
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, July 23, 2010, 9:30 AM to 12:00 noon

Meeting attendees

- Arpita Chatterjee (Fairfax Co. DOT)
- Erik Dahlberg (WMATA)
- John (Jay) Evans (Cambridge Systematics)
- Dan Goldfarb (Cambridge Systematics)
- Manish Jain (AECOM Consult, Inc.)
- Bahram Jamei (Virginia DOT)
- Eric Jenkins (M-NCPPC, Prince George's Co.)
- Wendy Jia (WMATA)
- Dial J. Keju (Frederick Co.)
- John Li (Michael Baker Corp.)
- Yuanjun Li (M-NCPPC, Montgomery Co.)
- Subrat Mahapatra (MD SHA)
- Joe Mehra (MCV Associates, Inc.)
- Jaak Pedak (Fairfax Co. DOT)
- Dante Perez-Bravo (CH2M HILL)
- Rich Roisman (VHB)
- Dan Stevens (Fairfax County DOT)
- Gregg Steverson (Prince William Co.)

COG/TPB staff in attendance

- Tim Canan
- Joe Davis
- Bob Griffiths
- Wanda Hamlin
- Charlene Howard
- Hamid Humeida
- Ron Kirby
- Mary Martchouk
- Ron Milone
- Abdul Mohammed
- Mark Moran
- Jinchul Park
- Clara Reschovsky
- Meseret Seifu
- Robert Snead
- Dusan Vuksan
- C. Patrick Zilliacus

The meeting was chaired by Subrat Mahapatra of the Maryland State Highway Administration (MD SHA).

1. Introductions and approval of highlights from the previous meeting

The highlights from the May 21, 2010 meeting of the Travel Forecasting Subcommittee (TFS) were approved without any changes.

2. 2007/2008 Household Travel Survey documentation

This item was presented by Bob Griffiths of TPB staff. A copy of the draft technical documentation, dated July 23, and appendices were distributed to the subcommittee. TPB staff processed the survey once it was delivered by the contractor, NuStats. Mr. Griffiths mentioned that while the documentation is complete, there may still be edits to come. He proceeded to describe the documentation, which includes survey methodology and survey processing sections and pointed out that the survey design was particularly complex because of the decision to oversample high density, mixed land use areas as a means of gaining better representation of non-motorized and transit modes. Next, Mr. Griffiths

discussed the sample types that were used in the survey to ensure that both mail only and mail/phone households were reached which included:

- Type 21- Addresses with a telephone number available. Contacted by phone and mail, with no incentive.
- Type 22- Addresses without available telephone number. Contacted by mail, with \$50 incentive.
- Type 23- Addresses with a telephone number available. Contacted by mail, with \$50 incentive.

Next, Mr. Griffiths pointed out tables in the documentation that include survey response rates by survey stratum and sample type, including an estimate of how many surveys were delivered, number of respondents recruited, and percent of diaries completed. He noted that households that received the \$50 incentive had lower overall recruitment and response rates, however, a higher rate of travel diary retrieval. Overall, the target numbers were achieved in all jurisdictions. Mr. Griffiths also mentioned that the documentation included the survey interview, reminder calls, and the GPS add on. The survey processing section of the documentation includes a description of the geocoding methodology, modal edits, data checks, speed/distance checks, analysis of households that moved, imputation of missing household and person data, and trip linking procedures. The final section of the documentation summarizes the expansion of survey data to population totals (survey weighting). Mr. Griffiths concluded the presentation by mentioning that the documentation will be available on the TFS website.

Following the presentation a subcommittee member asked whether any comparisons have been done with the 1994 HTS or the 2000 Census. Mr. Griffiths responded that some comparisons with the 1994 HTS data have been completed and presented to the TPB on March 17, 2010 (available on the TPB website). We have also made comparisons with the ACS, which included the number of households in the 2007 HTS and the ACS and the household size in the 2007 HTS and the ACS.

3. Development of bus-only trips from the 2008 Regional Bus Survey

This item was presented by Clara Reschovsky of TPB staff. A copy of the presentation slides was distributed to the subcommittee. Ms. Reschovsky started her presentation with a discussion of the two datasets, including the WMATA bus survey file and the Fairfax Connector survey file, which were combined to form the 2008 Bus Survey. She then mentioned how the bus-only trips (which will be used to obtain targets for mode choice calibration) were filtered out from the full dataset based on access and egress modes. Next, she described the methodology for recoding errors in the number of transit vehicles used (an important variable for trip linking), based on access and egress modes. For example, if the person accessed the bus that he or she was surveyed on by another bus, yet the number of transit vehicles used was listed as one, it was modified to at least two. After fixing the errors in the file, Ms. Reschovsky calculated the number of trips by mode, which consisted of bus only with no transfer (40%), bus only with bus transfer (25%), and bus with rail transfer (35%). She also summarized trips by:

- Access mode to bus
- Egress mode from bus
- Household vehicle availability
- Household income

- Origin-Destination by Jurisdiction

One of the attendees inquired whether any adjustments have been made to the bus survey weights that were provided by NuStats because they found that some of the weighting factors were very high (up to 250). Ms. Reschovsky responded that the original weights had not been revisited; however, once the linked trip weights are calculated, using the number of transit vehicles used on a trip, the weighting factors will be reduced. A brief discussion of the cases where the weights were very high followed, and at the end, the attendee mentioned that in order to make weights reasonable, they either smoothed them or applied a cap. A comment was made by TPB staff that there are some gaps in the survey including northern Montgomery County, which was under-surveyed and some outer counties where the response rate was low.

4. Network development: Status of the calibration-year (2007) highway and transit networks

This item was presented by Bobby Snead, recently retired from COG and now a consultant. A copy of the presentation slides was distributed to the subcommittee. Mr. Snead began his presentation by mentioning that the new 2007 highway and transit networks have been completed on the new 3,722-TAZ system, which provides refinement in areas where growth has occurred since the development of the last area system, including the outer jurisdictions. He described the ArcGIS tools that are being used including the TPBMAN, a geographic database that contains multi-year highway and transit networks, and COGTOOLS, a customized ArcGIS application used to edit TPBMAN, which allows exporting files for use in Cube Voyager. The objectives for the development of these tools included consistency of multi-year networks, improved accuracy of the networks, efficiency of updating the networks, better integration of highway and transit, and multi-user editing capabilities. He also discussed some of the enhancements in the new network including conflation to the NAVTEQ street base, more nodes resulting in an increased number of centroid connectors and highway links, revised area types, and new highway link attributes. Mr. Snead proceeded to thank the local jurisdictions for providing feedback on centroid locations and connectors and said that these changes have been incorporated into the networks. Lastly, Mr. Snead mentioned that TPB staff is continuing to update the networks based on reviews, checking connectivity of the networks, developing the year-2040 highway and transit networks, and optimizing TPBMAN. There were no questions for Mr. Snead.

5. Status of the Version 2.3 travel model on the 3,722-TAZ area system

This item was presented by Ron Milone of TPB staff. Mr. Milone began by pointing out that the TPB staff is currently working on developing the Version 2.3 model, however the Version 2.2 model (on the 2,191 TAZ system) will be utilized for the upcoming conformity analysis along with Round 8.0 land use forecast. This should be the last use of Version 2.2 Travel Model for air quality conformity. He then went on to discuss some of the changes that will be implemented in the Version 2.3 Travel Model including:

- New 3,722 TAZ system
- Nested logit mode choice model
- New truck model

- Five modeled purposes (the Non-Home-Based purpose has been split into Non-Home-Based Work and Non-Home-Based Other)
- Trip generation rates inclusive of motorized/non-motorized trips
- Switch from three-to five-hour peak periods in order to take into account the peak spreading that has occurred since 1994 and to capture a greater share of work trips
- Addition of a new time-of-day period (midday) to better match trip patterns

Mr. Milone then discussed the timeline for Version 2.3 activities. TPB staff hopes to complete demographic models and trip generation by the September TFS meeting and trip distribution and mode choice by the November meeting. The Travel Model is to be finished by December 2010.

A subcommittee member pointed out that Virginia is currently doing a number of studies, which include two I-66 projects, and would like to be able to use the Version 2.3 Travel Model. However, they are concerned whether the model would be completed by the end of the year. He also expressed concern that it will be difficult to check the validity of the model results because numerous changes have been made to the Version 2.2 model. Mr. Milone responded that detailed comparisons by time-of-day will be done on the new model adding that one has to be careful comparing two different model sets. Another attendee commented that the most important comparison is between the new model and the new survey data, not the new model and the previous model. A discussion followed regarding conversion of the Round 8.0 land use forecast, from the 3,722-TAZ system to the 2,191-TAZ system for the conformity analysis. An attendee commented that it would be valuable to maintain the equivalency table between the old and the new zone systems because many projects may still require analysis on the old system with a new land use forecast. He suggested that in order to avoid model users allocating land use to the old system based on area proration, TPB should provide the equivalency tables. Mr. Griffiths mentioned that he has done the conversion and is willing to document the work and provide the files to the jurisdictions.

A question was asked regarding what the new four time periods will be and whether the model will be calibrated for these time periods. Mr. Milone stated that there will be a new midday period (10 AM - 3 PM) and expanded peak period definitions (from 6-9 AM to 5-10 AM and from 4-6 PM to 3-8 PM). With respect to model calibration, he mentioned that some hourly counts are available and will be used to verify VMT and screenline crossings. He added that there is still a lack of data when it comes to hourly speeds, particularly with respect to arterial facilities.

6. Proposed parking cost model for automobile modes

This item was presented by Mary Martchouk of TPB staff, who distributed a copy of the presentation slides to the subcommittee. Ms. Martchouk gave some background information about the existing parking cost model, mentioning that the parking cost is currently estimated as a function of the TAZ employment density and that the model is in need of updating. She proposed using the 2007 HTS data, which includes information regarding trip parking cost, to re-estimate the daily parking cost based on work-related trips and hourly parking cost based on other trips purposes. Ms. Martchouk then showed the observed daily parking cost plotted against TAZ employment density with a line fitted through the points and suggested that the relationship is weak and perhaps the floating employment density should

be used instead. She also suggested that the parking cost should be looked at by area type of the attraction zone because most observations where parking cost was incurred were of area types 1 or 2. A logarithmic model was then estimated based on area type 1 and 2 data that will be applied to area types 1, 2, and 3 to estimate daily parking costs. For the hourly parking costs, insufficient observed data was available and thus general parking meter rates will be used based on area types, which vary from no cost to \$2.00 per hour.

A suggestion was made by a subcommittee attendee to replace the one-mile floating employment density with employment density calculated based on the employment density within the TAZ and the adjacent TAZs, because it would be less sensitive to the location of the TAZ boundary. Ms. Martchouk admitted that this may yield better results, however, it would be difficult to implement. A question was asked regarding the removal of outlier points. Ms. Martchouk responded that a number of outliers have been removed and the observations used to estimate the model appear to be valid. In conclusion, Mr. Milone added that the resulting parking cost model is a reasonable update to the existing model and that many other MPOs use travel survey data to derive parking cost models.

7. FY 2010 end-of-year reports in models development and network development

Mark Moran of TPB staff presented the models development report, while Bobby Snead presented the network development report. A copy of the presentation slides was distributed to the subcommittee.

Mr. Moran began by informing the attendees that draft copies of both the models and network reports are available at the meeting and online on the TFS webpage and asked subcommittee members to provide comments on the reports within 30 days. He then mentioned that the models development report discusses five tracks: applications, methods development, research, data collection, and maintenance. Mr. Moran proceeded to point out some of the key points in the report including:

- Enhancements to Version 2.2 Travel Model include the application of tolls to external markets, addition of an explicit HOV assignment step, and changes to auto operating cost growth
- Version 2.3 Travel Model on the 3,722-TAZ system is currently being developed using the 2007/2008 HTS
- The new model will include five trip purposes, a non-motorized trip end model for all purposes, and a consistent traffic assignment convergence
- Updates have been made to the truck model, as well as external and through trips
- Mode choice targets have been developed for model calibration for most of the transit submodes
- "Pseudo Round 8.0" land use forecast will be used for model calibration
- 2007 HTS is ready and has been checked
- Base-year counts have been extracted from the RTDC and are being added to the network
- 2007 Air Passenger Survey will be used to update airport trips, which will include auto and transit trips

Following the presentation, an attendee asked whether the TPB staff have looked into increasing the number of gravity model iterations. Mr. Moran responded that this is something that the TPB is planning to do. A subcommittee member inquired whether the TPB staff has looked into how many time periods other MPOs use and the length of the peak periods. Mr. Milone responded that all the MPOs are different and they look at patterns in the local data, which is what the TPB staff has done and is using to make their recommendation. Mr. Moran added that based on the CS reports, very few MPOs have just three time periods.

Mr. Snead presented the network development report, which consists of an overview, project elements in the 2010 CLRP, network inputs to the Version 2.2 Travel Model, and the development of the network for the Version 2.3 Travel Model. He, then, went over some of the updates to the 2009 CLRP that are included in the report. In addition, Mr. Snead described what is included in the Version 2.2 Model Network Development and Version 2.3 Model Network Development sections of the report. Some of the key points in the report include the development of:

- 3,722-TAZ area system
- New node numbering system
- New area types
- Highway and transit network inputs
- Updated screenline layer

He concluded the presentation by going over the next steps, including testing of the networks, phasing TPBMAN application into production, developing the year-2040 networks, adding the 2010 CLRP projects to the networks, and including year-2010 transit service data.

8. Scan of best practices in travel demand forecasting

This item consisted of two presentations:

- a. Task 10 Potential Short-Term Model Enhancements: Transit-Related Enhancements (Jay Evans, Cambridge Systematics), which was deferred from the previous meeting
- b. TPB staff comments on Tasks 7-10 (Mark Moran, TPB staff)

Before discussing the results of the investigation into modeling transit enhancements, Mr. Evans pointed out that the source of information for all the tasks was model documentation from nearly 30 MPOs. The first part of Task 10 concerned the representation of transit in the model. Mr. Evans stated that the TPB's representation of distance-based Metrorail fares is consistent with the state of practice; however, he suggested that the TPB may want to consider explicitly representing fares for each mode combination. Next, Mr. Evans discussed transit fare subsidies including the challenges with implementing them. He acknowledged that there are many difficulties due to the complexity of the transit system and different subsidies for federal employees and private sector employees; however, he suggested that it would be beneficial if the subsidies were applied to all transit modes, as opposed to just Metrorail, which was the case with the tests done by TPB staff in 2009. He proposed accomplishing this by estimating models using recent survey data or exploring CBD discounts or district-level measures

of subsidy. Wendy Jia from WMATA mentioned that using the Metrorail Survey and the Bus Survey, WMATA staff were able to identify the percentage of riders receiving a federal subsidy, so one can use this information to apply subsidy adjustments. The third topic of Task 10 involved exploring how bus speeds should be modeled as a function of highway travel times. Mr. Evans suggested that it is state of practice to model transit times as a function of highway travel times and this can be accomplished through the use of bus speed curves, regression models, or by adding bus delay to the congested highway time. The last part of the presentation focused on mode choice modeling, which can be completed using the “estimation” approach, the “assertion” approach or a hybrid of the two. Mr. Evans pointed out that close to half of the MPOs use estimation for their mode choice models. The CS recommendation for TPB is to take the estimation approach first, and then use hybrid approach if necessary.

A TPB staff asked whether the FTA has any fare representation requirements. Mr. Evans responded that the FTA has concerns about inconsistent user benefits calculation where distance based fares are combined with flat fares, however, there are no requirements. A good practice would be to represent fares by provider and transit mode. The staff member brought up the ongoing struggle representing peak-of-the-peak fares and the resulting shifts in number of trips in an aggregate model. Ms. Jia mentioned that WMATA assumes a fixed percentage of persons shift from the peak of the peak to the shoulder of the peak. Mr. Evans suggested using an average value of the fare for the entire peak period after the subsidies are considered.

A TPB staff member inquired whether the development of bus speed approach requires link-level speed data for buses. Mr. Evans responded that one can look at the assigned time for a particular bus line that can be obtained from a report produced by Cube and then disaggregate the bus route by facility type. Ms. Jia mentioned that a recent bus speed map from the Priority Corridor Network (PCN) study can be a viable source of data for bus speed model calibration. She said that real travel time data is obtained from WMATA buses and the information is geocoded and stored in a central database.

Following Mr. Evans' presentation, Mr. Moran presented some preliminary TPB staff comments on the four task-order draft "memoranda" that CS had produced in FY 2010 (Tasks 7-10). He explained that the four draft memoranda had been delivered to TPB staff at the end of June, and that CS had now compiled the four memos into a draft report that was being shared with the TFS today via the TFS webpage. There would be a 30-day review period beginning today. TPB staff is in the process of a memo that contains TPB comments on the CS recommendations (e.g., what model updates to incorporate and when to phase them in), but, since the memo is not yet finished, the purpose of Mr. Moran's presentation today was to present some preliminary TPB staff comments. His presentation consisted of a summary of the CS findings and some TPB staff comments on the findings. This information is summarized below (Mr. Moran's presentation covered only Tasks 7-9, not Task 10, since these were the tasks that had already been presented to the TFS at the May 21 meeting):

Task 7: TPB will continue to monitor the developments of traffic assignment algorithms, will test the bi-conjugate Frank-Wolfe, and plans to implement a traffic convergence threshold, such as a relative gap of 10^{-3} . Staff is also considering using skim matrix root mean square error as a measure of the level of

convergence in the speed feedback loop, and changing the traffic assignment so that the final trip table is assigned to the network.

Task 8: For the Version 2.3 Travel Model, the TPB will split Non-Home-Based trips into Non-Home-Based Work and Non-Home-Based Other and will consider Home-Based School and Home-Based University trip purposes in future model updates. In addition, in the short term, transit trips to the airport will be added to the seed matrix, with the split between auto and transit being a fixed percentage. Following the initial release of the Version 2.3 Travel Model on the new zone system, TPB staff hopes to develop a nested-logit ground access mode choice model.

Task 9: As mentioned previously, the number of time of day periods will be increased from three to four, with peak periods consisting of five hours each. TPB staff will also try to apply the QDF in a more uniform fashion or eliminate it by using new volume-delay function (VDF). Lastly, Mr. Moran mentioned that TPB staff will consider CS's recommendation to eliminate the multi-run assignment that is used for modeling HOV/HOT travel, adding that staff would like to get a copy of the model setups used by CS to test its elimination.

9. 2009 central employment core cordon count of vehicular and passenger volumes

This item was presented by C. Patrick Zilliacus of TPB staff. A copy of the presentation slides was distributed to the subcommittee. In his presentation to the TFS, Mr. Zilliacus discussed the single-day cordon counts that were completed from April through June 2009. The counts were completed from 5 AM to 10 AM for the inbound traffic into the core and from 3 PM to 8 PM for the outbound traffic. He discussed which stations were not counted. For the AM period, total person trips were observed to be higher by 20,000 (443,000 to 463,000) compared to 2006 counts. Single-occupant vehicle volumes during this period decreased, while multiple-occupant vehicles and transit riders increased. For the PM period, total person trips were observed to be higher by 17,000 (428,000 to 444,500) as compared to 2006, with the number of single-occupant vehicles being down and number of transit riders being up. It was also noted that travelers appear to be entering the core earlier in the morning and leaving earlier in the afternoon. The last observation that was made is the fact the auto occupancy appears to have risen from 1.20 to 1.26- the first increase in decades.

An attendee asked to clarify whether the counts were obtained on I-395 since counts on bridge crossings were missing. Mr. Zilliacus confirmed that I-395 counts were obtained between Glebe Rd. and Arlington Ridge Rd., where the maximum load point is.

Ms. Jia hypothesized that the increase in the auto occupancy could be due to economic downturn because she observed that Metrorail ridership decreased last May. However, she pointed out that leisure trips have continued to rise throughout this time. She also asked Mr. Zilliacus for the GIS map of count stations and he agreed to e-mail it to her. Another attendee asked whether the TPB looked at the fuel cost. Mr. Zilliacus responded that they did and when the study was conducted the fuel costs had already gone down from their peak in 2008. He stated that he is unsure whether there are any prolonged effects of the spike in the fuel prices on the auto occupancy.

10. Other business

There was no other business. The next proposed meeting of the TFS is Friday, September 17, 2010 from 9:30 AM to 12:00 noon. The meeting adjourned at about 12:08 PM.

The highlights were written by Mary Martchouk and Mark Moran.