National Capital Region
Transportation Planning Board

TPB TRAVEL FORECASTING SUBCOMMITTEE

HIGHLIGHTS OF THE JANUARY 26, 2024 MEETING, 9:30 AM TO 12:00 NOON

Meeting was held virtually via web conferencing software. There was no on-site meeting.

MEETING ATTENDEES

MEMBERS, ALTERNATES, AND PARTICIPANTS

- Jonathan Avner (Whitman, Requardt & Assoc.)
- Anson Gock (Delaware DOT)
- David Hensle (RSG)
- Li Li (Whitman, Requardt & Assoc.)
- Yuanjun Li (M-NCPPC, Montgomery Co.)
- Feng Liu (Cambridge Systematics)
- Srikanth Neelisetty (Transurban)
- Ian Newman (NVTA)
- Marie Pham (Loudoun Co.)
- Mark Radovic (MDOT)
- Mushtaqur (Mushtaq) Rahman (Baseline Mobility Group)
- Harun Rashid (NVTA)
- Amir Shahpar (VDOT)
- Rana Shams (MDOT)
- William Thomas III (Baker International)
- Malcolm Watson (Fairfax County DOT)
- Chris Wichman (AirSage)
- Jun (Jim) Yang (M-NCPPC, Montgomery Co.)
- Zhibo Zhang (DDOT)

COG STAFF

- Bill Bacon
- Tim Canan
- Joe Davis
- Nazneen Ferdous
- Charlene Howard
- Ken Joh
- Jan Mou (James) Li
- Mark Moran
- Wanda Owens
- Jinchul (JC) Park
- Jane Posey
- Meseret Seifu
- Bahar Shahverdi
- Jessica Storck
- Dusan Vuksan
- Feng Xie
- Zhuo Yang

1. OPENING: MEETING ROLES, RULES, AND ROLL CALL OF PARTICIPANTS

Mr. Moran discussed roles of the meeting participants (e.g., chair, host, technical host, and note taking), meeting rules, and then performed a roll call of participants.

2. APPROVAL OF MEETING HIGHLIGHTS FROM THE NOVEMBER 17 MEETING

This meeting of the Travel Forecasting Subcommittee (TFS) was chaired by Mr. Rashid. The highlights of the November 17, 2023 meeting of the TFS were approved without any changes.

3. AIRPORT GROUND ACCESS TRAVEL TIME STUDY

This item was presented by Dr. Yang with a set of presentation slides. Dr. Yang started with the background information of the Ground Access Travel Time Study, including a historical analysis, study area, metrics, data timeframes, definitions of day types and time of day. The main metrics analyzed in the project were Travel Time, Travel Time Index (TTI), and Planning Time Index (PTI) categorized by both geospatial dimensions (airport, route, road segment) and temporal dimensions (year, day of week, and time of day). Dr. Yang presented demographic information, showing a stable population before, during and after the pandemic. As for employment, it decreased dramatically and then rebounded, though the current employment is still lower than pre-pandemic levels. Dr. Yang then presented TTI and PTI comparisons across all time periods of day for weekdays. For BWI, the highest TTIs and PTIs were observed during the PM peak period. For DCA and IAD, the highest TTIs were observed during the AM peak period. He shared TTI maps of the regional network across the study year, particularly for weekdays. Managed lanes were analyzed, showing that a noticeable amount of travel time was saved for travel on managed lanes.

Mr. Moran asked what tools were used to work with the vehicle probe data and asked what challenges were faced during the analysis. Dr. Yang said he used the Python programming language with packages like PySpark. The challenges were the RAM limitation of handling gigabyte-level data sets. Therefore, PySpark was applied to use disk storage instead of consuming RAM. Mr. Rashid asked if travel demand was considered in the analysis. Dr. Yang responded that it was not and mentioned that this type of data source was not incorporated in previous ground access travel time analyses. Mr. Tim Canan also responded from the regional air system planning perspective and stated that the Regional Airport Passenger Survey project focused on enplanements which focused on the demand side. He also noted that the demand analysis would come as part of the regional air system planning update, but not necessarily within this project. Mr. Harun Rashid asked if COG was planning to conduct an air passenger survey. Mr. Canan responded that COG did not conduct the survey during the pandemic but completed the survey in the fall of 2023. COG staff shared the initial findings from the survey data with COG's Aviation Technical Subcommittee on January 25, 2024. COG staff is currently weighting the survey response data which will later be incorporated into the General Findings report.

4. GENERATIVE ARTIFICIAL INTELLIGENCE (AI): ONE STAFF'S EXPERIENCE WITH CHATGPT

Mr. Xie made a presentation that shares his personal experience with generative Artificial Intelligence (AI), specifically with ChatGPT, in the past three months. Mr. Xie began his presentation with a brief introduction of ChatGPT, including related terminologies, current ChatGPT versions, and the setup of a ChatGPT account. He then went through some of his use cases with ChatGPT in three categories, including using ChatGPT as a search engine/research assistant, using ChatGPT as a content editor/generator, and using ChatGPT as a programming assistant. Mr. Xie concluded his presentation with some caveats about the use of ChatGPT at work, such as the data security/copyright concerns as well as the "hallucinations" issue inherent with Large Language Models (LLMs).

During the presentation, Mr. Moran asked a clarification question about why ChatGPT does not have access to the PopulationSim documentation. Mr. Xie responded that ChatGPT 3.5 was trained using data up to January 2022 and the specific PopulationSim documentation might not have been

available at that time. He added that it is possible that the training data for ChatGPT 3.5 did not include any PopulationSim documentation at all. At the end of the presentation, Mr. Shahpar asked if ChatGPT can be used to provide traffic volume forecasts for a particular highway segment. Mr. Xie responded that COG staff did not use ChatGPT for travel demand forecasting. He also noted that ChatGPT is designed as a general-purpose language model. There are specialized AI systems that are developed to perform different tasks, such as mathematic problem solving, but ChatGPT is not designed as a system that is specialized in traffic volume forecasting. In response to a question from Ms. Yuanjun Li in the chat box on what year/month of data that ChatGPT 3.5 is updated to now, Mr. Xie responded that ChatGPT 3.5 was trained with data up to January 2022 and is not trained with new data to his knowledge, but he was not sure about GPT-4 or GPT-5.

5.   STATUS REPORT ON THE COG/TPB GEN3 TRAVEL MODEL

This item was presented by Mr. Moran, who spoke from a set of presentation slides. Mr. Moran provided a status report on the Gen3 Travel Demand Forecasting Model, the TPB's next-generation travel demand forecasting model, which is an activity-based model (ABM), implemented in the open-source ActivitySim software platform. Mr. Moran noted that the Gen3 Model was being developed in two phases. Phase 1 was completed in FY 23. Phase 2 is planned to be completed in the first quarter of 2024. He noted that the Gen3 Model validation metrics, presented at previous meetings, had met or exceeded those of the Gen2 (production-use, trip-based) Model. He said that the calibration/validation report is almost finished, and that the user's guide is also almost finished. The final model (Gen3 Model, version 1.0.0) has been submitted to COG staff for review. He noted that, once COG staff receives final model and signs off on it, COG staff will begin usability testing phase ("Phase 3") to determine if the model is ready for production use. The duration of the usability testing phase depends on how smoothly the testing goes. Mr. Moran concluded by noting that COG staff plans to support both the Gen2 and Gen3 models for an indefinite period.

Ms. Yuanjun Li asked if COG staff plans to continue to update the production-use (Gen2) model. Mr. Moran said that COG staff plans to continue to support the Gen2 Model, which could include revalidating the model to more recent observed data, such as the latest household travel survey. Mr. Rashid asked how long the COG/TPB staff usability testing would take. Mr. Moran and Mr. Vuksan said that it would likely take one to two years, but the duration depends on how smoothly the usability testing proceeds. Ms. Yuanjun Li asked if COG staff could begin the training earlier for interested parties, which would help them move forward with the transition to activity-based models. Mr. Moran said that COG staff plan to offer training once they have determined that the Gen3 Model is suitable for production use. There are no current plans to offer training on a model that is still a developmental model. Mr. Moran added that all the finalized documentation on the developmental Gen3 Model can be found on COG's website.[1] There will be three new reports added to this webpage soon: 1) Gen3 Model, Phase 2, user's guide; 2) Gen3 Model, Phase 2, calibration report; and 3) Gen3 Model, Phase 2, sensitivity testing.

6.   UPDATES FROM THE ACTIVITYSIM CONSORTIUM

This item was presented by Mr. Hensle, who spoke from a slide presentation. Mr. Hensle discussed the ActivitySim Consortium, the latest developments with ActivitySim, and upcoming developments. The ActivitySim Consortium is a group of about 14 public-sector agencies (mainly MPOs in the U.S.) that contribute a yearly fee, which is used as a pooled funding mechanism, to improve the

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[1] "TPB's Development Travel Models: Gen3 Model - Travel Demand Modeling," Metropolitan Washington Council of Governments, July 18, 2022, https://www.mwcog.org/transportation/data-and-tools/modeling/developmental-travel-model/.

ActivitySim software. Although ActivitySim is open-source software, which anyone can use for free, membership in the consortium provides agencies the right to make decisions on which improvements to make to the software. As open-source software, anyone can view and update the model code, but most of the development of ActivitySim is conducted by a bench of consultants (currently, RSG, Cambridge Systematics, and WSP). The ActivitySim software itself is an activity-based framework that is built in Python. All the utility calculations that are made for each of the ActivitySim sub models (e.g., work from home, tour mode choice, etc.) are exposed to the users through configuration files. This allows the ActivitySim code base to be implemented in many different regions using the same code.

The Phase 8 development cycle of ActivitySim (2023) is wrapping up, with major new features expected in the next release, in the next month or so. Features discussed during the presentation include a built-in input checker, updated documentation, memory usage improvements, and some under-the-hood updates to the data pipeline within the model. The input checker allows users to specify the columns in the input data files as well as do bespoke checks on data in the table or even across tables. Each agency will have their own input checker implementation specific to their region's data. The input checker allows users to write their own Python code that performs the checks quickly at the start of every ActivitySim run they do. ActivitySim documentation is hosted on their GitHub wiki. The documentation has been restructured and functionality has been implemented to list all the available settings and their allowed values in the documentation. Part of this work is also validation of those settings that occur while running ActivitySim. For memory usage improvements, ActivitySim was updated to take advantage of pandas' Categorical variables that drastically reduces the memory size required for text string type variables. This has been shown to reduce the memory requirements by up to 40%. These memory savings are available for the user without any need to change their configuration files. The final 2023 development cycle was just a note that ActivitySim's underlying data pipeline has removed its dependency from the Orca Python package. This is not something users will notice but will make the development and maintenance of ActivitySim easier in the future. Looking into 2024, ActivitySim will have a major focus on improving the computational performance of ActivitySim.

At the end of the presentation, regarding the checking of input data, Mr. Rashid mentioned that some of his previous scenario analyses have had to be redone due to incorrect input data. Thus, he was excited that the input checking feature can help avoid those types of issues.

7. 2024 TRANSPORTATION RESEARCH BOARD (TRB) ANNUAL MEETING: SHARING SESSION

Several attendees shared their experiences during the 2024 TRB Annual Meeting. Various sessions and lessons learned were discussed by Mr. Moran, Mr. Joh, Mr. Vuksan and Ms. Ferdous from COG, and Ms. Yuanjun Li from Montgomery Planning.

Mr. Moran discussed TRB's financial struggles, highlighting the organization's lack of profitability and the consequent decrease in specialty conference frequency, the introduction of Cube 2024 software, the ITLE model for electric vehicle analysis, and findings from a county-level study on air pollutants in the U.S. Ms. Ferdous highlighted the usefulness of AI tools while alerting everyone about handling confidential information and the need for checking the accuracy of outputs from such tools. Mr. Joh found the session on smartphone surveys enlightening, noting that we are not where we expected to be 10 years ago regarding the advancement in this area. Ms. Yuanjun Li summarized her lessons learned in three categories: AI and privacy considerations, equity in transportation models, and the integration of electric cars into transportation models.

Lastly, Mr. Vuksan covered an interesting presentation and the findings from a study by the MPO from Seattle which utilized an activity-based model and MOVES model to estimate greenhouse gas emissions for different measures.

8. OTHER BUSINESS

Mr. Xie announced that COG staff has been working with local jurisdictions on fixing a few anomalies noticed in the draft, zone-level, Cooperative Forecast land use data. COG staff has received all updated data files from local jurisdictions and are in the final stages of preparing a set of revised land use data. Once the revised land use data is received from Paul Desjardin's Department of Community Planning and Services (DCPS), Mark's Travel Forecasting & Emissions Analysis (TFEA) Team would apply the employment definition adjustments factors and generate the land use input files for the regional travel demand model in early March. Mr. Rashid noted that he hopes that these are minor fixes and won't alter the main trend due to Covid for both housing and employment forecasts. Mr. Xie noted that all of the jurisdiction's totals would remain the same (comparing Round 10 to Round 9.2a). The minor land use corrections affected some within-jurisdiction values, but did not result in material changes to the land use totals at the jurisdictional level.

Mr. Moran announced that the next TFS meeting would take place on March 22, 2024, from 9:30 AM to 12:00 noon. Regarding external/non-COG presentations, Mr. Moran announced that, at the March meeting, Michael Clarke would be presenting Teralytics Studio. And in November, Prince George's County will be presenting an update on Travel Demand Modeling in Prince George's County.

9 ADJOURN

The meeting was adjourned at about 12:00 noon.