 540. The formal approvals of the required documents are based on the planned construction limits associated with the Preferred Alternative as presented in the documents. Environmental documents have been prepared by NCTA, or its representatives, during the planning phase of Complete 540 to identify human and natural environmental impacts and to obtain environmental approvals, which specify mitigation requirements and recommendations.

The Design-Build teams, with the support and oversight of NCTA, shall be responsible for all coordination with governmental entities. The Design-Build teams shall ensure compliance with the conditions and schedules set forth in approved environmental documents and permits.

Public Involvement

Public involvement and input has been encouraged throughout the development of the Project. Local government officials, civic organizations, neighborhood groups, and interested citizens were informed of the progress of the Project through a series of public workshops and a substantial number of small group meetings. Other outreach efforts and opportunities for the public to review project information and provide input included project mailings, a project website, and a toll-free project telephone number (i.e., project hotline).

In addition, NCTA has continued to use the well-established CSC to provide interested citizens with educational materials. NCTA and the CSC have continued to run public outreach campaigns for toll roads, transponders, and other NCTA related topics.

During the design and construction phases of the Project, the public involvement program will maintain a high level of communication by informing and educating local government agencies, special interest groups, businesses, and the general public about the status of the Project. The Design-Build teams will develop a Public Information Plan for the Project that will provide the public with an opportunity for input, notify the public in advance of construction and potential impacts.

Project Costs

A breakdown of the project cost estimate for implementation of the Project is presented in **Exhibit 8.**

NCTA has reduced contractor project cost risk by performing several tasks associated with higher risks prior to the Design-Build procurement process. For example, environmental permits have been advanced. Geotechnical investigations were conducted to identify unsuitable soils and the presence of rock. NCDOT also conducted detailed geo-environmental site assessments, including soil and groundwater testing, at locations with potentially hazardous waste; i.e., gas stations, junkyards, industrial sites, etc. The results of these investigations were provided to the short-listed Design-Build teams. The Design-Build contracts also include incentives and liquidated damages for schedule variations from the expected substantial completion dates. Contingencies have been incorporated in the project budget to cover these uncertainties.

Exhibit 8: Cost Estimate Summary

Project Element	R-2721A Cost ($M)	R-2721B Cost ($M)	R-2828 Cost ($M)	Total Cost ($M)
Highway Design-Build Contract	$ 183.76	$ 161.14	$ 406.12	$ 751.02
Third Party Delay Contingency	$ 13.17	$ 11.55	$ 29.11	$ 53.83
Change Order Contingency	$ 12.83	$ 12.53	$ 28.47	$ 53.83
Construction Engr. & Inspection	$ 11.93	$ 10.38	$ 26.06	$ 48.37
Incentives	$ 0.54	$ 0.72	$ 2.25	$ 3.51
Landscaping	$ 2.67	$ 2.32	$ 5.84	$ 10.83
Right of Way	$ 54.89	$ 79.08	$ 71.62	$ 205.59
Utilities	$ 8.39	$ 26.41	$ 24.40	$ 59.20
Toll Integration Vendors	$ 3.96	$ 6.98	$ 10.30	$ 21.24
Agency Labor and Administration	$ 3.37	$ 3.29	$ 7.33	$ 14.00
Administrative Contingency	$ 8.05	$ 8.37	$ 16.81	$ 33.22
Diesel & AC Price Adj. Reserve Fund	$ 3.90	$ 2.20	$ 3.30	$ 9.40
Mussel Prop. & Env. Prot. Measures	$ -	$ -	$ 31.40	$ 31.40
Total Cost ($M)	**$ 307.46**	**$ 324.97**	**$ 663.01**	**$ 1,295.44**

CASH FLOW PROJECTIONS

Quarterly projections of cash flow required to construct the Project are shown in **Exhibit 9**. Quarterly cash flows are based upon the anticipated schedule of Design-Build construction, right-of-way acquisition and other activities. The highway Design-Build contracts will utilize a monthly payment based upon verified progress of work. Each Design-Build team will submit a construction schedule and cash flow projection prior to start of work. If construction progress is slower than scheduled, payment will be made only for work accomplished in a given month.

Exhibit 9: Cash Flow Summary

9/25/2019

	DESCRIPTION/YEAR	Cost Estimate ($M)	Prior Expenditures	actuals Jul-Sept 18 Q1 FY19	actuals Oct-Dec 18 Q2 FY19	actuals Jan-Mar 19 Q3 FY19	actuals Apr-Jun 19 Q4 FY19	Jul-Sept 19 Q1 FY20	Oct-Dec 19 Q2 FY20	Jan-Mar 20 Q3 FY20	Apr-Jun 20 Q4 FY20	Jul-Sept 20 Q1 FY21	Oct-Dec 20 Q2 FY21	Jan-Mar 21 Q3 FY21	Apr-Jun 21 Q4 FY21	Jul-Sept 21 Q1 FY22	Oct-Dec 21 Q2 FY22	Jan-Mar 22 Q3 FY22	Apr-Jun 22 Q4 FY22	Jul-Sept 22 Q1 FY23	Oct-Dec 22 Q2 FY23	Jan-Mar 23 Q3 FY23	Apr-Jun 23 Q4 FY23	Jul-Sept 23 Q1 FY24	Oct-Dec 23 Q2 FY24	Jan-Mar 24 Q3 FY24	Apr-Jun 24 Q4 FY24
R-2721A	Construction	$ 183.76	$ -	$ -	$ -	$ -	$ -	$ 11.77	$ 23.68	$ 16.71	$ 14.09	$ 13.26	$ 12.57	$ 12.69	$ 12.66	$ 12.86	$ 12.26	$ 12.86	$ 12.66	$ 12.86	$ 2.81	$ -	$ -	$ -	$ -	$ -	$ -
R-2721A	Design	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
R-2721A	Toll Integration	$ 3.96	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.16	$ 0.24	$ 0.18	$ 0.18	$ 0.36	$ 0.48	$ 0.83	$ 0.83	$ 0.48	$ 0.24	$ -	$ -	$ -	$ -
R-2721A	Landscaping	$ 2.67	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.34	$ 1.34	$ -	$ -	$ -	$ -	$ -
R-2721A	Right of Way	$ 54.89	$ -	$ 0.000697	$ 0.00550	$ 0.14455	$ 1.70518	$ 6.59	$ 6.59	$ 4.39	$ 4.39	$ 5.57	$ 5.57	$ 3.18	$ 1.59	$ 7.58	$ 4.55	$ 1.52	$ 1.52	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
R-2721A	Utilities	$ 8.39	$ -	$ -	$ -	$ -	$ -	$ 2.52	$ 2.52	$ 2.52	$ 0.84	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
R-2721A	*Agency Costs:*																										
R-2721A	NCDOT Labor, Exp., and Surcharges	$ 3.21	$ -	$ -	$ -	$ 0.00076	$ 0.00103	$ 0.20	$ 0.20	$ 0.20	$ 0.20	$ 0.20	$ 0.20	$ 0.20	$ 0.20	$ 0.19	$ 0.19	$ 0.19	$ 0.19	$ 0.21	$ 0.21	$ 0.21	$ 0.21	$ -	$ -	$ -	$ -
R-2721A	Third Party Delay Contingency	$ 13.17		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 13.17	$ -	$ -	$ -	$ -
R-2721A	Change Order Allowance	$ 12.83	$ -	$ -	$ -	$ -	$ -	$ 0.90	$ 0.90	$ 0.90	$ 0.90	$ 0.80	$ 0.80	$ 0.80	$ 0.80	$ 0.77	$ 0.77	$ 0.77	$ 0.77	$ 0.74	$ 0.74	$ 0.74	$ 0.74	$ -	$ -	$ -	$ -
R-2721A	Public Education / Outreach	$ 0.16	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.02	$ 0.02	$ 0.02	$ 0.02	$ 0.02	$ 0.02	$ 0.02	$ 0.02	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
R-2721A	CEI and Materials Testing	$ 11.93	$ -	$ -	$ -	$ -	$ -	$ 0.78	$ 0.78	$ 0.78	$ 0.78	$ 0.78	$ 0.78	$ 0.78	$ 0.78	$ 0.75	$ 0.75	$ 0.75	$ 0.75	$ 0.69	$ 0.69	$ 0.69	$ 0.69	$ -	$ -	$ -	$ -
R-2721A	Incentives	$ 0.54	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.54	$ -	$ -	$ -	$ -	$ -
R-2721A	Contingency and Reserves	$ 8.05	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.52	$ 0.52	$ 1.05	$ 0.52	$ 0.52	$ 0.52	$ 0.52	$ 0.50	$ 0.50	$ 0.50	$ 0.50	$ 0.46	$ 0.46	$ 0.46	$ 0.46	$ -	$ -	$ -	$ -
R-2721A	Fuel and AC Reserves	$ 3.90		$ -	$ -	$ -	$ -	$ 0.12	$ 0.35	$ 0.35	$ 0.35	$ 0.35	$ 0.23	$ 0.23	$ 0.35	$ 0.35	$ 0.23	$ 0.23	$ 0.35	$ 0.12	$ 0.08	$ 0.08	$ 0.12	$ -	$ -	$ -	$ -
R-2721A	PROJECT SUB-TOTAL	$ 307.46	$ -	$ 0.000697	$ 0.005504	$ 0.14531	$ 1.70621	$ 22.86	$ 35.54	$ 26.36	$ 22.59	$ 21.51	$ 20.70	$ 18.59	$ 17.16	$ 23.20	$ 19.45	$ 17.20	$ 17.23	$ 15.91	$ 7.15	$ 4.52	$ 15.62	$ -	$ -	$ -	$ -
R-2721B	Construction	$ 161.14	$ -	$ -	$ -	$ -	$ 5.32743	$ 6.83	$ 15.87	$ 13.58	$ 16.31	$ 14.06	$ 8.79	$ 6.77	$ 10.18	$ 15.64	$ 19.13	$ 13.38	$ 12.90	$ 2.37	$ -	$ -	$ -	$ -	$ -	$ -	$ -
R-2721B	Design	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
R-2721B	Toll Integration	$ 6.98	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.28	$ 0.42	$ 0.31	$ 0.31	$ 0.63	$ 0.84	$ 1.47	$ 1.47	$ 0.84	$ 0.42	$ -	$ -	$ -	$ -
R-2721B	Landscaping	$ 2.32	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.16	$ 1.16	$ -	$ -	$ -	$ -	$ -
R-2721B	Right of Way	$ 79.08	$ -	$ 0.000247	$ 0.00224	$ 0.89483	$ 1.42516	$ 9.49	$ 9.49	$ 6.33	$ 6.33	$ 8.03	$ 8.03	$ 4.59	$ 2.29	$ 11.10	$ 6.66	$ 2.22	$ 2.22	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
R-2721B	Utilities	$ 26.41	$ -	$ -	$ 0.03389	$ 1.69892	$ 2.44294	$ 3.17	$ 3.17	$ 2.11	$ 2.11	$ 3.50	$ 3.50	$ 3.50	$ 1.17	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
R-2721B	*Agency Costs:*																										
R-2721B	NCDOT Labor, Exp., and Surcharges	$ 3.13	$ -	$ -	$ -	$ 0.00136	$ 0.00116	$ 0.19	$ 0.19	$ 0.19	$ 0.19	$ 0.19	$ 0.19	$ 0.19	$ 0.19	$ 0.19	$ 0.19	$ 0.19	$ 0.19	$ 0.22	$ 0.22	$ 0.22	$ 0.22	$ -	$ -	$ -	$ -
R-2721B	Third Party Delay Contingency	$ 11.55		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 11.55	$ -	$ -	$ -	$ -
R-2721B	Change Order Allowance	$ 12.53	$ -	$ -	$ -	$ -	$ -	$ 0.78	$ 0.78	$ 0.78	$ 0.78	$ 0.78	$ 0.78	$ 0.78	$ 0.78	$ 0.78	$ 0.78	$ 0.78	$ 0.78	$ 0.78	$ 0.78	$ 0.78	$ 0.78	$ -	$ -	$ -	$ -
R-2721B	Public Education / Outreach	$ 0.16	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.02	$ 0.02	$ 0.02	$ 0.02	$ 0.02	$ 0.02	$ 0.02	$ 0.02	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
R-2721B	CEI and Materials Testing	$ 10.38	$ -	$ -	$ -	$ -	$ -	$ 0.65	$ 0.65	$ 0.65	$ 0.65	$ 0.65	$ 0.65	$ 0.65	$ 0.65	$ 0.65	$ 0.65	$ 0.65	$ 0.65	$ 0.65	$ 0.65	$ 0.65	$ 0.65	$ -	$ -	$ -	$ -
R-2721B	Incentives	$ 0.72	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.72	$ -	$ -	$ -	$ -	$ -
R-2721B	Contingency and Reserves	$ 8.37	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.52	$ 0.52	$ 1.05	$ 0.52	$ 0.52	$ 0.52	$ 0.52	$ 0.52	$ 0.52	$ 0.52	$ 0.52	$ 0.52	$ 0.52	$ 0.52	$ 0.52	$ -	$ -	$ -	$ -
R-2721B	Fuel and AC Reserves	$ 2.20	$ -	$ -	$ -	$ -	$ -	$ 0.07	$ 0.20	$ 0.20	$ 0.20	$ 0.20	$ 0.13	$ 0.13	$ 0.20	$ 0.20	$ 0.13	$ 0.13	$ 0.20	$ 0.07	$ 0.06	$ 0.06	$ 0.04	$ -	$ -	$ -	$ -
R-2721B	PROJECT SUB-TOTAL	$ 324.97	$ -	$ 0.000247	$ 0.036126	$ 2.59511	$ 9.19671	$ 21.17	$ 30.87	$ 24.36	$ 27.62	$ 27.95	$ 22.61	$ 17.43	$ 16.42	$ 29.41	$ 28.39	$ 18.52	$ 18.32	$ 6.08	$ 4.85	$ 4.95	$ 14.19	$ -	$ -	$ -	$ -
R-2828	Construction	$ 406.12	$ -	$ -	$ -	$ 20.15998	$ 10.76543	$ 12.52	$ 15.26	$ 21.59	$ 26.87	$ 30.27	$ 26.56	$ 22.12	$ 26.12	$ 31.50	$ 34.15	$ 21.88	$ 39.55	$ 34.27	$ 19.17	$ 7.43	$ 5.94	$ -	$ -	$ -	$ -
R-2828	Design	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
R-2828	Toll Integration	$ 10.30	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.05	$ 0.46	$ 0.52	$ 0.26	$ 0.26	$ 1.03	$ 1.03	$ 2.01	$ 3.35	$ 0.67	$ 0.67	$ -	$ -	$ -	$ -
R-2828	Landscaping	$ 5.84	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2.92	$ 2.92	$ -	$ -	$ -	$ -	$ -
R-2828	Right of Way	$ 71.62	$ -	$ -	$ 0.00028	$ 0.00060	$ 0.00439	$ 4.83	$ 8.06	$ 9.67	$ 9.67	$ 7.34	$ 7.34	$ 7.34	$ 7.34	$ 1.93	$ 1.93	$ 1.29	$ 1.29	$ 2.68	$ 0.89	$ -	$ -	$ -	$ -	$ -	$ -
R-2828	Utilities	$ 24.40	$ -	$ -	$ -	$ -	$ -	$ 5.86	$ 5.86	$ 5.86	$ 1.95	$ 1.95	$ 1.95	$ 0.98	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
R-2828	*Agency Costs:*																										
R-2828	NCDOT Labor, Exp., and Surcharges	$ 7.12	$ -	$ -	$ -	$ -	$ -	$ 0.44	$ 0.44	$ 0.44	$ 0.44	$ 0.44	$ 0.44	$ 0.44	$ 0.44	$ 0.44	$ 0.44	$ 0.44	$ 0.44	$ 0.44	$ 0.44	$ 0.44	$ 0.44	$ -	$ -	$ -	$ -
R-2828	Third Party Delay Contingency	$ 29.11	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 29.11	$ -	$ -	$ -	$ -
R-2828	Change Order Allowance	$ 28.47	$ -	$ -	$ -	$ -	$ -	$ 1.35	$ 1.35	$ 1.35	$ 1.35	$ 1.92	$ 1.92	$ 1.92	$ 1.92	$ 1.92	$ 1.92	$ 1.92	$ 1.92	$ 1.92	$ 1.92	$ 1.92	$ 1.92	$ -	$ -	$ -	$ -
R-2828	Public Education / Outreach	$ 0.22	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.03	$ 0.03	$ 0.03	$ 0.03	$ 0.03	$ 0.03	$ 0.03	$ 0.03	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
R-2828	CEI and Materials Testing	$ 26.06	$ -	$ -	$ -	$ -	$ -	$ 1.56	$ 1.56	$ 1.56	$ 1.56	$ 1.56	$ 1.56	$ 1.56	$ 1.56	$ 1.50	$ 1.50	$ 1.50	$ 1.50	$ 1.89	$ 1.89	$ 1.89	$ 1.89	$ -	$ -	$ -	$ -
R-2828	Incentives	$ 2.25	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2.25	$ -	$ -	$ -	$ -	$ -
R-2828	Mussel Prop. & Env. Prot. Measures	$ 31.40	$ -		$ 0.00100	$ 0.26031	$ 0.00591	$ 4.49	$ 4.49	$ 4.49	$ 4.49	$ 1.81	$ 1.81	$ 1.81	$ 1.81	$ 0.30	$ 0.30	$ 0.30	$ 0.30	$ 0.30	$ 0.30	$ 0.30	$ 0.30	$ 1.79	$ 1.79	$ -	$ -
R-2828	Contingency and Reserves	$ 16.81	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.92	$ 0.92	$ 1.85	$ 1.09	$ 1.09	$ 1.09	$ 1.09	$ 1.09	$ 1.09	$ 1.09	$ 1.09	$ 1.09	$ 1.09	$ 1.09	$ 1.09	$ -	$ -	$ -	$ -
R-2828	Fuel and AC Reserves	$ 3.30	$ -	$ -	$ -	$ -	$ -	$ 0.10	$ 0.30	$ 0.30	$ 0.30	$ 0.29	$ 0.29	$ 0.19	$ 0.23	$ 0.34	$ 0.29	$ 0.21	$ 0.16	$ 0.29	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ -
R-2828	PROJECT SUB-TOTAL	$ 663.01	$ -	$ -	$ 0.001281	$ 20.42090	$ 10.77573	$ 31.16	$ 38.24	$ 46.18	$ 48.48	$ 46.70	$ 43.04	$ 37.94	$ 41.06	$ 39.31	$ 41.91	$ 29.69	$ 47.31	$ 44.89	$ 32.02	$ 18.92	$ 41.37	$ 1.79	$ 1.79	$ -	$ -
	PROJECT COST FOR FINANCING	$ 1,295.44	$ -	$ 0.000944	$ 0.042912	$ 23.16131	$ 21.67865	$ 75.19	$ 104.65	$ 96.90	$ 98.69	$ 96.16	$ 86.36	$ 73.96	$ 74.64	$ 91.92	$ 89.76	$ 65.41	$ 82.87	$ 66.87	$ 44.03	$ 28.38	$ 71.18	$ 1.79	$ 1.79	$ -	$ -
P/E	Additional P/E	$ 14.40	$ -					$ 0.90	$ 0.90	$ 0.90	$ 0.90	$ 0.90	$ 0.90	$ 0.90	$ 0.90	$ 0.90	$ 0.90	$ 0.90	$ 0.90	$ 0.90	$ 0.90	$ 0.90	$ 0.90	$ -	$ -	$ -	$ -
P/E	Environmental Mitigation	$ 50.48	$ 50.48																								
P/E																											
P/E	Prior Expenditures (P/E) and stipends	$ 36.65	$ 27.42	$ 2.89749	$ 1.82937	$ 2.10795	$ 2.39292																				
P/E	Prior Expenditures (ROW)	$ 41.89	$ 23.06	$ 5.80718	$ 5.79290	$ 1.85765	$ 5.36809																				
	PROJECT TOTAL (TIFIA ELIGIBLE)	$ 1,438.85	$ 100.96	$ 8.71	$ 7.67	$ 27.13	$ 29.44	$ 76.09	$ 105.55	$ 97.80	$ 99.59	$ 97.06	$ 87.26	$ 74.86	$ 75.54	$ 92.82	$ 90.66	$ 66.31	$ 83.77	$ 67.77	$ 44.93	$ 29.28	$ 72.08	$ 1.79	$ 1.79	$ -	$ -

Implementation Schedule

The implementation schedule for Phase I of Complete 540 is shown below in **Exhibit 10**.

Exhibit 10: Implementation Schedule

Event	Date
R-2721A:	
Design-Build Advertisement	September 4, 2018
Price Proposal Opening	April 16, 2019
Limited Notice to Proceed	July 23, 2019
Substantial Completion	October 21, 2022
Project Final Completion	November 23, 2022
R-2721B:	
Design-Build Advertisement	July 2, 2018
Price Proposal Opening	February 19, 2019
Limited Notice to Proceed	March 18, 2019
Substantial Completion	August 29, 2022
Project Final Completion	October 19, 2022
R-2828:	
Design-Build Advertisement	April 16, 2018
Price Proposal Opening	November 20, 2018
Limited Notice to Proceed	December 19, 2018
Substantial Completion	October 24, 2022
Project Final Completion	November 24, 2022

APPENDIX A: NCTA BOARD DELEGATION OF DUTIES

DELEGATION OF DUTIES

TO

THE NORTH CAROLINA TURNPIKE AUTHORITY BOARD

BY

THE NORTH CAROLINA SECRETARY OF TRANSPORTATION

This Delegation of Duties by the North Carolina Secretary of Transportation to the Board of the North Carolina Turnpike Authority is issued this 23 day of July, 2010, effective upon execution, under the authority and powers granted to the North Carolina Secretary of Transportation, including NCGS §143B-10 and §143B-349;

WHEREAS, the North Carolina General Assembly adopted legislation effective July 27, 2009 that transferred all powers and duties of the North Carolina Turnpike Authority (NCTA) to the Secretary of Transportation (Secretary) as recorded in Session Law 2009-343 and as codified in NCGS §136-89.182(b);

WHEREAS, the NCTA has the requisite expertise to establish the toll rates for the various toll projects under development by the NCTA (Turnpike Projects as defined in NCGS §136-89.181, said expertise being based upon solid business models and planning and, in addition, the NCTA has the financial background to assess feasibility and risk for financing the various toll projects under development by the NCTA;

WHEREAS, it is in the best interest of the State of North Carolina that certain powers assumed by the Secretary under the transfer be hereby delegated to the NCTA Board:

> The power to fix, revise, charge, and collect tolls and fees for the use of the Turnpike Projects pursuant to NCGS §136-89.183 (a) (5);
>
> To issue bonds or notes of the NCTA pursuant to NCGS §136-89.183(a)(6);
>
> To invest the proceeds of bonds or notes of the NCTA that are pending disbursement or other idle funds of the Authority in any investment authorized by NCGS §159-30 pursuant to NCGS §136-89.183 (6a); and
>
> To exercise such additional powers as shall be necessary for the financing of Turnpike Projects through compliance with the associated bond documentation, including complying with any arbitrage, rebate or other federal tax filings and providing for secondary market disclosure; provided any such additional power may be subjected to conditions, including the involvement and participation of other portions of the North Carolina Department of Transportation, which are stated within the bond documentation and executed by the Secretary acting as the Secretary;

THEREFORE, This Delegation shall be binding upon the North Carolina Department of Transportation, its successors and assigns.

Eugene A. Conti, Jr.

Eugene A. Conti, Jr.
Secretary
North Carolina Department of Transportation

(SEAL)

APPENDIX B: GEOMETRIC DESIGN CRITERIA

R-2721A: Expecting design criteria following award of contract. R-2721B is shown below:

PROPOSED DESIGN CRITERIA

STATE PROJECT:	37673.3.GV4	
F. A. PROJECT:	NHP-0540(042)	
COUNTY:	Wake	DIVISION: 5
PROJECT DESCRIPTION:	Triangle Expressway Southeast Extension from east of Pierce Olive Road(SR 1389) to east of US401	
PREPARED BY:	HDR	

ROUTE	NC 540	Ramps @ NC 540	Loops @NC 540	SR 1387	SR 1386	SR 1578	SR 1929	REFERENCE
LINE	-L-	-Y8- RAMPS -Y13- RAMPS	-Y8- LOOPS -Y13- LOOPS	-Y7- West Lake Rd	-Y8- Bells Lake Rd	-Y10- Dear Meadow	-Y10A- Deerborn Dr	OR REMARKS
TRAFFIC DATA								
ADT LET YR = 2018	27,400	-	-	9,600	8,800	1,600	-	@TF
ADT DESIGN YR = 2040	60,300	-	-	17,900	13,200	3,800	-	@TF
TTST	4%	-	-	1%	1%	1%	-	@TF
DUALS + REC VEH	7%	-	-	5%	2%	2%	-	@TF
DHV	12%	-	-	10%	12%	10%	-	@TF
DIR	65%	-	-	55%	60%	60%	-	@TF
CLASSIFICATION	Rural Freeway	Ramp	Loop	Local	Collector	Local	Local	NCDOT Functional Class Maps
TERRAIN TYPE	Rolling	Rolling	Rolling	Rolling	Rolling	Rolling	Rolling	*** I-1-1D
DESIGN SPEED mph	75	65	30	50	50	30	30	RFP PG 225 1.1.4/ PG 229
POSTED SPEED mph	70	-	-	45	45	25	25	
PROP. R/W WIDTH ft	350 ft	Varies	Varies	Varies	140'	100'		
CONTROL OF ACCESS	Full	Full	Full	None	None	None	None	RFP PG 225 1.1.2
RUMBLE STRIPS (Y/N)	Y	N	N	N	N	N	N	RFP PG 225 1.1.7
TYPICAL SECTION TYPE	6 Lane Divided	1 Lane	1 Lane	5 Lane	4 Lane Divided	2 Lane	2 Lane	RFP PG 225 1.1.6, PG 229 4.2, 4.3, 4.4
LANE WIDTH ft	12'	16'	18'	12'	12'	12'	10'	RFP PG 225 1.1.5, PG229 4.2, 4.3, 4.4
SIDEWALKS (Y/N)	N	N	N	N	N	N	N	
BICYCLE LANES (Y/N)	N	N	N	N	N	N	N	
MEDIAN WIDTH ft	70 ft	n/a	n/a	n/a	23'	n/a	n/a	RFP PG 226 1.1.8
MED. PROTECT. (GR/BARRIER)	Cable Guiderail	n/a	n/a	n/a	n/a	n/a	n/a	*** I-3-6
SHOULDER WIDTH (total)								
MEDIAN ft	14'	12'	14' Berm	n/a	1'-6" C&G	n/a	n/a	RFP PG 225 1.1.6. PG 228 3.2, 3.3
OUTSIDE w/o GR ft	14'	14'	12'	8'	8'	8'	2'	RFP PG 225 1.1.6. PG 228 3.2, 3.4
OUTSIDE w/ GR ft	17 ft	17'	15'	11'	11'	11'	7'	RFP PG 225 1.1.6. PG 228 3.2, 3.5
PAVED SHOULDER								
OUTSIDE TOTAL/FDPS ft	12' / 12'	4' /4'	4' / 4'	4' / 4'	4' / 4'	1'/1	n/a	RFP PG 225 1.1.6, PG 229 4.2,4.3, 4.4
MEDIAN TOTAL/FDPS ft	12' / 12'	4' / 4'	n/a	n/a	n/a	n/a	n/a	RFP PG 225 1.1.6, PG 229 4.2,4.3,4.4
GRADE								
MAX.	4%	5%	10%	8%	7%	10%	10%	** PG. 3-119,5-3, 8-4*** I-8-4
MIN.	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	** PG. 3-119
K VALUE								
SAG	206	157	37	96	96	37	37	**PG. 3-161
CREST	312	193	19	84	84	19	19	**PG. 3-155
HORIZ. ALIGN.								
MAX. SUPER.	.08	.08	.08	.06	.06	.04	.04	RFP PG 225 1.1.4, **3-44,45,47
MIN. RADIUS ft	2210	1480'	230'	833'	833'	250'	250'	RFP PG 225 1.1.4, **3-44, 45,47
SPIRAL (Y/N)	Y	Y	Y	N	N	N	N	*** I-1-11
CROSS SLOPES								
PAVEMENT	.02	.02	.02	.02	.02	.02	.02	*** I-1-3B
PAVED SHOULDER	.04	.02	.02	.02	.02	.02	.02	# STD. 560.02
TURF SHOULDER	.04	.08	.08	.08	.08	.08	.08	*** I-1-2B *** I-1-4O
MEDIAN DITCH	8:1	n/a	n/a	n/a	n/a	n/a	n/a	*** I-1-2B
DITCH TYPICAL (A,B)	A	A	A	A	A	B	B	***I-1-2A, F-1
CLEAR ZONE ft	30'	30'	18'	28'	28'	16'		***I-1-4N

NOTES:

*	AASHTO ROADSIDE DESIGN GUIDE 2002	@MM Municapal Meeting Recommendations
**	AASHTO GEOMETRIC DESIGN OF HIGHWAYS AND STREETS 2011	
***	NCDOT ROADWAY DESIGN MANUAL	
#	NCDOT ROADWAY STANDARD DRAWINGS	
@TF	COMPLETE 540 TRAFFIC FORECAST OCT. 2016	

PROPOSED DESIGN CRITERIA

STATE PROJECT:	37673.3.GV4
F. A. PROJECT:	NHP-0540(042)
COUNTY:	Wake DIVISION: 5
PROJECT DESCRIPTION:	Triangle Expressway Southeast Extension from east of Pierce Olive Road(SR 1389) to east of US401
PREPARED BY:	HDR

ROUTE	SR 1929	SR 1404	SR 1375	Service Road	SR 1405	SR 1503	SR 2456	REFERENCE
LINE	-Y10B- Pine Slope Dr	-Y11- Johnson Pond Rd	-Y12- Lake Wheeler Rd.	-Y12B-	-Y13- US 401	-Y13A- Donny Brook Rd	-Y14- -Y14A- Old McCullers Rd	OR REMARKS
TRAFFIC DATA								
ADT LET YR = 2018	-	3,100	-	-	47,300	5,500	-	@TF
ADT DESIGN YR = 2040	-	4,100	-	-	73,100	8,100	-	@TF
TTST	-	1%	-	-	1%	1%	-	@TF
DUALS + REC VEH	-	2%	-	-	3%	2%	-	@TF
DHV	-	10%	-	-	8%	8%	-	@TF
DIR	-	65%	-	-	60%	55%	-	@TF
CLASSIFICATION	Local	Local	Collector	Local	Arterial (Expressway)	Collector	Local	NCDOT Functional Class Maps
TERRAIN TYPE	Rolling	Rolling	Rolling	Rolling	Rolling	Rolling	Rolling	*** I-1-1D
DESIGN SPEED mph	30	50	50	30	60	40	30	RFP PG 225 1.1.4
POSTED SPEED mph	25	45	45	25	55	35	25	
PROP. R/W WIDTH ft		Varies			220'	120'	Varies	
CONTROL OF ACCESS	None	None	None	None	None	None	None	RFP PG 229 4.4, PG 330 4.5,4.6,4.7
RUMBLE STRIPS (Y/N)	N	N	N	N	N	N	N	RFP PG 229 4.4, PG 330 4.5,4.6,4.7
TYPICAL SECTION TYPE	2 Lane	2 Lane	4 Lane Divided	2 Lane	6 Lane Divided	2 Lane	2 Lane	RFP PG 229 4.4, PG 330 4.5,4.6,4.7
LANE WIDTH ft	11'	12'		9'	12'	12'	10'	RFP PG 229 4.4, PG 330 4.5,4.6,4.7
SIDEWALKS (Y/N)	N	N	Y	N	N	N	N	
BICYCLE LANES (Y/N)	N	N	Y	N	N	N	N	
MEDIAN WIDTH ft	n/a	n/a	23'	n/a	30'	n/a	n/a	RFP PG 226 1.1.8
MED. PROTECT. (GR/BARRIER)	n/a	n/a	n/a	n/a	GR	n/a	n/a	*** I-3-6
SHOULDER WIDTH (total)								
MEDIAN ft	n/a	n/a	1'-6" C&G	n/a	6'	n/a	n/a	RFP PG 229 4.4, PG 330 4.5,4.6,4.7
OUTSIDE w/o GR ft	2'	8'	10' berm	2'	12'	8'	8'	RFP PG 229 4.4, PG 330 4.5,4.6,4.7
OUTSIDE w/ GR ft	7'	11'	14' berm	7'	15'	11'	11'	RFP PG 229 4.4, PG 330 4.5,4.6,4.7
PAVED SHOULDER								
OUTSIDE TOTAL/FDPS ft	n/a	1'/1'	2'-6" C&G	n/a	10' / 4'	1'/1'	n/a	RFP PG 229 4.4, PG 330 4.5,4.6,4.7
MEDIAN TOTAL/FDPS ft	n/a	n/a	1'-6" C&G	n/a	4' / 4'	n/a	n/a	RFP PG 229 4.4, PG 330 4.5,4.6,4.7
GRADE								
MAX.	10%	8%	7%	10%	5%	10%	8%	** PG. 3-119, 8-4*** I-5-3,6-3,7-4
MIN.	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	** PG. 3-119
K VALUE								
SAG	37	96	96	37	136	64	37	**PG. 3-161
CREST	19	84	84	19	151	44	19	**PG. 3-155
HORIZ. ALIGN.								
MAX. SUPER.	.04	.06	.04	.04	.08	.06	.04	*** 1-1-5
MIN. RADIUS ft	250'	833'	926	250'	1200'	485	250'	**3-44, 45, 47
SPIRAL (Y/N)	N	N	N	N	Y	N	N	*** I-1-11
CROSS SLOPES								
PAVEMENT	.02	.02	.02	.02	.02	.02	.02	*** I-1-3B
PAVED SHOULDER	n/a	.02	C&G	.02	.04	.02	n/a	# STD. 560.02
TURF SHOULDER	.08	.08	berm	.08	.04	.08	.08	*** I-1-2B *** I-1-4O
MEDIAN DITCH	n/a	n/a	n/a	n/a	5:1	n/a	n/a	*** I-1-2B
DITCH TYPICAL (A,B)	B	A	n/a	B	A	A	B	***I-1-2A, F-1
CLEAR ZONE ft		26'	12'		30'	18'	10'	***I-1-4N

NOTES:

*	AASHTO ROADSIDE DESIGN GUIDE 2002	@MM Municapal Meeting Recommendations
**	AASHTO GEOMETRIC DESIGN OF HIGHWAYS AND STREETS 2011	
***	NCDOT ROADWAY DESIGN MANUAL	
#	NCDOT ROADWAY STANDARD DRAWINGS	
@TF	COMPLETE 540 TRAFFIC FORECAST OCT. 2016	

PROPOSED DESIGN CRITERIA

STATE PROJECT: 37673.3.GV4
F. A. PROJECT: NHP-0540(042)
COUNTY: Wake DIVISION: 5
PROJECT DESCRIPTION: Triangle Expressway Southeast Extension from east of Pierce Olive Road(SR 1389) to east of US401

PREPARED BY: HDR

ROUTE LINE	Service Roads	Local Detours	Arterial Detours	Collector Detours	Local Detours			REFERENCE OR REMARKS
TRAFFIC DATA								
ADT LET YR = 2018	<100	>5500	>15000	>8300	<5500			@TF
ADT DESIGN YR = 2040	<100							@TF
TTST								@TF
DUALS + REC VEH								@TF
DHV								@TF
DIR								@TF
CLASSIFICATION	Local	Local	Arterial	Collector	Local			NCDOT Functional Class Maps
TERRAIN TYPE	Rolling	Rolling	Rolling	Rolling	Rolling			*** I-1-1D
DESIGN SPEED mph	40	45	45	45	45			RFP PG 225 1.1.4/ 229
POSTED SPEED mph	35	45	45	45	45			
PROP. R/W WIDTH ft	Varies		Varies	Varies	Varies			
CONTROL OF ACCESS	N	N	N	N	N			RFP PG 225 1.1.2
RUMBLE STRIPS (Y/N)	N	N	N	N	N			RFP PG 225 1.1.7
TYPICAL SECTION TYPE	2 Lane	2 Lane	2 Lane	4 Lane Divided	2 Lane			RFP PG 225 1.1.6, PG 229 4.2, 4.3,4.4
LANE WIDTH ft	10'	Varies	Varies	Varies	Varies			RFP PG 225 1.1.5, PG229 4.2,4.3,4.4
SIDEWALKS (Y/N)	N	N	N	N	N			
BICYCLE LANES (Y/N)	N	N	N	N	N			
MEDIAN WIDTH ft	n/a	n/a	n/a	n/a	n/a			RFP PG 226 1.1.8
MED. PROTECT. (GR/BARRIER)	n/a	n/a	n/a	n/a	n/a			*** I-3-6
SHOULDER WIDTH (total)								
MEDIAN ft	n/a	n/a	n/a	n/a	n/a			RFP PG 225 1.1.6. PG 228 3.2, 3.3
OUTSIDE w/o GR ft	2'	8'	8'	8'	6'			RFP PG 225 1.1.6. PG 228 3.2, 3.4
OUTSIDE w/ GR ft	7'	11'	11'	11'	9'			RFP PG 225 1.1.6. PG 228 3.2, 3.5
PAVED SHOULDER								
OUTSIDE TOTAL/FDPS ft	n/a	n/a	n/a	n/a	n/a			RFP PG 225 1.1.6, PG 229 4.2,4.3,4.4
MEDIAN TOTAL/FDPS ft	n/a	n/a	n/a	n/a	n/a			RFP PG 225 1.1.6, PG 229 4.2,4.3,4.4
GRADE								
MAX.	10%	9%	9%	9%	9%			** PG. 3-119, 5-3,8-4*** I-8-4
MIN.	0.3%	0.3%	0.3%	0.3%	0.3%			** PG. 3-119
K VALUE								
SAG	64	79	79	79	79			**PG. 3-161
CREST	44	61	61	61	61			**PG. 3-155
HORIZ. ALIGN.								
MAX. SUPER.	.04	.04	.04	.04	.04			RFP PG 225 1.1.4, **3-44,45,47
MIN. RADIUS ft	533'	711'	711'	711'	711'			RFP PG 225 1.1.4, **3-44,45,47
SPIRAL (Y/N)	N	N	N	N	N			*** I-1-11
CROSS SLOPES								
PAVEMENT	.02	.02	.02	.02	.02			*** I-1-3B
PAVED SHOULDER	n/a	n/a	n/a	n/a	n/a			# STD. 560.02
TURF SHOULDER	.08	.08	.08	.08	.08			*** I-1-2B *** I-1-4O
MEDIAN DITCH	n/a	n/a	n/a	n/a	n/a			*** I-1-2B
DITCH TYPICAL (A,B)	B	A	A	A	B			***I-1-2A, F-1
CLEAR ZONE ft	18'	28'	28'	28'	28'			***I-1-4N

NOTES:

- * AASHTO ROADSIDE DESIGN GUIDE 2002
- ** AASHTO GEOMETRIC DESIGN OF HIGHWAYS AND STREETS 2011
- *** NCDOT ROADWAY DESIGN MANUAL
- # NCDOT ROADWAY STANDARD DRAWINGS
- @TF COMPLETE 540 TRAFFIC FORECAST OCT. 2016

@MM Municapal Meeting Recommendations

PROPOSED DESIGN CRITERIA

PROJECT REFERENCE NO.	SHEET NO.
R-2721B	4 OF 4

STATE PROJECT:	37673.3.GV4	
F. A. PROJECT:	NHP-0540(042)	
COUNTY:	Wake	DIVISION: 5
PROJECT DESCRIPTION:	Triangle Expressway Southeast Extension from east of Pierce Olive Road(SR 1389) to east of US401	
PREPARED BY:	HDR	

SCALE:

PLANS	1" = 50'			
PROFILES	1" = 50'	horiz.	1" = 10'	vert.
INTERCH. DETAIL	1" = 50'			
CROSS-SECTIONS	1" = 20'	horiz.	1" = 20'	vert.

SHEET SIZE:

PLANS	22" x 34"
INTERCH. DETAIL	34" x 68"
CROSS-SECTIONS	11" x 17"

BRIDGES and/or CULVERTS:

TYPE (SINGLE/DUAL/RCBC)	Single	Single	Dual	Single	Single	Single	Dual	Single	Dual
SIZE (LENGTH X WIDTH X HT)	80' x 255'	87' x 289'	58' x 270'	26' x 600'	36' x 267'	56' x 267'	58' x178'	138' x298'	58'x110'
LOCATION	Y7 West Lake Rd over 540	Y8 Bells Lake Rd over 540	540 over Wetland	Y8RPA over Wetland	Y10 Deer Meadow Rd over 540	Y11 Johnson Pond Rd over 540	540 over Y12 Lake Wheeler Rd	Y13 US 401 over 540	540 over Y14 McCullers Rd
SKETCH #	1	2	3	4	5	6	7	8	9
HORIZ.CLEARANCE	-	-	-	-	-	-	-	-	-
VERT. CLEARANCE	17'-0"	17'-0"			17'-0"	17'-0"	16'-6"	17'	15'6"

DESIGN EXCEPTIONS:

NOTES: (SPECIAL CONSIDERATIONS)

R-2828 Design Criteria is shown below:

PROPOSED DESIGN CRITERIA

STATE PROJECT:	R-2828	TIP:	R-2828
F. A. PROJECT:	N/A	PAGE:	1 of 4
COUNTY:	WAKE & JOHNSTON	DATE:	01/31/19
PROJECT DESCRIPTION:	Six-Lane divided facility for the extension of the Triangle Expressway (NC 540) from east of SR 2722 (Old McCullers Road) to east of I-40 and US 70 (Clayton Bypass		
DIVISION:	4 & 5		
PREPARED BY:	WSP		

ROUTE	NC 540	Old Stage Rd, NC 50 (Benson Rd)		Turbine Interchange			Fanny Brown Rd	REFERENCE OR REMARKS
		Ramp	Loop	Flyover	Ramp	Loop		
LINE	-L-	-Y17RPA-, -Y17RPB-, -Y17RPC-, -Y17RPD-, -Y21RPB-, -Y21RPC-	-Y21LPB-, -Y21LPC-	-Y22FLYBD-, -Y22FLYCC-, -Y22RPAFLY-, -Y22RPDE-, -Y22SLIPRPC-	-Y22RPA-, -Y22RPB-, -Y22RPC-, -Y22RPCD-, -Y22RPD-, -Y22RPE-, -Y22RPEA-, -Y22SLIPRPA-, -Y22SLIPRPB-	-Y22LPA-, -Y22LPC-	-Y16-	
TRAFFIC DATA								
ADT LET YR 2018	-	Varies	Varies	Varies	Varies	Varies	4840	
ADT DESIGN YR 2040	53,400	Varies	Varies	Varies	Varies	Varies	9500	
TTST %	4	Varies	Varies	Varies	Varies	Varies	1	
DUALS %	7	Varies	Varies	Varies	Varies	Varies	2	
K	12	Varies	Varies	Varies	Varies	Varies	11	
DIR	65	Varies	Varies	Varies	Varies	Varies	75	
CLASSIFICATION	Freeway	Ramp	Loop	Flyover	Ramp	Loop	Local	RFP
TERRAIN TYPE	Rolling	Rolling	Rolling	Rolling	Rolling	Rolling	Rolling	RFP
DESIGN SPEED mph	75	65 / 55 / 40 (1)	30	65 / 60 (1)	65 / 55 / 40 (1)	30 / 35 (5)	50	RFP
POSTED SPEED mph	70	N/A	N/A	N/A	N/A	N/A	45	Posted
PROP. R/W WIDTH ft	350 ft (Minimum)	Varies	Varies	Varies	Varies	Varies	Varies	RFP
CONTROL OF ACCESS	Full	Full	Full	Full	Full	Full	None	RFP
RUMBLE STRIPS (Y/N)	Yes	No	No	No	No	No	No	RFP
TYPICAL SECTION TYPE	6 Lane Divided	1-2 Lane Shld	1 Lane Shld/C&G	1-2 Lane Shld	1-2 Lane Shld	1 Lane Shld/C&G	3 Lane Shld	RFP
LANE WIDTH ft	12	16/12	18	16/12	16/12	18	12/16 (2)	RFP
SIDEWALKS (Y/N)	No	No	No	No	No	No	No	RFP
BICYCLE LANES (Y/N)	No	No	No	No	No	No	No	RFP
MEDIAN WIDTH m or ft	70	N/A	N/A	N/A	N/A	N/A	N/A	RFP
MED. PROTECT. (GR/BARRIER)	Guiderail	N/A	C&G	N/A	N/A	C&G	N/A	RFP
SHOULDER WIDTH (total)								
MEDIAN/INSIDE ft	14	12	C&G - 14' Berm	12	12	C&G - 14' Berm	N/A	RFP
OUTSIDE w/o GR ft	14	14	12	14	14	14	8	RFP
OUTSIDE w/ GR ft	17	17	15	17	17	17	11	RFP
PAVED SHOULDER								
OUTSIDE TOTAL/FDPS ft	12/12	4/4	4/4	12/12	12/12	12/12	4/4	RFP
MEDIAN TOTAL/FDPS ft	12/12	4/4	C&G	4/4	4/4	C&G	N/A	RFP
GRADE								
MAX.	4%	4%	7%	5%	5%	7%	8%	AASHTO 8-4 , 5-3
MIN.	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	SRTG Pg. 3/AASHTO Pg. 3-119/RFP
K VALUE								
SAG	206	157 / 115 / 64	37	157 / 136	136	37 / 49 (5)	96	AASHTO 3-161
CREST	312	193 / 114 / 44	19	193 / 151	151	19 / 29 (5)	84	AASHTO 3-155
HORIZ. ALIGN.								
MAX. SUPER.	0.08	0.08	0.08	0.06	0.08	0.08	0.06	RDM 1-15/RFP
MIN. RADIUS ft	2210	1480 / 960 / 444	230	1480 / 1330	1480 (1) / 1200	230 / 314 (5)	833	AASHTO 3-45 / 3-47 and RFP
SPIRAL (Y/N)	Yes	Yes	Yes	Yes	Yes	Yes	No	
CROSS SLOPES								
PAVEMENT	0.02	0.02	0.02	0.02	0.02	0.02	0.02	RDM 1-1-3B
PAVED SHOULDER	0.04/0.02 (4)	0.02	0.02	0.02	0.02	0.02	0.02	RSD # 560.01 (Y16) and #560.02
TURF SHOULDER	0.04	0.04 IN / 0.08 OUT	0.08	0.04 IN / 0.08 OUT	0.04	0.04	0.08	RSD # 560.01 (Y16) and #560.02
MEDIAN DITCH	8:1	N/A	N/A	N/A	N/A	N/A	N/A	RDM 1-2B, F-4
DITCH TYPICAL (A/B)	A	A	A	A	A	A	A	RDM 1-2A, F-1
CLEAR ZONE ft	30	30	14-16	30	30	14-16	20-22	RDM 1-4N
TYPICAL SECTION NO.	1 THRU 3	7	14	15 THRU 17	16 and 19	18 and 20	4	

NOTES:

(1) 65 mph for first curve through gore limits.
(2) Two Way Left Turn Lane to be 16 ft wide.
(3) Sidewalk or Multi-Use Path between ramp terminals
(4) Outside paved shoulder standard slope/Median paved shoulder slope for future lane
(5) Y22LPC has a design speed of 35 mph

PROPOSED DESIGN CRITERIA

STATE PROJECT:	R-2828	TIP:	R-2828
F. A. PROJECT:	N/A	PAGE:	2 of 4
COUNTY:	WAKE & JOHNSTON	DATE:	01/31/2019
PROJECT DESCRIPTION:	Six-Lane divided facility for the extension of the Triangle Expressway (NC 540) from east of SR 2722 (Old McCullers Road) to east of I-40 and US 70 (Clayton Bypass)		
DIVISION:	4 & 5		
PREPARED BY:	WSP		

ROUTE	Old Stage Rd Interchange	Old Stage Rd	Holland Church Rd	Sauls Rd	Jordan Rd	NC 50 Interchange	NC 50	REFERENCE OR REMARKS
LINE	-Y17-	-Y17-	-Y18-	-Y19-	-Y20-	-Y21-	-Y21-	
TRAFFIC DATA								
ADT LET YR 2018	12,560	12,560	3910	4180	2340	18,260	18,260	
ADT DESIGN YR 2040	26,400	26,400	7300	7300	3800	31,000	31,000	
TTST %	1	1	1	1	1	1	1	
DUALS %	2	2	6	5	2	2	2	
K	10	10	11	10	10	9	9	
DIR	65	65	75	65	65	65	65	
CLASSIFICATION	Collector	Collector	Local	Local	Local	Minor Arterial	Minor Arterial	RFP
TERRAIN TYPE	Rolling	Rolling	Rolling	Rolling	Rolling	Rolling	Rolling	RFP
DESIGN SPEED mph	50	50	50	50	50	50	50	RFP
POSTED SPEED mph	45	45	45	45	45	45	45	Posted
PROP. R/W WIDTH ft	Varies	Varies	Varies	Varies	Varies	Varies	Varies	RFP
CONTROL OF ACCESS	Full	None	None	None	None	Full	None	RFP
RUMBLE STRIPS (Y/N)	No	No	No	No	No	No	No	RFP
TYPICAL SECTION TYPE	4 Lane Divided	4 Lane Raised Median	2 Lane Shld	3 Lane Shld	3 Lane Shld	4 Lane Divided	4 Lane Raised Median	RFP
LANE WIDTH ft	12	12	12	12/16 (2)	12/16 (2)	11/14	11/14	RFP
SIDEWALKS (Y/N)	Yes(3)	No	No	No	No	Yes (3)	No	RFP
BICYCLE LANES (Y/N)	No	No	No	No	No	Yes- 14' Shared	No	RFP
MEDIAN WIDTH m or ft	28'	23	N/A	N/A	N/A	40'	23	RFP
MED. PROTECT. (GR/BARRIER)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	RFP
SHOULDER WIDTH (total)								
MEDIAN/INSIDE ft	C&G	C&G	N/A	N/A	N/A	C&G	C&G	RFP
OUTSIDE w/o GR ft	C&G - 8' Berm/ C&G - 13' Berm	8	8	8	8	C&G - 8' Berm	8	RFP
OUTSIDE w/ GR ft	C&G - 8' Berm/ C&G - 13' Berm	11	11	11	11	C&G - 8' Berm	11	RFP
PAVED SHOULDER								
OUTSIDE TOTAL/FDPS ft	4 / 4	4/4	2/2	4/4	4/4	N/A	4/4	RFP
MEDIAN TOTAL/FDPS ft	N/A	N/A	N/A	N/A	N/A	N/A	N/A	RFP
GRADE								
MAX.	7%	7%	8%	8%	8%	5%	5%	AASHTO 8-4
MIN.	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	SRTG Pg. 3/AASHTO Pg. 3-119/RFP
K VALUE								
SAG	96	96	96	96	96	96	96	AASHTO 3-161
CREST	84	84	84	84	84	84	84	AASHTO 3-155
HORIZ. ALIGN.								
MAX. SUPER.	0.04	0.04	0.06	0.06	0.06	0.06	0.06	RDM 1-15/RFP
MIN. RADIUS ft	926	926	833	833	833	833	833	AASHTO 3-44 / 3-45 / 3-47
SPIRAL (Y/N)	No	No	No	No	No	No	No	
CROSS SLOPES								
PAVEMENT	0.02	0.02	0.02	0.02	0.02	0.02	0.02	AASHTO 6-3
PAVED SHOULDER	0.02	0.02	0.02	0.02	0.02	0.02	0.02	Roadway Standard Drawing #560.01
TURF SHOULDER	N/A	0.08	0.08	0.08	0.08	0.08	0.08	Roadway Standard Drawing #560.01
MEDIAN DITCH	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
DITCH TYPICAL (A/B)	N/A	A	A	A	A	A	A	RDM 1-2A, F-1
CLEAR ZONE ft	20-22	20-22	20-22	20-22	20-22	20-22	20-22	RDM 1-4N
TYPICAL SECTION NO.	5 and 6	5 and 6	10	4	4	11 AND 12	11 AND 12	

NOTES:

(1) 65 mph for first curve through gore limits.

(2) Two Way Left Turn Lane to be 16 ft wide.

(3) Sidewalk or Multi-Use Path between ramp terminals.

PROPOSED DESIGN CRITERIA

STATE PROJECT:	R-2828	TIP:	R-2828
F. A. PROJECT:	N/A	PAGE:	3 of 4
COUNTY:	WAKE & JOHNSTON	DATE:	01/31/2019
PROJECT DESCRIPTION:	Six-Lane divided facility for the extension of the Triangle Expressway (NC 540) from east of SR 2722 (Old McCullers Road) to east of I-40 and US 70 (Clayton Bypass)		
DIVISION:	4 & 5		
PREPARED BY:	WSP		

ROUTE	New Bethel Church Rd	Service Rds	I-40		REFERENCE OR REMARKS
LINE	-Y22B-		-Y22-		
TRAFFIC DATA					
ADT LET YR 2018	420	N/A	85,750		
ADT DESIGN YR 2040	N/A	N/A	115,900		
TTST %	N/A	N/A	6		
DUALS %	N/A	N/A	3		
K	N/A	N/A	8		
DIR	N/A	N/A	60		
CLASSIFICATION	Local	Local	Freeway		RFP
TERRAIN TYPE	Rolling	Rolling	Rolling		RFP
DESIGN SPEED mph	50	40	75		RFP - Service RD 6.3.2
POSTED SPEED mph	45	35	70		Posted
PROP. R/W WIDTH ft	Varies	Varies	Varies		RFP
CONTROL OF ACCESS	None	None	Full		RFP
RUMBLE STRIPS (Y/N)	No	No	Yes		RFP
TYPICAL SECTION TYPE	2 Lane Shld	2 Lane Shld	8 Lane Divided		RFP
LANE WIDTH ft	12	10	12		RFP - Service RD 6.3.2
SIDEWALKS (Y/N)	No	No	No		RFP
BICYCLE LANES (Y/N)	No	No	No		RFP
MEDIAN WIDTH m or ft	N/A	N/A	22		RFP
MED. PROTECT. (GR/BARRIER)	N/A	N/A	Concrete Barrier		RFP
SHOULDER WIDTH (total)					
MEDIAN/INSIDE ft	N/A	N/A	10		RFP
OUTSIDE w/o GR ft	8	2	14		RFP - Service RD 6.3.2
OUTSIDE w/ GR ft	11	7	17		RFP
PAVED SHOULDER					
OUTSIDE TOTAL/FDPS ft	2/2	None	12/12		RFP
MEDIAN TOTAL/FDPS ft	N/A	N/A	10/10		RFP
GRADE					
MAX.	8%	10%	4%		AASHTO 8-4, 5-3
MIN.	0.3%	0.3%	0.3%		SRTG Pg. 3/AASHTO Pg. 3-119/RFP
K VALUE					
SAG	96	64	206		AASHTO 3-161
CREST	84	44	312		AASHTO 3-155
HORIZ. ALIGN.					
MAX. SUPER.	0.06	0.04	0.08		RDM 1-15/RFP- Service RD. 6.3.2
MIN. RADIUS ft	833	533	2210		AASHTO 3-45
SPIRAL (Y/N)	No	No	Yes		
CROSS SLOPES					
PAVEMENT	0.02	0.02	0.02		AASHTO 6-3
PAVED SHOULDER	0.02	0.02	0.04		Roadway Standard Drawing #560.01
TURF SHOULDER	0.08	0.08	0.04		Roadway Standard Drawing #560.01
MEDIAN DITCH	N/A	N/A	N/A		
DITCH TYPICAL (A/B)	B	B	A		RDM 1-2A, F-1 / RFP - Service RD 6.3.2
CLEAR ZONE ft	16-18	7-10	30		RDM 1-4N
TYPICAL SECTION NO.	10	9			

NOTES:

(1) 65 mph for first curve through gore limits.
(2) Two Way Left Turn Lane to be 16 ft wide.
(3) Sidewalk or Multi-Use Path between ramp terminals.

PROPOSED DESIGN CRITERIA

STATE PROJECT:	R-2828	**TIP:**	R-2828
F. A. PROJECT:	N/A		
COUNTY:	WAKE & JOHNSTON	**PAGE:**	4 of 4
PROJECT DESCRIPTION:	Six-Lane divided facility for the extension of the Triangle Expressway (NC 540) from east of SR 2722 (Old McCullers Road) to east of I-40 and US 70 (Clayton Bypass)		
DIVISION:	4 & 5		
PREPARED BY:	WSP		

SCALE:

PLANS	1 in = 50 ft			
PROFILES	1 in = 10 ft	*horiz.*	1 in = 10 ft	*vert.*
INTERCH. DETAIL	N/A			
CROSS-SECTIONS	1 in = 10 ft	*horiz.*	1 in = 10 ft	*vert.*

SHEET SIZE:

PLANS	22 x 34
INTERCH. DETAIL	N/A
CROSS-SECTIONS	22 x 34

BRIDGES and/or CULVERTS:

STR. #1 DUAL BRIDGES ON -L- (NC 540) OVER NORFOLK SOUTHERN RAILROAD	See Structure Recs
STR. #2 BRIDGE ON SR 2723 (FANNY BROWN RD.) OVER -L- (NC-540)	See Structure Recs
STR. #3 BRIDGE ON SR 1006 (OLD STAGE RD.) OVER -L- (I-485)	See Structure Recs
STR. #4 BRIDGE ON SR 2725 (HOLLAND CHURCH RD.) OVER -L- (NC-540)	See Structure Recs
STR. #5 DUAL BRIDGES ON -L- (NC-540) OVER JUNIPER BRANCH	See Structure Recs
STR. #6 BRIDGE ON SR 2727 (SAULS RD.) OVER -L- (NC-540)	See Structure Recs
STR. #7 DUAL BRIDGES ON -L- (NC-540) OVER SR 2731 (JORDAN RD.)	See Structure Recs
STR. #8 BRIDGE ON NC 50 (BENSON RD.) OVER -L- (NC-540)	See Structure Recs
STR. #9 DUAL BRIDGES ON -L- (NC-540) OVER UNNAMED TRIBUTARY TO SWIFT CREEK	See Structure Recs
STR. #10 DUAL BRIDGES ON -L- (NC-540) OVER SWIFT CREEK	See Structure Recs
STR. #11 BRIDGE ON SR 2703 (NEW BETHEL CHURCH RD.) OVER EXIST. I-40, -Y22SLIPRPA- & -Y22FLYBD-	See Structure Recs
STR. #12 DUAL BRIDGES AT I-40 INTERCHANGE ON -L- (NC-540) OVER -Y22FLYCC- & -Y22FLYBD-	See Structure Recs
STR. #13 DUAL BRIDGES AT I-40 INTERCHANGE ON -L- (NC-540) OVER EXISTING I-40	See Structure Recs
STR. #14 BRIDGE AT I-40 INTERCHANGE ON -Y22FLYCC- OVER UNNAMED TRIBUTARY TO SWIFT CREEK	See Structure Recs
STR. #15 BRIDGE AT I-40 INTERCHANGE ON -Y22FLYCC- OVER -Y22FLYCC-	See Structure Recs
STR. #16 BRIDGE AT I-40 INTERCHANGE ON -Y22FLYCC- OVER EXISTING I-40	See Structure Recs
STR. #17 BRIDGE AT I-40 INTERCHANGE ON -Y22FLYCC- OVER -Y22FLYBD- & -Y22SLIPRPC-	See Structure Recs
STR #18 BRIDGE AT I-40 INTERCHANGE ON -Y22FLYCC- OVER -L- (NC-540)	See Structure Recs
STR. #19 BRIDGE AT I-40 INTERCHANGE ON -Y22FLYCC- OVER EXISTING I-40, -Y22RPB- & -Y22FLYBD-	See Structure Recs
STR. #20 BRIDGE AT I-40 INTERCHANGE ON -Y22FLYBD- OVER EXISTING I-40	See Structure Recs
STR. #21 BRIDGE AT I-40 INTERCHANGE ON -Y22SLIPRPC- OVER EXISTING I-40	See Structure Recs
STR. #22 BRIEGE AT I-40 INTERCHANGE ON -Y22RPDE- OVER UNNAMED TRIBUTARY TO SWIFT CREEK	See Structure Recs

DESIGN EXCEPTIONS: N/A

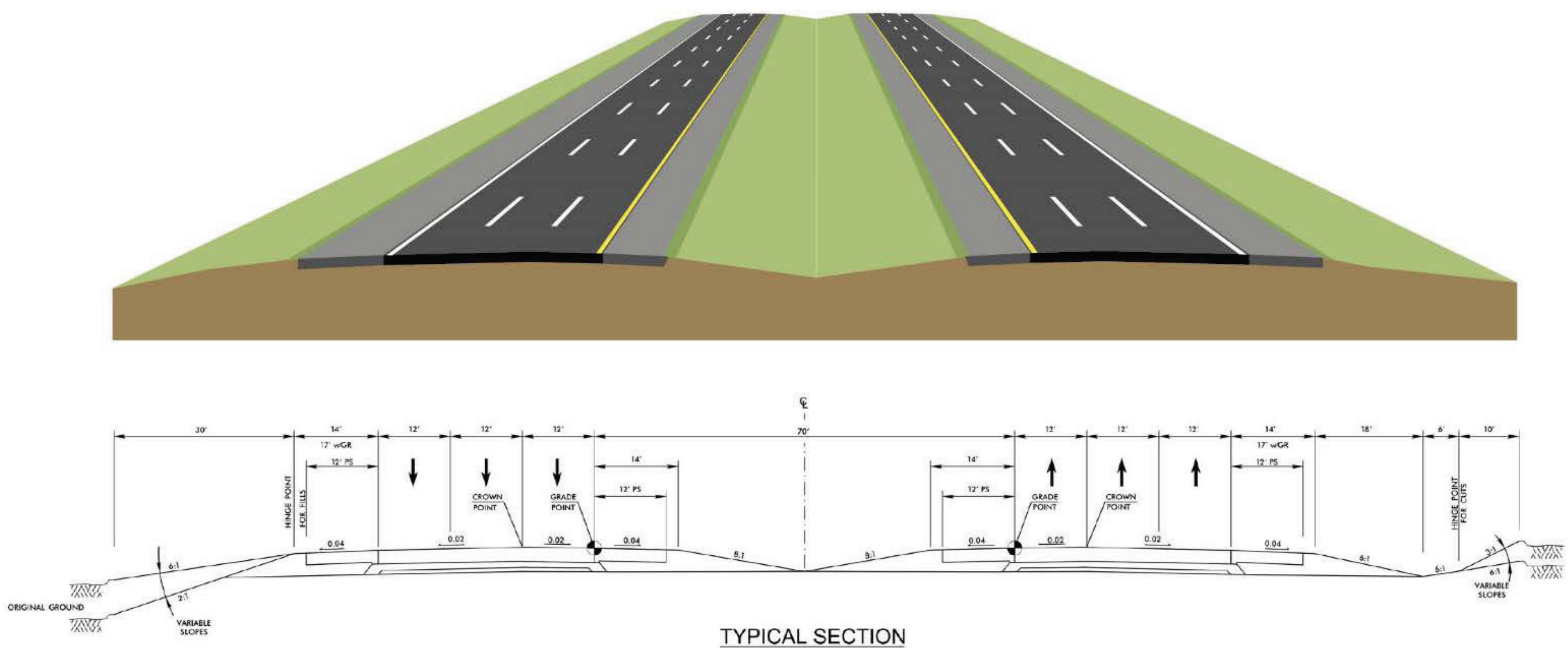
NOTES: (SPECIAL CONSIDERATIONS)

CULVERTS:

NOTE: SIZE OF ANY BOX CULVERTS TO BE DETERMINED DURING HYDRAULIC DESIGN

APPENDIX C: TYPICAL SECTIONS

Proposed Lane Configuration



TYPICAL SECTION
-L- NC 540

APPENDIX D: CONTINGENT GUARANTEES

RESOLUTION APPROVING A SUPPORT GUARANTEE FOR CERTAIN STIP PROJECTS INVOLVING THE NORTH CAROLINA TURNPIKE AUTHORITY AND AUTHORIZING THE SECRETARY TO TAKE ALL NECESSARY STEPS IN CONNECTION THEREWITH

WHEREAS, the General Assembly of North Carolina created the North Carolina Turnpike Authority (the *"Authority"*) to study, plan, develop, design, establish, purchase, construct, operate and maintain turnpike and toll projects in the State of North Carolina;

WHEREAS, the General Assembly of North Carolina transferred the Authority into the North Carolina Department of Transportation (the *"NCDOT"*) pursuant to Session Law 2009-343 and the North Carolina Secretary of Transportation, pursuant to NCGS 143B-10 and 143B-349, has delegated to the Authority certain powers with respect to, among other things, turnpike and toll projects;

WHEREAS, there are various projects in the State Transportation Improvement Plan, including but not limited to:

- No. R-2828 (Southern Wake Freeway/Triangle Expressway Southeast Extension (Raleigh Outer Loop) US 401 to I-40);
- No. R-2829 (Eastern Wake Freeway/Triangle Expressway Southeast Extension (Raleigh Outer Loop) I-40 to US 64/US 264 Bypass);
- No. R-2721A (Southern Wake Freeway/Triangle Expressway Southeast Extension (Raleigh Outer Loop) NC 55 Bypass to East of SR 1152 (Holly Springs Road)); and
- No. R-2712B (Southern Wake Freeway/Triangle Expressway Southeast Extension (Raleigh Outer Loop) East of SR 1152 (Holly Springs Road)) to East of US 401.

all of which are expected to be tolled and in which the Authority will be involved;

WHEREAS, while the total funding of such projects is still being considered, it is clear that regardless of the amounts and sources of funds for such projects, various parties will need assurance that sufficient funds will be available (a) to complete construction costs for the identified project work, (b) to provide operating and maintenance funds in the event toll and related revenues are not adequate therefor, and (c) to provide funds for renewal and replacement of the various components of the project in the event toll and related revenues are not adequate therefor;

WHEREAS, for this purpose it is requested that this Board agree to provide, upon the issuance of the respective record of decision, a guarantee of funding support for unanticipated construction costs, operating and maintenance costs and renewal and replacement costs (the *"Guarantee"*) as evidenced by this resolution and future supplemental resolutions which may add additional projects for such support;

WHEREAS, any payments made on the Guarantee for a specified project will be repaid to NCDOT from revenues of such project, with simple statutory interest, in priority after debt service on any financing for the project, debt service reserves, operating and maintenance and reserves therefor and renewal and replacement costs and reserves therefor with respect to the specified project, but ahead of other Authority uses;

NOW THEREFORE, be it resolved by the North Carolina State Board of Transportation, as follows:

Section 1. The Board hereby approves and establishes the Guarantee on the terms set forth in Section 2 hereof. The Guarantee initially shall apply to the following STIP Projects (each a *"Specified Project"*):

- No. R-2828 (Southern Wake Freeway/Triangle Expressway Southeast Extension (Raleigh Outer Loop) US 401 to I-40);
- No. R-2829 (Eastern Wake Freeway/Triangle Expressway Southeast Extension (Raleigh Outer Loop) I-40 to US 64/US 264 Bypass);
- No. R-2721A (Southern Wake Freeway/Triangle Expressway Southeast Extension (Raleigh Outer Loop) NC 55 Bypass to East of SR 1152 (Holly Springs Road)); and
- No. R-2712B (Southern Wake Freeway/Triangle Expressway Southeast Extension (Raleigh Outer Loop) East of SR 1152 (Holly Springs Road)) to East of US 401.

Any other STIP Project may be added to the Guarantee as a Specified Project by the adoption of a supplemental resolution hereto and Acknowledgement by the Secretary.

Section 2. The Guarantee is made on the following basis:

a) The toll and other revenues of each Specified Project shall be separately held and accounted for by the Authority or an agent thereof in one or more separate accounts (a *"Revenue Account"*).

b) Such toll and other revenues shall be used only to pay debt service on any financing for the Specified Project, to fund or replenish a debt service reserve, to pay all or a portion of the cost of previously unanticipated construction costs, to pay operating and maintenance expenses and fund or replenish a reserve therefor with respect to the Specified Project and to pay reasonable renewal and replacement costs and fund or replenish a reserve therefor as determined by the Authority, unless and until any amounts transferred under c) hereof have been repaid.

c) Subject to the provisions of d) hereafter, NCDOT will pay to the Authority, upon its request for deposit in accounts as designated by the Authority or its agent, 1) for unanticipated construction costs of a Specified Project, the amount of such costs, 2) to an account for operating and maintenance expenses, an amount such that, taking into account the amount of anticipated revenues of such Specified Project during such period, there will be within such account an amount equal to the sum of the expected total of operating and maintenance expenses (including scheduled deposits to a reserve therefor or replenishments of draws on such reserve) for the following 12 month period, and 3) to an account for renewal and replacement costs, an amount such that, taking into account the amount of anticipated revenues of such Specified Project during such period, there will be within such account an amount equal to the expected total of renewal and replacement costs (including scheduled deposits to a reserve therefor or replenishments of draws on such reserve) for the following 12 month period.

d) The obligation of NCDOT hereunder to the extent payments relate to the operating and maintenance expenses (including for a scheduled deposit to a reserve therefor or replenishment of a draw on such reserve) is to be funded from amounts in the State Highway Fund. The obligation of NCDOT to the extent of other payments hereunder is to be funded from amounts in either the State Highway Fund or the State Highway Trust Fund. Each such payment is subject to appropriation by the State and the availability of amounts in such fund. In the event of an overpayment, NCDOT may withhold or decrease future payments to recoup such overpayment.

e) Amounts in the Revenue Account for a Specified Project at the beginning of a State fiscal year, in excess of the sum of 1) amounts needed for anticipated debt service payments during such year on any financing for the Specified Project (including a scheduled deposit to a reserve therefor or replenishment of a draw on such reserve), and 2) 125% of i) the expected total of operating and maintenance expenses during such year (including for a scheduled deposit to a reserve therefor or replenishment of a draw on such reserve) and ii) the expected total of renewal and replacement costs during such year (including for a scheduled deposit to a reserve therefor or replenishment of a draw on such reserve), reduced by anticipated revenues of such Specified Project during such year, shall be repaid with interest to NCDOT to the extent funds have previously been transferred under c) hereof.

f) Simple interest on amounts transferred under c) hereof shall be calculated at the rate determined pursuant to Section 136-176(b) of the NCGS. Any partial repayments made pursuant to e) shall be credited to principal and interest in proportion to the total of principal and interest owed on the date of repayment.

Section 3. The Secretary of Transportation is hereby authorized and directed to permit and agree to the resources of the Department, including employees and agents, being used as required for the appropriate implementation of the Guarantee.

Section 4. It is acknowledged that should a Specified Project be the subject of public bond financing or debt with similar security provisions, it may be necessary for the portion of the Guarantee relating to that Specified Project to be stated in a separate agreement or contained within the financing documents if requested by the Authority and such changes as so necessary are hereby authorized and approved.

Section 5. It is further acknowledged that one or more Specified Projects may be combined and/or added to other projects which have previously received comparable guarantees and, notwithstanding the terms in Section 2 hereof, the particular terms and provisions of the Guarantee for such Specified Projects, including identification of the accounts or funds to which the guaranteed amounts will be deposited, how such amounts will be calculated and when repayments thereof will be made and in what amounts, may be conformed to the documentation for such comparable guarantees.

Adopted MAY 3, 2018

Acknowledgement by Secretary of Transportation

The undersigned Secretary of Transportation of the State of North Carolina is executing this Acknowledgement to evidence the agreement of the North Carolina Department of Transportation to the Guarantee contained in the attached Resolution.

SECRETARY OF TRANSPORTATION

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APPENDIX D

AUDITED FINANCIAL STATEMENTS OF THE AUTHORITY FOR FISCAL YEARS ENDED JUNE 30, 2019 AND 2018

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NORTH CAROLINA TURNPIKE AUTHORITY

FINANCIAL STATEMENTS

As of and for the Years Ended June 30, 2019 and 2018

And Report of Independent Auditor

Cherry Bekaert LLP
CPAs & Advisors

Cherry Bekaert LLP
CPAs & Advisors

Report of Independent Auditor

Board of Directors
North Carolina Turnpike Authority
Raleigh, North Carolina

Report on the Financial Statements

We have audited the accompanying statements of net position of the North Carolina Turnpike Authority ("NCTA"), a major enterprise fund of the State of North Carolina, and a business unit of the North Carolina Department of Transportation ("NCDOT") as of June 30, 2019 and 2018, and the related statements of revenues, expenses, and changes in net position and cash flows for the years then ended, and the related notes to the financial statements, which collectively comprise the NCTA's basic financial statements as listed in the table of contents.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with accounting principles generally accepted in the United States of America ("U.S. GAAP"); this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditor's Responsibility

Our responsibility is to express an opinion on these financial statements based on our audits. We conducted our audits in accordance with auditing standards generally accepted in the United States of America and the standards applicable to financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the financial statements are free of material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the NCTA's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the NCTA's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall financial statement presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Opinion

In our opinion, the financial statements referred to above present fairly, in all material respects, the respective financial position of the NCTA, as of June 30, 2019 and 2018, and the respective changes in financial position and cash flows for the years then ended in accordance with U.S. GAAP.

Emphasis of Matter

Nature of Reporting Entity

As discussed in Note 1 to the financial statements, the financial statements present only the NCTA and do not purport to and do not present fairly the financial position of the State of North Carolina or the NCDOT, as of June 30, 2019 and 2018, and the changes in their financial position and their cash flows thereof for the years then ended in conformity with U.S. GAAP.

Other Matters

Required Supplementary Information

U.S. GAAP requires that the management's discussion and analysis and the required supplementary information as listed in the table of contents be presented to supplement the basic financial statements. Such information, although not a required part of the basic financial statements, is required by the Governmental Accounting Standards Board, who considers it to be an essential part of financial reporting for placing the basic financial statements in an appropriate operational, economic, or historical context. We have applied certain limited procedures to the required supplementary information in accordance with auditing standards generally accepted in the United States of America, which consisted of inquiries of management about the methods of preparing the information and comparing the information for consistency with management's responses to our inquiries, the basic financial statements, and other knowledge we obtained during our audit of the basic financial statements. We do not express an opinion or provide any assurance on the information because the limited procedures do not provide us with sufficient evidence to express an opinion or provide any assurance.

Supplementary and Other Information

Our audit was conducted for the purpose of forming opinions on the financial statements that collectively comprise the basic financial statements of the NCTA. The Statement of Revenues, Expenses, and Changes in Net Position (Modified Accrual Basis) is presented for purposes of additional analysis and is not a required part of the financial statements. The Statement of Revenues, Expenses, and Changes in Net Position (Modified Accrual Basis) is the responsibility of management and was derived from and relates directly to the underlying accounting and other records used to prepare the financial statements. Such information has been subjected to the auditing procedures applied in the audit of the financial statements and certain additional procedures, including comparing and reconciling such information directly to the underlying accounting and other records used to prepare the financial statements or the financial statements themselves, and other additional procedures in accordance with auditing standards generally accepted in the United States of America. In our opinion, based on our audit, the information is fairly stated, in all material respects, in relation to the financial statements as a whole.

Other Reporting Required by *Government Auditing Standards*

In accordance with *Government Auditing Standards*, we have also issued our report dated October 31, 2019, on our consideration of the NCTA's internal control over financial reporting and on our tests of its compliance with certain provisions of laws, regulations, contracts, and grants agreements and other matters. The purpose of that report is to describe the scope of our testing of internal control over financial reporting and compliance and the results of that testing, and not to provide an opinion on internal control over financial reporting or on compliance. That report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering the NCTA's internal control over financial reporting and compliance.

Cherry Bekaert LLP

Raleigh, North Carolina
October 31, 2019

Management's Discussion and Analysis ("MD&A") provides an overview of the North Carolina Turnpike Authority's ("NCTA" or "Turnpike Authority") activities during the fiscal years ("FY") ended June 30, 2019, 2018, and 2017. The MD&A also includes condensed financial information comparing the current year to the prior years.

Overview of the Financial Statements

The Turnpike Authority is a public agency of the State of North Carolina located within the Department of Transportation ("NCDOT" or "Department") and is a major enterprise fund of the State. As such, NCTA is included in the State of North Carolina's Comprehensive Annual Financial Report. The accompanying statements were prepared in accordance with accounting principles generally accepted in the United States of America ("U.S. GAAP") to represent NCTA's financial position separate from the State of North Carolina.

Included in this report are the statements of net position as of June 30, 2019 and 2018, the statements of revenues, expenses, and changes in net position for the years ended June 30, 2019 and 2018, and the statements of cash flows for the years ended June 30, 2019 and 2018. **These statements represent all financial activity of the Turnpike Authority at the fund level, therefore they are not an accurate representation of the financial position of individual Turnpike Authority projects (a project specific statement of revenues, expenses, and changes in net position is on page 54).** These statements use the accrual basis of accounting, which is similar to the accounting used by most private-sector businesses. All of the current year's revenues and expenses are taken into account regardless of when cash is received or paid. The statements of net position present assets and deferred outflows of resources less liabilities and deferred inflows of resources, thus presenting NCTA's financial position at the end of the fiscal year, while the statements of revenues, expenses, and changes in net position present information showing how NCTA's net position changed during the fiscal year.

The North Carolina Turnpike Authority

History

In October 2002, legislation was passed authorizing the creation of the Turnpike Authority with the purpose to study, design, plan, construct, promote, own, finance and operate a system of toll roads, bridges, and/or tunnels supplementing the traditional non-toll transportation system serving the citizens of North Carolina (N.C. General Statute §136-89.182). Financial activity for the Turnpike Authority started in late Fiscal Year 2004. By action of the North Carolina General Assembly, effective July 27, 2009, the Turnpike Authority became a part of NCDOT.

Legislation was passed in 2013 creating the Strategic Mobility Formula, a new way to fund and prioritize transportation projects to ensure they provide the maximum benefit to the State of North Carolina (House Bill 817). This law also included changes to the annual appropriations ("GAP funds") dedicated to Turnpike Authority projects; the annual appropriation of $49 million remains for the Triangle Expressway ($25 million) and Monroe Expressway ($24 million) projects.

The Turnpike Authority operates with a project-level financial structure. NCTA projects are financed as individual systems, and revenues are subject to North Carolina General Statue §136-89.188(a) which states, "Revenues derived from a Turnpike Project authorized under this Article shall be used only for the following costs associated with the project from which the revenue was derived or a contiguous toll facility:

1. Authority administration costs
2. Development, right-of-way acquisition, design, construction, expansion, operation, maintenance, reconstruction, rehabilitation, and replacement costs.
3. Debt service on the Authority's revenue bonds or related purposes such as the establishment of debt service reserve funds."

To maintain the mandated project-level financial structure, the Turnpike Authority must have separate operating and capital budgets for each Turnpike Project.

Board of Directors

The Turnpike Authority is governed by a nine-member Board of Directors consisting of four members appointed by the General Assembly of North Carolina (two members appointed by the President Pro-Tempore of the Senate and two members appointed by the Speaker of the House of Representatives), four members appointed by the Governor of the State, and the North Carolina Secretary of Transportation. The Chair of the Board is selected by the Turnpike Authority Board. Currently, MG(R) James H. Trogdon, III, P.E., the North Carolina Secretary of Transportation, serves as the Chairman of the Turnpike Authority Board. As of June 30, 2019, there was one vacancy on the Turnpike Authority Board.

Board Authority

On July 23, 2010, the following powers were delegated by the North Carolina Secretary of Transportation to the Turnpike Authority Board of Directors:

- Fix, revise, charge, and collect tolls and fees for the use of Turnpike Projects pursuant to NCGS §136-89.183 (a)(5);
- Issue bonds or notes of the Turnpike Authority pursuant to NCGS §136-89.183(a)(6);
- Invest the proceeds of bonds or notes of the Turnpike Authority that are pending disbursement or other idle funds of the Turnpike Authority in any investment authorized by NCGS §159-30 pursuant to NCGS §136-89.183 (6a); and,
- Exercise such additional powers as shall be necessary for the financing of Turnpike Projects through compliance with the associated bond documentation, including complying with any arbitrage, rebate or other federal tax filings and providing for secondary market disclosure; provided any such additional power may be subjected to conditions, including the involvement and participation of other portions of the North Carolina Department of Transportation, which are stated within the bond documentation and executed by the Secretary acting as the Secretary.

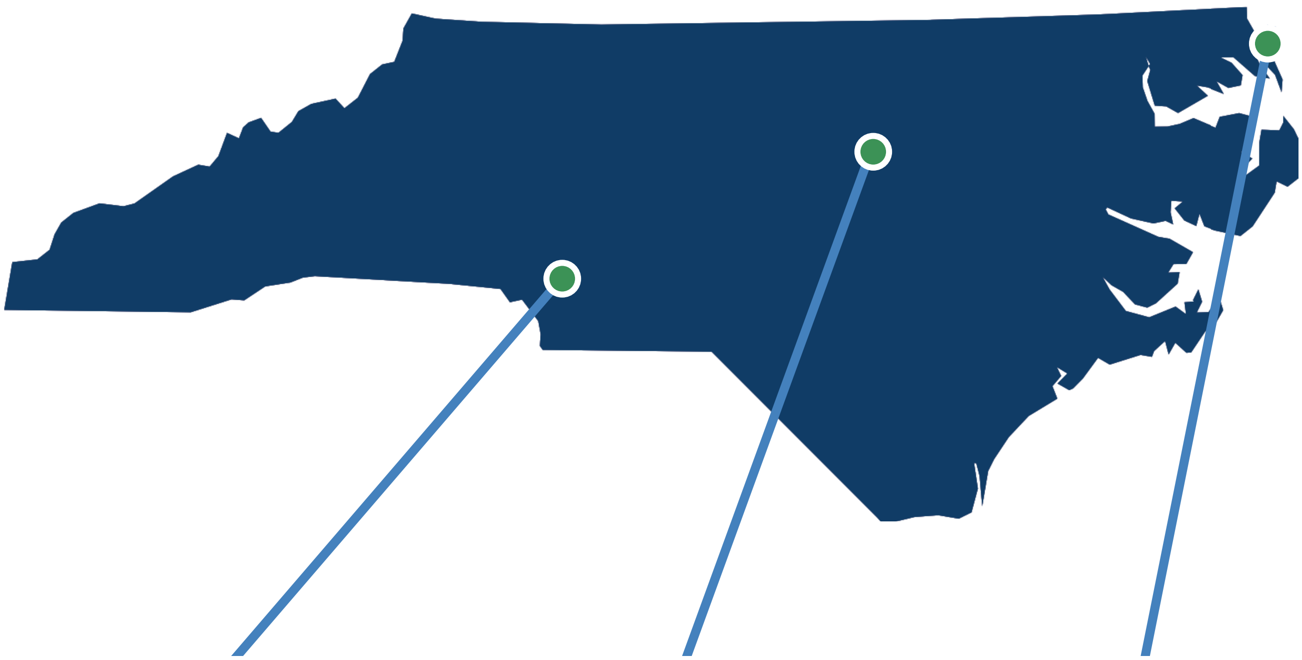
Toll Rate Policy

On September 17, 2008, the Turnpike Authority Board of Directors adopted a toll rate policy (the "Toll Rate Policy") which provides guidelines pursuant to which the Turnpike Authority shall establish and adjust toll rate schedules for its projects. Pursuant to the Toll Rate Policy, the Turnpike Authority is required to hire a Traffic Consultant to prepare a Traffic and Revenue Report for each of its projects and forecast the projected traffic and toll revenue to be generated. After receipt of such Traffic and Revenue Report, the Toll Rate Policy directs the Turnpike Authority Board of Directors to adopt a toll rate schedule that forecasts revenue on the project that are at least the same level as the revenue set forth in the Traffic and Revenue report.

Under the Toll Rate Policy, an increase in the toll rates is required each year unless the Turnpike Authority provides to the Trustee (1) a resolution of the Turnpike Authority's Board directing that the toll rates will not be increased or will be increased in a lesser amount than assumed in the Traffic and Revenue Report; (2) a certificate of an officer of the Turnpike Authority to the effect that NCTA is in compliance with all applicable rate covenants in the Trust Agreement and all other documents for the Bonds issued to finance its projects; and (3) a report of the Traffic Consultant showing that for each succeeding fiscal year through the final maturity date for all indebtedness issued to finance the project, the forecasted revenues in each such fiscal year would be such that one dollar of additional senior lien indebtedness could be issued by the Turnpike Authority in compliance with the requirements of the additional debt limitations set forth in the documents related to all bonds issued to finance the project.

The Turnpike Authority Board of Directors has adopted toll rate schedules for both the Triangle Expressway and Monroe Expressway projects based on their respective Traffic and Revenue Reports. The toll rate schedules for each facility provide the toll rates for every year through the final maturity date for all indebtedness issued to finance each project. Toll rates on both facilities increase each January 1 based on the approved toll rate schedules. In Calendar Year (CY) 2018, the average cost per mile for customers on the Triangle Expressway in a Class 1 (two-axle) vehicle paying with a transponder was $0.17 and in CY 2019, the average cost per mile increased to $0.18. In CY 2019, the average cost per mile for customers on the Monroe Expressway in a Class 1 (two-axle) vehicle paying with a transponder is $0.14.

Turnpike Authority Projects



Charlotte Area

- Monroe Expressway
- I-77 Express Lanes
  Partially open to traffic
- I-485 Express Lanes
  Construction began August 2019
- U.S. 74 Express Lanes

Raleigh Area

- Triangle Expressway
- Complete 540

Outer Banks

- Mid-Currituck Bridge

Project status as of June 30, 2019

- Open to Traffic
- Under Construction Contract
- Under Development

Operational Projects

Triangle Expressway

The Triangle Expressway is a six-lane, 18.8-mile All-Electronic Toll (AET) facility, extending from the interchange of I-40 and N.C. 147 in the north, to the N.C. 55 Bypass in the south, to partially complete the "Outer Loop" around the greater Raleigh area. The Triangle Expressway opened in phases between 2011 and 2013, with the final phase opening to toll traffic on January 2, 2013.

Fiscal Year 2019 Highlights

Transactions:	55.7 million	8.7% year-over-year increase
Revenue:	$52.6 million	7.4% year-over-year increase
Operating Expenses:	$20.1 million	0.6% below budget

Monroe Expressway

The Monroe Expressway is a four-lane, 19.8-mile AET facility that extends from U.S. 74 at I-485 in eastern Mecklenburg County to U.S. 74 between the towns of Wingate and Marshville in Union County. The Monroe Expressway opened to toll traffic on November 27, 2018.

Fiscal Year 2019 Highlights

Transactions:	15.5 million
Revenue:	$6.5 million
Operating Expenses:	$2.8 million

I-77 Express Lanes

The I-77 Express Lanes project has been delivered as a concession agreement between NCDOT and I-77 Mobility Partners, LLC and is the first toll project in the state of North Carolina delivered via a public-private partnership (P3). The I-77 Express Lanes project is approximately 26 miles long between the I-77 / I-277 junction in Charlotte and N.C. 150 in Mooresville. The Turnpike Authority is responsible for account management, billing and customer service for the express lanes. The northern-most 13 miles of the express lanes opened to traffic on June 1, 2019 and the remaining segments are expected to open in late 2019.

Projects Under Development

The State Transportation Improvement Program (STIP) designates the scheduling and funding of transportation projects in the state of North Carolina. The following projects under development have been committed in the first five years of the FY 2018 to 2027 STIP.

Complete 540

The proposed Complete 540 project will extend the existing Triangle Expressway System approximately 29 miles from the N.C. 55 Bypass in Apex, NC to the U.S. 64/U.S. 264 Bypass in Knightdale, completing the "Outer Loop" around the greater Raleigh area. Phase I of the Complete 540 project will extend the existing Triangle Expressway to I-40 in the Southeast of Raleigh and Phase II will extend the project from I-40 up to I-540. Phase I is expected to open to traffic in 2023.

I-485 Express Lanes

The proposed I-485 Express Lanes project will add one express lane in each direction for approximately 17 miles between I-77 and U.S. 74 in southern Charlotte. The project will also extend the outside general-purpose lane in each direction from Rea Road to N.C. 16 (Providence Road). Construction on the project is expected to begin in late summer 2019. I-485 Express Lanes are expected to open to traffic in late 2022.

U.S. 74 Express Lanes

There are currently two proposed express lanes projects being studied on the U.S. 74 corridor in the Charlotte region. The first of two projects will provide express lanes in the median of U.S. 74 between I-277 and Idlewild Road for approximately five miles. The second project is part of a planned express lanes network that involves widening and adding express lanes to U.S. 74 from Idlewild Road in Charlotte to I-485 in Matthews, for approximately 6.3 miles.

Mid-Currituck Bridge

The proposed Mid-Currituck Bridge is a seven-mile long project between U.S. 158 and the Outer Banks. There will be a two-lane bridge spanning the Currituck Sound connecting Currituck County mainland with its Outer Banks as well as a two-lane bridge spanning the Maple Swap on Currituck County mainland connecting Aydlett to U.S. 158.

Financial Highlights & Analysis

Turnpike Authority Fund

Budgeted Administrative Activities for fiscal years 2019 and 2018 were limited to salaries, personnel, Board members' per-diem, travel, and other general operating expenditures, while project-related costs were funded by state-appropriated, Federal Highway Administration ("FHWA"), or project-specific financings. Funding for administrative expenses is reviewed and advanced as needed from the Highway Trust Fund. Interest began to accrue on the advance on January 1, 2014.

- The Turnpike Authority's total assets increased $122.6 million to $2.2 billion.
- The Turnpike Authority's total capital assets increased $86.2 million to $1.9 billion.

Triangle Expressway

The Triangle Expressway is North Carolina's first modern toll road, and is approximately 18.8 miles of new highway construction, extending from the interchange of I-40 and N.C. 147 on the north end, to the N.C. 55 Bypass in the south, to partially complete the "Outer Loop" around the greater Raleigh area. The final phase opened to toll traffic on January 2, 2013. In April 2017, the Veridea Parkway interchange, previously named Old Holly Springs-Apex Road, opened to traffic. The Veridea Parkway Interchange is located between the U.S. 1 interchange and the N.C. 55 Bypass interchange on the southern end of the Triangle Expressway and provides a direct local link between the Triangle Expressway and Veridea Parkway/Old Holly Springs-Apex Road. The Veridea Parkway Interchange was paid for in part with proceeds of the 2009 toll revenue bonds. A second interchange, the Morrisville Parkway Interchange, is currently under construction and is expected to be completed in early 2020 to provide increased connectivity and access. Toll revenues from both the Veridea Parkway Interchange and Morrisville Parkway Interchange are or will be included in Receipts and Revenues of the Triangle Expressway System.

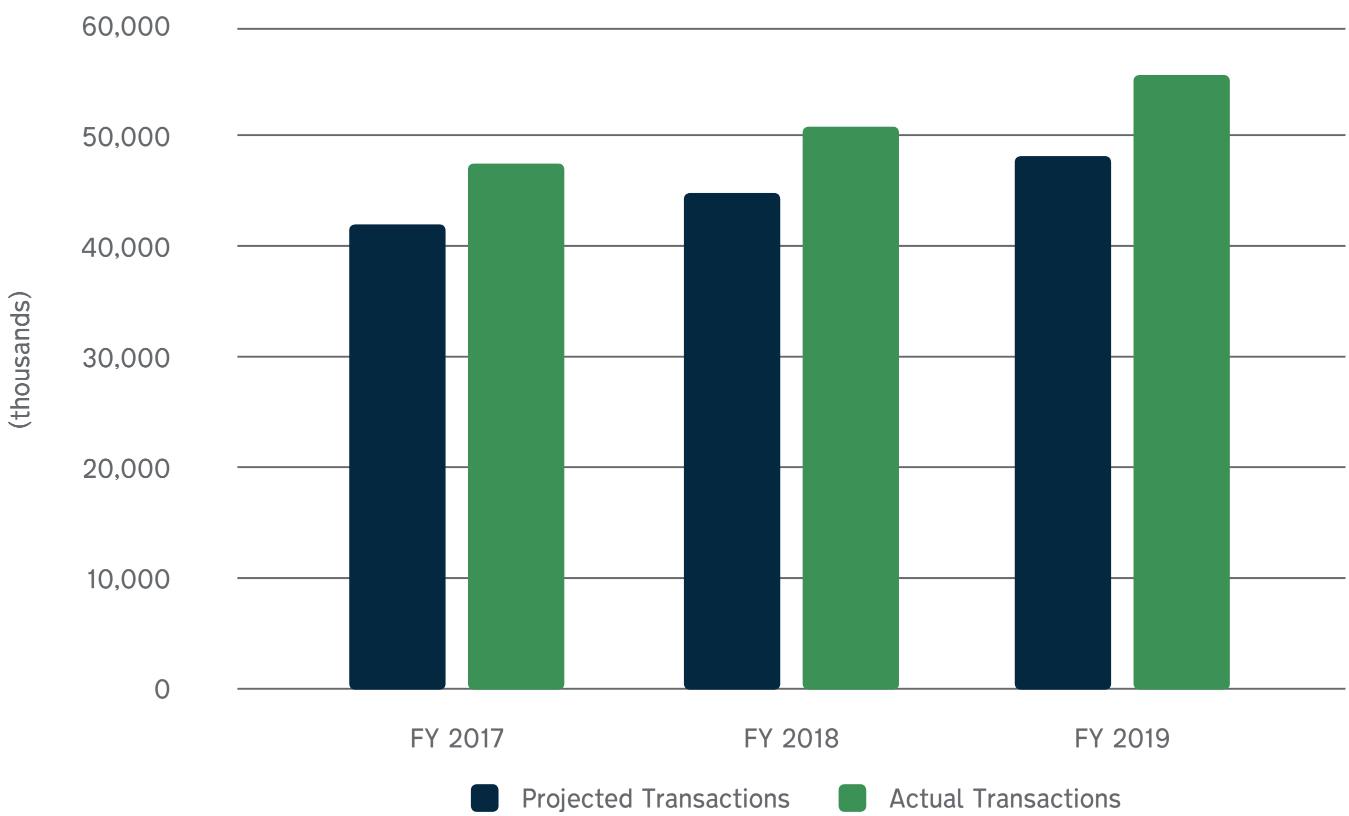
Fiscal Year 2019 Highlights

- Transactions grew 8.7% to 55.7 million in FY 2019 from 2018. Fiscal Year 2019 had the highest number of transactions on record and was the sixth straight fiscal year of transaction growth.
- Revenue increased 7.4% to $52.6 million in FY 2019 from FY 2018. FY 2019 had the highest fiscal year operating revenue on record which was the sixth straight year of revenue growth.
- Operating expenses for the Triangle Expressway increased by 11.7% to $20.1 million in FY 2019 which was 0.56% under budget.
- In December 2018, the Turnpike Authority issued Triangle Expressway System Toll Revenue Refunding bonds, Series 2018 to refund the 2009 Triangle Expressway Transportation Infrastructure Finance and Innovation Act (TIFIA) loan. This transaction resulted in net present value savings of over $10.2 million.
- In March 2019, Fitch upgraded the Appropriation Revenue Bonds on the Triangle Expressway to AA from AA-. The rating outlook is stable.

Transactions & Revenue

The Triangle Expressway has seen six consecutive fiscal years of transaction and revenue growth. Transactions and revenue continue to exceed projections from the 2009 investment grade Traffic and Revenue Report prepared by CDM Smith. Project to date, transactions and revenue have exceeded the 2009 projections by 12 and 30 percent, respectively. The table below shows the number of toll transactions on the Triangle Expressway in fiscal years 2017, 2018 and 2019.

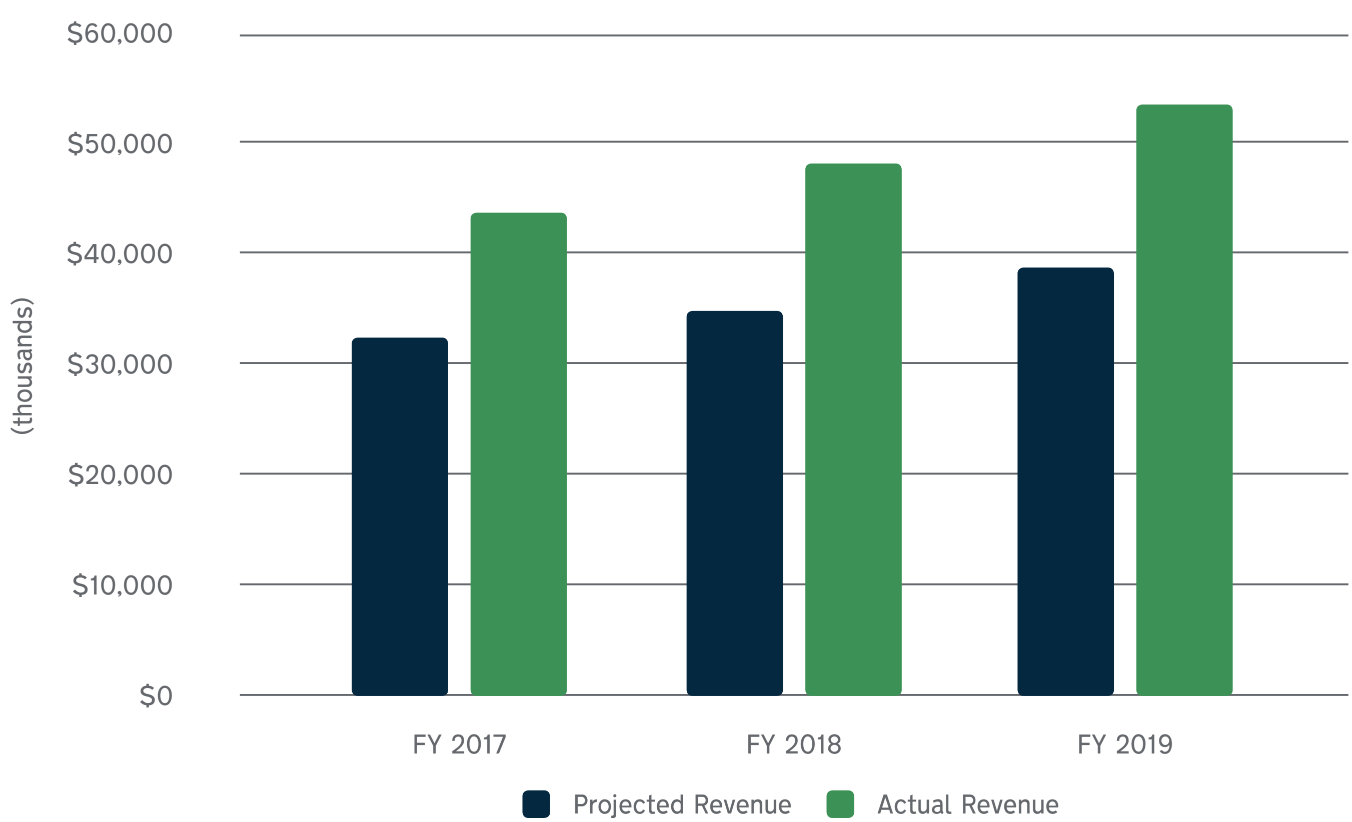
	FY 2017	FY 2018	FY 2019
Projected Transactions	41,896,000	45,037,000	48,466,000
Actual Transactions	47,513,586	51,236,836	55,711,406
Actual to Projected (%)	113%	114%	115%
Actual Transactions YOY Increase (%)	11.9%	7.8%	8.7%



The table below shows the actual revenue received on the Triangle Expressway in fiscal years 2017, 2018 and 2019. Actual revenue is shown on a cash basis and is inclusive of the following:

- Toll Revenue
- Processing Fees
- Interest Earnings
- Credit Card Equity Fees
- Non-Sufficient Funds Fees
- Actual Damages

	FY 2017	FY 2018	FY 2019
Projected Revenue	$32,138,000	$35,719,000	$39,705,000
Actual Revenue	$44,009,928	$48,937,600	$52,551,254
Actual to Projected (%)	137%	137%	132%
Actual Revenue YOY Increase (%)	21.4%	11.2%	7.4%



	FY 2017	FY 2018	FY 2019
Toll Revenue as a % of Total Actual Revenue	87.4%	88.0%	91.6%

Toll Revenue as a percent of Total Actual Revenue is calculated by dividing the total toll revenue by actual revenue for each fiscal year. This percentage has grown over the last three fiscal years which indicates the toll revenue has been increasing at a higher rate than revenues earned from processing fees, etc.

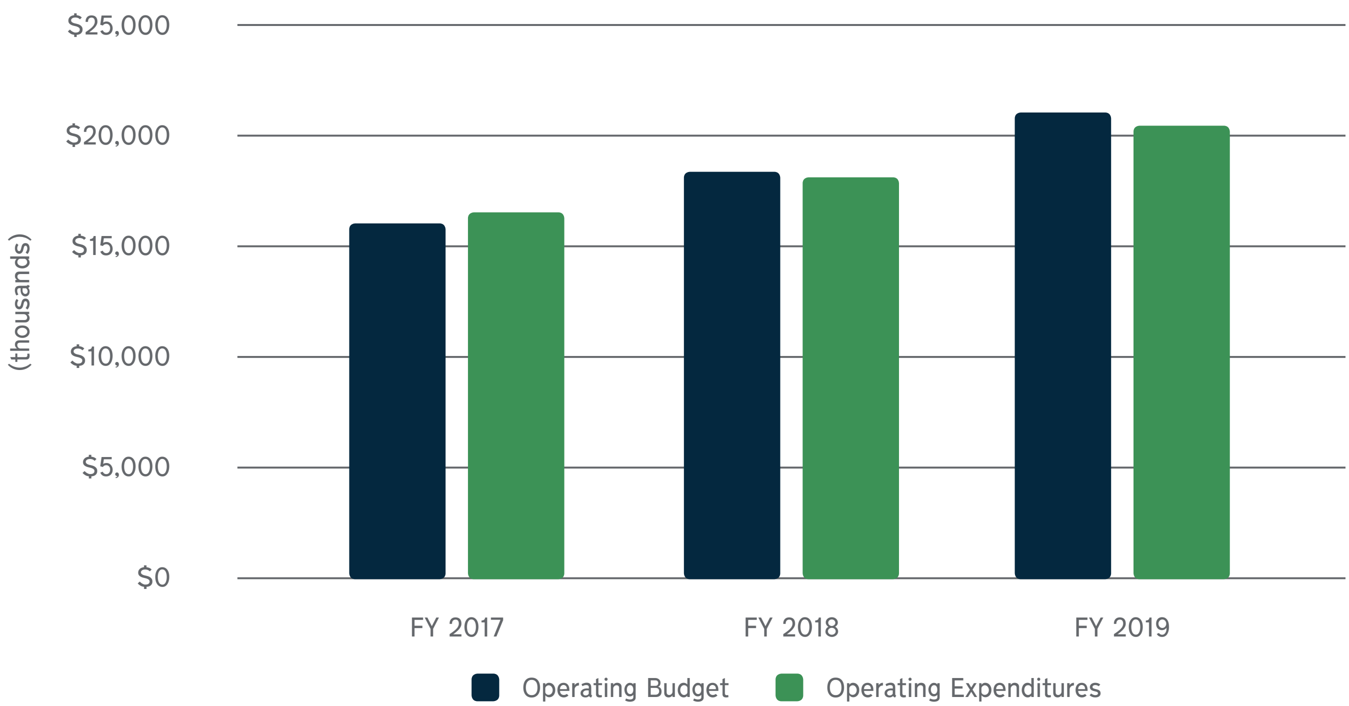
Operating Expenses

Operating Expenses for the Triangle Expressway include:

- NCDOT Personnel & Professional Consultant Labor
- Roadway Maintenance
- Service & Safety Patrols
- Toll Operations & Customer Service
- Marketing & Communications

Below is a breakdown of the operating budgets and expenses for the Triangle Expressway for fiscal years 2017, 2018 and 2019. Operating expenses increased 11.7% in FY 2019, 10.5% in FY 2018 and 10.0% in FY 2017. Operating expenses increased at a lower rate than actual revenue growth in fiscal years 2017 and 2018, and at a slightly higher rate than revenue in FY 2019. This can largely be attributed to increases associated with the back office system contract extension.

	FY 2017	FY 2018	FY 2019
Operating Budget	$16,055,147	$18,229,305	$20,241,040
Operating Expenses	$16,304,561	$18,019,430	$20,128,589



Monroe Expressway

The Monroe Expressway is an AET facility that is 19.8-miles of new highway construction that extends from U.S. 74 at I-485 in eastern Mecklenburg County to U.S. 74 between the towns of Wingate and Marshville in Union County. The expressway improves mobility and capacity within the project study area by providing a highway for the U.S. 74 corridor that allows for high-speed regional travel. The Monroe Expressway opened to traffic on November 27, 2018.

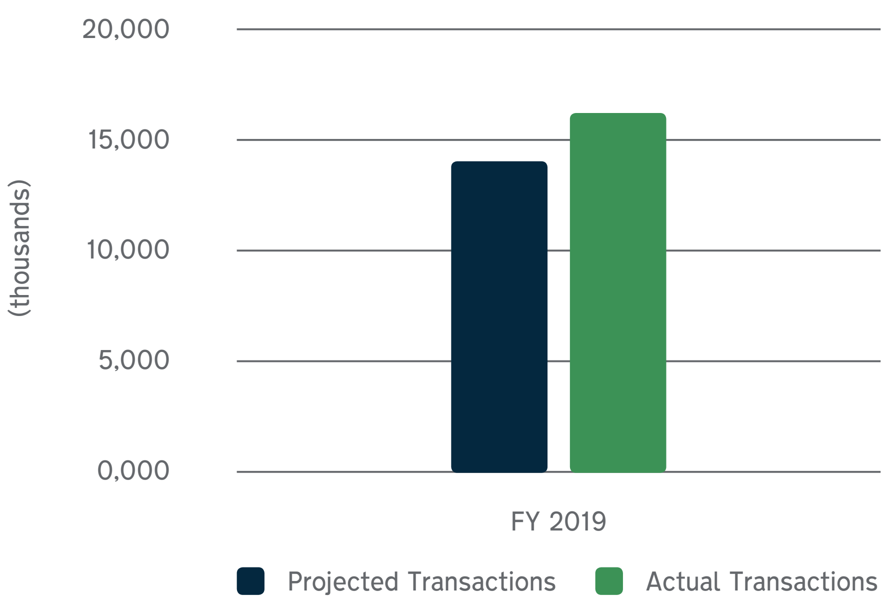
Fiscal Year 2019 Highlights

- The Monroe Expressway opened to traffic on November 27, 2018.
- In FY 2019, the Monroe Expressway had 15.5 million transactions.
- In FY 2019, the Monroe Expressway earned $6.5 million in revenue.
- In May 2019, S&P upgraded the outstanding Toll Revenue Bonds as well as the TIFIA Loan on the Monroe Expressway to BBB from BBB-. The rating outlook is stable.

Transactions & Revenue

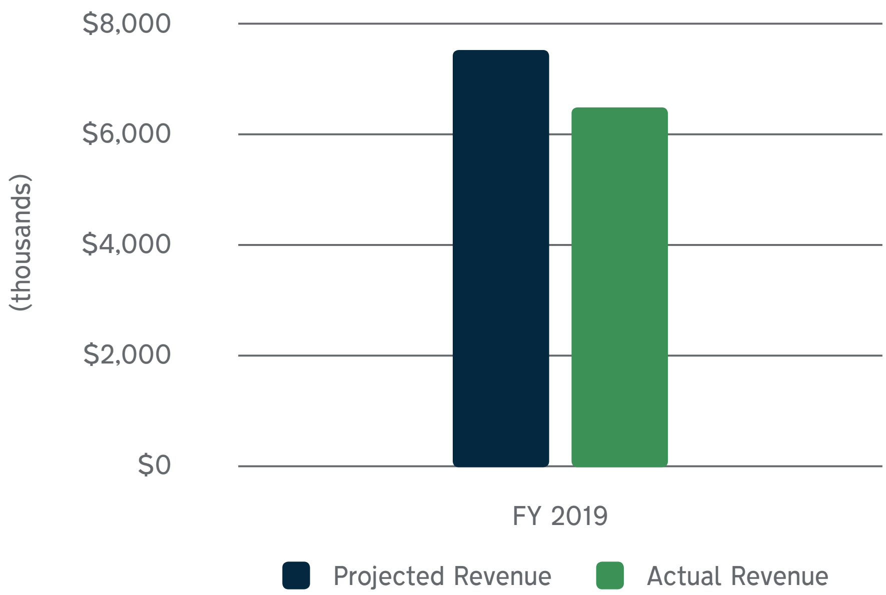
The Monroe Expressway has seen steady transaction and revenue growth in Fiscal Year 2019. Below is a table that shows the number of toll transactions compared to projections from the original 2016 investment grade Traffic and Revenue Report prepared by CDM Smith. FY 2019 transactions exceeded 2016 projections by eight percent.

	FY 2019
Projected Transactions	14,324,000
Actual Transactions	15,465,670
Actual to Projected (%)	108%



In FY 2019 the actual revenue received on the Monroe Expressway was 13 percent under projections, which was influenced largely by the timing of the bill by mail invoicing cycle, and the project opening in November of this fiscal year. The Traffic and Revenue Report assumes revenue occurs in the same fiscal year as the corresponding transaction, however, given the bill by mail invoicing cycle, there is a timing difference for when cash is received. Operating revenue for FY 2019 totaled $9.5 million.

	FY 2019
Projected Revenue	$7,519,000
Actual Revenue	$6,516,170
Actual to Projected (%)	87%



	FY 2019
Toll Revenue as a % of Total Actual Revenue	90.1%

Toll Revenue as a percent of Total Actual Revenue is calculated by dividing the total toll revenue by Actual revenue for each fiscal year.

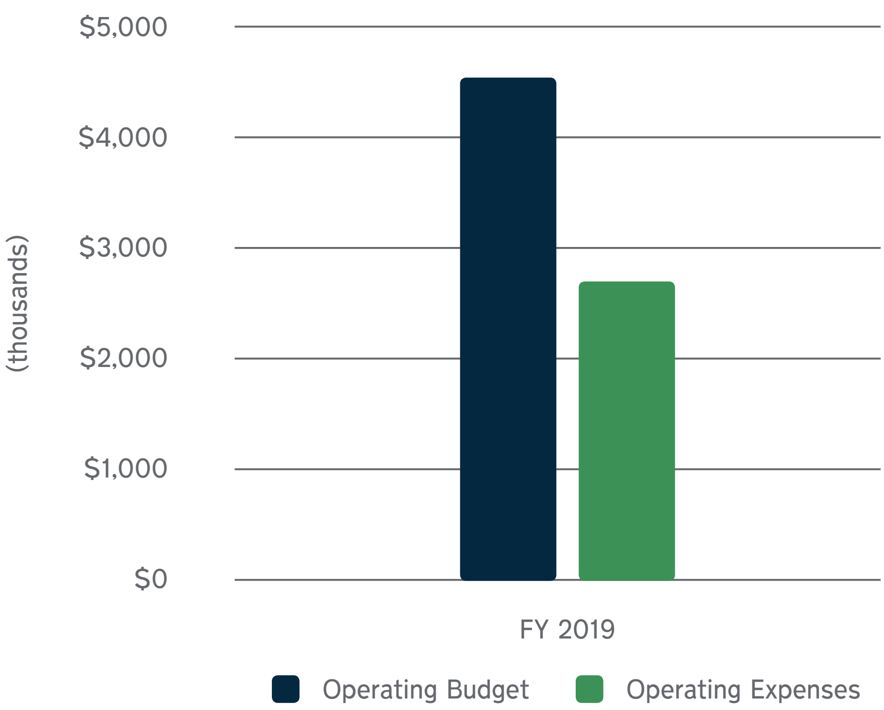
Operating Expenses

Operating Expenses for the Monroe Expressway include:

- NCDOT Personnel & Professional Consultant Labor
- Roadway Maintenance
- Service & Safety Patrols
- Toll Operations & Customer Service
- Marketing & Communications

Below is a breakdown of the operating budget and expenses for the Monroe Expressway for Fiscal Year 2019. The operating budget for FY 2019 is from the base case projections at financial close.

	FY 2019
Operating Budget	$4,616,500
Operating Expenses	$2,843,312



New Debt Issuances

Triangle Expressway

There was one bond issuance in Fiscal Year 2019. On December 12, 2018, NCTA issued $401,155,000 of Triangle Expressway System Senior Lien Turnpike Revenue Refunding Bonds, Series 2018, pursuant to Article 6H of Chapter 136 and Article 5 of Chapter 159 of the North Carolina General Statutes, to refund the Triangle Expressway Transportation Infrastructure Finance and Innovation Act (TIFIA) Loan. Interest on the bonds is payable semiannually on January 1 and July 1 of each year, beginning July 1, 2019. The Series 2018 bonds mature from January 1, 2020 through January 1, 2041 and were issued at coupon rates of 4.000% and 5.000%. The bonds are subject to optional redemption on or after January 1, 2029. The transaction resulted in over $10.2 million net present value savings.

Additionally, on August 3, 2017, the Turnpike Authority entered into a forward delivery bond purchase agreement with Bank of America, N.A. (the "Bank") whereby the Bank purchased and the Turnpike Authority sold $161,759,000 of Triangle Expressway System Appropriation Revenue Refunding Bonds, Series 2018B on December 31, 2018. Interest on the bonds is payable semiannually on January 1 and July 1 of each year, beginning July 1, 2019. The Series 2018B bonds will mature from January 1, 2020 through January 1, 2032 and were issued at a coupon rate of 2.820%. The bonds are subject to optional redemption on or after January 1, 2029.

Monroe Expressway

There were no new debt issuances for the Monroe Expressway in Fiscal Year 2019.

Outstanding Debt as of June 30, 2019

Triangle Expressway

	Outstanding Par	Final Maturity
Senior Lien Revenue Bonds, Series 2009B	$35,173,109	1/1/2038
Appropriation Revenue Bonds, Series 2009B	$20,210,000	1/1/2021
Senior Lien Revenue Refunding Bonds, Series 2017	$194,035,000	1/1/2039
Senior Lien Revenue Refunding Bonds, Series 2018	$401,155,000	1/1/2041
Appropriation Revenue Refunding Bonds, Series 2018A	$150,125,000	1/1/2039
Appropriation Revenue Refunding Bonds, Series 2018B	$161,759,000	1/1/2032

Monroe Expressway

	Outstanding Par	Final Maturity
Appropriation Revenue Bonds, Series 2010A	$233,920,000	1/1/2041
Appropriation Revenue Bonds, Series 2011	$123,185,000	7/1/2041
Toll Revenue Bonds, Series 2016A	$119,455,000	7/1/2054
Toll Revenue Bonds, Series 2016C	$17,596,904	7/1/2041
TIFIA Loan	$120,000,000	7/1/2053

Net Position

Net position represents the residual interest in the Turnpike Authority's assets after all liabilities are deducted. For reporting purposes, they are divided into three categories: net investment in capital assets; restricted; and unrestricted.

Condensed Statements of Net Position

	2019	2018	2017
Current Assets	$ 30,438,031.58	$ 18,735,628.56	$ 18,424,898.00
Restricted Assets, Prepaid Insurance Costs, and Net OPEB Asset	300,630,636.32	275,924,998.73	324,352,204.00
Capital Assets	1,850,085,869.36	1,763,845,036.74	1,661,457,187.00
Total Assets	2,181,154,537.26	2,058,505,664.03	2,004,234,289.00
Deferred Outflows of Resources	30,349,746.50	28,830,658.95	20,743,112.00
Current Liabilities	117,186,988.36	141,317,794.87	99,141,469.00
Noncurrent Liabilities	1,692,373,834.10	1,595,214,113.90	1,606,765,510.00
Total Liabilities	1,809,560,822.46	1,736,531,908.77	1,705,906,979.00
Deferred Inflows of Resources	1,147,919.00	33,221.00	32,383.00
Net Investment in Capital Assets	484,796,525.78	529,511,803.08	459,895,176.00
Restricted:			
Debt service	108,390,159.83	7,475,821.35	5,476,668.00
Transportation	177,263.89	-	-
Unrestricted	(192,568,407.20)	(186,924,333.22)	(146,333,805.00)
Net Position	$ 400,795,542.30	$ 350,063,291.21	$ 319,038,039.00

Current Assets

The increase in FY 2019 is due to an increase in accounts receivable, including a receivable of federal funds for the Complete 540 project. The increase in FY 2018 is mainly due to an increase in transponder inventory.

Restricted Assets & Prepaid Insurance Costs

The increase in FY 2019 was due to the sale of bonds which increased restricted investments. The decrease in FY 2018 is due to the use of bond proceeds for the Monroe Expressway and the continued amortization of the bond insurance for the Triangle Expressway.

Capital Assets

Capital Assets, Non-Depreciable

The decrease is due to the reclassification of the Monroe Expressway from construction in progress to a depreciable capital asset as the road opened in FY 2019. The increase in FY 2018 due to the increase in the construction in progress and the land accounts for continued work on the various turnpike projects.

Capital Assets, Depreciable

The increase in FY 2019 is due to the opening of the Monroe Expressway and the reclassification from construction progress to a depreciable asset. The decrease in FY 2018 is due to the annual depreciation of the Triangle Expressway.

Current Liabilities

Current liabilities include accounts payable, current portion of interest payable, obligations under securities lending, current portion of revenue bonds payable, and other current liabilities. The decrease in FY 2019 is due to a decrease in the payables to other funds. At June 30, 2019 most of the outstanding Monroe Expressway contract payment reimbursements to the Highway Fund had been cleared that were outstanding at June 30, 2018. The increase in FY 2018 is due to an increase in the payables to other funds. This increase is due to an increase in contract payments for the Monroe Expressway that were initially paid for by the Highway Fund and will be reimbursed by the Turnpike Authority at a later date.

Noncurrent Liabilities

Noncurrent liabilities include revenue bonds payable, notes payable, funds advanced to the Turnpike Authority from the Highway Trust Fund to cover the Turnpike Authority's administrative expenditures, and the noncurrent portion of accrued vacation and interest payable. The increase in FY 2019 is due to the increase in bonds payable. The decrease in FY 2018 is due to the decrease in the noncurrent bonds payable.

Net Position & Revenues, Expenses, and Changes in Net Position

For fiscal years 2019 and 2018, the Turnpike Authority ended with positive net position.

Condensed Statements of Revenues, Expenses, and Changes in Net Position

	2019	2018	2017
Operating Revenues:			
Charges for Services	$ 63,987,342.98	$ 48,999,352.61	$ 44,707,706.00
Other Operating Revenues	1,168,045.23	648,256.27	812,050.00
Total Operating Revenues	65,155,388.21	49,647,608.88	45,519,756.00
Operating Expenses:			
Personnel Services	1,643,266.67	1,326,736.25	1,212,703.00
Supplies and Materials	69,796.86	72,748.57	281,122.00
Contracted Personnel Services	1,004,455.46	776,212.34	888,012.00
Travel	67,194.56	49,989.22	35,126.00
Advertising	574,499.10	123,921.65	48,844.00
Utilities	275,971.24	281,988.94	272,028.00
Dues and Subscription Fees	11,500.00	23,960.00	22,586.00
Other Services	5,316,703.91	3,814,480.59	4,965,440.00
Cost of Goods Sold	810,118.81	726,724.39	788,249.00
Capital Outlay	33,972,010.22	15,153,166.50	15,262,218.00
Rental Expense	176,432.27	107,994.45	65,529.00
Depreciation	24,035,020.18	16,129,720.29	16,129,720.00
Total Operating Expenses	67,956,969.28	38,587,643.19	39,971,577.00
Operating Income (Loss)	(2,801,581.07)	11,059,965.69	5,548,179.00
Nonoperating Revenue (Expenses) and Capital Grants	(24,802,956.86)	(33,562,851.52)	103,562,052.00
Transfers In	78,336,789.02	55,543,931.22	49,000,000.00
Change in Net Position	50,732,251.09	33,041,045.39	(98,698,711.00)
Net Position Beginning, July 1	350,063,291.21	319,038,039.00	417,736,750.00
Net Position, Restatement (GASB 75)	-	(2,015,793.18)	-
Net Position Ending, June 30	$ 400,795,542.30	$ 350,063,291.21	$ 319,038,039.00

Operating Revenues

Operating revenues are revenues derived from the business operations of the Turnpike Authority. These include toll revenues, fees, and sales revenue from the sale of transponders. The increase in revenues is due to the increased usage of the Triangle Expressway and toll collections on the entire roadway and the opening of the Monroe Expressway in November 2018.

Operating Expenses

Operating expenses are expenses used to acquire or produce goods and services to carry out the mission of the Turnpike Authority. The increase in FY 2019 was due to increased depreciation which now includes the Monroe Expressway and contract payments that were no longer capitalized as construction in progress due to the opening of the Monroe Expressway in November 2018. The majority of the other services expenses are the costs associated with the standard overhead allocation from NCDOT which had a decrease in FY 2018, resulting in an overall decrease in operating expenses.

Nonoperating and Other Revenue/Expenses

Nonoperating revenues/expenses are revenues received or expenses incurred for which goods and services are not provided or received. They include capital grants, transfers in and out, investment income, and debt service expense. Capital grants are the funds received from the Federal Highway Administration (“FHWA”) and NCDOT for their participation in the initial construction of toll highways and in preliminary studies to determine the feasibility of a toll facility. The amount in FY 2019 increased due to an increase in federal funds related to the Complete 540 project. The amount in FY 2018 decreased due to the one-time transfer of debt for the 2011 GARVEE bonds to the Department of Transportation Highway Fund in FY 2017 that did not occur again in FY 2018.

Transfers In

Transfers in include funds received from NCDOT for gap funding of debt service and funds for the FHWA State match. The amount of State match increased in fiscal years 2019 and 2018 as the result of increased expenditures on the Complete 540 project and the Mid-Currituck Bridge.

Transfers Out

There were no transfers out for FY 2019. Transfers out decreased in FY 2018 due to a one-time transfer of the 2011 series GARVEE bonds and bond proceeds to the Highway Fund in FY 2017 that did not occur again in FY 2018.

Economic Outlook

The Triangle Expressway is located in the greater Raleigh area and is a commuter facility that leads into the Research Triangle Park (RTP). RTP is the largest operating research park in North America, covering approximately 7,000 acres and employing over 40,000 people. The Triangle Expressway has demonstrated low elasticity with six consecutive fiscal years of transaction growth while toll rates on the facility have increased annually, as required by the Turnpike Authority's Toll Rate Policy. According to Wake County Economic Development, the Raleigh metro is considered one of the most competitive metros in the United States. Over the next 10 years, the Raleigh metro is projected to grow by approximately three million people. The Monroe Expressway is located in the greater Charlotte area in both Mecklenburg and Union counties which are projected to grow by over 16 and 14 percent, respectively, in the next five years. Recent trends in population, employment and development across the State of North Carolina suggest that the state will continue to be a strong market.

Requests for Information

Additional information may be found on the Turnpike Authority's **Investor Information website**. Any request for information about this report should be sent to the Chief Financial Officer at the North Carolina Turnpike Authority, 1 South Wilmington Street, Raleigh, NC 27601.

NORTH CAROLINA TURNPIKE AUTHORITY
STATEMENTS OF NET POSITION

JUNE 30, 2019 AND 2018

	2019	2018
ASSETS		
Current Assets:		
Securities Lending Collateral	$ 988,452.05	$ 175,215.77
Accounts Receivable	23,174,778.70	17,453,905.49
Inventory	1,434,992.29	625,769.09
Intergovernmental Receivable	4,839,808.54	480,738.21
Total Current Assets	30,438,031.58	18,735,628.56
Noncurrent Assets:		
Restricted Assets:		
Cash and Cash Equivalents	13,364,762.94	7,475,821.35
Investments	283,744,683.17	264,029,048.40
Total Restricted Assets	297,109,446.11	271,504,869.75
Net OPEB Asset	1,897.00	3,209.00
Prepaid Insurance Costs	3,519,293.21	4,420,128.98
Capital Assets, Nondepreciable:		
Land and Permanent Easements	294,273,916.96	272,478,849.30
Construction in Progress	137,808,586.20	777,309,523.64
Capital Assets, Depreciable, Net of Depreciation:		
Highway Network	1,418,003,366.20	714,056,663.80
Total Capital Assets, Net of Depreciation	1,850,085,869.36	1,763,845,036.74
Total Noncurrent Assets	2,150,716,505.68	2,039,773,244.47
Total Assets	2,181,154,537.26	2,058,508,873.03
Deferred Outflows of Resources:		
Pension	551,816.00	321,293.00
Other Post Employment Benefits	863,955.00	387,129.00
Unamortized Bond Refunding Charges	28,933,975.50	28,122,236.95
Total Deferred Outflows of Resources	30,349,746.50	28,830,658.95
LIABILITIES		
Current Liabilities:		
Accounts Payable	23,487,317.19	6,359,252.63
Accrued Interest Payable	33,130,860.66	33,176,459.92
Accrued Vacation	22,146.00	11,786.00
Obligations under Securities Lending	988,452.05	175,215.77
Due to Other Funds	25,638,759.51	74,277,869.26
Bonds Payable, Net	26,210,000.00	22,060,000.00
Intergovernmental Payables	1,075,811.22	809,598.71
Unearned Revenue	6,633,641.73	4,447,612.58
Total Current Liabilities	117,186,988.36	141,317,794.87
Noncurrent Liabilities:		
Bonds Payable, Net	1,502,824,026.75	1,103,425,490.06
Note Payable	120,000,000.00	372,876,792.00
Advances from Other Funds	28,718,451.39	27,763,020.74
Accrued Interest Payable	38,082,449.96	88,732,367.10
Accrued Vacation	224,474.00	187,983.00
Net OPEB Liability	1,794,683.00	1,745,360.00
Net Pension Liability	729,749.00	483,101.00
Total Noncurrent Liabilities	1,692,373,834.10	1,595,214,113.90
Total Liabilities	1,809,560,822.46	1,736,531,908.77
Deferred Inflows of Resources:		
Pension	21,111.00	33,221.00
Other Post Employment Benefits	1,126,808.00	711,111.00
Total Deferred Inflows of Resources	1,147,919.00	744,332.00
NET POSITION		
Net Investment in Capital Assets	484,796,525.78	529,511,803.08
Restricted:		
Debt service	108,390,159.83	7,475,821.35
Transportation	177,263.89	-
Unrestricted	(192,568,407.20)	(186,924,333.22)
Total Net Position	$ 400,795,542.30	$ 350,063,291.21

The accompanying notes to the financial statements are an integral part of these statements.

NORTH CAROLINA TURNPIKE AUTHORITY

STATEMENTS OF REVENUES, EXPENSES, AND CHANGES IN NET POSITION

YEARS ENDED JUNE 30, 2019 AND 2018

	2019	2018
Revenues:		
Operating Revenues:		
Charges for Services	$ 63,987,342.98	$ 48,999,352.61
Other Operating Revenues	1,168,045.23	648,256.27
Total Operating Revenues	65,155,388.21	49,647,608.88
Expenses:		
Operating Expenses:		
Personnel Services	1,643,266.67	1,326,736.25
Supplies and Materials	69,796.86	72,748.57
Contracted Personnel Services	1,004,455.46	776,212.34
Travel	67,194.56	49,989.22
Advertising	574,499.10	123,921.65
Utilities	275,971.24	281,988.94
Dues and Subscription Fees	11,500.00	23,960.00
Other Services	5,316,703.91	3,814,480.59
Cost of Goods Sold	810,118.81	726,724.39
Capital Outlay	33,972,010.22	15,153,166.50
Rental Expense	176,432.27	107,994.45
Depreciation	24,035,020.18	16,129,720.29
Total Operating Expenses	67,956,969.28	38,587,643.19
Operating Income (Loss)	(2,801,581.07)	11,059,965.69
Nonoperating Revenues (Expenses):		
Investment Earnings	6,053,169.97	2,577,215.65
Federal Interest Subsidy on Debt	6,177,123.20	10,833,446.56
Interest and Fees	(64,498,789.98)	(50,115,611.73)
Miscellaneous	105,666.95	1,175.00
Total Nonoperating Expenses	(52,162,829.86)	(36,703,774.52)
Loss Before Transfers and Capital Grants	(54,964,410.93)	(25,643,808.83)
Capital Grants	27,359,873.00	3,140,923.00
Transfers In	78,336,789.02	55,543,931.22
Increase in Net Position	50,732,251.09	33,041,045.39
Net Position, Beginning	350,063,291.21	319,038,039.00
Restatement (GASB 75)	-	(2,015,793.18)
Net Position, Ending	$ 400,795,542.30	$ 350,063,291.21

The accompanying notes to the financial statements are an integral part of these statements.

NORTH CAROLINA TURNPIKE AUTHORITY
STATEMENTS OF CASH FLOWS

YEARS ENDED JUNE 30, 2019 AND 2018

	2019	2018
Cash Flows from Operating Activities:		
Receipts from Customers	$ 58,736,929.91	$ 49,561,240.30
Receipts from (Payments to) Other Funds	(323,039.95)	17,624.65
Payments to Employees and Fringe Benefits	(1,605,626.67)	(353,572.68)
Payments to Vendors and Suppliers	(34,972,743.71)	(19,375,856.98)
Payments to Other Funds	(49,305,265.90)	-
Other Receipts	2,183,365.86	102,308.73
Other Payments	(1,512,497.75)	(357,806.14)
Net Cash Flows from Operating Activities	(26,798,878.21)	29,593,937.88
Cash Flows from Noncapital Financing Activities:		
Advances from Other Funds	955,430.65	867,091.35
Net Cash Flows from Noncapital Financing Activities	955,430.65	867,091.35
Cash Flows from Capital and Related Financing Activities:		
Acquisition and Construction of Capital Assets	(87,463,472.48)	(55,304,496.25)
Transfers from Other Funds	78,336,789.02	55,543,931.22
Federal Interest Subsidy on Debt	6,177,123.20	10,833,446.56
Capital Grants	23,991,091.00	3,144,443.00
Capital Gifts	33,000.00	-
Principal Payments	(556,451,792.00)	(18,395,000.00)
Interest Payments	(130,637,180.37)	(72,691,785.36)
Proceeds from Capital Debt	711,280,950.95	157,091,341.05
Payment to Bond Escrow Agent	-	(159,529,078.43)
Bond Issuance Costs	(166,113.94)	(443,498.14)
Insurance Recoveries	105,666.95	1,175.00
Net Cash Flows from Capital and Related Financing Activities	45,206,062.33	(79,749,521.35)
Cash Flows from Investing Activities:		
Proceeds from Sale and Maturities of Investments	593,888,452.38	178,209,897.41
Purchase of Investments	(611,849,026.31)	(129,935,022.54)
Investment Earnings	4,486,900.75	3,012,770.60
Net Cash Flows from Investing Activities	(13,473,673.18)	51,287,645.47
Net Change in Cash and Cash Equivalents	5,888,941.59	1,999,153.35
Cash and Cash Equivalents, Beginning of Year	7,475,821.35	5,476,668.00
Cash and Cash Equivalents, End of Year	$ 13,364,762.94	$ 7,475,821.35

The accompanying notes to the financial statements are an integral part of these statements.

NORTH CAROLINA TURNPIKE AUTHORITY
STATEMENTS OF CASH FLOWS (CONTINUED)

YEARS ENDED JUNE 30, 2019 AND 2018

	2019	2018
Reconciliation of Operating Income (Loss) to Net Cash Flows From Operating Activities:		
Operating Income (Loss)	$ (2,801,581.07)	$ 11,059,965.69
Adjustments to Reconcile Operating Income (Loss) to Net Cash Flows from Operating Activities:		
Depreciation Expense	24,035,020.18	16,129,720.29
Management Fees	(1,512,497.75)	(357,806.14)
Changes in Assets and Deferred Outflow:		
Accounts Receivable	(5,720,873.21)	77,527.62
Intergovernmental Receivables	(700,248.38)	(59,844.47)
Due from Other Funds	(323,039.95)	17,624.65
Inventory	(809,223.20)	(386,107.04)
Prepaid Items	283,467.91	931,011.31
Net OPEB Asset	1,312.00	(104.00)
Deferred Outflows for Pensions	(230,523.00)	72,541.00
Deferred Outflows for OPEB	(476,826.00)	(323,257.00)
Changes in Liabilities and Deferred Inflows:		
Accounts Payable	6,973,632.32	1,106,761.82
Due to Other Funds	(49,305,265.90)	-
Funds Held for Others	1,894,029.15	943,433.57
Due to Fiduciary	855,329.69	53,325.58
Unearned Revenue	292,000	-
Compensated Absences	46,851.00	29,455.00
Net OPEB Liability	49,323.00	(337,412.00)
Deferred Infows for OPEB	415,697.00	711,111.00
Net Pension Liability	246,648.00	(74,847.00)
Deferred Inflows for Pensions	(12,110.00)	838.00
Net Cash Flows from Operating Activities	$ (26,798,878.21)	$ 29,593,937.88
Noncash Investing, Capital, and Financing Activities:		
Change in Fair Value of Investments	$ (5,647,460.83)	$ 248,539.53
Change in Land as a Result of Accounts Payable	1,668,742.66	6,500.00
Change in Construction in Progress as a Result of Accrual Liabilities	12,251,935.53	50,596,323.68
Change in Securities Lending Collateral	813,236.28	(36,548.23)
Increase in Receivables Related to Nonoperating Income	3,335,782.00	-
Donated or Transferred Assets	(1,085.00)	-

Note 1—Nature of operations and summary of significant accounting policies

Organization and Purpose – The North Carolina Turnpike Authority ("NCTA") was established by G.S. 136 Article 6H on October 3, 2002. Effective July 27, 2009, the North Carolina General Assembly adopted Session Law 2009-343, transferring the NCTA to the North Carolina Department of Transportation ("NCDOT") to conserve expenditures and improve efficiency. The NCTA is a business unit of the NCDOT and is subject to and under the direct supervision of the Secretary of Transportation. The NCTA is presented as a major enterprise fund in the State of North Carolina. Currently, the NCTA is authorized to construct, operate, and maintain up to 11 turnpike projects in the State.

Financial Reporting Entity – The concept underlying the definition of the financial reporting entity is that elected officials are accountable to their constituents for their actions. As required by accounting principles generally accepted in the United States of America ("U.S. GAAP"), the financial reporting entity includes both the primary government and all of its component units. An organization other than a primary government serves as a nucleus for a reporting entity when it issues separate financial statements. The NCTA is a business unit of the NCDOT. The NCTA is an integral part of the State of North Carolina's *Comprehensive Annual Financial Report* ("CAFR"). These financial statements for the NCTA are separate and apart from those of the State of North Carolina and NCDOT and do not present the financial position of the State or NCDOT, or changes in their financial position and cash flows. The NCTA is governed by a nine-member Board of Directors; two members are appointed by the Senate Pro Tempore and two by the Speaker of the House. The remaining five are appointed by the Governor and include the Secretary of Transportation.

Basis of Presentation – The accompanying financial statements are presented in accordance with U.S. GAAP as prescribed by the Governmental Accounting Standards Board ("GASB"). The full scope of the NCTA's activities is considered to be a single business-type activity and accordingly, is reported within a single column in the basic financial statements.

Basis of Accounting – The financial statements of the NCTA have been prepared using the "economic resources" measurement focus and the accrual basis of accounting. Under the accrual basis, revenues are recognized when earned, and expenses are recorded when an obligation has been incurred. Grants and similar items are recognized as revenue as soon as all eligibility requirements imposed by the provider have been met.

State Treasurer's Securities Lending Collateral – While the NCTA does not directly engage in securities lending transactions, it deposits certain funds with the State Treasurer ("Treasurer") in the short-term investment fund ("NC STIF"), which participates in securities lending activities. Based on the State Treasurer's allocation of these transactions, the NCTA recognizes its allocable share of the assets and liabilities related to these transactions on the accompanying financial statements as "Securities Lending Collateral" and "Obligations under Securities Lending." The NCTA's allocable share of these assets and liabilities is based on the NCTA's year-end deposit balance per the State Treasurer's records.

Based on the authority provided in General Statute 147-69.3(e), the Treasurer lends securities from its investment pools to broker-dealers and other entities (borrowers) for collateral that will be returned for the same securities in the future. The Treasurer's securities custodian manages the securities lending program. The Treasurer's custodian lent U.S. government and agency securities, Federal Nation Mortgage Association Securities, corporate bonds, and notes for collateral. The Treasurer's custodian is permitted to receive cash, U.S. government and agency securities, or irrevocable letters of credit as collateral for the securities lent.

The collateral is initially pledged at 102% of the market value of the securities lent and additional collateral is required if its value falls to less than 100% of the market value of the securities lent. There are no restrictions on the amount of loans that can be made. Substantially, all security loans can be terminated on demand by either the Treasurer or the borrower.

Note 1—Nature of operations and summary of significant accounting policies (continued)

Additional details on the Treasurer's securities lending program are included in the State of North Carolina CAFR. An electronic version of this report is available by accessing the North Carolina Office of the State Controller's ("NC OSC") Internet home page http://www.ncosc.net/ and clicking on "Public Information" or by calling the State Controller's Financial Reporting Section at (919) 707-0500.

Receivables – Accounts receivable consist of uncollected toll revenues and intergovernmental receivables consist of amounts due from the Federal Highway Administration ("FHWA") and other local governmental agencies in connection with reimbursement of allowable expenditures made pursuant to contracts and grants that are verifiable, measurable, and expected to be collected and available for expenditures for which the resource provider's conditions have been satisfied.

Allowance for Doubtful Accounts – An allowance for doubtful accounts has not been established because there are no indications of significant delinquencies from the collection of toll revenues as of June 30, 2019 and 2018. Uncollectible accounts receivable were written off in 2019 and 2018 using the direct write-off method.

Inventory – Inventory is valued at the lower of cost (first-in, first-out) or net realizable value and consists of transponders held for resale.

Restricted Cash and Cash Equivalents – This classification includes funds received through toll revenue collections. The proceeds are to be used for debt service payment. The funds are held in the NC STIF. Ownership interest of the NC STIF is determined on a fair market valuation basis as of June 30, 2019 and 2018, in accordance with the NC STIF operating procedures.

Restricted Investments – This classification includes revenue and funds received from the State of North Carolina to be used solely for the construction of the Triangle Expressway and the Monroe Expressway. See Note 3 for further information on restricted investments.

Prepaid Insurance Costs – Prepaid insurance costs consist of guaranty bond insurance related to the issuance of the 2009 Triangle Expressway bonds and the 2017 and 2018 Triangle Expressway Revenue Refunding bonds. These amounts are capitalized and will be amortized over the maturity of the bonds.

Capital Assets, Nondepreciable – Capital assets, nondepreciable include land and permanent easements purchased for specific projects. These costs will never be depreciated. Construction in progress includes consultant contract expenditures and contracted personnel service expenditures that are charged to specific projects. These costs will be transferred to depreciable asset categories when projects are complete.

Capital Assets, Depreciable – Capital assets, depreciable are stated at cost at the date of acquisition or fair value at date of donation in the case of gifts. Assets that have a value or cost in excess of $5,000.00 at the date of acquisition and have an expected useful life of more than two years are capitalized. This definition conforms to the policy of the North Carolina Office of State Controller.

Depreciation is calculated using the straight-line method over the estimated useful life of 50 years for the highway network. Capital assets are carried at cost less accumulated depreciation.

Noncurrent Liabilities – Noncurrent liabilities include the advances from other funds, bonds payable, a note payable, accrued interest, accrued vacation, net pension liability, and net OPEB liability that will not be paid within the next fiscal year.

Note 1—Nature of operations and summary of significant accounting policies (continued)

Accrued Vacation – The NCTA's policy is to record the cost of vacation leave when earned. The policy provides for a maximum accumulation of unused vacation leave of 30 days which can be carried forward each January 1 or for which an employee can be paid upon termination of employment. Also, any accumulated vacation leave in excess of 30 days at year-end is converted to sick leave. Under this policy, the accumulated vacation leave for each employee as of June 30 equals the leave carried forward at the previous December 31 plus the leave earned less the leave taken between January 1 and June 30.

In addition to the vacation leave described above, accrued vacation includes the accumulated unused portion of the special annual leave bonuses awarded by the North Carolina General Assembly. The bonus leave balance on December 31 is retained by employees and transferred into the next calendar year. It is not subject to conversion to sick leave. When classifying accrued vacation into current and noncurrent, leave is considered taken using a last-in, first-out method.

Net Position – The NCTA's net position is classified as follows:

Net Investment in Capital Assets – This represents the NCTA's total investment in capital assets, net of the corresponding related debt.

Restricted – For the year ended June 30, 2018, this represents funds received through toll revenue collections which are held in the NC STIF to be used for debt service payments. For the year ended June 30, 2019, this represents funds received through toll revenue collections and other deposits that are to be used for debt service payments and reserves. The funds are held in the NC STIF and other investments (*see Notes 2 and 3).*

Unrestricted – Since there were toll collections only on the Triangle and Monroe Expressways and the NCTA is incurring expenses in excess of the capital grants received, the NCTA has a deficit in the unrestricted balance.

Deferred Outflows/Inflows of Resources – In addition to assets, the statement of net position will sometimes report a separate section for deferred outflows of resources. This separate financial statement element, deferred outflows of resources, represents a consumption of net position that applies to a future period and so will not be recognized until then. The NCTA has items that meet this criterion which include pension related deferrals, other postemployment benefits ("OPEB") related deferrals, and deferrals related to debt refundings that took place in the current year and in prior years. The statements of net position also report a separate section for deferred inflows of resources. This separate financial statement element, deferred inflows of resources, represents an acquisition of net position that applies to a future period and so will not be recognized until then. The NCTA has two items that meets this criterion which include pension related deferrals and OPEB related deferrals.

Revenue and Expense Recognition – The NCTA classifies its revenue and expenses as operating and nonoperating in the accompanying statements of revenues, expenses, and changes in net position. Operating expenses generally result from providing services and producing and delivering goods in connection with the NCTA's principal ongoing operations. Operating expenses are all expense transactions incurred other than those related to capital and non-capital financing or investing activities as defined by GASB Statement No. 9, *Reporting Cash Flows of Proprietary and Nonexpendable Trust Funds and Governmental Entities That Use Proprietary Fund Accounting.* Nonoperating expenses mainly relate to interest expense and the amortization of premiums and discounts of long-term debt.

Operating revenues include activity from the toll roads that were open for operations during the fiscal years ended June 30, 2019 and 2018. These revenues include toll revenues, processing fees, and other charges arising from the toll roads.

Note 1—Nature of operations and summary of significant accounting policies (continued)

Nonoperating revenues include activities that have the characteristics of nonexchange transactions. Revenue from nonexchange transactions represents funds received from the FHWA and NCDOT. Revenues from FHWA are classified as Capital Grants and are considered nonoperating, along with investment income and transfers in from the NCDOT, since these are related to investing, capital, or non-capital financing activities.

Use of Estimates – The preparation of financial statements in conformity with U.S. GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities as of the dates of the financial statements and the reported amounts of revenues and expenses during the reporting periods. Actual results could differ from those estimates.

Retirement Plans – For purposes of measuring the net pension liability, deferred outflows of resources and deferred inflows of resources related to pensions, and pension expense, information about the fiduciary net position of the Teachers' and State Employees' Retirement System ("TSERS") and additions to/deductions from TSERS' fiduciary net position have been determined on the same basis as they are reported by TSERS. For this purpose, plan member contributions are recognized in the period in which the contributions are due. The NCTA's employer contributions are recognized when due and the NCTA has a legal requirement to provide the contributions. Benefits and refunds are recognized when due and payable in accordance with the terms of TSERS. Investments are reported at fair value.

Other Post Employment Benefit Plans – For purposes of measuring the net OPEB asset and liability, deferred outflows of resources and deferred inflows of resources related to OPEB, and OPEB expense, information about the fiduciary net positions of the Retiree Health Benefit Fund ("RHBF") and the Disability Income Plan of North Carolina ("DIPNC"), and additions to/deductions from RHBF and DIPNC's fiduciary net positions have been determined on the same basis as they are reported by RHBF and DIPNC. For this purpose, plan member contributions are recognized in the period in which the contributions are due. The NCTA's employer contributions are recognized when due and the NCTA has a legal requirement to provide the contributions. Benefits and refunds are recognized when due and payable in accordance with the terms of RHBF and DIPNC. Investments are reported at fair value.

Note 2—Deposits

As of June 30, 2019 and 2018, respectively, $13,364,762.94 and $7,475,821.35 shown on the statements of net position as restricted cash and cash equivalents represent the NCTA's equity position in the State Treasurer's NC STIF. The NC STIF (a portfolio within the State Treasurer's Investment Pool, an external investment pool that is not registered with the Securities and Exchange Commission and does not have a credit rating) had a weighted average maturity of 1.1 and 1.0 years as of June 30, 2019 and 2018, respectively.

Ownership interest of the NC STIF is determined on a fair market valuation basis as of June 30, 2019 and 2018, in accordance with the NC STIF operating procedures. Valuation of the underlying assets is performed by the custodian.

The NCTA's fair market value share of the NC STIF was determined based on Level 2 inputs in accordance with U.S. GAAP. At 2019 and 2018, $13,364,762.94 and $7,475,821.35, respectively, are classified as restricted. These amounts represent cash collected from toll revenues that is restricted for payments on bonds. Deposit and investment risks associated with the State Treasurer's Investment Pool (which includes the State Treasurer's NC STIF) are included in the State of North Carolina's CAFR. An electronic version of this report is available by accessing the NC OSC's Internet home page http://www.ncosc.net/ and clicking on "Public Information" or by calling the State Controller's Financial Reporting Section at (919) 707-0500.

Note 3—Restricted investments

The NCTA's policy for eligible investments are governed by North Carolina General Statute 159-30 and bond covenants that, in general, allow funds to be invested in obligations of the United States or United States government sponsored enterprises, obligations of the State of North Carolina or localities of the State of North Carolina, prime quality commercial paper, shares of certain money market mutual funds, and commingled investment pools.

Fair Value Measurements – U.S. GAAP defines fair value as the exchange price that would be received for an asset or paid to transfer a liability in the principal or most advantageous market for the asset or liability in an orderly transaction between market participants on the measurement date. U.S. GAAP also establishes a fair value hierarchy that prioritizes the inputs to valuation techniques used to measure fair value. The hierarchy consists of three broad levels of inputs that may be used to measure fair value is as follows:

Level 1 – Inputs to the valuation methodology are quoted prices available in active markets for identical assets and are given the highest priority;

Level 2 – Inputs consist of observable inputs other than quoted prices for identical assets; and

Level 3 – Inputs consist of unobservable inputs and are given the lowest priority.

Concentrations of Credit Risk – A diversified portfolio is managed by the NCTA, financial advisors, and trustees to minimize the risk of loss resulting from over concentration of assets. Securities that are exposed to credit risk, i.e., commercial paper, are limited to 5% of the portfolio to a single issuer. The NCTA's policy does not set a limit on the amount that may be invested in any single government sponsored enterprise, money market mutual fund, or commingled investment pool.

Interest Rate Risk – Interest rate risk represents the risk governments are exposed to as a result of changes in interest rates on the fair value of an investment. Generally, the longer the maturity of an investment the greater the sensitivity of its fair value to changes in market interest rates. The NCTA's policy to mitigate risk has been to structure the investment portfolio so that securities mature to meet cash requirements reducing the need to sell securities on the open market prior to maturity. In addition, interest rate risk is reduced by investing funds primarily in shorter-term securities. The NCTA does not have a formal investment policy that limits investment maturities as a means of managing its exposure to fair value losses arising from increasing interest rates.

Note 3—Restricted investments (continued)

The NCTA's revenue bond proceeds were invested as follows as of June 30:

	2019			
			Investment Maturities (in Years)	
Type of Investment	Valuation Measurement Method	Fair Value	Less Than 1 Year	1 – 5 Years
U.S. Treasuries	Fair Value - Level 1	$ 147,072,503.93	$ 143,541,958.95	$ 3,530,544.98
U.S. Government Agencies	Fair Value - Level 2	4,161,633.16	1,148,869.49	3,012,763.67
NC STIF	Fair Value - Level 2	2,492,108.23	-	2,492,108.23
Commercial Paper	Fair Value - Level 2	6,833,086.10	6,833,086.10	-
Money Market Mutual Funds	Cost	123,185,351.75	123,185,351.75	-
		$ 283,744,683.17	$ 274,709,266.29	$ 9,035,416.88

	2018			
			Investment Maturities (in Years)	
Type of Investment	Valuation Measurement Method	Fair Value	Less Than 1 Year	1 – 5 Years
U.S. Treasuries	Fair Value - Level 1	$ 37,838,242.93	$ 36,485,531.64	$ 1,352,711.29
U.S. Government Agencies	Fair Value - Level 2	4,058,196.28	2,923,290.09	1,134,906.19
NC STIF	Fair Value - Level 2	138,118,089.43	-	138,118,089.43
Money Market Mutual Funds	Cost	84,014,519.76	84,014,519.76	-
		$ 264,029,048.40	$ 123,423,341.49	$ 140,605,706.91

As of June 30, 2019 and 2018, included in the Money Market Mutual Funds totals as stated above, $123,185,351.75 and $54,330,713.08, respectively, were invested in the PFM Funds – Prime Series, Institutional Class. The PFM Funds – Prime Series is an SEC-registered money market mutual fund. The fund invests in obligations of the United States government and its agencies, high quality debt obligations of U.S. companies, and obligations of financial institutions. The fund seeks to maintain a constant $1 net asset value and is rated "AAAm" by Standard & Poor's. In addition, the fund maintains a weighted average maturity of 60 days or less.

In addition to NCTA revenue bond proceeds, additional debt was incurred by the State of North Carolina. Investment of the proceeds of such debt is governed by North Carolina General Statute §147-69.1 and bond covenants that, in general, allow funds to be invested in obligations of the United States or United States government sponsored enterprises, obligations of the State of North Carolina or localities of the State of North Carolina, prime quality commercial paper, shares of certain money market mutual funds, and commingled investment pools.

Note 4—Capital assets

A summary of changes in capital assets for the year ended June 30, 2019 is presented as follows:

	July 1, 2018	Additions	Disposals	Transfers	June 30, 2019
Capital Assets, Nondepreciable					
Land and Permanent Easements	$ 272,478,848.86	$ 22,345,551.39	$ (550,483.73)	$ -	$ 294,273,916.52
Construction in Progress	777,309,522.88	88,481,870.14	-	(727,982,807.58)	137,808,585.44
Total Capital Assets, Nondepreciable	1,049,788,371.74	110,827,421.53	(550,483.73)	(727,982,807.58)	432,082,501.96
Capital Assets, Depreciable					
Highway Network	806,486,015.00	-	-	727,982,807.58	1,534,468,822.58
Machinery and Equipment	60,035.00	-	(27,428.91)	-	32,606.09
Total Capital Assets, Depreciable	806,546,050.00	-	(27,428.91)	727,982,807.58	1,534,501,428.67
Less Accumulated Depreciation for:					
Highway Network	92,429,350.00	24,035,020.18	-	-	116,464,370.18
Machinery and Equipment	60,035.00	-	(26,343.91)	-	33,691.09
Total Accumulated Depreciation	92,489,385.00	24,035,020.18	(26,343.91)	-	116,498,061.27
Total Capital Assets, Depreciable, Net of Depreciation	714,056,665.00	(24,035,020.18)	(1,085.00)	727,982,807.58	1,418,003,367.40
Capital Assets, Net of Depreciation	$ 1,763,845,036.74	$ 86,792,401.35	$ (551,568.73)	$ -	$ 1,850,085,869.36

A summary of changes in capital assets for the year ended June 30, 2018 is presented as follows:

	July 1, 2017	Additions	Disposals	Transfers	June 30, 2018
Capital Assets, Nondepreciable					
Land and Permanent Easements	$ 258,834,956.00	$ 13,648,582.86	$ (4,690.00)	$ -	$ 272,478,848.86
Construction in Progress	672,435,846.00	104,873,676.88	-	-	777,309,522.88
Total Capital Assets, Nondepreciable	931,270,802.00	118,522,259.74	(4,690.00)	-	1,049,788,371.74
Capital Assets, Depreciable					
Highway Network	806,486,015.00	-	-	-	806,486,015.00
Machinery and Equipment	60,035.00	-	-	-	60,035.00
Total Capital Assets, Depreciable	806,546,050.00	-	-	-	806,546,050.00
Less Accumulated Depreciation for:					
Highway Network	76,299,630.00	16,129,720.00	-	-	92,429,350.00
Machinery and Equipment	60,035.00	-	-	-	60,035.00
Total Accumulated Depreciation	76,359,665.00	16,129,720.00	-	-	92,489,385.00
Total Capital Assets, Depreciable, Net of Depreciation	730,186,385.00	(16,129,720.00)	-	-	714,056,665.00
Capital Assets, Net of Depreciation	$ 1,661,457,187.00	$ 102,392,539.74	$ (4,690.00)	$ -	$ 1,763,845,036.74

Note 5—Advances from other funds

The following is a summary of changes in the NCTA's Advances from Other Funds as of June 30, 2019:

	July 1, 2018	Additions	June 30, 2019
Advances from Other Funds	$ 27,763,020.74	$ 955,430.65	$ 28,718,451.39

The following is a summary of changes in the NCTA's Advances from Other Funds as of June 30, 2018:

	July 1, 2017	Additions	June 30, 2018
Advances from Other Funds	$ 26,895,929.00	$ 867,091.74	$ 27,763,020.74

Pursuant to G.S. 136-176(b), operation and project development costs for the NCTA are eligible for funding from the Highway Trust Fund administration funds. These funds are considered an Advance from Other Funds and are to be repaid from toll revenue as soon as possible. Beginning January 1, 2014, one year after the NCTA began collecting tolls on the completed Triangle Expressway project, the NCTA began accruing interest on the unpaid balance owed to the Highway Trust Fund at a rate equal to the State Treasurer's average annual yield (1.91% as of June 30, 2019) on its investment of Highway Trust Fund funds pursuant to G.S. 147-6.1. The NCTA accrued $494,655.28 and $306,164.26 of interest for the years ended June 30, 2019 and 2018, respectively.

Note 6—Lease obligations

During the year ended June 30 2014, the NCTA entered into lease agreements for road maintenance equipment. Rental expense relating to operating leases during the years ended June 30, 2019 and 2018 was $176,432.27 and $107,994.45, respectively.

Note 7—Long-term debt

Long-term debt as of June 30 consists of the following:

Revenue Bonds:	2019	2018
Revenue bonds payable, Series 2009A Triangle Expressway System Revenue Bonds in the amount of $234,910,000.00, issued July 29, 2009, with coupon rates of 5.50% and 5.75%, with principal payments beginning January 2019, final maturity of January 2039, net of unamortized discount of $879,000.00 as of June 30, 2016. These revenue bonds payable were refunded in March 2017 except for $600,000.00, which was paid in full on January 1, 2019.	$ -	$ 600,000.00
Revenue bonds payable, Series 2009B Capital Appreciation Triangle Expressway System Revenue Bonds in the amount of $35,173,109.00, issued July 29, 2009, with interest ranging from 6.74% to 7.10% compounding semi-annually, with principal payments beginning January 2030, due in full January 2038.	35,173,109.00	35,173,109.00

Note 7—Long-term debt (continued)

Revenue Bonds:	2019	2018
Revenue bonds payable, Series 2009B Triangle Expressway State Appropriation Revenue Bonds in the amount of $352,675,000.00 issued July 29, 2009, with coupon rates of 6.00% and 6.70%, with principal payments beginning January 2017. These revenue bonds payable were refunded in December 2018 except for $20,210,000.00, which matures January 1, 2021.	$ 20,210,000.00	$ 190,930,403.00
Revenue bonds payable, Series 2010A Monroe Connector System State Appropriation Revenue Bonds in the amount of $233,920,000.00, issued October 26, 2010, with coupon rates of 5.318% and 5.418%, with principal payments beginning January 2022, final maturity January 2041.	233,920,000.00	233,920,000.00
Revenue bonds payable, Series 2011 Monroe Connector System State Appropriation Revenue Bonds in the amount of $214,505,000.00, issued November 30, 2011, with coupon rates of 4.25% and 5.00%, with principal payments beginning July 2012, final maturity July 2041, net of unamortized premium of $10,206,780.75 as of June 30, 2019.	133,391,780.75	142,798,689.00
Revenue bonds payable, Series 2016 Monroe Expressway Toll Revenue Bonds in the amount of $137,051,904.35, issued January 31, 2017, with a coupon rate of 5.00%, with principal payments beginning July 2023, final maturity July 2054, net of unamortized premium of $6,764,096.60 as of June 30, 2019.	143,816,001.00	144,051,467.00
Revenue bonds payable, Series 2017 Triangle Expressway System Senior Lien Turnpike Revenue Refunding Bonds in the amount of $200,515,000.00, issued March 30, 2017, with coupon rates of 3.125% and 5.00%, with principal payments beginning January 2018, final maturity January 2039, net of unamortized premium of $21,282,277.00 as of June 30, 2019.	215,317,277.00	220,974,279.00
Revenue bonds payable, Series 2018A Triangle Expressway System Appropriation Revenue Refunding Bonds in the amount of $150,125,000.00, issued May 10, 2018, with average coupon rates of 4.00%, with principal payments beginning January 2019, final maturity January 2039, net of unamortized premium of $6,528,615.00 as of June 30, 2019.	156,653,615.00	157,037,543.00
Revenue bonds payable, Series 2018B Triangle Expressway System Appropriation Revenue Refunding Bonds in the amount of $161,759,000.00, issued December 31, 2018, with average coupon rates of 2.82%, with principal payments beginning January 2020, final maturity January 2032, net of unamortized premium of $6,528,615.00 as of June 30, 2019.	161,759,000.00	-
Revenue bonds payable, Series 2018 Triangle Expressway System Senior Lien Turnpike Revenue Refunding Bonds in the amount of $401,155,000.00, issued December 12, 2018, with average coupon rates of 4.61%, with principal payments beginning January 2020, final maturity January 2041, net of unamortized premium of $27,638,244.00 as of June 30, 2019.	428,793,244.00	-
Total Bonds, Net	$ 1,529,034,026.75	$ 1,125,485,490.00

Note 7—Long-term debt (continued)

Bonds payable maturities are as follows:

Years Ending June 30,	Principal	Interest	Total
2020	$ 26,210,000.00	$ 65,047,628.67	$ 91,257,628.67
2021	29,860,000.00	62,748,899.26	92,608,899.26
2022	42,122,000.00	61,240,619.26	103,362,619.26
2023	37,679,000.00	59,679,545.36	97,358,545.36
2024	42,697,000.00	58,118,287.31	100,815,287.31
2025-2029	259,633,358.50	261,579,821.35	521,213,179.85
2030-2034	324,173,520.25	260,611,629.05	584,785,149.30
2035-2039	413,609,105.75	245,812,769.80	659,421,875.55
2040-2044	173,135,028.25	48,444,617.80	221,579,646.05
2045-2049	36,810,000.00	22,611,750.00	59,421,750.00
2050-2054	56,880,000.00	10,994,000.00	67,874,000.00
2055-2059	13,805,000.00	345,125.00	14,150,125.00
	1,456,614,012.75	1,157,234,692.86	2,613,848,705.61
Issuance Premiums	72,420,014.00	-	72,420,014.00
	$ 1,529,034,026.75	$ 1,157,234,692.86	$ 2,686,268,719.61

	2019	2018
Note Payable:		
Triangle Expressway TIFIA note payable for an amount not to exceed $386,662,363.00, opened on July 1, 2009, bearing interest of 4.25% per annum, with interest payments beginning July 2015, principal payments beginning January 2024, and final maturity in January 2043. This note was refunded in full in December 2018.	$ -	$ 372,876,792.00
Monroe Expressway TIFIA note payable for an amount not to exceed $166,500,000.00, opened on January 31, 2017, bearing interest of 3.08% per annum, with interest payments beginning July 2021, principal payments beginning January 2024, and final maturity in July 2053.	$ 120,000,000.00	$ -

The Triangle Expressway ("TriEx") TIFIA note payable required debt service payments commencing July 1, 2015, with a final maturity of January 1, 2043. No payment of principal or interest on the TriEx TIFIA note payable was required to be made during the period of July 1, 2009 through January 1, 2015. Payments of interest commenced on January 1, 2015 and payments of principal and interest were to commence on January 1, 2024. The amounts of principal and interest to be paid were calculated based on the total amount drawn on the note and amount of accrued interest outstanding as of January 1, 2015. In December 2018 the NCTA paid in full the balance of principal and accrued interest. Accrued interest on the loan agreement was $0 and $66,628,276.00 as of June 30, 2019 and 2018, respectively.

On January 31, 2017, the NCTA signed an agreement with the United States Department of Transportation for a Monroe Expressway TIFIA note payable of up to $166,500,000.00. In January 2019 the NCTA drew down $120,000,000.00 on this note, which is being used to pay certain costs, including land acquisition, design, construction, and equipping of the Monroe Expressway Project. The note payable requires debt service payments commencing July 1, 2021, with a final maturity of July 1, 2053. No payment of principal or interest on the Monroe Expressway note payable is required to be made during the period of January 1, 2019 through January 1, 2021. The amounts of principal and interest to be paid are calculated based on the total amount drawn on the note and amount of accrued interest outstanding as of July 1, 2021. Accrued interest on the loan agreement was $1,691,046.58 and $0 as of June 30, 2019 and 2018, respectively.

Note 7—Long-term debt (continued)

The Monroe Expressway TIFIA note payable maturities are as follows:

Years Ending June 30,	Principal	Interest	Total
2020	$ -	$ -	$ -
2021	-	851,452.97	851,452.97
2022	-	1,631,951.52	1,631,951.52
2023	-	2,199,586.83	2,199,586.83
2024	163,244.30	3,466,073.97	3,629,318.27
2025-2029	4,562,451.28	20,324,241.74	24,886,693.02
2030-2034	9,201,416.82	19,643,752.00	28,845,168.82
2035-2039	15,122,087.23	18,222,371.93	33,344,459.16
2040-2044	22,617,445.19	15,825,798.15	38,443,243.34
2045-2049	31,758,892.68	12,208,719.42	43,967,612.10
2050-2053	36,574,462.50	6,603,781.78	43,178,244.28
	$ 120,000,000.00	$ 100,977,730.31	$ 220,977,730.31

Long-term liability activity for the year ended June 30, 2019 is as follows:

	July 1, 2018	Additions	Reductions	June 30, 2019	Due Within One Year
Bonds Payable:					
Bonds	$ 1,077,275,013.00	$ 562,914,000.00	$ (183,575,000.25)	$ 1,456,614,012.75	$ 26,210,000.00
Deferred Amounts:					
For Issuance Premiums	48,620,074.00	28,366,951.00	(4,567,011.00)	72,420,014.00	-
For Issuance Discounts	(409,597.00)	-	(409,597.00)	-	-
	1,125,485,490.00	591,280,951.00	(188,551,608.25)	1,529,034,026.75	26,210,000.00
Note Payable	372,876,792.00	120,000,000.00	(372,876,792.00)	120,000,000.00	-
Accrued Vacation	199,769.00	152,108.00	(105,257.00)	246,620.00	22,146.00
Net OPEB Liability	1,745,360.00	49,323.00	-	1,794,683.00	-
Net Pension Liability	483,101.00	246,648.00	-	729,749.00	-
Total Long-Term Debt	$ 1,500,790,512.00	$ 711,729,030.00	$ (561,237,686.25)	$ 1,651,805,078.75	$ 26,232,146.00

Long-term liability activity for the year ended June 30, 2018 is as follows:

	July 1, 2017, Restated (GASB 75)	Additions	Reductions	June 30, 2018	Due Within One Year
Bonds Payable:					
Bonds	$ 1,096,395,013.00	$ 150,125,000.00	$ (169,245,000.00)	$ 1,077,275,013.00	$ 22,060,000.00
Deferred Amounts:					
For Issuance Premiums	45,253,234.00	6,966,341.00	(3,599,501.00)	48,620,074.00	-
For Issuance Discounts	(497,539.00)	-	(87,942.00)	(409,597.00)	-
	1,141,150,708.00	157,091,341.00	(172,932,443.00)	1,125,485,490.00	22,060,000.00
Note Payable	372,876,792.00	-	-	372,876,792.00	-
Accrued Vacation	170,314.00	116,487.00	(87,032.00)	199,769.00	11,786.00
Net OPEB Liability	2,082,772.00	-	(337,412.00)	1,745,360.00	-
Net Pension Liability	557,948.00	-	(74,847.00)	483,101.00	-
Total Long-Term Debt	$ 1,516,838,534.00	$ 157,207,828.00	$ (173,431,734.00)	$ 1,500,790,512.00	$ 22,071,786.00

Note 7—Long-term debt (continued)

Total interest cost on indebtedness was $74,259,475.72 and $76,168,933.46 for the years ended June 30, 2019 and 2018, respectively. Total capitalized interest represented $22,886,997.83 and $25,251,644.29 of this amount during the years ended June 30, 2019 and 2018, respectively.

In the Event of Default

The Trust Agreement for the North Carolina Turnpike Authority's outstanding senior lien revenue bonds for the Triangle Expressway System ($630,363,108) contains a provision providing that there can be no acceleration of payment of principal of or interest on such bonds as a result of the occurrence of any event of default.

The Trust Agreement for the North Carolina Turnpike Authority's outstanding state appropriation revenue bonds for the Triangle Expressway System ($332,094,000) and the Trust Agreement for the Monroe Connector System ($357,105,000) contains a provision providing that there can be no acceleration of payment of principal of or interest on such bonds as a result of the occurrence of any event of default.

The Trust Agreement for the North Carolina Turnpike Authority's outstanding toll revenue bonds for the Monroe Expressway ($137,051,904) contains a provision providing that there can be no acceleration of payment of principal of or interest on such bonds as a result of the occurrence of any event of default.

Federal Interest Cash Subsidy

The NCTA has elected to treat the Triangle Expressway System State Annual Appropriation Revenue Bonds, Series 2009B and the Monroe Connector System State Appropriation Revenue Bonds, Series 2010A as "Build America Bonds" for purposes of the *American Recovery and Reinvestment Tax Act of 2009* ("Recovery Act"). In adherence with the Recovery Act, the NCTA receives cash subsidy payments from the United States Treasury Department equal to 35% of the interest payable on the Series 2009B and 2010A State Appropriation Bonds. As part of the 2019 Federal Budget, the payments received during the year ended June 30, 2019 were reduced by 6.2%. As part of the 2018 Federal Budget, the payments received during the year ended June 30, 2018 were reduced by 6.6%. Cash subsidy payments totaled $6,177,123.20 and $10,833,446.56 for the years ended June 30, 2019 and 2018, respectively.

Refundings

On March 22, 2017, the NCTA issued $200,515,000.00 of senior lien advance refunding bonds to provide resources that were placed in an irrevocable trust to be used for interest on the refunded bonds until January 1, 2019 and the principal amount of the refunded bonds on January 1, 2019. As a result, the refunded bonds are considered to be defeased and the liability has been removed from the statements of net position as of June 30, 2017. The reacquisition price exceeded the net carrying amount of the old debt by $20,734,143.00. This amount is shown as a deferred outflow of resources and amortized over the life of the refunded debt. This advance refunding was undertaken to reduce total debt service payments over the next 22 years by $65,515,780.00 and resulted in an economic gain of $32,153,069.00.

On May 10, 2018, the NCTA issued $150,125,000.00 of appropriation revenue refunding bonds. These bonds were issued to refund, in advance of their maturity, certain of the NCTA's Triangle Expressway System State Appropriation Revenue Bonds, Series 2009B, and to pay costs incurred in connection with the issuance of these bonds. As a result, the refunded bonds are considered to be defeased and the liability has been removed from the statements of net position as of June 30, 2018. The reacquisition price exceeded the net carrying amount of the old debt by $9,777,825.18. This amount is shown as a deferred outflow of resources and amortized over the life of the refunded debt. This advance refunding was undertaken to reduce total debt service payments over the next 22 years by $15,026,177.17 and resulted in an economic gain of $10,933,562.18.

Note 7—Long-term debt (continued)

On November 20, 2018, the NCTA issued $401,155,000 of appropriation revenue refunding bonds. These bonds were issued to refund, in advance of its maturity, the TriEx TIFIA note payable and accrued interest, and to pay costs incurred in connection with the issuance of these bonds. As a result, the refunded TriEx TIFIA note payable is considered to be defeased and the liability has been removed from the statements of net position as of June 30, 2019. The reacquisition price did not exceed the net carrying amount of the TriEx TIFIA note payable and accrued interest. This advance refunding was undertaken to reduce total debt service over the next 23 years by $18,561,930.32 and will result in a present value economic gain of $10,245,387.60.

On December 31, 2018, the NCTA issued $161,759,000.00 of appropriation revenue refunding bonds. These bonds were issued to refund, in advance of their maturity, certain of the NCTA's Triangle Expressway System State Appropriation Revenue Bonds, Series 2009B, and to pay costs incurred in connection with the issuance of these bonds. As a result, the refunded bonds are considered to be defeased and the liability has been removed from the statements of net position as of June 30, 2019. The reacquisition price exceeded the net carrying amount of the old debt by $3,366,930.55. This amount is shown as a deferred outflow of resources and amortized over the life of the refunded debt. This advance refunding was undertaken to reduce total debt service payments over the next 13 years by $22,646,034.24 and resulted in an economic gain of $18,854,944.18.

Note 8—Deferred outflows of resources – unamortized bond refunding charges

Gains and losses from debt refunding must be deferred and amortized over the lesser of the original remaining life of the old debt or the life of the new debt. In addition, gains and losses related to debt refunding are to be used in determining the carrying value of the new debt issued to finance debt refunding. As of June 30, 2019, and 2018, the carrying values of the 2017 Triangle Expressway System Senior Lien Turnpike Revenue Refunding Bonds and the 2018 Triangle Expressway System Appropriation Revenue Refunding Bonds have been adjusted for the gain from defeasance (net of amortization) of $28,933,975.50 and $28,122,236.95, respectively.

This deferred outflow of resources is included as unamortized bond refunding charges in the statements of net position.

Note 9—Pledged revenues

The NCTA has pledged, as security for revenue bonds, net revenues from the operation of the Triangle Expressway System and the Monroe Connector System. In July 2009, the NCTA issued Triangle Expressway System State Annual Appropriation Revenue Bonds ($352,675,000.00) and Triangle Expressway System Senior Lien Revenue Bonds ($270,083,109.00). In October 2010, the NCTA issued Monroe Connector System State Annual Appropriation Revenue Bonds ($233,920,000.00). In November 2011, the NCTA issued State Annual Appropriation Revenue Bonds ($214,505,000.00). In January 2017, the NCTA issued Monroe Expressway Toll Revenue Bonds ($137,051,904.00). In March 2017, the NCTA issued Triangle Expressway System Senior Lien Turnpike Revenue Refunding Bonds ($200,515,000.00). In May 2018, the NCTA issued Triangle Expressway System Appropriation Revenue Refunding Bonds ($150,125,000.00). In November 2018, the NCTA issued Triangle Expressway System Appropriation Revenue Refunding Bonds ($401,155,000.00) In December 2018 the NCTA issued Triangle Expressway System Appropriation Revenue Refunding Bonds ($161,759,000.00) For the Senior Lien Revenue Bonds, specific revenues pledged consist of toll revenues and all other income derived from the operation of the Triangle Expressway System. For the State Annual Appropriation Revenue Bonds, specific revenues pledged consist of federal interest subsidy payments and investment income.

Note 9—Pledged revenues (continued)

The NCTA has elected to treat the State Annual Appropriation Revenue Bonds as "Build America Bonds" for purposes of the American Recovery and Reinvestment Act of 2009 and to receive a cash subsidy from the United States Treasury equal to 35% of the interest payable on these bonds. As part of the 2019 Federal Budget, the payments received during the year ended June 30, 2019 were reduced by 6.2%. As part of the 2018 Federal Budget, the payments received during the year ended June 30, 2018 were reduced by 6.6%.

Proceeds from the bonds are being used to pay the costs of land acquisition, design, construction, and equipping of the Triangle Expressway System, a 19-mile toll road facility built in Durham and Wake counties that was fully opened in January 2013. Additionally, proceeds from the bonds are being used to pay the costs of design, construction, and equipping of the Monroe Connector System, a 19.7-mile toll road facility to be built in Mecklenburg and Union counties that was fully opened in November 2018. The total principal and interest remaining to be paid on the bonds is $2,686,268,720.06 payable through fiscal year 2055 (final maturity date). For the year ended June 30, 2019, principal and interest paid and available revenues (toll revenues, fees, federal interest subsidy, federal transportation funds, and investment revenues) were $72,209,680.55 and $74,236,152.78, respectively. For year ended June 30, 2018, principal and interest paid and available revenues (toll revenues, fees, federal interest subsidy, federal transportation funds, and investment revenues) were $72,794,532.36, and $62,483,152.84, respectively.

Note 10—Retirement plans

Plan Description – The NCTA is a participating employer in the statewide Teachers' and State Employees' Retirement System ("TSERS"), a cost-sharing multiple-employer defined benefit pension plan administered by the State of North Carolina. TSERS membership is comprised of employees of the State (state agencies and institution), universities, community colleges, and certain proprietary component units along with the employees of Local Education Agencies and charter schools. Article 1 of G.S. Chapter 135 assigns the authority to establish and amend benefit provision to the North Carolina General Assembly. Management of the plan is vested in the TSERS Board of Trustees, which consists of 13 members – nine appointed by the Governor, one appointed by the state Senate, one appointed by the state House of Representatives, and the State Treasurer and State Superintendent who serve as ex-officio members. The Teachers' and State Employees' Retirement System is included in the State of North Carolina's CAFR. The State's CAFR included financial statements and required supplementary information for TSERS. That Report may be obtained by writing to the Office of the State Controller, 1410 Mail Service Center, Raleigh, North Carolina 27699-1410, by calling (919) 981-5454, or at www.osc.nc.gov.

Benefits Provided – TSERS provides retirement and survivor benefits. Retirement benefits are determined as 1.82% of the member's average final compensation times the member's years of creditable service. A member's average final compensation is calculated as the average of a member's four highest consecutive years of compensation. General employee plan members are eligible to retire with full retirement benefits at age 65 with five years of creditable service (or 10 years of creditable service for members joining TSERS on or after August 1, 2011), at age 60 with 25 years of creditable service, or at any age with 30 years of creditable service. General employee plan members are eligible to retire with partial retirement benefits at age 50 with 20 years of creditable service or at age 60 with five years of creditable service (or 10 years of creditable service for members joining TSERS on or after August 1, 2011). Survivor benefits are available to eligible beneficiaries of members who die while in active service or within 180 days of their last day of service and who have either completed 20 years of creditable service regardless of age or have completed five years of service and have reached age 60 (10 years for members joining on or after August 1, 2011). Eligible beneficiaries may elect to receive a monthly Survivor's Alternate Benefit for life or a return of the member's contributions. The plan does not provide for automatic post-retirement benefit increases. Increases are contingent upon actuarial gains of the plan.

Note 10—Retirement plans (continued)

Contributions – Benefit and contribution provisions for TSERS are established by North Carolina General Statutes 135-8 and may be amended only by the North Carolina General Assembly. Employer and member contribution rates are set each year by the North Carolina General Assembly based on annual actuarial valuations. Required employer contribution rates for the years ended June 30, 2019, and 2018 were 12.29% and 10.56%, respectively, while employee contributions were 6% each year. The NCTA made 100% of its annual required contributions for the years ended June 30, 2019, 2018, and 2017. Contributions to the pension plan from the NCTA were $193,133.00 and $136,611.00 for the years ended June 30, 2019 and 2018, respectively.

Refunds of Contributions – Employees who have terminated service as a contributing member of TSERS may file an application for a refund of their contributions. By state law, refunds to members with at least five years of service include 4% interest. State law requires a 60-day waiting period after service termination before the refund may be paid. The acceptance of a refund payment cancels the individual's right to employer contributions or any other benefit provided by TSERS.

Pension Liabilities, Pension Expense, and Deferred Outflows of Resources and Deferred Inflows of Resources Related to Pensions – As of June 30, 2019, the NCTA reported a liability of $729,749.00 for its proportionate share of the net pension liability. The net pension liability was measured as of June 30, 2018. The total pension liability used to calculate the net pension was determined by an actuarial valuation as of December 31, 2017. The total pension liability was then rolled forward to the measurement date of June 30, 2018, utilizing update procedures incorporating the actuarial assumptions.

The NCTA's proportion of the net pension liability was based on a projection of the NCTA's long-term share of future payroll covered by the pension plan, relative to the projected future payroll covered by the pension plan of all participating TSERS employers, actuarially determined. As of June 30, 2019 and 2018, the NCTA's proportion was 0.01% and the proportion did not change from the prior measurement date.

For the years ended June 30, 2019 and 2018, the NCTA recognized pension expense of $195,365.00 and $136,886.00, respectively. As of June 30, 2019, the NCTA reported deferred outflows of resources and deferred inflows of resources related to pensions from the following sources:

	Deferred Outflows of Resources	Deferred Inflows of Resources
Difference between actual and expected experience	$ 53,258.00	$ 7,324.00
Changes in assumptions	146,442.00	-
Net difference between projected and actual earnings on pension plan investments	69,545.00	-
Change in proportion and differences between agency's contributions and proportionate share of contributions	1,576.00	13,787.00
Change in proportion	87,862.00	-
Contributions subsequent to the measurement date	193,133.00	-
	$ 551,816.00	$ 21,111.00

Note 10—Retirement plans (continued)

As of June 30, 2018, the NCTA reported deferred outflows of resources and deferred inflows of resources related to pensions from the following sources:

	Deferred Outflows of Resources	Deferred Inflows of Resources
Difference between actual and expected experience	$ 10,473.00	$ 15,805.00
Changes in assumptions	76,323.00	-
Net difference between projected and actual earnings on pension plan investments	65,380.00	-
Change in proportion and differences between agency's contributions and proportionate share of contributions	32,506.00	17,416.00
Contributions subsequent to the measurement date	136,611.00	-
	$ 321,293.00	$ 33,221.00

As of June 30, 2019, the $193,133.00 included as a component of deferred outflows of resources related to pensions resulting from NCTA contributions subsequent to the measurement date will be recognized as a decrease of the net pension liability in the year ended June 30, 2020. Other amounts reported as deferred inflows of resources and deferred outflows of resources related to pensions will be recognized in pension expense as follows:

Years Ending June 30,	
2020	$ 180,233.00
2021	123,275.00
2022	35,341.00
2023	(1,277.00)
2024	-
Total	$ 337,572.00

Actuarial Assumptions – The total pension liability in the December 31, 2017, actuarial valuation was determined using the following actuarial assumptions, applied to all periods included in the measurement:

Inflation	3.00%
Salary increases	3.50% to 8.10%, including inflation and productivity factor of 3.50%
Investment rate of return	7.00%, net of pension plan investment expense, including inflation

The plan currently uses mortality tables that vary by age, gender, employee group (i.e., general, law enforcement officer) and health status (i.e., disabled and healthy). The current mortality rates are based on published tables and based on studies that cover significant portions of the U.S. population. The healthy mortality rates also contain a provision to reflect future mortality improvements.

The actuarial assumptions used in the December 31, 2017, valuation were based on the results of an actuarial experience study for the period January 1, 2010 through December 31, 2014. Future ad hoc COLA amounts are not considered to be substantively automatic and, are therefore, not included in the measurement.

Note 10—Retirement plans (continued)

The projected long-term investment returns and inflation assumptions are developed through review of current and historical capital markets data, sell-side investment research, consultant whitepapers, and historical performance of investment strategies. Fixed income return projections reflect current yields across the U.S. Treasury yield curve and market expectations of forward yields projected and interpolated for multiple tenors and over multiple year horizons. Global public equity return projections are established through analysis of the equity risk premium and the fixed income return projections. Other asset categories and strategies' return projections reflect the foregoing and historical data analysis. These projections are combined to produce the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage and by adding expected inflation. The target allocation and best estimates of arithmetic real rates of return for each major asset class as of June 30, 2017 are summarized in the following table:

Asset Class	Target Allocation	Real Rate of Return
Fixed Income	29.0%	1.4%
Global Equity	42.0%	5.3%
Real Estate	8.0%	4.3%
Alternatives	8.0%	8.9%
Credit	7.0%	6.0%
Inflation Protection	6.0%	4.0%
	100.0%	

The information above is based on 30-year expectations developed with the consulting actuary for the 2017 asset liability and investment policy study for the North Carolina Retirement Systems, including TSERS. The long-term nominal rates of return underlying the real rates of return are arithmetic annualized figures. The real rates of return are calculated from nominal rates by multiplicatively subtracting a long-term inflation assumption of 3.00%. All rates of return and inflation are annualized.

Discount Rate – The discount rate used to measure the total pension liability was 7.00%. The projection of cash flows used to determine the discount rate assumed that contributions from plan members will be made at the current contribution rate and that contributions from employers will be made at statutorily required rates, actuarially determined. Based on these assumptions, the pension plan's fiduciary net position was projected to be available to make all projected future benefit payments of the current plan members. Therefore, the long-term expected rate of return on pension plan investments was applied to all periods of projected benefit payments to determine the total net pension liability.

Sensitivity of the NCTA's Proportionate Share of the Net Pension Liability to Changes in the Discount Rate – The following presents the NCTA's proportionate share of the net pension liability calculated using the discount rate of 7.00%, as well as what the NCTA's proportionate share of the net pension asset or net pension liability would be if it were calculated using a discount rate that is 1-percentage-point lower (6.00%) or 1 percentage-point higher (8.00%) than the current rate:

	1% Decrease (6.00%)	Discount Rate (7.00%)	1% Increase (8.00%)
NCTA's proportionate share of the net pension liability	$ 1,391,755.00	$ 729,749.00	$ 174,260.00

Deferred Compensation and Supplemental Retirement Income Plans – IRC Section 457 Plan – The State of North Carolina offers its permanent employees a deferred compensation plan created in accordance with Internal Revenue Code Section 457 through the North Carolina Public Employee Deferred Compensation Plan (the "Plan").

Note 10—Retirement plans (continued)

The Plan permits each participating employee to defer a portion of his or her salary until future years. The deferred compensation is available to employees upon separation from service due to death, disability, or retirement or financial hardships if approved by the Board of Trustees of the Plan.

The Board, a part of the North Carolina Department of Administration, maintains a separate fund for the exclusive benefit of the participating employees and their beneficiaries, the North Carolina Public Employee Deferred Compensation Trust Fund. The Board also contracts with an external third party to perform certain administrative requirements and to manage the trust fund's assets. All costs of administering and funding the Plan are the responsibility of the Plan participants. No costs are incurred by the NCTA. The voluntary contributions by employees amounted to $28,271.00 and $30,423.92 for the years ended June 30, 2019, and 2018, respectively.

IRC Section 401(k) Plan – All members of TSERS are eligible to enroll in the Supplemental Retirement Income Plan, a defined contribution plan, created under Internal Revenue Code Section 401(k). All costs of administering the Plan are the responsibility of the Plan participants. No costs are incurred by the NCTA. The voluntary contributions by employees amounted to $57,014.38 and $24,567.58 for the years ended June 30, 2019 and 2018, respectively.

Note 11—Other postemployment benefits

The NCTA participates in the Comprehensive Major Medical Plan (the "Medical Plan"), a cost-sharing, multiple-employer defined benefit health care plan that provides postemployment health insurance to eligible former employees. Eligible former employees include long-term disability beneficiaries of the Disability Income Plan of North Carolina and retirees of TSERS.

Retiree Health Benefit Fund
Plan Description – The Retiree Health Benefit Fund ("RHBF") has been established as a fund to provide health benefits to retired and disabled employees and their applicable beneficiaries. The RHBF is established by General Statute 135-7, Article 1. It is a cost-sharing, multiple-employer, defined benefit healthcare plan, exclusively for the benefit of former employees of the State, the University of North Carolina System, and community colleges. In addition, LEAs, charter schools, and some select local governments also participate.

Management of the plan is vested in the State Health Plan Board of Trustees, which consists of 13 members – eight appointed by the Governor, one appointed by the State senate, one appointed by the State House of Representatives, and the State Treasurer, the State Superintendent, and the Director of the Office of State Human Resources who serve as ex-officio members. The RHBF is supported by a percent of payroll contribution from participating employing units. Each year the percentage is set in legislation, as are the maximum per retiree contributions from the RHBF to the State Health Plan. The State Treasurer, with the approval of the State Health Plan Board of Trustees, then set the employer contributions (subject to the legislative cap) and the premiums to be paid by retirees, as well as the health benefits to be provided through the State Health Plan.

The financial statements and other required disclosures for the plan are presented in the State of North Carolina's CAFR, which can be found at https://www.osc.nc.gov/public-information/reports.

Benefits Provided – Plan benefits received by retired employees and disabled employees from the RHBF are OPEB. The healthcare benefits for retired and disabled employees who are not eligible for Medicare are the same as for active employees. The plan options change when former employees become eligible for Medicare. Medicare retirees have the option of selecting one of two fully-insured Medicare Advantage/Prescription Drug Plan options of the self-funded Traditional 70/30 preferred Provider Organization plan option that is also offered to non-Medicare members. If the Traditional 70/30 Plan is selected by a Medicare retiree, the self-funded State Health Plan coverage is secondary to Medicare.

Note 11—Other postemployment benefits (continued)

Those former employees who are eligible to receive medical benefits from the RHBF are long-term disability beneficiaries of the DIPNC and retirees of the TSERS, the consolidated Judicial Retirement System ("CJRS"), the Legislative Retirement System ("LRS"), the University Employees' Optional Retirement Program ("ORP"), and a small number of local governments, with five or more years of contributory membership service in their retirement system prior to disability or retirement, with the following exceptions: for employees first hired on or after October 1, 2006, and members of the General Assembly first taking office on or after February 1, 2007, future coverage as retired employees and retired members of the General Assembly is subject to the requirement that the future retiree have 20 or more years of retirement service credit in order to receive coverage on a noncontributory basis. Employees first hired on or after October 1, 2006 and members of the General Assembly first taking office on or after February 1, 2007 with 10 but less than 20 years of retirement service credit are eligible for coverage on a partially contributory basis. For such future retirees, the State will pay 50% of the State Health Plan's noncontributory premium.

Section 35.21(c) and (d) of Session Law 2017-57 repeals retiree medical benefits for employees first hired January 1, 2021. The new legislation amends Article 3B of Chapter 135 of the General Statutes to require that retirees must earn contributory retirement service in TSERS (or in an allowed local system unit), CJRS, or LRS prior to January 1, 2021, and not withdraw that service, in order to be eligible for retiree medical benefits under the amended law. Consequently, members first hired on and after January 1, 2021 will not be eligible to receive retiree medical benefits.

The RHBF's benefit and contribution provisions are established by Chapter 135-7, Article 1 and Chapter 135, Article 3B of the General Statutes and may be amended only by the North Carolina General Assembly. The RHBF does not provide for automatic post-retirement benefit increases.

Contributions – By General Statute, accumulated contributions from employers to the RHBF and any earnings on those contributions shall be used to provide health benefits to retired and disabled employees and their applicable beneficiaries. By statute, contributions to the RHBF are irrevocable. Also by law, fund assets are dedicated to providing benefits to retired and disabled employees and their applicable beneficiaries and are not subject to the claims of creditors of the employers making contributions to the RHBF. However, the RHBF assets may be used for reasonable expenses to administer the RHBF, including costs to conduct required actuarial valuations of state – supports retired employees' health benefits. Contribution rates to the RHBF, which are intended to finance benefits and administrative expenses on a pay-as-you-go basis are determined by the General Assembly in the Appropriations Bill. For the years ended June 30, 2019 and 2018, the NCTA contributed 7.69% and 6.27% of covered payroll which amounted to $97,732.21 and $78,436.23, respectively.

At June 30, 2019, the NCTA reported a liability of $1,745,360.00 for its proportionate share of the net OPEB liability. The net OPEB liability was measured as of June 30, 2018, and the total OPEB liability used to calculate the net OPEB liability was determined by an actuarial valuation as of December 31, 2017. The total OPEB liability was then rolled forward to the measurement date of June 30, 2018 utilizing update procedures incorporating the actuarial assumptions. The NCTA's proportion of the net OPEB liability was based on a projection of the NCTA's present value of future salary, actuarially determined. At December 31, 2017 and 2016, the NCTA's proportion was 0.01%.

Note 11—Other postemployment benefits (continued)

As of June 30, 2019, $98,531.00 of contributions subsequent to the measurement date, $193.00 from a difference between project and actual earnings on OPEB plan investments, and $756,710.00 related to the change in proportion of the net OPEB liability are reported as deferred outflows of resources and will be recognized as a decrease of the net OPEB liability in the year ending June 30, 2020. Other amounts reported as deferred inflows of resources related to OPEB will be recognized in OPEB expense as follows:

Years Ending June 30,		
2020	$	(95,361.00)
2021		(95,361.00)
2022		(95,361.00)
2023		(95,169.00)
2024		12,823.00
Total	$	(368,429.00)

Actuarial Assumptions – The total OPEB liability in the December 31, 2017, actuarial valuation was determined using the following actuarial assumptions, applied to all periods included in the measurement:

Inflation	3.00%
Salary increases	3.50% to 8.10%, including inflation and productivity factor of 3.50%
Healthcare cost trend rate – Medical	5.00% to 6.50%
Healthcare cost trend rate – Prescription Drug	5.00% to 7.25%
Healthcare cost trend rate – Administrative	3.00%

Discount Rate – The discount rate used to measure the total OPEB liability for the RHBF was 3.87%. The projection of cash flow used to determine the discount rate assumed that contributions from employers would be made at the current statutorily determined contribution rate. Based on the above assumptions, the plan's fiduciary net position was not projected to be available to make projected future benefit payments of current plan members. As a result, a municipal bond rate of 3.87% was used as the discount rate used to measure the total OPEB liability. The 3.87% rate is based on the Bond Buyer 20-year General Obligation Index as of June 30, 2018.

Sensitivity of the NCTA's Proportionate Share of the Net OPEB Liability to Changes in the Discount Rate – The following presents the NCTA's proportionate share of the net OPEB liability would be if it were calculated using a discount rate that is 1-percentage-point lower (2.87%) or 1-percentage point higher (4.87%) than the current discount rate:

	1% Decrease (2.87%)	Discount Rate (3.87%)	1% Increase (4.87%)
NCTA's proportionate share of the net OPEB liability	$ 2,120,436.00	$ 1,745,360.00	$ 1,533,557.00

Note 11—Other postemployment benefits (continued)

Sensitivity of the NCTA's Proportionate Share of the Net OPEB Liability to Changes in Healthcare Trend Rates – The following presents the NCTA's proportionate share of the net OPEB liability would be if it were calculated using a discount rate that is 1-percentage-point lower or 1-percentage point higher than the current discount rate:

	1% Decrease	6.50% Medical, 7.25% Rx, 3.00% Administrative	1% Increase
NCTA's proportionate share of the net OPEB liability	$ 1,251,103.81	$ 1,745,360.00	$ 1,864,999.52

OPEB Plan Fiduciary Net Position – Detailed information about the OPEB plan's fiduciary net position is available in the separately issued CAFR for the State of North Carolina, which can be found at https://www.osc.nc.gov/public-information/reports.

Disability Income Plan of North Carolina
Plan Description – Short-term and long-term disability benefits are provided through the DIPNC, a cost-sharing, multiple-employer defined benefit plan, to the eligible members of TSERS which includes employees of the State, the University of North Carolina System, community colleges, and certain Local Education Agencies and ORP.

Management of the plan is vested in the State Health Plan Board of Trustees, which consists of 13 members – eight appointed by the Governor, one appointed by the State Senate, one appointed by the State House of Representatives and the State Treasurer, the State Superintendent, and the Director of the Office of the State Human Resources who serve as ex-officio members. Management of the plan is vested in the State Health Plan Board of Trustees, which consists of 13 members – eight appointed by the Governor, one appointed by the State Senate, one appointed by the State House of Representatives and the State Treasurer, the State Superintendent, and the Director of the Office of State Human Resources who service as ex-officio members.

The financial statements and other required disclosures for the plan are presented in the State of North Carolina's CAFR, which can be found at https://www.osc.nc.gov/public-information/reports.

Benefits Provided – Long-term disability benefits are payable as an OPEB from DIPNC after the conclusion of the short-term disability period or after salary continuation payments cease, whichever is later, for as long as the employee is disabled. An employee is eligible to receive long-term disability benefits provided the following requirements are met: (1) the employee have five or more years on contributing membership services in TSERS or ORP, earned within 96 months prior to the end of the short-term disability period or cessation of salary continuation payments, whichever is later; (2) the employee must make application to receive long-term benefits within 180 days after the conclusion of the short-term disability period or after salary continuation payment cease or after monthly payments for Workers' Compensation cease (excluding monthly payments for permanent partial benefits), whichever is later; (3) the employee must be certified by the Medical Board to be mentally or physically disabled for the further performance of his/her usual occupation; (4) the disability must have been continuous, likely to be permanent, and incurred at the time of active employment; (5) the employee must not be eligible to receive an unreduced retirement benefit from TSERS after (1) reaching the age of 65 and completing five years of membership service, or (2) reaching the age of 60 and completing 25 years of creditable service, or (3) completing 30 years of service at any age.

Note 11—Other postemployment benefits (continued)

Contributions – Benefit and contribution provisions are established by Chapter 135, Article 6, of the General Statutes and may be amended only by the North Carolina General Assembly. The plan does not provide for automatic post-retirement benefit increases. Disability income benefits are funded by actuarially determined employer contributions that are established in the Appropriations Bill by the General Assembly and coincide with the State fiscal year. For the fiscal years ended June 30, 2019 and 2018, employers made a statutory contribution of 0.14% of covered payroll which was equal to the actuarially required contribution. The NCTA's contributions to the plan were $2,182.22 and $1,751.37 for the year ended June 30, 2019 and 2018.

The contributions cannot be separated between the amounts that relate to other postemployment benefits and employment benefits for active employees. Those individuals who are receiving extended short-term disability benefit payments cannot be separated from the number of members currently eligible to receive disability benefits as another postemployment benefit.

OPEB Asset, OPEB Expense, and Deferred Outflows and Inflows of Resources Related to OPEB – At June 30, 2019, the NCTA reported an asset of $1,897.00 for it proportionate share of the net OPEB asset. The net OPEB asset was measured as of June 30, 2018, and the total OPEB asset used to calculate the net OPEB asset was determined by an actuarial valuation as of December 31, 2017. The total OPEB asset was then rolled forward to the measurement date of June 30, 2018 utilizing update procedures incorporating the actuarial assumptions. The NCTA's proportion of the net OPEB asset was based on a projection of the NCTA's present value of future salary, actuarially determined. At December 31, 2017 and 2016, the NCTA's proportion was 0.01%.

As of June 30, 2019, $2,200.00 resulting from the NCTA's contributions subsequent to the measurement date, $3,309.00 from a difference between actual and expected experience, $357.00 from changes in assumptions, $1,477.00 from a difference between project and actual earnings on OPEB plan investments, and $1,178.00 from a change in proportion between the NCTA's contributions and proportionate share of contributions are reported as deferred outflows of resources and will be recognized as an increase of the net OPEB asset in the year ending June 30, 2020. Other amounts reported as deferred inflows of resources related to OPEB will be recognized in OPEB expense as follows:

Years Ending June 30,		
2020	$	1,351.00
2021		1,350.00
2022		800.00
2023		591.00
2024		378.00
Thereafter		375.00
Total	$	4,845.00

Actuarial Assumptions – The total OPEB asset in the December 31, 2017, actuarial valuation was determined using the following actuarial assumptions, applied to all periods included in the measurement:

Inflation	3.00%
Salary increases	3.50% to 8.10%, including inflation and productivity factor of 3.50%
Investment rate of return	3.75%, net of pension plan investment expense, including inflation
Cost of living adjustment	3.50%

Note 11—Other postemployment benefits (continued)

Sensitivity of the NCTA's Proportionate Share of the Net OPEB Asset to Changes in the Discount Rate – The following presents the NCTA's proportionate share of the net OPEB asset would be if it were calculated using a discount rate that is 1 percentage point lower (2.75%) or 1-percentage point higher (4.75%) than the current discount rate:

	1% Decrease (2.75%)	Discount Rate (3.75%)	1% Increase (4.75%)
NCTA's proportionate share of the net OPEB asset	$ 1,454.00	$ 1,897.00	$ 2,322.00

Common Actuarial Assumptions for both OPEB Plans – The total OPEB asset was determined by an actuarial valuation performed as of December 31, 2017 using the following actuarial assumptions, applied to all periods in the measurement, unless otherwise specified. The total OPEB liability was calculated through the use of update procedures to roll forward from the actuarial valuation date to the measurement date of June 30, 2018. The update procedures incorporated the actuarial assumptions used in the valuation. The entry age normal cost method was utilized.

The OPEB plan currently uses mortality tables that vary by age, gender, employee group (i.e. teacher, general, law enforcement officer), and health status (i.e. disabled and healthy). The current mortality rates are based on published tables and based on studies that cover significant portions of the U.S. population. The mortality rates also contain a provision to reflect future mortality improvement.

The actuarial assumptions were based on the results of an actuarial experience review for the period January 1, 2010 through December 31, 2014.

The long-term expected rate of return on OPEB plan investments was determined using a building-block method in which best estimate ranges of expected future real rates of return are developed for each major asset class. These ranges are combined to produce the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation and by adding expected inflation. The target allocation and best estimates of arithmetic real rates of return for each major asset class are summarized in the following table:

Asset Class	Target Allocation	Long-Term Expected Real Rate of Return
Fixed Income	29.0%	1.4%
Global Equity	42.0%	5.3%
Real Estate	8.0%	4.3%
Alternatives	8.0%	8.9%
Credit	7.0%	6.0%
Inflation Protection	6.0%	4.0%
	100.0%	

Note 11—Other postemployment benefits (continued)

Total OPEB Expense, OPEB Assets and Liabilities, and Deferred Outflows and Inflows of Resources Related to OPEB

The following is information related to the proportionate share and OPEB expense as of June 30, 2019:

	RHBF	DIPNC	Total
OPEB expense	$ 89,084.00	$ 204.00	$ 89,288.00
OPEB liability (asset)	1,794,683.00	(1,897.00)	1,792,786.00
Proportionate share of net OPEB liability (asset)	0.01%	0.01%	
Deferred Outflows of Resources			
Difference between actual and expected experience	-	3,309.00	3,309.00
Changes in assumptions	-	357.00	357.00
Net difference between projected and actual earnings on OPEB plan investments	193.00	1,477.00	1,670.00
Change in proportion and differences between agency's contributions and proportionate share of contributions	-	1,178.00	1,178.00
Change in proportion	756,710.00	-	756,710.00
Contributions subsequent to the measurement date	98,531.00	2,200.00	100,731.00
	855,434.00	8,521.00	863,955.00
Deferred Inflows of Resources			
Difference between actual and expected experience	122,728.00	-	122,728.00
Changes in assumptions	777,498.00	-	777,498.00
Change in proportion and differences between agency's contributions and proportionate share of contributions	225,106.00	-	225,106.00
Change in proportion	-	1,476.00	1,476.00
	$ 1,125,332.00	$ 1,476.00	$ 1,126,808.00

Note 11—Other postemployment benefits (continued)

The following is information related to the proportionate share and OPEB expense as of June 30, 2018:

	RHBF	DIPNC	Total
OPEB expense	$ 126,942.00	$ 1,839.00	$ 128,781.00
OPEB liability (asset)	1,745,360.00	(3,209.00)	1,742,151.00
Proportionate share of net OPEB liability (asset)	0.01%	0.01%	-
Deferred Outflows of Resources			
Difference between actual and expected experience	-	880.00	880.00
Changes in assumptions	-	-	-
Net difference between projected and actual earnings on OPEB plan investments	-	703.00	703.00
Change in proportion and differences between agency's contributions and proportionate share of contributions	-	813.00	813.00
Change in proportion	306,290.00	-	306,290.00
Contributions subsequent to the measurement date	76,669.00	1,774.00	78,443.00
	382,959.00	4,170.00	387,129.00
Deferred Inflows of Resources			
Difference between actual and expected experience	125,146.00	-	125,146.00
Changes in assumptions	480,664.00	-	480,664.00
Net difference between projected and actual earnings on OPEB plan investments	649	-	649
Change in proportion and differences between agency's contributions and proportionate share of contributions	104,241.00	-	104,241.00
Change in proportion	-	411.00	411.00
	$ 710,700.00	$ 411.00	$ 711,111.00

Note 12—Risk management

The NCTA is exposed to various risks of loss related to torts; theft of, damage to, and the destruction of assets; errors and omissions; injuries to employees; and natural disasters. The NCTA carries insurance through the NCDOT for risks of loss. There have been no significant reductions in insurance coverage from the previous year, and settled claims have not exceeded coverage in any of the past three fiscal years.

Tort claims of up to $1,000.00 are self-insured under the authority of the State Tort Claims Act. In addition, the State provides excess public officers' and employees' liability insurance up to $10,000.00 via contract with a private insurance company. The premium, based on a composite rate, is paid by the NCDOT directly to the insurer.

The State Property Fire Insurance Fund ("Fire Fund"), an internal service fund of the State, insures all state-owned buildings and contents for fire and various other property losses up to $2,500.00 per occurrence. The Fire Fund purchases excess insurance from private insurers to cover losses over the amounts insured by the Fund. Losses covered by the Fire Fund are subject to a $5.00 per occurrence deductible except for theft losses that carry a $1.00 per occurrence deductible. There have been no significant reductions in insurance coverage from the previous year and settled claims have not exceeded coverage in any of the past three fiscal years.

State-owned vehicles are covered by liability insurance handled by the North Carolina Department of Insurance. The State is self-insured for the first $1,000.00 of any loss through a retrospective rated plan. Excess insurance coverage is purchased through a private insurer to cover losses greater than $1,000.00 up to $10,000.00. The liability limits for losses occurring in-state are $1,000.00 per claimant and $10,000.00 per occurrence. The NCDOT covers the cost of excess insurance and pays for those losses falling under the self-insured retention.

Note 12—Risk management (continued)

The NCTA is protected for losses from employee dishonesty and computer fraud for employees paid in whole or in part from State funds. This coverage is with a private insurance company and is handled by the North Carolina Department of Insurance with coverage of $5,000.00 per occurrence, with a $75.00 deductible and 10% participation in each loss above the deductible. In addition, the NCDOT has a separate public employee dishonesty and faithful performance policy with a limit of $1,000.00.

Employees and retirees are provided health care coverage by the Medical Plan, a component unit of the State. The Medical Plan is funded by employer and employee contributions and is administered by a third-party contractor.

The North Carolina Workers' Compensation Program provides benefits to workers injured on the job. All employees of the State are included in the program. When an employee is injured, the NCTA's primary responsibility is to arrange for and provide the necessary treatment for the work-related injury. The NCTA is responsible to pay medical benefits and compensation in accordance with the North Carolina Workers' Compensation Act. The NCTA is self-insured for workers' compensation.

Term life insurance of $25.00 to $50.00 is provided to eligible employees. This self-insured death benefit program is administered by the State Treasurer and funded via employer contributions. The employer contribution rate was 0.16% of covered payroll for the current fiscal year.

Additional details on the state-administered risk management programs are disclosed in the State of North Carolina's CAFR. An electronic version of this report is available by accessing the North Carolina Office of the State Controller's Internet home page http://www.ncosc.net/ and clicking on "Public Information" or by calling the State Controller's Financial Reporting Section at (919) 707-0500.

Note 13—Commitments and contingencies

The NCTA has established an encumbrance system to track its outstanding commitments on construction projects and other purchases. Outstanding commitments for engineering and design contracts were $333,001,295.39 and $53,354,092.61 as of June 30, 2019 and 2018, respectively.

The NCTA at times is involved in litigation in the normal course of business. Although the outcome of any such litigation is not presently determinable, in the opinion of management and the NCTA's General Counsel, the results of the litigation will not have a materially adverse impact on the financial position of the NCTA.

Note 14—Adoption of new accounting standard

The NCTA implemented GASB Statement 88, *Certain Disclosures Related to Debt, including Direct Borrowings and Direct Placements* in the fiscal year ending June 30, 2019. The financial statements have been updated to reflect the changes in disclosure.

Note 15—Subsequent events

In connection with the preparation of the financial statements and in accordance with U.S. GAAP, the NCTA considered for disclosure subsequent events that occurred after the statement of net position date of June 30, 2019 through October 31, 2019, which was the date the financial statements were available to be issued.

On September 16, 2019, the NCTA drew down an additional $46,500,000.00 on the Monroe Expressway TIFIA note payable.

REQUIRED SUPPLEMENTARY INFORMATION

This section contains additional information required by generally accepted accounting principles.

- Schedule of Proportionate Share of Net Pension Liability – Teachers’ and State Employees’ Retirement System
- Schedule of Contributions – Teachers’ and State Employees’ Retirement System
- Schedule of Proportionate Share of Net OPEB Liability – Retiree Health Benefit Fund
- Schedule of Contributions– Retiree Health Benefit Fund
- Schedule of Proportionate Share of Net OPEB Asset – Disability Income Plan of North Carolina
- Schedule of Contributions – Disability Income Plan of North Carolina

Schedule of Proportionate Share of Net Pension Liability
Teachers' and State Employees' Retirement System
June 30, *

	2019	2018	2017	2016	2015	2014
NCTA's proportion of the net pension liability (%)	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
NCTA's proportion of the net pension liability ($)	$ 729,749.00	$ 483,101.00	$ 557,948.00	$ 225,156.00	$ 69,460.00	$ 356,082.00
NCTA's covered-employee payroll	$ 1,250,976.57	$ 1,020,099.00	$ 899,061.00	$ 882,095.00	$ 988,337.00	$ 988,337.00
NCTA's proportionate share of the net pension liability as a percentage of its covered-employee payroll	58.3%	47.4%	62.1%	25.5%	7.0%	36.0%
Plan fiduciary net position as a percentage of the total pension liability	87.61%	89.51%	87.32%	94.64%	98.24%	90.60%

Schedule of Contributions
Teachers' and State Employees' Retirement System
June 30, *

	2019	2018	2017	2016	2015	2014
Contractually required contribution	$ 191,567.60	$ 132,103.13	$ 101,322.00	$ 74,249.00	$ 86,087.00	$ 82,328.00
Contributions in relation to the contractually required contribution	(191,567.60)	(132,103.13)	(101,322.00)	(74,249.00)	(86,087.00)	$ (82,328.00)
Contribution deficiency (excess)	$ -	$ -	$ -	$ -	$ -	$ -
NCTA's covered-employee payroll	$ 1,558,727.00	$ 1,250,976.57	$ 1,020,099.00	$ 899,061.00	$ 882,095.00	$ 988,337.00
Contributions as a percentage of covered-employee payroll	12.3%	10.6%	9.9%	8.3%	9.8%	8.3%

*The amounts presented for each fiscal year were determined as of the prior fiscal year ended June 30. Information is not available for preceding years, to the extent 10 years of information is not presented.

Schedule of Proportionate Share of Net OPEB Liability
Retiree Health Benefit Fund
June 30, *

	2019	2018
NCTA's proportion of the net OPEB liability (%)	0.01%	0.01%
NCTA's proportion of the net OPEB liability ($)	$ 1,794,683.00	$ 1,745,360.00
NCTA's covered-employee payroll	$ 1,558,727.46	$ 1,020,099.00
NCTA's proportionate share of the net OPEB liability as a percentage of its covered-employee payroll	115.1%	171.1%
Plan fiduciary net position as a percentage of the total OPEB liability	4.40%	3.52%

Schedule of Contributions
Retiree Health Benefit Fund
June 30, *

	2019	2018
Contractually required contribution	$ 97,732.21	$ 78,436.23
Contributions in relation to the contractually required contribution	(97,732.21)	(78,436.23)
Contribution deficiency (excess)	$ -	$ -
NCTA's covered-employee payroll	$ 1,558,727.46	$ 1,020,099.00
Contributions as a percentage of covered-employee payroll	6.27%	7.69%

*The amounts presented for each fiscal year were determined as of the prior fiscal year ended June 30. Information is not available for preceding years, to the extent 10 years of information is not presented.

Schedule of Proportionate Share of Net OPEB Asset
Disability Income Plan of North Carolina
June 30, *

	2019	2018
NCTA's proportion of the net OPEB asset (%)	0.01%	0.01%
NCTA's proportion of the net OPEB asset ($)	$ 1,897.00	$ 3,209.00
NCTA's covered-employee payroll	$ 1,558,727.46	$ 1,020,099.00
NCTA's proportionate share of the net OPEB asset as a percentage of its covered-employee payroll	0.12%	0.31%
Plan fiduciary net position as a percentage of the total OPEB asset	108.47%	116.23%

Schedule of Contributions
Disability Income Plan of North Carolina
June 30, *

	2019	2018
Contractually required contribution	$ 2,182.22	$ 1,751.37
Contributions in relation to the contractually required contribution	(2,182.22)	(1,751.37)
Contribution deficiency (excess)	$ -	$ -
NCTA's covered-employee payroll	$ 1,558,727.46	$ 1,020,099.00
Contributions as a percentage of covered-employee payroll	0.14%	0.17%

*The amounts presented for each fiscal year were determined as of the prior fiscal year ended June 30. Information is not available for preceding years, to the extent 10 years of information is not presented.

SUPPLEMENTARY INFORMATION

NORTH CAROLINA TURNPIKE AUTHORITY

STATEMENT OF REVENUES, EXPENSES, AND CHANGES IN NET POSITION — (MODIFIED ACCRUAL BASIS – NON GAAP)

YEAR ENDED JUNE 30, 2019

	Triangle Expressway	Monroe Expressway
Revenues:		
Operating Revenue:		
Charges for Services	$ 53,468,228.66	$ 9,350,399.16
Toll Receipts	50,511,229.00	8,723,498.00
Toll Bad Debt	(1,297,476.78)	-
Late Payment Fee	4,077,462.54	619,931.48
Electronic Transaction Fees	173,942.30	6,653.37
Returned Check Fee	3,071.60	316.31
Other Operating Revenues	7,500.00	152,099.88
Total Operating Revenues	53,475,728.66	9,502,499.04
Expenses:		
Operating Expenses:		
Shared Operating Expenses	12,057,548.66	1,883,259.36
Personnel Services	577,834.76	67,313.29
Contracted Personnel Services	279,926.68	177,480.72
Supplies and Materials	2,572.58	4,383.67
Travel	6,975.40	1,608.03
Advertising	72,626.48	23,819.98
Utilities	200,068.32	23,344.80
Dues and Subscription Fees	570.00	-
Other Services	1,018.11	-
Other Expenses	1,348,152.57	22,847.05
Capital Outlay	5,468,372.08	554,163.92
Right of Way	3,000.00	-
Rental Expense	59,140.32	1,460.88
Total Operating Expenses	20,077,805.96	2,759,681.70
Total Operating Renewal and Replacement:		
Shared Operating Renewal and Replacement	-	908,660.03
Personnel Services	143,514.47	1,017,199.24
Contracted Personnel Services	6,698.60	200,857.70
Supplies and Materials	20,515.00	29,384.79
Travel	1,047.67	26,228.44
Advertising	-	359,993.66
Utilities	-	12,865.98
Other Services	139,849.18	29,436.00
Other Expenses	-	42,188.88
Capital Outlay	5,930,181.28	27,280,311.54
Right of Way	321,826.00	13,651,656.63
Rental Expense	52,973.07	76,711.76
Total Operating Renewal and Replacement	6,616,605.27	43,635,494.65
Operating Income (Loss)	26,781,317.43	(36,892,677.31)

NORTH CAROLINA TURNPIKE AUTHORITY
STATEMENT OF REVENUES, EXPENSES, AND CHANGES IN NET POSITION —
(MODIFIED ACCRUAL BASIS – NON GAAP) (CONTINUED)

YEAR ENDED JUNE 30, 2019

	Triangle Expressway	Monroe Expressway
Nonoperating Revenues (Expenses):		
Municipal Participation Reimbursement	$ 8,477.00	$ -
State Agency Participation Reimbursement	-	33,000.00
Sale of Land	550,483.73	-
Investment Earnings	2,546,538.06	1,760,458.52
Federal Interest Subsidy on Debt	2,140,015.74	4,037,107.46
Interest and Fees		
Triangle Expressway System Senior Lien Revenue Bonds, Series 2009A	(27,000.00)	-
Triangle Expressway System State Annual Appropriation Revenue Bonds, Series 2009B (Federally Taxable-Issuer Subsidy-Build America Bonds)	(11,993,484.00)	-
Triangle Expressway System Senior Lien Revenue Refunding Bonds, Series 2017	(9,735,093.76)	-
Triangle Expressway System Appropriation Revenue Refunding Bonds, Series 2018A	(3,853,208.33)	-
Triangle Expressway TIFIA Bond Interest	(17,289,937.77)	-
Monroe Connector System State Annual Appropriation Revenue Bonds, Series 2010A, (Federally Taxable-Issuer Subsidy-Build America Bonds)	-	(12,297,007.20)
Monroe Connector System State Appropriation Revenue Bonds, Series 2011	-	(6,274,625.00)
Monroe Connector System Senior Lien Revenue Bonds, Series 2016	-	(5,969,262.50)
Principal:		
Triangle Expressway System Senior Lien Revenue Bonds, Series 2009A	(600,000.00)	
Triangle Expressway System State Annual Appropriation Revenue Bonds, Series 2009B (Federally Taxable-Issuer Subsidy-Build America Bonds)	(9,615,000.00)	-
Triangle Expressway System Senior Lien Turnpike Revenue Refunding Bonds, Series 2017	(3,320,000.00)	-
Monroe Connector System Senior Lien Revenue Bonds, Series 2011	-	(8,525,000.00)
Total Nonoperating Expenses	(51,188,209.33)	(27,235,328.72)
Loss before Transfers and Capital Grants	(24,406,891.90)	(64,128,006.03)
Capital Grants	-	111,812.00
Transfers In	25,000,000.00	24,000,000.00
Increase (Decrease) in Net Position	$ 593,108.10	$ (40,016,194.03)

Note 1 – Basis of presentation

Operating revenues inclusive of Late Payment Fees, Electronic Transaction Fees and Returned Check Fees are shown on a cash basis. These revenues are accounted for at the fund level and allocated across the NCTA's operational projects at the end of each month based on facility usage. Any accrued revenue inclusive of these fees has not yet been allocated to a specific project, therefore, it cannot be included in the project specific operating revenue amounts.

Report of Independent Auditor on Internal Control over Financial Reporting and on Compliance and Other Matters Based on an Audit of Financial Statements Performed in Accordance With *Government Auditing Standards*

Board of Directors
North Carolina Turnpike Authority
Raleigh, North Carolina

We have audited in accordance with the auditing standards generally accepted in the United States of America and the standards applicable to the financial audits contained in *Government Auditing Standards* issued by the Comptroller General of the United States, the financial statements of the North Carolina Turnpike Authority ("NCTA"), a major enterprise fund of the State of North Carolina, and a business unit of the North Carolina Department of Transportation ("NCDOT"), as of and for the years ended June 30, 2019 and 2018, and the related notes to the financial statements, which collectively comprise the NCTA's basic financial statements as listed in the table of contents, and have issued our report thereon dated October 31, 2019.

The financial statements present only the NCTA and do not purport to and do not present fairly the financial position of the State of North Carolina or the NCDOT, as of June 30, 2019 and 2018, and the changes in their financial position and their cash flows for the years then ended in conformity with accounting principles generally accepted in the United States of America.

Internal Control over Financial Reporting

In planning and performing our audit of the financial statements, we considered the NCTA's internal control over financial reporting ("internal control") to determine the audit procedures that are appropriate in the circumstances for the purpose of expressing our opinions on the financial statements, but not for the purpose of expressing an opinion on the effectiveness of the NCTA's internal control. Accordingly, we do not express an opinion on the effectiveness of the NCTA's internal control.

A deficiency in internal control exists when the design or operation of a control does not allow management or employees, in the normal course of performing their assigned functions, to prevent, or detect and correct misstatements, on a timely basis. A material weakness is a deficiency, or a combination of deficiencies, in internal control, such that there is a reasonable possibility that a material misstatement of the NCTA's financial statements will not be prevented, or detected and corrected, on a timely basis. A significant deficiency is a deficiency, or a combination of deficiencies, in internal control that is less severe than a material weakness yet, important enough to merit attention by those charged with governance.

Our consideration of internal control was for the limited purpose described in the first paragraph of this section and was not designed to identify all deficiencies in internal control that might be material weaknesses or significant deficiencies. Given these limitations, during our audit, we did not identify any deficiencies in internal control that we consider to be material weaknesses. However, material weaknesses may exist that have not been identified.

Compliance and Other Matters

As part of obtaining reasonable assurance about whether the NCTA's financial statements are free from material misstatement, we performed tests of its compliance with certain provisions of laws, regulations, contracts, and grant agreements, noncompliance with which could have a direct and material effect on the determination of financial statement amounts. However, providing an opinion on compliance with those provisions was not an objective of our audit, and accordingly, we do not express such an opinion. The results of our tests disclosed no instances of noncompliance or other matters that are required to be reported under *Government Auditing Standards*.

Purpose of this Report

The purpose of this report is solely to describe the scope of our testing of internal control and compliance and the results of that testing, and not to provide an opinion on the effectiveness of the NCTA's internal control or on compliance. This report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering the NCTA's internal control and compliance. Accordingly, this communication is not suitable for any other purpose.

Cherry Bekaert LLP

Raleigh, North Carolina
October 31, 2019

This audit required 375 audit hours at a cost of $69,000.

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APPENDIX E

PROPOSED FORM OF OPINION OF BOND COUNSEL

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HUNTON ANDREWS KURTH LLP
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101 SOUTH TRYON STREET
CHARLOTTE, NORTH CAROLINA 28280

TEL 919 • 864 • 7200
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FILE NO: 77055.4

December 17, 2019

Board of Directors
North Carolina Turnpike Authority
Raleigh, North Carolina

$370,975,000
North Carolina Turnpike Authority
Triangle Expressway System Senior Lien
Turnpike Revenue Bonds, Series 2019

Gentlemen:

We have examined the applicable law and certified copies of proceedings and documents relating to the issuance by the North Carolina Turnpike Authority (the "Authority") of its Triangle Expressway System Senior Lien Turnpike Revenue Bonds, Series 2019, in the aggregate principal amount of $370,975,000 (the "Bonds"), to provide funds, together with other available funds, to pay (a) the costs of land acquisition, design, construction and equipping of an extension of the existing toll road facility in Wake and Durham Counties, North Carolina (the "Triangle Expressway System"), from its existing eastern termination point to intersect with I-40 known as Complete 540 – Phase 1 (the "Project"), (b) certain interest on the Bonds, (c) the premium for a municipal bond insurance policy issued by Assured Guaranty Municipal Corp. (the "Series 2019 Bond Insurer") with respect to certain Bonds, (d) the premium for a municipal bond debt service reserve insurance policy with respect to the Bonds issued by the Series 2019 Bond Insurer and (e) costs incurred in connection with the issuance of the Bonds. Reference is made to the form of the Bonds for additional information concerning their details, payment and redemption provisions and the proceedings pursuant to which they are issued.

The Bonds recite that they are issued under and pursuant to the Constitution and laws of the State of North Carolina (the "State"), including Article 6H (Public Toll Roads and Bridges) of Chapter 136, as amended, of the North Carolina General Statutes (the "NCGS"), and The State and Local Government Revenue Bond Act, Article 5 of Chapter 159, as amended, of the NCGS, a Bond Order of the Authority adopted on October 31, 2019 (the "Bond Order"), authorizing the issuance of the Bonds, and an Amended and Restated Trust Agreement dated as of December 1, 2019, which is a restatement and compilation of a Trust Agreement dated as of June 1, 2009, between the Authority and Wells Fargo Bank, N.A., as trustee (in such capacity, the "Trustee"), as previously supplemented and amended by a First Supplemental Trust Agreement dated as of July 1, 2009, a Second Supplemental Trust

Agreement dated as of March 1, 2017, and a Third Supplemental Trust Agreement dated as of December 1, 2018 (collectively, the "Prior Trust Agreement"), and as further supplemented and amended by a Fourth Supplemental Trust Agreement dated as of December 1, 2019 (the "Fourth Supplemental Trust Agreement" and, together with the Prior Trust Agreement, the "Trust Agreement"). All capitalized terms not defined herein are as defined in the Trust Agreement.

The Bonds are special obligations of the Authority secured by a pledge, charge and lien upon the Trust Estate consisting primarily of Receipts from the Triangle Expressway System. The Authority is not obligated to pay the principal of or the interest on the Bonds except from Receipts or certain other monies made available therefor under the Trust Agreement, and neither the faith and credit nor the taxing power of the State or any political subdivision or agency thereof, including the Authority, is pledged to the payment of the principal of and the interest on the Bonds. At the time of issuance of the Bonds there will be outstanding certain of the Authority's Triangle Expressway System Senior Lien Turnpike Revenue Bonds, Series 2009B, Triangle Expressway System Senior Lien Turnpike Revenue Refunding Bonds, Series 2017, and Triangle Expressway System Senior Lien Turnpike Revenue Refunding Bonds, Series 2018 (in the aggregate, the "Existing Parity Bonds"), which are secured by a pledge of the Trust Estate on parity with the Bonds. The Authority is concurrently issuing Triangle Expressway System Revenue Bond, TIFIA Series 2019, in an aggregate principal amount of up to $[_______] (the "TIFIA Series 2019 Bond"), evidencing the obligation to repay a loan from the United States Department of Transportation, pursuant to the Transportation Infrastructure Finance and Innovation Act of 1998 ("TIFIA"), for the Triangle Expressway System. The TIFIA Series 2019 Bond is initially secured with a lien on the Trust Estate junior to the lien securing the Bonds and the Existing Parity Bonds but on certain conditions may become secured on parity with the Bonds and the Existing Parity Bonds. The Trust Agreement also provides for the issuance or incurrence from time to time under the conditions, limitations and restrictions therein set forth of additional bonds and Senior Lien Parity Debt secured by a pledge of the Trust Estate on parity with the Bonds and the Existing Parity Bonds.

Without undertaking to verify the same by independent investigation, we have relied on certifications by representatives of the Authority, the North Carolina Department of Transportation and the North Carolina Local Government Commission as to certain facts relevant to both our opinion and requirements of the Internal Revenue Code of 1986, as amended (the "Code"). The Authority has covenanted to comply with the current provisions of the Code regarding, among other matters, the use, expenditure and investment of the proceeds of the Bonds and the timely payment to the United States of any arbitrage rebate amounts with respect to the Bonds, all as set forth in the proceedings and documents relating to the issuance of the Bonds (the "Covenants").

The Series 2019 Bond Insurer has issued a municipal bond insurance policy with respect to the Bonds maturing in the years 2042, 2049 (initially bearing CUSIP No. 65830RCT4) and 2055 (initially bearing CUSIP No. 65830RCU1) and a municipal bond debt service reserve insurance policy with respect to all of the Bonds (the "Policies"). Reference is made to the Policies for a full statement of their terms and conditions and to the opinion of counsel to the Series 2019 Bond Insurer as to the validity of the Policies, upon which you are relying as to matters therein. No opinion as to such matters is expressed herein.

Based on the foregoing and in accordance with customary opinion practice, we are of the opinion that:

1. The Bonds have been authorized and issued in accordance with the Constitution and statutes of the State and constitute valid and legally binding special obligations of the Authority, payable as to principal and interest solely from Receipts and certain other monies made available therefor under the Trust Agreement. The Bonds do not create or constitute a debt or pledge of the faith and credit of the State or any political subdivision or agency thereof, including the Authority.

2. The Bond Order has been duly adopted by the Authority, and the Trust Agreement has been duly executed and delivered by the Authority. The Fourth Supplemental Trust Agreement is permitted by the Prior Trust Agreement, and the Trust Agreement, assuming the due authorization, execution and delivery thereof by the Trustee, constitutes a valid and legally binding agreement of the Authority which assigns and pledges the Trust Estate to the Trustee and is enforceable against the Authority in accordance with its terms.

3. The rights of the holders of the Bonds and the enforceability of such rights, including enforcement by the Trustee of the obligations of the Authority under the Trust Agreement, may be limited or otherwise affected by (a) bankruptcy, insolvency, reorganization, fraudulent conveyance, moratorium and other laws affecting the rights of creditors generally and (b) principles of equity, whether considered at law or in equity.

4. Under current law, interest, including accrued original issue discount ("OID"), on the Bonds (a) is not included in gross income for federal income tax purposes and (b) is not an item of tax preference for purposes of the federal alternative minimum income tax. The opinion in the preceding sentence is subject to the condition that there is compliance

subsequent to the issuance of the Bonds with all requirements of the Code that must be satisfied in order that interest thereon not be included in gross income for federal income tax purposes. In the case of the Bonds maturing in 2042 (the "OID Bonds"), the difference between (i) the stated principal amount of the OID Bonds and (ii) the initial offering price to the public (excluding bond houses and brokers) at which a substantial amount of such Bonds is sold will constitute OID; OID will accrue for federal income tax purposes on a constant yield-to-maturity method; and a holder's basis in such a Bond will be increased by the amount of OID treated for federal income tax purposes as having accrued on the Bond while the holder holds the Bond. Failure by the Authority to comply with the Covenants, among other things, could cause interest, including accrued OID, on the Bonds to be included in gross income for federal income tax purposes retroactively to their date of issue. We express no opinion regarding other federal tax consequences of the ownership of or receipt or accrual of interest on the Bonds.

5. Under current law, interest, including accrued OID, on the Bonds is exempt from State income taxes.

Our services as bond counsel to the Authority for the Bonds have been limited to rendering the foregoing opinion based on our review of such legal proceedings as we deem necessary to approve the validity of the Bonds and the tax-exempt status of the interest thereon. We have not made any investigation concerning the Project, the Receipts or the financial resources of the Authority or the Series 2019 Bond Insurer, and we express no opinion as to the accuracy or completeness of any information, including the Preliminary Official Statement dated November 13, 2019, or the Official Statement dated November 21, 2019, with respect to the Bonds, that may have been relied upon by anyone in making the decision to purchase Bonds.

Very truly yours,

APPENDIX F

DTC'S BOOK-ENTRY-ONLY SYSTEM

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APPENDIX F

DTC'S BOOK-ENTRY-ONLY SYSTEM

The Depository Trust Company, New York, New York ("DTC"), will act as securities depository for the Series 2019 Bonds. The Series 2019 Bonds will be issued as fully-registered bonds registered in the name of Cede & Co. (DTC's partnership nominee) or such other name as may be requested by an authorized representative of DTC. One fully-registered Series 2019 Bond for each maturity in the aggregate principal amount of such maturity will be deposited with DTC, or with the Trustee on DTC's behalf.

DTC is a limited-purpose trust company organized under the New York Banking Law, a "banking organization" within the meaning of the New York Banking Law, a member of the Federal Reserve System, a "clearing corporation" within the meaning of the New York Uniform Commercial Code and a "clearing agency" registered pursuant to the provisions of Section 17A of the Securities Exchange Act of 1934. DTC holds and provides asset servicing for issues of U.S. and non-U.S. equity issues, corporate and municipal debt issues, and money market instruments that DTC's participants ("Direct Participants") deposit with DTC. DTC also facilitates the post-trade settlement among Direct Participants of sales and other securities transactions in deposited securities, through electronic computerized book-entry transfers and pledges between Direct Participants' accounts. This eliminates the need for physical movement of securities certificates. Direct Participants include both U.S. and non-U.S. securities brokers and dealers, banks, trust companies, clearing corporations and certain other organizations. DTC is a wholly-owned subsidiary of The Depository Trust & Clearing Corporation ("DTCC"). DTCC is the holding company for DTC, National Securities Clearing Corporation and Fixed Income Clearing Corporation, all of which are registered clearing agencies. DTCC is owned by the users of its regulated subsidiaries. Access to the DTC system is also available to others such as both U.S. and non-U.S. securities brokers and dealers, banks, trust companies and clearing corporations that clear through or maintain a custodial relationship with a Direct Participant, either directly or indirectly ("Indirect Participants"). DTC has Standard & Poor's rating of AA+. The DTC Rules applicable to its Participants are on file with the Securities and Exchange Commission. More information about DTC can be found at www.dtcc.com.

Purchases of the Series 2019 Bonds under the DTC system must be made by or through Direct Participants, which will receive a credit for the Series 2019 Bonds on DTC's records. The ownership interest of each actual purchaser of the Series 2019 Bonds ("Beneficial Owner") is in turn to be recorded on the Direct and Indirect Participants' records. Beneficial Owners will not receive written confirmation from DTC of their purchase. Beneficial Owners are, however, expected to receive written confirmations providing details of the transaction, as well as periodic statements of their holdings, from the Direct or Indirect Participants through which the Beneficial Owner entered into the transaction. Transfers of ownership interests in the Series 2019 Bonds are to be accomplished by entries made on the books of Direct and Indirect Participants acting on behalf of Beneficial Owners. Beneficial Owners will not receive certificates representing their ownership interests in the Series 2019 Bonds, except in the event that use of the book-entry system for the Series 2019 Bonds is discontinued.

To facilitate subsequent transfers, all Series 2019 Bonds deposited by Direct Participants with DTC are registered in the name of DTC's partnership nominee, Cede & Co., or such other name as may be requested by an authorized representative of DTC. The deposit of the Series 2019 Bonds with DTC and their registration in the name of Cede & Co. or such other DTC nominee do not effect any change in beneficial ownership. DTC has no knowledge of the actual Beneficial Owners of the Series 2019 Bonds; DTC's records reflect only the identity of the Direct Participants to whose accounts the Series 2019 Bonds are credited, which may or may not be the Beneficial Owners. The Direct and Indirect Participants are responsible for keeping account of their holdings on behalf of their customers.

Conveyance of notices and other communications by DTC to Direct Participants, by Direct Participants to Indirect Participants and by Direct Participants and Indirect Participants to Beneficial Owners of the Series 2019 Bonds will be governed by arrangements among them, subject to any statutory or regulatory requirements as may be in effect from time to time. Beneficial Owners of the Series 2019 Bonds may wish to take certain steps to augment transmission to them of notices of significant events with respect to the Series 2019 Bonds, such as redemptions, tenders, defaults and proposed amendments to the security documents. For example, Beneficial Owners of the Series 2019 Bonds may wish to ascertain that the nominee holding the Series 2019 Bonds for their benefit has agreed to obtain and transmit notices to Beneficial Owners. In the alternative, Beneficial Owners may wish to provide their names and addresses to the registrar and request that copies of notices be provided directly to them.

Redemption notices will be sent to DTC. If less than all the Series 2019 Bonds are being redeemed, DTC's practice is to determine by lot the amount of the interest of each Direct Participant in such issue to be redeemed.

Neither DTC nor Cede & Co. (nor such other DTC nominee) will consent or vote with respect to the Series 2019 Bonds unless authorized by a Direct Participant in accordance with DTC's Procedures. Under its usual procedures, DTC will mail an Omnibus Proxy to the Authority as soon as possible after the record date. The Omnibus Proxy will assign Cede & Co.'s consenting or voting rights to those Direct Participants to whose accounts the Series 2019 Bonds are credited on the record date (identified in a listing attached to the Omnibus Proxy).

Principal and interest payments on the Series 2019 Bonds will be made to Cede & Co. or such other nominee as may be requested by an authorized representative of DTC. DTC's practice is to credit Direct Participants' accounts upon DTC's receipt of funds and corresponding detail information from the Authority or the Trustee on each payable date in accordance with their respective holdings shown on DTC's records. Payments by Participants to Beneficial Owners will be governed by standing instructions and customary practices, as is the case with securities held for the accounts of customers in bearer form or registered in "street name," and will be the responsibility of such Participants and not of DTC, the Authority, or the Trustee, subject to any statutory or regulatory requirements as may be in effect from time to time. Payments of principal and interest to Cede & Co. (or such other nominee as may be requested by an authorized representative of DTC) is the responsibility of the Authority and the Trustee, disbursement of such payments to Direct Participants shall be the responsibility of DTC, and disbursements of such payments to the Beneficial Owners shall be the responsibility of the Direct and Indirect Participants.

DTC may discontinue providing its services as depository with respect to the Series 2019 Bonds at any time by giving reasonable notice to the Authority or the Trustee. Under such circumstances, in the event that a successor depository is not obtained, Series 2019 Bonds are required to be printed and delivered. The Authority may decide to discontinue use of the system of book-entry-only transfers through DTC (or a successor securities depository). In that event, Series 2019 Bonds are required to be printed and delivered.

The information in this Official Statement concerning DTC and DTC's book-entry system has been obtained from DTC, and the Authority takes no responsibility for the accuracy thereof.

APPENDIX G

SPECIMEN MUNICIPAL BOND INSURANCE POLICY

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MUNICIPAL BOND INSURANCE POLICY

ISSUER: Policy No: -N

BONDS: $ in aggregate principal amount of

Effective Date:

Premium: $

ASSURED GUARANTY MUNICIPAL CORP. ("AGM"), for consideration received, hereby UNCONDITIONALLY AND IRREVOCABLY agrees to pay to the trustee (the "Trustee") or paying agent (the "Paying Agent") (as set forth in the documentation providing for the issuance of and securing the Bonds) for the Bonds, for the benefit of the Owners or, at the election of AGM, directly to each Owner, subject only to the terms of this Policy (which includes each endorsement hereto), that portion of the principal of and interest on the Bonds that shall become Due for Payment but shall be unpaid by reason of Nonpayment by the Issuer.

On the later of the day on which such principal and interest becomes Due for Payment or the Business Day next following the Business Day on which AGM shall have received Notice of Nonpayment, AGM will disburse to or for the benefit of each Owner of a Bond the face amount of principal of and interest on the Bond that is then Due for Payment but is then unpaid by reason of Nonpayment by the Issuer, but only upon receipt by AGM, in a form reasonably satisfactory to it, of (a) evidence of the Owner's right to receive payment of the principal or interest then Due for Payment and (b) evidence, including any appropriate instruments of assignment, that all of the Owner's rights with respect to payment of such principal or interest that is Due for Payment shall thereupon vest in AGM. A Notice of Nonpayment will be deemed received on a given Business Day if it is received prior to 1:00 p.m. (New York time) on such Business Day; otherwise, it will be deemed received on the next Business Day. If any Notice of Nonpayment received by AGM is incomplete, it shall be deemed not to have been received by AGM for purposes of the preceding sentence and AGM shall promptly so advise the Trustee, Paying Agent or Owner, as appropriate, who may submit an amended Notice of Nonpayment. Upon disbursement in respect of a Bond, AGM shall become the owner of the Bond, any appurtenant coupon to the Bond or right to receipt of payment of principal of or interest on the Bond and shall be fully subrogated to the rights of the Owner, including the Owner's right to receive payments under the Bond, to the extent of any payment by AGM hereunder. Payment by AGM to the Trustee or Paying Agent for the benefit of the Owners shall, to the extent thereof, discharge the obligation of AGM under this Policy.

Except to the extent expressly modified by an endorsement hereto, the following terms shall have the meanings specified for all purposes of this Policy. "Business Day" means any day other than (a) a Saturday or Sunday or (b) a day on which banking institutions in the State of New York or the Insurer's Fiscal Agent are authorized or required by law or executive order to remain closed. "Due for Payment" means (a) when referring to the principal of a Bond, payable on the stated maturity date thereof or the date on which the same shall have been duly called for mandatory sinking fund redemption and does not refer to any earlier date on which payment is due by reason of call for redemption (other than by mandatory sinking fund redemption), acceleration or other advancement of maturity unless AGM shall elect, in its sole discretion, to pay such principal due upon such acceleration together with any accrued interest to the date of acceleration and (b) when referring to interest on a Bond, payable on the stated date for payment of interest. "Nonpayment" means, in respect of a Bond, the failure of the Issuer to have provided sufficient funds to the Trustee or, if there is no Trustee, to the Paying Agent for payment in full of all principal and interest that is Due for Payment on such Bond. "Nonpayment" shall also include, in respect of a Bond, any payment of principal or interest that is Due for Payment made to an Owner by or on behalf of the Issuer which has been recovered from such Owner pursuant to the

United States Bankruptcy Code by a trustee in bankruptcy in accordance with a final, nonappealable order of a court having competent jurisdiction. "Notice" means telephonic or telecopied notice, subsequently confirmed in a signed writing, or written notice by registered or certified mail, from an Owner, the Trustee or the Paying Agent to AGM which notice shall specify (a) the person or entity making the claim, (b) the Policy Number, (c) the claimed amount and (d) the date such claimed amount became Due for Payment. "Owner" means, in respect of a Bond, the person or entity who, at the time of Nonpayment, is entitled under the terms of such Bond to payment thereof, except that "Owner" shall not include the Issuer or any person or entity whose direct or indirect obligation constitutes the underlying security for the Bonds.

AGM may appoint a fiscal agent (the "Insurer's Fiscal Agent") for purposes of this Policy by giving written notice to the Trustee and the Paying Agent specifying the name and notice address of the Insurer's Fiscal Agent. From and after the date of receipt of such notice by the Trustee and the Paying Agent, (a) copies of all notices required to be delivered to AGM pursuant to this Policy shall be simultaneously delivered to the Insurer's Fiscal Agent and to AGM and shall not be deemed received until received by both and (b) all payments required to be made by AGM under this Policy may be made directly by AGM or by the Insurer's Fiscal Agent on behalf of AGM. The Insurer's Fiscal Agent is the agent of AGM only and the Insurer's Fiscal Agent shall in no event be liable to any Owner for any act of the Insurer's Fiscal Agent or any failure of AGM to deposit or cause to be deposited sufficient funds to make payments due under this Policy.

To the fullest extent permitted by applicable law, AGM agrees not to assert, and hereby waives, only for the benefit of each Owner, all rights (whether by counterclaim, setoff or otherwise) and defenses (including, without limitation, the defense of fraud), whether acquired by subrogation, assignment or otherwise, to the extent that such rights and defenses may be available to AGM to avoid payment of its obligations under this Policy in accordance with the express provisions of this Policy.

This Policy sets forth in full the undertaking of AGM, and shall not be modified, altered or affected by any other agreement or instrument, including any modification or amendment thereto. Except to the extent expressly modified by an endorsement hereto, (a) any premium paid in respect of this Policy is nonrefundable for any reason whatsoever, including payment, or provision being made for payment, of the Bonds prior to maturity and (b) this Policy may not be canceled or revoked. THIS POLICY IS NOT COVERED BY THE PROPERTY/CASUALTY INSURANCE SECURITY FUND SPECIFIED IN ARTICLE 76 OF THE NEW YORK INSURANCE LAW.

In witness whereof, ASSURED GUARANTY MUNICIPAL CORP. has caused this Policy to be executed on its behalf by its Authorized Officer.

ASSURED GUARANTY MUNICIPAL CORP.

By ________________________________
Authorized Officer

A subsidiary of Assured Guaranty Municipal Holdings Inc.
1633 Broadway, New York, N.Y. 10019
(212) 974-0100

Form 500NY (5/90)

NORTH CAROLINA
Turnpike Authority

Mixed Sources
Product group from well managed forests, controlled sources and recycled wood or fiber.

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