Highlights of the TPB Travel Forecasting Subcommittee Meeting
Held on Friday, March 19, 2004

Bill Mann of Virginia Department of Transportation chaired this meeting.

Item 1. Approval of January 23, 2004 Meeting Highlights

The highlights were approved as written.

Item 2. Schedule and Status of Version 2.1D Model Update

Ron Kirby began the presentation with a brief reference to the *Descriptions of Proposed Work Elements for the TPB Models Development Program to (a) Address Concerns Raised by the TRB Committee First Letter Report and (b) Advance the State of Modeling Practice in the Metropolitan Washington Region* which was discussed at the January TFS meeting. The work program is spread over a number of years, and Mr. Kirby explained that staff is hopeful that the forthcoming six year reauthorization of the federal transportation bill will significantly increase planning funds. Those additional funds would be used largely for data collection and model updates. He explained that incremental enhancements have been made to the Version 2.1C model. Those changes are characterized as the first 'draft' of the Version 2.1D model. The draft Version 2.1D model will be available in the near future upon written request. Mr. Kirby reiterated that the official Version 2.1C model that was used in conformity and to set mobile budgets for FY04 is currently available and is documented on COG's website.

Item 3. Version 2.1D Model

Ron Milone distributed a summary outline entitled, *Status of the TPB Version 2.1D Regional Travel Model* to the subcommittee. He explained that during the past two months TPB staff has been engaged in the development of a new model now known as Version 2.1D. At present the model remains in development. The V2.1D model was built off of the currently adopted Version 2.1C model and includes a series of incremental enhancements. Although the model is not yet finalized, it will be made available in draft form to interested individuals upon written request.

Mr. Milone explained the Version 2.1D model enhancements address many of the concerns articulated by the TRB model review committee, specifically to:

- improve the overall model performance;
- minimize adjustments (e.g., K-factors);
- improve the mode choice model application with respect to speed feedback;
- re-examine assumptions used in the mobile emissions post-processor;
- implement short term transit improvements; and
- relate bus speeds to highway congestion.

He stated that the Version 2.1D model will not address two other concerns voiced by the committee, namely the explicit modeling of business/commercial travel and the investigation of a nested logit mode choice model. However, TPB staff is presently working to address these enhancements in the longer term. He added that TPB has also identified the need to integrate the FTA-sponsored SUMMIT model (for evaluating transit improvements) with the TPB modeling process as another important long-term need.

The Version 2.1D model currently features the following technical enhancements relative to the current Version 2.1C model:

- Improved sensitivity to highway pricing/toll modeling capacity;
- Updated capacity/speed look-up parameters;
- Revised freeway VDF function;
- Increased maximum iterations from 10 to 20 in the equilibrium assignment process;

- Added capability to incorporate zonal area-type overrides;
- Reduction in the number/magnitude of K-factors;
- Increased feedback iterations to ensure consistency of speed inputs/outputs;
- More robust algorithm for transit path building; and
- HBW Mode Choice model: Adjusted ratio of OVTT to IVTT so that it equals 2.5 (was 1.5).

Mr. Milone stated that TPB staff is pleased with the development work completed to date, given that the Version 2.1D model has a reduced number of parameter adjustments and yet the performance of the model is improved relative to the current Version 2.1C model. The model remains in draft, and the TFS will be apprised of ongoing refinements at the May 21, 2004 meeting.

Questions and Comments

Bill Mann asked if Version 2.1D model results for 2000 and 2030 are available. Ron Kirby replied that 2000 and 2030 results will be available in the near future.

Bahram Jamei asked staff to specify the additional running time needed to run the Version 2.1D, relative to the Version 2.1C model. Ron Milone replied that the Version 2.1C model presently executes in about 5 hours on 3.0 Ghz machines. In contrast, the Version 2.1D model requires about 9 hours on the same platform. The increase is due to the increased number of modeling iterations specified in the new model (from 4 to 7). The number of iterations in the 'final' V2.1D model may ultimately be moderated.

Dan Goldfarb referenced page 6 of the handout and asked staff to specify how assigned link volume averaging was handled in the Version 2.1D model. Ron Milone replied that the Version 2.1C model consists of 4 modeling iterations, where no volume averaging occurs in iterations 1 and 2, but volume averaging is used in the 3rd iteration (on a 50-50 basis) and the 4th iteration (on a 2/3-/1/3 basis). In contrast, the Version 2.1D model consists of 7 iterations, where iterations 1-4 are identical to those of Version 2.1C. The additional iterations 5-7 essentially repeat the averaging process used in the prior iterations 2-4.

Don Vary asked if the 2000 CTPP data will be used to inform the validation of the Version 2.1D model. Ron Milone replied that TPB has not yet received the Census trip flow data. Bob Griffiths added that TPB anticipates receiving the trip flow tables at the end of March.

Mr. Replogle requested a comparison of the Version 2.1D modeled freeway speeds with observed speeds by direction. He explained that in Atlanta, modeled freeway speeds were compared against observed ITS data. The comparisons indicated that the model underestimated the travel speeds particularly in the off-peak direction. He added that this type of bias will result in underestimating Nox emissions.

Michael Replogle commented that the Version 2.1C model did not validate well against time-of-day traffic count data. He expressed concern that the time-of-day issues may not be resolved with additional iterations. Ron Milone responded that time-of-day summaries presented in the Version 2.1C model report can be reproduced as per the Version 2.1D model; however, he cautioned that improvements in this regard may not be found. Mr. Replogle further suggested that the TPB consider partitioning the time-of-day model into an additional number of purpose/ time period categories. Ron Milone asked Mr. Replogle if he knew of any other major MPO in the US with superior time-of-day modeling capabilities and performance relative to the TPB model. Mr. Replogle replied that he has not looked at the practice of every MPO but is confident that it can be done. Ron Kirby commented that this time-of-day issue was discussed in the December 24, 2003 documentation that was sent the TRB Committee. He specifically referenced page 14 of that report. *"TPB Staff is also planning to conduct some comparisons between the time-of-day distributions resulting from the post-processor and distributions observed from permanent count stations located throughout the Washington metropolitan area. TPB staff plans to assess whether the post-processing methodology might be useful in providing improved time-of-day distributions for traffic modeling and analysis, in addition to being used for estimation of mobile emissions as is the case in currently adopted TPB procedures."*

Ron Kirby commented that the effect of telecommuting may be germane to the time-of-day issue. In the 1994 data, the effect of telecommuting was almost imperceptible, and today it is as high as 15%. These types of considerations are best addressed with post-processing of the modeled output. He also stressed that peak spreading is another issue that is best addressed with post-processing.

Don Vary commented that Cambridge Systematics is in the process of conducting a time-of-day study to examine behavioral responses to congestion, such as peak spreading. The project has just begun and will continue for the next six to twelve months.

Eric Graye asked which enhancements (page 3 of handout) did not result from the ICC study. Ron Milone replied that most of the enhancements have been 'informed' by the ICC work.

Bill Mann asked how the model will be evaluated against observed time-of-day counts. Ron Kirby replied that staff developed hourly traffic distributions by facility type and 'peaking orientation' as part of the mobile emissions post processor. Observed counts should be evaluated against what is produced by the post-processor.

Michael Replogle commented that there is a very robust time-of-day traffic count database available that was developed by Montgomery County. The database is composed of MSHA's eighteen permanent count stations, intersection turning movements and count data compiled into a time of day directional count database for Montgomery County along with data from other jurisdictions. He commented that there was an analysis for permanent count station time-of-day data in the Version 2.1C model, and it did provide some useful indicators of the model performance on a directional basis for AM and PM peak. The Version 2.1C model validation data showed that there were some important problems that need to be addressed. Mr. Replogle asked that some analysis be presented on the Version 2.1D data as soon as possible. Eric Graye clarified that Montgomery County's database focuses on Montgomery County only.

David Kline suggested that TPB distribute a written request for any available time of day data to the COG member jurisdictions.

Yuanjun Li from M-NCPPC (Montgomery County) commented that modeling travel by time-of-day is difficult using regional travel models, and she expressed concern about any model's ability to explain peak spreading.

Item 4. Analysis of 2000 Census Transportation Planning Package (CTPP) Workers by Place of Work Tabulations and Cooperative Forecasting Base Year Employment Estimates for 2000

Bob Griffiths distributed a copy of *Analysis of 2000 Census Transportation Planning Package (CTPP) Workers by Place of Work Tabulations and Cooperative Forecasting Base Year Employment Estimates for 2000.* He began his presentation with a brief introduction. The Census Transportation Planning Package (CTPP) is a special tabulation of response to the U.S. Census long form questionnaire intended to provide data to support a wide range of transportation planning activities. The tables in CTPP relate social and demographic characteristics of persons, households and workers to commuting characteristics, such as travel modes to work and commuting travel times. It is the only source of information that tabulates Census data by MPO defined Transportation Analysis Zones (TAZ). A CTPP was created for all MPOs and state transportation departments after the 1990 Census and again after the 2000 Census. There are three types of data tabulations that are provided in the CTPP. They include:

- Part 1 – Tabulations by Place of Residence;
- Part 2 – Tabulations by Place of Work; and
- Part 3 – Tabulations of Worker Flows from Place of Residence to Place of Work.

The CTPP tabulations are an extremely useful, comprehensive data source for transportation planning. The tabulations are useful for checking and updating base year population, household, and employment land

activity data by jurisdiction and TAZ. They are also useful for checking and validating regional travel demand forecasting models for such things as jurisdiction to jurisdiction commuting flows and commuting modal shares.

COG/TPB staff received the CTPP 2000 – Part 2 tabulations by place of worker in late January. Staff compared the CTPP 2000 – Part 2 tabulations of workers by place of work with COG Cooperative Forecasting 1990 and 2000 employment totals for jurisdictions in the Washington region and with Baltimore Metropolitan Council (BMC) Cooperative Forecasting 1990 and 2000 employment totals for Anne Arundel and Howard counties. The comparison of the 1990 and 2000 CTPP – Part 2 tabulations with the Cooperative Forecasting employment totals show a substantial increase in the ratio of Cooperative Forecasting employment totals to the CTPP – Part 2 worker tabulations between 1990 and 2000.

The CTPP tabulations of workers by place of work do not equate directly employment total by place of work. Thus, staff had to make two adjustments to the CTPP – Part 2 worker tabulations to obtain an estimate of total at place of work employment from the CTPP data. The first adjustment was to apply a 1.6% work absenteeism factor to the CTPP data to account for workers temporarily absent from their jobs the week before the Census was taken. The CTPP – Park 2 worker tabulations only include workers who were at work the week prior to the Census. The second adjustment was to apply a 10.5% multiple job holding factor to the CTPP data to account for workers who work at more than one job. The CTPP worker tabulations only count each worker once, regardless of the fact that some workers have more than one job. The 10.5% multiple job holding factor was obtained from the 2000 COG/TPB Household Survey that asked workers a question on multiple job holding.

Comparison of estimated at-place employment from the CTPP – Part 2 data with Round 6.4 Cooperative Forecasting employment totals match well for most jurisdictions in the Washington region, but for several local Maryland jurisdictions the Cooperative Forecasting employment totals exceed estimated at-place employment from the CTPP data by almost 20%, even after the adjustments for worker absenteeism and multiple job-holding. It appears that one of the reasons why the Cooperative Forecasting employment totals exceed CTPP-derived employment estimates for several Maryland jurisdictions is that these jurisdictions use BEA-based employment estimates for their base year employment totals.

Historically, most jurisdictions in the Washington region have developed their Cooperative Forecasting base year employment total from a combination of ESA-202 wage and salary payroll employment data, Decennial Census data on self-employed workers and an independent estimate of Federal government employment (including military) received from the National Capital Planning Commission (NCPC). Estimated 2000 employment totals obtained by adding CTPP-derived estimates of at place self-employed and military employment to year 2000 1st quarter ESA-202 wage and salary employment matches very well with Cooperative Forecasting Round 6.4 employment totals for 2000. Maryland jurisdictions using BEA-based employment estimates to develop their base year employment totals are approximately 20% to 40% higher than would be estimated from a combination of ESA-202 payroll employment and Census data for self-employed and military workers. Further, it would appear that to reconcile 2000 employment totals for those Maryland jurisdictions using BEA-based employment estimates to develop their base year employment totals with the CTPP- Part 2 worker tabulations, one would have to assume that approximately one in three workers held multiple jobs or that most multiple job holders held more than three jobs.

In conclusion, this analysis suggests that, because all jurisdictions in the Baltimore region develop their base year Cooperative Forecasting employment totals using BEA-based employment estimates, a technical adjustment should be made to the Cooperative Forecasting employment forecasts we receive from BMC before using them in our transportation modeling. This technical adjustment would make the employment data received for BMC jurisdictions more consistent with our non-BEA-based definition of employment. Similarly, BMC should make a technical adjustment to the Cooperative Forecasting employment totals they receive from us for DC, Montgomery County and Prince George's County to make these employment totals more consistent with their BEA-based definition of employment before using them in their transportation modeling work.

Jim Hogan commented that K-factors are involved in modeling these counties, and it might be possible to eliminate some if the Cooperative Forecast implemented a change in the forecasting process based on the CTPP adjustments.

Don Vary inquired about the definition of employment categories. Bob Griffiths responded that Census classifies employment categories as class of worker and type of industry.

Yuanjun Li inquired about Carroll County. Bob Griffiths replied that BMC did not have Carroll County in their Cooperative Forecasting Round 6.4 table.

Bob Moore questioned if it is worth trying to summarize this data. There is uncertainty in this data, so how do you get down to the time-of-day level. You have to question how many of these jobs are peak hour jobs, and do they vary by jurisdiction?

Tom Harrington asked when will the CTPP 2000 - Part 1 and Part 2 data be available. Bob Griffiths replied that Part 1 is available; however, staff is still evaluating Part 2.

Howard Chang expressed concern about the discrepancies of reporting accurate employment totals in Maryland.

Item 5. Household Travel Survey Update

Bob Griffiths stated that temporary staff is geo-coding the trip ends for the 2003 survey. A report will be available in May/June on the travel surveys.

Bob Owolabi commented that at TRB in January the Census Bureau stated that this would be the last time for the CTPP, and they plan to migrate to the ACS. Bob Griffiths responded that it is hopeful that another CTPP will take place in 2010.

The next TFS meeting will be held on May 21, 2004.

COG/TPB Travel Forecasting Subcommittee
Sign-In Sheet
Meeting of March 19, 2004

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