National Capital Region
Transportation Planning Board

Approved
As of 5/15/2020

TPB TRAVEL FORECASTING SUBCOMMITTEE

HIGHLIGHTS OF THE MARCH 20, 2020 MEETING

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

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MEETING ATTENDEES

MEMBERS, ALTERNATES, AND PARTICIPANTS

- Bill Allen (Bentley Systems Inc.)
- Katie Brinson (Bentley Systems Inc.)
- Jim Bunch (Sabra & Associates)
- Kevin Chai (Fairfax Co. DOT)
- Oliver Charlesworth (Bentley Systems Inc.)
- Zuxuan Deng (DDOT)
- Nazneen Ferdous (Jacobs)
- Joel Freedman (RSG Inc.)
- Dan Goldfarb (NVTC)
- Eric Graye (M-NCPPC, Montgomery Co.)
- Adam Groves (PTV Group)
- Kyeongsu Kim (Connetics Transportation Group)
- David Kline (Fairfax County DOT)
- Betsy LaRue (PTV)
- Jim Lam (Caliper)
- Jaesup Lee (M-NCPPC, Montgomery Co.)
- Yuanjun Li (M-NCPPC, Montgomery Co.)
- Xuemei Liu (Cambridge Systematics)
- Nabid Morshed (Baseline Mobility Group)
- Krishna Patnam (AECOM)
- Maggie Qi (Fairfax County DOT)
- Andres Rabinowicz (Caliper)
- Mushtaqur (Mushtaq) Rahman (Baseline Mobility Group)
- Harun Rashid (NVTA)
- Rich Roisman (Arlington Co. DES) for Christine Sherman Baker (Arlington Co. DES)
- Amir Shahpar (VDOT)
- Tasnim Siddika (Baseline Mobility Group)
- Chris Simons (Bentley Systems Inc.)
- Howard Slavin (Caliper)
- Malcolm Watson (Fairfax County DOT)
- Jongsun Won (PTV Group)

COG STAFF

- William Bacon
- Tim Canan
- Anant Choudhary
- Joe Davis
- Greg Goodwin
- Charlene Howard
- Ken Joh
- Martha Kile
- Sanghyeon Ko
- Arianna Koudounas
- Nicole McCall
- Ron Milone (Contractor)
- Jessica Mirr
- Mark Moran
- Erin Morrow
- Ray Ngo

- Wanda Owens
- Jinchul (JC) Park
- Jane Posey
- Meseret Seifu
- Dusan Vuksan
- Feng Xie
- Jim Yin

* All meeting participants attended the meeting remotely via WebEx.

This meeting of the Travel Forecasting Subcommittee (TFS) was chaired by Mr. Amir Shahpar.

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

The highlights of the January 24, 2020 meeting of the TFS were approved without changes.

2. AIR QUALITY CONFORMITY ANALYSIS OF THE FY 2021-2024 TIP AND THE 2020 AMENDMENT TO THE VISUALIZE 2045 LONG RANGE TRANSPORTATION PLAN

This item consisted of two presentations, one by Ms. Posey and one by Mr. Moran. Both presenters spoke from a set of presentation slides, which were presented in the WebEx session and were uploaded to the TFS webpage after the meeting.

Ms. Posey reviewed the air quality conformity analysis of the 2020 amendment to Visualize 2045 and the FY 2021-2024 TIP. She listed the pollutants and analysis years, and briefly discussed changes to technical inputs since the previous conformity analysis. The changes included updated project inputs, Round 9.1a Cooperative Forecasts of land activity, and a new version of the travel demand model (Ver. 2.3.78). She shared the URL for an online map that shows the major projects in the plan. She noted that there is also a table listing all the project inputs on the COG website. Ms. Posey shared graphs of both trips and vehicle miles of travel (VMT) from the analysis. She reviewed graphs of Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx) emissions and explained that the Plan and TIP passed the conformity test because the emissions levels for all analysis years are below the mobile emissions budgets. She shared a graph showing mobile-source Greenhouse Gas (GHG) emissions through time. Ms. Howard noted that the URL for the online map shown in the slide show was incorrect. Ms. Posey indicated that she would correct it before the presentation slides were posted to the TFS webpage.

Mr. Moran discussed the transmittal package for the Version 2.3.78 Travel Model. He noted that before the package is ready to transmit, staff re-runs all the travel model steps for each year, summarizes the output, and develops updated network documentation and an updated travel model user's guide. He described the contents of the model/network transmittal package, indicating that the standard package would include Transportation Analysis Zone (TAZ)-level land use and transportation networks for seven analysis years (2017, 2019, 2021, 2025, 2030, 2040, 2045); model scripts and batch files; and model documentation. Mr. Moran noted that model outputs are not included in the transmittal package due to the large size of those files. He explained that the 2.3.78 Model gives the same results as the previous model (Ver. 2.3.75), since the three technical corrections in the updated model do not affect modeled results. He informed the group that the transmittal package should be ready in mid-April. There were no questions.

3. UPDATES TO TPB'S TRAVEL DEMAND FORECASTING MODEL: GEN2 MODEL

This item was presented by Mr. Xie, who spoke from a set of presentation slides, which were presented in the WebEx session and were uploaded to the TFS webpage after the meeting. In this

presentation, Mr. Xie updated the subcommittee on the status of TPB's Generation-2 (Gen2) Travel Demand Forecasting Model development activities. Mr. Xie started with an overview of the current Gen2 production-use and developmental models. Mr. Xie then went through the milestones of recent Gen2 model development activities and resulting documentation. In the end, he laid out the plans to finalize the Ver. 2.4 Model and to make it the next production-use model without a formal TPB action, since it would likely be ready prior to the next air quality conformity analysis.

Jim Bunch asked if TPB staff are switching from the Cube TRNBUILD transit path-builder to the Cube Public Transport (PT) transit path-builder and if the LineSum and other utilities will be updated accordingly. Mr. Xie responded that TPB staff are conducting a preliminary investigation of using Cube PT for transit modeling in one of their developmental models. Specifically, TPB staff are now looking into preliminary path-tracing results from PT vs. TRNBUILD for QC/QA. The investigation is still in a very early stage. No firm decision has been made in terms of switching to PT. Thus, TPB staff are not developing any utilities for PT at this stage.

Ms. Patnam asked if TPB staff are using Cube Version 6.4.5 and if TPB staff tried some of the assignment improvement features that have been introduced in that version. Mr. Xie responded that TPB staff are using Cube Version 6.4.1 because of the stability issue associated with Cube Version 6.4.5 and that TPB has not yet implement any assignment improvement features that were introduced in Cube 6.4.5. Mr. Ngo added that when TPB staff conducted model runs using Cube Version 6.4.5 on a travel model server (tms8), noting that some runs went through and some stopped in the walkshed generation step, and that he did some tests incorporating some of the assignment improvement features in Cube 6.4.5, which did not result in noticeable model runtime improvements.

Mr. Slavin asked if TPB staff tried the American Legion Bridge example with tighter levels of assignment convergence. Mr. Xie answered that TPB staff did increase the highway assignment convergence criteria for the last feedback loop from a relative gap of 10^{-4} to relative gap values of 10^{-5} and 10^{-6}, but that did not change the directionality of VMT change. Mr. Slavin then commented that tighter convergence always reduces vehicle hours of travel (VHT) and increases VMT, so if that is not happening, there could be another issue. Mr. Xie agreed that tightening highway convergence criteria will usually reduce model noise. He added that in those tests, however, TPB staff still observed unintuitive decreases in VMT with tighter levels of convergence, and, in fact, that was when TPB staff started to suspect that the reversal of directionality of VMT change was caused by something more systematic than model noise.

Mr. Bunch asked how many iterations were being carried out and whether they max out. Mr. Xie responded that the maximum number of highway assignment iterations is 300 and the highway assignment completes when either the maximum number of iterations or highway assignment convergence criterion is reached, whichever occurs first.

4. UPDATES TO TPB'S TRAVEL DEMAND FORECASTING MODELS: GEN3 MODEL

This item was presented by Mr. Freedman, who spoke from a set of presentation slides. Mr. Freedman first discussed Task Order 1, Program Administration, which includes four tasks:

1. Attend meetings and prepare meeting summaries
2. Develop project management plan (PMP)
3. Provide training to COG/TPB staff
4. Respond to ad-hoc requests not covered under other task orders

He presented an overall project schedule, which covered FY 20 to FY 23. Then he discussed Task Order 2, Assessment of Current Model and Design of Gen3 Model, which will result in a report, due the end of May. Mr. Moran noted that, after the Gen3 Model design report has been completed,

model development can proceed, likely with two phases of development: an initial model calibration and a model re-calibration to address any issues found in the initial calibration.

Ms. Patnam asked whether the traffic assignment process will remain in Cube. Mr. Freedman answered that is likely that, for the initial release of the Gen3 Model, that Cube will continue to be used, although he noted that COG staff wants to learn the pros and cons of all travel demand modeling software packages to ensure that the best package is being used.

5. SURVEY OF NETWORK MANAGEMENT PRACTICES AT PEER METROPOLITAN PLANNING ORGANIZATIONS (MPOS)

This item was presented by Mr. Yin, who spoke from a set of presentation slides. Mr. Yin presented the findings of a survey, conducted by TPB staff in 2019, whose purpose was to survey peer MPOs regarding their practices to manage, edit, and update the transportation networks that are used as inputs to regional travel demand models. The sample frame was the 20 largest MPOs in the U.S. (based on 2010 population), where Washington, D.C. (TPB) is number nine on the list. TPB staff received responses from 12 MPOs (13 including TPB).

Mr. Yin discussed how the survey was conducted and presented the survey summary results. The four main travel demand forecasting (TDF) software packages in use are Cube (Bentley Systems), TransCAD (Caliper), EMME (INRO Consultants), and VISUM (PTV Group). In addition to each of the four TDF software packages, each MPO uses Geographic Information System (GIS) software, typically either ArcGIS or TransCAD. Mr. Yin concluded with the following findings:

- Network management is a complex process.
- 12 surveyed peer MPOs use three different network management software packages to serve different needs.
- There is no universal network management software package that can meet the needs of every MPO.
- A reliable customized tool is necessary to manage multi-year, multi-modal network databases.

A meeting attendee asked whether the survey included public planning agencies in Canada. Mr. Yin stated that the survey covered only the U.S.

Ms. Li noted that M-NCPPC built its own network management tool to manage multi-year, multi-modal network databases. The tool, called MCTools, was based on COGTools.

6. BENTLEY CUBE: CURRENT AND FUTURE DEVELOPMENT FOR THE NEXT GENERATION

This item was presented by Mr. Charlesworth who spoke from a set of presentation slides. He noted that Citilabs was acquired by Bentley Systems, Inc. in October 2019. His presentation covered two main topics: 1) Cube 6, with an emphasis on recent updates and using Cube Public Transport (PT); and 2) Cube 7. Regarding Cube 6, he presented overview of PT, including its processing steps, fare representation, crowding, and provided the results of two tests (one for transit assignment and one for highway assignment) conducted by Bentley Systems staff using one of COG's developmental travel models (Gen2/Ver. 2.5). Mr. Charlesworth also discussed updates planned for Cube 6.5, such as an update to Cube Land, support for ArcGIS 10.7, and Bentley SELECT Licensing. Then he discussed Cube 7, which should be released in beta format later in 2020. Cube 7 updates include a new GIS network editor and better spatial analysis, with more support for new GIS formats, including Spatialite. Other improvements include Cube Cluster, Application Manager, version control, and better Python support (CubePy). Research topics for Cube 7 include making use of GPU co-processors, a new trip distribution module (TRIPDIST), a new traffic assignment algorithm (FASTPATH), and a next-generation dynamic traffic assignment (DTA) algorithm called FASTLANE.

There is also research into improving transit modeling, such as improving model run time and developing multi-modal assignments that include built-in park-and-ride elements.

Mr. Bunch asked whether Cube is moving away from ArcGIS. Mr. Charlesworth answered that Cube is moving away from ArcGIS Engine. He said that Esri might be doing the same, since it is moving toward ArcGIS Pro. Nonetheless, Cube will continue to support ArcGIS (slide 16).

Mr. Xie asked whether future versions of Cube will continue to support and enhance for both PT and TRNBUILD. Mr. Charlesworth said that improvements will be made to PT, and Cube 7 will continue to support TRNBUILD, but he said he would need to check on whether TRNBUILD will be getting any future updates.

Mr. Freedman asked about the likely time window for the release of Cube 7. Mr. Charlesworth said that the Beta release of Cube 7 should be around the fall of 2020. Most of the content through slide 23 should be in the Beta release.

Mr. Morshed asked whether any other scripting languages, apart from Python were going to be integrated with Cube. Mr. Charlesworth answered that Python was selected due to its popularity especially for university students. Since the API for Cube 7 is capable of expansion to other scripting languages, Bentley is open to hearing suggestions for other programming languages that should be integrated.

Ms. Patnam asked if there is backwards compatibility between Cube 6 and Cube 7. Mr. Charlesworth answered that there will be some conversion tools, but, for the most part, there should be no problems with compatibility. Cube 7 will continue to support Cube script. An attendee asked if he knew what percentage of agencies use PT versus TRNBUILD. Mr. Charlesworth said that he did not.

Mr. Yin asked how GTFS is going to be used in Cube 7, e.g., to create a new transit network or just to get some transit information from GTFS? Mr. Charlesworth thought that the biggest benefit of the new GTFS capabilities would be experienced by agencies using timetable scheduling. The Bentley FLOW tool has a GTFS editor, which will allow you to edit transit lines that are stored in GTFS format. Ms. Li asked whether the new GIS and DBMS features of Cube 7 would allow Cube to manage multi-year networks. Mr. Charlesworth thought that it would, but admitted that this was an area where his knowledge was more limited.

7. OTHER BUSINESS

A. 2017-2018 Regional Travel Survey: Status report

Dr. Joh provided a brief status report on the Regional Travel Survey (RTS). Since the last TFS briefing, TPB staff has been working on the data processing and editing of the RTS trip file collected from the Part 2 survey (travel diary). Staff is close to wrapping up the processing of the trip file, particularly the trip linking and trip logic checks for non-automobile trips including rail, bus, bicycle, and walk trips. Dr. Joh stated that this task should be completed in the next few weeks. Once this task is completed, findings from the trip files will be shared with the subcommittee.

B. Scheduling TFS presentations for CY 2020

Mr. Moran noted that COG/TPB tries to include one non-COG/external presentation at each TFS meeting. He suggested that people with ideas about interesting non-COG presentations should contact him.

C. Regional Transportation Data Clearinghouse Updates

Ms. Howard provided a brief status report on the Regional Transportation Data Clearinghouse (RTDC). Due to technical issues, she was not able to use her microphone to deliver the update, so

she provided an update via the WebEx chat window. RTDC updates were occurring in two primary areas:

- CTPP county-to-county flow by means of transportation (2012 -2016).
- VMT weekday trends for the modeled region (2005 to 2018)

Mr. Shahpar mentioned that VDOT is interested in finding out what percentage of employees at various agencies can telework during the COVID-19 pandemic, since VDOT would like to correlate that information with the decreases in road traffic that are being experienced.

8. ADJOURN

The meeting adjourned around 12:00 noon. The next meeting is scheduled for Friday, May 15, 2020 at 9:30 A.M.