National Capital Region Transportation Planning Board
Metropolitan Washington Council of Governments
777 North Capitol Street, N.E., Suite 300, Washington, D.C. 20002-4290

Travel Forecasting Subcommittee Meeting Highlights

Friday, September 23, 2011, 9:30 AM to 12:00 PM

Meeting attendees

- Manfredo Davila (M-NCPPC, Prince George's Co.)
- Dan Goldfarb (Cambridge Systematics)
- Eric Graye (M-NCPPC, Montgomery Co.)
- Jamie Henson (DDOT)
- Manish Jain (AECOM)
- Bahram Jamei (Virginia DOT)
- Yuanjun Li (M-NCPPC, Montgomery Co.)
- David Roden (AECOM)
- Phil Shapiro (STC)
- Sashank Singuluri (AECOM)
- Dan Stevens (Fairfax County DOT)
- Gregg Steverson (Prince William Co.)

COG/TPB staff in attendance

- William Bacon
- Anant Choudhary
- Joe Davis
- Bob Griffiths
- Eulalie Gower-Lucas
- Wanda Hamlin
- Charlene Howard
- Hamid Humeida
- Mary Martchouk
- Ron Milone
- Mark Moran
- Jinchul (JC) Park
- Jane Posey
- Wenjing Pu
- Clara Reschovsky
- Rich Roisman
- Meseret Seifu
- Daniel Son
- Dusan Vuksan
- Feng Xie
- Jim Yin

The meeting was chaired by Jamie Henson of DDOT.

1. Introductions and approval of highlights from the previous meeting

The highlights from the July 22 meeting of the Travel Forecasting Subcommittee (TFS) were approved without any changes.

2. Consultant contract: Assistance with development and application of the TPB travel demand model

Mark Moran of TPB staff presented this item and distributed a copy of the presentation slides to the attendees. Mr. Moran stated that COG/TPB has recently issued a Request for Qualifications (RFQ) for technical support in the models development area. This is a task-order contract concerned with advising TPB staff on specific travel modeling methods as well as conducting focused research in travel modeling practice at other MPOs across the country. TPB staff has maintained this technical assistance project for the past six years (COG/TPB has previously contracted with Vanasse Hangen Brustlin and Cambridge

Systematics). He reviewed the consultant selection process and announced that the new contract has been awarded to AECOM. Mr. Moran also discussed the task orders for the current fiscal year (FY 2012). Task 1 entails attending meetings and responding to technical questions relating to models development activities. TPB staff is also formulating three additional proposed tasks associated with improving the Version 2.3 mode choice modeling process (Tasks 2 and 3) and reducing the time needed to run the TPB Version 2.3 travel model (Task 4). Mr. Moran added that The budget for these four task items is $100,000 out of a total budget of $150,000. There were no questions following the presentation.

3. TPB Version 2.3 Travel Model on the 3,722-TAZ area system: Status report

This item was presented by Ron Milone of TPB staff, who distributed a copy of his presentation slides to the attendees. Mr. Milone reminded the committee that the most recent draft Version 2.3 travel model releases were 2.3.17, released on April 29, and 2.3.27, released on June 30. Modeling work supporting the 2011 CLRP Air Quality Conformity Determination is now in progress using the Version 2.3.27 model release. Model simulations have been executed for the years 2002, 2016, 2020, and 2030. TPB staff is currently working on the final 2040 simulation. He added that staff anticipates that the Version 2.3 model will be adopted in November and a transmittal package for the adopted model will be prepared during December. The existing V2.3.27 model may be subject to further modification pending an evaluation of initial model results. Staff will fully apprise the TFS of any additional changes to the model at the next (November) meeting.

Next, Mr. Milone discussed the so-called "transit constraint" which has been an integrated component of all TPB's regional travel models since 2000. The transit constraint is essentially an adjustment of the mode choice model output trip tables that reflects the expectation that peak period Metrorail demand traveling to and through the regional core will reach capacity prior to 2040. The transit constraint procedure was originally requested by WMATA in order to reflect the implications of funding limitations on planned capacity expansion of the Metrorail system in the regional travel demand model. It is currently assumed that the Metrorail demand will reach peak capacity at the year 2020, and so the transit constraint is imposed on mode choice model results for all simulation years after 2020 (the “binding” year). The transit constraint process mechanically functions to maintain peak period Metrorail trips to and through the core at 2020 levels and to convert "excess" Metrorail demand into auto demand. While there are other possible responses to Metrorail congestion that could be assumed, the existing assumption that peak Metrorail riders will divert to auto modes is acceptable to WMATA and TPB staff.

A subcommittee attendee inquired whether year 2020 was selected as the binding year as a result of a peak factor analysis. He mentioned that WMATA has a “line load” application which allows one to determine the load for different segments and stations based on the mode choice output. He also pointed out that WMATA plans on transferring to all 8-car trains by 2030 thus expanding the capacity by 15%-20%. TPB staff responded that it relies on WMATA's input regarding the specific binding year of the transit constraint. Mr. Milone was not familiar with the specific analysis WMATA uses to arrive at the prescribed constraint year, but stated that WMATA has periodically revised constraint the year based on

updated funding and planning assumptions. The subcommittee attendee also suggested that instead of running the year 2020 analysis to determine the capacity and then applying it in year 2030, the transit capacity can be calculated from the fleet size and then used directly for the year 2030 run. Another subcommittee member asked whether the transit constraint is applied to trips from everywhere in the region to the core or just from Virginia. TPB staff responded that the constraint is applied to all peak Metrorail trips to and through the core, irrespective of the trip origin location.

Next, Mr. Milone discussed the post processor to the travel demand model which is used to refine travel model speeds and to apply the Mobile 6 emission rates to modeled travel demand output. Starting emission rates are applied to hourly trips at the zone level, while the running emissions are applied to hourly VMT at the link level. Since the running emissions are based on link speeds, the post processor speeds are critical to the emissions calculation. Mr. Milone then described the process of deriving hourly link speeds. He next showed the resulting link speeds for ten locations in the modeled region and compared them to speeds obtained from INRIX. He concluded that, in general, the post processor speeds compared with INRIX speeds reasonably well, considering that the regional model is validated to screenline levels instead of individual link volumes. Final model documentation on the Version 2.3-based speed post processor will be prepared by December.

A subcommittee attendee commented that some of the simulated free-flow speeds appear to be lower than the INRIX-based free-flow speeds and suggested looking into the source of the discrepancy. Mr. Milone agreed that this may be something that should be examined. However, he added that the INRIX free-flow speeds may not be representative of true conditions. Mary Martchouk added that the INRIX speeds are obtained from probe vehicles and thus the sample size during the free-flow conditions (at night) may be small. It is also unclear how INRIX treats outlier speeds, thus these may be skewing the average free-flow speed. Bob Griffiths mentioned that, based on floating car studies, INRIX speeds were observed to be higher than those obtained from the floating car.

An attendee inquired whether any INRIX data is available for local streets with signalized intersections. Mr. Milone responded that currently there is no local data. However, they are continuously expanding their coverage so in the future there may be a larger speed data sample. Another attendee asked whether there is information regarding the number of observations used for calculating the hourly speeds. Mr. Griffiths responded that while the number of observations is not available, INRIX provides a measure of quality of the data using a letter grade which is related to the number of observations. He added that one reason that there is no local data available is because in order to have sufficiently reliable data, there need to be many observations which are more difficult to obtain on roads with lower traffic. He also mentioned that in some cases if not enough observations exist for a segment of the road for the specified time frame, historical averages can be included in the calculation of the average speed. A consultant mentioned that at a recent ITE event, there was an announcement that INRIX data will be publicly available on a website in the coming months. At the current time public agencies and consultants that are working with them have access to this data.

4. TPB Version 2.3 Travel Model on the 3,722-TAZ area system: Corridor-level sensitivity tests

This item was presented by Dusan Vuksan and Feng Xie of TPB staff. They distributed a copy of their slides to the attendees. Mr. Vuksan first explained the reasons behind conducting sensitivity tests and discussed the typical test scenarios. He then described the first test that was conducted which involved adding one lane to the I-95 corridor in each direction between the Capital Beltway and the Baltimore Beltway. The added road capacity resulted in a shift in vehicles from competing facilities to I-95 as anticipated. The greatest changes in trip distribution and jurisdictional VMT occurred in Prince George's, Montgomery, Anne Arundel, and Howard counties which are located in the modified corridor. However, some smaller volume changes were observed on facilities beyond the study area including I-95 in Virginia. Mr. Xie presented the findings of the second test, which involved keeping the I-95 modification from test 1 and running the model to a minimum relative gap threshold of 10^{-4} instead of 10^{-3}, the latter value being the standard practice for the TPB Version 2.3 Travel Model. This test yielded similar results in the study area, however, fewer volume changes were observed in areas far removed from the study area. Mr. Vuksan concluded the presentation by mentioning that the sensitivity tests yielded reasonable results and pointing out that while the relative gap threshold of 10^{-3} is sufficient for many regional analyses, for corridor-level studies it may be desirable to have a higher level of convergence.

Following the presentation, a subcommittee attendee asked whether any significant changes were observed in the trip distribution between the run with 10^{-3} relative gap and 10^{-4} relative gap. Mr. Vuksan responded that no large changes were observed. He added that the relative gap change essentially had an impact on only volumes farther away from the study area. A subcommittee member asked whether the model would produce similar results if a more complicated piece of the system was modified, such as part of the DC network. Mr. Vuksan responded that he would expect similar results based on the findings of both his tests and those presented at the previous TFS meeting.

5. Recent developments in tour-based/activity-based models

Mr. Milone mentioned at the start of this item that a budget adjustment has been made to the Models Development program element (4C.) in the current (FY 2012) UPWP. TPB staff was informed in August that the Maryland DOT has rescinded some of its funding contribution to the current TPB work program (approximately $250,000). This type is situation is always a possibility as the initial UPWP is based on several funding stream assumptions. Senior staff has decided to address the rescission by removing an activity in Models Development: The development of an advanced (activity-based) travel model. This activity has been considered in previous work programs, but has been deferred given that an AMPO study examining the cost and benefits of advanced modeling approaches has been underway for several months and has not yet been fully completed. Mr. Milone also added that he expects that this money will be restored once additional funding becomes available. At that point, TPB staff will need to determine the best use of the restored funds, making use of information from the AMPO study and other similar studies on the topic.

Rich Roisman of TPB staff presented the last two parts of the item. He distributed a copy of his presentation to the attendees. Mr. Roisman began with an overview of what ABMs are as well as the

reported benefits of these models, including a more realistic theoretical foundation, improved modeling of intra-household interactions, more detailed outputs, improved ability to model pricing, and ability to eliminate non-home-based trips. Some of the concerns regarding ABMs include the cost of implementation, lack of standards, higher complexity level, and uncertainty regarding whether they yield better results. Next, Mr. Roisman discussed some of the findings of the TRB Special Report 288 released in June 2007. These included the fact that while the current models may be inadequate to address some of the modeling demands and policy concerns, most MPOs continue to use the four-step process. The report also pointed out that there is insufficient evidence that the advanced (activity-based) models provide significant improvements over current practice and that they can be implemented for a reasonable cost. Next, Mr. Roisman briefly mentioned NCHRP Synthesis 406, a report released in mid-2010 which documents interviews with users of advanced models.

Mr. Roisman then discussed Phase 1 of the AMPO Pooled Funding Initiative, which aimed to identify MPO experiences with ABMs, describe the status of MPO documentation, develop performance and cost criteria for assessing ABMs and design a study to compare ABMs and trip based models (TBMs). In this study, model development and model application documentation were reviewed from nine agencies, including NYMTC, MORPC, SACOG, SFCTA, ARC, DRCOG, KRTPO, Tahoe MPO, and PSRC. It was concluded that while some documentation exists, it is "not sufficient to permit an assessment of the benefits to the agency of implementing an activity-based model relative to the incremental cost of new model development rather than maintenance or upgrading of the trip-based model." The report also proposed three different ways to compare TBMs and ABMs, including aligned, case study, and conceptual model comparison. Based on the report, the study steering committee selected the case study model comparison for the next phase of the study.

Before describing the work that is planned for the Phase 2 of the AMPO Pooled Funding Initiative, Mr. Roisman discussed a recent Ohio DOT study, completed in February 2011, which compared the MORPC production ABM model to a TBM specially developed for these tests. The study conclusions were that the ABM performed slightly better than the TBM at estimating the vehicle ownership, work flow distribution, work start time distribution, and average travel time for work trips. Thus the ABM was better able to provide better travel behavior information for these four indicators. However, the overall predictive abilities of the two models were assessed to be equal. It was also noted, that part of the benefit from using the ABM is lost due to the use of the static traffic assignment which is unable to have a finer time resolution.

Next, Mr. Roisman discussed the Phase 2 of the AMPO Pooled Initiative, which involves completing detailed case studies in Atlanta and Sacramento. The study tasks include documenting the rationale for developing the ABM, model development timeline, the relationship of ABM to TBM, how the ABM and TBM are used in different planning processes, and lessons learned in the development process. The study also involves reviewing model application results of the ABM and comparison to the TBM. Mr. Roisman concluded his presentation by stating that ABM development is a costly process and there is a need for more evidence of the benefits before TPB proceeds to develop an ABM.

Mr. Milone inquired whether Phase 2 of the study will compare the existing data from the ABM and TBM or if new data will be generated. Mr. Roisman responded that both time and budget are limited and thus only the existing information will be used. A subcommittee member inquired what software packages are used for ABMs. Mr. Roisman responded that the standard travel demand software such as TransCAD and Citilabs are used however they are highly customized for the ABM application. The additional scripting is completed in a variety of languages including Python, R, etc. A subcommittee attendee asked whether the TPB is considering switching to the dynamic traffic assignment (DTA). Mr. Milone responded that DTA may be considered in the future, however there are many challenges associated with its implementation. One of the largest obstacles is the lack of detailed validation data as well as traffic signal data. In addition it is still unclear what it would take to upgrade the transportation network in order to perform DTA. Mr. Roisman added that the one of the SHRP2 research projects involves two case studies focused on implementing ABMs with fine-grained, time-dependent networks (which utilize DTA) in Jacksonville, FL and Sacramento, CA. This study may clarify some of the issues with implementing DTA and creating detailed networks for ABMs.

There was a discussion regarding the difficulty of obtaining the disaggregate data for ABM development. Mr. Griffiths mentioned that now that the Census long form is not being used, the only source of data needed for the population synthesizer is the Public Use Microdata Sample (PUMS) which has a dramatically lower sample size and aggregates five years of data.

6. Other business

There was no other business. The next proposed meeting of the TFS is Friday, November 18, 2011 from 9:30 AM to 12:00 noon. The meeting adjourned at about 11:45 AM.

The highlights were written by Mary Martchouk.