

Triangle Regional Models Protocol

I. Purpose

The purpose of this protocol is to provide a clear structure and procedures for collaboration on the development, modification and maintenance of a mutually adopted Triangle Regional Model (TRM), and associated transportation modeling tools. Specifically, this protocol defines signatories to the protocol, responsibilities for maintenance and modification of different versions of the travel demand model and any ancillary modeling tools, procedures for distribution of the mutually adopted model, steps to amend this protocol, and, if necessary, how to dissolve participation with the TRM. In addition, the purpose of the protocol is to assure consistency of model sets, integrity of data sets, and the mutual support and buy-in of all signatory agencies.

II. Definition of Terms

The following terms shall have the meanings indicated. All other terms should be understood to have their usual and customary meanings.

- A. Signatory. The person authorized to sign written commitments on behalf of a Signatory Agency with regard to the items in this protocol.
- B. Signatory Agency. An organization that has agreed to participation in the Triangle Regional Model through the adoption of this protocol and participation in the annual work program and budget.
- C. Model Custodial Agency. The organization designated by the Signatory Agencies to be responsible for the warehousing, maintenance, documentation and distribution of all data, computer programs, and model files necessary to install and execute the Triangle Regional Model and any ancillary modeling tools. The Model Custodial Agency is also responsible for related written technical reports, manuals and similar materials associated with versions of the Triangle Regional Model and any ancillary tools covered by this protocol.
- D. Triangle Regional Model Team. Technical staff working for the Model Custodial Agency plus technical staff employed by signatory agencies who have been assigned to work on Triangle Regional Model tasks in the adopted annual work program.
- E. Metropolitan Transportation Plan (MTP). The most recent adopted or amended Metropolitan Transportation Plan that applies to any Metropolitan Planning Organization (MPO) which is a signatory agency to this protocol.
- F. Calibration Year: the year for which the files of any model version have been aligned with socioeconomic data, traffic counts and transit ridership.
- G. Validation Year: the year for which the calibrated model is run to compare results to actual traffic counts and transit ridership.
- H. Technical Correction: a technical correction is a change to a model version to fix errors or depict conditions already intended to be in the model. A technical correction does not add new features to, nor modify existing features of, the model; nor does it incorporate updated data or inputs in the model.
- I. Ancillary Modeling Tools: modeling software or other analytic methods, along with their associated data, that are not part of the official Triangle Regional Model but are assigned to the Model Custodial Agency by the Signatories.

III. Organizational Structure

Signatories

The signatories to this protocol shall be the Executive Board chair for the NC Capital Area Metropolitan Planning Organization (CAMPO), the MPO Board chair for the Durham-Chapel Hill-Carrboro Metropolitan Planning Organization (DCHC MPO), the chair of the GoTriangle Board of Trustees (GoTriangle), and the Secretary of the North Carolina Department of Transportation (NCDOT). Additional signatories may be added as provided for in Section V of this protocol. Each signatory may at any time designate an official signee by written notice to each of the other signatories. If any titles of positions or names of agencies change, their successors are deemed to meet the above definitions without modification of this protocol.

Model Executive Committee

The Model Executive Committee shall be composed of one person (the “member”) from each of the signatory agencies as designated in writing by each signatory. This person will exercise seat, voice and vote on behalf of the signatory agency on matters of use of personnel time, budget allocations and other resources. By written notice to the other Executive Committee members, this person may appoint a designated alternate who may participate on the Committee and vote in the absence of the Executive Committee Member. The executive committee shall oversee the development of a common work program and priorities for all aspects of the Triangle Regional Model. In addition, this committee is responsible for resolving conflict and disputes related to aspects of the TRM, including but not limited to, items associated with the work program, priorities, model team collaboration and technical issues that arise in the development, maintenance and use of the model. The Executive Committee shall strive to meet quarterly, but shall meet at least twice per local government fiscal year (July 1 through the subsequent June 30), and may choose to meet on an as-needed basis, if warranted. A quorum for conducting business of the Executive Committee shall be fifty percent (50%) plus one of the membership. The Executive Committee, at its discretion, may request that a signatory agency, the model custodial agency or another agency serve as a convener and facilitator for activities of the Executive Committee. On voting matters, a tie vote by the Executive Committee means the motion is not approved.

Model Custodial Agency

The Model Executive Committee shall appoint a model custodian. The model custodian will be responsible for maintaining the computer files related to the Triangle Regional Model, including all transportation model files and associated network link data and traffic analysis zone level socioeconomic data, for model calibration and validation years and currently adopted MTP base, future interim and future horizon years. This work will include but not be limited to maintaining a log of changes and current documentation of model work, complete backup of model files, and managing access to the model via FTP site or other means. The model custodian is further responsible for distribution of model files and documentation to signatories through FTP access or other means as needed. It is the signatories’ responsibility to direct their contractors or consultants to the model custodian for access to mutually adopted and transitional model files. The model custodian shall keep a record of all model files supplied to contractors or consultants.

Model Team

The TRM Model Team consists of the staff employed by the custodial agency to support the TRM Service Bureau and representatives from signatory agencies who are responsible for undertaking TRM tasks. The Model Team serves in a technical and advisory capacity; decisions related to the Triangle

Regional Model are made by the Model Executive Committee, or the Signatory Agencies, as outlined in this protocol. Signatory agencies shall commit FTE staff levels, or the funding equivalent, as contained in the approved work program and budget adopted by the Executive Committee. All TRM Model Team members shall, at the discretion of the Project Manager, work on site at the model custodial agency to enable the Team to collaborate seamlessly and reduce risks that team members will be unable to fulfill their TRM obligations due to non-TRM assignments.

If tasks related to a modal-specific ancillary modeling tool are part of the Model Team work program and budget, any project sponsor staff and/or contractors shall be invited to participate in Model Team efforts related to that tool, subject to a written understanding with any project sponsors.

The custodial agency shall designate a Project Manager for the TRM Service Bureau who serves as the leader of the Team and is responsible for implementing and monitoring the annual work program and budget approved by the TRM Executive Committee. The Project Manager is responsible for providing adequate staff effort to fulfill the work program by specifying task descriptions, deliverables and person hours required. The Project Manager is accountable to the Executive Committee and is empowered by the Executive Committee to manage the TRM team members, including staff representing the signatory agencies, in order to implement the approved work program. Each team member is responsible for progress reporting in a time and manner determined by the Project Manager and shared with the Executive Committee.

Triangle Regional Model User Forum

The Model User Forum shall create a space where practitioners who use the Triangle Regional Model or are engaged in broader transportation modelling efforts can come together to discuss issues, concerns and opportunities, and share ideas related to the use and improvement of the TRM and related transportation modeling software. The Model Custodial Agency shall serve as convener and facilitator for this forum. Participation in the Forum shall include but not be limited to MPO and NCDOT staff, as well as other end-users such as local transportation departments and consultants. This Forum shall be convened as needed, but not less than annually.

IV. Triangle Regional Model

It is common practice for transportation modelers to be working on more than one version of a model at any given time, for example by applying one version while developing a subsequent version. This section is designed to create clear distinctions between model versions, guide the appropriate use of specific versions, and provide expectations for how both the Model Executive Committee and the Model Team understand these distinctions and communicate them effectively. Nothing in this protocol shall bind an organization from undertaking statutory or regulatory responsibilities, including using a version of the model prior to its adoption by all signatory agencies. Nothing in this protocol prevents a signatory agency from developing and using other versions based on the Triangle Model or using other or supplementary transportation models, but only the versions addressed by this protocol are deemed to have standing as the “Mutually Adopted Model” by all signatories.

Model Version Definitions

The Triangle Regional Model shall have at least one version (the “Mutually Adopted Model”, often termed the “Official” model) and may have other versions as defined below. A model is comprised of a group of files run on a specified computer platform. All versions of the model shall be specified by a version name, number and adoption or approval date. An appendix to this protocol illustrates the status of different versions of the model at the time of this protocol revision.

1. Mutually Adopted Triangle Regional Model (“Official” Model). There shall be a mutually adopted version of the Triangle Regional Model at all times. This version shall be adopted or re-adopted by all of the signatory agencies concurrently with each initial adoption of an MTP, as described in the “Adopting and Distributing the Model” section of this document.
2. Transitional Triangle Regional Model. A transitional version of the TRM is optional, allowing signatory agencies, partner agencies and consultants to confidently take advantage of model improvements and upgraded SE and network data that have been carefully vetted by the Model Custodial Agency and which the signatory agencies intend to incorporate within the mutually adopted version. A transitional version of the TRM is expected to proceed to designation as the Mutually Adopted Regional Model within a relatively short time period, and thus may be the best version for studies that are getting underway and will extend for longer than 6 months or a year.
3. Developmental Triangle Regional Model. A developmental version of the TRM is optional. A developmental version would typically involve significant changes to major elements of the model, such as an updated computer platform and/or the functionality of one or more of the steps in the model, such as trip generation, destination choice, mode choice and assignment.

For each model version, the file set shall include calibration and validation year files, future year files whose horizon year shall align with an appropriate MTP horizon year, and one or more intermediate year files, as reviewed by the Model Team and approved by the Executive Committee. Model documentation, including at a minimum a Technical Manual and a User’s Guide, shall be kept current and made available along with the model’s files. All files and documentation that comprise the Mutually Adopted Model and any Transitional Model will be maintained in the Triangle Regional Model Technical Manual prepared and updated by the Model Custodial Agency.

Ancillary Modelling Tools

The work program and budget may include tasks that involve ancillary modelling tools, including modal-specific tools, that rely on, link to, serve as a component of or complement to, or benefit from inputs and/or outputs of the Triangle Regional Model. Tasks associated with ancillary modelling tools may be included in the adopted TRM budget and workplan. Signatory Agencies and other partners may choose to develop supplementary protocols or written agreements related to ancillary modelling tools.

Using the Model

Organizations wishing to use the Triangle Regional Model shall apply procedures outlined in the Triangle Regional Model Technical Manual. Any model changes, assumptions or alternative analyses that are used by one of the Signatory Agencies must be documented to show deviations from the mutually adopted model, and communicated to the Model Custodial Agency. It is appropriate for any agency or group that will use the Triangle Regional Model to support major transportation decisions to use the most currently adopted version of the Official Triangle Regional Model, or in certain applications, an approved transitional version of the model.

Work Program

In order to plan, budget, and administer Triangle Regional Model Activities, a two-year work program aligned with NCDOT and MPO fiscal years outlining tasks and priorities shall be developed by the Project Manager in consultation with the Model Team and approved by the Model Executive Committee, at least once a year. The two-year work program shall include a detailed budget and task list covering the first year. This work program shall identify, at a minimum, deliverables associated

with each task, the estimated time frame and milestones for completing each task, the resources required to complete each task, and note of any future tasks that are dependent upon its completion. Carrying out the tasks of this work program will be the responsibility of the Project Manager and the Model Team and, where clearly specified, the signatory agencies. The work program should clearly distinguish tasks related to the mutually adopted version, any transitional version, any developmental version and any ancillary modeling tools.

The work program should remain flexible to be able to respond to shifting priorities, as determined by the Executive Committee. Significant adjustments to the work program, defined as changes resulting in the failure to complete a budgeted deliverable in the first year of the two-year program, require review and approval by the Executive Committee. Minor adjustments in hour allocations or team assignments are at the discretion of the Custodial Agency Project Manager.

Any proposed amendments to an adopted work program shall be submitted in writing to the Project Manager of the Model Custodial Agency, who will share the proposal with the Model Team and include the proposal in the agenda of the next meeting of the Model Executive Committee.

Descriptions of the proposed amendments are to be prepared by the proposer in a form to be reviewed by the Model Team and acted on by the Model Executive Committee. The Model Executive Committee will approve or deny proposed amendments to the work program, approve modified versions of the proposed amendments or table proposals for further discussion pending receipt of additional information.

Adopting and Distributing the Model

The mutually adopted Triangle Regional Model shall be adopted by the signatories to this agreement as needed for new versions of the model but not more often than semi-annually. The signatories through their individual approval processes officially adopt the model. The signatories shall transmit notification of official approval action in writing to the Model Custodial Agency staff person responsible for providing oversight and direction to the Triangle Model Team. The Model Custodial Agency shall retain copies of approvals. Upon adoption of the official model, the Model Custodial Agency shall distribute it to signatory agencies.

Modification of the Model

The Model Team under the supervision of the Model Executive Committee will be responsible for modification of the versions of the Triangle Regional Model. Modification includes but is not limited to modifying model structure, updating data files, improving model inputs, correcting errors in the model and adding enhancements to the model structure.

The Model Executive Committee shall collectively develop, and the Model Custodial Agency shall maintain, a list of types of modifications to the mutually adopted model version that can be made by the approval of: (1) the Model Team itself (Technical Corrections that are “minor” changes such as correcting network coding errors or modifying zonal centroid connectors); (2) the Model Executive Committee (“moderate” changes such as modifying capacity restrained assignment types or mode choice model parameters); and (3) the signatory agencies (“major” changes such as revisions to population or employment forecasts, changes to MTP networks). Because authority for adopting population and employment forecasts and MTP networks resides with each MPO and NCDOT within its jurisdictional area, nothing in this section constrains an MPO or NCDOT from making these independent decisions. A signatory agency may elect to delegate its authority to approve major changes to its Executive Committee member by written communication to the Model Custodial Agency.

It shall be the goal of the signatories of this protocol to maximize the decision-making authority of both the Model Team and the Model Executive Committee so that only model modifications deemed to be most important to regional travel demand forecasts require the direct review and approval of the signatory agencies. Regardless of the type of change, whether minor technical corrections, moderate changes or major changes, all modifications made to the mutually adopted model shall be fully documented to the extent sufficient that all changes can be completely replicated or reversed. This documentation shall be developed and maintained by the Model Custodial Agency in ways that are easily accessible and reviewable by staff of Signatory Agencies, Model Team members and model users.

When an MTP is amended, the MPOs and NCDOT shall provide any SE data and roadway and transit network changes to all future year networks to the Model Custodial Agency, and the Model Custodial Agency shall incorporate these SE data and network changes into a proposed update to the mutually adopted version of the model. Upon presentation of a proposed revision by the Model Custodial Agency and endorsement by the Executive Committee, the Model Custodial Agency shall incorporate these changes into the adopted regional model and distribute it to signatory agencies so that the model aligns with the amended MTP(s). The mutually adopted version should not be revised to incorporate changes more often than every six months.

Incorporation of Ancillary Modeling Tool Results

The signatory agencies may:

- i) consider incorporation of modal-specific results from ancillary modeling tools into the official model;
- ii) replace official model modal-specific results with results from an ancillary modeling tool; or
- iii) link the official model to ancillary modeling tools (for example a post-processor).

Any party proposing consideration of ancillary modeling tool results shall prepare written justification and documentation in a form to be developed by the Model Custodial Agency, reviewed by the Model Team and acted on by the Model Executive Committee. The Model Executive Committee will approve or deny the proposal, approve modified versions of the proposal, or table the proposal for further discussion pending receipt of additional information.

V. Amending the Agreement

This document may be revised by mutual agreement of all signatories.

During the lifetime of the agreement, it may be desirable to add or revise signatories. The approval of all current signatories shall be required to agree to such a change. The Model Executive Committee will then be responsible for revising this document and distributing copies to all signatories.

This agreement shall automatically renew each year on July 1 for the subsequent 12-month period (beginning on July 1 and ending on the following June 30.th) Any signatory may withdraw from the agreement effective on July 1 of any year provided that the signatory provides written notice of intent to withdraw at least 180 calendar days prior to the July 1 date of withdrawal and the signatory's policy board votes to withdraw from this agreement at least 90 days prior to the July 1 withdrawal date. The withdrawal of one signatory shall not affect the agreement as it pertains to the remaining signatories.

Signatories

Signed this ____ day of _____, in the year _____ by _____

Representing Capital Area Metropolitan Planning Organization (CAMPO)

Signed this ___ day of _____, in the year _____ by _____

Representing Durham-Chapel Hill-Carrboro Metropolitan Planning Organization (DCHC)

Signed this ___ day of _____, in the year _____ by _____

Representing North Carolina Department of Transportation (NCDOT)

Signed this ___ day of _____, in the year _____ by _____

Representing GoTriangle

Appendix 1. Illustration of Triangle Regional Model Versions and Checklist (this appendix is illustrative and is not a part of signed protocol)

As of September 1, 2021

Model Version:	Mutually Adopted	Transitional	Developmental
Standing:	Required	Optional	Optional
Status:	Adopted [date]	Approved for analysis: 09-15-20 by Executive Committee	in development by Model Team and consultant
Model Name (and nickname):	AdoptedTRMv6.0-XXyy20 (v6.0)	TransitionalTRMv6.2-XXyy20 (v6.2)	DevelopmentalTRMvG2-XXyy21 (vG2)
Model Platform:	TransCAD 6	TransCAD 6	TransCAD 8
Responsibility for Adoption or Approval:	All signatory agencies*	TRM Executive Committee	TRM Executive Committee
Calibration Year:	2013	2016	2020 (pre-COVID)
Validation Year:			
MTP Base-Horizon Year (interim years) for SE data and highway and transit network files:	2013-2045 (2025, 2035)	2045 (2025, 2035) - current 2050 (2030, 2040) – in preparation	2055 (2035, 2045)
Example uses:	Used to develop 2045 MTP	Used to develop 2050 MTP	Anticipated to use to develop 2055 MTP

* As described in the Model Protocol, minor technical corrections to the official model may be made by the Model Team, with written documentation and renaming the model to include the date on which the Model Custodian incorporated the corrections. Certain significant modifications may be made by vote of the Executive Committee with written documentation and renaming of the model to include the date on which the vote was made.