
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, May 20, 2011, 9:30 AM to 12:00 PM

Meeting attendees

- Dan Goldfarb (Cambridge Systematics)
- John (Jay) Evans (Cambridge Systematics)
- Eric Graye (M-NCPPC, Montgomery Co.)
- Jamie Henson (District DOT)
- Bahram Jamei (Virginia DOT)
- Wendy Jia (WMATA)
- Dial J. Keju (Frederick Co.)
- Dalia Leven (Cambridge Systematics)
- Yuanjun Li (M-NCPPC, Montgomery Co.)
- Jaak Pedak (Fairfax Co. DOT)
- Phil Shapiro (STC)
- Dan Stevens (Fairfax County DOT)
- Gregg Steverson (Prince William Co. DOT)

COG/TPB staff in attendance

- William Bacon
- Elena Constantine
- Joe Davis
- Wanda Hamlin
- Charlene Howard
- Hamid Humeida
- Mary Martchouk
- Ron Milone
- Abdul Mohammed
- Mark Moran
- Wenjing Pu
- Clara Reschovsky
- Rich Roisman
- 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 April 29, 2011 meeting of the Travel Forecasting Subcommittee (TFS) were approved with only one minor change: Maggie Qi's employer had been listed as "VHB" when it should have been listed as "CH2M HILL."

2. TPB Version 2.3 travel model on the 3,722-TAZ area system: Status report

This item was presented by Ron Milone and Mark Moran of TPB staff. A handout was distributed. Mr. Milone reviewed the model activities undertaken by staff since the April 29 TFS meeting, which included making minor refinements to the model, servicing five model requests, summarizing 2040 transit, and performing highway assignment sensitivity tests. TPB staff plans to apply the Version 2.3 Travel Model in the air quality conformity and maintenance of the PM2.5 National Ambient Air Quality Standard State Implementation (PM2.5 Maintenance SIP). Mr. Milone mentioned that there are still some issues that need to be addressed, including excessively long run times, achieving tighter convergence, and

preparing ancillary modeling procedures. Next, Mr. Milone discussed the results of the 2040 transit analysis. He showed transit trips for 2007 and 2040 by transit mode, access mode, and number of productions and attractions by Metrorail segment, noting that the transit demand grows from 2007 to 2040 as expected. Mr. Milone also mentioned that a comparison done between the estimated 2040 Silver Line ridership and 2025 Environmental Impact Statement (EIS) projections looked reasonable.

Mr. Moran presented the results of sensitivity tests with respect to the traffic assignment. He first provided some background on the traffic assignment process, mentioning that six user equilibrium assignments are performed within each speed feedback iteration. The stopping criterion for each UE assignment is a relative gap of 10^{-3} or a maximum of 300 iterations. Mr. Moran then discussed the different traffic assignment algorithms that were tested including Frank-Wolfe, conjugate Frank-Wolfe, and bi-conjugate Frank-Wolfe. In addition, traffic assignments with and without distributed processing (DP) were analyzed. The slowest to converge was the Frank-Wolfe algorithm with no DP for a future year run (109 hours). The fastest was the bi-conjugate Frank-Wolfe algorithm for base year, distributed over 4 cores (33 hours). Next, Mr. Moran discussed the effects of distributed processing (Cube Cluster) on the model results. When the travel model was run with Cube Cluster, the resulting VMT was slightly different, compared to that produced by the model run without Cube Cluster. The percent difference at the regional level was about 0.03% and as high as 0.09% at jurisdictional level. At the link level, the change in estimated volumes due to using Cube Cluster, was generally about the same magnitude, though there were some links in the network where the volumes differed by more than 20%. Mr. Moran then discussed the next steps in model development. These include examining transit results, investigating the cause of underestimation of walk-access transit, looking into causes for different results with and without Cube Cluster, and performing more sensitivity tests. Mr. Moran concluded his presentation by recommending that the users running the model use the bi-conjugate Frank-Wolfe assignment with a consistent number of cores/processors for each alternative tested.

A subcommittee member inquired how the run times will change if someone is using DP with two cores instead of DP with four cores. Mr. Moran responded that all the recent tests had been completed on either four or eight cores, thus the exact run time with two cores is not known. He added that the reduction in run times is non-linear so the most benefit is gained by going from one to two cores, with decreasing benefit as you add more cores. The subcommittee member then inquired whether Cube Voyager can store all the paths that are created in a file. Mr. Moran responded that, though he believed that this was possible in Cube Voyager, TPB staff had not yet tried doing this, in part because of the concern that the path files would be quite large and might slow down the traffic assignment process. However storing path information would be beneficial for checking paths, both transit and highway.

3. Assistance on travel demand model development and application

This item consisted of three presentations:

- Task 11- Transit Assignment for the Version 2.3 Travel Model (Dan Goldfarb, Cambridge Systematics)
- Task 12- Consideration of Available Commercial Travel Demand Software Packages (Jay Evans, CS)

- Task 13- Review of Version 2.3 Travel Model Methods, Scripts, and Potential Enhancements (Dalia Leven, CS)

Mr. Evans began by explaining that these presentations were preliminary results, presented in advance of the actual reports, which would be delivered to TPB staff in mid June. (Note: It is expected that the reports would be shared with the TFS at the next meeting, in July.)

Next, Mr. Goldfarb discussed the work done for Task 11: transit assignment for the Version 2.3 Travel Model. A handout was distributed. Mr. Goldfarb began by mentioning that the new travel model includes a 15-mode mode choice model as well as the ability to run a transit assignment, both of which pose new challenges with respect to the data that needs to be collected for validation. He discussed some metrics suggested for model validation in the Travel Model Validation and Reasonableness Checking Manual, including ridership at screenlines and cutlines, cordon counts, and passenger miles traveled. While there are no well defined standards in the industry, Cambridge Systematics compared the Version 2.3 travel model results to the standards used for the Florida Standard Urban Transportation Model Structure (FSUTMS). CS staff concluded that the estimated regional boardings and line boardings coming from the Version 2.3 travel model are reasonable. The estimated transit ridership across the Potomac screenline was also deemed reasonable, while the estimated number of Metrorail and commuter rail passengers crossing the Beltway screenline was somewhat low, compared to observed data. Mr. Goldfarb also discussed transit validation results for Seattle, Baltimore, and NYMTC. He concluded his presentation by mentioning a graphical output tool that CS is using to assess the validity of transit results. (Note: The work performed by CS was done with an earlier version of the travel model, 2.3.9, not the latest version, 2.3.17.)

Mr. Milone mentioned that, in the past, there had been issues with comparing estimated and observed transit at the Beltway, since a drive-access transit trip might cross the Beltway as a car and, thus, be observed as an auto trip, not a transit trip. He asked whether this issue might be coming into play here. Mr. Goldfarb responded that the reason for the underestimation in the Metrorail and commuter rail trips at the Beltway screenline may be a result of "leapfrogging." He mentioned that they also observed this issue with I-66, where, instead of driving to the closest park-and-ride lot (e.g., Vienna), some people would take I-66 to the closer-in park-and-ride lots (e.g., East Falls Church). He added that it may be important to assign the drive-access trips to the highway network, especially around large parking lots, since the current procedure does not include these auto trips on the highway network. Mr. Goldfarb also discussed the fact that CS recently obtained the CTPP results at the jurisdiction level data by transit submode. The written report documenting Task 11 will compare the result of the transit assignment from the Version 2.3 travel model with the CTPP jurisdictional transit trip information. A subcommittee attendee commented that some additional sources of discrepancy at the Beltway screenline may be network coding errors and people taking the bus, instead of Metrorail.

Mr. Evans described the work done for Task 12, which focused on a process for evaluating various travel demand modeling software packages. He distributed a copy of his slides to the attendees. Mr. Evans stated that CS consulted the software review processes used by a number of states and MPOs as well as the TPB work program. The proposed methodology for conducting such a review involves identifying

criteria of interest to the agency, assigning each criterion a rank based on importance, deciding how well each piece of software meets the criteria, and finally, calculating a weighted average for each product. In addition to the software evaluation methodology, Mr. Evans discussed the use of the different packages by the 26 largest MPOs. According to the inventory, the majority (16) use a Citilabs' product, followed by TransCAD (7), EMME/2 (3), and VISUM (1).

Ms. Leven presented the review of Version 2.3 Methods, Scripts, and Potential Enhancements. She distributed a copy of her slides. Ms. Leven began by stating that the review of the Version 2.3 model, which focused on traffic assignment, highway/transit skimming, and the feedback mechanism, showed that the model process is generally sound, with only small efficiency improvements identified. Next, she discussed the use of Cube Cluster for traffic assignment, which results in significant time savings. Then, she went over the benefits of implementing Public Transport in Cube Voyager, some of which include on-screen tracing of transit paths, the ability to define multiple transit user classes, and allowing circular transit routes. Lastly, Ms. Leven discussed possible improvements to the toll modeling methodology to accommodate different tolling policies and operations, as well as the use of different values of time for various income levels.

A committee attendee inquired whether Cube Cluster makes the decision regarding whether to use intra-step distributed processing (IDP) or multi-step distributed processing (MDP). Ms. Leven replied that it is the user who makes the decision and sets it up. Another subcommittee attendee inquired whether there are any specific benefits to using IDP as opposed to MDP. Ms. Leven responded that the difference between the two lies in what you are trying to accomplish and the implementation. Mr. Goldfarb added that implementing MDP requires additional scripts that you have to maintain and it is up to the agency whether they wish to add them. Mr. Moran also added that the TPB's initial focus has been on implementing Cube Cluster in the highway assignment because highway assignment accounts for about half the model run time. Generally, Citilabs suggests using IDP and MDP on a finalized model, not in testing, because it's difficult to trace issues if there are errors. Thus, at this point, TPB staff has implemented DP in only the highway assignment model step.

4. Delineation of Census TAZs for the region

This item was presented by Martha Kile of TPB staff, who began by explaining why the TPB is working on creating the Census Transportation Planning Products (CTPP) TAZs: to ensure that the Census data summaries that are delivered are on a zone system that is similar to the TPB TAZ system. In order to create the CTPP zone system, MPOs and states were provided aggregation software as well as requirements and recommendations regarding zone aggregation. The requirements were that each TAZ should be created from an aggregation of census blocks and that all the blocks must be assigned to a TAZ. The recommendations were that TAZs should be contiguous and include at least 1,200 population or workers. The process for delineating TAZs includes assigning census blocks to existing TAZs, verifying that all the blocks are assigned and merging TAZs that do not meet the requirements or recommendations described previously. Next, Ms. Kile showed some plots of census blocks being aggregated into CTPP TAZs. Lastly, she mentioned that the next steps include continuing to merge TAZs and creating CTPP Traffic Analysis Districts (TADs).

5. Spring 2010 Regional HOV Study

Clara Reschovsky of TPB staff presented this item and distributed a copy of her slides and draft copies of the report to the attendees. Ms. Reschovsky described the data collection process for obtaining the travel times on HOV and corresponding non-HOV facilities. For each route segment, floating car runs were completed to obtain travel time information, and counts were collected to calculate car occupancies. The segments where the study was conducted include I-395/I-95, I-66 (both inside and outside Beltway), VA- 267, I-270, and US-50. She then showed comparisons of HOV and non-HOV travel times and standard deviations of travel times. The analysis indicated that the highest time savings are in I-95/I-395 corridor and the lowest are along US-50. The HOV lanes on the I-95/I-395 corridor also yield reliable travel times. In addition, the study indicated that the average speeds on I-66 and VA-267 are low in the morning and that speeds on route I-66 are unreliable. Lastly, Ms. Reschovsky discussed the AM and PM auto occupancies. She noted that the average occupancy was very low in the HOV lanes on I-66 and VA-267. In conclusion, she discussed some future issues, which include introduction of HOT lanes on I-95 and the Beltway and direct access into HOV lanes.

An attendee inquired about the percentage of single occupancy vehicles observed in the HOV lanes. Ms. Reschovsky responded that this information has not been reviewed yet, but can be if there is a need. She warned, however, that the occupancy counts are done by an observer on the side of the road and the results may not be entirely accurate if the car has tinted windows or it is dark outside. Another attendee made a comment that the visual impact of construction on the Beltway interchange with I-66 may have resulted in lower speeds and lower reliability. Ms. Reschovsky responded that this may be the case and that it will be considered once a new data point is obtained at the conclusion of the construction. Another committee member inquired whether there was any correlation observed with gas prices and occupancy. Ms. Reschovsky stated that they have not considered this, though it will be investigated in the future.

6. Other business

There was no other business. The next proposed meeting of the TFS is Friday, July 22, 2011 from 9:30 AM to 12:00 noon. The meeting adjourned at about 12:05 PM.

The highlights were written by Mary Martchouk.