



## MEMORANDUM

**TO:** Wendy Jia, WMATA  
**FROM:** Mark S. Moran, COG/TPB  
**SUBJECT:** COG/TPB staff response to WMATA letter, dated December 9, 2015, regarding proposed changes to the short-term implementation plan for improving the COG/TPB trip-based, regional travel demand forecasting model  
**DATE:** January 15, 2016  
**CC:** Shyam Kannan, Allison Davis, and Melissa Chow, WMATA  
David Roden, AECOM  
Ronald Milone, Robert Griffiths, and Kanti Srikanth, COG/TPB  
John (Jay) Evans and Feng Liu, Cambridge Systematics, Inc.

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Thank you for your letter, dated December 9, 2015, regarding proposed changes to the short-term implementation plan for improving the COG/TPB trip-based, regional travel demand forecasting model. As per your suggestion, we had a meeting at WMATA on January 6, 2016 to discuss the ideas set forth in your letter. The following people attended that meeting:

- Shyam Kannan, Wendy Jia, Allison Davis, and Melissa Chow (WMATA)
- David Roden (AECOM, working with WMATA)
- Ron Milone and Mark Moran (COG/TPB staff)
- John (Jay) Evans and Feng Liu (Cambridge Systematics, Inc., working with COG/TPB)

This memo provides a formal COG/TPB staff response to your letter. This response was informed by the discussions that occurred at the January 6 meeting.

### Background

In FY 15, COG/TPB staff, working with its consultant, Cambridge Systematics, Inc. (CS), began developing a strategic plan for updating the COG/TPB regional travel demand forecasting model. In FY 16, the COG/TPB strategic plan for models development was drafted, presented to the COG/TPB Travel Forecasting Subcommittee (TFS), and then revised in October 2015.<sup>1</sup> The seven-year strategic plan include three phases:

1. FY 16-17: Updates to the existing four-step travel demand model (FSM)
2. FY 18-20: Development of an activity-based travel demand model (ABM) with existing data
3. FY 21-22: Development of an ABM with new data, such as the new Household Travel Survey, which is planned to be conducted in FY 17 and should be ready for use in FY 20

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<sup>1</sup> Cambridge Systematics, Inc., "Draft Strategic Plan for Model Development, Task Order 15.2, Report 3 of 3," Final Report (Washington, D.C.: Metropolitan Washington Council of Governments, National Capital Region Transportation Planning Board, October 15, 2015).

In November, a short-term implementation plan, focused on Phase 1 of the strategic plan, was developed.<sup>2</sup> The short-term plan was e-mailed to the TFS, including WMATA, on November 13, 2015, and the short-term plan was discussed at the November 20, 2015 meeting of the TFS. The short-term plan began a 30-day review and comment period on November 13. During that time, we received only one set of comments: your December 9 letter. At the upcoming TFS meeting, on January 22, we plan to discuss your letter (and our responses), since the comments in your letter were the only ones received on the short-term implementation plan.

As part of its current contract with COG, and as a result of the strategic plan and the short-term implementation plan, CS has proposed five task orders for FY 16 (see Attachment A). Two of these task orders have been authorized by COG/TPB staff (T.O. 16.1 and 16.2). Three of the proposed task orders are under consideration (T.O. 16.3, 16.4, and 16.5). As noted in the FY 16 UPWP, WMATA has allocated \$90k of its \$225k COG technical assistance funds to be used for TPB travel demand model improvements.<sup>3</sup> We thank WMATA for helping to fund improvements to the regional model.

### **WMATA comments and COG/TPB staff responses**

The December 9 WMATA letter includes five comments, each of which is paraphrased below and followed by the COG/TPB staff response.

**WMATA comment #1:** Although the COG/TPB regional travel demand forecasting model explicitly represents various transit sub-modes, such as Metrorail, commuter rail, local bus, commuter/express bus, light rail transit (LRT), and bus rapid transit (BRT), WMATA believes the COG/TPB model should be enhanced to better represent the differences between these sub-modes. This enhancement should occur in the mode choice step and would thus be part of proposed Task Order 16.5. Prior to finalizing the short-term implementation plan (and, by implication, the associated proposed FY 16 task orders), CS should clarify and address the planned model improvements in this area. (pp. 1-2).

**COG/TPB staff response #1:** COG/TPB staff agrees that, where practical, it would be beneficial to improve the model's ability to differentiate between various transit sub-modes. It is planned that work designed to improve the model's ability to differentiate between various transit sub-modes will occur as part of proposed Task Orders 16.2 and 16.5. As we pointed out at the January 6 meeting, this enhanced differentiation could happen in one or more parts of the travel demand model (e.g., trip generation, trip distribution, mode choice, or trip assignment), and need not be restricted to only the mode choice step. As noted at the January 6 meeting, COG/TPB staff will proceed with amending the consultant contract to make WMATA's \$90K funding available to CS (minus about 5% which would be retained by COG for contract administration) for Task Order 16.5, pending approval by COG's Contracts & Procurement Manager, since the move would require a contract amendment.

**WMATA comment #2:** The representation of bike and walk travel (non-motorized travel) in the COG/TPB regional travel demand model should be enhanced. Enhancing the modeling of non-motorized (NM) travel is addressed in proposed task orders 16.2, 16.4, and 16.5. Prior to finalizing

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<sup>2</sup> John (Jay) Evans to Mark Moran, "Short-Term Trip-Based Model Strategy Implementation Plan," Memorandum, (November 11, 2015).

<sup>3</sup> "FY 2016 Unified Planning Work Program for Transportation Planning for the Washington Metropolitan Region" (Washington, D.C.: National Capital Region Transportation Planning Board, Metropolitan Washington Council of Governments, March 18, 2015), 90, <http://www.mwcog.org/transportation/activities/upwp/>.

the short-term implementation plan (and, by implication, the associated proposed FY 16 task orders), CS should assess the various approaches to improved modeling of NM travel and recommend to TFS a clearly defined methodology and process for improved modeling of bike and walk trips. (p. 2). At the January 6 meeting, Shyam expressed an interest in carrying NM trips all the way through the model, i.e., performing non-motorized trip assignment.

**COG/TPB staff response #2:** We agree that the model should be enhanced to better represent NM travel, which is why this enhancement is covered in three of the five FY 16 task orders. The current COG/TPB model estimates NM trip ends in trip generation, but they are not carried further through the model. We do not agree that NM trips should be carried all the way through trip assignment as part of a *regional* travel demand model, since 1) the majority of NM travel occurs beneath the zonal scale, and 2) such a practice is far outside of the current state of practice.<sup>4</sup> The COG/CS study team will do the following. First, consider new inputs to the model that are being developed, such as parcel-level data, to determine what potential they have for enhancing NM modeling. Second, staff will ensure that estimated NM travel (i.e., NM trip-ends) will be explicitly included as part of the standard reports that are currently generated as part of trip generation. The development effort will include a validation of the modeled NM output with the data from the recent geographically focused household travel surveys.

**WMATA comment #3:** WMATA has concerns with developing a parcel-level land use database as a way to better deal with NM modes. Instead, WMATA favors updating the existing, regional, trip-based model to include a pedestrian environment factor (PEF), such as the one that was developed by AECOM for recent modeling work done for WMATA. Prior to finalizing the short-term implementation plan (and, by implication, the associated proposed FY 16 task orders), CS should “provide a staged action plan that includes the integration and application of the [AECOM] PEF in the regional model as an immediate step, and identifies approaches to develop and maintain the parcel-level land use database” (p. 3).

**COG/TPB staff response #3:** COG/TPB staff is not convinced that it would be an efficient use of resources to create a new, interim version of the regional travel demand model that includes the AECOM PEF structure. Nonetheless, based on the Jan. 6 meeting, we agreed to the following: First, AECOM will transmit a copy of the WMATA travel model which includes PEFs in its mode choice model to COG/TPB staff and CS. Second, COG/TPB staff and CS will review the travel model with AECOM PEFs to determine if the AECOM PEF approach will complement our overall model development plan. The model development effort will discuss the need to forecast parcel-level information, and will focus on leveraging existing parcel-level data to the fullest extent possible.

**WMATA comment #4:** WMATA would like the regional travel demand model to include an explicit link between bus speeds and the speeds of the roads over which the buses travel. The current COG/TPB regional travel model addresses the bus-speed linkage in an aggregate manner. WMATA would like a new bus speed model that is more disaggregate and WMATA would like such a model to be implemented by FY 16.

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<sup>4</sup> See, for example, Cambridge Systematics, Inc. et al., *NCHRP Report 716: Travel Demand Forecasting: Parameters and Techniques*, National Cooperative Highway Research Program (Washington, D.C.: Transportation Research Board of the National Academies, 2012), 9, <http://www.trb.org/Main/Blurbs/167055.aspx>.

**COG/TPB staff response #4:** Improving the linkage between road speeds and bus speeds is covered under Task 9 of Task Order 16.2. The task order states, “CS will review state of the practice and alternative approaches in linking bus speeds to highway speeds (consider and/or develop appropriate factors or look-up tables) and COG/TPB will come to a decision on a recommended approach.” The planned implementation was in FY 17. WMATA wanted to move the implementation into FY 16 and revise Task Order 16.2 to reflect this. However, T.O. 16.2 was authorized by COG/TPB staff on December 28, and it did not include the accelerated timeline. The study team will proceed as originally proposed, i.e., 1) CS will investigate approaches to link transit speeds with highway service levels and recommend an approach during FY 16, and 2) The selected approach will be implemented in FY 17. If CS and COG/TPB staff determine that it is possible to begin implementation in FY 16, which has only six months remaining, then they will begin implementation in FY 16.

**WMATA comment #5:** Changes to the transit assignment procedure in the regional travel demand model. WMATA is seeking two enhancements. First, the number of time-of-day periods in transit assignment should go from the current two (peak and off-peak) to four, so that it is comparable to highway assignment, which also uses four time-of-day periods (AM peak period, midday, PM peak period, and nighttime). Second, each transit time-of-day period should include the appropriate share of all trip purposes, as opposed to the current practice where it is assumed that all home-based work (HBW) trips occur in the peak period and all other trip purposes occur in the off-peak period.

**COG/TPB staff response #5:** According to both CS and a recent TRB report on travel demand modeling, the state of the practice at most large MPOs is to use only two time-of-day periods in transit assignment.<sup>5</sup> By contrast, the COG/TPB practice of assuming all HBW trips occur in the peak period is not in line with state of the practice, where most MPOs assume a share of all trip purposes occur in each of the two time-of-day transit assignment periods. Consequently, COG/TPB staff will continue the practice of using two time-of-day periods for transit assignment (peak and off-peak, in production/attraction format), but CS, as part of Task Order 16.5, will convert the COG/TPB model to implement the more common practice of blending all trip purposes into each of the two transit assignment periods. The decision of whether to move to more than two time-of-day periods for transit assignment could be re-considered during the development of the ABM, which is planned to occur in FY 18-20.

**Attachment:** A. Proposed and Authorized FY 16 Task Orders for Cambridge Systematics under COG Contract 14-056

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<sup>5</sup> Ibid., 78.

## **FY 16 Task Orders for Cambridge Systematics under COG Contract 14-056**

**T.O. 16.1: Attend relevant meetings and respond to ad-hoc requests by COG/TPB staff (\$50,000), authorized 6/23/15**

**T.O. 16.2: Advice and Testing (\$60,000), authorized 12/28/15**

1. Version Control and Bug-Tracking Software
2. Non-Resident Trips Update
3. Screenlines/Cutlines
4. Speed/Travel Time Validation Improvement
5. Migration of Transit Path-Building Software
6. Perform Transit Network Coding Enhancements
7. Include Transit Drive Access Trips into Highway Assignment
8. Add External-to-Internal Transit Trips
9. Revise Bus Speed Linkage to Highway Speeds
10. Migration of Mode Choice Application Software
11. Walk Access Script Enhancement
12. Develop Parcel-Level Development Database
13. Develop Census and Household Travel Survey Database
14. Prepare Non-Motorized GIS Database

**T.O. 16.3: Managed Lanes (\$50,000), under consideration**

1. Review the latest practice of modeling managed lanes in the regional modeling frameworks
2. Evaluate options for enhancing managed lane modeling
3. Review data availability to support enhanced managed lanes modeling
4. Make recommendations
5. Potentially begin implementation

**T.O. 16.4: Non-Motorized Model Enhancements (\$40,000), under consideration**

1. Establish a baseline
2. Provide an update to the latest practice of modeling non-motorized travel in regional modeling framework
3. Evaluate options for enhancing non-motorized travel modeling
4. Make recommendations
5. Begin implementation

**T.O. 16.5: Mode Choice Model Enhancements (\$90,000), under consideration, will require contractual change**

1. Review the latest practice of mode choice modeling in the regional modeling framework
2. Evaluate options for enhancing non-motorized travel modeling
3. Make recommendations
4. Begin implementation