National Capital Region
**Transportation Planning Board**

## MEMORANDUM

**TO:** TPB Technical Committee

**FROM:** Ronald Milone and Mark Moran, COG/TPB Staff

**SUBJECT:** Strategic Plan for the TPB Travel Model Development

**DATE:** June 30, 2016

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## INTRODUCTION

This memorandum provides a brief review of a multi-year strategic plan that will guide the future development of the TPB's travel forecasting methods. The plan was developed with the assistance of a nationally recognized transportation consultant, Cambridge Systematics, Inc.(CS), during FY 2015 and early FY 2016. The TPB Travel Forecasting Subcommittee (TFS), the oversight committee for the TPB's Models Development program, has received regular briefings on the plan throughout its development. Additionally, the TPB Technical Committee was briefed on the plan on April 3, 2015, December 4, 2015, and will be briefed again on July 8.

## BACKGROUND

The currently adopted travel demand forecasting model, known as the Version 2.3 Model, supports many of the transportation planning studies conducted in the Washington, D.C. region. The current model is an aggregate, trip-based (or "four-step") model that operates on a 6,800-square-mile domain. The TPB model produces forecasts of highway, transit and non-motorized travel demand that are most meaningful at a regional scale of analysis. TPB model is not appropriate for sub-area or site-specific transportation studies, such as determining turning movements at roadway intersections or developing passenger demand at specific rail stations, since the model has not been validated at those levels. For sub-area or site-specific transportation studies, one should either post-process the outputs of the regional travel model, or use specially tailored software. Nonetheless, the TPB travel demand model provides a logical, rational and reasonable basis for conducting metropolitan-area studies including evaluations of the regional long-range transportation plan, mobile emission assessments, and corridor-level planning.

While TPB staff implements refinements to the adopted travel model on a yearly basis, the last formal strategic plan for the TPB travel models was prepared in 1993.[1] The development of a strategic plan is important as it allows staff to deliberatively chart out a model improvement course that takes into account local planning issues, best practices in travel demand forecasting at other metropolitan planning organizations (MPOs), and the latest advances emerging from research.

[1] Parsons Brinckerhoff Quade & Douglas, Inc., *A Strategic Plan for the Improvement of the Metropolitan Washington Council of Governments Transportation Modeling Procedures* (Washington, D.C.: Metropolitan Washington Council of Governments, January 8, 1993).

## STRATEGIC PLAN GOALS

The primary goal of the strategic plan was to ensure that future modeling improvements would align with policy areas of interest of the TPB and its stakeholders. Staff consulted the TPB Vision[2] and the Regional Transportation Priorities Plan (RTPP)[3] to identify key policy areas. The RTPP goals relate to themes that are quite relevant to travel modeling and include providing a comprehensive range of transportation options, promoting established activity centers as prime development locations, and maximizing operational effectiveness of the transportation system.

A secondary goal of the strategic plan was to ensure that the TPB travel modeling practice was within the state of the practice at other peer MPOs. As transportation issues and interests vary substantially between metropolitan areas, it is generally accepted by the profession that there is no single modeling approach that is suitable for all MPOs. Nonetheless, an evaluation of modeling procedures used in other metropolitan areas was deemed useful especially for identifying possible long-term improvements.

## STRATEGIC PLAN DEVELOPMENT

The strategic plan formulation was supported with information obtained both locally and nationally. TPB worked with CS to design and implement two surveys:

1. Model Stakeholder Survey: The online survey, conducted in spring of 2015, targeted travel modeling users in the Washington, D.C. region and inquired about how the regional model was being used and was used to solicit feedback on the positive and negative features of the currently adopted model. The respondents included local transportation agency staff as well as consultants who are familiar with the TPB model. After the survey was conducted, a special workshop was held, at which, TPB staff shared the initial results of the survey and also asked attendees some of the same questions as were found in the online survey.

2. A National Survey of Modeling Practices at Peer MPOs: In this second online survey, also conducted in spring of 2015, 23 MPOs were contacted and asked to identify features of their travel forecasting practice, both in application and in development. The sample included the top 20 MPOs, in terms of population (TPB is #9 on the list) and three smaller MPOs known for innovation in travel demand forecasting.

The stakeholder survey indicated that travel modelers in the region were generally quite satisfied with the existing model, model documentation and TPB staff support. However, stakeholders voiced some dissatisfaction with lengthy computing times and with difficulties in adapting the regional model to sub-area study needs. Stakeholders pointed to several emerging areas of planning interest that should be considered in the TPB's model improvement plans:

- peak spreading behavior and time-of-day policies;

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[2] "The TPB Vision," *Metropolitan Washington Council of Governments*, 2015, http://www.mwcog.org/transportation/activities/vision/.

[3] Ronald Kirby et al., *Regional Transportation Priorities Plan for the National Capital Region* (Washington, D.C.: National Capital Region Transportation Planning Board, Metropolitan Washington Council of Governments, January 15, 2014), https://www.mwcog.org/transportation/priorities/.

- transit modeling (demand for better differentiation of transit sub-modes; modeling transit oriented development and transit access);
- pricing and managed lanes, such as high-occupancy vehicle (HOV) lanes and high-occupancy/toll (HOT) lanes;
- travel time reliability; and
- non-motorized travel (bike and walk) sensitivity.

The national survey of MPO practices indicated that 70% of the agencies surveyed were either using or developing an activity-based travel demand mode (ABM). ABMs have emerged out of research as an alternative to conventional trip-based models. ABMs are different from trip-based models in that they model individual behavior as opposed to aggregate travel behavior, and they model tours (a tour is a sequence of trips). The survey determined that six of the 23 were using an ABM in production while 10 are currently developing an ABM. The findings of the national survey indicated to staff that TPB's modeling practice should, at minimum, consider the exploration of an ABM in its travel modeling improvement planning, in order to remain consistent with modeling activities being undertaken by peer MPOs. In fact, our sister MPO in Baltimore - the Baltimore Metropolitan Council (BMC) – which models some of the same jurisdictions that we do and uses the same household travel survey as we do, has just completed a three-year project to develop its own ABM. TPB staff has been monitoring the progress of this effort and will consider its advances as we move forward with model improvements for the Washington, D.C. region.

## STRATEGIC PLAN RECOMMENDATIONS

The TPB's strategic plan is contained in three reports:

1. Identifying Potential Opportunities for Model Improvement;[4]
2. Status of Activity-Based Models and Dynamic Traffic Assignment at Peer MPOs;[5] and
3. Draft Strategic Plan for Model Development.[6]

The first two reports focused on the presentation and evaluation of the information drawn from the stakeholder and national surveys conducted earlier. The third report detailed the recommended strategic plan, which was informed by the first two reports.

The recommended strategic plan is presented as a seven-year "roadmap" of travel modeling improvements. It is comprised of three phases over a seven-year timeframe:

Phase 1 (Years 1-2): Four-Step Modeling Improvement
Phase 2 (Years 3-5): Activity Based Model (using existing data)

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[4] Cambridge Systematics, Inc., *Identifying Potential Opportunities for Model Improvement, Task Order 15.2, Report 1 of 3*, Final Report (Washington, D.C.: Metropolitan Washington Council of Governments, National Capital Region Transportation Planning Board, October 15, 2015).
[5] Cambridge Systematics, Inc., *Status of Activity-Based Models and Dynamic Traffic Assignment at Peer MPOs, Task Order 15.2, Report 2 of 3*, Final Report (Washington, D.C.: Metropolitan Washington Council of Governments, National Capital Region Transportation Planning Board, October 15, 2015), http://www.mwcog.org/uploads/committee-documents/bVxfWF9Y20151027140413.pdf.
[6] 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).

Phase 3 (Years 6-7): Enhanced Activity Based Model (using updated data)

Phase 1 will focus on improving the existing trip-based model. The Phase 1 improvements will include transit modeling refinements, enhanced modeling treatment of managed (HOT/HOV) lanes, improved methods for modeling non-resident travel in the Washington region. Phase 1 will also include refinements to the treatment of non-motorized travel and several other technical refinements. This phase will also include preparatory activities supporting the next phases, such as developing a parcel-level database. Staff will also interact with BMC staff to gauge the comfort level they have with their ABM.

Phase 2 will begin the development of a "first-cut" ABM using existing data, such as the 2007/2008 COG/TPB Household Travel Survey. The ABM would likely be consistent with other such models that have been implemented in other metropolitan areas. Staff envisions that Phase 2 will serve as a demonstration that an ABM can be successfully developed for the Washington region and can serve as a robust analytical tool to model policies that are difficult to model with the existing trip-based model (such as pricing and environmental justice).

Phase 3 will involve the development of an enhanced ABM using newly collected household travel survey data (a 2017 survey is currently planned). The Phase 3 effort will, of course, be dependent upon the successful completion of Phase 2.

## NEXT STEPS

Following the review and approval of the strategic plan by the TFS, COG/TPB staff, working with CS, begun to implement Phase 1 of the plan. To identify some of the updates and guide the work, a short-term implantation plan was developed.[7] Following the review and approval of the Technical Committee, the strategic plan will be finalized and presented to the TPB at its July 20, 2016 meeting. COG/TPB staff will continue to monitor the developments at other peer MPOs, including BMC, and will apprise both the TFS and the Technical Committee of any new developments.

Ref: U:\draftDocs\Strategic_Plan_Overview_v3.docx

[7] John (Jay) Evans to Mark Moran, "Short-Term Trip-Based Model Strategy Implementation Plan," Memorandum, (November 11, 2015).