National Capital Region Transportation Planning Board, Metropolitan Washington Council of Governments
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Travel Forecasting Subcommittee Meeting Highlights

Friday, May 21, 2010, 9:30 AM to 12:00 noon

Meeting attendees

- Arpita Chatterjee (Fairfax Co. DOT)
- Michael Eichler (WMATA)
- John (Jay) Evans (Cambridge Systematics)
- Dan Goldfarb (Cambridge Systematics)
- Eric Graye (M-NCPPC, Montgomery Co.)
- Derek Gunn (MD SHA)
- Tony Hofmann (Michael Baker Corp.)
- Bahram Jamei (Virginia DOT)
- Eric Jenkins (M-NCPPC, Prince George's Co.)
- Dalia Leven (Cambridge Systematics)
- Yuanjun Li (M-NCPPC, Montgomery Co.)
- Feng Liu (Cambridge Systematics)
- Subrat Mahapatra (MD SHA)
- Rich Roisman (VHB)
- Phil Shapiro (STC)
- Dan Stevens (Fairfax County DOT)
- Gregg Steverson (Prince William Co.)

COG/TPB staff in attendance

- William Bacon
- Mike Clifford
- Joe Davis
- Bob Griffiths
- Wanda Hamlin
- Charlene Howard
- Gareth James
- Mary Martchouk
- Andrew Meese
- Ron Milone
- Mark Moran
- Jane Posey
- Wenjing Pu
- Clara Reschovsky
- Meseret Seifu
- Robert Snead

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 March 19, 2010 meeting of the Travel Forecasting Subcommittee (TFS) were approved without any changes.

2. 2007/2008 Household Travel Survey

This item was presented by Bob Griffiths of TPB staff. Mr. Griffiths mentioned that the final data file has been delivered to TPB's models development group. He said that he has been reviewing the jurisdiction-to-jurisdiction trip tables, which generally look good, although he has noticed a slight DC bias, in that work trips to DC are a little higher than expected, but he added that the same thing occurred with the 1994 Household Travel Survey (HTS), so he did not think any adjustment is going to be required. Mr. Griffiths said that he expected the HTS documentation to be finished by the end of the fiscal year (June 30).

3. Status of the Ver. 2.3 Travel Model on the 3,722-TAZ area system

This item was presented by Ron Milone of TPB staff, who distributed a copy of his presentation slides. However, before presenting this item, he took a few minutes to discuss the recent federal certification review that took place at COG/TPB. The federal government certifies or re-certifies MPOs every four years. The TPB was last certified in 2006, so it was time for the process to happen again. TPB staff met with officials from FHWA and FTA on April 19, 20, 21, and 29. The meeting on April 29 focused on the travel demand modeling procedures used by TPB. There were over 165 questions that were answered by TPB staff in writing and these formed the basis of the discussions that occurred over the four days of meetings.

Next, Mr. Milone returned to his agenda item. He discussed some of the models development activities that have taken place recently, such as the creation of the pseudo Round 8.0 land use files, the final efforts to clean data sets (such as removing holidays from the 2007 HTS), and the beginning work on developing model calibration files. He provided some control totals from the final HTS data files. Mr. Milone mentioned that, on slide 10, and also when developing trip tables, only certain key travel modes are included, such as transit, auto driver, auto passenger, walk, and bike. By contrast, the "other" mode category, which includes modes such as limousine and paratransit, is not included as part of the motorized travel total. Mr. Griffiths pointed out that the "other" mode also includes school bus and there are a lot of school bus trips. Mr. Milone also compared trip rates from the 1994 and 2007 Household Travel Surveys, noting a large drop in trip rates for all four trip purposes, with the exception of home-based shop (HBS), which went up. He felt the overall drop in trip rates was part of a national trend. By contrast, it appears that trip lengths are going up over the 13-year period, though part of this could be due to the fact that in 1994, only 13 jurisdictions were surveyed, whereas in 2007, all 22 jurisdictions were surveyed. Lastly, he presented a timeline showing that, although there had been some delay in developing the travel demand modeling networks and land use data, the Version 2.3 travel model on the 3,722-TAZ area system is still on track to be finished by December 2010, which would make it available for use in the 2011 air quality conformity determination (i.e., 2011 CLRP and FY 2012-2017 TIP).

A meeting attendee asked whether the model calibration was being done all in house or with consultants. TPB staff indicated that it is being done in house. The member asked whether the federal certification review questions and answers were available to review. TPB staff indicated that they are available on the TPB website, with section "O" focused on travel demand modeling (see http://www.mwcog.org/transportation/committee/committee/archives.asp?COMMITTEE_ID=16 or http://www.mwcog.org/uploads/committee-documents/Z15ZW1pY20100401112058.pdf). An attendee asked whether, in addition to the year-2007 calibration network, what other 3722-TAZ networks would be produced. TPB staff indicated that a year-2040 network would be produced and used for the model validation effort.

Given the fact that the trip rates from the 2007 HTS are lower than those from the 1994 HTS, a meeting attendee asked how much of the drop could be attributed to changing behavior versus the fact that the 2007 HTS was more extensive and probably more rigorous than the 1994 HTS. Mr. Griffiths responded that he has compared notes with Heather Contrino, who did the National Household Travel Survey, and

she found very similar trends, i.e., lower trip rates, except for those aged 65 and older. The NHTS was done when there was more of an economic recession, which has an impact on daily travel. We found that the household trip rate is down more than the person trip rate. Mr. Griffiths added that one of the most interesting things was that, for the younger age groups, the social/recreation trips were down by about 50%, which is huge. The likely explanation is increased use of texting and social network websites, like Facebook. It is hard to know, however, whether that trend will persist when people in that age cohort move into their 30s and 40s.

A TFS member asked when COG's Regional Transportation Data Clearinghouse (RTDC) will receive updated information. TPB staff indicated that 2008 traffic counts should be added to the RTDC by this June. The way that it works for the state DOTs and the HPMS program, their submittal deadline is mid June, so the 2009 counts will not be completed from the states until 2010. We get them in the fall and load them into our system, so there will always be a two-year gap. The member asked whether the RTDC has transit counts. TPB staff indicated that we are working with WMATA to get the latest data into the RTDC. This item concluded with some discussion about whether trip rates from the latest Baltimore HTS were following a similar pattern..

4. Investigation into area type and walkability measures

This item was presented by Mary Martchouk of TPB staff, who distributed a copy of her presentation slides. TPB staff has been conducting an investigation into possible new schemes for the "area type" variable. Staff has also been investigating various measures of walkability. The area type variable is typically a function of employment density and population density. It is used in a number of different places in the Version 2.2 travel model, including the vehicle availability model, trip generation, the non-motorized HBW trip end model, and for calculating the free-flow speed and capacity of road links. Ms. Martchouk presented a revised definition for the area type variable. In the Version 2.2 Travel Model, area type is defined based on a one-mile "floating" employment and population density. The one-mile floating density for a specified TAZ is calculated by separately summing the land activity and land area of the given TAZ with the land activity and land area of the other TAZs whose centroids lie within a one-mile radius of the given TAZ's centroid, and then calculating the density from the combined land activity and land area (this aggregation technique is sometimes referred to as "geographic centroid aggregation"). The revised area type is still based on a one-mile floating density, but it now has fewer categories (six vs. seven) and the transitions from one level to the next are smoother than before. The revised area type benefited from the finer geographical resolution available in the 3,722-TAZ area system.

Ms. Martchouk also presented a series of GIS-based walkability metrics that might be used in one or more of the models or submodels in the Version 2.3 Travel Model. Examples include street density, intersection density, number of cul-de-sacs, number of street blocks, and average street block size.

A subcommittee member asked how one would forecast these fine-grained, GIS-based measures. TPB staff indicated that there are two basic approaches. Either you can freeze the values at their base-year levels, only changing them if you have detailed knowledge about how a given area will develop (This is essentially what is done with the inputs to the household income submodel). Or you can come up with

guidelines about how the walkability metrics will change with changes in the land use and road network – two items that are forecast as part of the normal modeling effort, since they are both inputs. Another member asked whether the Version 2.3 model would have a bike network. TPB staff said that it would not, although there is a walk network that is generated by the WALKACC program (the walk network is derived from the non-freeway road links). Next, there was a discussion about which jurisdictions and agencies had GIS-based sidewalk inventories and which did not. A subcommittee member asked whether TPB staff has updated the lookup tables used for link free-flow speed and capacity, given the updated area type definition. TPB staff indicated that that adjustment will be made during the model calibration/validation work. This same member also asked whether TPB staff had considered increasing the number area type categories (as opposed to decreasing it from 7 to 6). TPB staff indicated that we considered increasing the number of area type categories, but when we looked at the distributions of population density and employment density, it was extremely non-linear and there were no obvious break points in the distribution that would have indicated a benefit of moving to more area type categories. TPB staff also pointed out that there is an "area type override capability" in the travel model, so, if an analyst has superior information to what is coming out of the area-type model, one can override the computed value.

Jay Evans mentioned that Cambridge Systematics, Inc. (CS) has been working with Durham-Chapel Hill MPO in North Carolina, where they had decent success using the household travel survey data and developing trip generation models for non-motorized travel. However, he added, it becomes more challenging when you try to go further into the model stream One of the variables that worked for CS was the block density. Regarding the issue of asserting parameters and using override values, one has to be careful because you can get accused of biasing your modeling results. CS's general recommendation is to stick with things that are objective as much as possible.

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

This item was presented by Bobby Snead and Meseret Seifu, both of TPB staff. A copy of the presentation slides was distributed to the subcommittee. Before his presentation began, Mr. Milone mentioned that Mr. Snead was going to be retiring from COG on June 11. Mr. Milone thanked Mr. Snead for his 36 years of service to COG, TPB, and the region. It is expected that Mr. Snead will be hired as a contractor for another two to three months to smooth the transition period as we search for the person who will replace Mr. Snead. Mr. Snead began the presentation, discussing some of the recently completed work. For example, TPB staff has

- completed adding new road links to ensure consistency with the new finer-grained TAZ system,
- created new TAZ centroids, and
- connected the TAZ centroids to the highway network.

We have been using the newly developed, multi-modal, multi-year network geodatabase (TPBMAN), which is accessed using an ArcGIS add-in, developed by DCI, Inc., called COGTools. Year-2007 highway and transit networks were exported from the TPBMAN geodatabase for use in the travel model. During this work, it was discovered that there are still some software bugs in TPBMAN/COGTools that need to

be resolved. Until these issues can be resolved, as a work-around, Cube Base software was used to make final corrections to the highway and transit networks. At this point, work is proceeding in parallel in the two systems (TPBMAN and Cube Base). What remains to be determined is whether these TPBMAN software bugs can be fixed, so that TPBMAN can become an integral part of the network development process used by TPB staff for both development work and production work, such as developing networks for the air quality conformity process. At the last TFS meeting, TPB staff presented a series of highway network maps and asked for comments from the state and local jurisdictions. We received feedback from the following counties: Prince George's, Frederick, Prince William, and Fairfax. We have incorporated the comments from all of the counties, with the exception of Fairfax Co., whose comments were just received recently, hence they will be addressed in the next few days.

Next, Meseret Seifu discussed some of the details about how highway networks are exported from the TPBMAN geodatabase. She also discussed some of the Cube Voyager scripts that were used to check the accuracy of network attributes. She mentioned that the new highway networks contained information about not just the length of road links, but also their alignment or curvature, which can be seen visually in the geodatabase network or in a network exported to Cube .NET format, if "true shape display" is turned on. She presented comparisons that were done between the new year-2007 3722-TAZ highway network and the existing year-2010 2191-TAZ highway network from the 2009 CLRP and FY 2010-2015 TIP. As one would expect, due to the increase in number of zones, there were significant increases in the number of centroid connectors and highway links. For example, the number of highway links (non-centroid connector) went from 20,429 to 30,796, a 51% increase. Mr. Snead then concluded the presentation by describing the next steps.

Subrat Mahapatra asked whether road name would be one of the attributes found in the new TPB highway networks. Mr. Milone indicated that we could add facility name as a character attribute to new highway networks. There was then a discussion about the difference between "street name" and "route ID" and which should be used in TPB networks. Eric Graye (M-NCPPC, Montgomery Co.) indicated that Montgomery Co. would be sending TPB staff some comments on centroid connectors next week and wondered if that would be too late for input. TPB staff indicated that we would do our best to incorporate the comments.

6. Scan of best practices in travel demand forecasting: Findings from the latest four task orders

This item consisted of presentations on four task orders with a different presenter for each task order:

- Task 7 – Further Investigation of Convergence in User Equilibrium Traffic Assignment and Speed Feedback (Dan Goldfarb, CS)
- Task 8 – Potential Short-Term Model Enhancements: Trip Purposes and Special Generators (Feng Liu, CS)
- Task 9 – Potential Short-Term Model Enhancements: Time of Day Model, Queue Delay Function, and Two-Step Assignment (Dalia Leven, CS)
- Task 10 – Potential Short-Term Model Enhancements: Transit-Related Enhancements (Jay Evans, CS) [Note: Due to time constraints, this item was not presented to the TFS.]

[Note that the presentations were made before the corresponding report chapters were available. Four draft report chapters, one for each task order, were sent to TPB staff at the end of June. For the July 23 TFS meeting, the TFS will be given access to PDF copies of the reports and TPB staff plans to make a presentation to the TFS regarding TPB comments on the four report chapters. Consequently, the focus of the following section will be on the questions and answers, not on the findings themselves.]

Mr. Goldfarb presented the draft findings from Task 7 – Further Investigation of Convergence in User Equilibrium Traffic Assignment and Speed Feedback. A copy of the presentation was also distributed. A meeting attendee asked whether Prince George's County (M-NCPPC, Prince George's Co.) was using TransCAD's new origin user equilibrium (OUE) traffic assignment. Mr. Jenkins indicated that they are using OUE, adding that it runs about 150 iterations to reach convergence, which requires a 10-hour (typically overnight) model run.

Mr. Liu presented the draft findings from Task 8 – Potential Short-Term Model Enhancements: Trip Purposes and Special Generators. A copy of the presentation was also distributed. There was some discussion about the best way to model trips generated by people living in group quarters, including the pros and cons of using ITE trip generation rates. Regarding modeling air passenger trips to the commercial airports, there was some discussion about the challenges of modeling airport choice, particularly in regions with three commercial airports, such as the Washington, D.C. region. Mr. Evans stressed that the emphasis of the airport model recommendation is on the mode of access, not airport choice. Mentioning research that had been done in the New York City area on airport choice, Mr. Evans said that there are so many external factors that airport choice models are not a recommended practice. He said that CS takes it as a given that you know the general proportions of air passengers using the three commercial airports and that they are fairly stable. He said that focusing on ground access choice would give TPB some representation of mode choice at the airport, adding that that was the motivation behind the CS recommendation. Another person mentioned the Multiple Airport Demand Allocation Model (MADAM) that was tried 30 years ago and never succeeded in working.

Ms. Leven presented the draft findings from Task 9 – Potential Short-Term Model Enhancements: Time of Day Model, Queue Delay Function, and Two-Step Assignment. A copy of the presentation was also distributed. A meeting attendee asked whether time-of-day choice models have the capability to move trips both out of and into the peak period (for example, if there is unused demand in the peak period). Ms. Leven said that time-of-day choice models do, in fact, have the capability to move trips both directions. Mr. Milone asked that we defer the last presentation (Task 10 – Potential Short-Term Model Enhancements: Transit-Related Enhancements, to have been presented by Jay Evans) due to time constraints. Consequently, a copy of the presentation was not distributed to the TFS.

7. Briefing on the Draft 2010 Congestion Management Process (CMP) Technical Report

This item was presented by Andrew Meese and Wenjing Pu, both of TPB staff. A copy of the presentation slides was distributed to the subcommittee. There were two parts to the presentation. First was a presentation of the recently released 2010 Congestion Management Process (CMP) Technical

Report.[1] Second was an analysis of the I-95 Corridor Coalition/INRIX highway speed data. Mr. Meese presented part one. He discussed the background of the CMP and discussed the connections between the CMP and the TFS. The TPB Technical Committee has responsibility for technical oversight of the CMP Technical Report, advised by four other subcommittees or task forces, one of which is the TFS. He also discussed key findings and recommendations from the report, including:

- Continue the Commuter Connections Program
- Continue the MATOC program and agency/ jurisdictional transportation management activities
- Consider variable pricing and other management strategies for capacity increasing projects
- Encourage implementation of congestion management for major construction projects
- Continue and enhance the use of continuous, probe-based congestion monitoring data
- Integrate probe-based congestion monitoring data and location-fixed sensor data
- Continue travel time reliability analysis
- Explore the use of INRIX and other emerging data sources to produce online quarterly snapshots of regional congestion

Mr. Meese identified the priority areas of the report in terms of TFS review:

- Executive Summary (pages 7-21)
- State of congestion (Chapter 2, pages 29-88)
- Analyses of INRIX data (pages 48-65)
- Conclusions (Chapter 6, pages 145-147)

The deadline for comments is May 28 and the report is to be finalized at the June 4 Tech. Committee meeting.

Mr. Pu presented an analysis of the I-95 Corridor Coalition/INRIX highway speed data. Since 2008, a selection of freeways and major arterials in the Metropolitan Washington area has been monitored by the I-95 Corridor Coalition's Vehicle Probe Project. The data covers many of the freeways in the metropolitan area, with the notable exception of I-270 in Maryland. The project is a collaboration among the Coalition, the University of Maryland, and INRIX, Inc., whose goal is to provide comprehensive and continuous real-time travel information to members. The project acquires travel time and speed data on freeways and arterials using vehicle probe technology. While the dominant source of data is obtained from fleet systems that use GPS to monitor vehicle location, speed, and trajectory, other data sources such as sensors may also be used. The INRIX system fuses data from various sources to present a comprehensive picture of traffic flow. Mr. Pu presented a series of analyses and metrics such as the Travel Time Index (the ratio of the actual travel time to the free-flow travel time), the Planning Time Index (the ratio of the 95th percentile travel time to free-flow travel time), and the Buffer Time Index (the difference between the 95th percentile travel time and average travel time, normalized by normal travel time), using the last two metrics to quantify travel time reliability.

[1] Wenjing Pu and Andrew Meese, *2010 Congestion Management Process (CMP) Technical Report*, Draft report (Washington, D.C.: Metropolitan Washington Council of Governments, National Capital Region Transportation Planning Board, April 30, 2010).

Mr. Milone mentioned that the INRIX data is very pricey (although right now, TPB is getting the data for free), so it is important for us to get as much information out of it as we can. Mr. Meese pointed out that the main reason the data exists is for real-time purposes. For example, when you are driving on Maryland freeways and you see travel times on variable message signs, that's INRIX data. So, the fact that we are taking the archived data and analyzing it, means that we are secondary users of the data. Mr. Mahapatra asked whether TPB gets the data from Maryland CHART (Coordinated Highways Action Response Team). TPB staff responded that that was not the case. TPB gets the data from a contract that responded to an RFP from the I-95 Corridor Coalition, so, the TPB, as an affiliate member of the coalition, has access to the data. So, TPB staff has directly downloaded the data from the INRIX company website. Mr. Mahapatra asked who came up with the processes to calculate the various metrics, such as buffer time index. Mr. Pu said that these metrics were calculated by TPB staff. Mr. Mahapatra asked whether TPB staff knew about similar work being done by BMC in Baltimore. TPB staff indicated that it was not aware of anyone else who was analyzing archived data, adding that it would be interested to talk to anyone else who is undertaking similar work to TPB.

8. 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 Mark Moran and Mary Martchouk.