

Highlights of the TPB Travel Forecasting Subcommittee Meeting
Held on Friday, September 26, 2003

Bill Mann of Virginia Department of Transportation chaired this meeting.

Item 1: Approval of July 18, 2003 Meeting Highlights

The highlights were approved as written.

Item 2: Transportation Research Board (TRB) Review Process

Jon Williams with the Transportation Research Board (TRB) distributed a handout entitled "Process for Transportation Research Board Committee on Review of Travel Demand Modeling". Mr. Williams began his presentation with a detailed overview of the National Academies. The National Academies is a private nonprofit organization chartered by congress to advise the government on major policy issues and is administered by the National Research Council (NRC). TRB is one of six major divisions of the National Academies. The historic mission of the National Academies is to conduct policy studies. Three key elements to ensure quality control of studies commissioned by the government are the committee appointments process, well-defined statement of tasks, and peer review report.

Mr. Williams explained that the peer review committee is comprised of a chairman, 2 consultants, 2 academicians, and 2 MPO model practitioners. The work scope of the peer review process defined specific criteria for the selection of the committee members, as follows:

- Application of travel forecasting models by MPO's,
- Development of applied travel forecasting models, and
- Independent academic research on travel and emissions modeling.

The work scope also included five major requirements:

- 1) Provide guidance on the performance of COG/TPB's TP+ Version 2.1 travel model;
- 2) Provide guidance on the process of merging travel model outputs to produce mobile source emissions;
- 3) Provide guidance on COG/TPB proposed direction of future demand model upgrades;
- 4) Provide guidance on travel surveys and other data needs; and
- 5) Provide guidance on grain of TAZs for future upgrades.

Mr. Williams further explained that a five-person panel was assembled to review the logic of the arguments made by the peer review committee in the letter report. The panel determined whether conclusions were properly supported and whether the report fulfilled its statement of tasks.

In conclusion, Mr. Williams stated that the two products of the peer review would be:

- A report stating the committee's assessment of 1) COG/TPB's travel model performance, and 2) COG/TPB's post-processor for forecasting mobile source emissions (dated September 8, 2003).
- A letter report providing guidance on future activities relating to the models program, including advanced modeling directions, data, and zone system considerations (due December 31, 2003).

Item 3. TPB Staff Comments on TRB Peer Review First Letter Report

Ron Kirby distributed a handout entitled “Briefing on Transportation Research Board First Letter Report and TPB Staff Comments on ‘A Review of Travel Demand Modeling by the National Capital Region Transportation Planning Board’”. He began his presentation with a brief overview of the peer review process. He further explained that COG/TPB staff drafted a letter to TRB Committee to provide the views of TPB staff on certain key aspects of the first letter report, as well as addition information and context for the second phase of the model review to be conducted over the remainder of the calendar year.

Mr. Kirby explained that the TRB Committee made eleven observations regarding the TPB travel models. TPB staff agreed with five observations and further attention is not required. Three of the eleven observations that TPB staff agrees offer potential for improvement in the modeling process that can be addressed by TPB staff are:

TRB Committee Point No. 3: *“Statistical measures indicate that base-year modeled link volumes do not match observed traffic counts and transit ridership as closely as committee members would typically expect in model validation.”*

Mr. Kirby commented that TPB staff recognizes that there is potential for improvement in matching link volumes with observed traffic counts and transit ridership data. Refinements to the Version 2.1C model are currently in progress.

TRB Committee Point No. 5: *“TPB’s inclusion of the home-based shopping trip (HBS) category in trip generation is commendable. Combining business and commercial trips in non-home-based trips (NHB) category is not advisable.”*

Mr. Kirby commented that TPB staff agrees that ideally, developing a separate model for light commercial travel in the Washington region would be preferable to the present approach, under which this category of travel is included in the NHB (non-home-based) trip category. However, present data constraints make it extremely difficult to develop such a model in the Washington region, and in many other regions as well.

TRB Committee Point No. 6: *“The use of fixed bus speeds in TPB networks may misstate the influence of transit in estimates of future trip distribution and mode choice.”*

Mr. Kirby commented that TPB staff believes that the net affect of the lack of long-range bus service specificity in the out-years of the Plan is likely to be underestimation of bus service levels and transit usage, particularly in growing areas of the region. TPB staff agrees that further work is warranted in this area, but believes that the scope should involve a comprehensive approach to defining future bus service, of which the effects of growing congestion on bus speeds should be just one component.

Three of the eleven observations that TPB staff believes require further consideration and discussion are:

TRB Committee Point No. 7: *“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.”*

Mr. Kirby commented that TPB staff is developing additional information describing the rationale for and use of adjustment factors in the Washington area and other metropolitan areas for presentation to and discussion with the TRB Committee. While the use of these factors is subject to professional judgment and might be carried out differently by different practitioners, TPB staff believes that the rationale for their use is sound. TPB staff looks forward to further discussion with the TRB Committee on this topic.

TRB Committee Point No. 8: *“TPB’s feedback on highway and transit times to trip distribution by-passes mode choice and is not typical of good modeling practice in regions with significant transit services and ridership.”*

Mr. Kirby commented that TPB staff disagrees with the TRB Committee on this point, which TPB staff has found to be a much more complex issue than it appears. In structuring the speed feedback component of the TPB modeling process to meet the requirements of EPA’s conformity rule, TPB staff executed and analyzed a number of alternative approaches. TPB staff found that there were a number of conceptual and practical problems with feeding highway speeds back through a sequential trip distribution/mode choice/traffic assignment procedure. The approach chosen for the TPB modeling process was felt to be the best option available for both addressing these problems and meeting EPA’s requirements. He stated that TPB staff would be most interested in the experience of other metropolitan areas with extensive rail and priority HOV systems, and in any suggestions the TRB Committee may have for improving this component of the process.

TRB Committee Point No. 10: *“The TPB’s procedure for estimating hourly traffic volumes and speeds – aggregation of peak and off-peak period traffic assignments to be 24-hour total that is then redistributed to hourly period – is questionable, because final emissions estimates are not strictly based upon assigned peak and off-peak link volumes and speeds. Testing will be needed to determine the procedure’s effects on emissions estimates.”*

Mr. Kirby commented that TPB staff disagrees with the TRB Committee on this point, because TPB staff does not agree with the way the TRB Committee has characterized certain key aspects of the TPB’s procedure for estimating hourly traffic volumes and speeds. After reviewing the TRB Committee’s analysis and observations on the TPB’s procedure for estimating hourly traffic volumes and speeds and associated emissions, TPB staff continues to believe that the logic of the procedure is sound, that the procedure properly uses the period-specific link volumes produced by the travel models as a starting point for link categorization and for peak spreading, that the structure of the procedure will ensure that emissions are not understated, and that the procedure is in full compliance with EPA and DOT requirements. However, TPB staff recognizes that better detailed documentation will provide more clarification of post-processing.

Mr. Kirby concluded his presentation by informing the TFS 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 due December 31, 2003. He added that changes to the FY04 UPWP and proposed work and budget allocations for FY05 UPWP and beyond would be recommended to the TPB in early 2004. Mr. Kirby stressed the importance of documentation and commented that detailed documentation should be available on certain issues to insure understanding of the modeling process.

Item 4.

Subcommittee Discussion of the TRB Peer Review Report

Chairman Mann began the discussion of the TRB first letter report with comments regarding speed feedback and the use of adjustment factors. He suggested that while recycled speeds should be considered in mode choice, it may not be suitable for trip distribution. For example, in an analysis of travel in the I-95/I-395 corridor in Northern Virginia, he demonstrated that the effect of future highway congestion on trip distribution would diminish overall (SOV, HOV and transit) travel markets to the District. While SOV accessibility may decline with rising congestion levels, HOV and transit accessibility should, in fact, be increasing as the relative time savings offered by the priority lanes improves over time. However, the expected increase of these special markets will not be reflected in the model since the recycling of congested speeds in distribution will negatively affect the accessibility of total person travel. He added that many people in the I-95 corridor travel long distances on transit or HOV simply because a priority facility exists. Highway congestion levels are not as great a factor in the trip length pattern of travelers in the corridor. With regard to the use of K-factors, he suggested that such factors do not undermine the travel modeling process. They are necessary for explaining socio-economic influences on trip patterns that aren't detected in the gravity model framework. He added that K-factors should be used only if they are deemed to be stable over time and can be reasonably justified.

Ron Milone commented that, socio-economic effects on trip patterns could ideally be addressed in land use models such as a household location choice model. However, this type of tool is beyond the state of the practice in transportation modeling, and so K-factors are used to account for such effects. He agreed that K-factors should be explainable and stable over the forecasted time horizon.

Bob Griffiths commented that peak spreading must also be considered in looking at feedback of congested travel time in trip distribution. He noted that many commuters in the Shirley Highway corridor had shifted their departure time to an earlier time (e.g. before 7 AM) rather than change their origin-destination travel pattern. Phil Shapiro added that another important consideration is change of mode. He stated that 80% of persons working at the Pentagon and living outside the beltway used transit or HOV for their peak period commute. He also commented that using the fastest time for each interchange may be the best way to approach speed feedback in the I-95/I-395 corridor.

Bahram Jamei commented that speed feedback works if the road is congested and the travel pattern is changed.

Jun Villoria commented that models need to have adjustment factors in order to capture the idiosyncrasies of all the different travel patterns and the different corridor sub-area studies in the region. The most important question is whether to apply the adjustment factors in the forecasting mode and whether these factors are transferable over time. He added that models will always have errors in calibration, and professional judgment should be used to determine the impacts K-factors have on forecasts. He also added that the COG/TPB Version 2.1C model is a very good regional model. Corridor sub-area studies require more localized information to give a better understanding of how travel patterns change in these corridors. Transit forecasts are more heavily influenced by relative costs among modes than travel times.

Mike Clifford commented that person trips on some interchanges decreased dramatically when congested speeds were fed from assignment back into trip distribution. Then, even when a higher

percentage of mode split was applied, transit and HOV decreased because the person trip tables were much smaller. After numerous discussions with the TFS regarding speed feedback, it was decided to freeze base mode choice transit and HOV in the TPB model set. Subsequent person trip reductions would only affect LOV, which is consistent with what happens in the real world. He added that speed feedback should be applied only in trip distribution.

Jon Williams commented that the TRB Committee felt that K-factors are typically justifiable when applied to interchanges across jurisdictional boundaries, major physical barriers such as rivers, or perceived barriers associated with socio-economic differences within a region, conditions found in abundance in the Washington region. However, committee members were concerned that the fraction of inter-zonal pairs to which K-factors are applied is inordinately large, in comparison with river crossings and other apparent sources of distortion in the region's travel patterns, and agreed that such extensive application of K-factors to be inadvisable. Ron Kirby agreed that the committee did not rule out the concept of K-factors but criticized the way K-factors were used in COG/TPB's regional model. He noted that the committee labeled K-factors as adjustment factors and implied that these factors were used simply to insure better results from the model, an opinion not shared by TPB staff.

Phil Shapiro asked if TFS would respond to the TRB Committee letter report? Ron Kirby replied that if individuals had specific observations or suggestions, to provide such comments via email to COG/TPB staff. He noted that a meeting with the TRB Committee is scheduled for October. COG/TPB staff will provide information on proposed model upgrades at this meeting. In summary, the discussion evoked a wide range of opinions concerning these issues.

Item 5. On-going Refinement of the Version 2.1/TP+ Release C Travel Model in Corridor and Sub-Area Studies

Ron Kirby informed the subcommittee that COG/TPB staff is currently working with Phil Shapiro on the Inter-County Connector (ICC) study. He proposed that COG/TPB staff and local jurisdictions work more closely together to insure detailed knowledge of corridor information. More effort should be made to incorporate jurisdictional corridor and sub-area studies results into COG/TPB's regional model to insure commonality of model inputs and refinements. He added that the District of Columbia would use the Version 2.1C model to conduct a transit study.

Phil Shapiro noted that some changes were made to area type and to the speed and capacity classes by category for the ICC study. Changes were also made to the VDF curves for freeways and improvements were made to traffic counts. Using measures of effectiveness and speeds from the post-processor improved results for the entire region. He questioned why COG/TPB did not originally use the speeds from the post-processor? Mike Clifford replied that speeds and capacities from the post-processor were not used because they did not exist at the time the Version 2.1C model was calibrated/validated. Explicit research tasks performed under the mobile emissions work program as part of the post-processor following Mobile 6 were used to look at how the updated Highway Capacity Manual revised speeds and capacities. Research to develop tables for the post-processor was done sequentially to the Version 2.1C travel demand model and was available about six months later. He also explained that the networks used for the travel demand model in the expanded cordon were MINUTP-based. Detailed review of coding in the ICC corridor revealed several zones with only one connection, as opposed to three or four which would be expected in the expanded cordon. MINUTP limited the number of node numbers and link constraints due to DOS space. Migrating over to Viper/TP+ has alleviated those issues.

Chairman Bill Mann noted that numerous corridor and sub-area studies are being done in the region, and consultants are producing different VDF curves and input speed curves. It will be very difficult for COG/TPB staff to decipher and compile these data for future refinements to the regional model.

Ron Kirby commented that he and Ron Milone participate on a committee set up by the National Association of MPO's and have been interacting with the FHWA and FTA. FHWA and FTA not only review regional work but they also review highway and transit corridor studies. It has not been resolved whether FHWA and FTA will develop minimum criteria for what is acceptable in modeling practices.

Eric Graye asked if COG/TPB's Version 2.1C model was being validated for use in the ICC study and if this validation involved testing the model in future years. Mike Clifford replied yes the model has been tested in forecast mode and looks reasonable. Phil Shapiro added that there was concern with growth in VMT. It was compared to land use and was very close to level of growth per household.

Eric Graye then asked when the model would be used in production for the ICC study. COG/TPB staff commented that the model is currently being used for the ICC corridor study.

David Kline commented that Fairfax would be hiring consultants to conduct an I-66 study in the near future. Chairman Bill Mann emphasized the importance of keeping the TFS abreast of various studies being conducted in the local jurisdictions.

Ron Kirby informed the subcommittee that Round 6.2 inputs were used in developing the updated SIP. However, Round 6.3 inputs were used for air quality conformity of the TIP and Plan and will be approved by the COG Board in November. He strongly suggested that members wait to use the latest Round 6.3 inputs in their corridor sub-area studies.

Jim Hogan noted that recommendations from the TRB Committee would be in their December letter report. These recommendations 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.

The next TFS meeting will be held on November 21, 2003.