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, November 19, 2010, 9:30 AM to 12:00 noon

Meeting attendees

- Thomas Burke (Fairfax County DOT)
- Erik Dahlberg (WMATA)
- John (Jay) Evans (Cambridge Systematics)
- Dan Goldfarb (Cambridge Systematics)
- Eric Graye (M-NCPPC, Montgomery Co.)
- Jamie Henson (DDOT)
- Tony Hofmann (Michael Baker Corp.)
- Manish Jain (AECOM Consult, Inc.)
- Bahram Jamei (Virginia DOT)
- Eric Jenkins (M-NCPPC, Prince George's Co.)
- David Kline (Fairfax County DOT)
- Yuanjun Li (M-NCPPC, Montgomery Co.)
- Subrat Mahapatra (MD SHA)
- Maggie Qi (VHB)
- Phil Shapiro (STC)
- Dan Stevens (Fairfax County DOT)
- Gregg Steverson (Prince William Co.)

COG/TPB staff in attendance

- William Bacon
- Elena Constantine
- Joe Davis
- Charles Grier
- Bob Griffiths
- Wanda Hamlin
- Charlene Howard
- Hamid Humeida
- Eulalie Lucas
- Mary Martchouk
- Andrew Meese
- Ron Milone
- Abdul Mohammed
- Mark Moran
- Jinchul Park
- Jane Posey
- Clara Reschovsky
- Meseret Seifu
- Daniel Son
- Robert Snead
- Dusan Vuksan
- Jim Yin

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 September 17, 2010 meeting of the Travel Forecasting Subcommittee (TFS) were approved without any changes.

2. Ver. 2.3 travel model on the 3,722-TAZ area system

a/b. Status report and Time-of-day model updates

The first part of the presentation was conducted by Ron Milone of TPB staff, who distributed the presentation slides to the attendees. Mr. Milone first went over some of the items that were discussed at the previous TFS meeting and comments received in response to these presentations. Some of the suggested changes included using weighted trips to calculate trip rates, reducing the proposed five-hour peak period durations, and disaggregating the I-X trip extraction model. He mentioned that these

suggestions were taken into account and implemented in the model. The updated trip generation models were then applied to the land use and the results were evaluated. In addition to updating the trip generation models, TPB staff have been working on assigning observed traffic to the network to evaluate different assignment parameters and looking at the trip distribution parameters. Mr. Milone then mentioned that between now and the January TFS meeting, staff plans to complete trip distribution, mode choice, overall model application process and corresponding model documentation. At the end of the presentation, Mr. Milone made a general announcement that the latest air quality conformity work, Round 8.0 land use, and model application were approved by the TPB on November 17 and will be available as a standard transmittal package.

Meseret Seifu, of TPB staff, presented the information on time-of-day model updates. She began her presentation by reminding the attendees that the Version 2.3 travel model will have four time-of-day periods including AM peak, midday, PM peak, and night (off-peak). However, the initial decision to extend the AM and PM peaks to five hours has been changed to be in better agreement with HOV facilities operation. The AM peak will now be three hours long (6 AM- 9 AM) and the PM peak will be four hours long (3 PM-7 PM). Ms. Seifu then showed tables describing the percentage of daily traffic that occurs in each time-of-day period by trip purpose. She also showed scatterplots of observed and predicted traffic counts (obtained by assigning the HTS trips) by time-of-day, which indicated strong agreement between the observed and estimated data. Following Ms. Seifu's presentation, Mr. Milone added that there are currently 1,700 hourly link volumes which were analyzed for time-of-day information.

A subcommittee member inquired what happens if HOV facility operation hours do not coincide with the selected peak period hours. He also asked how the shoulder lanes, known as "green lanes," that operate between 5 AM and 11 AM, are coded in the model. Mr. Milone responded that while many of the HOV facilities have different hours of operation, in general the 5-hour peak durations that were considered previously are excessive. The new peak periods conform better to HOV operation hours and, in those cases where they do not, roadway capacity is adjusted accordingly (as per suggestion of Dusan Vuksan).

Next, there was a discussion of whether the revised peak period durations (3-hour AM and 4-hour PM) are better than the previously proposed 5-hour peak period durations. One subcommittee attendee expressed concern that the 3-hour peak would not capture the peak spreading, which goes well beyond three hours. When he worked on the I-395 corridor, he saw peak hour percentages of 33%, which indicates very congested conditions. He also pointed out that, according to the analysis that was presented, the midday volume is almost 20% of the total daily volume, which may indicate that some of the morning work commuters are captured during the wrong time-of-day period. The attendee said that he would like to see the daily volume distribution for the 5-hour peak periods. His conclusion was that TPB should focus on addressing peak spreading instead of alignment of peak periods with HOV facility operations. Mr. Milone mentioned that it is possible that some people shift their trips away from the AM peak to avoid the HOV restrictions. He also mentioned that he can share the summaries for the 5-hour peak period durations. A subcommittee attendee from Cambridge Systematics mentioned that CS had suggested using shorter peak periods because, in addition to the HOV, the transit operations align

better with the 3-hour peak periods. Their suggested way to address peak period spreading is by eventually introducing time-of-day choice model. The concern with just extending peak periods is that this will shift people away from the peak period and result in unrealistically flat peak periods.

Mr. Griffiths asked whether the observed trips are the HTS trips. Mr. Milone answered in the affirmative.

c. Trip generation estimation updates

This item was presented by Mary Martchouk of TPB staff, who distributed copies of her presentation to the attendees. Ms. Martchouk first discussed the re-estimation of the vehicle availability model due to changes in the network and transit path building process. The updated model includes the same explanatory variables as the one that was previously presented and has similar coefficient values. Next, Ms. Martchouk mentioned that the trip rates were re-estimated based on weighted trips rather than unweighted. Weighted trip rates are better able to account for under- and over-sampled areas and are more consistent with other models. The weighted trips rates that were calculated were found to be higher than the unweighted, with the total trip rate increasing from 7.4 to 8.4 trips per household. The third update was done to the I-X trip extraction model. In response to comments at the September TFS meeting, separate curves were developed for counties near Baltimore (Carroll, Howard, and Anne Arundel counties) vs. the rest of the region. From the analysis, it was found that the HBW external trip rate was significantly higher for the Baltimore region as compared to the rest of the modeled area. As a result, three curves will be used in the Version 2.3 model, one for Baltimore region HBW trips, one for non-Baltimore HBW trips, and one for the entire region for all non-HBW trip purposes. To conclude her presentation, Ms. Martchouk briefly discussed the two trip generation models that remained unchanged, including non-motorized trip model and trip attraction model.

A subcommittee attendee suggested that TPB staff may want to make sure the traffic volumes at external stations are not unrealistically high, especially for future-year networks.

d. Trip generation application results

Mr. Milone presented this item. He distributed copies of his two memos both dated November 18, 2010, to the attendees. Mr. Milone said that the memos discuss the application results of demographic and trip generation models to the “Pseudo” Round 8.0 land use forecast. The first memo focuses on jurisdiction-level performance of demographic models. According to Mr. Milone, on a region-wide basis, the models for household size, household income and vehicle availability are performing well. He then pointed out that on pages 4, 7, and 12, the tables show estimated, observed and the difference between estimated and observed numbers for household size, household income and vehicle availability, respectively. According to Mr. Milone, the models are doing a good job at matching observed data.

Next, Mr. Milone reviewed a memorandum detailing the trip generation performance. In order to obtain the estimated numbers, production and attraction rates were applied to the land use file. This process was followed by application of the I-X trip extraction model and the non-motorized model. The initial estimated results showed some deviation from observed data at the area type level. Thus adjustment factors were applied by area type and trip purpose for motorized and non-motorized trips. The adjusted

motorized trip productions by jurisdiction are shown on page 3. Most of the jurisdictions are within 10% of the observed, except where the values of productions are small, such as the DC core with productions of 16,000 HBS trips. Mr. Milone then discussed motorized trip attractions as shown on page 4. He said that these generally agree with observed data except some cases such as Alexandria. In Alexandria the ratio of estimated to observed HBW trips is quite high (about 1.37), which could be in part due to issue with observed data. When compared to the 2000 CTPP, the observed trip attraction number was significantly lower (84,000 as compared to 100,000). Lastly, Mr. Milone pointed out the non-motorized trip summaries shown on pages 5 and 6. He explained that the deviation in these trips is higher because the base is smaller and there is also more sampling error. Mr. Milone then inquired whether anyone has any comments on the adjustment factors or the results of the analysis.

A representative from CS offered that since non-motorized models did not make distinctions between area types 1 and 2, area type factors are a positive development that allows one to see a change in the number of trips if a TAZ shifts from area type 2 to area type 1. Another subcommittee attendee commented that the results appear acceptable considering the inherent imperfections in the observed data.

e. Traffic assignment of observed trips

This item was presented by Mark Moran of TPB staff, who distributed copies of his presentation slides to the attendees. He started by discussing the motivation for performing traffic assignment of observed trips, which is three-fold:

- To estimate adjustment factors to be applied to trips following the trip generation step
- To obtain skims that will be used in trip distribution and mode choice
- To evaluate convergence criteria and functional form of the volume delay functions

Mr. Moran showed a table describing the observed and estimated number of trips and corresponding VMT. He pointed out that the target VMT is 155 million while the estimated VMT is only 116 million which points to the need to increase trips coming from the trip generation step. In order to meet the target VMT, the non-HBW trips would have to be multiplied by a factor of 1.75, which is high compared to previously used factors of 1.5 for HBS/HBO and 1.17 for NHB.

Mr. Milone asked the TFS for guidance on how to meet the target VMT. He mentioned that this problem has existed in the past and the trip rates were increased by 30%-50%. However, in order to meet the target this time, the non-HBW trips would have to be increased by 75%, which will lead the overall trip rate to rise to 12 trips per household. This number would be much higher than the expected value of about 10 trips per household. As part of the Household Travel Survey, a GPS add-on was used to determine the underreporting in the trip rates, which revealed that 15% of trips are not reported. Mr. Milone then discussed alternative ways of increasing the trips including raising residual trips. Mr. Moran added that the residual trips may indeed be too low because during commercial vehicle estimation, only vehicles that “appeared” to be commercial were counted, thus many unlabeled vehicles would have been missed. He also raised the point that Chicago was one of the cities that increased commercial vehicle trips in order to meet their VMT target. Next, there was a brief discussion of how reasonable the

VMT target is. Mr. Griffiths mentioned that he would like to see the VMT developed by using the 2007 land use data instead of extrapolating between 2005 and 2010 VMT results because of the economic recession. Mr. Griffiths also offered that in the Sacramento area, VMT determined from the HTS comprised only 75% of VMT obtained from counts. He explained that the difference could be due to commercial vehicles, external trips, as well as other sources that are not accounted for in the HTS, such as group quarters and military bases. Another attendee agreed that there are many reasons for low trip numbers including poor tourist/visitor estimates that are based on a 1968 survey.

Next, Mr. Moran discussed the traffic assignment parameters that were tested. These included different functional forms of the Volume Delay Function as well as the way in which the VDF was implemented, addition of the Queuing Delay Function to various facility types, and convergence criteria. He compared the currently used conical VDF with Akçelik function, commenting that the Akçelik function captures the observed speed profile better than the conical function, but the conical function leads to quicker convergence. He then presented some of the traffic assignment runs that were performed and compared them in terms of convergence time. In the current Version 2.2 of the travel model, 60 iterations of the assignment are performed with no set convergence criteria. This resulted in the AM and PM peak assignment relative gap of more than 0.01, while other assignments converged to almost 0.0001 relative gap. Mr. Moran said that it would be preferable if the same overall relative gap were achieved instead of the assignment terminating due to reaching the maximum allowed iterations. Next, he discussed some additional runs that were performed, which yielded the following conclusions.

- Bi-conjugate Frank-Wolfe assignment should be used because it's faster than Frank-Wolfe and gradient methods.
- Conical VDF with QDF applied to all streets should be used because it converges faster than Akçelik function, and the QDF applied to all streets allows to better capture the drop in speeds for VC ratio above 1.
- Although a relative gap of 0.001 is desirable, we may need to use a value of 0.01 to make the model run times acceptable.

Further assignment testing is ongoing, so some conclusions may get revised in the next couple of weeks.

f. Trip distribution estimation

This item was postponed until the next TFS meeting.

3. Additional Geographically-Focused Household Travel Survey Samples

This item was presented by Bob Griffiths of TPB staff, who handed out copies of his two memos. He began his presentation by mentioning that an additional $790,000 has been allocated in the Unified Planning Work Program for additional Household Travel Surveys. The initial survey conducted that included 11,000 households provided all the information necessary for modeling, however, some local planning staff would like to focus on subareas of the region. Currently there are not enough samples per TAZ to do more disaggregate evaluations. While TPB may provide a model that predicts these patterns, in general, citizens and elected officials can be skeptical about models; they would like to know more about the people who actually live there. Arlington County was the first one to do an add-on to the

2007 HTS, using their own money. Last spring they collected an additional 400 samples in the Columbia Pike, Shirlington, and Jefferson Davis corridors. The newly conducted surveys help the staff explain impacts on local traffic resulting from redevelopment that the citizens are concerned about. For example, in the Columbia Pike corridor, they were able to show that the redevelopment would generate more walk and bike trips. In addition to Arlington County, there have been discussions with Prince George's, Montgomery and other jurisdictions. Initially an additional 1,200 households were going to be surveyed in three geographically-focused areas. However, now that more money has been allocated, the number of samples will be doubled to 2,400 samples overall in six geographically-focused areas listed on page 2 of the memo. This list includes Federal Center SW/Navy Yard, where there has been recent commercial and high density residential development; Friendship Heights, which is an example of high density residential area near a Metro station; Purple Line international corridor; city of Frederick, which is an example of an outlying activity center; Reston; and Woodbridge areas. Data collection for these areas is anticipated to start in March 2011 and finish in June 2011. In addition to these six areas, Technical Committee proposed doing a survey in a seventh area. However, this would require shifting funds from another project. The final decision regarding the addition of a seventh area will be made at he December TPB meeting. Next, Mr. Griffiths briefly discussed his second memo, which concerns conversion of the Round 8.0 land use forecast from the 3,722-TAZ system to the 2191-TAZ system. He mentioned that table 1 on page 3 indicates that 93% of new zones are contained in old zones, thus resulting in a one-to-one conversion. For the remaining cases, the memo describes the conversion process for households and employment. He concluded by saying that the data files resulting from the conversion can be made available on the TFS website.

4. Fall 2009 Washington-Baltimore Regional Air Passenger Survey Findings

This item was presented by Abdurahman Mohammed of TPB staff. He distributed a copy of his slides to the attendees. He mentioned that the survey is conducted every two years in order to collect information about changing characteristics of air passengers and determine the airport terminal needs. In 2009, the survey included a sample of 679 flights (617 domestic and 62 international) at three airports (BWI, DCA, and IAD). The questionnaire was similar to previous surveys with one question changed: instead of asking how the respondent purchased the ticket, the 2009 survey asked whether the passenger used any check-in services. Other changes in processing the 2009 survey included adopting the new TAZ system and revising the AAZ system. Mr. Mohammed then reviewed the results of the survey including percentages of respondents that originated locally versus those who transferred from a connecting flight. Lastly, he mentioned that the full report documenting airport use, airport preference, trip purpose, trip origin activities, mode of access, resident status, age, income, boarding pass and bag checking will be available under the Aviation Technical Subcommittee documents on the TPB website.

5. Arterial Highway System Performance in the Metropolitan Washington Region – Winter 2010 Survey

Anant Choudhary of TPB staff presented this item. He distributed copies of his presentation slides to the attendees. Mr. Choudhary first talked about the reason for collecting the arterial highway travel time and speed data, which is to identify the severity of congestions in select locations and use this data as a requirement of the Congestion Management Process. He also described the extent of the monitoring and showed the schedule for monitoring different roadways. Currently 57 major arterial routes totaling 430 center line miles are monitored on a three-year basis, 145 miles of which were surveyed in FY 2010. Mr. Choudhary then explained that in order to conduct the performance analysis, four cars with GPS were used to record travel time and speed data between 1 PM and 8 PM on the assigned routes. Levels of Service E and F were considered congested. Then, he showed the changes in performance from FY 2004 to FY 2010 on a few routes including MD 450, VA7, and M St. Mr. Choudhary concluded his presentation by informing the attendees that the full report that contains performance results for all the listed routes is available online.

A subcommittee member inquired whether the overall traffic conditions have improved or remained the same between FY 2004 and FY 2010. Mr. Choudhary mentioned that it is difficult to make a conclusion regarding regional congestion based on link data. However, he added that he can provide the comparison between the lane miles of congested (levels of service E and F) for FY 2004 and FY 2010 if anyone is interested. Mr. Mahapatra added that, based on the studies conducted by MDSHA, there has been a drop in VMT in the past couple of years. A member of TPB staff added that they have seen the congestion increase on some links and improve on other links downstream, thus the data is inconclusive. One change that they did note is that traffic conditions in developed commercial areas have declined.

Mr. Griffiths inquired about the number of runs completed for each corridor because in congested conditions there may have been too few runs conducted. Mr. Choudhary responded that they obtained enough data to be statistically significant. Mr. Griffiths also mentioned that major construction projects can affect observed traffic conditions. Mr. Choudhary said that the surveys are done under normal conditions only, with no runs in the event of an accident, constructions or poor weather. Mr. Mahapatra mentioned that MDSHA is working on deploying the Bluetooth technology in order to dramatically increase sample size and enable a continuous data stream of travel speeds and travel times. Mr. Griffiths inquired whether Bluetooth detectors are expensive. Mr. Mahapatra responded that they are not and MDSHA already has 25 cases that they can install to capture vehicles traveling along different routes such as the Intercounty Connector (ICC).

6. Announcement of new chair of the TFS for 2011

Mr. Moran mentioned that the chair of the TFS rotates on an annual basis, each January, between DC, Maryland, Virginia, and WMATA. Since it is the last meeting in 2010, a new chair was to be appointed. He then thanked Subrat Mahapatra for serving on the subcommittee and presented him with a certificate of appreciation. Mr. Moran then announced that Jamie Henson from DDOT will be the new chair for calendar year 2011.

There was no other business. The next proposed meeting of the TFS is Friday, January 21, 2011 from 9:30 AM to 12:00 noon. The meeting adjourned at about 11:50 PM.

The highlights were written by Mary Martchouk and Mark Moran.