National Capital Region
Transportation Planning Board

TPB TRAVEL FORECASTING SUBCOMMITTEE

HIGHLIGHTS OF THE JANUARY 28, 2022 MEETING

9:30 AM to 12:00 noon, Web conferencing ONLY, due to COVID-19 precautions. There was no on-site meeting.

MEETING ATTENDEES

MEMBERS, ALTERNATES, AND PARTICIPANTS

- Jonathan Avner (Whitman, Requardt & Assoc.)
- Christine Sherman Baker (Arlington Co. DES)
- Alex Bettinardi (Oregon DOT)
- Kevin Chai (Fairfax Co, DOT)
- Oliver Charlesworth (Bentley Systems Inc)
- Filippo Contiero (Bentley Systems Inc)
- Austin Foster (MDOT)
- Joel Freeman (RSG, Inc.)
- Dan Goldfarb (MITRE Corporation)
- Eric Graye (M-NCPPC, Montgomery Co.)
- Chetan Joshi (PTV Group)
- George Kandathil (Tri County Council for Southern Maryland)
- Kyeongsu Kim (Nelson\Nygaard)
- David Kline (Fairfax County DOT)
- Hameed Kutubi (VDOT)

- Li Li (Whitman, Requardt & Assoc.)
- Yuanjun Li (M-NCPPC, Montgomery Co)
- Feng Liu (Cambridge Systematics)
- Vahid Moshtagh (VDOT)
- Srikanth Neelisetty (Transurban)
- Krishna Patnam (AECOM)
- Marie Pham (Loudoun Co.)
- Maggie Qi (Fairfax County DOT)
- Mark Radovic (Gannet Fleming)
- Elham Shayanfar (MDOT)
- Lisa Shemer (MDOT-SHA)
- Malcom Watson (Fairfax County DOT)
- Jongsun Won (PTV Group)
- Qian (Cherry) Xiong (T.Y Lin International)
- Jim Yang (M-NCPPC, Prince George's Co.)
- Yi Zhao (DDOT)

COG STAFF

- William Bacon
- Joe Davis
- Nazneen Ferdous
- Ken Joh
- Martha Kile

- Sanghyeon Ko
- James Li
- Nicole McCall
- Mark Moran
- Ray Ngo

- Jinchul (JC) Park
- Meseret Seifu
- Dusan Vuksan
- Feng Xie
- Zhuo Yang

* All meeting participants attended the meeting remotely via WebEx.

This meeting of the Travel Forecasting Subcommittee (TFS) was chaired by Ms. Shemer.

1. INTRODUCTIONS AND APPROVAL OF MEETING HIGHLIGHTS FROM THE PREVIOUS MEETING

First, a roll call was conducted. Next, the highlights of the November 19, 2021 meeting of the TFS were approved.

2. MODELING PUBLIC TRANSPORT IN THE ARLINGTON CO. TOUR-BASED TRAVEL MODEL

This item was presented by Ms. Sherman Baker and Mr. Contiero, who spoke from a set of presentation slides. First, Ms. Sherman Baker provided an introduction and noted the importance of modeling public transportation in Arlington Co., given the importance of transit in the study area and the potential to enhance the transit system. Next, Mr. Contiero presented the algorithm developed for the Arlington Public Transport model and the steps undertaken for the calibration of the model. Mr. Contiero started with a general overview of the Public Transport module, which is part of the Bentley Systems CUBE Voyager software package. He also highlighting the customization that was done for the Arlington Co. model. During the presentation, Mr. Contiero showed the approach adopted for Arlington in terms of input processing (master network, transit lines, transit system), user classes adopted, and time periods simulated during the skimming and assignment steps. He discussed the main steps of the model in terms of network preparation (link attributes for defining the transit speeds and additional attributes in the line files), non-transit legs, and structuring the fare system.

Mr. Contiero also shared with the subcommittee, the main parameters, functions and factors adopted in the model, citing the process of deriving and refining them during the calibration of the model. He also described some of the outputs coming from the application of the model for the base year scenario and the comparison with observed data. Lastly, he described potential future improvements for the model, with a quick overview on the investigation into an auxiliary "crowding algorithm," external from the transit assignment, to consider the capacity of the system within the demand model with a simplified approach.

Regarding Slide 9, Mr. Moran noted that he could understand why you would separate out non-motorized travel in its own user class, but, he did not understand why you chose to have two user classes, one for access and one for egress. Mr. Contiero said that this was because Bentley had separated the matrices by origin-to-destination and destination-to-origin. He noted that Bentley's approach was to force the usage of the right access or egress modes.

Mr. Moshtagh asked, in the WebEx chat window, how long are the walk links? Mr. Contiero noted that the minimum and maximum lengths were shown on slide 11. Mr. Xie asked a couple questions in the WebEx chat window. First, why did Bentley create short and long non-transit (NT) legs? Does the mode choice model require short- and long-access skims? Mr. Contiero said that we do not do it for the mode choice model, but it is for having better control over the path-building process in the PT algorithm, with more flexibility to penalize different short vs long non-transit legs in terms of perceived cost. Second, in the WebEx Chat window, Mr. Xie asked, since NT legs are derived from the actual infrastructure, do we need to run NT leg generation only once, instead of repeated times in the feedback loop? Mr. Contiero said, yes, only once.

Mr. Ngo asked, in the WebEx chat window, which transfer data sources were used for the calibration of the model? Mr. Contiero said that most of the information came from the travel surveys, but he said that more details can be found in the model documentation. Mr. Kandathil asked in the WebEx chat window what was the meaning of the acronym "TNCnR"? Mr. Contiero said that this meant "Transportation Network Company [as an access mode] and Ride [transit]", which is similar to the acronym PnR for Park and Ride and KnR for Kiss and Ride.

3. TRANSITIONING FROM A TRIP-BASED TRAVEL MODEL TO AN ACTIVITY-BASED TRAVEL MODEL: MOTIVATIONS AND EXPERIENCES OF THE OREGON DEPARTMENT OF TRANSPORTATION

This item was presented by Mr. Bettinardi from the Oregon DOT who spoke from a set of presentation slides. Mr. Bettinardi discussed four major topics: 1) An overview of the models being supported by ODOT and the modeling context used in the state of Oregon; 2) The reasons and motivations ODOT is shifting to the ABM platform, including the perceived advantages; 3). Some examples of the challenges ODOT has already faced in shifting to an activity-based model (ABM) over the past several years; and 4) Next steps for ODOT as the launch of Oregon's next statewide travel survey gets underway and ODOT prepares to estimate a new set of ABM's using ActivitySim.

The table on slide 8 compares the capabilities of trip-based modes and ABMs. The table implies that trip-based models are superior to ABMs. In the WebEx chat window, Mr. Vuksan asked why that would be the case. Mr. Bettinardi said trip-based models have easier-to-specify zone inputs and are deterministic. ABM's are stochastic models with changing results and more complicated zonal inputs. For applications that are focused on a very small region in the model, it's much easier to get consistent results from a trip-based. Mr. Bettinardi noted that that does not mean that ABMs cannot answer be used for traffic impact studies – just that ABMs are more complex to operate, especially for these types of focused questions. So, trip-based models do have a strength, arguably, over ABMs in this area.

Mr. Bettinardi noted, on slide 13, that ActivitySim can support three types of zone systems: 1) Systems with one zone type, such as TAZs; 2) Systems with two zone types, such as TAZs and micro-analysis zones (MAZs); and 3) Systems with three zone types: TAZ, MAZ, and transit access points (TAP), used to represent transit stops. ODOT is currently working with the three-zone-type system for its MPO models, but he noted that ODOT is considering switching to a two-zone-type system, given the simplicity of the transit systems in these areas. [COG's planned Gen3 Model will make use of a one-zone-type system (TAZs). In the future, COG will consider the benefits of switching to a two- or three-zone-type system.]

In the WebEx chat window, Mr. Vuksan asked, for your production planning work, do you execute the model in house or with consultant assistance? He also asked how many modelers ODOT has on staff? Mr. Bettinardi said that his group has about 15 staff members. About three work on traffic monitoring or the Regional Integrated Transportation Information System (RITIS); About three to four staff work on conducting NEPA-level planning analysis with modeling tools; About seven to eight staff work on modeling. Of those, about one to two staff work on the statewide models. Lastly, about five staff run the MPO models, which covers five smaller MPOs and also 10 sub-MPO models. ODOT uses consultants for calibration of or enhance of the models. With the ABM, we used consultants to develop the first ABM, which involved starting with the SANDAG CT-RAMP model and then re-estimating a couple of models.

In WebEx chat window, Mr. Kandathil asked, what are some of the major/most important data requirements of ABMs that are not required in conventional trip-based models? And for unpopulated areas of the United States, are these data requirements worth the cost of acquisition? Mr. Bettinardi said that this can vary across the country, based on what datasets are readily available to the given modeling agency, but in Oregon's experience, data cost was not impacted with the shift to ABMs. The same data sources are used regardless of whether an ABM or trip-based model is deployed. However, the main difference is how detailed the data/inputs are represented in the ABM. For example, in Oregon, the ABM was setup with an "all-streets" network vs a "planning level," no-local-street network. The data source already existed in both cases, but a fair amount more work was needed to setup the all-streets network in the ABM.

Regarding the input checker mentioned earlier in Mr. Bettinardi's presentation, Mr. Moran asked whether that was part of ActivitySim or a separate add-on. Mr. Bettinardi said that the ODOT input checker was an add-on, noting that he did not think that it had yet been made part of the main ActivitySim software platform. Mr. Moran asked whether ODOT has found model runtimes for the ABM to be a significant challenge. Mr. Bettinardi said, not yet, but he said that ABMs that are run by ODOT are relatively small regions. Based on his experience with other ActivitySim users, long model runtimes are a common concern. In the case of ODOT, the model runtime is six hours with three speed feedback iterations. He noted that one cause for the long runtime was due to the three-zone-system complexity that ODOT is using. Mr. Moran asked whether ODOT has you found it challenging to find qualified staff to run the ABMs. Mr. Bettinardi stated that finding qualified staff can be a big challenge. ODOT has multiple staff with decades of great experience in trip-based models, but much less experience with ABMs. He noted that trip-based models rely on a lot of matrix calculations, whereas ABMs rely on dealing with lists of people and households.

4. COG/TPB GEN3 TRAVEL MODEL: STATUS REPORT

This item was presented by Mr. Freedman who spoke from a set of presentation slides. Mr. Freedman began his presentation by describing the phased model development plan for the Gen3 Model. In Phase 1, a prototype model was developed that can be tested by the COG/TPB staff and used to learn the strengths and weaknesses of the transferred model. In Phase 2, a production-use model that can be used for regional planning work will be delivered. Mr. Freedman reviewed the activities completed in Phase 1, including data analysis and preparation, model deployment, model estimation, initial model calibration and validation, and sensitivity testing. Mr. Freedman noted that the deadline for completion of all Phase 1 activities is the end of February 2022.

At slide 5, there was an internet outage that affected the presenter for about 15 minutes. Staff began to discuss the next agenda item (TRB Annual Meeting), then returned to the Gen3 Model after the internet outage was fixed.

Mr. Freedman then explained the procedure used to calibrate alternative-specific constants in the model (slide 8). Mr. Freedman then provided a broad overview of the Phase 1 model calibration and validation results, noting where goodness-of-it seemed reasonable and/or where additional work may be required in Phase 2. These summaries included tables, charts, and figures comparing Gen3 Phase 1 Model results to Census data, household travel survey data, traffic counts, and transit boardings.

Concerning slide 19 ("Fully Joint Tours"), Mr. Moran noted that the Gen3 Model was predicting about 8% of households would have one eating out tour and one visiting tour, but that that combination did not seem to appear in the Regional Travel Survey (RTS) data. Mr. Freedman agreed with that interpretation of the bar chart, and said that we should keep in mind that there are fully joint tours, so, the survey seems to have found no cases with a household that made one fully joint eating out tour along with one fully joint visiting tour. Mr. Moran noted that the demand model has 30-minute time intervals and asked whether it could be used to analyze peak spreading. Mr. Freedman replied, yes, the model does respond to peak spreading. But, currently, the skimming is done in the four time-of-day periods, so the model will respond to the levels of congestion in these four time periods rather than the half-hour periods. Some agencies have implemented multiply assignments within the peak period to try to get more sensitivity to deal with that. But that is not currently in the Phase 1 model.

Following the presentation, but referring to slide 36 ("Transit Validation – Metrorail Boarding Summary"), Ms. Li noted that the ratio of estimated to observed was only 0.93, which was not as good as she would have expected. She noted that Metrorail observed data should be reliable since it comes from counts made at faregates. Mr. Freedman reminded the subcommittee that, for the

Phase 1 model, very little work has been done regarding calibrating operator-specific results in the model. So, the level which we are calibrating the Phase 1 model are broad tour modes, like walk-transit, park-and-ride-transit, and kiss-and-ride-transit (as shown on slide 24). Given that perspective, Mr. Freedman argued that the model is doing well considering that we have not spent a lot of time looking at rail-specific constants and making any adjustments to those. Mr. Xie noted that the underestimation of transit may relate to the overestimation of VMT in DC. He remembered that RSG had looked at the mode choice for tours going to DC and the Phase 1 model was sending more auto tours to DC but fewer non-motorize and transit tours. So that could be a factor. Mr. Freedman noted that we were underestimating zero-auto households in the District. In the chat window, Mr. Kandathil asked, why on slide 14, for certain jurisdictions, the average home-to-work length did not fit the observed average trip length as well as other jurisdictions. Mr. Freedman replied that this could be due to small sample sizes for small jurisdictions, like Falls Church, or because the model does not understand something about the people who live in a small jurisdiction, such as a major employer that may affect the home-to-work distance more significantly for a certain jurisdiction.

5. TRANSPORTATION RESEARCH BOARD (TRB) 101ST ANNUAL MEETING

Mr. Moran noted that he did not attend the TRB this year, even though he has attended many past meetings, and noted that no one from his team attended TRB, although several COG staff from other teams did attend this year. Ms. Shemer stated that she also did not attend this year's TRB, but several members of her staff attended. She said that one member on her staff attended a good talk on visualization in transportation and also a session on measures of effectiveness (MOEs) for equitable employment access. Mr. Avner attended a session about planning for shared and autonomous vehicles. One of those presentations discussed the spatial context of ride hailing, focusing on spatial density and urban form. Another session was accounting for ride hailing and autonomous vehicles, including what the vehicles do while you are at your destination. He noted that they developed some sub-models that could be implemented into a four-step model that looked at parking versus circulating versus returning home. Mr. Avner stated that he also attended a very interesting talk given by the head of the Southeastern Pennsylvania Transportation Authority (SEPTA) and the Kansas DOT about changes these agencies had to make during the pandemic. Mr. Avner also attended the same visualization in transportation session. There was also discussion about Building Information Modeling (BIM), including how we organize data and communicate with other business partners.

In the WebEx chat, Mr. Goldberg stated that the TRB poster sessions were about 50% full, noting that it was very odd to see the hall so empty. Ms. Li stated that she attended all four days of the meeting, onsite. She had heard that about 7,000 people had registered, but many people ended up canceling at the last minute, and some presenters never showed up. She noted that, although the Convention Center was less crowded than in past years, the conference went well. She added that, from her TRB attendance, she learned about using Big Data for different planning tasks. For example, there was a presentation from Wejo, a company specializing in connected vehicle data.

Mr. Moran asked if anyone knew about the status of future TRB conferences, such as the TRB Planning Applications Conference and the TRB Innovations in Travel Modeling Conference. Mr. Avner said that it is currently unclear.

6. ROUNDTABLE DISCUSSION OF CURRENT MODELING EFFORTS AROUND THE REGION

Mr. Avner, noted that, regarding the Maryland Statewide Model, MDOT is about to embark on a round of updates for demographic and network data. Either Mark Radovic or I may reach out to various to verify that we have the latest data from each agency, which we plan to bring into the statewide model. Mr. Moran asked whether Mr. Avner was referring to the statewide trip-based

model or the statewide activity-based model. Both, according to Mr. Avner, since they both share network and land use data. There were no updates from Virginia, DC, or transit agencies.

7.   OTHER BUSINESS

A.   Snapshots of efforts of COVID-19 on travel, available on COG website

Ms. Kile reported that COG/TPB staff continue to develop snapshots to illustrate how the COVID-19 pandemic is impacting travel in the metropolitan Washington region. The charts show changes in roadway traffic and air passenger enplanements compared with pre-pandemic levels. The snapshot is available on the COG website (https://www.mwcog.org/documents/2021/07/16/covid-19-travel-monitoring-snapshot-covid19-traffic-monitoring/). The current snapshot shows traffic data through November 2021. Ms. Kile noted that regional roadway traffic levels had rebounded to over 95% of the 2019 in July 2021, then decreased slightly when compared to their 2019 levels in August and September but were back to over 95% of 2019 levels in November 2021. Regional air travel rebounded quite a bit during the summer with air passenger enplanements over 70% of 2019 levels. By October they were 75% of 2019 levels. She noted that COG does not have all of the November data for enplanements, but preliminary data show that air travel had continued to increase through November.

B.   Planned guest presentations at upcoming TFS meetings

Mr. Moran noted that, for the March 25 TFS meeting, we plan to have someone from Northeast Maglev and WSP give a presentation on travel demand modeling work that has been done for the proposed Baltimore-to-Washington magnetic levitation (meglev) train service. Mr. Moran also noted that, after the March TFS meeting, there are no other scheduled guest presentation, so he encouraged interested presenters to contact him so that they can be added to the schedule.

Ms. Shemer noted that she hoped that her group at MDOT SHA -- Travel Forecasting and Analysis Division (TFAD) -- might be able to make a presentation to the TFS this summer. Ms. Shemer also suggested that it would be interesting to have the Baltimore Metropolitan Council (BMC) provide an update on their recent modeling activities, including any recent work done with their activity-based travel model (ABM). Mr. Moran said that COG/TPB staff would welcome a presentation from BMC.

C.   Next scheduled meeting

Planned for Friday, March 25, 2022, 9:30 A.M. to 12 noon. COG is currently planning a return to the office on March 1, 2022. However, it is still to be determined if the March 25 TFS meeting will be virtual or hybrid.

8.   ADJOURN

The meeting adjourned at about 12:00 noon.