



Local governments working together for a better metropolitan region

November 20, 2002

Mr. Michael A. Replogle
Transportation Director
Environmental Defense
1875 Connecticut Avenue, N.W.
Washington, D.C. 20009-5728

Dear Mr. Replogle:

In a letter of November 4, 2002 to Phil Mendelson, Chair of the Transportation Planning Board (TPB), and Kate Hanley, Chair of the Metropolitan Washington Air Quality Committee (MWAQC) sent by you and others (Ms. Milmoie, Mr. Fitzpatrick, Mr. Epstein, Mr. Miller, and Mr. Schwartz), reference is made to "critical deficiencies in the TPB Version 2 model that must be remedied". The reference is based on detailed discussion provided in a Technical Report accompanying a study entitled, *More Sprawl, More Traffic, No Relief: An Analysis of Proposed Potomac River Crossings*, October 2002.

Mr. Norm Marshall of Smart Mobility, Inc. joined you in presenting your comments on the TPB Version 2 travel demand model and proposed enhancements to the model at the TPB Travel Forecasting Subcommittee meeting on November 15, 2002. This letter summarizes the key responses to your comments provided by COG/TPB staff at the November 15, 2002 meeting.

Traffic Assignment Feedback into Trip Distribution

The authors of the Smart Mobility, Inc. report state that "the TPB DCV2 model does include distribution feedback. However, the feedback mechanism is only applied to home-based work trips." In fact, COG/TPB staff have implemented feedback for all trip purposes in both the Version 2.0 and Version 2.1 models. The feedback has been implemented using a time of day model prior to traffic assignment, which takes into account the distribution of trips by purpose by time of day. Both the A.M. peak and off-peak travel times flowing from the traffic assignment step are fed back into trip distribution.

Use of Data from the Nationwide Personal Transportation Survey (NPTS)

COG/TPB staff does not recommend using the Nationwide Personal Transportation Survey (NPTS) as a means to develop or enhance a travel demand model, as appears to have been done by Smart Mobility, Inc. in producing an "enhanced" model. The 798 households from the NPTS mentioned in your footnote on page 5 of your report in fact represent more than just the Washington region. They include the combined

Washington-Baltimore-Hagerstown DC-MD-VA-WV consolidated metropolitan statistical area. Only 496 of these households are located in the Washington region, and of these, only 313 households provided information about their weekday travel. Such a sample is too small to develop or enhance a travel demand forecasting model for the metropolitan Washington region. By comparison, the 1994 COG/TPB Household Travel Survey, upon which the Version 2.1 model and previous models were developed, collected weekday travel data from more than 4,700 households living in the Washington region.

The NPTS was designed to produce a national estimate of annual daily travel, not to develop an estimate of daily weekday travel in the metropolitan Washington region. National control totals, not control totals for individual metropolitan regions, were used to develop the sample expansion factors for the NPTS survey data. There can be no reasonable expectation that NPTS data will reliably estimate the number of daily weekday person or vehicle trips in the metropolitan Washington region, or even correctly estimate regional population, household and worker totals. Further, the NPTS data is based on very approximate "self-reported" travel distances, which research has shown are not very accurate. The actual starting point and ending point of each trip is not reported. In the 1994 COG/TPB Household Travel Survey such information is reported.

For the reasons given above, COG/TPB staff believes that the use of the NPTS data to calibrate an enhanced model is inappropriate.

Misspelled Parameter in Gravity Model Execution

The authors of the Smart Mobility, Inc. report point out a misspelled TP+ parameter "MAXITERS" in the original execution of the Version 2.0 gravity model (or trip distribution model). This parameter spelling has been corrected along with other corrections in the latest runs of the Version 2.1 model. These results are documented in an updated report on the Version 2.1 model which will be posted on the COG web site on Friday, November 22. The results obtained with the corrected runs have not markedly changed from previous results obtained with the Version 2.1 model.

Model Validation

The authors of the Smart Mobility, Inc. report comment that the "Enhanced Model performs better than both the Version 2.0 and 2.1 models in estimating Potomac River crossings." They also comment that their "modifications have also improved the overall performance of the model on the other screenlines analyzed by TPB. In the Enhanced Model, 20 of the 35 screenlines show improvement over the DCV2 model (i.e., the ratio of estimated to observed volume is closer to 1)."

COG/TPB staff has had to address model performance in several areas:

- Vehicle Miles of Travel (VMT)
- Trip Length Frequency
- Travel Patterns by Mode, by Jurisdiction
- Speed Estimation

As such, the model calibration effort has focused on optimizing the performance across these areas. The authors of the Smart Mobility, Inc. report have not reported how the Enhanced Model performs in areas beyond screenline traffic volume summaries and vehicle miles of travel. Staff has found that, given the limitations in various data (traffic counts, survey samples), it is necessary to look across this spectrum of indicators when judging the performance of any travel demand model. It should be noted that the observed data are subject to a range of variation. Smart Mobility, Inc. should investigate the performance of the Enhanced Model for all of these measures before reaching conclusions about its performance relative to Version 2.0 or Version 2.1.

Smart Mobility, Inc. argues that K-factors and time penalties should be used sparingly in travel demand modeling, and they indicate that they have taken the Version 2.0 model (which they label the DCV2 model), removed all the income-level time penalties, and replaced the TPB K-factors with a more limited set to form what they describe as an Enhanced Model. COG/TPB staff concurs that K-factors and time penalties should be used sparingly. Indeed, the referenced K-factors in both the Version 2.0 and 2.1 models are the fewest ever employed in TPB travel forecasting models in estimating vehicle miles of travel and trips by mode (transit, HOV, LOV). As part of the review of the Version 2.0 model performance, COG/TPB staff have removed the bridge time penalties in traffic assignment. This change has been reflected in the re-estimated Version 2.1 model released on October 4, 2002.

The authors of the Smart Mobility, Inc. report state that “the DCV2 model assigns too many vehicles to the low class facilities which have count volumes under 20,000 vehicles per day. The estimated volume on these roadways is 13 percent too high. In addition, the model is under-assigning vehicles to the high class facilities which have count volumes greater than 100,000 vehicles per day. The estimated volumes on the two high class facility types are 11 percent and 28 percent low respectively when compared against the count VMT. The evidence in Table 1 suggests that the DCV2 model is estimating too many trips and that on average the trips are too short.”

COG/TPB staff notes that the comparison in Table 1 is for count ranges, not facility classes, as implied in the use of terms such as “low class facilities” and “high class facility types.” The performance of the Version 2.0 model with respect to facility type is given in Exhibit 8.5 of the report, Version 2.0/TP+ Travel Model Calibration Report. Overall, the Version 2.0 model estimates volumes on links for which observed counts are available to within 4 percent. A similar finding is made for the Version 2.1 model in Version 2.1/TP+ Travel Model Calibration Report, October 4, 2002.

At the TPB Travel Forecasting Subcommittee meeting on November 15th, the authors of the Smart Mobility, Inc. report commented that the model validation needed to focus on comparisons with time-of-today traffic counts obtained from permanent count stations in the region. COG/TPB staff and other members of the subcommittee responded that there are very few permanent count stations in operation in the Washington region at present (3 to 4 in Maryland, 12 to 13 in Virginia, of which as many as one half may be inoperable). Staff felt this number is insufficient to check traffic simulations by the models, and noted that vehicle miles of travel need to be checked against reporting from the Highway Performance Monitoring System (HPMS) in order to test whether or not a travel demand model simulates regional VMT.

Relationship Between Vehicle Travel Demand and Mobile Source Emissions

On page 3, paragraph 2 of your letter of November 4th, you state:

“Thus, like the TPB Version 1 travel demand model, Version 2 will overestimate motor vehicle travel demand in the future and overestimate the benefits of proposed highway improvements.” (emphasis added)

On page 3, paragraph 3 of your letter of November 4th, you state:

“Use of the Version 2 model to support SIP air quality planning or transportation conformity analysis without remedying these problems threatens to lead to serious underestimation of mobile source emissions, ...” (emphasis added)

The logic relating these two apparently inconsistent statements is unclear. We request that you provide further explanation on your reasoning so that we may provide appropriate comment.

Conclusion

COG/TPB staff does not have enough information about the performance of the enhanced model developed by Smart Mobility, Inc. to assess the suitability of your recommendations for incorporation in the COG/TPB modeling process. You indicated at the November 15, 2002 meeting that you were willing to make available in CD-ROM the “enhanced” model that you have developed. COG/TPB staff has expressed interest in receiving this model from you for the purpose of reviewing its performance against a range of observed data that we have been using to assess the performance of the Version 2.1 travel demand model.

We appreciate your comments and suggestions on the new TPB Version 2.1 model. We are encouraging all interested parties to review the results obtained from the new model.

Comments received may result in additional refinements to the Version 2.1 model as it is applied to travel forecasting and emissions estimation over the coming months. The upcoming TRB peer review of the COG/TPB modeling process and the emissions post processor during 2003 will provide further opportunity to comment.

Sincerely,



Ronald F. Kirby
Director, Department of
Transportation Planning

cc: Dolores Milmo, Solutions Not Sprawl
Neal Fitzpatrick, Audubon Naturalist Society of
the Central Atlantic States
Lee Epstein, Chesapeake Bay Foundation
Chris Miller, Piedmont Environmental Council
Stewart Schwartz, Coalition for Smarter Growth
Kanathur Srikanth, Chair, TPB Technical Committee
George Cardwell, Chair, TPB Travel Forecasting Subcommittee
Phil Andrews, Chair, MWAQC Technical Advisory Committee
Julie Pastor, Chair, COG Planning Directors Technical Advisory Committee
Jane M. Kenny, Regional Administrator, EPA Region 2
Nelson Castellanos, Division Administrator, FHWA Maryland Office
Roberto Fonseca-Martinez, Division Administrator, FHWA Virginia Office
Gary Henderson, Division Administrator, FHWA DC Office
Susan E. Schruth, Regional Administrator, FTA
Rep. Frank Wolf
Rep. Chris Van Hollen
Senator Mikulski
Senator Sarbanes
Senator Warner
Senator Allen