GoTriangle
Board of Trustees
Wed, June 27, 2018 12:00 pm-2:30 pm

I. Call to Order and Adoption of Agenda

ACTION REQUESTED: Adopt agenda with any changes requested.
(1 minute Jennifer Robinson)

II. Recognition
   A. Introduction of New Hires
      (1 minute Jeff Mann)
   B. Announcement of Promotions
      (1 minute Jeff Mann)

III. Public Hearings
   A. FY 2019 Proposed Budgets
      Operating and Capital budget, the Durham-Orange Transit Plan budget and the Wake Transit Plan budget
   B. Draft FY 2018 Section 5307 (Urbanized Area Formula Grant Program) Program of Projects and Schedule

IV. Public Comment
The public comment period is held to give citizens an opportunity to speak on any item. The session is no more than thirty minutes long and speakers are limited to no more than three minutes each. Speakers are required to sign up in advance with the Clerk to the Board.
(5 minutes Jennifer Robinson)

V. Consent Agenda
Items listed on the consent agenda are considered as a single motion. At the request of any Board member, or member of the public, items may be removed from the consent agenda and acted on by a separate motion. Items pulled from the consent agenda will be placed at the beginning of the general business agenda for discussion and action. Any Board member wishing to remove an item from the consent agenda should advise staff in advance.

ACTION REQUESTED: Approve consent agenda.
(1 minute Jennifer Robinson)
   A. May 23, 2018 - Regular Session Minutes
   B. June 21, 2018 - Special Session Minutes
   C. June 21, 2018 - Closed Session Minutes
   D. February 28, 2018 - Regular Session Minutes (Amended)
   E. Draft FY 2018 Section 5307 (Urbanized Area Formula Grant Program) Program of Projects and Schedule

      ACTION REQUESTED: If NO public comments are received at the public hearing, or during the public comment period that ends on June 27, 2018, staff requests that the Board adopt resolutions 2018 0005 and 2018 0006.

Resolution 2018 0005

Resolution 2018 0006

VI. General Business Agenda

Items listed on the general business agenda are for discussion and possible action. Such designation means that the Board intends to discuss the general subject area of that agenda item before making any motion concerning that item.

A. Items Removed from the Consent Agenda

ACTION REQUESTED: Discuss and take action on any items removed from the consent agenda.
(1 minute Jennifer Robinson)

B. Operations & Finance Committee Report
(20 minutes Michael Parker)

1. Wake Transit Bus Plan Service Standards and Performance Measures

ACTION REQUESTED: Approve the Wake Transit Bus Plan Service Guidelines and Performance Measures.

Wake Transit Bus Plan Service Guidelines and Performance Measures

2. Adoption of FY19 Fare Schedule

ACTION REQUESTED: Adopt the FY19 Fare Schedule.

FY19 Fare Schedule

3. Recommendation to Extend RTP OnDemand Service Pilot

ACTION REQUESTED: Extend the OnDemand service pilot by six (6) months to December 31, 2018.

C. Planning & Legislative Committee Report
(10 minutes Will Allen III)

1. FY19 Business Plan

ACTION REQUESTED: Approve FY19 business plan.

D. Proposed FFY19-21 Disadvantaged Business Enterprise (DBE) Program Goal

ACTION REQUESTED: Adopt Resolution 2018 0007, approving DBE goal of 6.0% FFY19-21.
(5 minutes Sylvester Goodwin)

DBE Goal Setting Methodology

Resolution 2018 0007

E. Amendment to GoTransit Partners Bylaws

ACTION REQUESTED: Amend the Bylaws of GoTransit Partners to increase the number of members appointed to the Board of Directors to nineteen (19).
(5 minutes Shelley Blake)

Bylaws of GoTransit Partners - Amended

F. ITRE Contract Renewal

ACTION REQUESTED: Authorize the GM to sign a contract with ITRE to provide continued model development services of the Triangle Regional Model (TRM) for FY19.

(5 minutes Patrick McDonough)

TRM Budget FY19
ITRE FY19 Scope of Work

G. Resolution Supporting Grant Application for RUS Bus

ACTION REQUESTED: Adopt resolution of support.
(5 minutes Patrick McDonough)

H. FY18 Budget Ordinance Amendments

ACTION REQUESTED: Adopt FY18 budget ordinance amendments.
(5 minutes Harriet Lyons)

I. FY19 Budget Ordinances

ACTION REQUESTED: Adopt FY19 budget ordinances.
(10 minutes Saundra Freeman)

VII. Other Business

A. General Manager's Report
(5 minutes Jeff Mann)

Contracts

1. Transit Operations Report

   (5 minutes Patrick Stephens)
2. D-O LRT Project Update
   (5 minutes Danny Rogers)
3. Wake Transit Update
   (5 minutes Patrick McDonough)
4. Communications Update
   (5 minutes Mike Charbonneau)

B. General Counsel's Report
(5 minutes Shelley Blake)

C. Chair's Report
(5 minutes Jennifer Robinson)

D. Board Member Reports
1. CAMPO Executive Board Representative
   (5 minutes Will Allen III)
2. DCHC MPO Board Representative
   (5 minutes Ellen Reckhow)
3. Regional Transportation Alliance (RTA) Rep.
   (5 minutes Will Allen III)

VIII. Closed Session - Personnel Matters

ACTION REQUESTED: Move into Closed Session pursuant to NCGS §143-318.11(a)
(6) to consider the qualifications, competence, performance, character, fitness, conditions of appointment, or conditions of initial employment of an individual public officer or employee or prospective public officer or employee; or to hear or investigate a complaint, charge, or grievance by or against an individual public officer or employee.

General personnel policy issues may not be considered in a closed session.
(15 minutes Jennifer Robinson)

IX. Adjournment
(Jennifer Robinson)

GoTriangle Board of Trustees
Meeting Minutes
May 23, 2018

Board Room, The Plaza, 4600 Emperor Blvd., Suite 100
Durham, NC

Board Members Present:

Will Allen III (left 1:29 p.m.)
Mary-Ann Baldwin
Wendy Jacobs
Vivian Jones
Mark Marcoplos
Ellen Reckhow
Jennifer Robinson, Chair
Steve Schewel (left 2:34 p.m.)

Board Members Absent:

Sig Hutchinson (excused)
Valerie Jordan (by phone)
Michael Parker (excused)
Andy Perkins Jr.
Nina Szlosberg-Landis (excused)

Chair Jennifer Robinson officially called the meeting to order at 12:01 p.m.

I. Adoption of Agenda

Action: On motion by Jones and second by Baldwin the agenda was adopted with the changes noted below. The motion was carried unanimously.

- Add resolution supporting pursuit of Federal funding for electric buses.
- Add Planning & Legislative Committee report.
- Add action item from Planning & Legislative Committee, approval of BRT evaluation framework.
- Add action item from Planning & Legislative Committee, resolution authorizing the General Manager to accept donations of real property.
- Add action item from Planning & Legislative Committee, adoption of Sponsorship and Naming Rights Policy.
- Move the CAMPO Executive Board report and the RTA report to follow the Planning & Legislative Committee report.

II. Recognition

A. Introduction of New Hires

General Manager Mann announced the hiring of Juan Cutino and Natanyi Townsend, Customer Information Associates and Ashley Schultz, Public Involvement Specialist.

B. Announcement of Promotions

None.

III. Public Hearings

A. FY 2019 Proposed Budgets

Action: Chair Robinson opened the public hearing on the FY19 Proposed Budgets (including the Operating and Capital budget, the Durham-Orange Transit Plan budget and the Wake Transit Plan budget) at 12:04 p.m.

Robinson recognized Karen Rindge, Executive Director of WakeUP Wake County on behalf of the Capital Area Friends of Transit, whose comments are attached and hereby made a part of these minutes.

There being no additional comments, the hearing was closed at 12:09 p.m.

IV. Public Comment

Chair Robinson recognized Zach Brown, who spoke against the proposed elimination of the Duke University Chapel Drive stop for DRX commuters from Durham to Raleigh. He stated that increased frequency on the DRX is needed.

Robinson then recognized Julie DeMeester. She stated that she is married to Zach Brown and requested that the Chapel Drive stop remain for the DRX route from Durham to Raleigh, an increase in the number of trips between 7:00-10:00 a.m. and hourly service throughout the day.

V. Consent Agenda

Action: On motion by Reckhow and second by Allen the consent agenda was approved. The motion was carried unanimously.

The following consent agenda items were approved:

- March 28, 2018 - Regular Session Minutes
- April 17, 2018 - Work Session Minutes
- April 17, 2018 - Regular Session Minutes

VI. Presentations

A. RUS Bus Joint Development

General Manager Mann stated that HR&A was hired to do a market analysis for the Raleigh Union Station bus component (RUS Bus). He introduced Kyle Vangel, whose presentation is attached and hereby made a part of these minutes.

IV. General Business Agenda

B. Planning & Legislative Committee Report

1. BRT Evaluation Framework

Patrick McDonough stated that this document outlines how BRT corridors will be evaluated for Wake Transit. It was designed to respond to Federal

standards for projects that will be put forward as well as to help determine if teaming corridors together would make more viable projects.

Action: On motion by W. Jacobs and second by Jones the minutes of the Board approved the BRT Evaluation Framework from the Wake Transit Major Investment Study. The motion was carried unanimously. The framework is attached and hereby made a part of these minutes.

2. Acceptance of Real Property by Donation

Committee Chair Allen explained that this resolution authorizes the General Manager to accept real property donations without having to come back to the Board.

Action: On motion by Baldwin and second by Reckhow the minutes of the Board adopted *Resolution 2018 0003 Resolution of the GoTriangle Board of Trustees Authorizing the General Manager to Accept Donations of Real Property*. The motion was carried unanimously. The resolution is attached and hereby made a part of these minutes.

3. Sponsorship and Naming Rights Policy

General Counsel Blake stated this is a broad policy that sets out a process if someone wants to make a donation in exchange for naming rights or sponsorship of a GoTriangle asset. She stated that guidelines will be adopted as well.

Action: On motion by W. Jacobs and second by Allen the minutes of the Board adopted the Sponsorship and Naming Rights Policy as presented. The motion was carried unanimously. The policy is attached and hereby made a part of these minutes.

VIII. Other Business

D. Board Member Reports

1. CAMPO Executive Board Representative

Will Allen III reported that the only transit related issue was a public hearing on the FY19 transit work plan. He said CAMPO would vote on the plan next month. He added that NCDOT Secretary Trogdon reported on Build NC, an overview of how NCDOT is going to accelerate projects over the next five years.

3. Regional Transportation Alliance (RTA) Representative

Will Allen III reported that the recent summits seemed to be a way to keep key business leaders and others engaged. He stated the topics covered a wide range of transportation and mobility issues.

VII. General Business Agenda

A. Items Removed from Consent Agenda

None.

B. Operations & Finance Committee Report

Ellen Reckhow reported on behalf of the Operations & Finance Committee.

1. Wake Transit FY18 Q4 Proposed Amendment

Reckhow stated that the Committee voted unanimously to recommend adoption of a budget amendment for Wake Transit for the youth GoPass.

Action: On motion by Allen and second by W. Jacobs the Board approved the Youth GoPass for Wake Transit and adopted *Ordinance 2018 0004 GoTriangle Fiscal Year 2018 Triangle Tax District - Wake Operating Fund Ordinance Amendment*. The motion was carried unanimously.

2. GoTriangle August 2018 Service Changes Recommendations

Reckhow stated that the Committee recommended approval of the proposed service changes, but asked staff to go over the recommendations.

John Tallmadge added that staff has discovered an opportunity to adjustment the times buses leave Durham station heading toward Raleigh in order to preserve the local connection at Chapel Drive. He said this would not change the number of trips daily, but estimated it would add 15 minutes per day and less than $10,000 per year. He asked that staff be given the discretion to make those adjustments within the final schedule in order to preserve some of the connectivity requested in public comment. Tallmadge also responded to the comment about the last trip morning peak trip. He stated the proposal is for 9:00 a.m., but staff would extend that until 9:05 a.m. in the final schedule. Regarding mid-day service, he said that the Short Term Transit Plan would address that, with a goal of consistent, all day trips in that corridor.

Action: On motion by Allen and second by Baldwin the Board approved service changes to the holiday schedule and service days as well as changes to Route DRX, giving staff discretion to make final changes as requested. The motion was carried unanimously.

3. FY18 Budget Amendment to Include Chapel Hill Transit Carryover

Reckhow presented a budget amendment related to Chapel Hill Transit expenditures in FY17.

Action: On motion by Schewel and second by Allen the Board approved *Budget Ordinance Amendment 2018 0002 GoTriangle Fiscal Year 2018 Triangle Tax*

District-Durham-Orange Fund Ordinance Amendment. The motion was carried unanimously.

C. Planning & Legislative Committee Report

Already covered.

D. Resolution Supporting Pursuit of Federal Funding for Electric Buses

General Manager Mann presented a resolution of support for GoTriangle's efforts to seek Federal funding through FTA's Low or No Emission grant program for electric buses.

Action: On motion by Baldwin and second by Reckhow the minutes of the Board adopted *Resolution 2018 0004 Resolution of the GoTriangle Board of Trustees Supporting Pursuit of Federal Funding for Electric Buses*. The motion was carried unanimously. The resolution is attached and hereby made a part of these minutes.

VIII. Other Business

A. General Manager's Report

A list of contracts approved by the General Manager is attached and hereby made a part of these minutes.

General Manager Mann stated that staff continues to watch the Federal funding process. GoTriangle also is pursuing a TIGER grant application for the RUS Bus project and likely will seek funds through the Volkswagen settlement fund for some form of electric vehicles.

1. Transit Operations Report

Patrick Stephens reported that the buses from MCI for the pilot program and demonstration should arrive in late June. MCI also has expressed interest in GoTriangle piloting an all-electric vehicle, which will be produced in late 2019.

Allen left.

2. Durham-Orange Light-Rail Transit Project Update

Dave Charters and Katharine Eggleston gave a presentation, which is attached and hereby made a part of these minutes.

3. Wake Transit Update

John Tallmadge reported that the FY19 work plan is going through the approval process. Additionally, the Short Range Transit Plans are begin developed for GoTriangle, GoRaleigh, and GoCary, which will include specific stops and the schedules. As well as the fare strategy, we're looking at policies and functionalities to be employed in new technologies across the region.

Patrick McDonough gave an update on the Major Investment Studies for BRT and CRT.

4. Communications Update

Mike Charbonneau's presentation is attached and hereby made a part of these minutes.

B. General Counsel's Report

General Counsel Shelley Blake noted the following items:

- We have reached out to affected property owners with letters of intent asked if they are willing to donate their property.
- The legal department is working on the agreements in Wake County for the FY19 work plan.
- Guidelines will be developed for the naming policies just adopted.

C. Chair's Report

The Chair noted that Board member travel for FY19 has been approved. She stated that there is an extra ticket available for the upcoming State of the Region event.

D. Board Member Reports

1. CAMPO Executive Board Representative

Already covered.

2. DCHC MPO Board Representative

Ellen Reckhow reported that regional projects have been put out for public comment. The DCHC amended its Comprehensive Transportation Plan to designate Farrington Road as a two-lane road instead of a 4 lane.

3. Regional Transportation Alliance (RTA) Representative

Already covered.

4. ULI Spring Conference

Ellen Reckhow's conference report is attached and hereby made a part of these minutes.

Schewel left.

IX. Adjournment

Action: Chair Robinson the meeting was adjourned the meeting at 2:41 p.m.

_____
Jennifer Robinson, Chair

Attest:

_____
Michelle C. Dawson, CMC
Clerk to the Board

GoTriangle Board of Trustees
Meeting Minutes
June 21, 2018

Board Room, The Plaza, 4600 Emperor Blvd., Suite 100
Durham, NC

Board Members Present:

Will Allen III
Mary-Ann Baldwin
Sig Hutchinson
Vivian Jones
Mark Marcoplos
Michael Parker
Ellen Reckhow
Jennifer Robinson, Chair
Steve Schewel
Nina Szlosberg-Landis

Board Members Absent:

Wendy Jacobs (excused)
Valerie Jordan
Andy Perkins Jr.

Chair Jennifer Robinson officially called the meeting to order at 9:09 a.m.

I. Adoption of Agenda

Action: On motion by Marcoplos and second by Parker the agenda was adopted. The motion was carried unanimously.

II. Closed Session – Employee Performance Evaluations

Action: On motion by Baldwin and second by Jones the Board adjourned into closed session at 9:10 a.m. pursuant to the General Statute and for the purposes listed below. The motion was carried unanimously.

Pursuant to NCGS §143-318.11 (i) (6) to consider the qualifications, competence, performance, character, fitness, conditions of appointment, or conditions of initial employment of an individual public officer or employee or prospective public officer or employee.

A. General Manager Performance Evaluation
B. General Counsel Performance Evaluation
C. Clerk to the Board Performance Evaluation

Action: The Board returned to open session at 11:20 a.m.

III. Report of Action Taken

Action: On motion by Parker and second by Baldwin the Board voted to give the General Manager, General Counsel and Clerk to the Board each a 4% merit increase. The motion was carried unanimously.

Action: On motion by Baldwin and second by Hutchinson the Board authorized the Board Chair to speak individually with the General Manager, General Counsel and Clerk to the Board regarding the feedback provided during the evaluation. The motion was carried unanimously.

Action: On motion by Reckhow and second by Schewel the Board approved the work plans as submitted by the General Manager, General Counsel and Clerk to the Board. The motion was carried unanimously.

IV. Adjournment

Action: The meeting was adjourned at 11:22 a.m.

_____
Jennifer Robinson, Chair

Attest:

_____
Michelle C. Dawson, CMC
Clerk to the Board

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Connecting all points of the Triangle

MEMORANDUM

TO: GoTriangle Board of Trustees

FROM: Michelle Dawson, Clerk to the Board of Trustees

DATE: June 15, 2018

SUBJECT: **Amendment to Minutes of February 28, 2018**

Action Requested

Staff requests that the Board amend the meeting minutes of February 28, 2018.

Background and Purpose

In February, the Operations & Finance Committee recommended additional staffing for the Wake Transit Plan. The Board approved the recommendation; however, the actual budget amendment was not included in the agenda. The minutes of that meeting have been amended to include adoption of the ordinance, as shown in red below.

2. **Wake Transit FY 2018 Q2 Proposed Amendments**
   Action: On motion by Jones and second by Reckhow the Board approved the Wake Transit FY18 Q2 amendments and adopted *Ordinance 2018 0003 GoTriangle Fiscal Year 2018 Triangle Tax District- Wake Operating Fund Ordinance Amendment*. The motion was carried unanimously. The list of amendments is attached and hereby made a part of these minutes.

Financial Impact

None.

Attachments

- None

Staff Contact(s)

- Michelle Dawson, 919-485-7438, mdawson@gotriangle.org

Connecting all points of the Triangle

MEMORANDUM

TO: GoTriangle Board of Trustees

FROM: Finance and Administrative Services

DATE: June 11, 2018

SUBJECT: **DRAFT FY 2018 Section 5307 (Urbanized Area Formula Grant Program) Program of Projects and Schedule**

Strategic Objective or Initiative Supported

Initiative: Actively seeking the financial resources to fund the county transit plans

Action Requested

If no public comments are received at the public hearing or during the public comment period that ends on June 27, 2018, staff requests that the Board approve the attached resolutions that:

1. Approve the DRAFT FY 2018 Section 5307 Program of Projects as final; and
2. Authorize the filing of applications with the U.S. Department of Transportation and the N.C. Department of Transportation.

Background and Purpose

The Section 5307 Urbanized Area Formula Grant Program makes Federal resources available to urbanized areas for transit capital and operating assistance and for transportation-related planning. Each year GoTriangle submits a grant application for formula program funds. In the past, GoTriangle has requested formula program grant funds to finance its planning, capital and preventive maintenance expenses during the fiscal year.

Prior to the submission of a grant application for Section 5307 formula grant funds, grantees must publish a proposed Program of Projects for the year and hold a public hearing to receive citizen comments on the program. Below is a DRAFT Section 5307 Program of Projects for FY 2018 that has been developed by GoTriangle staff and is based on FY 2018 actual expenditures (projected through June 30, 2018). This year's full appropriation was published by FTA in May 2018.

A public hearing on the Program of Projects will be held at the beginning of the June Board meeting. The Program of Projects along with a notice of public hearing was published in area newspapers during the third week of May. The advertisement also solicited written comments to be submitted directly to GoTriangle.

Staff will consider all comments received during the public hearing and comment period and, if necessary, will make appropriate changes to the Program of Projects. If no comments are received prior to the June Board meeting or at the public hearing, then the Board will be asked to approve the Program of Projects as final at its June meeting (see attached resolutions). Staff will notify the Board of the receipt of any prior public comments at the public hearing. If comments are received during the public hearing or comment period and changes are made to the Program of Projects, then the amended Program of Projects will be resubmitted to the Board for final approval at its July meeting.

Following final approval of the Program of Projects, GoTriangle will prepare a grant application to the Federal Transit Administration (FTA) for the FY 2018 expenses. GoTriangle has previously reached agreements with GoRaleigh, GoCary, GoDurham, Chapel Hill Transit and Orange Public Transportation on the Section 5307 allocation that each transit system in the region will receive.

Financial Impact

For FY 2018, GoTriangle staff has identified approximately $3,005,334 in expenditures that will be eligible for funding through the formula grant program. A summary of the projected expenses and revenue sources for Section 5307 Urbanized Area Formula Grant Program funds in FY 2018 follows:

DRAFT FY 2018 Section 5307 Urbanized Area Formula Grant Program of Projects

I.	**Total Project Expenditures**		
	Revenue Rolling Stock	$	1,008,778
	GoTriangle Planning Expenses		855,000
	Preventive Maintenance		855,000
	Routine Capital		259,615
	Safety and Security		26,941
	Total	**$**	**3,005,334**
II.	**Grant Funding Sources**		
	Federal (80%)	$	2,404,267
	NCDOT (3%)		100,878
	Local (17%)		500,189
	Total	**$**	**3,005,334**

Notes of explanation on the proposed Program of Projects:

1. There are two components to the proposed Program of Projects: a.) planning expenses; and b.) capital (including rolling stock purchase, routine capital and preventive maintenance).
   a. FY 2018 Planning Expenses ($855,000)
   b. Capital ($2,150,334)
      - Purchase of two (2) expansion buses for Durham-Orange
      - Purchase of one (1) replacement paratransit vehicle
      - Purchase of routine capital equipment: oil/water separator, and rim polisher
      - FY 2018 preventive maintenance expenses ($855,000)
      - Safety and Security: purchase of mass alert safety system

2. The primary components of the planning expenses that will be financed by Section 5307 grant funds are staff salaries, planning consultant fees and the regional travel modeling effort.

3. The State portion of the funding is 6%. NCDOT will not provide matching funds for Planning, Routine Capital, Preventive Maintenance, or Safety and Security elements of the grant. NCDOT will provide a 10% match for the three vehicles ($100,878). GoTriangle must provide the remaining 17% or $500,189.

4. The GoTriangle match to the grant project will come from the General Fund, except for the two expansion buses which will be funded from the Durham-Orange Transit Plan. The adopted GoTriangle FY 2018 Budget already reflects the projected formula grant revenues and the local match; therefore, a budget amendment will not be necessary.

Attachments

- Resolution 2018 0005
- Resolution 2018 0006

Staff Contact

- Deirdre Walker, 919-485-7481, dwalker@gotriangle.org

2018 0005

RESOLUTION OF THE GOTRIANGLE BOARD OF TRUSTEES APPROVING FINAL SECTION 5307 PROGRAM OF PROJECTS FOR FY 2018

WHEREAS, the Section 5307 Urbanized Area Formula Program makes Federal resources available to urbanized areas for transit capital and transportation-related planning assistance; and,

WHEREAS, the Research Triangle Regional Public Transportation Authority has identified capital and transportation-related planning assistance needs for FY 2018 and presented those needs to the Board of Trustees and the public in a Program of Projects; and,

WHEREAS, no comments were received from either the Board of Trustees or the public at the public hearing or during the public comment period.

NOW, THEREFORE, BE IT RESOLVED, that the Section 5307 Program of Projects for FY 2018 that was presented to the Board of Trustees on June 27, 2018 and subjected to public review and comment from May 17, 2018 through June 27, 2018 be adopted as the Research Triangle Regional Public Transportation Authority's final Section 5307 Program of Projects for FY 2018.

BE IT FURTHER RESOLVED that GoTriangle staff is instructed to advertise the final Section 5307 Program of Projects for FY 2018 in accordance with Federal Section 5307 program requirements.

ADOPTED THIS 27TH DAY OF JUNE 2018.

_____
Jennifer Robinson, Board of Trustees Chair

ATTEST:

_____
Michelle C. Dawson, Clerk to the Board

2018 0006

RESOLUTION OF THE GOTRIANGLE BOARD OF TRUSTEES AUTHORIZING THE FILING OF APPLICATIONS WITH THE U.S. DEPARTMENT OF TRANSPORTATION AND THE N.C. DEPARTMENT OF TRANSPORTATION FOR GRANTS AUTHORIZED BY 49 U.S.C. CHAPTER 53, U.S. CODE OF THE FEDERAL TRANSIT ACT, AS AMENDED (2010-06-21/R-) AND ARTICLE 2B OF CHAPTER 136 OF THE NORTH CAROLINA GENERAL STATUTES

WHEREAS, the United States Secretary of Transportation is authorized to make grants for mass transportation program of projects; and

WHEREAS, Article 2B of Chapter 136 of the North Carolina General Statutes designated the Department of Transportation as the agency of the State of North Carolina responsible for administering funding assistance for public transportation; and

WHEREAS, the contract for financial assistance will impose certain obligations upon the applicant, including the provision by it of the local share of project costs; and

WHEREAS, it is required by the U.S. Department of Transportation in accord with the provisions of Title VI of the Civil Rights Act of 1964, as amended, that in connection with the filing of applications for assistance under the Federal Transit Act, as amended, the applicant files an assurance that it will comply with Title VI of the Civil Rights Act of 1964 and the U.S. Department of Transportation requirements thereunder; and

WHEREAS, it is the goal of the applicant that minority business enterprise be utilized to the fullest extent possible in connection with these projects, and that definitive procedures shall be established and administered to ensure that minority businesses shall have the maximum feasible opportunity to compete for contracts where procuring construction contracts, supplies, equipment contracts, or consultant and other services; and

WHEREAS, the Research Triangle Regional Public Transportation Authority hereby assures and certifies that it will comply with the federal and state statutes, regulations, executive orders, and all administrative requirements related to the applications made to and grants received from the Federal Transit Administration, as well as the provisions of Section 1001 of Title 18, U.S.C.

NOW, THEREFORE, BE IT RESOLVED by the Board of Trustees of the Research Triangle Regional Public Transportation Authority:

1. That the General Manager is authorized to execute and file applications on behalf of the Research Triangle Regional Public Transportation Authority with the U.S. Department of Transportation, to aid in the financing of operating, capital and planning assistance projects pursuant to Sections 104(f), 5303, 5307, 5309, 5310, 5311, 5312, 5313, 5314, 5316, 5317, 5337, 5339, 5340, TIGER and BUILD of the Federal Transit Act, as amended.

2. That the General Manager is authorized to execute and file applications on behalf of the Research Triangle Regional Public Transportation Authority with the North Carolina Department of Transportation, to aid in the financing of the Public Transportation Grant Program to include matching North Carolina Department of Transportation local federal operating, capital and planning grants, Technology Program assistance, Apprentice and Intern Program assistance, Transportation Demand Management Program assistance, State Maintenance Assistance Program, and Demonstration Projects.

3. That the General Manager is authorized to execute and file with such applications an assurance or any other document required by the U.S. Department of Transportation fulfilling the purposes of Title VI of the Civil Rights Act of 1964.

4. That the General Manager is authorized to furnish such additional information as the U.S. Department of Transportation and the North Carolina Department of Transportation may require in connection with the applications for the program of projects and budget.

5. That the General Manager is authorized to set forth and execute affirmative minority business policies in connection with the project's procurement needs.

6. That the General Manager is authorized to execute grant agreements on behalf of the Research Triangle Regional Public Transportation Authority with the U.S. Department of Transportation and N.C. Department of Transportation in aid to the financing of the operating, capital, and planning assistance for the program of projects.

ADOPTED THIS 27TH DAY OF JUNE 2018.

_____
Jennifer Robinson, Board of Trustees Chair

ATTEST:

_____
Michelle C. Dawson, Clerk to the Board

GoTriangle Board of Trustees
Operations & Finance Committee Meeting Minutes
May 23, 2018

Board Room, The Plaza, 4600 Emperor Blvd., Suite 100
Durham, NC

Committee Members Present:

Mary-Ann Baldwin
Ellen Reckhow
Steve Schewel (arr. 10:52 a.m.)

Committee Members Absent:

Sig Hutchinson (excused)
Valerie Jordan
Michael Parker (excused)
Andy Perkins Jr.

Ellen Reckhow officially called the meeting to order at 10:52 am.

VIII. FY19 Proposed Budget Changes

Saundra Freeman presented changes to the proposed FY19 budget, which are attached and hereby made a part of these minutes. She also shared a memorandum, which also is attached and hereby made a part of these minutes, regarding the timing of expenditures for the D-O LRT project. She explained that with the decision to accelerate the project and apply for the FFGA earlier, spending is needed sooner than anticipated when the transit plan put together. She stated that although the overall fund balance is positive, Orange County would have a deficit. The memorandum explains how this situation would be handled.

Reckhow noted concern about the assumption for sales tax revenue growth being aggressive and higher than Durham County predictions. Freeman responded that based on current year actuals, staff is comfortable with the number in the GoTriangle budget.

Schewel arrived.

Ellen Reckhow officially called the meeting to order at 10:52 am.

I. Adoption of Agenda

Action: On motion by Baldwin and second by Schewel the agenda was adopted. The motion was carried unanimously.

II. Approval of Minutes

Action: On motion by Schewel and second by Baldwin the Committee approved the minutes of the April 17, 2018, meeting. The motion was carried unanimously.

III. Wake Transit FY 2018 Q4 Proposed Amendment

Action: On motion by Baldwin and second by Schewel the Committee voted to recommend Board approval of the Wake Transit FY18 Q4 youth GoPass supplies and materials amendment. The motion was carried unanimously.

IV. August 2018 Service Changes Recommendations

Jon Dodson presented the August 2018 service changes recommendations.

Action: On motion by Schewel and second by Baldwin the Committee voted to recommend Board approval of August service changes to the holiday schedule, service days and Route DRX. The motion was carried unanimously.

V. FY18 Budget Amendment to Include Chapel Hill Transit Carryover

Jennifer Keep requested a budget amendment to cover expenses incurred in FY17 by Chapel Hill Transit. She stated that the reimbursement request was not sent to GoTriangle until FY18. She stated that all of the Durham and Orange County partner agencies are up-to-date as of third quarter FY18.

Action: On motion by Schewel and second by Baldwin the Committee voted to recommend Board adoption of a budget ordinance amendment to the Triangle Tax District – Durham-Orange Fund. The motion was carried unanimously.

VI. 2018-2019 Fare Schedule

John Tallmadge reminded the Committee that last month the Board approved fare-free for youth 18 and younger and there was previous discussion about eliminating free transfers. He stated that based on feedback from customers and analysis of Title VI impacts, staff is not recommending the elimination of transfers. He requested that eh Committee recommend Board adoption of the fare schedule for FY19 with no further changes.

The Committee discussed the differences in the youth fare policies of GoDurham, GoTriangle and Wake County. Baldwin requested that staff have conversations about including Durham's policy which allows persons seeking a GED to ride fare free.

Action: On motion by Baldwin and second by Schewel the Committee voted to recommend Board adoption of the 2018-2019 Fare Schedule, with a request that staff reviews all the fare policies for consistency. The motion was carried unanimously.

VII. Recommendation to Extend RTP OnDemand Service Pilot

John Tallmadge stated that a pilot project was begun in January for service delivery in Research Triangle Park with the hope of reducing costs and growing ridership. He stated that staff would like an opportunity to do marketing outreach

to the apartment complexes and employers in the area and see the results. He requested that the Committee recommend Board approval to extend the pilot program for six months, through December 31.

Tallmadge then introduced Katy Lang, a recent graduate of UNC-Chapel Hill's Department of City and Regional Planning, whose presentation is attached and hereby made a part of these minutes.

Action: On motion by Baldwin and second by Schewel the Committee voted to recommend that the Board approve extending the OnDemand service pilot for six (6) months to December 31, 2018. The motion was carried unanimously.

IX. Adjournment

Action: Ellen Reckhow adjourned the meeting at 11:42 am.

_____
Michael Parker, Committee Chair

Attest:

_____
Michelle C. Dawson, CMC
Clerk to the Board of Trustees

Connecting all points of the Triangle

MEMORANDUM

TO: GoTriangle Board of Trustees

FROM: Regional Services Development

DATE: June 13, 2018

SUBJECT: Wake Transit Bus Plan Service Standards and Performance Measures

Strategic Objective or Initiative Supported

This item supports the Strategic Initiative, "Establish joint service standards/performance standards with transit agencies across region. Ensure all contracts for transit service requirements to meet our service quality and vehicle standards."

Action Requested

Staff requests that the Board approve the Wake Transit Bus Plan Service Guidelines and Performance Measures.

Background and Purpose

Wake County voters approved funding for the Wake Transit Plan in November 2016. The Transit Planning Advisory Committee is developing a multi-year plan to guide the implementation of bus services as defined in the Wake Transit Plan. Service guidelines and performance measures have been developed to facilitate the implementation of a cost effective network of services funded through Wake Transit revenues.

While the Wake Transit Bus Plan Service Standards and Performance Measures apply to Wake Transit funded services only, GoTriangle may consider applying the guidelines, measures and standards for the entire GoTriangle service area of Wake, Durham and Orange counties.

Two sections of the Service Guidelines and Performance Measures document have been temporarily removed – Farebox recovery targets and Customer Satisfaction Survey – and will be added back into the final document once a fare analysis has been completed and the survey has been finalized/approved by all participating agencies in August.

Financial Impact

There is not a direct financial impact related to this item.

Attachments

- Wake Transit Bus Plan – Service Guidelines and Performance Measures

Staff Contact

- Mary Kate Morookian, 919-485-7549, mmorookian@gotriangle.org

Wake Transit Bus Plan

Service Guidelines and Performance Measures

(DRAFT Final v2)

TABLE OF CONTENTS

TABLE OF FIGURES

1 Introduction

Wake Transit Bus Plan

Wake County residents passed a ballot measure that funded the Wake Transit Plan in November 2016. The Wake Transit Plan recommended a variety of transit services designed to link communities in Wake County and the surrounding region. This Plan will provide a range of solutions from high capacity services, such as frequent bus routes, to lower capacity options, such as demand-response services.

To ensure long-term sustainability of the evolving transit network requires that services are cost-effective and that financial operations are sound. With these goals in mind, the member agencies commissioned development of service design guidelines and performance measures for bus service. It is anticipated that the service design guidelines and performance measures will be approved by both the Wake Transit Governing Boards and individual transit providers and be used to govern investments associated with the Wake Transit Bus Plan

These service guidelines and performance measures will establish a framework and rationale for the operation of transit services in Wake County. Service guidelines provide consistency in the service planning process. Performance measures track and report on the productivity of individual services and the overall network. The combined framework is intended to communicate a clear, consistent, and equitable strategy that is understandable to the Wake Transit Bus Plan's stakeholders: transit riders, transit operators, elected officials, and taxpayers.

Wake County's transit providers—GoRaleigh, GoTriangle, GoCary, and Wake Coordinated Transportation Service (WCTS)—adhere to service guidelines and performance measures set locally. These locally developed guidelines and measures both shape and communicate development and monitor the performance of transit service funded through local resources. The service guidelines and performance measures recommended as part of the Wake Transit Bus Plan consider—but do not entirely replicate—existing local measures and standards. Instead, the Wake Transit Bus Plan guidelines and measures are intended to supplement local policies and be utilized in parallel with any local measures and standards. The recommended guidelines and measures also reflect best practices developed by transit agencies across the United States.

The service guidelines, route classifications, and performance measures included in this report reflect service operations and development envisioned by the Wake Transit Bus Plan. While the framework is designed to be flexible and accommodate changes, the Transit Planning Advisory Committee (TPAC) recommends that the guidelines, standards, measures, and targets are reviewed at least once every four years to ensure they continue to represent best practices and are successfully guiding development of the Wake Transit Bus Plan.

Key Terms

To help clarify key terms used throughout the report, below are four important definitions:

- A **guideline** is a recommendation that leads or directs a course of action to achieve a certain goal.
- A **standard** sets the minimum investment required to reach the service classification. For example, this report sets standards for the span of service expected for demand-response service.
- A **measure** is a reference point against which performance is evaluated. Measures can be evaluated against a baseline value or against a specific target.
- A **target** is the defined value set for individual measures. For example, a target might be 20 passengers per revenue hour.

Transit Service Guidelines and Performance Measure Goals

Aside from the adage "you can't manage what you don't measure", there are several reasons why service guidelines are critical for transit agencies. Transit service guidelines and performance measures should:

- **Reflect the vision and goals of the overall transit network:** Transit service guidelines and performance measures reflect community values for transit service. An agency that values extensive geographic coverage above concentrating service in high-demand corridors will adhere to a different set of service guidelines and performance measures than one that focuses on most-efficiently serving demand. There is not a standard or accepted set of service guidelines and performance measures. However, the Wake Transit Bus Plan service guidelines and performance measures are designed to reflect the values of good transit service. Namely service that is efficient, effective, and customer friendly.
- **Ensure consistency among Wake County transit service providers:** The Wake Transit Bus Plan is in a relatively unique position of developing a network of transit services that will be implemented by multiple independent operators. Establishing overarching service guidelines and performance measures that apply to all operators will set baseline expectations for a consistent, integrated, and coordinated network of services.
- **Provide transparency:** Service guidelines and performance measures provide benchmarks and performance indicators that reflect realistic and appropriate levels of productivity and cost-effectiveness. These indicators track the development of the network and can be shared with elected boards and members of the public. Accordingly, the service guidelines and performance measures must be easy to understand, directly related to network goals, and instill confidence in the stakeholders.
- **Establish evaluation criteria for all services:** Service guidelines and performance measures include evaluation metrics and tools to shape, define, and evaluate individual transit routes and the emerging transit network. The guidelines will direct attention and investments to specific parts of the network. They will also create a clear, consistent, and equitable framework for decision-making and investment.

- **Prioritize funding:** By conducting frequent service evaluations, transit providers can identify areas of short-term and ongoing additional funding needs. As an example, longer-term projects such as expanding park-and-ride facilities may not arise in traditional transit guidelines, standards, and measures, but they are critical in ensuring ridership growth if capacity is maximized.
- **Support Federal Transit Administration (FTA) compliance:** Ultimately, transit service will be implemented using a combination of local and state funding, as well as FTA federal funding. Transit operators who receive FTA funding are required to adhere to a series of policies and regulations, including requirements associated with Title VI of the Civil Rights Act of 1964. The FTA monitors these requirements through a triennial review process. However, by integrating service guidelines and performance measures into management practices, there is an assurance of compliance. The guidelines, standards, measures, and targets included in this document are consistent with the FTA Circular 4702.1B (Title VI), which includes establishing service guidelines for vehicle loads and headways, on-time performance, service availability, and equitable distribution of transit amenities and vehicle assignments.

Existing Service Policies of Wake County Transit Providers

Four independent transit agencies operate public transportation services in Wake County. Each operator follows prescribed guidelines and performance measures to govern the provision of transit services (Figure 1).

Figure 1 | Wake County Transit Provider Policy Guidelines

Transit Provider	Governing Service Guidelines and Performance Measures
GoRaleigh	• GoRaleigh Service Change Initiation Policy • GoRaleigh Rider Notification Policy • GoRaleigh Shelter and Bench Policy • GoRaleigh Title VI Program
GoTriangle	• GoTriangle Regional Bus Service Standards • GoTriangle Title VI Program
GoCary	• Town of Cary Fixed Route Transit Service Standards • Town of Cary Title VI Program
WCTS	• Wake Coordinated Transportation Service Operations Guide

GoRaleigh Policies

Several GoRaleigh policies are related to transit service changes and the provision of transit amenities. GoRaleigh adopted its Service Change Initiation Policy in 2002. The policy states that no changes shall be made to a new route for at least six months after service initiation, unless safety, operational, or productivity issues warrant review by the provider.

GoRaleigh's Rider Notification Policy defines changes in transit service and outlines the required procedure for handling major service changes. According to GoRaleigh's Shelter and Bench

Policy, shelters and benches are warranted at bus stops where there are at least 25 and 10 boardings a day, respectively. The policy states that special facilities should be provided, if necessary, at locations such as hospitals, clinics, senior centers, or recreation facilities serving seniors or persons with disabilities.

In addition to these written policies, GoRaleigh tracks:

- Predictive policy: Review routes with farebox revenue less than 50% of the systemwide average
- On-time performance: Defined as zero minutes early and five minutes late. Routes performing at 74.9% or less require review

GoRaleigh also maintains standards based on Title VI requirements. These standards guide Title VI compliance, ensuring that minority and low-income individuals receive equitable transit service. The GoRaleigh Title VI Program defines the following standards:

- Load: Routes experiencing passenger load ratios between 1.01 to greater than 1.50 at any point should be reviewed
- Headway: Headways shall vary between peak periods and off-peak periods where demand dictates in order to minimize operating expenses and provide the most efficient service during weekday peak demand periods.
- On-time performance: 85% of trips should be completed no later than five minutes after the scheduled time point
- Service availability: Evaluate the availability of transit service within Raleigh's minority Census Block Groups
- Passenger amenities: Provide bus shelters for stops with 25 daily boardings or more and benches for stops with 10 boardings or more
- Vehicle assignments: Randomly assign vehicles to routes on a daily basis to ensure that buses are distributed equitably

GoTriangle Policies

GoTriangle's service guidelines are contained within the 2004 GoTriangle Regional Bus Service Standards. This document provides detailed expectations for GoTriangle services and establishes several service performance indicators, including:

- Unlinked Passenger trips per Vehicle Revenue Hour
- Cost Recovery Ratio
- Operating Cost per Unlinked Passenger Trip
- Subsidy per Passenger
- Unlinked Passenger Trips per Vehicle Revenue Mile

GoTriangle classifies routes as Peak Period, Daytime, Evening, or Weekend; routes are also classified as New (in operation for less than six months) or regular (in operation for six months or more) services. For each service standard, GoTriangle sets performance expectations based on the average of all routes in the category. Accordingly, once an average has been calculated, each route can be classified as low-performing (less than 75% of average), average (from 75% to 125% of average), or high-performing (greater than 125% of average).

According to the Regional Bus Service Standards, GoTriangle uses the results of the performance evaluation to address both low-performing routes and high-performing routes. Low-performing routes are defined as routes that score "low" on three to five indicators; depending on the indicators, GoTriangle will consider alignment modifications or schedule changes to improve performance. Passenger amenity improvements are often recommended for high-performing GoTriangle routes.

The Regional Bus Service Standards also guide Title VI compliance. Although Title VI evaluations are processed separately from service standards, GoTriangle evaluates additional indicators to compare predominantly minority Census tracts with predominantly non-minority Census tracts, to ensure they are distributing and allocating services, amenities and other resources equitably. Indicators considered under GoTriangle's Title VI evaluation include:

- Impact on minority communities and minority-owned businesses during and after construction
- Impacts that may be felt in minority communities, including increased traffic and the amount of available parking
- Transit vehicle load factors between minority and non-minority Census tracts
- Vehicle headways in minority and non-minority Census tracts
- Distribution of amenities (benches, shelters, etc.) in minority and non-minority Census tracts
- Transit access (distribution of transit services, number of people within a one-half mile walking distance to the system) in minority and non-minority Census tracts

GoCary Policies

GoCary developed Fixed Route Transit Service Standards in 2014, in part to ensure that the Town of Cary complies with nondiscrimination laws and regulations, including Title VI. The goal of the service standards is to establish policies necessary to ensure that GoCary service does not create disparate impacts on minority populations nor pose disproportionate burdens on low-income populations. Beyond this overarching goal, the document also outlines several standards:

- Vehicle loads: Vehicle loads should not exceed seating capacity on 30% or more of the trips provided on a given route, or exceed a load factor of 1.30
- Vehicles will be assigned based on ridership demand
- Service frequency: Thirty minute frequency on all routes during peak periods and 60-minute frequency on all fixed loop routes and off-peak period service
- On-time performance: Average system-wide on-time performance of 95%
- Service availability: Provide bus service to at least 50% of Cary residents living within three-quarters of a mile of a bus route
- Distribution of amenities: Provide a shelter at bus stops with over 20 boardings per day

WCTS Policies

WCTS's Operations Guide (2015) outlines how the system's coordinated public and human service transportation operations are designed, operated, and delivered. The requirements and standards included in the Operations Guide are specific to coordinated service provision.

WCTS's primary service indicator is on-time performance. The Operations Guide states that the contractor is responsible for maintaining a minimum standard of "on-time vehicle trips" of 95% on both a daily trip basis and over the course of the contract period. The operations guide also sets several requirements regarding scheduling and dispatch, including:

- Daily scheduling sets a target that establishes that 99% of all trips (individual riders) not spend more than one hour "in-vehicle" riding time.
- On-time performance measures the actual pick-up time with the scheduled pick-up time, as well as arrival prior to appointment time. A trip is considered "on-time" if the vehicle arrives for the rider within ± 30 minutes of the scheduled time in addition to arriving at appointment no later than appointment time. A minimum of 95% of all trips within Raleigh should be picked up within 60 minutes. Outside of Raleigh, a minimum of 95% of all trips should be picked up within 90 minutes.
- The contractor should schedule and dispatch services that average at least 1.5 trips per hour on a monthly basis.

2 Transit Service Development

Overview

Public transit services typically fall along a spectrum of high-capacity/high-productivity routes that operate in densely populated corridors, to lower-capacity/lower-productivity services that serve large, but less densely inhabited areas (Figure 2). As communities and agencies design and deploy transit services, it is important to match the optimal service types to the individual market so that transit services are efficient, appropriate, and cost-effective.

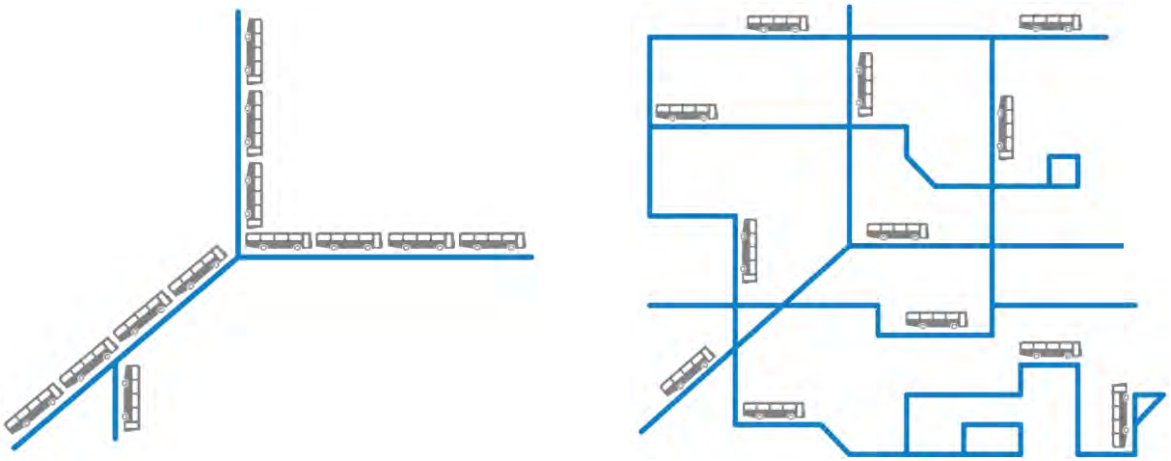
Service Allocation Policy

Most transit providers provide a mix of ridership-oriented services and coverage-oriented services. Typically, service types reflect the operating environment, such that high-capacity modes are deployed in higher-density urban areas, and coverage-oriented services operate in rural or lower-density suburban areas. In some areas a combination of services is appropriate, such as complementary paratransit service or local fixed-route bus service combined with BRT. Wake County's challenge is developing a transit network with an appropriate balance between coverage and ridership-oriented services, so people with limited mobility have access to the service they need, while the network is as cost-effective as possible.

The Wake County Transit Plan, based on community feedback and funding allocations, sets a goal for the entire Wake Transit Plan of providing approximately 70% of the Transit Plan's operating dollars to "productivity" services that will be justified by high ridership; the Plan allocates the remaining 30% to coverage-oriented services. This allocation reflects a shift in how transit services are generally allocated in Wake County, with the pre-Wake Transit Plan services broadly categorized at 70% coverage-oriented and 30% ridership-oriented.

Figure 2 | Productivity Model and Coverage Model

PRODUCTIVITY MODEL	COVERAGE MODEL
The **productivity model** concentrates service on collector streets that feature the highest density of development. As a result, service is more direct, faster, and more productive. Because the bus operates on a handful of main streets, most people will have to walk to and from their bus route. Ridership-oriented services tend to feature higher frequencies, operate longer service spans, and carry more riders than coverage-oriented services. Examples include light rail and bus rapid transit, but also high frequency bus corridors.	The **coverage model** operates service on many streets, even if service is infrequent. This model ensures that the maximum number of people have nearby access to bus service, and is more likely to provide door-to-door service (even if the overall trip time is longer). Coverage services tend to have lower frequencies and operate on residential streets. As a result, coverage-oriented routes tend to carry fewer riders, as compared with ridership-oriented services. The main advantage of coverage services is the increased geographic accessibility of the network, particularly for people unable to walk longer distances.



Transit Operating Environment

Transit operating environments also influence transit service design and productivity. As discussed, successful transit services match the product (type of service) with the market (who is going to use it). Transit providers directly control the product and set characteristics such as service quality (cleanliness of the vehicle, reliability of service, friendliness of the driver, etc.), service design (how efficiently the service transports passengers to their desired destinations), and the price of the trip or fare.

Transit agencies have less direct control over their operating environments. The most significant factors influencing transit ridership relate to land use, including the number of people within walking distance of a transit route (density); the safety, comfort, and attractiveness of the built environment; the type of development (housing, jobs, shopping, etc.); and the amount and cost of parking. Although transit agencies typically have limited control over their operating environments, transit agencies can develop routes to complement the characteristics of specific environments.

Density is the largest single factor influencing transit demand, as the number of people within walking distance of a bus route determines the overall demand for travel, or market size. Accordingly, if there are more people living or working within walking distance (e.g. denser development), there are more potential users of the service. Further, because land tends to be more expensive in high-density communities, these areas also feature less parking and are more likely to charge for parking. Limited parking and/or parking fees are critical factors to making transit attractive. Corridors with high densities, therefore, can support higher transit frequency and higher capacity transit modes, such as light rail or bus rapid transit. Corridors and communities with lower densities are better matched with lower frequency service types (local bus routes or demand-response service).

Urban form also shapes transit demand, as transit service is more accessible in areas with sidewalks, crosswalks, and manageable street crossings; including these accessibility features can also expand the reach of transit. Land use also shapes transit demand; office space, for example, usually has higher demand on weekdays while shopping areas may have demand on weekdays and weekends.

Route Classifications

Wake County is a large and diverse region. Consequently, the Wake Transit Plan consists of a variety of services, inclusive of high productivity/high-capacity services (frequent transit) to lower productivity, coverage-oriented services (local bus routes or demand-response services). Given these various service types require different levels of investment and have different operating expectations, it is appropriate to define a route classification system. The route classification system facilitates evaluation of routes within the context of similar routes. The classification system also facilitates investment and development of individual routes, by allowing individual routes to move up and down the classification hierarchy. This means that a route that over-performs the expectations for its classification category, it could be “upgraded” with additional investment in service hours and frequency if it can meet the defined performance expectations.

Eight unique service types are identified in the Wake Transit Bus Plan: frequent routes; local routes; community routes; demand-response services; core regional routes; express routes, and shuttle services (Figure 3 |). Each service type is linked with service level guidelines and productivity measures in Sections 4 and 5.

Transit service design principles generally discourage route branches and service deviations because they complicate rather than simplify service. As a result, branches and deviations should be justified based on ridership or coverage goals and be judged according to the same standards as other similar routes when they are required.

Figure 3 | Transit Services Types in the Wake Transit Bus Plan

Service Type	Characteristics
Frequent Route 	Frequent routes are high-capacity, high productivity services that should operate along densely developed primary arterials and offer a high level of frequency. They form the "backbone" of the service network and provide connections to network hubs. Most other routes will connect to them. Bus stops will be spaced farther apart as compared with other services, and routes should be simple and direct.
Local Routes 	Local routes also operate along primary arterials, but in areas of less dense development patterns. They also typically are anchored at a transit hub, either in downtown or at the end of a frequent route or BRT. These routes offer relatively frequent, simple, and direct service. Routes are typically productive with relatively high ridership.
Community Routes 	Community routes serve low-density communities and neighborhoods, bringing passengers to transit hubs or higher capacity services. Community routes typically make very frequent stops and focus on extending service coverage and offering basic transportation to individuals that lack mobility options. Community routes are exclusively focused on widening geographic service coverage, or "filling in the gaps" of the transit network. Productivity is usually low.
Demand-Response Services 	Demand-response service offers curb-to-curb or door-to-door service upon request. Services are well suited for serving low-density areas and can be provided by a range of providers, from traditional transit agencies to app-based ride-hailing providers. Demand-response service typically operates within a geographically limited area, and provides pick up and drop off services within a defined zone. Demand-response service includes ADA paratransit service, which operates under specific FTA guidelines, serving individuals with disabilities and older adults. Demand-response service also includes emerging mobility options such as microtransit, which is an IT-enabled private multi-passenger transportation service that serve passengers using dynamically generated routes.
Core Regional Routes 	Core regional routes provide longer-distance service connecting the major activity centers across jurisdictions on weekdays and weekends. They provide the backbone of the region's transit network, and prioritize connecting transit centers to facilitate transfers. They have limited stops to provide fast travel times and use freeways and expressways where appropriate.
Express Routes 	Express routes are services specifically designed to bring people from residential areas to employment centers. They operate during peak commute periods and make few stops, often at park & ride facilities or transit centers, before traveling non-stop to the employment center via highways or freeways. Service may operate on weekdays or weekends.
Shuttle Services 	Shuttles offer connections between a small number of activity centers, such as between an airport and a transit hub or rental car center. These routes are typically very simple and easy to use, and are often fare-free. Shuttles may also be scheduled to provide additional transportation during special events, such as sporting events, concerts, or parades.

3 Transit Service Design

Transit service design reflects the fact that successful transit services must be intuitive for riders to understand and use. Likewise, transit services designed to be simple and logical for riders are almost always easier for transit operators to implement. The following transit service design principles are intended to help service providers develop a network of logical, consistent, and user-friendly services.

The service design guidelines are not required per se, but are intended to enforce consistency in the service planning process by providing direction on how to allocate, prioritize, or deploy services in a way that is consistent with the Research Triangle's values and service goals. Guidelines also help avoid potentially inequitable, and possibly inefficient, allocations of service. Without guidelines, there is little rationale on which to base responses to requests for service or to agree or disagree to service requests. Service guidelines also ensure transit agencies respond to emerging needs in a way that is consistent and predictable and communicate how transit services will respond to changing land uses or development patterns. Guidelines can also direct service investments or disinvestment over the lifetime of transit service development.

Service Should be Simple

To encourage people to use transit, services should be easy to understand. The way service is designed influences how easy it is for people to understand the available transportation options. Most of the guidelines in this section aim to make service intuitive, logical, and easy to understand.

Routes Should Operate Along a Direct Path

Passengers and potential passengers alike prefer faster, more direct transit services. In order to remain competitive with personal vehicles, special attention should be placed on designing routes to operate as directly as possible. Direct routes maximize average speed for the bus and minimize travel time for passengers while maintaining access to service. Routes should not deviate from the most direct alignment unless there is a compelling reason to do so.

Route Deviations Should be Minimized

As described above, service should be as direct as possible. Consistent with this idea, the use of route deviations—traveling off the most direct route—should be minimized.

There are instances when deviating service from the most direct route is appropriate, such as avoiding a bottleneck or to provide service to major shopping centers, employment sites, medical centers, schools, etc. In these cases, the benefits of deviating service from the main

route must be weighed against the inconvenience caused to passengers already on board. Route deviations should be implemented only if:

- The deviation will increase the route's overall productivity
- The number of new passengers served is equal to or greater than 25% of the number of passengers inconvenienced by the additional travel time on any particular deviated trip
- The deviation does not interfere with the provision of regular service frequencies and/or the provision of coordinated service with other routes operating in the same corridor
- Pedestrian access to a large trip generator is unsafe due to a lack of infrastructure, or inaccessible due to a dendritic street pattern

In most cases, where route deviations are provided, they should operate for the entire service period. Exceptions are during times when the sites that the route deviations serve have no activity—for example, route deviations to shopping centers do not need to serve those locations early in the morning before employees start commuting to work.

Major Routes Should Operate Along Arterials

Frequent and local routes should operate on major roadways and should avoid deviations to provide local circulation. Riders and potential transit users typically have a general knowledge of an area's arterial road system and use that knowledge for geographic points of reference. The operation of bus service along arterials makes transit service faster and easier for riders to understand and use. This principle applies only to routes with a productivity-based strategy.

Routes Should be Symmetrical

Routes should operate along the same alignment in both directions to make it easy for riders to know how to return to their trip origin location. For example, if a route follows 4th Street into downtown, it should use 4th Street on its outbound trip. Exceptions can be made in cases where such operation is not possible due to one-way streets or turn restrictions. In those cases, routes should be designed so that the opposite direction alignments run parallel as closely as possible.

Routes Should Serve Well-Defined Markets

Service should be developed to serve well-defined markets. Ideally, major corridors should be served by only one route of each service type—for example, one frequent route and one local route, and not by multiple frequent routes or multiple local routes. Exceptions can and should be made when multiple routes should logically operate through the same corridor to unique destinations.

Services Should be Well-Coordinated

When multiple routes operate through the same corridor but serve different destinations, service should be coordinated to maximize utility and minimize redundancy. To avoid bunching of buses and to balance loads, major routes of the same service type using the same corridor

should be scheduled to operate at similar frequencies and should alternate trips at even intervals.

Most routes intersect with other routes at transfer centers, stations, and street intersections. At major transfer locations, schedules should be coordinated to the greatest extent possible to minimize connection times for the predominant transfer flows.

Service Should be Consistent

Routes should operate along consistent alignments and at regular intervals (headways). People can easily remember repeating patterns but have difficulty remembering irregular ones. For example, routes that provide four trips an hour should depart every 15 minutes. Limited exceptions can be made in cases where demand spikes during a short period in order to eliminate or reduce crowding on individual trips.

Service Design Should Maximize Service

The distance and travel time of a route determine how efficiently a bus can operate. Service should be designed to maximize the time a vehicle is in service, and minimize the amount of time it is out-of-service. In other words, the length of the route and the time it takes to make each trip impacts they layover required at each end of the route, and how many buses are needed to provide service. Often, it may be more efficient to extend a route to pick up a few more passengers and limit the amount of layover time.

Vehicle Type Should be Appropriate for Service

Transit vehicles should be matched to service types by vehicle type and capacity. For example, the standard fixed-route transit vehicle is typically a 40’ transit bus and is appropriate for most services. However, high ridership routes may warrant 60’ articulated vehicles, and conversely, lower ridership routes such as local routes or shuttles may only require 30’ vehicles. Flex service and demand-response vehicles typically utilize smaller vehicles.

Additionally, as required by Title VI, transit providers must distribute vehicle assignments evenly throughout the system so newer vehicles are equitably deployed across the service area.

4 Service Level Standards

Service level standards help transit providers determine how much transit service to actually provide, given the underlying local market and operating conditions. Setting expectations for service levels also creates a coordinated and consistent network of service by establishing uniform standards for each service type.

The service level standards work in concert with the service productivity measures (Section 5) to create a network that is easy for operators to communicate to riders and stakeholders. Concurrently, the standards should result in a transit network that is productive and efficient. The combined standards and measures also create a framework for expanding and contracting service. Transit operators are able to provide more service on any particular route or market, as deemed appropriate, but must provide at least the minimum proposed standard to meet the service type requirements.

The service level standards are determined based on five standards:

1. **Service Coverage/Availability:** Aligns service types with markets and operating conditions.
2. **Span of Service:** Sets route start and end times.
3. **Service Frequencies:** Recommends how often transit service is operated.
4. **Passenger Loads:** Establishes acceptable levels of passenger volumes relative to the number of available seats.
5. **Bus Stop Spacing and Amenities:** Recommends stop spacing and amenity investments.

As discussed, service level standards set required *minimum* service levels for each route type. They also establish the minimum hours of service and service frequencies, as well as acceptable passenger loads. Investments in a route may be increased (longer service span or increased frequency), if or when ridership increases to levels that exceed maximum loading standards. Conversely, service may be reduced when ridership falls below the minimum productivity measures. Likewise, service spans may be lengthened to extend service earlier in the morning and later at night, if minimum productivity targets can be met.

Service Coverage/Availability

Service coverage standards guide the development of new services, not existing service. They are used to evaluate when to provide new services, including the characteristics of any new service, such as the service type and quantity. **The Wake Transit Plan has set a strategic direction for new services, so that transit service will be available to 54% of the population and 80% of the jobs within Wake County.** Obtaining this goal and maintaining productivity standards will require matching transit services with markets.

Fixed-route transit service is not effective and productive in every environment. Population and employment densities are the strongest indicators of potential transit demand, and national experience has helped develop standards for the amount and type of fixed-route transit service based on density (Figure 4). Generally speaking, areas with densities of less than three to six households per acre, or four jobs per acre, cannot successfully support fixed-route transit, unless other factors exist (see below). Once densities exceed three to six households per acre or four jobs per acre, fixed-route bus services may be viable. Areas with higher densities may warrant higher levels of transit service.

While population and employment densities are a good method to evaluate the potential for service, there are other factors to consider when planning service for an area, such as corridor demographic data (i.e. household incomes), the supply and/or cost of parking, or excessive traffic congestion. In communities and areas where one or more of these conditions exist, transit service may be effective even if densities are low.

Figure 4 | Transit Supportive Population and Employment Densities

Source: Composite data compiled by Nelson\Nygaard from various sources.

Minimum Span of Service

The span of service is determined by the length of time a route operates, typically the time a route begins and the time it ends. The span of service determines how usable a service is for riders. It is also an important consideration for the overall network of services. Setting standards and expectations for the length of service for all types of routes ensures riders will be able to make connections and transfers between routes. However, service span is also one of the most important factors in determining how much a route will cost to operate. Developing an appropriate span of service—one that will meet rider and network needs, but not result in empty buses—is an essential component of an effective transit network.

Service standards establish the required base span of service for each route type (Figure 5). The span of service varies by day of the week (weekdays, Saturdays, and Sundays), recognizing that the amount of activity, and consequently the need or demand for transit service, varies by day of the week. The standard reflects the ***shortest*** period of time that different route types of service should operate. The span of service for any individual route can be greater—but not less—than the standard. While transit operators may extend the span of service for any

particular route, these trips must meet the minimum productivity and efficiency expectations for that category of service (see Section 4).

Figure 5 | Minimum Span of Service

	Frequent Route	Local Route	Community Route	Demand-Response Service[1]	Core Regional Route	Express Route	Shuttle Service
Weekdays							
Begin	6:00 AM	6:00 AM	7:00 AM	7:00 AM	6:00 AM	7:00 AM	—
End	12:00 AM	10:00 PM	9:00 PM	6:00 PM	10:00 PM	7:00 PM	—
Saturdays							
Begin	6:00 AM	6:00 AM	7:00 AM	*Saturday service may be provided, if warranted, but is not required.*	10:00 AM	*Saturday service may be provided, if warranted, but is not required.*	—
End	12:00 AM	10:00 PM	7:00 PM		10:00 PM		—
Sundays							
Begin	7:00 AM	10:00 AM	10:00 AM	*Sunday service may be provided, if warranted, but is not required.*	10:00 AM	*Sunday service may be provided, if warranted, but is not required.*	—
End	12:00 AM	10:00 PM	7:00 PM		10:00 PM		—

Notes: The beginning span of service refers to the departure of the first inbound trip, and the ending span of service refers to the departure time of the last peak direction trip.

[1] Does not supersede ADA paratransit legal requirements

Minimum Service Frequencies

Service frequency reflects the time interval between two vehicles traveling in the same direction on the same route, or how often the bus serves a particular stop. Service frequency is a critical to establish transit service as an attractive and viable travel mode, and significantly influences transit ridership. Alternatively, frequency has a significant impact on operating costs. Improving a route from a 60-minute frequency to a 30 minute-frequency doubles the route's operating costs. Because operating high-frequency service is so expensive, transit service frequency can vary throughout the day (i.e. peak and off-peak periods) to reflect existing or potential demand. Service frequencies are also set to ensure there are enough vehicles on the route to accommodate passenger volumes while not exceeding recommended loading standards.

The required service frequencies for routes in the Wake Transit Bus Plan are shown in Figure 6. These service frequencies set the *minimum* expectation for the frequency of bus service to ensure network compatibility. Consistent with the span of service expectations, transit operators are permitted to provide higher service frequencies. However, these additional trips are expected to meet the minimum productivity expectations for the category of service (see Section 5).

Service frequencies are listed in terms of "clock face intervals" (e.g. every 10, 15, 20, 30, or 60 minutes) as these intervals are easier for passengers to remember and can help facilitate better

transfer connections between routes. Whenever possible, frequencies should be set at regular clock-face intervals. However, there are two key exceptions:

- Where individual trips must be adjusted away from clock face intervals to meet shift times, work times, transfer connections, coordinate with pulse schedules, or other special circumstances;
- Where the desired frequency of service causes round trip recovery time to exceed 20% of the total round trip vehicle time. In such cases, the inefficiency of the schedule outweighs the benefit of a clock face schedule.

Figure 6 | Minimum Service Frequency (Frequency in Minutes)

	Frequent Route	Local Route	Community Route	Demand-Response Service	Core Regional Route	Express Route	Shuttle Service
Weekdays							
Early AM	30	60	60	—	60	—	60
AM Peak	15	30	60	—	30	3 peak direction trips	60
Midday	30	30	60	—	30	—	60
PM Peak	15	30	60	—	30	3 peak direction trips	60
Night	30	60	60	—	60	—	60
Saturdays							
All Day	30	60	60	—	60	*Saturday service may be provided, if warranted, but is not required.*	
Sundays							
All Day	30	60	60	—	60	*Sunday service may be provided, if warranted, but is not required.*	

Note: "—"indicates that the standard does not apply. Also, the standard applies to services that are provided, and do not imply that all services will be provided at all times.

Vehicle Loadings

Vehicle loadings refer to the number of riders on the bus relative to the seating capacity of the vehicle. Vehicle loadings are typically measured in terms of maximum standards to capture the time (or portion of the route) when the greatest number of riders are on the vehicle at the same time. Transit providers can adjust services to keep the number of passengers on its vehicles at a comfortable level, always within the limits of safety. In peak periods, this means that some passengers may be expected to stand for a portion of the trip. In off-peak periods and for service that operates longer distances, service will be designed to try to provide a seat to all customers. Transit operators maintain passenger loads within acceptable levels by matching capacity to demand. They can accomplish this by matching vehicle types with ridership levels (i.e. assign larger vehicles to higher ridership routes) by increasing (or decreasing) the frequency of service.

Service standards set requirements for the maximum average vehicle loads by service type and time of day (Figure 7 |). The standard reflects the average number of passengers relative to seating capacity for both the peak and off-peak periods, at the busiest point on the route.

Figure 7 | Average Vehicle Loading Maximums

	Frequent Route	Local Route	Community Route	Demand-Response Service	Core Regional Route	Express Route	Shuttle Service
Peak	120%	120%	100%	100%	100%	100%	100%
Off-Peak	100%	100%	100%	100%	100%	100%	100%

Note: Maximums are averages over one-hour periods; individual trips may exceed averages.

Bus Stop Spacing and Amenities

The distance between bus stops is of key concern to providing effective transit service. More closely spaced stops provide customers more convenient access, as they are likely to experience a shorter walk to the nearest bus stop. However, transit stops are also a major reason that transit service is slower than personal vehicle trips, as each additional stop requires the bus to decelerate, come to a complete stop, load and unload riders, and then accelerate and re-merge into traffic. Since most riders want service that balances convenience and speed, the number and location of stops is a key component of determining that balance.

Transit services are tailored toward serving different types of trips and needs. In general, services that emphasize speed and productivity (e.g., frequent routes) should have fewer stops, while services that emphasize accessibility (e.g., community routes) may have more frequent stops.

Standards for minimum stop spacing (or maximum stops per mile) are shown in Figure 8 |. Where multiple routes operate in the same corridor, the standard for the highest level of service operation applies. Core regional route services are not required to serve every stop in a corridor. Exceptions to these standards should only be made in locations where walking conditions are particularly dangerous, significant topographical challenges impede pedestrian access, or factors compromise safe bus operations and dwelling. This includes level of walkability, the absence of pedestrian accommodations, and the presence of a dendritic street network throughout much of the region.

Figure 8 | Industry Standard Bus Stop Spacing Standards

	Frequent Route	Local Route	Community Route	Demand-Response Service	Core Regional Route	Express Route	Shuttle Service
Minimum Stop Spacing in Feet							
Moderate to High Density Areas	1,300	1,300	1,300	—	2,640	—	1,300
Low Density Areas	2,600	2,600	1,300	—	2,640	—	1,300
Maximum Number of Stop Per Mile							
Moderate to High Density Areas	4	4	4	—	2	—	4
Low Density Areas	2	2	4	—	2	—	4

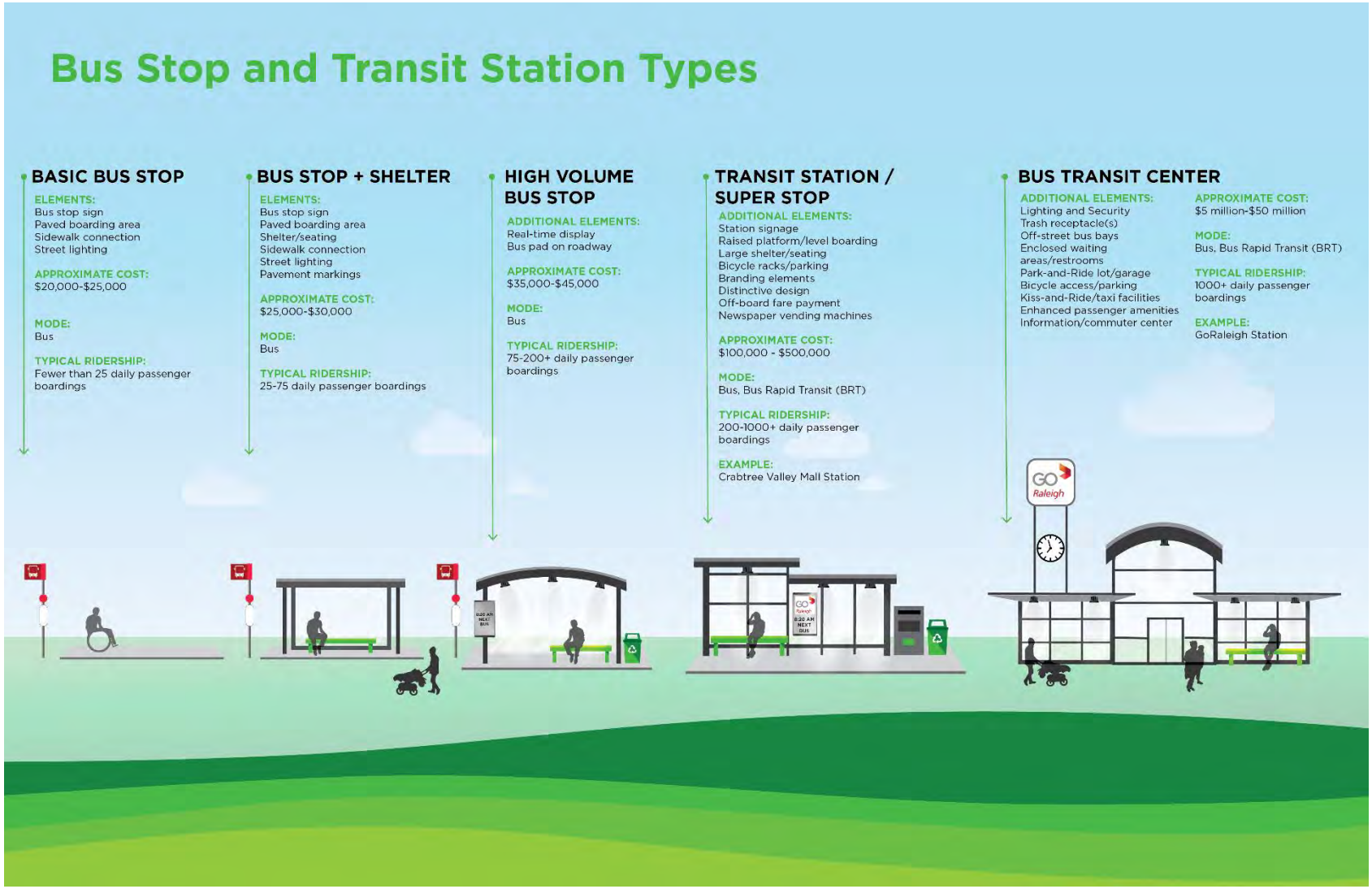
Notes: Moderate to high density defined as greater than or equal to 4,000 persons per square mile; low density defined as less than 4,000 persons per square mile

In addition to stop spacing, stops should include amenities that are appropriate for the level of passenger activity occurring at each stop. This standard serves several purposes: it ensures amenities are distributed with equity, as required by Title VI, as well as ensuring transit providers are efficiently investing capital resources in locations where it is most appropriate. Since passenger amenities enhance multiple routes, these standards are not specific to the type of service, only the total number of boardings, as described.

Where practicable, all new or improved bus stops and passenger waiting areas must conform to the ADA requirements as laid out in the Department of Transportation ADA standards for Transportation Facilities (2006). These standards specify a variety of requirements for platform surface, widths, and connectivity to surrounding sidewalk infrastructure and shelter facilities. As funds are available, existing bus stops and passenger waiting areas should be updated to meet ADA requirements.

Additionally, all stops should include clear signage. Additional amenities such as benches should be provided, as appropriate, depending on the level of passenger activity. Figure 9 provides a description of recommended amenities by type of stop. .

Figure 9 | Bus Stop and Transit Station Types



5 Performance Measures

Overview

Wake County is investing in new and enhanced transit services. As these investments develop and strengthen the transit network, people will have more options for how and where they travel using public transportation. Transit ridership and productivity will strengthen as investment increases and land use patterns change and Wake County residents start to rely on public transportation for more of their travel needs. However, the transformation of the transit network will be gradual rather than immediate and individual transit services will grow into the established performance measures over time. This means that the network overall, as well as individual routes, should not be expected to consistently achieve all of the recommended performance measures in the short-term.

The performance measures in this report were developed by:

1) Considering the existing performance measures and productivity levels of similar services currently operated within Wake County
2) Reviewing performance measures and productivity levels used by peer agencies, including both peers of the current network as well as peers applicable to the evolving transit network

Recommended Performance Measures

This document includes a combination of network-level and route specific performance measures. Network -level performance measures will measure progress towards overall goals and guide investment at a strategic level. Route-level performance measures will identify over- and under-performing routes and determine when it is appropriate to change investments associated with an individual route. Accordingly, route-level performance measures are defined for each type of service, recognizing that expectations for service productivity will be shaped by the underlying market and operating characteristics.

Performance measures consist of a limited set of focused measures that capture the critical aspects of service productivity, efficiency, and effectiveness; at the same time, these performance measures can be easily reproduced and communicated. The following four route – level-performance measures are recommended:

- **Operating Cost per Passenger Boarding**: The operating cost per passenger boarding reflects the cost of serving each passenger boarding. It is calculated by dividing operating and administrative costs by the total number of passenger boardings.

- **Passenger Boardings per Revenue Hour:** The number of passenger boardings per revenue hour measures how well the service is being used. It can be measured for the overall network as well as on a route-by-route basis by dividing the number of passenger boardings by the number of vehicle revenue hours. For core and suburban regional service this is measured as passenger boardings per trip (the one-way operation of a vehicle between two endpoints on a route) due to the longer distance trips and unique service characteristics.
- **Farebox Recovery:** Farebox recovery is the ratio of revenue earned at the farebox divided by operating costs. It is a similar measure as the subsidy per passenger boarding, but is a relative indicator rather than absolute measure.
- **On-Time Performance**: Measures how closely a transit service adheres to the published schedule. It is an important measure for transit users because it directly impacts service reliability. On-time performance is measured by comparing scheduled and actual bus departure and arrival times at fixed time points (bus stops). Most transit operators set bands around scheduled times to allow for some variation in the schedule, so that service is considered on time if the vehicle arrives no more than one minute before and five minutes after the published schedule at designated timepoints. On-time performance is typically measured as a percentage (i.e. 85% of all routes are on-time).

These performance measures are designed to evaluate routes in year 2027 of the Wake Transit Plan. Individual route performance is expected to improve as the overall network of transit service expands and improves. The standards set out in this document reflect the productivity expected from a mature and complete transit network. Bus services associated with the Wake Transit Bus Plan will be phased in over time as are the expectations associated with individual routes. This approach ensures the performance targets will be appropriate for the life of the Wake Transit Plan.

The performance standards, excluding on-time performance, will be phased in over time, such that in the initial years, individual routes and services will be evaluated according to the following schedule:

- Fiscal Years 2017-2021 – 80% of target
- Fiscal Years 2022-2026 – 90% of target
- Fiscal Year 2027 and beyond – 100% of target

Operating cost per passenger boarding is expected to decrease as service improves and ridership increases. For that reason, the phased schedule is the inverse for this performance standard and should be evaluated according to the following schedule:

- Fiscal Years 2017-2021 – 120% of target
- Fiscal Years 2022-2026 – 110% of target
- Fiscal Year 2027 and beyond – 100% of target

Peer Review

Peer transit systems were identified through the National Transit Database (NTD) to determine appropriate performance measures for the Wake Transit Bus Plan. This process identified 11 peers, including four North Carolina agencies (Charlotte, Durham, Greensboro, and Winston-Salem); and seven national peers (Charleston, SC; Fort Wright, KY; Indianapolis, IN; Little Rock,

AR; Madison, WI; Nashville, TN; and Richmond, VA). As a reference, the document also includes standards used by national leaders in transit service development and aspirational peers for Wake County. These agencies include the Regional Transit District in Denver; Tri-Met in Portland, Oregon; and Miami-Dade Transit in Miami.

The information obtained in this peer review:

- Identifies best practices used in the setting and development of performance measures by transit agencies
- Explores the existing productivity levels of transit providers operating service within Wake County
- Considers the performance standards achieved by similarly sized and positioned peer transit agencies, as well as three aspirational peers.

Best Practices

This review of transit performance measures identified best practices that ensure performance measures are used in a constructive and appropriate way and work to encourage ongoing improvement and development. The most relevant of these best practices include:

- Setting performance standards based on route type
- Adjusting performance expectations to reflect new and existing services
- Calculating performance based on specific standards, not averages, which by design are continually shifting and result in an unstable baseline and target that can never be achieved
- Collecting data on route performance quarterly, but evaluating routes annually

Peer Systems and Underlying Operating Characteristics

The peer review includes operating characteristics (service area, service area population, annual operating costs, and peak vehicles) to help interpret relative performance (Figure 10 |). Data on both the operating characteristics and performance measures were compiled using the National Transit Database (NTD) (2016 reporting data). Figure 11 compares GoTriangle, GoRaleigh, and GoCary to the selected peers on a number of measures of service performance and efficiency, while Figure 12 provides the same information for WCTS.

As part of setting performance measures this document balances what is realistic in Wake County today (2017) with the future expected investment in the transit network. As seen in Figure 13, the frequent and regional bus service operated by agencies in Denver, Portland, Miami, and Seattle are monitored under standards comparable to the standards proposed in this document.

Figure 10 | Wake County Transit Providers and Peer Systems – Fixed Route Service Statistics

City	Service Provider	Service Area Size (sq. mi.)	Service Area Population (2010)	Annual Operating Costs (in millions)	Fixed-Route Vehicles in Peak Service
Transit Agencies Operating in Wake County					
Triangle Region, NC[1]	**GoTriangle**	1,519	1,402,824	$19.6	57
Raleigh, NC	**GoRaleigh**	125	347,729	$22.9	65
Cary, NC	**GoCary**	55	157,259	$1.8	9
Peer Agencies					
Charleston, SC	**Charleston Area Regional Transportation Authority**	137	543,209	$14.0	87
Charlotte, NC	**CATS**	688	1,098,944	$80.5	198
Durham, NC	**Durham Area Transit Authority**	93	240,017	$18.3	45
Fort Wright, KY	**TANK**	267	278,653	$18.8	91
Greensboro, NC	**Greensboro Transit Authority**	127	269,666	$14.0	41
Indianapolis, IN	**IndyGo**	396	928,281	$57.9	136
Little Rock, AR	**Rock Region Metro**	100	165,255	$13.5	49
Madison, WI	**Metro Transit**	72	256,150	$46.9	182
Nashville, TN	**Metropolitan Transit Authority**	484	655,900	$47.5	124
Nashville, TN	**Middle Tennessee Regional Transit Authority**	750	1,583,115	$9.1	56
Phoenix, AZ	**Valley Metro**	732	3,629,114	$83.1	282
Richmond, VA	**GRTC**	227	449,572	$37.6	121
Winston-Salem, NC	**Winston-Salem Transit Authority**	108	199,555	$11.5	36
	Peer Average	**246**	**462,291**	**$32.8**	**101**

Source: National Transit Database (2016), U.S. Census and local provider data

[1] Includes service outside of Wake County

Figure 11 | Wake County Transit Providers and Peer Systems – Fixed Route Operating Statistics

City	Service Provider	Passenger Boardings per Revenue Hour	Passenger Boardings per Revenue Mile	Operating Cost per Passenger Boarding	Cost per Revenue Hour	Farebox Recovery (%)
Transit Agencies Operating in Wake County						
Triangle Region, NC[2]	**GoTriangle**	13.0	0.6	$10.99	$142.83	10.3%
Raleigh, NC	**GoRaleigh**	22.9	1.8	$4.27	$97.67	14.2%
Cary, NC	**GoCary**	7.0	0.5	$7.26	$50.53	9.5%
Peer Agencies						
Charleston, SC	**Charleston Area Regional Transportation Authority**	20.2	1.5	$3.62	$73.06	31.8%
Charlotte, NC	**CATS**	24.5	1.9	$4.13	$101.37	23.0%
Durham, NC	**Durham Area Transit Authority**	30.0	2.2	$3.09	$92.81	15.0%
Fort Wright, KY	**TANK**	15.6	1.1	$5.44	$84.69	22.0%
Greensboro, NC	**Greensboro Transit Authority**	24.2	1.9	$3.32	$88.74	21.4%
Indianapolis, IN	**IndyGo**	17.7	1.3	$6.30	$111.71	17.1%
Little Rock, AR	**Rock Region Metro**	14.3	1.0	$5.41	$77.47	13.2%
Madison, WI	**Metro Transit**	32.9	2.6	$3.53	$116.19	27.3%
Nashville, TN	**Metropolitan Transit Authority**	20.2	1.7	$5.20	$104.89	18.8%
Nashville, TN	**Middle Tennessee Regional Transit Authority**	18.1	0.5	$14.35	$259.45	18.7%
Phoenix, AZ	**Valley Metro**	18.4	1.4	$4.84	$89.11	20.7%
Richmond, VA	**GRTC**	22.0	2.0	$4.34	$95.41	21.4%
Winston-Salem, NC	**Winston-Salem Transit Authority**	21.9	1.9	$3.81	$83.49	13.9%
	Peer Average	**22.1**	**1.7**	**$4.38**	**$93.62**	**20.4%**

Source: National Transit Database (2015) and local provider data

[2] Includes service outside of Wake County

Figure 12 | Wake County Transit Providers and Peer Systems – Demand-Response and ADA Paratransit Statistics

City	Service Provider	Passenger Boardings per Revenue Hour	Passenger Boardings per Revenue Mile	Operating Cost per Passenger Boarding	Cost per Revenue Hour	Farebox Recovery (%)
Transit Agencies Operating in Wake County						
Wake County, NC	**WCTS**	1.6	0.1	$27.00	$31.72	11.0%
Triangle Region, NC[3]	**GoTriangle**	1.5	0.07	$73.42	$129.82	3.56%
Raleigh, NC	**GoRaleigh**	1.3	0.1	$25.45	$33.44	9.1%
Cary, NC	**GoCary**	1.5	0.1	$32.12	$50.14	13.7%
Peer Agencies						
Charleston, SC	**Charleston Area Regional Transportation Authority**	1.9	0.1	$36.13	$67.79	24.1%
Charlotte, NC	**CATS**	1.8	0.1	$37.35	$68.54	10.9%
Durham, NC	**Durham Area Transit Authority**	2.2	0.1	$25.38	$56.10	4.5%
Fort Wright, KY	**TANK**	1.9	0.1	$33.30	$61.87	6.8%
Greensboro, NC	**Greensboro Transit Authority**	2.2	0.1	$31.78	$69.17	3.6%
Indianapolis, IN	**IndyGo**	1.8	0.1	$31.79	$56.31	11.5%
Little Rock, AR	**Rock Region Metro**	2.3	0.1	$24.99	$56.57	10.7%
Madison, WI	**Metro Transit**	2.3	0.2	$42.22	$98.68	4.3%
Nashville, TN	**Metropolitan Transit Authority**	2.2	0.1	$54.88	$119.52	5.1%
Phoenix, AZ	**Valley Metro**	1.3	0.1	$47.61	$62.35	6.0%
Richmond, VA	**GRTC**	2.5	0.1	$18.50	$45.67	12.5%
Winston-Salem, NC	**Winston-Salem Transit Authority**	3.0	0.2	$15.64	$47.08	18.8%
	Peer Average	**2.1**	**0.1**	**$33.30**	**$67.47**	**9.9%**

Source: National Transit Database (2015) and local provider data

[3] Includes service outside of Wake County

Figure 13 | Performance Standards Reported by Aspirational Peers

Frequent Route Performance Standards				
City	Service Provider	Passenger Boardings per Revenue Hour	Operating Cost per Passenger Boarding	Farebox Recovery (%)
Denver, CO	**RTD**	25	$6.28	30%
Portland, OR	**Tri-Met**	15	--	--
Miami, FL	**Miami-Dade County**	30	--	20%
Seattle, WA	**Sound Transit**	N/A	N/A	N/A
Wake County, NC	**Wake Transit Bus Plan (Proposed)**	25	$6.00	20%
Core Regional Route Performance Standards				
City	Service Provider	Passenger Boardings per Revenue Hour	Operating Cost per Passenger Boarding	Farebox Recovery (%)
Denver, CO	**RTD**	--	--	--
Portland, OR	**Tri-Met**	15	--	--
Miami, FL	**Miami-Dade County**	30[4]	--	--
Seattle, WA	**Sound Transit**	25 (all day), 15 (limited service)	--	--
Wake County, NC	**Wake Transit Bus Plan (Proposed)**	20[5]	$6	20%
Demand-Response Performance Standards				
City	Service Provider	Passenger Boardings per Revenue Hour	Operating Cost per Passenger Boarding	Farebox Recovery (%)
Denver, CO	**RTD**	1.5	--	--
Portland, OR	**Tri-Met**	--	--	--
Miami, FL	**Miami-Dade County**	--	--	--
Seattle, WA	**Sound Transit**	N/A	N/A	N/A
Wake County, NC	**Wake Transit Bus Plan (Proposed)**	1.5	$30	5%

Sources: TriMet Service Guidelines Framework (2014), RTD Transit Service Policies and Standards (2016), Miami-Dade Transit Service Standards (2009)

[4] Passengers per trip

[5] Passengers per trip

Performance and Productivity Measures

This document recommends five network-wide and four route-level performance measures. Performance measures are designed to track progress towards established goals and the cost-effectiveness of the overall network. These performance metrics are not measured against a standard, but rather are tracked over time to ensure network productivity is improving and transit service is advancing the goals of the Wake Transit Bus Plan in a cost-effective manner. Network-wide performance measures include:

- Percentage of Wake County residents within walking distance (3/4 of a mile) of all-day service
- Percentage of Wake County jobs within walking distance (3/4 of a mile) of all-day service
- Percentage of ridership-oriented routes, as measured by total service cost
- Network-wide farebox recovery ratio (average total network)
- Operating cost per revenue hour (average total network)

Route level performance measures are intended to facilitate management and oversight of individual routes and support additional service reporting requirements, including Title VI requirements. Each performance measure includes a standard or expectation for productivity. Productivity standards are developed for each performance measure and for each route classification. The performance measures are intended to be realistically achievable within the local operating characteristics and land use patterns of Wake County while also meeting the standards achieved by peer agencies. The four recommended measures are:

- Passenger boardings per revenue hour (or trip, the one-way operation of a vehicle between two endpoints on a route), depending on route classification
- Operating cost per passenger boarding
- Farebox recovery ratio
- On-time performance

Passenger Boardings per Revenue Hour (or per Trip)

The most common and reliable way to track transit service productivity is the number of passenger boardings for each hour of active service, or passenger boardings per revenue service hour. An exception to this rule is for core regional routes and express routes, which often travel for longer distances with fewer stops; productivity on these routes is measured as passenger boardings per bus trip, the one-way operation of a vehicle between two endpoints on a route.

The standard sets a minimum for the average number of passenger boardings that a route should generate for each service hour (Figure 14). The standards vary by service type and by day of the week and time of day.

Figure 14 | Minimum Productivity Levels (Passenger boardings per Revenue Vehicle Hour)

	REVENUE VEHICLE HOUR					REVENUE VEHICLE TRIP	
	Frequent Route	Local Route	Community Route	Demand-Response Service	Shuttle Service	Core Regional Route	Express Route
Weekdays							
All Day	**25**	**20**	**10**	**1.5**	**10**	**20**	**10**
Early Morning	15	10	10	1.5	10	10	–
Late Night	15	10	10	1.5	10	10	–
Saturdays							
All Day	**20**	**15**	**10**	**1.5**	**10**	**15**	–
Sundays							
All Day	**15**	**10**	**10**	**1.5**	**10**	**10**	–

Note: "Early morning" and "Late Night" refers to service before and after the minimum span of service. All day refers to the complete span of service, including early morning and late night service. "—" indicates that the standard does not apply. *core regional and express route productivity is measured as a minimum number of passengers per **trip**.

Operating Cost per Passenger Boarding

The operating cost to transport each passenger boarding is a key metric to understand the absolute and relative performance of the Wake Transit Bus Plan's funded services. The minimum standard for operating cost per passenger boarding varies by route type is defined in Figure 15.

Figure 15 | Operating Cost per Boarding

Frequent Route	Local Route	Community Route	Demand-Response Service	Core Regional Route	Express Route	Shuttle Service
$6.00	$6.00	$10.00	$30.00	$6.00	$10.00	$10.00

Farebox Recovery

Farebox recovery is the percentage of operating expenses recouped by farebox revenues. Performance measures applies only to routes and services where fares are collected. Standards for minimum farebox recovery percentages are set by route type (Figure 16).

Figure 16 | Minimum Farebox Recovery

Frequent Route	Local Route	Community Route	Demand-Response Service	Core Regional Route	Express Route	Shuttle Service
*	*	*	*	*	*	*

** The Wake Bus Plan is conducting a fare study to evaluate fare levels generally and the potential for increased integration across Wake Transit Plan partners. This analysis will be completed by August, 2018.*

Figure 16 will be updated with recommendations for minimum farebox recovery rates after the fare study is complete.

On-Time Performance

On-time performance is a measure of the reliability of route operations. Measuring an individual route's schedule adherence provides information on whether a customer can count on a bus being there as scheduled. Minimum on-time performance percentages are defined in Figure 17. To precisely measure on-time performance, a definition of on-time must be established. The most widely accepted fixed route measure of on-time is up to one minute earlier and no more than five minutes later (-1 minute to +5 minutes) than the scheduled arrival time at all time points. The only exception to this measure would include early arrivals on express routes to their final destinations. Demand response and ADA measure on-time for both pickups and drop-offs. The most widely accepted measure of on-time is +/-20 minutes of the scheduled pickup and drop-off time.

Figure 17 | Minimum On-Time Performance

Frequent Route	Local Route	Community Route	Demand-Response Service	Core Regional Route	Express Route	Shuttle Service
85%	85%	85%	85%	85%	85%	85%

Over- and Under-Performing Routes

The TPAC understands that transit providers are solely responsible for operating their services. As such**, transit providers have discretion to recommend and implement changes to their routes as needed.** Transit providers are encouraged to integrate the Service Guidelines and Performance Measures as they review and evaluate their transit services. This internal review process, as proposed for the Wake Transit Bus Plan, should consider transit operations as well as the impact of exogenous variables that may impact route productivity, such as gas prices.

However, the TPAC designed these performance standards and measures to strike a balance between setting realistic and achievable goals with a desire to encourage ongoing improvement. As such, the TPAC recommends that transit providers compare and contrast route performance relative to the Wake Transit Bus Plan standards. Routes that consistently over-perform relative to their standards may warrant additional investment; and conversely routes that consistently under-perform relative to their standard may warrant a reduced investment. It's necessary to recognize that not every route will meet all of the established standards, all of the time. Recognizing this, over-performing routes are defined as services that surpass at least three performance measures for three or more consecutive quarters. Under-performing routes are defined as routes that fall below the minimum standards for three or more performance measures for a period of three or more consecutive quarters.

Local transit providers will develop a report, submitted to the TPAC quarterly, that shows performance on individual performance measures at a route level. This report will also include information on the number of consecutive quarters the route has over- or under-performed relative to the standards. The TPAC will not be taking action on the routes on a quarterly basis, but transit providers will make the information available on a quarterly basis.

The TPAC recommends a tiered system for addressing over- and under- performing routes. This process is designed to be clear, consistent, and fair while ensuring the most cost-effective investments are prioritized.

1. New routes or routes undergoing significant changes (defined as a 20% change in revenue miles or hours) will be classified as new and exempt from performance measures services for a period of 18 months to build ridership and the market for transit services. This grace period is intended to reflect the major changes in transit service development in Wake County. The time period is longer than the one currently adopted by GoTriangle and GoRaleigh.
2. Local transit providers will review route productivity annually (in conjunction with the annual work plan process). **Routes identified as under- or over-performing will be considered as part of the local transit provider's existing route review process.** This process will be conducted in advance of the annual work plan development process and may consider corrective actions such as minor changes to include service design, strengthening connections, coordination with other routes; and/or marketing or information systems. Any actions resulting from this are at the discretion of the transit providers.
3. **Any significant changes to the funding of individual routes will be recommended as part of the update to the Wake Transit Bus Plan,** a process that is envisioned to occur at least once every four years. As part of this process, routes that have over- or under-

performed relative to at least three of their respective standards for the past three or more consecutive quarters will be subjected to more strenuous review. This process will include reviewing:

- The specific performance measures where over- or under-performance has been recorded, including duration and the magnitude of the gap.
- Exogenous variables out of the transit providers' control that may have contributed to over- or under-performance.
- Efforts under-taken by the transit provider to address over- or under-performance.

Routes that consistently over-perform set targets and have not received additional investment ***may*** be considered for additional resources. Additional resources may be used to advance the route classification to a higher tier or service (i.e. graduate service from a local route to a frequent route).

Likewise, routes that have exhausted their route development period and have not improved with annual adjustments ***may*** be recommended for a reduction or elimination of funding. For example, a reduction in funding may be used to move a route down a classification tier (i.e. from a community route to a demand response service).

6 Measuring Customer Satisfaction

Customer satisfaction is a critical element of the Wake Transit Plan as the vision adopted by the voters includes clear guidelines for enhancing customer service. The goal with these guidelines is a transit system that prioritizes accessibility, comfort, security, reliability, cleanliness, courtesy, and communication. Customer satisfaction measures also allow TPAC member agencies to understand if complaints are incidental to a particular individual or systemic to the overall network. Regular, periodic customer satisfaction surveys also allow Wake Transit Governing Boards to track satisfaction in the overall transit network as it evolves.

Customer Satisfaction Survey

Requirements for the customer satisfaction survey will be updated to reflect a regional customer survey scope of work negotiated in July 2018.

Connecting all points of the Triangle

MEMORANDUM

TO: GoTriangle Operations & Finance Committee

FROM: Regional Services Development

DATE: May 15, 2018

SUBJECT: **2018-2019 Fare Schedule**

Strategic Objective or Initiative Supported

This proposal is intended to support the following objectives:
1.1 Increase number of customers served with sustainable transportation services
1.5 Maintain cost-effectiveness.

Action Requested

Staff recommends that the Committee recommend that the Board adopt the 2018-2019 Fare Schedule as attached.

Background and Purpose

GoTriangle Board of Trustees adopts the fare schedule for our transit services (see attached). This sets the prices for cash boardings as well as which passes will be offered and at what prices. Further, the Board establishes whether and which discounts will be available to any groups of customers. The last adjustment to the fare schedule was adopted by the Board of Trustees in 2014.

In January, staff proposed two changes to the fare structure and pricing. The first was changes to the youth fares and introduction of a free Youth GoPass. That final recommendation was adopted by the Board of Trustees in April. The second proposal was the elimination of free transfers between GoTriangle buses.

This memo describes the public feedback received, the results of an equity analysis as required by Title VI of the Civil Rights Act, and the staff recommendation to continue offering free transfers between GoTriangle buses and to evaluate other strategies to streamline the regional fare structure and offer more equitable fare pricing along with the introduction of new fare technology.

Summary of Public Input

GoTriangle conducted public outreach regarding a proposal to eliminate transfers during the period between January 23, 2018, and April 6, 2018. Outreach included direct outreach to community partners, pop-up events at transit centers, social media pushes and online engagement. Sentiment related to the elimination of transfer proposal was overwhelming negative with concern for the financial impact on individuals with limited income or who do not travel round trip and would not benefit from replacing transfers with a regional day pass.

The majority of comments were received via email and through social media. These comments were generated through online outreach and received via email to the GoTriangle service planning department and info@gotriangle.org. Data from the Fare Changes social push that started on March 19, 2018, shows that between 2 Facebook posts and 6 tweets there were 9,578 reached and 286 interactions. There have been 366 page views on gotriangle.org/fare-changes, of which 177 were through the Spanish-language version of the site.

The attached table identifies the type, date and location of outreach events conducted regarding the proposal to eliminate transfers.

Findings from Title VI Equity Analysis

Using data from the 2016 On-Board Customer Survey, staff conducted the required analyses of the differences in racial identity and income levels of the customers who reported making transfers for their trips compared with our ridership as a whole. For the analysis based on racial identity, 64% of customers who used transfers identified themselves as minority, compared with 58% of all customers. This does not exceed the adopted threshold of a 10% difference, and thus does not rise to the level of a disparate impact on minority customers.

For the analysis on income levels, 40% of customers who used transfers reported household incomes below the federal poverty level, compared with 25% of all customers. This 15% difference exceeds the adopted threshold of a 10% difference, and thus would be a disparate impact on low-income customers.

It is important to remember that this is a small number of customers since only 4% of all boardings are associated with using transfers. However, this is helpful in understanding who would be affected by the proposal.

Staff Recommendation

Based on the public input, the equity analysis findings, and the recent initiation of a regional fare study, staff recommends Board adoption of the FY 2019 Fare Schedule without making a change to the transfer policy or price. Staff will continue to evaluate options to make the regional fare structure more consistent and more equitable with the introduction of new fare technologies, policies, and prices.

The FY 2019 Fare Schedule incorporates the changes to youth fares and introduction of the Youth GoPass as previously adopted by the Board of Trustees.

Financial Impact

The fare change proposal will have an impact on revenues. The change to youth fares is anticipated to result in a reduction in revenues of approximately $23,000 in FY 2019, of which we estimate one-third will be reimbursed through the Wake share of the Triangle Tax District. Impacts beyond FY19 are difficult to estimate. We would expect youth ridership to grow over time as we add service and as the youth population grows. Under the current fare schedule, that would lead to increasing future revenues that would be foregone under the proposal. However, we also expect that an impact of the Youth fare proposal is that we are creating new riders "for life" that we otherwise wouldn't be seeing as customers. As they become 19, these customers would be generating revenues for GoTriangle that we wouldn't otherwise realize. We do not have good estimates about how these two forces would offset one another. If they completely offset each other, we would continue to see a reduction in revenues of $15,500 annually.

Attachments

- Table of Public Outreach Activities
- Comparison of Current Fare Schedule with Recommended FY19 Fare Schedule

Staff Contact(s)

John Tallmadge, 919.485.7430, jtallmadge@gotriangle.org

Fare Schedule for Comparison

SERVICE TYPE	FARE TYPE	CURRENT*		RECOMMENDED**	
		Full Fare	Discount Fare	Full Fare	Discount Fare
Regional	Cash Fare	$2.25	$1.00	$2.25	$1.00
	Transfer to Regional Route	Free	Free	Free	Free
	Transfer to Express Route	$0.75	$0.25	$0.75	$0.25
	DayPass (unlimited rides)	$4.50	$2.00	$4.50	$2.00
	7-Day Pass (unlimited rides)	$16.50	$7.50	$16.50	$7.50
	31-DayPass (unlimited rides)	$76.50	$34.00	$76.50	$34.00
Express	Cash Fare	$3.00	$1.25	$3.00	$1.25
	Transfer	Free	Free	Free	Free
	DayPass (unlimited rides)	$6.00	$2.50	$6.00	$2.50
	7-Day Pass (unlimited rides)	$22.00	$9.25	$22.00	$9.25
	31-DayPass (unlimited rides)	$102.00	$42.50	$102.00	$42.50
Paratransit	Cash Fare	$4.50	$4.50	$4.50	$4.50
	11-Ride Card	$45.00	$45.00	$45.00	$45.00
	Monthly Pass	$153.00	$153.00	$153.00	$153.00
Discounts	Children (5 and under)	Free		Free	
	Children (6 through 12)	Pay Discount Rates		Free	
	Youth (ages 13 through 18)	Pay Discount Rates		Free with Youth GoPass, else Pay Discount Rates	
	Seniors (ages 65+)	Pay Discount Rates		Pay Discount Rates	
	Persons w/ Disabilities	Pay Discount Rates		Pay Discount Rates	
	Social Service Org's	25% discount off DayPass		25% discount off DayPass	
	$13.50 Stored Value	$12.00		$12.00	
	$25 Stored Value	$20.00		$20.00	
	$50 Stored Value	$40.00		$40.00	

*Adopted by GoTriangle Board of Trustees on June 25, 2014.
** Effective July 1, 2018

Connecting all points of the Triangle

MEMORANDUM

TO: GoTriangle Operations & Finance Committee

FROM: Regional Services Development

DATE: May 17, 2018

SUBJECT: **Recommendation to Extend RTP OnDemand Service Pilot**

Strategic Objective or Initiative Supported

Promote first and last-mile access (e.g., on-demand shuttle pilot project in RTP)

Action Requested

Staff requests that the Committee recommend to the full Board of Trustees to extend the OnDemand service pilot by six (6) months to December 31, 2018.

Background and Purpose

The OnDemand Service is a two year research and demonstration project that will test innovative technologies to provide transportation service in and around the Research Triangle Park (RTP). The On-Demand Project's goal is to attract new transit riders to GoTriangle by enhancing transit service within the park to on demand, instead of the current fixed schedule, as well as making service available whenever GoTriangle provides service to the Regional Transportation Center (RTC), an improvement over the current peak-period only service.

The OnDemand service began on January 2, 2018. We focused initial outreach on existing customers to teach them how to request trips and connect with the vehicle. For the first several months, we have continued to evaluate the operations together with TransLoc to make refinements to how operators, supervisors, and dispatchers use the system. We have regularly given feedback to TransLoc about changes we would like to see to the algorithm or the user interface.

Preliminary Performance Evaluation

The goals established for this pilot are to attract new customers (target of 200 daily boardings) for the same level of operating costs or to serve the pre-existing number of customers (approximately 110 daily boardings) for a reduced operating cost (target 25% reduction). A secondary goal was to attract customers making more direct trips without requiring transfers, or reducing travel times.

We had the assistance of Katy Lang, a graduate student at UNC's Department of City and Regional Planning, in performing an initial evaluation and researching experiences at other transit agencies that are testing on-demand services. Her evaluation was based on data for the early period from January 22 – February 16. The findings for that period, and continuing more recently, are the OnDemand service has not attracted new customers, nor reduced costs. New direct trips are being made.

While the service is not meeting the performance targets, we have not initiated marketing to residents in the service area. We also conservatively started with four vehicles during the peak periods, despite knowing that was more service than the pre-existing levels due to the new mid-day service. In early May, the operator schedule was revised to reduce the number of vehicles from four to three during times when we weren't seeing peak demand. Staff will be evaluating whether to further reduce the vehicle hours provided for August.

Recommendation

In order to evaluate the impacts of marketing and operational service changes, staff is recommending an extension of the pilot service for an additional six months to December 31, 2018. In addition, staff will continue discussions with stakeholders in Research Triangle Park and the surrounding area about service design and funding for calendar year 2019. Staff will also evaluate options for charging fares for direct OnDemand trips.

Financial Impact

The incremental costs of continuing the pilot for six months are estimated at $100,000 above the costs of operating the four fixed route shuttles. This is predominately associated with the costs of the six hours of mid-day service operation that had not been operated before the pilot.

Attachments

- None

Staff Contact(s)

- John Tallmadge, 919-485-7430, jtallmadge@gotriangle.org

GoTriangle Board of Trustees
Planning & Legislative Committee Meeting Minutes
May 23, 2018

Board Room, The Plaza, 4600 Emperor Blvd., Suite 100
Durham, NC

Committee Members Present:

Will Allen III, Committee Chair
Wendy Jacobs
Vivian Jones
Mark Marcoplos (arr. 10:12 a.m.)
Jennifer Robinson

Committee Members Absent:

Nina Szlosberg-Landis (excused)

Committee Chair Will Allen III called the meeting to order at 10:05 a.m.

I. Adoption of Agenda

Action: On motion by Robinson and second by Jones the agenda was adopted. The motion was carried unanimously.

II. Approval of Minutes

Action: On motion by Robinson and second by Jones the minutes of the February 28, 2018, meeting were approved. The motion was carried unanimously.

III. FY19 Business Plan

John Tallmadge two documents which are attached and hereby made a part of these minutes. He reminded the Committee that annually the Board reviews the initiatives identified in the Strategic Plan for the upcoming fiscal year. He pointed out new and added initiatives for each of the five strategic objectives. He also discussed the second attachment, an example from transit operations of a one-pager for its six initiatives, which states the purpose, objectives and milestones for the initiative. Tallmadge stated that these one-page documents were being developed for all the initiatives.

Robinson suggested that milestones that have been accomplished remain on the list with a checkmark to show their completion.

Action: On motion by Jones and second by W. Jacobs the Committee voted to recommend Board approval of the FY19 business plan. The motion was carried unanimously.

IV. BRT Evaluation Framework

Patrick McDonough discussed the proposed BRT evaluation framework.

Action: On motion by Robinson and second by Marcoplos the minutes of the Committee voted to recommend Board approval of the BRT Evaluation Framework from the Wake Transit Major Investment Study. The motion was carried unanimously.

Allen suggested the Committee bring forward this recommendation to the Board at today's meeting.

V. Acceptance of Real Property by Donation

General Counsel Blake stated that this will allow the General Manager to accept donations of property for the ROW that is needed without having to come back to the Board for each, as long as the associated costs are within $100,000.

Action: On motion by Jones and second by Robinson the minutes of the Committee voted to recommend Board adoption of a resolution authorizing General Manager to accept donations of real property. The motion was carried unanimously.

VI. Sponsorship and Naming Rights Policy

Shelley Blake presented a draft sponsorship and naming rights policy for discussion. She explained that the policy is set up for GoTransit Partners to accept the donation, but the GoTriangle Board would approve the naming. She noted that the location and historic reference of a property has to remain.

Action: On motion by Robinson and second by W. Jacobs the Committee voted to recommend Board adoption of the Sponsorship and Naming Rights Policy. The motion was carried unanimously.

VII. Update on Joint Development Program

Patrick McDonough's presentation is attached and hereby made a part of these minutes.

VII. Adjournment

Action: Chair Allen adjourned the meeting at 11:19 a.m.

_____
Will Allen III, Committee Chair

Attest:

_____
Michelle C. Dawson, CMC
Clerk to the Board of Trustees

Providing the skills, staffing, systems and technology needed to meet our objectives

Initiatives continuing into FY2019

- Conduct organizational review and clarify roles and responsibilities across the organization *(Human Resources)*
- Develop and implement a succession planning process *(Human Resources)*
- Annually update plan for human capital needs *(Human Resources)*
- Align performance appraisal system with the strategic plan *(Human Resources)*
- Develop and deploy an annual employee engagement survey *(Human Resources)*
- Plan for human capital needs, including assessing costs of turnover, wage/salary impacts, EEO goals *(Human Resources / EEO)*
- Formalize organization-wide employee training programs (e.g., safety, performance evaluations, interviewing, procurement) *(Human Resources / EEO)*
- Plan for space needs (office, storage, O&M facilities, parking, etc.) *(Real Estate)*
- Establish core organizational values *(GM Designee)*
- Adopt an organization-wide project management methodology *(Capital Development)*
- Implement Enterprise Resource Planning (ERP) system *(Finance / Information Technology)*
- Create performance management communication tools, including an automated dashboard, for internal and external audiences *(Information Technology)*
- Develop a 5-Year ITS Strategy *(Information Technology)*
- Implement Vanpool Business Plan *(Regional Services Development)*
- Formalize the organizational system for initiating and tracking hazard elimination or control in a timely manner. *(Transit Operations)*
- Transition to a Safety Management System approach to safety, per MAP-21 *(Transit Operations)*
- Establish a Continuity of Operations Plan (COOP) to ensure the agency can continue operation of essential functions during a broad range of natural or man-made emergencies *(Transit Operations)*

New Initiatives in FY2019

- Enhance and formalize the employee recognition program *(Human Resources)*
- Review and update business practices and procedures for planning, operations, and capital project development *(Regional Services Development / Transit Operations / Capital Development)*

Actively seeking the financial resources to fund the county transit plans

Continuing into FY2019

- Create and adopt financial management and oversight policies to include debt management and minimum reserves *(Finance)*
- Link budget requests to Strategic Plan initiatives and performance outcomes *(Finance)*
- Establish new budget accountability and expenditure forecasting process *(Finance)*
- Explore innovative financing opportunities, such as value capture and joint development *(Planning/TOD)*
- Coordinate applications for USDOT funding sources, such as New Starts, TIGER and Small Starts, with partner agencies to maximize federal grant revenues to the region *(Planning/TOD)*
- Work with the legislature to provide new options for transit development (funding strategies and project delivery methods) *(General Manager / General Counsel)*
- Develop 5-Year CIP, including needs for contracted services *(Regional Partnerships)*
- Conduct Fare Structure and Price analysis *(Regional Services Development / Regional Partnerships)*

- Complete preparations to submit request for a federal full funding grant agreement for the Light Rail Project *(Light Rail Project Team / Finance)*
- Prepare and submit application for federal TIFIA Loan for the Light Rail Project financing *(Finance)*
- Adopt and implement a Sponsorship and Naming Program *(General Counsel)*

Proactively developing positive partnerships to deliver on county transit plan promises

Continuing into FY2019

- Promote first- and last-mile access (e.g., on-demand shuttle pilot project in RTP) *(Regional Services Development)*
- Establish joint service standards/performance standards with transit agencies across region *(Regional Services Development)*
- Implement the County Transit Plans with Transit Planning Advisory Committee and Staff Working Groups *(Regional Services Development / Finance)*
- Maintain a Transit Asset Management Plan *(Transit Operations / Real Estate)*
- Develop a Business Plan for Access Paratransit service *(Transit Operations)*
- Establish new pass sales strategy *(Regional Partnerships)*
- Ensure all contracts for transit service requirements to meet our service quality and vehicle standards *(Regional Partnerships)*
- Convene transit agencies for coordination of operating practices and policies *(Regional Partnerships)*
- Establish a transit education and relationship-building program with partner governing entities (cities, towns, counties, MPOs) *(Champion TBD)*
- Establish a Better Bus Stop Initiative to provide clean, safe, and attractive waiting environments at bus stops *(Capital Development)*
- Renew RDU-RTP Task Force, make services/TDM programming to airport and RTP more attractive *(Communications & Public Affairs / Regional Services Development)*
- Work with partners to maintain and expand measures that give priority to buses, carpools, and vanpools on regional highways and arterials *(Planning / TOD)*

New Initiatives in FY2019

- Develop an Alternative Fuel Fleet Plan *(Transit Partnerships / Transit Operations)*
- Launch Youth GoPass *(Communications & Public Affairs)*
- Implement a Naming and Design Process for major capital projects *(Communications & Public Affairs)*

Proactively communicating with stakeholders and interested parties

Continuing into FY2019

- Convene the Transit Advisory Committee *(General Counsel / Communications & Public Affairs)*
- Implement a customer-friendly, easy-to-navigate website *(Communications & Public Affairs)*
- Release weekly stories / videos of customers *(Communications & Public Affairs)*
- Solicit customer feedback on a proactive basis (not merely in response to customer complaints or proposed changes), both online and in person *(Communications & Public Affairs)*
- Conduct annual customer and community attitudinal surveys *(Communications & Public Affairs)*
- Train all staff on the transit network, so they can confidently answer common questions about transit service *(Communications & Public Affairs / Human Resources)*

Encouraging the inclusion of transit in land use planning

Continuing into FY2019

- Develop GoTriangle Strategic Property Management Plan *(Real Estate)*
- Advance Raleigh Union Station Bus Terminal joint development project *(General Manager)*
- Advance relocation of Regional Transit Center to RTP Park Center *(Capital Development)*
- Support adoption of municipal transit-oriented development zoning and development ordinances *(Planning/TOD)*
- Recommend changes to local planning regulations and review processes to ensure that transit customers and facilities are given consideration in development plans *(Planning/TOD)*
- Advocate to allow for advertising in bus shelters within street Rights-of-Way *(Legal / Regional Services Development)*
- Develop better tools for educating decision-makers about transit accessibility of development locations *(Planning/TOD)*
- Establish partnerships with Cities, Towns and Counties to formalize notice and comment about transit and land-use decisions *(Planning/TOD)*

Connecting all points of the Triangle

MEMORANDUM

TO: GoTriangle Board of Trustees

FROM: EEO/DBE Office

DATE: June 13, 2018

SUBJECT: **Proposed FFY19-21 Disadvantaged Business Enterprise (DBE) Program Goal**

Action Requested

Staff requests that the Board approve the proposed DBE goal of 6.0% for Federal Fiscal Year (FFY) 2019-21 (Oct. 1, 2018 - Sept. 30, 2021).

Background and Purpose

In February 1999, the U.S. Department of Transportation (USDOT) issued a final rule for DBE Programs in 49 CFR Part 26. The TTA Board of Trustees adopted a revised Disadvantaged Business Enterprise (DBE) program in July 1999 to comply with the new rule.

The USDOT issued a new final rule affecting the implementation and management of the DBE program that was effective as of March 5, 2010. The new rule requires the submission of a three-year DBE goal and goal setting methodology rather than an annual submission.

The annual goal setting process (as prescribed in 49 CFR Part 26:45 and GoTriangle's approved DBE Program) requires the application of a statistical methodology to establish a proposed DBE goal. The proposed DBE goal is published and made available for public review and comment for a period of 45 days. During the public comment period, additional outreach efforts are made to obtain information relevant to the goal setting process from minority, women and general contractor groups, community organizations, DBEs, etc. GoTriangle's staff considers the comments and information received during the public comment period during the determination of the final DBE goal to be submitted to the Federal Transit Administration (FTA) for approval using the approved statistical methodology prescribed by FTA, GoTriangle staff has developed a proposed DBE Program goal for FFY 2019-21 of 6.0%. Achievement of the goal will be effected by the type of work involved; the location of the work and the availability of certified DBEs to perform the work to be subcontracted.

In accordance with public outreach requirements, a notice of the proposed DBE Program Goal for FFY 2019-21 was published in area newspapers: The Carolinian and The Carolina Times. GoTriangle posted the proposed goal on its website beginning on May 31, 2018. The notice called for a public comment period through July 14, 2018.

In the absence of any public comments, staff recommends that the Board adopt the attached resolution to approve the DBE goal of 6.0% for FFY 2019-21. Staff projects that the goal will be attained through race-neutral and race-conscious means. The overall goal will continue to be reviewed annually and amended as deemed necessary. Actual DBE utilization efforts shall be monitored and adjusted to ensure program implementation is consistent with the requirements of 49 CFR Part 26.

Attachment

- DBE Goal/Methodology 2019-2021
- Resolution 2018 0007

Staff Contact

- Sylvester Goodwin, (919) 485-7518, sgoodwin@gotriangle.org

GoTriangle DBE Goal Setting Methodology: Fiscal Years 2019 -2021

Step - 1A Determine the weight of each type of work by NAICS Code:

	NAICS Code	Project	Amount of DOT funds on project:	% of total DOT funds (weight)
1	23821	BOMF Renovations - HVAC/Elec	$44,000	5.73%
2	54133	C. Finley Improve - Engin/Survey	$40,000	5.21%
3	81131	Prev Maint-Bus Operations	$684,000	89.06%
4				
5				
		Total FTA-Assisted Contract Funds	$768,000	100.00%

Step - 1B Determine the relative availability of DBEs by NAICS Code:

	NAICS Code	Project	Number of DBEs available to perform this work*	Number of all firms available (including DBEs)*	Relative Availability
1	23821	BOMF Renovation - HVAC/Elec	26	761	3.42%
2	54133	C. Finley Improve - Engin/Survey	67	728	9.20%
3	81131	Prev Maint-Bus Operations	3	49	6.12%
4					
5					
		Combined Totals	**96**	**1538**	**6.24%**

Source: *NCDOT UCP/DBE Directory

Source: *US Census County Business Patterns 2015

***Local Market Area: Durham, Orange & Wake County - Majority Contractors/Subs and contracting dollars.**

Step 1 - C (Weight) x (Availability = Weighted Base Figure

	NAICS Code	Project	Weight	Times (x)	Availability	Weighted Base Figure
1	23821	**BOMF Renovation - HVAC/Elec**	5.73%	x	3.42%	0.20%
2	54133	**C. Finley Improve - Engineering**	5.21%	x	9.20%	0.48%
3	81131	**Prev Maint-Bus Operations**	89.06%	x	6.12%	5.45%
4						
5						
					Total	6.13%
					Expressed as a % (*100)	6.13%
					Rounded, Weighted Base Figure	**6.0%**

Step 2 Adjustment to Base Figure

No adjustment needed based on the availability of DBE firms in the specific work types, project location and ready, willing, and able DBEs.

2018 0007

RESOLUTION OF THE GO TRIANGLE BOARD OF TRUSTEES APPROVING DBE PROGRAM GOAL FOR FEDERAL FISCAL YEARS 2019-2021

WHEREAS, and in accordance with 49 CFR Part 26, GoTriangle has adopted a Disadvantaged Business Enterprise (DBE) Policy that states that it "shall not discriminate in any manner on the basis of race, color, sex or national origin, and shall take all reasonable steps to ensure that certified Disadvantaged Business Enterprises have the maximum opportunity to participate in the performance of contracts financed, in whole or in part, with financial assistance from the United States Department of Transportation (USDOT), acting through such agencies as the Federal Transit Administration (FTA) and the Federal Highway Administration (FHWA)"; and

WHEREAS, and to remain in compliance with 49 CFR Part 26, GoTriangle must develop a three-year goal for the participation of DBEs in federally funded contracting opportunities and must submit the goal to the FTA for approval; and

WHEREAS, using an FTA-approved statistical methodology, GoTriangle staff has developed a DBE Program Goal of 6.0% for the Federal FY 2019-2021 (October 1, 2018 - September 30, 2021); and

WHEREAS, opportunity for public review of and comment on the DBE Program Goal for Federal FY 2019-2021 has been adequately given.

NOW, THEREFORE, BE IT RESOLVED, by the GoTriangle Board of Trustees that:

1. The DBE program Goal for Federal FY 2019-2021 for GoTriangle shall be 6.0%.
2. The GoTriangle Board of Trustees shall consider all public comments on the DBE program goal that are received by July 14, 2018, and shall have the opportunity to adjust the goal based on public comments received.
3. In the event that no public comments on the DBE Program Goal are received by July 14, 2018, the DBE Program Goal shall become GoTriangle's DBE program goal for FFY 2019-2021 without further action by the GoTriangle Board of Trustees.
1. 4. Staff is directed to submit to the FTA all required documentation related to GoTriangle's DBE Program Goal for FFY 2019-2021.

ADOPTED THIS 27TH DAY OF JUNE 2018.

_____
Jennifer Robinson, Board of Trustees Chair

ATTEST:

_____
Michelle C. Dawson, Clerk to the Board

Connecting all points of the Triangle

MEMORANDUM

TO: GoTriangle Board of Trustees

FROM: Shelley Blake, General Counsel

DATE: June 15, 2018

SUBJECT: **Amendment to GoTransit Partners Bylaws**

Action Requested

Amend the Bylaws of GoTransit Partners to increase the number of members appointed to the Board of Directors to nineteen (19).

Background and Purpose

GoTriangle has established a nonprofit corporation, GoTransit Partners, in accordance with NCGS 159-42.1 which states that: A public authority may establish, control, and operate a nonprofit corporation that is created under Chapter 55A of the General Statutes and is a tax-exempt organization under the internal Revenue Code to further the authorized purposes of the public authority.

GoTriangle would like to increase the number of appointments to the Board of Directors for the nonprofit to nineteen (19). GoTriangle will present a recommendation to the GoTriangle Board of Trustees and request appointment of up to nineteen (19) members.

Financial Impact

None

Attachment

- Amended Bylaws of GoTransit Partners

Staff Contact

- Shelley Blake, 919.485.7561, sblake@gotriangle.org

BYLAWS OF GOTRANSIT PARTNERS

Incorporated under the laws of the State of North Carolina

ARTICLE ONE
Name, Location, and Offices

1.1 Name. The name of the Corporation shall be GoTransit Partners.

1.2 Registered Office and Agent. The Corporation shall maintain a registered office in the State of North Carolina, and shall have a registered agent whose address is identical with the address of such registered office.

1.3 Principal Office. The principal office of the Corporation is 4600 Emperor Boulevard, Durham, North Carolina 27703.

ARTICLE TWO
Purposes, Powers, and Governing Instruments

2.1 Nonprofit Corporation. The Corporation shall be organized and operated as a nonprofit corporation under the North Carolina Nonprofit Corporation Act, N.C. Gen. Stat. § 55A-1-01 et seq., and N.C. Gen. Stat. § 159-42.1 ("Establishment of nonprofit corporation by public authority").

2.2 Charitable Purposes. The Corporation is a "charitable or religious corporation" within the meaning of Section 55A-1-40(4) of the General Statutes of North Carolina. The purposes for which the Corporation is organized are exclusively charitable, scientific, and educational within the meaning of Section 501(c)(3) of the Internal Revenue Code, or corresponding section of any future federal tax code. More specifically, the purpose of the Corporation is to further the authorized purposes of the Research Triangle Regional Public Transportation Authority d/b/a GoTriangle (the "Authority"), including to finance, provide, operate, and maintain a safe, clean, reliable, adequate, convenient, energy efficient, economically and environmentally sound public transportation system for the service area of the Authority.

2.3 Powers. The Corporation shall serve only such purposes and functions and shall engage only in such activities as are consonant with the purposes set forth in this Article Two and as are exclusively charitable, scientific, or educational and are entitled to charitable, scientific, or educational status under Section 501(c)(3) of the Internal Revenue Code. In furtherance of such purposes, the Corporation shall have full power and authority:

(a) To perform any and all lawful acts which may be necessary or convenient to carry out the purposes of the Corporation;

(b) To collaborate with other organizations, entities, or persons whose activities further accomplish, foster, or attain such purposes;

(c) To make distributions of money to the Authority or to convey other personal or real property to the Authority;

(d) Subject to approval by the Authority, to make distributions to organizations that qualify as exempt organizations under Section 501(c)(3) of the Internal Revenue Code;

(e) To receive and accept property, whether real, personal, or mixed, by way of acquisition, gift, bequest, or devise, from any person or entity, whether public or private, to be held, administered, and disposed of in accordance with and pursuant to the governing instruments of the Corporation, as the same may be amended from time to time;

(f) To perform all other acts necessary or incidental to the above and to do whatever is deemed necessary, useful, advisable, or conducive, directly or indirectly, as determined by the Board of Directors in its discretion, to carry out any of the purposes of the Corporation, as set forth in the Articles of Incorporation and these Bylaws, including the exercise of all other power and authority enjoyed by corporations generally by virtue of the provisions of the North Carolina Nonprofit Corporation Act (within and subject to the limitations of section 501(c)(3) of the Internal Revenue Code).

2.4 Governing Instruments. The Corporation shall be governed by its Articles of Incorporation and these Bylaws.

ARTICLE THREE
Board of Directors

3.1 Authority and Responsibility of the Board of Directors.

(a) Except as otherwise provided by law, the Articles of Incorporation, or these Bylaws, all of the authority of the Corporation and the government and management of the affairs of the Corporation shall be vested in the Board of Directors; and all the powers, duties, and functions of the Corporation conferred by the Articles of Incorporation, these Bylaws, state statutes, common law, court decisions, or otherwise, shall be exercised, performed, or controlled by or under the authority of the Board of Directors.

(b) The governing body of the Corporation shall be the Board of Directors. The Board of Directors shall have supervision, control and direction of the management, affairs and property of the Corporation; shall determine its policies or changes thereto; and shall actively prosecute its purposes and objectives and supervise the disbursement of funds and other conveyances of property. The Board of Directors may, in the exercise of the powers granted, delegate certain of its authority and responsibility to an executive committee as well as other committees. Under no circumstances, however, shall any actions be taken which are inconsistent with the Articles of Incorporation and these Bylaws; and the fundamental and basic purposes of the Corporation, as expressed in the Articles of Incorporation and these Bylaws, shall not be amended or changed.

(c) The Board of Directors shall not permit any part of the net earnings or capital of the Corporation to inure to the benefit of any member, trustee, officer, director, or other private person or individual.

(d) The Board of Directors may, from time to time, appoint, as advisors, persons whose advice, assistance and support may be deemed helpful in determining policies and formulating programs for carrying out the purposes and functions of the Corporation.

(e) The Board of Directors may employ or retain such person or persons, including an executive director, officers, attorneys, trustees, agents, assistants, contractors and consultants, as in its judgment are necessary or desirable for the administration and management of the Corporation, and to pay reasonable compensation for the services performed and expenses incurred by any such person or persons.

(f) The Board of Directors may carry out any other function, consistent with law, the Articles of Incorporation, and these Bylaws, as may be prescribed by the Authority.

3.2 Number. Initially, the Board of Directors shall have five (5) members. The Authority may increase the number of members up to nineteen (19).

3.3 Manner of Appointment. Each director of the Corporation shall be appointed by the Authority.

3.4 Term of Office. Each director shall take office at the time specified in the notice of appointment and shall continue in office for a term of three (3) years, or until his or her successor has been appointed or until the director's death, resignation, retirement, or removal. A director may not serve more than two (2) successive terms of office.

3.5 Resignation and Removal. Any director, by notice in writing to the Board of Directors and to the Authority, may resign at any time. Any director may be removed, either for or without cause, by the Authority. If a director has more than one (1) unexcused absence in a calendar year, he or she shall be automatically removed from the Corporation's Board of Directors.

3.6 Vacancies. When a vacancy on the Board of Directors exists, arising at any time and from any cause, including the authorization of an increase in the number of directors, each remaining director may nominate a candidate for the Authority's consideration. The appointment of the new director shall be made according to Article 3.3. Each director so appointed shall hold office for the duration of the unexpired term that the director is filling or until his or her successor has been appointed, or until his or her earlier death, resignation, retirement, removal or disqualification.

3.7 Committees of the Board of Directors. By resolution adopted by a majority of the directors then in office, the Board of Directors may designate from among its members one or more committees, each consisting of no fewer than two (2) directors, as provided in Article 7. Except as prohibited by law, the Articles of Incorporation, or these Bylaws, each committee shall have the authority as set forth in the resolution establishing said committee. See also Article Eight generally ("Committees of Directors").

3.8 Compensation. Directors shall receive no compensation, but by duly-adopted resolution of the Authority, directors may be paid for expenses associated with their attendance at Board or committee meetings or may be paid a fixed sum for attendance at such meetings.

ARTICLE FOUR
Meetings of the Board of Directors

4.1 Place of Meetings. Meetings of the Board of Directors may be held at any place within the State of North Carolina as set forth in the notice thereof or in the event of a meeting held pursuant to waiver of notice, as may be set forth in the waiver, or if no place is so specified, at the principal office of the Corporation.

4.2 Regular Meetings; Notice. Regular meetings of the Board of Directors shall be held at least quarterly at such times, on such dates, and at such places as the Board of Directors may prescribe. Notice of the time, date, and place of each such regular meeting shall be given by the Secretary in accordance with the provisions of Article 5.1 no fewer than seven (7) days before such regular meeting.

4.3 Special Meetings; Notice. Special meetings of the Board of Directors may be called by or at the request of the Chairperson or by any two (2) of the directors in office at that time. Notice of the time, date, place, and purpose of any special meeting of the Board of Directors shall be given by the Secretary in accordance with the provisions of Article 5.1 no fewer than twenty-four (24) hours before such meeting; provided that notice shall be given at least seven (7) days prior to any special meeting the purpose of which is to consider any matter which would require the approval of a majority of the directors then in office.

4.4 Meeting Waiver. Attendance by a director at a meeting shall constitute waiver of notice of such meeting, except where a director attends a meeting for the express purpose of objecting to the transaction of business because the meeting is not lawfully called. See Article Five (“Notice and Waiver”).

4.5 Quorum. At meetings of the Board of Directors, a majority of the directors then in office shall be necessary to constitute a quorum for the transaction of business.

4.6 Vote Required for Action. Except as otherwise provided in the Articles of Incorporation or these Bylaws or by law, each director then in office shall have one (1) vote, and the vote of a majority of the directors present at a meeting at which a quorum is present shall constitute the action of the Board of Directors. In several places these Bylaws require the vote of a majority of the directors then in office and such specific provisions shall be followed rather than this general authority with respect to the matters covered in such Bylaws.

4.7 Telephone and Similar Meetings. Directors may participate in and hold a meeting by means of conference telephone or similar communications equipment by means of which all persons participating in the meeting can hear each other. Participation in a meeting by such means shall constitute presence in person at the meeting, except where a person participates in the meeting for the express purpose of

objecting to the transaction of any business on the grounds that the meeting is not lawfully called or convened. A telephonic meeting will require the same notice as a regular meeting.

4.8 Adjournments. A meeting of the Board of Directors, whether or not a quorum is present, may be adjourned by a majority of the directors present to reconvene at a specific time and place. It shall not be necessary to give notice of the reconvened meeting or of the business to be transacted, other than by announcement at the meeting which was adjourned. At any such reconvened meeting at which a quorum is present, any business may be transacted which could have been transacted at the meeting which was adjourned.

4.9 Ex Officio Participants. The Authority's General Manager, General Counsel, Chief Financial Officer, and Board of Trustees (or his or her respective designee) may attend, in a nonvoting capacity, any meeting of the Board of Directors. Notice of each meeting shall be provided to the foregoing ex officio participants in accordance with Article 5.1.

ARTICLE FIVE
Notice and Waiver

5.1 Procedure. Whenever these Bylaws require notice to be given, the notice shall be given in accordance with this Article. Notice under these Bylaws shall be in writing, unless oral notice is reasonable under the circumstances. Notice may be communicated in person, by telephone, teletype, e-mail, or other form of wire or wireless or electronic communication, or by mail or private carrier. Written notice, if in a comprehensible form, is effective at the earliest of the following:

(a) When received or when delivered, properly addressed, to the addressee's last known principal place of business or residence;

(b) Five (5) days after its deposit in the United States Mail, as evidenced by the postmark, if mailed with first-class postage prepaid and correctly addressed; or

(c) On the date shown on a written or electronic return receipt, if sent by a means generating a receipt, and the receipt is signed by or on behalf of the addressee or otherwise verified.

Oral notice is effective when actually communicated in a comprehensible manner to the person entitled to oral notice.

In calculating time periods for notice, when a period of time measured in days, weeks, months, years, or other measurement of time is prescribed for the exercise of any privilege or the discharge of any duty, the first day shall not be counted but the last day shall be counted.

5.2 Waiver. Any notice may be waived before or after the date and time stated in the notice. Except as provided herein, the waiver must be in writing or by electronic transmission, signed by the person entitled to the notice, and delivered to the Corporation for inclusion in the minutes or filing with the corporate records. See Article 4.4 ("Meeting Waiver").

ARTICLE SIX
Officers

6.1 Number and Qualifications. The executive officers of the Corporation shall consist of a Chairperson, a Secretary, and a Treasurer. The Board of Directors may from time to time create and establish the duties of such other officers or assistant officers as it deems necessary for the efficient management of the Corporation, including but not limited to a Vice Chairperson and/or an Executive Director, but the Corporation shall not be required at any time to have any officers other than a Chairperson, a Secretary, and a Treasurer. Any two (2) or more offices may be held by the same person.

6.2 Appointment and Term of Office. The executive officers of the Corporation shall be appointed annually by the Board of Directors by a majority vote of the directors then in office and shall serve until their successors have been appointed, or until their earlier death, resignation, removal, retirement, or disqualification. While holding such office, the Chairperson shall serve as a member of the Board of Directors of the Corporation.

6.3 Other Agents. The Board of Directors may appoint from time to time such agents as it may deem necessary or desirable, each of whom shall hold office during the pleasure of the Board of Directors, and shall have such authority and perform such duties and shall receive such reasonable compensation, if any, as the Board of Directors may from time to time determine.

6.4 Removal. Any officer or agent appointed by the Board of Directors may be removed by the Board of Directors by a majority vote of the directors then in office, whenever in its judgment the best interests of the Corporation will be served thereby. However, any such removal shall be without prejudice to the contract rights, if any, of the officer or agent so removed.

6.5 Vacancies. A vacancy in any office arising at any time and from any cause may be filled for the unexpired term at any meeting of the Board of Directors by a majority vote of the directors then in office.

6.6 Chairperson. The Chairperson shall exercise general supervision of the assets, business, operations, personnel, and affairs of the Corporation, subject to the control and approval of the Board of Directors. The Chairperson shall preside over all meetings of the Board of Directors. The Chairperson shall serve as a member, with the right to vote, of any executive committee of the Board of Directors. The Chairperson shall be authorized to sign checks, drafts, and other orders for the payment of money, notes or other evidences of indebtedness issued in the name of the Corporation, grant requests, and statements and reports required to be filed with state or federal officials or agencies; and the Chairperson shall be authorized to enter into any contract or agreement and to execute in the corporate name, along with the Treasurer or the Secretary, any instrument or other writing; and he or she shall see that all orders and resolutions of the Board of Directors are carried into effect. The Chairperson shall perform such other duties and have such other authority and powers as the Board of Directors may from time to time prescribe.

6.7 Secretary. The Secretary shall attend all meetings of the Board of Directors and record, or cause to be recorded, all votes, actions and the minutes of all proceedings in electronic format to be kept for that purpose and shall perform, or cause to be performed, like duties for the executive and other committees when required. The Secretary shall give, or cause to be given, notice of all meetings of the Board of Directors. The Secretary shall keep in safe custody the seal of the Corporation and, when authorized by the Board of Directors or the Chairperson, affix it to any instrument requiring it. When so affixed, it shall be attested by his or her signature or by the signature of the Treasurer or another director so designated by the Board of Directors. The Secretary shall perform such other duties and have such other authority and powers as the Board of Directors may from time to time prescribe or as the Chairperson may from time to time delegate.

6.8 Treasurer. The Treasurer shall have custody of the corporate funds and securities and shall keep full and accurate accounts of receipts and disbursements of the Corporation and shall deposit all monies and other valuables in the name and to the credit of the Corporation into depositories designated by the Board of Directors. The Treasurer shall disburse the funds of the Corporation as authorized by the Board of Directors or the Chairperson, and prepare financial statements each quarter or at such other intervals as the Board of Directors shall direct. The Treasurer shall perform such other duties and have such other authority and powers as the Board of Directors may from time to time prescribe or as the Chairperson may from time to time delegate.

ARTICLE SEVEN
Committees of Directors

7.1 Executive Committees. By resolution adopted by a majority of the directors in office, the Board of Directors may designate from among its members one or more executive committees, each of which shall consist of at least three (3) or more directors, including the Chairperson. Each such executive committee, to the extent provided in such resolution, shall have and exercise the authority of the Board of Directors in the management of the affairs of the Corporation. Any action by each such committee shall be reported to the Board of Directors at its meeting next succeeding such action.

7.2 Other Committees of Directors. Other committees for specific purposes, each consisting of two (2) or more directors, one of which shall be chair, and any designated persons, may be designated by a resolution adopted by a majority of directors then in office. Such resolution shall designate the members of the committee or the method by which the members will be selected; shall establish the power, duties and responsibility of the committee; and shall establish the procedures for the committee to follow. Any member of any committee may be removed by the person or persons authorized to appoint such member whenever in their judgment the best interests of the Corporation shall be served by such removal. Any action by each such committee shall be reported to the Board of Directors at its meeting next succeeding such action. Any such committee may be a standing committee or an ad hoc committee, as designated by the Board of Directors.

7.3 Term of Appointment. Each member of a committee shall continue as such until his or her successor is appointed, unless the committee shall be sooner terminated, unless such member shall be removed from such committee, or unless such member shall cease to qualify as a member thereof.

7.4 Chair. One (1) member of each committee shall be appointed chair thereof by the Board of Directors unless the Board of Directors delegates the appointment to a vote by the committee members.

7.5 Vacancies. Vacancies in the membership of any committee may be filled by appointments made in the same manner as provided in the case of the original appointments.

7.5 Quorum. Unless otherwise provided in the resolution of the Board of Directors designating a committee, a majority of the whole committee shall constitute a quorum; and the act of a majority of members present at a meeting at which a quorum is present shall be the act of the committee.

7.6 Rules. Each committee may adopt rules for its own government, so long as such rules are not inconsistent with the Articles of Incorporation, these Bylaws, or rules adopted by the Board of Directors.

ARTICLE EIGHT
Contracts, Checks, Deposits, Funds, Budget, Financial Reporting, and Audit

8.1 Contracts. The Board of Directors may authorize any officer(s) or agent(s) of the Corporation, in addition to the officers so authorized by these Bylaws, to enter into any contract or execute and deliver any instrument in the name and on behalf of the Corporation. Such authority must be in writing and may be general or confined to specific instances.

8.2 Checks, Drafts, Notes. All checks, drafts or other orders for the payment of money, notes or other evidences of indebtedness issued in the name of the Corporation shall be signed by such officer(s) or agent(s) of the Corporation so authorized by these Bylaws, or in such other manner as may from time to time be determined by resolution of the Board of Directors. In the absence of such determination by the Board of Directors, such instruments shall be signed by the officers directed by the Chairperson and in the absence of such direction by the Treasurer and countersigned by the Chairperson, Vice Chairperson, or Executive Director of the Corporation.

8.3 Deposits. All funds of the Corporation shall be deposited from time to time to the credit of the Corporation in such banks, trust companies or other depositories as the Board of Directors may select or approve.

8.4 Gifts. The Board of Directors may accept on behalf of the Corporation any contribution, donation, gift, bequest, or devise for the general purposes or for any special purpose of the Corporation.

8.5 Annual Budget and Work Plan. The Board of Directors shall develop and, following review and comment by the Authority, approve an annual budget and work plan for the Corporation. Changes that increase the budget during the fiscal year shall be approved by the Board of Directors.

8.6 Financial Reports and Records. The Corporation is required to file any and all reports to local, federal and state agencies requiring a report of the Corporation. This includes but is not limited to:

corporate tax returns, sales tax receipt reports; and employee required submittals, if applicable. Annual financial reports showing assets, liabilities and pending assets shall be submitted to the Board of Directors.

8.7 Audits. The Corporation shall undergo an independent audit at such time that the total receipts exceed $100,000 in a fiscal year. Upon request, the Authority shall have access to the financial records of the Corporation for audit or other purposes.

8.8 Fiscal Year. The fiscal year of the Corporation shall end on the last day of June or on such other date as may be fixed from time to time by the Board of Directors.

8.9 Annual Report. The Corporation shall submit to the Authority an annual report within sixty (60) days of the end of each fiscal year. The annual report will include a summary of donations, revenues, expenditures, and activities of the Corporation for the immediately preceding fiscal year.

8.10 Contributions. The Corporation shall remit proof of contribution to any individual or entity that makes a tax-deductible donation to the Corporation.

ARTICLE NINE
Indemnification and Insurance

9.1 Indemnification. In the event that any person who was or is a party to or is threatened to be made a party to any threatened, pending or completed action, suit or proceeding, whether civil, criminal, administrative or investigative, seeks indemnification from the Corporation against expenses, including attorney fees (and in the case of actions other than those by or in the right of the Corporation, judgments, fines and amounts paid in settlement), actually and reasonably incurred by him or her in connection with such action, suit, or proceeding by reason of the fact that such person is or was a director or officer, including an Executive Director of the Corporation, or an agent serving without compensation or is or was serving at the request of the Corporation as a director, officer, employee, trustee, or agent of another Corporation, domestic or foreign, nonprofit or for profit, partnership, joint venture, trust, or other enterprise, then, unless such indemnification is ordered by a court, the Corporation shall determine, or cause to be determined, in the manner provided under North Carolina law whether or not indemnification is proper under the circumstances because the person claiming such indemnification has met the applicable standards of conduct set forth in North Carolina law; and, to the extent it is so determined that such indemnification is proper, the person claiming such indemnification shall be indemnified to the fullest extent now or hereafter permitted by North Carolina law, including advances or reimbursements of litigation expenses to the extent permitted by North Carolina Law.

9.2 Indemnification Not Exclusive of Other Rights. The indemnification provided in Article 9.1 above shall not be deemed exclusive of any other rights to which those seeking indemnification may be entitled under the Articles of Incorporation or these Bylaws, or any agreement, vote of disinterested directors, or otherwise, both as to action in his or her official capacity and as to action in another capacity while holding such office, and shall continue as to a person who has ceased to be a director or officer, including any Executive Director, or to serve as an agent without compensation and shall inure to the benefit of the heirs, executors, and administrators of such a person.

9.3 Insurance. To the extent permitted by North Carolina law, the Corporation may purchase and maintain insurance on behalf of any person who is or was a director, officer, employee, trustee, or agent of the Corporation, or is or was serving at the request of the Corporation as a director, officer, employee, trustee or agent of another corporation, domestic or foreign, nonprofit or for profit, partnership, joint venture, trust or other enterprise.

ARTICLE TEN
Miscellaneous

10.1 Books and Records. The Corporation shall keep correct and complete books and records of account and shall also keep minutes of the proceedings of its Board of Directors and committees having any of the authority of the Board of Directors. The Corporation shall keep at its registered or principal office a record giving the names and addresses of the directors and any other information required under North Carolina law.

10.2 Corporate Seal. The corporate seal (of which there may be one or more exemplars) shall be in such form as the Board of Directors may from time to time determine.

10.3 Electronic Transactions. The Corporation may conduct electronic transactions in accordance with North Carolina law.

10.4 Internal Revenue Code. All references in these Bylaws to sections of the Internal Revenue Code shall be considered references to the Internal Revenue Code of 1986, as from time to time amended, to the corresponding provisions of any applicable future United States Internal Revenue Law, and to all regulations issued under such sections and provisions.

10.5 Construction. Whenever the context so requires, the masculine shall include the feminine and neuter, and the singular shall include the plural, and conversely. If any portion of these Bylaws shall be invalid or inoperative, then, so far as is reasonable and possible: The remainder of these bylaws shall be considered valid and operative; and effect shall be given to the intent manifested by the portion held invalid or inoperative.

10.6 Table of Contents; Headings. The table of contents and headings are for organization, convenience and clarity. In interpreting these Bylaws, they shall be subordinated in importance to the other written material.

10.7 Relation to Articles of Incorporation. These Bylaws are subject to, and governed by, the Articles of Incorporation.

10.8 Distribution Upon Dissolution. The Board of Directors of the Corporation, upon dissolution, shall dispose of all remaining assets to the Authority.

ARTICLE ELEVEN
Amendments

11.1 Power to Amend Bylaws. By a majority vote of the directors then in office, the Board of Directors may approve new or amended Bylaws; provided, however, that such new or amended Bylaws shall not become effective until further approved in writing by the Authority.

ARTICLE TWELVE
Tax-Exempt Status

12.1 Tax-Exempt Status. The affairs of the Corporation at all times shall be conducted in such a manner as to assure the Corporation's status as an organization qualifying for exemption from taxation pursuant to Section 501(c)(3) of the Internal Revenue Code.

ARTICLE THIRTEEN
Director or Officer Conflicts of Interest

13.1 Conflict of Interest Transaction. No director or officer of the Corporation, or any family member of such director or officer, or any corporation, partnership, association, trust or other entity in which such director or officer, or family member of such director or officer, serves as a director, officer, partner or trustee, or has a financial interest, shall be permitted to enter into any contract or transaction with the Corporation unless:

(a) Such director or officer discloses to the Board of Directors of the Corporation the material facts as to his or her or his or her family member's relationship with or interest in the entity proposing to enter into the contract or transaction with the Corporation, and the Board of Directors authorizes the contract or transaction by a majority vote of the disinterested directors (even though the disinterested directors may constitute less than a quorum); and

(b) The contract or transaction is fair to the Corporation.

13.2 Fairness to the Corporation. Factors to be considered in determining whether the contract or transaction is "fair" to the Corporation include an examination of the following:

(a) The price and terms of the contract or transaction (the price and terms of the contract or transaction may vary, but must be on a level which the Board of Directors would accept in an arm's-length negotiation, in light of the knowledge that the Board of Directors would reasonably have acquired in the course of such negotiation); and

(b) Whether the Board of Directors would reasonably determine that the contract or transaction was in the best interests of the Corporation.

13.3 Remedies for Violation of Conflict of Interest Requirements. If a director or officer of the Corporation, or any family member of such director or officer, or any corporation, partnership, association, trust or other entity in which such director, officer or family member of such director or officer serves as a director, officer, partner or trustee, or has a financial interest, enters into any contract or transaction with the Corporation without complying with the requirements described above, the Board of Directors may, at its sole discretion:

(a) Void the contract or transaction in its entirety and recover from such director or officer any damages and expenses suffered or incurred by the Corporation as a result of the contract or transaction; or

(b) Modify the price and terms of the contract or transaction so that the Corporation receives a price and terms comparable to what the Corporation would receive in an arm's-length negotiation.

ARTICLE FOURTEEN
Adoption of Bylaws

These Bylaws of GoTransit Partners were adopted by the Board of Trustees of the Research Triangle Regional Public Transportation Authority d/b/a GoTriangle and the Board of Directors of the Corporation, and became effective, as of August 23, 2017, and amended as of September 27, 2017, and further amended June 27, 2018.

APPROVED:

Research Triangle Regional Public Transportation Authority d/b/a GoTriangle

By: _____

Jennifer Robinson, Chair

GoTransit Partners

By: _____

_____, Chairperson

Connecting all points of the Triangle

MEMORANDUM

TO: GoTriangle Board of Trustees

FROM: Regional Services Development

DATE: June 27th, 2018

SUBJECT: **Renewal of Triangle Regional Model Service Bureau (TRMSB) Contract with Institute for Transportation Education and Research (ITRE)**

Strategic Objective or Initiative Supported
1.2 Pursue service improvements and expansion opportunities

Action Requested
Staff requests that the GoTriangle Board of Trustees authorize the General Manager to sign a contract with ITRE to provide continued model development services of the Triangle Regional Model (TRM) for Fiscal Year 2019 with a not-to-exceed (NTE) amount of $215,000.

Background and Purpose
The TRM Service Bureau maintains the Triangle region's travel demand forecasting model. Its work is funded through a four-way partnership involving Triangle Transit, NCDOT, DCHC-MPO, and CAMPO.

The model provides sophisticated data analysis of traffic patterns, volumes, and capacities on the Triangle road network as well as bus ridership and rail ridership forecasts for the future. The Federal New Starts process heavily utilizes regional travel demand models like the TRM to assess which rail projects to fund out of a limited pot of money at the federal level.

The model team is continually making improvements to the model to better estimate transit ridership now and in the future.

Financial Impact
The estimated amount for this contract is $208,939 for FY 2019 with a not-to-exceed dollar value for FY 2019 to $215,000.

Attachments
- FY19 Stakeholder Budget and Scope of Work

Staff Contact(s)
- Patrick McDonough, Manager of Planning & TOD, (919)485-7455

STAKEHOLDER BUDGETS ON ONE TABLE
TRIANGLE REGIONAL MODEL SERVICE BUREAU
BUDGET FOR FY 2019: JULY 1, 2018 TO JUNE 30, 2019

Budget Items	Description of Level of Effort	Proposed CAMPO	Proposed DCHC	Proposed NCDOT	Proposed GoTriangle	Proposed Total
Salaries and Wages (Personnel) *						
ITRE Associate Director	5 % effort for 12 mo	$ 1,538	$ 1,538	$ 1,538	$ 1,538	$ 6,154
Director	99.5 % effort for 12 mo ***	$ 25,278	$ 25,794	$ 25,794	$ 25,794	$ 102,661
Senior Research Associate	100 % effort for 12 mo	$ 22,632	$ 22,632	$ 22,632	$ 22,632	$ 90,529
Research Associate	80 % effort for 12 mo	$ 15,450	$ 15,450	$ 15,450	$ 15,450	$ 61,800
Research Associate	100 % effort for 12 mo	$ 7,119	$ 7,119	$ 7,119	$ 35,596	$ 56,954
Graduate Intern	50 % /sem; 100 % summer	$ 4,500	$ 4,500	$ 4,500	$ 4,500	$ 17,999
SUBTOTAL PERSONNEL		$ 76,518	$ 77,034	$ 77,034	$ 105,511	$ 336,096
Staff Benefits						
Staff (33%)		$ 23,766	$ 23,936	$ 23,936	$ 33,333	$ 104,971
Graduate Intern (21%+2 mos. ACA prem.)		$ 1,169	$ 1,169	$ 1,169	$ 1,169	$ 4,676
SUBTOTAL STAFF BENEFITS		$ 24,935	$ 25,105	$ 25,105	$ 34,502	$ 109,647
TOTAL PERSONNEL & BENEFITS		**$ 101,453**	**$ 102,139**	**$ 102,138**	**$ 140,013**	**$ 445,742**
Supplies and Materials						
(Photocopying, plotter paper, plotter ink)		$ 100	$ 100	$ 100	$ 100	$ 400
Computer replacements (2)		$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 6,000
Travel						
In State		$ 88	$ 88	$ 88	$ 88	$ 352
Out of State		$ -	$ -	$ -	$ -	$ -
Training		$ 750	$ 750	$ 750	$ 750	$ 3,000
Current Services						
Communications (long distance)		$ 37	$ 37	$ 37	$ 37	$ 148
Printing and Binding		$ -	$ -	$ -	$ -	$ -
Contracted Services						
On-call technical assistance		$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 20,000
		$ -	$ -	$ -	$ -	$ -
		$ -	$ -	$ -	$ -	$ -
Fixed Charges						
Rental of Equipment/State Vehicles		$ 75	$ 75	$ 75	$ 75	$ 300
Other Fixed Charges TransCAD $1,800/ea, FORTRAN $800, 5pm $305 Slack $228		$ 2,583	$ 2,583	$ 2,583	$ 2,583	$ 10,333
Student Aid / Tuition Remission						
In State		$ -	$ -	$ -	$ -	$ -
Subcontract						
Household travel survey update - Resource Systems Group, Inc.		$ -	$ 25,510	$ 70,500	$ 23,970	$ 119,980
		$ -	$ -	$ -	$ -	$ -
TOTAL OTHER DIRECT COSTS		**$ 10,133**	**$ 35,643**	**$ 80,633**	**$ 34,103**	**$ 160,513**
Facilities & Administrative Costs						
20% of MTDC **		**$ 22,317**	**$ 27,454**	**$ 27,454**	**$ 34,823**	**$ 112,048**
TOTAL ESTIMATED BUDGET		**$ 133,903**	**$ 165,236**	**$ 210,226**	**$ 208,939**	**$ 718,303**

Note: CAMPO portion of household survey (22% or $31,020 out of $141,000 total survey cost) is a separate project (DCHC is contributing additional $10,000)
* Uses a 3% growth factor/yr
** 20% based on one contract through the Master Agreement between NCSU-ITRE and NCDOT.
*** 0.5% of Director effort is committed to separate CAMPO household survey contract

Exhibit A

Project Scope of Work and Budget

Introduction

The following scope of work is presented as the proposed work plan for the TRM Model Team including the TRM Service Bureau for the budget year July 1, 2018 – June 30, 2019. The primary efforts outlined in this scope are intended to focus the efforts of the Model Team and Service Bureau on maintaining the TRMv6 model for the Triangle region, and developing a 2016 model using household survey data collected during 2016, transit on- board survey data collected during 2014 and 2015, and parking behavior data collected in 2016 and to be called version 6.1. Work will also continue to collect household survey data as a part of a recurring update program. Refer to Appendix A for an overall vision for v6 and v7 models.

Several assumptions are made within the context of this scope.

1. Each signatory agency's one half FTE contribution may include staff time from people other than their TRM Team member, but the TRM Team member will play a key role and other staff must be adequately trained to meet the needs of the TRM Team.
2. All TRM staff representing the signatory agencies will, as needed, work on site at ITRE, including any third person who is providing services in the name of a signatory agency. This enables the Team to work together on issues that require the input of multiple team members and reduces the tendency for team members to be reassigned to other tasks in their home offices.
3. The TRM Program Manager will assign tasks with associated deliverables and target dates. TRM Team members will agree to take responsibility for specific tasks and will be held accountable for completion of those tasks. The responsible team member (stakeholder and TRM Service Bureau) will be responsible for **monthly** reporting on progress in 5pm including 1) status, 2) changes in anticipated completion dates, 3) reasons for change, and 4) hours spent on model development work and percent of task complete for the month reported. Stakeholder team members are requested to report in a timely manner if any external resources or assistance is needed to complete tasks.
4. Signatory agencies will commit one half FTE per agency to the completion of the list of tasks outlined in this work plan. The TRM Program Manager will assume responsibility for providing adequate work to meet this obligation by specifying the task description, deliverables, and person hours required. This information will be provided at least quarterly and will be sufficient to fully incorporate the one half FTE required of each agency.
5. All intermediate and final products of this work program belong to the four stakeholders (NCDOT, CAMPO, DCHC, and GoTriangle) and these will be delivered to the stakeholders in a form and via media acceptable to each stakeholder at the end of the contract year or before. The products include: model files including input files; scripts and program source code; all technical memoranda; estimation data file inputs and outputs; technical reports and user guides; and tools prepared including macro script files and user guides for their use.

Note on model version names: the following version names will be used in this scope of work consistent with model team recommendations (for detailed TRM name history, please refer to Appendix B "TRM History" section).

- **TRM v6:** Updated and enhanced trip based model based on the v5 model. TRM v6 (with a 2010 estimation year, and 2013 base year) was delivered in May, 2016 and was used for developing the 2045 Metropolitan Transportation Plan and Air Quality Conformity Analysis, transit analysis, and Comprehensive Transportation Plan analysis.

- **TRM v6.1:** Enhanced trip based model developed with updated travel survey data, on-board transit survey data, and parking behavior survey data. TRM v6.1 will be delivered in December, 2020 and will be used for the 2050 Metropolitan Transportation Plan development and Air Quality analysis.

Overall Work Program Summary Task Table (including stakeholder work hours)

Task Number	Task Title	FY 17 Task Hours	FY 18 Task Hours	FY 19 Task Hours	% of Total FY 19
1.2	Household survey data collection, processing & analysis	880	448	560	5.8%
1.4	Process locally collected data	400	189	240	2.5%
1.5	External travel data collection	0	128	80	0.8%
1.6	Survey plan	0	0	120	1.2%
2.1	Maintain and update hwy. & transit networks, SE data	2,052	1,500	458	4.8%
2.3	Zone geography	0	0	80	0.8%
2.5	Transit networks	184	335	320	3.3%
2.6	Zonal data & models	0	136	176	1.8%
2.7	Develop an improved parking constraint model	1,380	1,072	692	7.2%
2.8	Data systems	240	0	120	1.2%
3.1	Estimation and re-calibration of trip production models	0	380	300	3.1%
3.2	Investigate improving non-home based trips	0	120	120	1.2%
4.2	Prepare time of day factors	0	144	144	1.5%
5.1	Estimation and calibration of destination choice model	0	1,076	980	10.2%
6.1	Estimation and calibration of non-motorized models	0	288	288	3%
7.1	Calibration of mode choice models	0	280	280	2.9%
8.4	External travel models	240	251	300	3.1%
8.8	FTA STOPS model	0	0	200	2.1%
9.1	Investigate improving hwy. assignment	128	56	460	4.8%
9.2	TRM v6 model assignment & overall model	0	0	631	6.6%

Task Number	Task Title	FY 17 Task Hours	FY 18 Task Hours	FY 19 Task Hours	% of Total FY 19
	calibration				
9.3	Develop revised calibration standards	0	0	112	1.2%
19.1	Develop overall model design	0	0	160	1.7%
19.2	Implement elements of overall model design	0	0	136	1.4%
19.3	Emerging issues to address in TRM	0	0	40	0.4%
20.1	TRM technical documentation	0	200	80	0.8%
20.2	TRM User’s Guide	0	40	80	0.8%
21.2	Assistance with TRM model application	120	138	160	1.7%
21.3	Action items	560	528	560	5.8%
22.1	Oversight and reporting	1,592	1,448	1,536	16.0%
22.2	Training	412	320	320	3.3%

1 Data collection

1.2 *Household survey data collection, processing & analysis*

1.2.2 Recurrent household survey data collection

Work will continue on a program of recurrent household survey data collection (similar to the American Community Survey or ACS). Benefits from a recurrent program of household survey data collection include: up-to-date data for developing models, ability to track change over time, and predictable and lower annual funding requirements as compared to surveys conducted every ten years. The cost efficiencies can be realized by executing the survey over time, by not repeatedly incurring startup costs. The data collection program was designed during FY 2017 based on stakeholder feedback. The survey instruments and survey materials were updated during FY18 and the detailed sampling plan was developed. During FY19 the survey will be performed and survey data products will be delivered. Expected products from the shorter cycle household survey data collection program are expected to include more frequent data updates, and every four or five years (depending on sample size and design of the data collection program) an aggregated set of data and survey documentation suitable for updating the model depending on how frequently the stakeholders want to update the model. Specific tasks will include purchasing sample, conducting the survey, coding, correcting and validating the survey data and weighting and expanding the data and documenting all survey activities and data. The data will also be checked for quality before and after it is delivered.

Deliverables:

a) Final delivery of data, working files, and all documentation

Est. start date: 8/2/2018

Est. end date: 6/30/2019

ID	Task Description	Task Hours
1.2.2	**Recurrent household survey data collection**	**560**
a)	Implement selected approach through contractor including administration of sub-contract	40
b)	Review and update list of transit routes, transit fares/passes, and park and ride lots and noting any added, removed or changed	80
c)	Monitor work of contractor during data collection including reviewing all draft deliverables and participating in progress teleconference calls	440

1.4 *Process locally collected data*

Stakeholders and local governments routinely collect many types of data that could be used for developing the TRM, such as traffic counts, turning movement counts, and transit passenger counts. In order to use the locally collected data for developing the TRM, it needs to be gathered from the agencies that collect it, to organize it for use, and to document it. This task will contact local agencies and compile a catalog of locally collected data including contact information and information about when and how often data is collected. A set of file folders will be created to organize the data, and to make it easy for team members to find it. Finally documentation will be prepared for the data gathered.

Special traffic counts were collected by NCDOT Traffic Survey during fall 2017. Special traffic counts collected by NCDOT will be obtained (expected delivery July, 2018) and they will be processed for use with model calibration and validation. Traffic counts collected by DCHC (daily and hourly) will be obtained, and be processed with NCDOT factors for use with model calibration and validation.

Deliverable:

Locally collected data gathered, organized, stored, and documented

Est. start date: 7/5/2018

Est. end date: 6/30/2019

The following table shows data needed from partners for this task:

Data item(s) needed from partners	**Date needed**
Traffic counts conducted during 2017/18 including hourly and classification counts	8/1/2018
Travel time data that may have been collected during 2017/18	8/1/2018

ID	**Task Description**	**Task Hours**
1.4	**Gather and process locally collected data**	**240**
a)	Identify data collected by stakeholders and local governments	8
b)	Contact agencies that collect data and arrange for transfer	40
c)	Organize storage for data	16
d)	Load data collected into storage	24
e)	Prepare/update documentation	16
f)	Process special traffic counts collected by NCDOT Traffic Survey	136

1.5 *External travel data collection*

This task will acquire external travel data collected by others, and process the data for TRM model use. An external cordon station survey was conducted in the TRM region in 2006 at thirteen external stations. This was an intercept survey that stopped vehicles inbound to the region during the AM period. This provides useful information for non-freeway facilities (though is a little out of date). This data needs to be updated and be supplemented for the major flows that take place on freeways and in the area added to the model study area (I-95). It is expected that the data will be acquired in time to be processed for TRM model use.

Deliverable:

Technical memorandum documenting the processing of the external data for TRM model use

Est. start date: 1/7/2019

Est. end date: 2/4/2019

ID	Task Description	Task Hours
1.5	**External travel data collection**	**80**
a)	Acquire and process external data for use in TRM	64
b)	Prepare tech memo documenting processing of external data	16

1.6 *Survey data collection plan*

This task will update the survey data collection plan to enhance it in several ways. It will list all previous surveys and surveys currently underway. It will describe need for and timing for future surveys and show when they will be used in model updates. It will distinguish between routine or ongoing data gathering, and periodic survey data collection.

Deliverable:

Survey data collection plan document to be kept current

Est. start date: 1/7/2019

Est. end date: 1/28/2019

ID	Task Description	Task Hours
1.6	**Survey data collection plan**	**120**
a)	Revise data collection plan to be current & to add sections as needed	80
b)	Send out draft revised data collection plan and gather comments	16
c)	Revise draft plan and create final version for distribution	24

2 Model inputs

2.1 *Maintain and update networks, and zonal data*

Maintain and update highway and transit networks, and zonal data whenever new data (such as school enrollment or zonal path density and average block size) are available, new attributes (such as on-street parking, truck prohibited links and lanes indicator) are needed in the model, new projects are completed, or errors are discovered.

2.1.1 Develop a tool to facilitate external review of highway and transit networks

Highway and transit networks ideally should be reviewed by local planning staff and be updated at least annually. During FY19 this task will implement the recommended approach developed during FY18. This task will include setting up the appropriate network for review, developing a list of local government reviewers and technical contacts, and sending out requests for review. After reviewers begin submitting edits using the tool, the results will be downloaded and edits will be made to the TRM highway network as needed. All edits made will be entered in the network editing log.

Deliverable:

Brief report describing the process carried out, a summary of the resulting review, and information about the edits undertaken in the TRM networks

Est. start date: 7/10/2018

Est. end date: 9/1/2018

ID	Task Description	Task Hours
2.1.1	**Develop a tool to facilitate external review of highway and transit networks**	**160**
a)	Set up tool for use and network for review	40
b)	Develop list of reviewers at local governments and technical contacts	20
c)	Send out request for review & follow up requests	20
d)	Download edits made by local reviewers and as appropriate make edits to TRM networks	64
e)	Prepare brief report documenting the review	16

2.1.3 Conduct review of highway and transit networks

A review of the highway and transit networks (2016 and TrueU) will be continued to locate any opportunities that may exist to improve network coding. This review will include comparing available speed data to network speeds, attribute coding, and need for adjusting or for additional centroid connectors. Available data will be obtained and will be processed for making comparisons to TRM network files. All findings will be reported and network modifications will be logged.

An initial brief task will develop a detailed plan for the review listing; the approach to be used, the way the attributes are to be reviewed, data sources to be consulted, and the way the review is to broken up into pieces by functional class and/or geography. Finally, a reporting and logging framework will be set up for use while conducting the review to properly document the work.

The next sub task will be to begin conducting the review based on the detailed plan developed above. All review will be documented in the logging and reporting format.

The highway network link functional classifications (NEWFCLASS) will be reviewed and updated to compare them with NCDOT 2015 updated functional class mapping resources so that model performance by functional class will be reported consistently with highway performance monitoring data. The review and updating will include how to integrate the smoothed urbanized area boundaries so that functional class can be reported by urban/small urban/rural classifications. In conjunction with this review and update of procedures, instructions for coding functional classification for existing facilities and future projects will be added to the network coding manual. As appropriate, procedures for checking networks for functional classification will be added to the user's guide for Task 2.1.1 above covering how often to conduct the review, and how to go about conducting the review. In addition this task will develop procedures and network coding rules for applying turn penalties and prohibitions. Once the procedures are prepared, the network will be reviewed to determine where turn penalties need to be added or changed. Use of HERE mapping data will be explored to determine how it might be used to identify locations in the model network that should have turn penalties. An approach will be developed to utilize the HERE mapping data in a form to relate it to the TRM network to be able to identify prohibited turn locations.

Deliverable:

Technical memorandum describing network coding rules for turn penalties and prohibitions suitable for inclusion in the coding manual.

Technical memorandum describing the data sources used and procedures followed for reviewing TRM networks.

Est. start date: 7/5/2018

Est. end date: 4/5/2019

ID	Task Description	Task Hours
2.1.3	**Conduct review of highway and transit networks**	**298**
a)	Develop detailed plan for conducting review of highway & transit networks	16
b)	Conduct review according to the detailed plan developed in sub task a) above and recorded in the reporting framework	58
c)	Prepare technical memorandum documenting the review conducted	24
d)	Prepare procedures for reviewing highway network link functional classification, conduct the review using NCDOT mapping resources, and prepare user's guide instructions for carrying out the review in future	80
f)	Develop procedures for coding turn penalties/prohibitions including use of vehicle probe data and other third party data resources such as HERE to identify locations for needed penalties/prohibitions, and coding penalties in future projects	80
g)	Update TRM network turn penalty table based on available data	24
h)	Draft tech memo with procedures for turn penalties suitable for use in coding manual	16

2.3 *Zone geography*

Objectives:

To review and if needed, to update TAZ geography to reflect development changes, and existing or future highway projects.

2.3.1 TAZ geography review

This task will develop a recommendation for timing and approach to review TAZ geography for TRMv6 and will address pros and cons of conducting the review before or in conjunction with the 2020 census.

Deliverable:

Technical memorandum reporting findings and recommendation

Est. start date: 7/30/2018

Est. end date: 8/10/2018

ID	Task Description	Task Hours
2.3.1	**TAZ geography review - recommendation**	**80**
a)	Review TAZs to determine an estimate of the amount of effort needed, and pros & cons of conducting review soon or in conjunction with 2020 census. If TAZs are identified as needing to be split for 2016, that can be done during the review.	40
b)	Prepare draft findings and send to team for review	16
c)	Revise draft findings and create final version for distribution	24

2.5 *Transit networks*

This task will work on several aspects of representing transit services in the TRM.

2.5.1 Develop improved transit model procedures

This task will determine an appropriate setting for the Pathfinder combination setting in transit path building.

Deliverable:

Technical memorandum reporting the methods used for testing and the results of the tests for different values for the Pathfinder combination setting. Also a recommendation will be made for this parameter in the TRM.

Est. start date: 7/9/2018

Est. end date: 7/20/2018

ID	Task Description	Task Hours
2.5.1	**Develop improved transit model procedures**	**80**
a)	Set up and test values between 0 and 1 for the Pathfinder combination parameter	40
b)	Prepare draft technical memorandum and send to team for review	16
c)	Revise draft technical memorandum and create final version for distribution	24

2.5.3 Develop approach to represent more than one premium transit mode (LRT, BRT, Commuter Rail)

When analyzing transit alternatives for the MTP, it may be desirable to distinguish between premium transit modes to account for differences in service characteristics beyond service frequency, speed, and fare. These service characteristics may include station amenities, reliability, and span of service provided. In TRMv6, only one set of alternative specific constants may be applied to the premium transit services, making it difficult to distinguish between Light Rail Transit, Bus Rapid Transit, and Commuter Rail. During FY17, this task began investigating approaches to represent these services to distinguish between them. A recommendation for an approach to apply in TRMv6 will be developed for review and possible implementation. If the team approves the recommended approach, then it will be designed and implemented. This is likely to require TRM script and FORTRAN program modification, testing and review.

Deliverable:

Technical memorandum: Investigation into approaches to represent service characteristics for more than one premium transit mode in the same alternative and approach recommended by the team. Description of the design for implementing the recommended approach, all TRM script and FORTRAN program modifications, and results of testing the implementation.

It is expected this approach will be incorporated in TRMv6.1.

Est. start date: 7/23/2018

Est. end date: 8/31/2017

ID	Task Description	Task Hours
2.5.3	**Develop approach to represent more than one premium transit mode**	**240**
a)	Design implementation approach to represent LRT, BRT, and Commuter Rail in a single scenario	40
b)	Modify scripting to implement the approach designed above including debugging and testing	160
c)	Prepare tech memo documenting design and implementation of approach	40

2.6 *Zonal data & models*

2.6.1 Population synthesizer

Objectives:

To improve population synthesis procedures to support further disaggregation of the TRM

Previous work:

Work took place to develop a population synthesizer element for the TRM starting in FY 2013 and was completed during FY 2014

2.6.1.1 Improve population synthesis

This task will review the PopGen procedure. It will be determined if the current PopGen tool should be retained, or if the PopGen standalone executable should be called in GISDK to simplify model set up and application.

Deliverable:

Technical memorandum on findings from review of the PopGen procedure, recommended changes and documentation for all changes made including updating the User's Guide.

Est. start date: 10/1/2018

Est. end date: 10/30/2018

ID	Task Description	Task Hours
2.6.1.1	**Improve population synthesis**	**176**
a)	Determine if PopGen should be replaced by other procedures including if the standalone version of PopGen could be used	16
b)	Prepare scripts to replace existing PopGen procedure	80
c)	Compare performance of improved approach to county and regional control totals	40
d)	Prepare documentation for all revised procedures including updating TRM User's Guide	40

2.7 ***Develop an improved parking constraint model***

Purpose: Improve parking constraint model to better address regional policy issues with sub-area analysis within a PASA.

Objective: Finalize improved parking cost and capacity constraint model calibration, validation, documentation, and sensitivity tests.*

Effort to date by fiscal year:

Fiscal Years	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018
Effort to date	342	262	359	168	747	(5/1)1,085

* In FY 2012 TRM SB staff reviewed and evaluated other region's parking constraint model practice and associated parking data collection approach. In FY 2013 the Model Team approved the initial design of new parking constraint models for TRM v6. During FY 2014 the parking analysis sub areas were reviewed and revised. During FY 2015 parking related model data for 2013 was collected including a parking inventory (facility location, rate and usage) for model estimation. Parking space inventory information was updated to 2015 for use during the parking behavior survey. During FY 2016 work was performed up through task 2.7.3. During 2015 and 2016 parking behavior data was collected at universities and CBDs for use in model development. The 2006 household survey was processed for use during parking model estimation. Also the modeled trips attracted to each PASA were mocked up using TRMv6 2015 for use in expanding the parking behavior survey data. Note that the parking survey data was delivered the first week of May, 2016 which delayed the start of the FY 2016 task 2.7.4 to analyze and prepare the data for model estimation. During FY 2018 work focused on estimating models and implementing the models in the TRM.

FY 2019 main tasks:

1) Review existing parking studies and prepare model validation data
2) Validate parking models compared to the parking studies
3) Calibration and validation
4) Document the TRM v6 improved parking model development

Effort estimated for the sub-tasks is based on the assumption that all three of the proposed parking choice models will be developed, while time needed for each model is given separately.

2.7.7 Calibrate TRM v6 parking constraint models

Deliverables:

1) Technical memorandum documents v6 parking model estimation and calibration process, with statistical test results; and model performance
2) Calibrated model (parameters, any input files)

Est. start date: 7/2/2018

Est. end date: 8/28/2018

ID	Task Description	Task Hours
2.7.7	**Calibrate model**	**120**
a)	Parking Location Choice Model	40
b)	Parking Reserved Space Choice Model	40
c)	Parking Monetary Subsidy Choice Model	40

2.7.8 Validate TRM v6 parking constraint models and final adjustment

This task will validate the TRMv6 parking constraint models and make final adjustments to the models. It incorporates the work for parking model comparisons to parking studies that seems appropriate to include here in model validation. This work is described next.

Parking studies are conducted to understand parking demand levels and to set parking policies related to short-term and long-term parking. They are used to determine if parking spaces are under or over supplied for different uses such as monthly space rental or on street parking among others. It is desired to compare the results of these studies with the parking model results. Work to be conducted will include collecting and reviewing parking studies conducted recently, selecting geography for comparing parking studies to the models (Parking Analysis Sub Areas may not have the same boundaries as parking study areas), and preparing a tech memo documenting the results of the comparison. The results of the comparison and recommendations for updating the model will be presented to the team for approval.

The products of this task will include final parameters and input files and a technical memorandum documenting the validation process including a comparison to parking studies.

Deliverables:

1) Technical memorandum document on TRM v6 parking model validation process including comparisons to parking studies
2) Finalized model specification and parameters (and input files)

Est. start date: 8/29/2018

Est. end date: 10/26/2018

ID	Task Description	Task Hours
2.7.8	**Validate model and final adjustment**	**332**
a)	Parking Location Choice Model	110
b)	Parking Reserved Space Choice Model	46
c)	Parking Monetary Subsidy Choice Model	46
d)	Collect and review parking studies conducted recently in the Triangle region	40
e)	Prepare summaries of parking study results for geography corresponding to PASAs by space/payment type	40
f)	Prepare technical memorandum documenting validation process and comparison of model results to parking studies	50

2.7.9 Final documentation

Deliverables:

1) Technical memorandum on entire Task 2.7 TRM v6 Parking cost/capacity constraint model development
2) Ready to use model components (GISdk script, FORTRAN program, parameters, model structure, input files)

Est. start date: 10/26/2018

Est. end date: 11/27/2018

ID	Task Description	Task Hours
2.7.9	**Final documentation**	**80**

2.7.10 Parking model sensitivity testing

The TRMv6 parking model will be tested for sensitivity to the following:

Changes in % mode share, transit ridership, auto vehicle trips (demand for parking spaces), with respect to parking spaces and parking cost changes.

Deliverables:

Technical memorandum documenting results of all sensitivity testing

Est. start date: 11/27/2018

Est. end date: 1/31/2018

ID	Task Description	Task Hours
2.7.10	**Parking model sensitivity testing**	**160**
a)	Design sensitivity tests and prepare model data for tests	40
b)	Conduct sensitivity tests using forecast scenario inputs	80
c)	Prepare technical memorandum documenting results of all tests	24
d)	Send out tech memo for comments and revise in response to comments, prepare final tech memo	16

2.8 *Data management program*

The TRM depends on many data inputs for model development and for model application. It depends on the quality of the data in order to produce quality results. The data is collected at different times depending on the purpose for the data. A data management program is needed so all partners can understand what input data has been collected or when it will be collected in the future, how and when it was or will be processed, and the quality checks that have or will be applied to it. Note that this incorporates and augments the survey plan to be developed in task 1.6.

2.8.1 Develop and maintain a list of model inputs

This task will develop a list that can be shared among the TRM partners to track updating and checking of all model inputs. This will collect information about input data already collected and the survey plan, model development schedules, and Metropolitan Transportation Plan update schedules. The objective is to allow the stakeholders to see both the full list for any year, and to be able to see more detailed information about any element in the list. It should also identify the purpose for gathering the data. This task will draw upon the Task 1.6 data collection plan products.

Deliverable:

Sharable program of model input updates including a schedule and uses intended for inputs

Est. start date: 1/28/2018

Est. end data: 2/15/2018

ID	Task Description	Task Hours
2.8.1	**Develop and maintain a list of model inputs**	**120**
a)	Develop in consultation with stakeholders an approach or tool to list all input data	24
b)	Gather available information about input data collection and put in the list	40
c)	Collect feedback from stakeholders and make adjustments to list as needed	40
d)	Provide presentation of tool to Model Team and Executive Committee	16

3 Trip generation

3.1 *Re-estimation and calibration of trip production and attraction models*

The TRMv6 trip production and attraction models will be updated using the 2016 household travel survey. This includes the following steps:

Deliverables:

1. New parameters for trip production models and trip attraction models
2. Technical memorandum on re-estimation and calibration of trip production and attraction models

Est. start date: 7/10/2018

Est. end date: 9/14/2018

ID	Task Description	Task Hours
3.1	**Re-estimation and calibration of trip production models**	**380**
a)	- Process the household survey data to create explanatory variables and observed trip production and attraction numbers and create estimation files - Prepare observed 2016 person trip production targets for calibration using 2016 HTS	80
b)	Update general population trip production and attraction models (for 6 purposes and 3 person types)	200
c)	Make any needed adjustments to model parameters and scripts to match calibration targets	40
d)	Prepare technical memorandum on updating and calibration of trip production and attraction models	60

3.2 *Investigate improving non-home based trips in the TRM*

One of the findings from investigating advanced trip based models is that non-home based trips are a weakness of trip based models. Approximately 19% of total trips in the TRM are non-home based trips (not including work based non-home trips). Techniques have been developed to improve the representation of non-home based trips. These techniques will be investigated more thoroughly including assessing level of effort and likely improvement to be gained by incorporating them in the TRM. This will form the basis for further work starting in Task 3 Trip Generation.

Deliverables:

Technical memorandum describing how techniques for improving non-home based trip making in the TRM could be implemented, level of effort needed to do so, and likely improvement to be expected. A recommendation will be provided regarding techniques to be included in TRMv6.1.

Est. start date: 11/27/2018

Est. end date: 1/28/2019

ID	Task Description	Task Hours
3.2	**Investigate improving non-home based trips in the TRM**	**120**
a)	Summarize techniques used to improve non-home based trips in trip based models	40
b)	Determine and summarize work to add these techniques to the TRM	40
c)	Prepare technical memorandum with results of investigation and recommendation for TRMv6.1	40

4 Time of day model

The current TRM v6 model uses fixed time-of-day factors to slice a daily trip matrix into multiple time periods of a day and estimates traffic conditions for each time period by assigning the sliced trip matrices onto the highway network. This is a typical time-of-day modeling approach widely used in the US.

4.2 *Prepare time of day factors*

This task will prepare time of day factors for trips in motion for the eight TRM time periods for use in subsequent steps including trip assignment.

Est. start date: 9/18/2018

Est. end date: 10/12/2018

ID	Task Description	Task Hours
4.2	**Prepare time of day factors**	**144**
a)	Prepare time of day factors from re-expanded/weighted 2016 household survey for 8 total time periods: 2 peaks (each with pre-peak shoulder, peak hour, and post-peak shoulder) and mid-day and night periods	128
b)	Prepare technical memorandum for the preparation of time of day factors	16

5 Trip distribution

5.1 *Update destination choice model*

This task will update parameters for the improved TRM v6 destination choice model. The objective is for v6 to better model trip distribution for each trip purpose by household strata, by employee type (including establishment type and employee earning levels for HBW, and establishment type for other trip purposes); focusing more on individual person types; to improve the accuracy of trip attraction allocation by purpose to appropriate destinations for each of the five household strata and/or employee types used in TRM v6.[†]

[†] In FY 2013: Stakeholders reviewed and approved the TRM SB initial design specification for the improved destination choice models.

In FY 2014: Script modified in TransCAD GISDK to include destination choice model in TRM v6 model stream, including creating Excel input/control file for model parameters (replacing the existing hard-coded coefficients in the FORTRAN program) replacing the standalone FORTRAN program

Prepared model estimation file from re-expanded/weighted 2006 Household Travel Survey and other data sources (e.g., traffic skims)

5.1.4 Prepare v6 destination choice model estimation files

This set of tasks will prepare new estimation files using the 2016 household survey data including updating the sampling procedure to sample up to 20 TAZs for each survey record, and calculating all explanatory variables for each possible destination TAZ.

Est. start date: 10/16/2018

Est. end date: 11/8/2018

ID	Task Description	Task Hours
5.1.4	**Prepare TRM v6 destination choice model estimation data files**	**140**
a)	Prepare explanatory variables (such as logsum, and congested travel times) in TRMv6	40
b)	Prepare the model estimation files, which includes sampling 20 possible destination TAZs for each trip record in the 2016 Household Survey, and calculating all explanatory variables for each possible destination TAZ	80
c)	Prepare technical memorandum	20

5.1.5 Update destination choice models

This task will update destination choice model parameters using 2016 household survey data.

Est. start date: 11/9/2018

Est. end date: 12/20/2018

1) Developed improved destination choice model (estimation, calibration and validation)
2) Documented most of the model development process

ID	Task Description	Task Hours
5.1.5	**Estimate TRM v6 destination choice models with 2016 HH survey data**	**336**
a)	Estimate model (HBW by 2 employee earning levels by 5 strata, and 5 trip purposes by 5 strata for other general population trip purposes)	288
b)	Documentation	48

5.1.6 Calibrate model

This task will compare model performance to observed trip tables from the 2016 household survey.

Deliverables:

1) Technical memorandum documents estimation and calibration process, with statistical test results; and distribution results performance
2) Calibrated model (parameters, any input files)

Est. start date:12/20/2018

Est. end date: 1/30/2019

ID	Task Description	Task Hours
5.1.6	**Calibrate TRM v6 destination choice model**	**264**
a)	Identify and prepare calibration target data [mostly likely 2016HTS], including observed target trip tables, county level and district level flow	40
b)	Review model performance result vs. survey based target [trip length/distance, county-to-county flow and district-to-district flow]	80
c)	Calibrate model specification (adjust parameters)	120
d)	Document calibration process	24

5.1.7 Validate model

This task will compare model results to data not used to update parameters and calibrate the models.

Deliverables:

1) Technical memorandum summarizes validation process and results.

Est. start date: 1/30/2019

Est. end date: 2/12/2019

ID	Task Description	Task Hours
5.1.7	**Validate TRM v6 destination choice model**	**152**
a)	Identify validation data source not used for estimation [e.g., CTPP and other data sources]	8
b)	Prepare validation data [depends upon availability]	16
c)	Develop validation approach	8
d)	Validate model including: Duke University, Durham & Raleigh downtowns, RTP, NCSU, and UNC	80
e)	Document validation result	40

5.1.8 Final adjustment

This task will make any needed adjustments for model application after completing calibration and validation.

Est. start date: 2/13/2019

Est. end date: 2/19/2019

ID	Task Description	Task Hours
5.1.8	**Final adjustment**	**40**

5.1.9 Documentation

Deliverables:

1) Technical memorandum on entire Task 5.1 TRM v6 2016 destination choice model
2) Ready to use model components (TransCAD script, parameters, input files)

Est. start date: 2/20/2019

Est. end date: 2/27/2019

ID	Task Description	Task Hours
5.1.9	**Final documentation for the TRM v6 destination choice model**	**48**

6 Non-motorized

1.1 *Updating and calibration of non-motorized models*

This task will update parameters for the non-motorized models with 2016 survey data and re-calibrate with 2016 re-expanded/weighted household survey data.

Deliverable:

New parameters for Non-motorized Models, and technical memorandum on the re-estimation and re-calibration of Non-motorized Models, and model parameter files and updated model script

Est. start date: 3/4/2019

Est. end date: 4/4/2019

ID	Task Description	Task Hours
6.1	**Estimation and calibration of non-motorized models**	**288**
a1)	Prepare non-motorized model specific zonal input data	24
a2)	Prepare observed non-motorized target data from re-expanded/weighted 2016 survey data	24
b)	Prepare model estimation files including calculating household characteristics, TAZ attributes, and inter-TAZ travel impedance for each survey record	80
c)	Re-estimate and calibrate non-motorized models (6) by time period for 5 strata	40
d)	Implement re-estimated/calibrated non-motorized model in model stream	40
e)	Documentation for work to update parameters and re-calibrate non-motorized models including calibration results	80

7 Mode choice

7.1 *Re-calibration of mode choice models*

This task will re-calibrate Mode Choice Model alternative specific constants for the existing TRMv6 approach to parking constraint

Deliverable:

New parameters for Mode Choice Models and input files, and technical memorandum on the calibration of Mode Choice Models

Est. start date: 4/9/2019

Est. end date: 5/28/2019

ID	Task Description	Task Hours
7.1	**Re-calibration of mode choice models**	**280**
a)	Prepare mode choice calibration targets from re-expanded/weighted 2016 household survey data and 2014 and 2015 transit on-board survey data, and 2016 parking behavior survey data	40
b)	Re-calibrate mode choice models for 6 general population trip purposes by 2 time periods	160
c)	Implement re-calibrated mode choice models into model stream	40
d)	Documentation	40

8 Special models

8.4 *Update external travel models (I-E, E-I, and EE)*

8.4.1 Update external travel models

Task will update external trip inputs for the TRMv6.1(2016) model. Based on the EE/EI update done for 2045, the following work listed in the table needs to be done for the 2016 model.

Deliverable:

Updated external inputs for external models & documentation of their preparation

Est. start date: 4/12/2019

Est. end date: 6/5/2017

ID	Task Description	Task Hours
8.4.1	**Update external travel models**	**300**
a)	Develop links to latest available version of the NC Statewide Model	160
b)	Prepare any variables not prepared in task 1.5 above. For TRMv6.1(2016) work remains to update the external stations including the EE/EI and %Auto/%CV splits based on the updated traffic counts.	80
c)	Documentation for all updates	40

8.8 *Interface to STOPS model*

The Federal Transit Administration has created the Simplified Trips-on-Project Software (STOPS) to aid project sponsors in quantifying the measures used by FTA to evaluate and rate projects.

8.8.1 Develop interface to STOPS model

This task will briefly review the documentation and software for STOPS to assess what information is needed from the TRM and how a tool could be developed to automate the process to prepare TRM data for use in STOPS. A tool will be developed similar to the Summit or Mobile6 tools for preparing the needed data and will be tested. It appears from the FTA STOPS overview, that year 2000 population and employment are needed. While current year (either 2013 or 2016) population and employment will be available for TRM geography, it may necessary to prepare this 2000 tabulation to support the tool. This will be determined during the review sub task.

Deliverable:

Technical memorandum describing the review conducted, all scripts prepared, and a User's Guide. Also working scripts for preparing STOPS inputs from the TRM.

Est. start date: 5/24/2018

Est. end date: 6/28/2018

ID	Task Description	Task Hours
8.8.1	**Develop interface to STOPS model**	**200**
a)	Review STOPS documentation & design interface	20
b)	Prepare script for interface designed above in sub task a)	140
c)	Prepare technical memorandum documenting work and User's Guide	40

9 Trip assignment, calibration & validation

This task will apply the model with 2016 model inputs and the resulting highway and transit assignments will be compared to calibration targets. Data for observed speeds will be compared

to model speeds. Comparisons will be made for peak periods as well as for the whole day.

9.1 *Investigate improving highway assignment*

9.1.1 Dynamic traffic assignment

Dynamic traffic assignment is being considered for both pricing and safety planning applications, and tools are being developed that may be appropriate for application in the Triangle region. These include DTALite being developed under an FHWA research project, and the SHRP 2 C10 project combining an activity based model with Dynus T.

An investigation of dynamic traffic assignment was conducted during FY 2013. This task continues work to incorporate dynamic traffic assignment in the TRM.

Timetable:

FY 2017: Select a DTA platform and prepare network and other inputs for a proof of concept

FY 2019: Begin creating a DTA application for TRMv6 using TRM inputs including post processors for new data formats as well as any new input data needed for DTA. See task 9.1.1.3 below.

9.1.1.3 Prepare inputs for microscopic traffic simulations from regional models

Regional travel demand models such as the Triangle Regional Model (TRM) contain detailed information about the network and travel demand. Traffic engineers often rely on this detailed information to build their traffic simulation models. There is already established practice in North Carolina to prepare inputs for TransModeler microsimulation software. Since TransModeler and TransCAD are both Caliper Inc. products, there is a substantial opportunity to streamline the protocol for transferring critical inputs from the TRM to TransModeler.

This task is intended to identify the best practices in North Carolina to prepare inputs for application of TransModeler using TRMv6. An example will be set up and applied. The work can be extended to identify discrepancies between modeled and simulated network performance measures, and the consequent bias from choosing one tool over another for the purpose.

Deliverable(s):

(1) Technical memorandum with results of investigation conducted.
(2) Work plan for preparing inputs for TransModeler application.

Est. start date: 4/23/2019

Est. end date: 5/24/2019

ID	Task Description	Task Hours
9.1.1.3	**Prepare inputs for microscopic traffic simulations from regional models**	**180**
a)	Conduct investigation of practices in NC to develop TransModeler simulation inputs, including setup and testing; prepare technical memorandum	100
b)	Using TRMv6 prepare inputs for application of TranModeler approach used in NC	80

9.1.2 Alternative traffic assignment methods

The traffic assignment method used in TRMv6 is called User Equilibrium bi-conjugate Frank-Wolfe (BFW) Multi-modal, Multi-class Assignment (MMA). There are other traffic assignment methods available that may provide advantages over the one currently used. Some of these include n-conjugate Frank-Wolfe User Equilibrium, and Origin based User Equilibrium assignment. Alternative methods for performing traffic assignment may converge to tighter convergence criteria more quickly than the one currently used. This task will set up and test several methods for performing traffic assignment and will provide a report on performance and specifics of how the choice of method may affect assignment results for comparing alternative project scenarios.

Deliverable:

Technical memorandum describing the alternative methods of traffic assignment selected for testing, setting up the tests (scenario inputs), testing results, and recommended approach for adoption in the TRM.

Est. start date: 5/3/2019

Est. end date: 5/28/2019

ID	Task Description	Task Hours
9.1.2	**Alternative traffic assignment methods**	**136**
a)	Review traffic assignment methods available for application in TransCAD and how to apply them	16
b)	Using TRMv6 prepare inputs for application of one or more alternate methods of performing static traffic assignment, setup and perform tests for the alternate methods and record the results	80
c)	Prepare technical memorandum documenting traffic assignment methods selected for testing, inputs used for testing, results, and recommendations	40

9.1.4 Toll model refinement/recalibration

This task will refine the toll model component of the TRM for use in task 9.2 below. Studies that have been conducted for toll facilities (including managed lanes) in the Triangle region will be gathered, and data or tools that could be incorporated in the TRM will be identified. Inputs or scripts developed by consultants conducting the studies will also be gathered.

a) Gather reports, data, model inputs and scripts prepared by contractors for toll studies in the TRM region
b) Determine any elements from sub task a) that can be incorporated in the TRM, and prepare a technical memorandum describing findings and providing recommendations for modifications to the TRM procedures
c) Based on sub task c) above, incorporate recommended data and procedures to improve the toll component of the TRM
d) Prepare a technical memorandum documenting all modifications made, sources for data, and information for model users that can be added to the User's Guide for the TRM

Deliverable(s):

Two technical memoranda: 1) Review findings and recommendations, and 2) Documentation of all modifications

Est. start date: 3/14/2019

Est. end date: 4/9/2019

ID	Task Description	Task Hours
9.1.4	**Toll model refinement/recalibration**	**144**
a)	Gather reports, data, model inputs & scripts prepared by contractors to toll studies	24
b)	Prepare tech memo describing findings & recommending modifications	16
c)	Make recommended modifications to improve toll component of TRM	64
d)	Prepare technical memorandum documenting all modifications & User's Guide	40

9.2 *V6 model assignment and overall model calibration*

9.2.1 Highway assignment

a) Review screen line and cut line definitions for TRM v6 and make any needed corrections
b) Perform assignment and perform reasonableness checks including: centroid connectors with zero volumes, highway links with zero volumes, highway links with speed less than five and ten miles per hour
c) Identify and make any needed model improvements in order to improve assignment such

as connecting unconnected links, adding links if missing, and correcting any errors in attribute coding.

Est. start date: 5/31/2019

Est. end date: 6/18/2019

ID	Task Description	Task Hours
9.2.1	**Highway assignment**	**104**
a)	Review screen line and cut line definitions in TRM v6	24
b)	Perform assignment and apply reasonableness checks	40
c)	Identify and make any needed model improvements	40

9.2.2 Transit assignment

a) Apply model script for transit assignment and confirm that script works correctly, and if not make corrections
b) Perform assignment and perform reasonableness checks including: transit lines with zero volumes, low transfer rates at downtown transfer stations
c) Identify and make any needed model improvements in order to improve assignment

Est. start date: 5/31/2019

Est. end date: 6/20/2019

ID	Task Description	Task Hours
9.2.2	**Transit assignment**	**120**
a)	Apply model script for transit assignment	16
b)	Perform assignment and apply reasonableness checks	40
c)	Identify and make any needed model improvements	64

9.2.3 Model chain calibration/validation

a) Traffic counts (including hourly and classification counts) from 2016 will be adapted for use with v6 networks during model calibration/validation associating them with network links and screen lines/cut lines. Peak period and peak hour counts will be prepared and

these will be associated with network links and screen lines/cut lines. Transit passenger counts by route will be adapted if necessary.

b) Initial calibration – evaluation measures script will be run and model performance will be compared to targets for measures listed in Exhibit A-2. Further checks will be made using hourly traffic counts and classification counts. VMT by county will be compared to NCDOT estimates or other sources. Summaries will be generated by region, county and district as appropriate. Additional checks will be made against district to district transit flows in the on-board survey, and extreme high and low highway link assignment differences will be compared to traffic counts. Hourly traffic counts will be compared to AM and PM peak period assignments. Validation checks will be made for a level of facility that will support sub-area and corridor studies.
c) If problems are discovered, model output and procedures will be studied to determine the cause(s) of the problem.
d) A set of adjustments will be designed to address the cause(s) of any problems that are discovered.
e) After adjustments have been made, the model will be run again, and model components (trip generation, trip distribution, mode choice, trip assignment) will be checked against calibration targets by trip purpose.
f) As necessary, model components will be re-calibrated, and the model will be run through again to determine if model performance matches performance targets. This process will be iterated until all problems identified have been addressed and the model meets performance targets.
g) This process of model testing and adjustment will be iterated until the overall model meets calibration and validation targets.
h) Sensitivity tests will be performed with inputs developed for the recently adopted 2045 Metropolitan Transportation Plan. Model results will be checked for reasonableness and any problems discovered will be documented and addressed.
i) A technical memorandum will be written to document model performance testing and all adjustments made to the model during the process of calibration and validation, including adjustments that are made to components already calibrated during model estimation steps (trip generation, trip distribution, non-motorized, and mode choice) completed earlier.

Deliverables:

Technical Memorandum on Highway and Transit assignments and model calibration/validation

Est. start date: 5/21/2019

Est. end date: 6/30/2019, remaining work complete by 10/11/2019

ID	Task Description	Task Hours
9.2.3	**Model chain calibration/validation**	**280**
a)	Traffic counts adapted to work with v6 screen lines and cut lines including by time of day/direction and by vehicle class as available	40
b)	Initial calibration summaries prepared and detailed review of results performed including thematic plots and review of outliers and network speeds	80
c)	If problems are found, diagnose cause of problems	80
d)	Design adjustments to address problems	80

Highway calibration might include, but not be limited to, the following work:

a) Focus on the screen lines and cut lines that miss the calibration targets, diagnose and address the issues. The possible approaches are: relocate the centroid connectors, check if the facility type designation is reasonable.

b) Re-estimate and/or re-calibrate the destination choice models, non-motorized models, and mode choice models with the updated network skim.

c) Check the modeled speed and observed speed.

Transit calibration might include, but not be limited to, the following work:

a) Check the transit coding to make sure no coding errors are involved.

b) Check the posted speed on the transit only links.

c) Compare the modeled ridership to the observed ridership by corridor, and identify the corridors that have big discrepancies. Study these corridors to diagnose the cause of problems.

d) Compare the modeled ridership to the observed ridership by route. Any low volume transit routes that do not assign within fifty percent of observed riders and any high volume transit routes that do not assign within thirty percent will be corrected or explained.

e) Check the bus speed, and adjust the bus speed equations when necessary.

f) Check the number of riders at major park and ride lots, and address the issues when found.

g) Re-calibrate the mode choice models when needed.

9.3 *Develop calibration standards*

A set of updated calibration standards will be developed in consultation with interested stakeholder staff and Executive Committee members.

Deliverable:

A technical memorandum documenting the development of an updated set of calibration

standards

Est. start date:

Est. end date:

ID	Task Description	Task Hours
9.3	**Develop calibration standards**	**112**
a)	Investigate current sources of calibration standards for example FL, MI, others	40
b)	Document current calibration standards for TRM and others and share with stakeholders	16
c)	Conduct meeting or work session with interested Executive Committee members and others to agree on new/revised calibration standards for the TRM	16
d)	Prepare draft technical memorandum, distribute for comments, and revise	40

19 Overall Model Design

The current version of the Triangle Regional Model (TRM) was developed in 2006 on the TransCAD version 4 platform based on earlier work in 2003 to convert the TRM from TranPlan to TransCAD version 3. The current version of the TRM (v6) was developed on the TransCAD version 6 platform. The current TRM also includes standalone programs for trip generation and mode choice written in FORTRAN, and a set of programs for performing population synthesis (PopGen) written mostly in Python code. The latest version of TransCAD is version 8, and it provides a number of enhancements and improvements over version 6. The stand-alone FORTRAN programs do not use any of the current advanced capabilities of the FORTRAN language, such as the Math Kernel Library, parallel processing, or multi-processor capabilities of the Intel FORTRAN compiler being used, which it has in common with other language compilers such as C, C++, Python or R. There could be advantages to updating the platform on which the TRM runs to TransCAD version 8 in terms of time needed to maintain the model scripts.

It is suggested to first convert the existing structure of the TRMv6 model to TransCAD version 8. Once the model is working on the new platform, a program of improvements can be undertaken such as, updating GISDK to object oriented programming (which is not included here).

19.1 *Develop overall model design*

It is suggested to develop a list of model elements to convert TRMv6 to TransCAD version 8 with a full description of the work needed to perform the conversion (scripting may be converted, and features of TransCAD version 8 may replace existing modules). A revised user interface may be designed and created. It is expected that Caliper Corp. staff will be consulted about the approach for making the conversion, and be asked to provide advice.

Deliverable:

Draft overall model design for review with tasks listed

Est. start date: 1/29/2019

Est. end date: 2/25/2019

ID	Task Description	Task Hours
19.1	**Develop overall model design**	**160**
a)	Obtain TransCAD version 8 and review new features to determine how they might be applied in TRM	40
b)	Compile list of TRM elements to convert and identify elements to replace and describe work required	80
c)	Prepare draft overall model design report for review, obtain comments and revise in response to comments	40

19.2 *Implement elements of overall model design*

It is expected that some of the steps included in the overall model design can be implemented during FY19, and others can be implemented during FY20.

Deliverable:

Conversion in progress starting with user interface redesign and adding elements from task 19.1 overall model design.

Est. start date: 2/26/2019

Est. end date: 3/20/2019

ID	Task Description	Task Hours
19.2	**Implement elements of overall model design**	**136**
a)	Based on model modernization program in task 20.1, begin conversion with user interface design	80
b)	Begin converting TRM elements and adding them to the new user interface	40
c)	Document all conversion work performed	16

19.3 *Emerging issues to address in TRM*

This task will perform a scan for emerging issues that might affect future forecasts that need to be accounted for in the TRM or in post processing of results. An example would be autonomous and connected vehicles.

Deliverable:

Brief technical memorandum outlining issue for TRM Executive Committee with options for

addressing it.

Est. start date: 3/21/2019

Est. end date: 3/27/2019

ID	Task Description	Task Hours
19.3	**Emerging issues to address in TRM**	**40**
a)	Perform scan for emerging issues and prepare a brief technical memorandum	40

20 TRM Documentation

As a large, complex model system, the TRM needs to be well documented so it can be understood and be used effectively by stakeholders and others.

20.1 *TRMv6 Technical Documentation*

Technical documentation will be prepared for the model estimation work undertaken for the 2016 model. Note there will be more work in FY20 to document tasks yet to be completed.

Deliverables:

1. Technical report compilation of technical memoranda
2. TRMv6 model report for a more general audience
3. Online documentation tools to use during TRMv6.1 development

Est. start date: 3/1/2019

Est. end date: 6/30/2019

ID	Task Description	Task Hours
20.1	**TRMv6 Technical Documentation**	**80**
a)	Draft TRMv6 2016 documentation and review by Model Team and EC	80

20.2 *TRMv6 User's Guide*

The User's Guide will be revised to include new information for the 2016 version of TRMv6.

Deliverables:

1. Updated User's Guide for TRMv6 2016

Est. start date: 3/1/2019

Est. end date: 6/30/2019

ID	Task Description	Task Hours
20.2	**TRMv6 User's Guide**	**80**
a)	Update draft User's Guide and review by Model Team and EC	80

21 Technical Assistance

21.1 *Assistance with model application for developing the Metropolitan Transportation Plan*

Objective:

To enable stakeholders to prepare alternatives using TRMv6 for MTP analysis

Work on the 2045 MTP was completed during 2018 and no additional work is expected during FY19.

21.2 *Technical assistance with TRM model application on as needed basis*

Objective:

To enable stakeholders (including stakeholder contractors) to apply the model as needed

TRM Service Bureau staff will provide technical assistance for stakeholder partners on an as needed basis when they are applying the TRM including GoTriangle or Wake Transit Investment Strategy activities. This will include providing model files and documentation to contractors working on the behalf of stakeholder partners. It will also include answering questions and providing assistance when problems arise.

It is expected that some of the hours for this task will be devoted to improving and simplifying the file structure for the set of files distributed as the official model set to make easier to set up and use.

21.3 *Action items*

Objective:

To address issues identified by stakeholders as Action Items.

From time to time the stakeholders may determine that there are work tasks not covered elsewhere in the work program that nonetheless must be done. During FY2018 such action items were requested by stakeholders. The action item work program element sets aside time for conducting work on tasks as determined by the stakeholders. These tasks will result in a work product, such as a technical memorandum that will document the work done and the completion

of the task. Unused time can be allocated to other work tasks after the end of the second quarter.

21.3.1 Stakeholder requested tasks

As stakeholders request tasks not listed elsewhere in the scope of work, a task description will be developed for the task, the task will be completed, and a technical memorandum will be prepared.

22 Oversight, reporting, and training

Objective:

To enable efficient and effective team communication and project management.

This task includes necessary administrative tasks and meetings needed for project oversight and communication with stakeholders such as Executive Committee, Model Team, and internal TRM Service Bureau meetings. Periodically team members meet both internally and with stakeholders to review task progress and approaches, solve problems, and keep stakeholders informed of work taking place on the project. The project also requires developing an annual work program, task assignments, and monthly team reporting.

22.1 *Oversight & reporting*

22.1.1 Oversight

TRM Team Meetings will be held monthly on the 2nd Thursday of each month unless there are no items to discuss. Model Team members may convene a technical team meeting to review task approaches in detail and develop recommendations for tasks on an as needed basis. Task includes preparation of all presentation materials for meetings.

Executive Committee meetings will be held every quarterly as designated by executive committee members.

Quarterly progress reports will be prepared in October, January, April, and July. Monthly status reports will be prepared.

A web site for team collaboration will be maintained to allow the team to share data, analysis, calendar, and documentation to improve collaboration and efficiency.

TRM Service Bureau team members will attend up to a total of four stakeholder project team meetings or one meeting per team member in the course of the project year.

22.1.2 Project management tool

During FY18 the team used 5pm for use during the year for tracking and reporting progress on work tasks. This task will continue use of this tool for tracking and reporting on progress.

Deliverables:

1. FY19 work program set up in 5pm for team use

2. Training for team members

Est. start date: 7/5/2018

Est. end date: 7/13/2018

ID	Task Description	Task Hours
22.1.2	**Project management tool**	**40**
a)	Setup 5pm project management tool for team use during FY19	40

22.1.3 Issue tracking tool

Both internal (stakeholder) and external users (contractors or others) of the TRM may discover issues or errors while using the model. These can be issues with inputs (geographic files or attributes) or with scripts and procedures. This task will develop or customize an issue tracker to allow users to record any issues found and to track their disposition/resolution. An ideal tool will be online to be available to outside users for entering issues and will report resolution status similar to issue ticket systems. This system will work in concert with quality checking by the model team in task 2.1.3 and any other similar tasks.

Deliverable:

Working tool set up and tested for collecting issues with the TRM

Est. start date:

Est. end date:

ID	Task Description	Task Hours
22.1.3	**Issue tracking tool**	**88**
a)	Brief investigation of issue ticket systems (updates earlier work)	16
b)	Recommend approach and set up a demo for team to review	16
c)	Set up and test team recommended tool	40
d)	Deploy and publicize availability of tool for team, stakeholders, & contractors	16

22.2 *Training*

22.2.1 TRM training

Training modules will be developed for stakeholder staff, and model users/consultants. These two groups will be briefly surveyed regarding their needs for training in the use of the TRM. Based on the survey results it is anticipated that two training modules will be developed with each tailored to the needs of each group. Each of the two modules will be given once during the year, and evaluation forms will be distributed to participants. The evaluations will be used to make

adjustments to the training modules for future sessions. The training sessions will be conducted in such a way as to obtain feedback from model users regarding their experience with the model or alternatively as a forum for TRM users.

ID	Task Description	Task Hours
22.2.1	**TRM training**	**120**
a)	Draft survey for stakeholder staff, and model users/consultants, review of survey by Model Team, and revisions to survey	30
b)	Conduct survey of stakeholders, and model users/consultants to determine needed training modules including developing a list of those that have requested the TRM files	10
c)	Develop stakeholder training module	20
d)	Develop model users/ consultant training module	20
e)	Set up and provide ½ day training for two groups or conduct annual forum for model users	40

22.2.2 Staff training

The highly technical nature of the work on the Triangle Regional Model requires that team members update their skills by attending training sessions, using on-line training opportunities, watching Travel Model Improvement Program webinars, and attending model user group meetings. This task will help ensure that up to date skills are applied when performing TRM work.

Appendix A

Vision for Developing the v6 and v7 Models

Policy Testing Needs Identified by Stakeholder Partners

Policy Testing Needs Identified by EC 10/20/2009	**Part of Model?**
1. Dynamic Tolls	Part of model
2. Greenhouse gas – land use change (Urban Sim)	Part of model
3. Peak spreading (a result)	Part of model
4. Parking constraint in CBD and elsewhere	Part of model
5. Environmental Justice (EJ) impacts (a result)	Analysis done outside model
6. Change mix of land uses within TAZs & consider design of land uses	Part of model
7. TDM policies	Analysis done outside model
8. ITS	Analysis done outside model
9. Making decisions on modal investments	Analysis done outside model

Suggested Elements of New Models or Work Programs

Suggested Elements (FY 2012 list)	**In v6**	**In v7**	**Invest.**	**Notes**
1. Improved Commercial Vehicle Model	X			DCHC #1
2. Improved Transit Assignment		X		DCHC #2
3a. Static Traffic Assignment Improvements	X		X	DCHC #3
3b. Dynamic Traffic Assignment		X		DCHC #3
4. Area Type Sub-model		X		DCHC #4
5. Population Synthesizer		X		DCHC #5

Suggested Elements (FY 2012 list)	In v6	In v7	Invest.	Notes
6. Trip Attraction and Destination Choice Sub-model	X			DCHC #6
7. University Student Trip Model		X		DCHC #7
8. Walk Access - Transit Link		X		DCHC #8
9. Employment Category and Special Trip Generators		X		DCHC #9
10. System Optimization	X			DCHC #10
11. Time of Day Model		X		DCHC #11
12. Parking Survey and/or Behavior Study		X	X	DCHC #12 Tri. Tran. req.
13a. Link Capacity Calculation			X	DCHC #13 CAMPO req.
13b. Intersection Delay			X	DCHC #13
14. HBW Journey or Tour Based Model		X		
15. Strategic data collection plan			X	MPO req.
16. TAZ review			X	

Suggested Elements (FY 2013 list)	In v6	In v7	Invest.	Notes
1. University student trip model	X			DCHC #1
2. Validation on person and CV trip rate	X			DCHC #2
3. Attraction share and destination choice improvement	X			DCHC #3
4. Mode choice estimation/calibration	X		X	DCHC #4
5. Transit model [updates]	X			DCHC #5
6. Time of day	X			DCHC #6
7. Disaggregated population synthesizer	X			DCHC #7
8. Auto ownership model	X			DCHC #8

Suggested Elements (FY 2013 list)	In v6	In v7	Invest.	Notes
9. Meso-scopic dynamic traffic assignment			X	DCHC #9
10. Action items				CAMPO
12. Parking Survey and/or Behavior Study	X			Tri. Tran.

Suggested Elements (FY 2014 list)	In v6	In v7	Invest.	Notes
1. Transit select link analysis tool	X			CAMPO
2. TRM training for stakeholders, model users, & consultants				CAMPO
3. Attend stakeholder project meetings				CAMPO

Suggested Elements (FY 2015 list)	In v6	In v7	Invest.	Notes
1. Procedure for including tools developed by stakeholders and others in TRM				CAMPO
2. Develop a tool to facilitate review of networks	X			CAMPO

Suggested Elements (FY 2016 list)	In v6	In v7	Invest.	Notes
1. Address model fundamentals and performance measures	X			CAMPO
2. Symposium or training to obtain feedback from stakeholders, model users, & consultants	X			CAMPO
3. Test parking policies & constraints in geographic areas where they are not observed today	X			GO Triangle

V6 Model

The v6 model will continue to be an aggregate trip based model based on the v5 model. The v6 model was used for the 2045 Metropolitan Transportation Plan (MTP) development completed in 2017. The focus for this model will be on further enhancement of the aggregate trip based model.

Fiscal Year	TRM v6 Development	Notes
Year 1 July 1, 2011 - June 30, 2012	Design new commercial vehicle model Optimize model run time performance TAZ modifications Modifications of SE data and SE models Develop improved transit network procedures Investigate and specify enhancements below: 1) definition of facility types 2) link capacity calculation 3) update link free flow speeds 4) intersection delay 5) develop GIS approach to changing future road characteristics 6) improve highway traffic assignment 7) employment categories and special generator definitions 8) investigate and implement improvements to area type calculations	
Year 2 July 1, 2012 - June 30, 2013	Design improved destination choice – attraction share model Develop and implement enhancements below: 1) reviewed & revised employment types for v6, developed and implemented SESyn to estimate population types, HH types, and employee by type at both residence and establishment locations 2) recommended changes to the trip attraction/destination choice sub model using new employment types 3) intersection delay & link capacity calculation implementation including data collection and input 4) designed improved parking constraint models specification and data collection. 5) develop peak spreading model 6) develop university student model Trip generation will be re-estimated using existing survey data.	
Year 3 July 1, 2013 - June 30, 2014	Complete the following enhancements: 1) commercial vehicle model, 2) develop new parking constraint models, 3) develop new university student travel models All remaining model components will be re-estimated using existing survey data. Highway assignment will be QA/QC'd.	
Year 4 July 1, 2014 - June 30, 2015	Model calibration and validation. Work tasks will include calibrating and validating model components and overall model performance.	

Fiscal Year	TRM v6 Development	Notes
Year 5 July 1, 2015 - June 30, 2016	Model calibration and validation. Calibrating and validating model components and overall model performance for the 2013 base year model has been completed. Sensitivity tests were conducted for a 2040 forecast year. A test of the TRMv6 True Universe files was conducted, and extensive checking and correcting of the highway and transit networks was conducted.	
Year 6 July 1, 2016 - June 30, 2017	The True Universe network and projects were extensively checked. Household survey data collected during 2016 was cleaned and processed. Parking model estimation files were prepared and model estimation was started.	
Year 7 July 1, 2017 - June 30, 2018	TRMv6 models for general population trip purposes will be estimated using 2016 household survey data.	

V7 Model

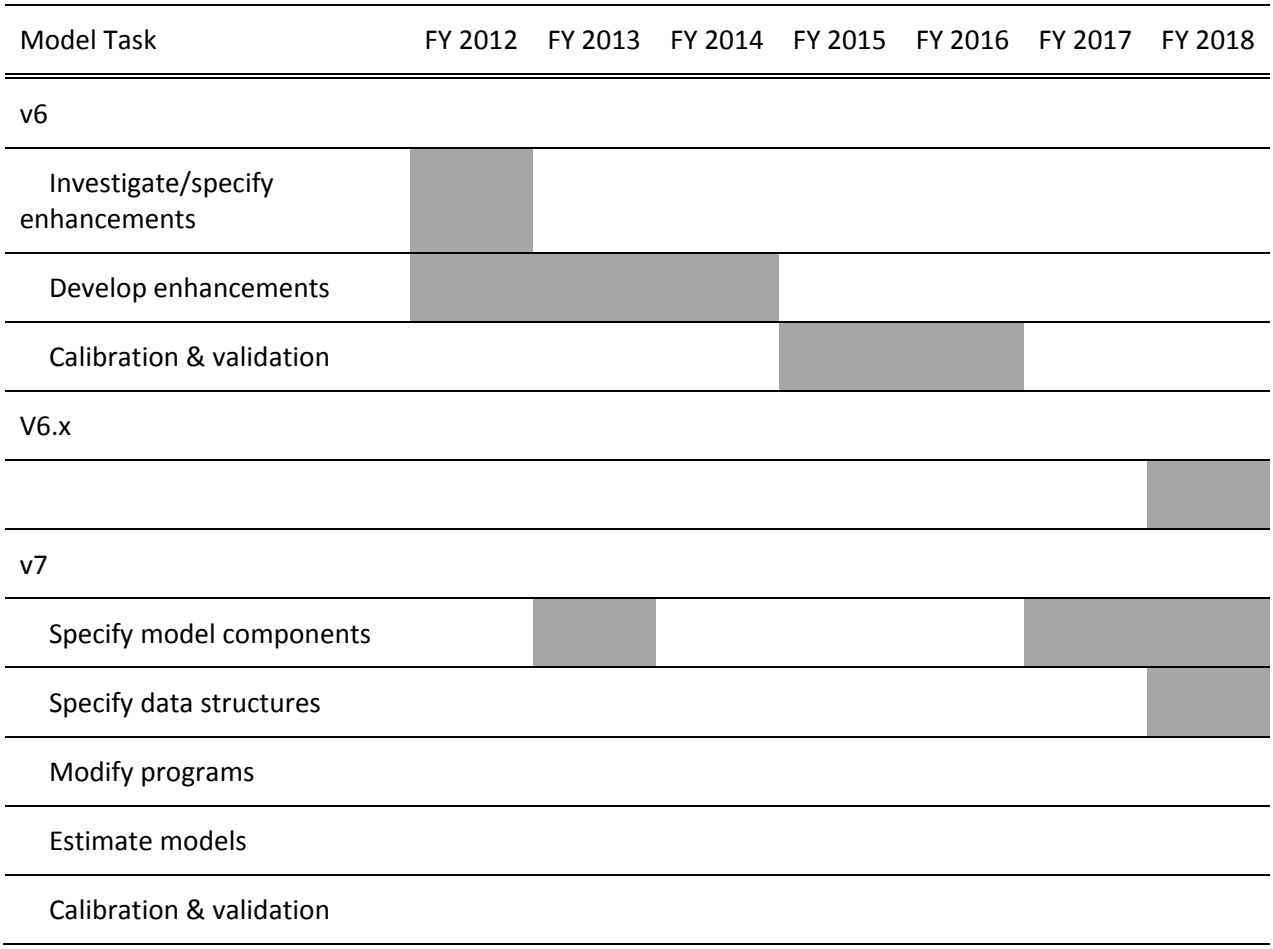
The v7 model will be either an enhanced trip based, a tour based or activity based model depending on stakeholder direction and perhaps beginning with modifications to the university student components. It is expected the v7 or further enhanced v6.1 model will be used for the 2050 MTP development starting in 2021. This will address policy testing needs that require consideration of how travelers change their daily schedules in response to policies intended to reduce peak congestion.

Fiscal Year	TRM v7 Development	Notes
Year 1 July 1, 2011 - June 30, 2012	Stakeholders agree on concept for v7 1) Convene expert panel 2) Develop work plan for v7 model development	
Year 2 July 1, 2012 - June 30, 2013	Investigation/specification of model structure and components: 1) population synthesizer, 2) land use models. 3) auto ownership model	

Fiscal Year	TRM v7 Development	Notes
Year 3 July 1, 2013 - June 30, 2014		
Year 4 July 1, 2014 - June 30, 2015		
Year 5 July 1, 2015 - June 30, 2016		
Year 6 July 1, 2016 - June 30, 2017	Conduct decision making process to select model type for TRMv7	
Year 7 July 1, 2017 - June 30, 2018	Investigation/specification of model structure and components: 1) Usual work place location model 2) Usual school location model. Estimate long term decision models: 1) Auto ownership model Investigation/specification of model structure and components: 1) Tour/activity scheduler, 2) Router. Investigate/specify and develop data structures. Determine best data structures for storing, processing and updating model elements. Approaches will be sought that maximize analyst productivity and model runtime performance.	
Year 8 July 1, 2018 – June 30, 2019	Estimate long term decision models: 1) Usual work location model 2) Usual school location model Available data will be prepare in the chosen data structure. Modify programs as needed to implement the chosen model specification including: 1) population synthesizer, 2) tour/activity scheduler, 3) router.	

Fiscal Year	TRM v7 Development	Notes
	Model component programs may be borrowed and adapted for use in the Triangle region. Estimate models and implement. Recent survey data will be used to estimate model components specified during years one to three [population synthesizer, tour/activity scheduler, router]. Other model components (commercial vehicles, external models) will be incorporated in overall model structure.	
Year 9 July 1, 2019 – June 30, 2020	Model calibration and validation. Initial model will be applied and any problems will be noted and addressed. This process will be iterated until all problems discovered have been addressed. The model will then be validated to observed conditions.	

Conceptual Schedule for Model Development



Appendix B

TRM History

Version - Release Year [Delivered Time]	**Key Features Enhancements vs. Previous Version**	**Base Year**	**Use**
v.1 - 2006 [Not to Stakeholder]	TTA New Start model converted to the TransCad platform with a 2002 base year as delivered by the contractor [Parsons Brinckerhoff] in Fall of 2006	2002	
v.2- 2006 [delivered 12/2006]	Revised and calibrated/validated to 2005 base year highway data only	2005	
v.3 - 2007 [β test version delivered 4/2007]	1. Updated mode choice ASC calibration using 2006 Household Interview Survey and 2006 Transit On Board Survey data 2. Repaired trip generation program and 3. Revised **2005** Socio Economic data provided by the MPOs.	**2005**	**1)** Transit Infrastructure Blueprint, **2)** the Chapel Hill Long Range Transit Plan, **3)** the Orange County Greenhouse Gas project and **4)** the Deficiency and Needs Analysis for the 2035 Long Range Transportation Plans.
v.4 - 2008 [Delivered 1/2008; approved spring; adopted 8/2008]	Improved v3-2007 ready for application and including HOV/HOT and toll capabilities.	**2005**	**1)** Alternatives Analysis and **2)** Air Quality Conformity Analysis for the 2035 Long Range Transportation Plans.

Version - Release Year [Delivered Time]	**Key Features Enhancements vs. Previous Version**	**Base Year**	**Use**
v.5 - 2011 Delivered 6/2011	**New:** 1. Parking capacity constraint 2. Airport trip making model 3. Bicycle and pedestrian travel sub models through trip distribution. 4. External station forecasts methodology. 5. Hourly capacity and traffic assignment 6. Use of Logsum in destination choice 7. Stratified utility coefficients by income in mode choice: 8. Summit analysis for FTA New Start analysis. 9. An off model GIS approach to forecast changes in road characteristics over time as rural areas become more urbanized [planned] 10. Travel by people from outside the region on transit. **Improved:** 1. Parking cost model improved; New: capacity constraint components added 2. Bus speed model: adjusted and validated vs. 2006 bus schedules. 3. Revise Federal Functional Class. Federal Functional Class has been updated in the 2010 v5 model to be consistent with NCDOT updates. **Investigated:** Cost of Auto Travel [e.g. gas price component]	2005, 2010	**1)** Alternatives Analysis and **2)** Air Quality Conformity Analysis for the 2040 Long Range Transportation Plans.

Version - Release Year [Delivered Time]	**Key Features Enhancements vs. Previous Version**	**Base Year**	**Use**
V6. 2016 Delivered 5/2016	**New:** 1. Free flow speeds based on highway capacity manual 2. Commercial vehicle model by trip purpose and linked to NC Statewide model 3. University student model for on and off campus students 4. Parking cost and parking capacity constraint models based on parking behavior survey data [in process] 5. Synthesized population for trip generation **Improved:** 1. Revised area types with added CBD area type and procedure to smooth and update area types for both TAZs and network links for scenarios and forecasts	2010, 2013	Alternatives Analysis for the 2045 Metropolitan Transportation Plans

Appendix C

TRM Calibration and Validation Statistics

Triangle Regional Model components will be calibrated and validated to the following targets. These tests based on local and national targets will be used to evaluate the quality of model components.

Calibration/validation Statistics

Model Inputs

Model demographic data inputs will be checked against benchmarks at a regional level for persons/household, employment/population ratio, and autos/household. Plots of persons per household and household income by zone (TAZ) will be compared to census values. A report will document all findings.

Model highway and transit networks will be checked for reasonableness and the results will be reported. Maps of various network characteristics (area types, lanes, speeds, counts, screenlines, and transit routes by company) will be plotted to aid in the checks and to document the process used. The transit on board survey data will be assigned by access mode to the transit network and comparisons of transfer rates and assignments by transit line and company will be made to determine if problems exist. The results will be reported.

Model output from the household and person model (workers, non-workers, and children), and by household strata will be compared to census and other data for the region and sub region levels as appropriate (county and district) depending on the availability of data. This comparison will be documented in a report.

Trip Generation

Work trips per worker match survey work trips per worker

Ratio of region wide trip productions to trip attractions by trip purpose +/- 10%

Summaries comparing observed and model estimated trips by trip purpose will be prepared

Daily trips by trip purpose will be compared to determine if proportions of daily travel by purpose match survey data and proportions from other areas (benchmarks)

Overall trip rates by trip purpose will be compared to those reported for other areas

Trip productions per household and per capita will be compared to standard reasonable ranges

Summary comparisons will be made at the region, county, and district levels

Work trip attractions will be compared to total employment, K-12 school trips will be compared to total school enrollments, and shopping trips will be compared to total retail employment

Trip Distribution

Percent Deviation of Average Trip Length (minutes) for all trip purposes +/- 5%

District to district comparisons will be made of observed and model estimated trips. Trip length frequency distributions by time and distance will be prepared by trip purpose by strata. Coincidence ratios will be prepared for the trip length frequency distributions with a target of >70% coincidence.

Percent intra zonal trips by purpose will be compared to benchmarks.

Mode Choice

All trip purposes will match observed mode shares for auto and transit modes (+/- 2%), though not for transit by access mode to avoid over calibrating

Summaries by trip purpose will be prepared comparing observed mode shares to model estimated mode shares. Work trip mode shares will be compared to census (CTPP) mode share data. District summaries will be prepared. Auto occupancies will be compared to survey auto occupancies. Mean transit trip lengths will be compared to observed and these will be expected to fall within +/- 5%. Parameters will be compared to acceptable ranges.

Validation Statistics[‡]

Vehicle Miles Traveled (VMT) by Federal Functional Class (based on links with counts)

Functional Class	Target % Deviation
Freeway	7%
Principal Arterial	10%
Minor Arterial	10%
Collector	15%
Local	15%
Total	5%

Screenline Comparison

Screenline Name	Target % Deviation
I-85	10%
I-40	10%
Wake/Durham County Line	10%

[‡] All traffic counts used for validation will be factored in a consistent way

Cutline Comparison

Cutline Name	Target % Deviation
SW Durham	15%
Durham	15%
Johnston County	15%
Chatham County	15%
North Raleigh	15%
Eastern Wake	15%
US 1 South	15%
North Wake	15%
US 70	15%

* If unable to match this best practice target, then a secondary check will be performed based on the overall volume of the cutline

Percent Difference of Total Traffic Count Volume and Total Model Assigned Volumes by County and Area Type

Summary Level	% Difference Target (+/-)
County	
Durham	10%
Orange	10%
Wake	10%
Chatham	10%
Harnett	10%
Johnston	10%
Nash	10%
Franklin	10%

Granville	10%
Person	10%
Area Type	
Urban	10%
Suburban	10%
Rural	10%

Percent Difference of Model Estimated Daily Traffic Volumes by Federal Functional Class

Federal Functional Class	FHWA Target (+/-)	TRM Target (+/-)
Freeway	7%	5%
Principal Arterial	10%	8%
Minor Arterial	15%	10%
Collector	25%	15%
Local	25%	15%

Percent Difference of Model Estimated Daily Traffic Volumes by Volume Group

Volume Group	Target % Deviation
1 -1000	55%
1001 – 2500	50%
2501 – 5000	30%
5001 – 10000	25%
10001 – 25000	20%
25001 – 50000	15%
>= 50001	10%
Total	5%

R-Square for Region wide Estimated Volumes vs. Traffic Counts

Target R^2 >= 0.88

Root Mean Square Error (RMSE) of Estimated Traffic Volumes

Target RMSE <= 35%

Evaluation of Peak Period Assignments for AM and PM Peak Periods

Screenline Comparison AM and PM Peak

Screenline Name	Target % Deviation
I-85	10%
I-40	10%
Wake/Durham County Line	10%

Cutline Comparison AM and PM Peak

Cutline Name	Target % Deviation
SW Durham	15%
Durham	15%
Johnston County	15%
Chatham County	15%
North Raleigh	15%
Eastern Wake	15%
US 1 South	15%
North Wake	15%
US 70	15%

* If unable to match this best practice target, then a secondary check will be performed based on the overall volume of the cutline

AM and PM Peak Period Percent Difference of Total Traffic Count Volume and Total Model Assigned Volumes by County and Area Type Based on Links with Hourly Traffic Counts

Summary Level	% Difference Target (+/-)
County	
Durham	10%
Orange	10%
Wake	10%
Chatham	10%
Harnett	10%
Johnston	10%
Nash	10%
Franklin	10%
Granville	10%
Person	10%
Area Type	
Urban	10%
Suburban	10%
Rural	10%

Overall average speeds will be reported for AM peak, PM peak and off peak periods.

Transit Ridership Assigned

Total transit riders target +/- 5%

Target for individual companies +/- 10%

Transit riders by corridor +/- 15% for the following corridors:

US 15-501 between Chapel Hill and Durham

NC 147 between Durham and RTP

I-40 between Chapel Hill and RTP

US 1 North between Raleigh and Wake Forest

US 70 East between Raleigh and Garner

2018 0008

RESOLUTION OF THE GOTRIANGLE BOARD OF TRUSTEES SUPPORTING THE GRANT APPLICATION FOR THE RALEIGH UNION STATION BUS FACILITY TO THE USDOT BUILD PROGRAM

WHEREAS, GoTriangle provides regional bus service in Wake, Durham, and Orange counties; and

WHEREAS, partner agencies such as GoRaleigh and GoCary connect local buses with regional services in Wake County; and

WHEREAS, the City of Raleigh recently completed the construction of Raleigh Union Station's rail components for intercity passenger rail; and

WHEREAS, the Wake County transit plan anticipates and supports the development of Commuter Rail and Bus Rapid Transit services converging in the area immediately adjacent to Raleigh Union Station; and

WHEREAS, creating a successful and convenient connection point between bus and rail services at Raleigh Union Station will expand mobility within Raleigh, throughout Wake County, and across the Triangle region; and

WHEREAS, USDOT has issued a Notice of Funding Availability for BUILD grants to advance transportation capital projects; and

WHEREAS, the GoTriangle Board adopted a Transit-Oriented Development policy in 2017 with the policy goals of Complete Communities, Sustainable Communities Strategy, Ridership, Value Creation/Value Capture, Transportation Choice, Affordability, and Collaboration.

NOW, THEREFORE, BE IT RESOLVED, by the GoTriangle Board of Trustees, that the Board fully supports GoTriangle's application for the Raleigh Union Station Phase II, also known as the "RUS Bus" project, to compete in the Better Utilizing Investments to Leverage Development (BUILD) Transportation Discretionary Grants program managed by the United States Department of Transportation (USDOT).

ADOPTED THIS 27TH DAY OF JUNE 2018.

_____

Jennifer Robinson, Board of Trustees Chair

ATTEST:

_____

Michelle C. Dawson, Clerk to the Board

CONTRACT WORK ORDERS FOR MAY 2018
(not exceeding $100K)

Contract #	Contractor (or subject if no contractor listed)	Contract Amount	Subject	Comments	JM Signed	General Counsel Signed
18-053	Alternative Fuels Fleet Assessment for Electric, CNG and Diesel Buses	$9,720.00		Contract is for Alternative Fuels Fleet Assessment for Electric, CNG and Diesel Buses. Term of agreement expire 3/30/2018.	5/4/18	5/7/18
18-047	GoPass between GoT and Marbles Kids Museum	-		Provides for GoT and Marbles Kids Museum to agree on the GoPass program. Term of agreement: 7/1/18 – 6/30/21	5/14/18	5/14/18
18-054	Route Service Operations	$87.50/hour		For GoRaleigh to operate Route Service. GoRaleigh will operate up to 26,000 hours of Route Service at a rate of $87.50/per hour. Term of agreement expire 6/30/23.	5/14/18	5/14/18
18-057	Coach Demonstration	-		For the demonstration of an MCI bus. Term of agreement will be six weeks. MCI shall be paid the sum of one (1) dollar.	5/17/18	5/21/18
16-045	Task Order 2.	$14,767.00	GoT Bus and Light Rail Integration Master Services Contract with Nelson/Nygaard.	Task Order 2 will analyze routing options for bus service connections to light rail stations for GoT, GoDurham and Chapel Hill Transit. This is a lump sum contract. The term is from execution of Task Order 2 to no later than 10/31/18.	5/25/18	5/24/18
?	GoCary COA – Task Order Amendment	$87,000.00		Provides for task order amendment of the Statement of Work, # 3 – Multi-year bus service implementation plan between Nelson/Nygaard, CAMPO, City of Raleigh and GoT. Not to exceed contract amount. Term of agreement: 4/6/18 – 10/31/18.	5/25/18	5/24/18