Highlights of the May 17, 2013 meeting of the Travel Forecasting Subcommittee

Held at the Metropolitan Washington Council of Governments, from 9:30 AM to 12:00 PM
Status of highlights: Approved on 7/19/13

Meeting attendees

- Dan Goldfarb (VHB)
- Eric Graye (M-NCPPC, Montgomery Co.)
- Eric Jenkins (M-NCPPC, Prince George's Co.)
- Wendy Jia (WMATA)
- Bob Josef (RK&K)
- Dial J. Keju (Frederick Co.)

- David Kline (Fairfax County DOT)
- Yuanjun Li (M-NCPPC, Montgomery Co.)
- Xuemei Liu (Cambridge Systematics)
- Krishna Patnam (AECOM)
- Dan Stevens (Fairfax County DOT)

COG/TPB staff in attendance

- William Bacon
- Joe Davis
- Bob Griffiths
- Wanda Hamlin
- Charlene Howard
- Hamid Humeida

- Nicole McCall
- Ron Milone
- Abdul Mohammed
- Mark Moran
- Jinchul (JC) Park
- Jane Posey

- Clara Reschovsky
- Rich Roisman
- Meseret Seifu
- Dusan Vuksan
- Feng Xie
- Jim Yin

The meeting was chaired by Wendy Jia of WMATA.

1.   Introductions and approval of meeting highlights from the previous meeting

The highlights from the March 22, 2013 meeting of the TFS were approved without change.

2.   Status report on the Version 2.3 Travel Model: The year-2010 validation

This item was presented by TPB staff members Ron Milone and Jane Posey. A presentation handout was first distributed. Mr. Milone reminded the subcommittee that the 2010 validation of the travel model has been ongoing and has involved comparing the existing (Version 2.3.39) travel model outputs against available 2010 demographic data, traffic counts, and transit counts. The comparison has indicated the need for some minor adjustments to the existing model. The adjusted travel model (Version 2.3.52) was presented at the last (March) TFS meeting. No further model modifications have been implemented since the last TFS meeting, but staff has recently refined observed data used to check the model and has

performed sensitivity testing. The Version 2.3.52 model is currently being applied and evaluated as part of the air quality analysis of the 2013 CLRP and 2013-18 TIP.

Mr. Milone reminded the subcommittee of the key refinements that have been implemented as part of the 2010 travel model validation effort:

- The highway network that is input to the travel model has been updated. Many freeway links in the District of Columbia have been recoded as expressways, which has effectively served to lower highway capacity and to reduce highway demand. The recoding was undertaken to address a noted over-estimation of VMT in the District, particularly on freeways. Other facility type and lane refinements have been made at isolated locations throughout the regional highway network. The refinements were based on recent aerial photography and on federal functional classification data that have been received from the state DOTs.
- Time penalties have been inserted on highway network links that represent bridge crossings over the Potomac River. An eleven-minute time penalty has been imposed to address a noted over-estimation of traffic crossing the river.
- Non-work, non-motorized trip rates in high-density areas were increased by 30% to improve the match between estimated and observed non-motorized trip shares. The TPB's recent geographically focused household travel survey was the source of the observed shares.
- Other technical enhancements have been made to the trip generation model and traffic assignment steps of the travel model.

Mr. Milone reviewed some of the technical refinements to the model in greater detail and also underscored improvements that have been made to reduce the model's running time. He noted that, for the year 2010, the V2.3 52 model produces about 3% fewer motorized trips and about 5% fewer vehicle-miles for the region than would be produced by the current V2.3.39 model. Staff is mindful that VMT appears to have been declining both locally and nationally for the past few years. It is unclear whether this trend is a short-term effect of an economic slow-down, or the beginning of a longer-term shift in travel behavior, but staff appreciates the importance of monitoring trends and behavioral changes through ongoing data collection efforts.

Jane Posey reviewed the analysis years that are being studied for this year's air quality analysis (2015, 2017, 2020, 2025, 2030 and 2040). She added that three additional network scenarios are being modeled for the years 2025, 2030 and 2040 to accommodate possible amendments to the Plan that are being proposed in Northern Virginia by VDOT. The amendments relate to highway improvements in the area west of Dulles International Airport. She added that staff plans on releasing the air quality conformity results for public comment in June. Staff currently anticipates that the conformity results, and supporting technical procedures, will be presented to the TPB for adoption in July.

Mr. Milone added that TPB staff is planning to prepare several documents in between now and September, including a validation report, an updated model user's guide, and network documentation. He also stated that staff intends to prepare a transmittal document for those local agencies interested in obtaining the latest model and model inputs for project planning work.

A consultant asked if it would be desirable to allow the end user the ability to specify the number of computer cores that used in running the model, possibly by automatically scanning the number that are available. The existing application is structured to execute the model using a maximum of 8 CPUs/cores. The user may alter the application process if fewer than 8 CPUs are available. Staff agrees that allowing for the flexibility to execute with fewer or more than the standard 8 CPUs is important and will consider this capability in the future.

3.   Status report on the consultant-assisted project for development of the TPB travel model: Traffic Assignment – Toll Modeling

This item was presented by Krishna Patnam of AECOM. A copy of the presentation slides was distributed to the subcommittee. Mr. Patnam gave a status report on the work done by AECOM to improve HOT-lane modeling in the COG/TPB travel model. The main goals of the work were 1) to replace both the multi-run and the two-step highway assignment with a single multi-class assignment; 2) to include dynamic toll setting as an option for any model run; 3) to reduce run times and further streamline the highway assignment process by using Cube Cluster (IDP and MDP) and by minimizing repetitive code. The current toll-setting process used by TPB staff can take up to five days to run. Although the revised toll-setting process is still under development, it is hoped that the new process will take less than five days to run. The proposed process would have three loops. First, the speed feedback loop (or global loop), shown on slide 7 of Mr. Patnam's presentation as a single black arrow, ensures that the link speeds coming out of traffic assignment are consistent with the speeds used as inputs to trip distribution and mode choice. Second, the toll-setting loop, shown on slide 7 as a set of two medium-sized green arrows, is used when the dynamic toll setting process is called. Third, the user equilibrium loop, shown on slide 7 as two small blue arrows, is used to achieve convergence in highway assignment (i.e., to ensure that all used paths are the optimized, minimum-time paths). One can reduce the number of toll setting loops required by using good seed values for the tolls.

Mr. Milone asked about the meaning of the numeral one in a gray circle on slide 6. Mr. Patnam said that this was to indicate that only one multi-class assignment was being conducted (i.e., no multi-run assignment). Mr. Milone also asked whether tolls get adjusted as part of the user equilibrium assignment process. Mr. Patnam said, "No," tolls are held constant in the highway assignment loop, but are adjusted only in the toll-setting loop. Mr. Patnam then discussed some of the design considerations. For example, the user should be able to disable toll setting, disable using Cube Cluster, and specify the precision to use in the toll search (using higher precisions can result in longer run times).

Mr. Milone asked what increment is used when increasing or decreasing a toll in the toll-setting process (e.g., a penny, a nickel?). Mr. Patnam responded that the increase or decrease is not a set amount – the increment size will change based on the two functions used (a non-linear function to raise tolls and a linear function to lower tolls). Rounding of toll values is generally done to the whole cent, but this is a parameter that the user can change, if so desired. Mr. Milone asked whether the toll setting process arrives at the same solution, regardless of the seed toll values that are chosen to start the process. Mr. Patnam said that they have found that the toll solutions are not unique (and this issue was again discussed at the end of Mr. Patnam's presentation).

Mr. Patnam concluded by describing the next steps for this investigation, including finishing the testing of the procedure, trying out the new Cube Voyager software (ver. 6.1.0, SP1), reducing the number of toll groups (from the current 130), and testing the progressive relative gap threshold that is used in the Version 2.3.52 Travel Model.

A TPB staff member asked how the tolls set using the new process compare to those set using the current TPB toll-setting process. Mr. Patnam said that the tolls set using the new process are, in fact, different from those set using the existing process. Furthermore, Mr. Patnam reminded the subcommittee that the toll solutions are not unique. Mr. Moran added that the toll solutions for neither the current nor the proposed methodology would result in unique toll values, since, although a well-converged user equilibrium solution results in unique link flows, it does not result in unique path flows (or route flows), which are the basis for establishing tolled and non-tolled paths and thus for determining toll values themselves. Given that HOT lanes are built next to general purpose (GP) lanes, Ms. Jia asked whether the new process would detect high volume-to-capacity (VC) ratios in the GP lanes and, in reaction to these, would raise tolls on the HOT lanes. Mr. Patnam responded that the signal to raise or lower tolls on the HOT lanes is based only on the traffic on the HOT lanes, not the GP lanes, though, due to the nature of the user equilibrium traffic assignment, elevated VC ratios on the GP lanes would likely correspond to elevated VC ratios on the parallel HOT lanes, which would then send the signal to raise the HOT lane tolls.

A consultant asked what the goal was of the HOT-lane toll setting process, e.g., was it simply to see what happens, or to optimize operations, or to calculate tolls for a revenue study. Mr. Patnam said that the goal was to find the level of HOT lane tolls that ensures that, as per the VDOT policy, HOVs should have priority in using HOV facilities, and introducing the HOT lane facilities should not significantly deteriorate travel times of HOVs. Operationally, in the travel model, this is implemented by ensuring that the VC ratio on HOT lanes remains in the range of 0.95 to 1.01. So, the consultant stated, it seem like the goal is operations. Mr. Moran cautioned, however, that since the travel model uses a static traffic assignment, neither the resultant speeds nor VC ratios coming out of the model are truly operational. The links speeds and link VC ratios are "planning" speeds and VC ratios (e.g., VC ratios in a travel model using a static assignment can go above 1.0, but operational VC ratios never go above 1.0). Given that the solutions to the toll-setting process are not unique, Dusan Vuksan asked how big the variation might be in estimated tolls that came from two different sets of input seed toll values. Mr. Patnam said that the variation appears to be small, but he did not have a firm answer to that question yet, since the testing phase is still underway. Mr. Milone added that the key, when evaluating alternatives that involve tolls, is to start with the same seed toll values for both the base and build alternatives. Feng Xie asked if AECOM had compared the output toll values coming from the new toll setting process to those from the existing process. Mr. Patnam said that initially they has performed such a comparison and the two techniques yielded different toll values, but the project is not yet complete, so there is more testing to be done. Jinchul Park asked whether the estimated tolls had been validated. Mr. Patnam replied, "Not yet," adding that the process is still underway. Mr. Milone added that TPB staff is striving to work with VDOT to obtain observed demand and toll rate data on the recently opened HOT lanes in Northern Virginia.

4.   Metrobus Survey Plan

This item was presented by Wendy Jia, of WMATA. Originally, Melissa Chow, also of WMATA, was to be the lead presenter, but she was unable to make the meeting. Ms. Jia presented an outline of a proposed Metrobus On-Board Passenger Survey. Ms. Jia explained that the purpose of the survey is 1) to provide updated ridership numbers for allocating operating subsidy payments by jurisdictions in the WMATA Compact, and 2) to comply with the FTA Title VI[1] Circular, which requires that transit providers conduct O/D surveys no less than every five years and, preferably, every three years. The last Metrobus survey was conducted in 2008, as part of a regional bus survey of all major bus operators. Ms. Jia reviewed three survey approach options:

- To survey all services once every three years. This option would comply with the Title VI circular; however it is difficult in terms of budget and staff resources.
- Rolling survey, where each route is surveyed once every three years. While this option is more manageable and allows for an even annual cost distribution, it might not be Title VI compliant, since some bus routes would not be surveyed until 2015, which is more than five years past the 2008 bus survey.
- Hybrid: System-wide survey for baseline, and then a rolling survey.

The third option was recommended by conducting a baseline survey in the fall and spring of 2014 followed by annual rolling surveys in 2015, 2016, and 2017.   The survey instrument will include 25 questions (in English and Spanish) addressing the following survey design issues:

1. Subsidy allocation by residency jurisdiction of passengers,
2. Trip characteristics for planning purposes such as O/D, time of trip, number of transfers, access, age, etc.
3. Civil rights and equity issues based on racial and income make up of riders, language spoken at home, travel patterns, etc.

It is anticipated that COG will take the lead on managing the 2014 baseline survey, with a WMATA staff member as a co-project manager. This approach allows WMATA to use Technical Assistance funds from COG's Unified Planning Work Program (UPWP). Ms. Jia completed her presentation by presenting the survey timeline, including implementation of the baseline survey in 2014.

There were a few questions about which bus service providers, other than WMATA, would participate in the survey. Ms. Jia explained that all providers receiving federal funds are required to comply with the requirements of Title VI, but it is up to each provider to determine how to meet the requirements, taking into account their individual budgets.   A staff member commented about the concept of rolling surveys and the complication of sampling and final factoring of the survey results.

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[1] Title VI of the Civil Rights Act of 1964.

5.   Briefing on changes in regional commuter patterns from 2000 to 2011

This item was presented by Robert Griffiths of the TPB staff. Mr. Griffiths distributed a copy the presentation slides to the subcommittee. He discussed in detail changes in regional commuting patterns and shifts in SOV, carpool, transit, walk, and bike commuting modal shares in the TPB planning region occurring between 2000 and 2011. Data summaries in the presentation were developed from three sources collected by the U.S. Census Bureau:

- 2000 Census
- 2007 American Community Survey (ACS)
- 2011 ACS Public Use Microdata Samples (PUMS)

Mr. Griffiths provided some background and the caveats associated with using the data. He reviewed the major changes in workers by place of residence and commuting modal shares between 2000 and 2011. He concluded with a summary of the major findings (slide 23), including:

- The number of workers residing in areas outside the region commuting to jobs inside the region increased by about 40% between 2000 and 2007, but has remained about constant since then, reducing the growth in long-distance commutes from external areas.
- All jurisdictions added a significant number of workers.
- Drive Alone/SOV commutes have declined slightly, but steadily since 2000.
- Carpool mode share has declined significantly since 2000.
- Transit mode share increased in every jurisdiction, and increased regionally by 30%.

Mr. Griffiths underscored that transit share has increased since 2000 as travel in the drive alone and carpooling modes has declined. The District, Arlington, and Prince George's County all saw gains of 7 percentage points or more in the transit mode share between 2000 and 2011. Charles County saw the next highest gain, moving from just 2.1% of trips in 2000 to 8% in 2011. He added that, the increase in the number of federal workers that commuted by transit might be related to the $240 transit subsidy per month that is offered to 80% of federal workers in the region. No questions were asked of Mr. Griffiths.

6.   Round-table discussion

This item was deferred to the next meeting.

7.   Other business

The next proposed meeting of the TFS is Friday, July 19, 2013 from 9:30 AM to 12:00 noon. The meeting was adjourned around 11:40 AM.

*** The meeting highlights were prepared by Ron Milone, Mark Moran, Hamid Humeida, and Meseret Seifu ***