

**Highlights of the TPB Travel Forecasting Subcommittee Meeting**  
**Held on Friday, November 21, 2003**

Bill Mann of Virginia Department of Transportation chaired this meeting.

**Item 1: Approval of September 26, 2003 Meeting Highlights**

The highlights were amended and approved as follows:

On page 5 of the September 26, 2003 meeting highlights, the amended statement should read, "Jon Williams read directly from page 14 of the September 8, 2003 letter report from the TRB Committee. In the report, the Committee states that K-factors are typically justifiable, etc..." instead of "Jon Williams commented that the TRB Committee felt that K-factors are typically justifiable, etc..."

**Item 2: Status Report on Transportation Research Board (TRB) Peer Review**

Jim Hogan informed the subcommittee that the Strawman work program (included in Item 3 of the agenda) was mailed to the TRB Committee on October 10, 2003. He explained that TPB staff is preparing additional information on certain committee observations, and on future plans for model upgrades and data collection, and the TRB Committee will utilize this additional information in preparing its second and final letter report which has been extended into early 2004. He also noted that recommendations from the letter report would serve as input to the TFS review of the proposed FY-2005 work program for models development, network development, and travel surveys at its January 16, 2004 meeting. The TPB would need these items included in the FY-2005 UPWP that it approves in March 2004.

**Item 3: Work Program Elements that TPB Staff Proposes to Undertake to Address Concerns Raised in the TRB Committee's First Letter Report and to Advance the State of Travel Demand Modeling Practice in the Washington Region**

Ron Milone distributed a handout entitled "Multi-Year Staging of Model Development Activities". He explained that TPB staff has prepared a multi-year work program description in response to a recent request by the TRB Committee. The proposed work program was fashioned to: 1) address concerns raised in the TRB Committee's first letter report and 2) to advance the state of travel demand modeling practice in the Washington region. COG's first-cut work program was transmitted to the TRB Committee on October 10, 2003. The TRB Committee will consider the proposed work program as it formulates the second letter report.

COG's model development program is built along 5 'tracks' corresponding to application (short-term improvements), methods development (or long-term improvements), research, data collection, and maintenance. Application improvements are associated with COG's currently adopted travel model now known as the Version 2.1/TP+, Release C. The work program description focuses most intensively on applications track activities. The activities include sensitivity tests, validation checks, and enhancements that could potentially lead to parameter adjustments and/or structural modifications to the Version 2.1/C model. Mr. Milone reviewed some of the work elements in greater detail.

### Investigation into Alternative Speed Feedback Methods

The TRB Committee has commented that “TPB’s feedback of highway and transit times to trip distribution bypass mode choice and is not typical of good modeling practice in regions with significant transit services and ridership.” Staff has begun an investigation of the practices employed in several large metropolitan areas to determine what is typical. This activity will be completed during FY2004, including documentation of the analysis and the investigation of practice in other MPOs, and a recommendation to implement a change to the modeling process if necessary.

### Investigation into Developing Bus Speeds as a Function of Congested Highway Speeds

The TRB Committee has observed, “The use of fixed bus speeds in TPB networks may mistake the influence of transit estimates in future trip distribution and mode choice.” Staff has begun investigating how other MPO’s relate bus speeds to congested highway link speeds. Staff will identify a selected method, and integrate the method into the Version 2.1/C model. Documentation of the selected method and related modeling changes will be produced during the second half of FY-2004.

### Investigation of Model Adjustment Factors

The TRB Committee has commented that “TPB’s extensive use of adjustment factors in trip generation, trip distribution, and mode choice to enhance the match between simulated and observed base-year data undermines the fundamental behavioral logic of the four-step modeling process.” The use of adjustments in different components of the model chain has been a point of disagreement between TPB staff and the TRB Committee. COG has undertaken a review of adjustments used in practice at several major MPOs and has found no clear guidelines in this regard. Staff plans to more fully document the use of these factors in the modeling process, which staff feels reflect, not undermine, the behavioral patterns that cannot be adequately portrayed by a travel demand model largely structured around time and cost variables alone. Staff maintains that the number of trip interchanges employing adjustment factors is not extensive in the Version 2.1C model, but will undertake a sensitivity analysis to see if reductions could be made. Documentation of these activities will be completed during the balance of FY2004.

### Implement Incremental Refinements to the Version 2.1 Model

This is a global activity which is to integrate the latest refinements emerging from the ongoing program, as these can be made ready for production modeling (i.e., air quality conformity of the TIP and Plan, project planning studies). A new label (Version 2.1D, 2.1E, etc.) would be affixed to the production model as these refinements are incorporated into the regional modeling process.

### Migration of Mode Choice Sub Models from MINUTP to TP+

This project will complete the migration of the Version 2 modeling process to the new TP+ software platform, such that improvement in transit assignments can be undertaken. Two models, a sub-mode split model which estimates the shares of rail-related and bus-only transit trips and a mode-of-arrival model which estimates the shares of access modes at Metrorail stations, are to be migrated to the TP+ platform. These models will be estimated using information contained in the 1994 HTS and 1994 Metrorail Survey. They will be validated using more recently collected rail and bus on-board surveys (see next work element).

### Highway and Transit Validation

Following the calibration of the mode choice sub-models, a validation effort will be undertaken to assess the accuracy of highway and transit simulations using the most recent sources of observed data. It is anticipated that highway ground counts corresponding to calendar year 2002 will be available to check daily screenline crossings and regional VMT. Hourly traffic data from Maryland databases will also be obtained to assess highway performance by time period. Transit validation checks will be accomplished using the 2000 Regional Bus On-Board Survey and the 2002 Metrorail On-Board Survey.

### Continue Airport Ground Access Model Development

The Washington region has three major airports: Dulles International, Baltimore-Washington International, and Ronald Reagan Washington National. The existence of three airports poses a complex situation in attempting to forecast ground access by mode to these airports. There is an ongoing effort to collect ground access travel data at approximately two-year intervals. Staff activities during FY-2004 involve the review of these data and investigation of ground access modeling practices in other metropolitan areas. It is envisioned that development of a model specification and calibration file could be undertaken in FY-2005 with the goal of implementing a production model during FY-2006.

### Begin Refinement of Truck/Commercial Vehicle Models

As is the case in many metropolitan areas, the structure of the truck models employed by TPB were developed many years ago, and have been informed by the results of internal and external truck surveys periodically. Most recently, an external truck survey was undertaken for the region in spring and summer 2003, and the information is being tabulated this fall. Post-processing including logic checking, geocoding, and factoring is scheduled to be undertaken during the balance of FY-2004. The last internal truck survey was conducted in 1996 and did not produce a useable dataset for updating the truck models.

The TRB Committee noted that TPB subsumes the estimation of light truck travel in the NHB trip purpose and does not recommend this approach. TPB has responded that until a better means of estimating light truck trips can be developed, there is no choice but to use the NHB trip purpose as a placeholder. At the urging of the TRB Committee, TPB staff has begun to investigate truck modeling practice in other metropolitan areas. Staff is reviewing the approach adopted in 2002 by the Baltimore Metropolitan Council and has obtained a complete set of model documentation. In conclusion, Mr. Milone stated that the work program will take full advantage of the TRB Committee recommendations.

### Comments and Questions

Jim Maslanka asked why were the 1994 HTS and 1994 Metrorail Survey used to estimate the transit sub-models instead of using a current dataset. Ron Milone replied that the model will be calibrated with 1994 data and will then be validated using 2000 bus on-board data and 2002 Metrorail on-board data.

Tom Harrington asked if COG's Longitudinal Survey was still being conducted and if the information from the survey was being used for models development purposes. Bob Griffiths replied that COG's Panel Survey data is not geographically detailed enough.

Caijun Luo asked about the status of the Airport Ground Access Model. Ron Milone replied that the airport model is planned for completion at the end of FY-2006 (assuming no further modifications to the work program).

Bahram Jamei asked if the name of model could be related to the year. COG staff replied that although the timeline suggests an annual update, newer model versions may actually occur at irregular intervals. COG staff prefers not to relate model names to specific years.

Bill Mann commented that adjustment factors that have been consistent over the last thirty years should be utilized on into the future. He suggested that COG review the old model to see if certain biases are still present in this day and time. He also stressed that adjustment factors are important to the four-step process. Jim Hogan explained that staff is preparing additional information on adjustment factors and that information will be discussed at the January TFS meeting.

Caijun Luo asked if telecommuting was a factor in the modeling process. Ron Milone replied that telecommuting is not addressed in the regional travel model. Instead post-processing (e.g., TERM analysis in air quality conformity planning) procedures are typically used to examine this type of policy. Bob Griffiths commented that telecommuting inquiries were made in the 1994 HTS and in the ongoing longitudinal surveys.

Bill Mann asked if yearly simulations were done to the survey to track it against ground counts. If telecommuting has a serious impact on the flow, then that information would have been obtained from the simulation. Bob Griffiths replied that telecommuters do not make commute trips, but may nonetheless create non-work VMT that didn't exist previously. Those trips tend to be a little shorter and closer to home. We are not completely losing the commute VMT, just a portion of it.

Eric Graye asked COG staff about the order of model improvements, i.e., would trip generation, improvements be made ahead of trip distribution improvements, etc. Ron Milone replied that the model steps are linked and so model improvements/adjustments would need to be implemented sequentially.

Bob Griffiths distributed a handout entitled "Data Collection (Track 4) Proposed Work Activities in Support of TPB Models Development Program". The activities in Track 4 are designed to support further refinement and development of COG/TPB travel forecasting models.

#### Regional Household Travel Survey

Current plans are to conduct a major new regional household travel survey in the spring and fall of 2004. It is anticipated that this survey will be very similar to the 1994 COG/TPB Household Travel Survey and designed to support further refinement and validation of the COG/TPB Version 2.1 four-step travel forecasting model. Data collection for the 2004 COG/TPB Survey is planned to occur in two phases. The first data collection phase is to be conducted in May and June of 2004 and the second phase in September and October.

A completed sample size of 2,500 households would be obtained in each survey data collection phase for a total sample size of about 5,000 households. This sample will be stratified by major jurisdiction with the total number of sample allocated to each jurisdiction roughly proportional to each jurisdiction's relative share of regional households. Slight exceptions to this proportional

allocation of survey samples will be in the District of Columbia and in lower density outlying semi-rural jurisdictions.

A Computer-Assisted Telephone Interviewing (CATI) survey methodology is planned for the 2004 Household Travel Survey. Random digit dialing techniques (RAD) will be used to develop a geographically stratified telephone sample of households to be contacted. The CATI travel survey methodology planned for the 2004 COG/TPB Household Survey is very similar to that used in the 1994 COG/TPB Household Survey, the 1998-2003 COG/TPB Longitudinal Household Travel Surveys, and the 2001 National Household Travel Survey (NTHS).

#### Auto External Survey

This project will obtain information on auto travel to and through the modeled regions by persons living in areas beyond the external travel cordon for the modeled area. Information on the origin and destination of the external auto trip, the trip purpose, the number of persons in the vehicle, number of vehicles regularly used by the trip makers household and the Potomac River Bridges that may be crossed will be obtained via a very short, mail-out/mail back postcard questionnaire. Data collected in this survey together with survey data in the 2003 Truck External Survey and 2004 COG/TPB survey will be used to update and recalibrate the travel forecasting models.

#### Analysis of Census Journey to Work Data

This project will obtain, tabulate, and analyze Census Journey to Work data collected in the 2000 Census. This work activity will include tabulation and analysis of Summary File 3 (SF3), the Public Use Microdata Sample (PUMS) and the Census Transportation Planning Package (CTPP 2000). Place of work geocoding for the CTPP 2000 will be used by comparing it to COG's small area TAZ-level employment data and develop place of work adjustment factors, if necessary. The CTPP 2000 data tabulations and analysis will also be used to review the current 2191-TAZ areas system and to suggest updates and refinements to it, especially in geographic areas that currently have large TAZs.

#### Regional Transportation Data Clearinghouse

Staff will update TPB's Regional Transportation Data Clearinghouse databases with updated traffic volumes and transit ridership data as well as transportation-related data from the 2000 Census. Formal arrangements with local, state, WMATA, and other regional agencies will be continued and expanded to transfer new data to and from the Regional Transportation Data Clearinghouse. The necessary database and communications infrastructure needed to incorporate better access to ITS and other more detailed traffic volume and speed data will also be developed.

Mr. Griffiths posed six issues for the TRB Committee on the planned new Regional Household Travel Survey:

- Sample Size Needed for Future Models Development;
- Activity-Based v. Trip-Based Travel Survey Diaries;
- One Day v. Multi-day Travel Survey Diaries;
- Declining Telephone Survey Response Rates;
- Survey Respondent Trip Underreporting; and
- "Typical Season" Data Collection v. Year-Round Survey Data Collection.

In conclusion, Mr. Griffiths stated that in reviewing the TRB Committee's first letter report and considering how we might address some of the issues raised through new data collection, TPB staff sees three potential options in terms of our planned new regional household travel survey and would be interested in the TPB Committee's comments on these options

Option 1 – Conduct CATI as planned.

Option 2 – Conduct planned CATI with GPS tracking add-on sub-sample.

Option 3 – Defer data collection for a new regional household travel survey until 2005. Begin now the design of a large-sample methodically enhanced regional household travel survey and seek additional funding from sources outside the planning funds in the UPWP.

#### Additional Comments

Jim Hogan commented that there is an issue with zones in the outer areas. COG is one of a few MPO's that model beyond the member government boundaries. The eight-hour standard will shift the non-attainment boundary. The zones in the outer jurisdictions are coarse. Some zones within the eight-hour boundary may need to be smaller. Mike Clifford added that modeling the eight-hour boundary will be a requirement. After early 2004, we will have one year to do conformity and if it is not completed then the plan will lapse, so the final geography is needed now.

Caijun Luo commented that the GPS can only track vehicles not people. Bob Griffiths agreed and replied that using the GPS addressed VMT based on household travel v. vehicle trips.

#### **Item 4. New Truck Models for the Baltimore Region**

Paul Agnello with the Baltimore Metropolitan Council (BMC) distributed a handout entitled "New Truck Models for the Baltimore Region". He began his presentation with a brief overview of the BMC model. He stated that in recent years, BMC has been updating various parts of its regional travel forecasting model. The truck model was developed in the mid-1960's, using data from 1962 and has not been revised since. BMC staff has accumulated some evidence that this model was severely underestimating actual truck traffic. As part of its on-going model improvement program, BMC decided in 2001 to start the process of revising the truck model.

He explained that the BMC truck model takes an innovative approach to the problem of estimating truck trips. The traditional method of calibrating truck trip rates is not workable. However, it should be possible to obtain relatively accurate counts of truck volumes by type on a number of roadway segments throughout the region. He also explained that "adaptable assignment" is a quick, simple and easily understood way to use count data to work backwards to obtain a zone-to-zone matrix of trips. The new truck models were developed for heavy trucks, medium trucks and commercial vehicles. Heavy trucks are classified as trucks having three or more axles, medium trucks have two axles and six tires and commercial vehicles are light/medium duty vehicles used for business.

New features were added to the methodology of the BMC truck model. They include:

- Truck special generators;
- Truck prohibitions;
- Truck passenger car equivalents;

- Sensitivity for land use;
- Sensitivity for jurisdiction; and
- Improved method for estimating external truck trips.

Key points of the new truck models are:

- The new models are based on households and retail, industrial, and office employment;
- The observed trip tables are synthesized from six hundred or more counts; commercial vehicle counts were synthesized from the survey at 113 locations for one to two hours midday;
- Observed trip tables were used to systematically improve new models in an iterative process; and
- A delta calibration adjustment table was created to account for differences between observed and estimated trip tables.

He briefly discussed truck special generators. The special generators were created to address the problem of under simulation in areas of high truck activity. One hundred and eighteen TAZ's were selected, and the selection process was based on input from modeling, technical and freight planning representatives. The new truck zone variable was created for categorizing zones into different types of truck activity. He pointed out that the new model has 71% fewer medium trucks, 133% more heavy trucks, and more future truck growth than the old model. He also added that the new model traffic assignments are much more accurate.

Mr. Agnello concluded his presentation by stating that the adaptable assignment model development was faster and cheaper than the traditional survey based approach. The adaptable assignment approach showed significant improvement over the old model in accuracy and logic.

Ron Milone asked if the new model results impacted the emissions estimate. Paul Agnello replied that the new model results were factored into the SIP and incorporated into the budget.

Bob Griffiths asked if the total VMT for the new models changed from the old model. Paul Agnello replied that VMT had increased.

#### **Item 5. Transit Modeling Issues**

Tom Harrington with the Washington Metropolitan Area Transit Authority (WMATA) distributed a handout entitled "Transit Modeling Issues". He stated that the previous MINUTP versions of the MWCOG model included transit forecasting capabilities, but the Version 2.1C does not currently have transit assignment or sub-mode choice model components. He added that the TRB review committee on travel demand identified transit modeling and validation as an area needing improvement. He further added that MWCOG's proposed multi-year model development program needs to make transit forecasting and validation a top priority. WMATA provides 1.2 million passenger trips daily and their goal is to double ridership between 1999 and 2025. He stated some needs for transit forecasting which are:

- System Planning (System Expansion Plan and Core Capacity Study)
- Corridor Studies and Project Planning (DC Alternative Analysis, Dulles Corridor Transit Study, Columbia Pike AA, Richmond Highway/Fort Belvoir Transit Feasibility Studies and Bi-County Transitway)

Mr. Harrington also discussed transit service which included:

- Improved treatment of auto access to rail stations;
- Bus speeds as a function of highway speeds;
- Bus priority treatments;
- Consistent treatment of travel time weights in pathbuilding, trip distribution, mode choice, and assignment; and
- Updated procedures for calculating bus and rail fares.

He stated that the current model structure does not allow for explicit calibration of transit trips by sub-mode and mode of access. Previous versions of the TPB model on the MINUTP platform included sub-mode choice models that are missing from the latest Version 2.1C model. These sub-models include:

- Sub-mode choice model to split transit into Metrorail and non-Metrorail by access type (walk- and auto- access); and
- Mode of arrival model used to apportion Metrorail trips by arrival modes (walk, bus, auto-pass., and auto-driver) and stations.

WMATA supports the implementation of these procedures in TP+ for use in estimating rail and bus trips. A long-term plan for improving the mode choice model should consider a nested model structure that would explicitly break out rail from bus trips to better reflect modal characteristics in the mode choice steps.

Mr. Harrington informed the subcommittee that FTA has endorsed the use of the SUMMIT post-processing tool to calculate transportation project benefits. Implementation of SUMMIT does not necessarily require structural changes to the TPB model, but it does place increased scrutiny on the underlying assumptions and procedures. In conclusion, Mr. Harrington stated that the TRB review process has been helpful in focusing attention on critical assumptions inherent to the modeling process that may not have been understood by the public. The second phase of the TRB review, which will produce a work plan for travel model improvements, presents an excellent opportunity to improve transit forecasting capabilities.

Jim Hogan asked to what extent will WMATA supplement the bus survey data with observed data in the outer jurisdictions (e.g., Prince William County). Tom Harrington replied that WMATA intends to show all bus providers in the region; however no other On-Board survey is planned.

Harry Sanders commented that he is concerned about transit data in the Mobility study and asked about measures of effectiveness. Jim Hogan replied that even though the Version 2.1C model presently does not contain the sub-mode choice model component, the model is capable of addressing many questions posed by the joint technical working group in analyzing alternatives under consideration.

The next TFS meeting will be held January 23, 2004.