COMMENTS OF THE OREGON MODELING STEERING COMMITTEE REGARDING TOLLING WHITE PAPER 3: TRAVEL DEMAND MODEL SUFFICIENCY

June 4, 2009

The Oregon Modeling Steering Committee (OMSC) was requested to host a forum to discuss the *Tolling White Paper 3: Travel Demand Model Sufficiency*. The white paper was prepared for the Oregon Department of Transportation (ODOT) in February 2009 by Parsons Brinckerhoff, David Evans & Associates, Inc., and Stantec Consulting Services, Inc. The forum will be held on Friday, June 5, 2009 and will include OMSC members and others.

This comment paper was prepared to provide a high-level review of key assumptions and conclusions to help facilitate the discussion. The OMSC was not requested to conduct a peer review of the white paper and no detailed review was conducted of the appendix materials.

GENERAL COMMENTS

In general, the white paper is thorough and well written. It describes modeling features that are important to modeling road tolling and pricing policies, and it provides a good description of how different types of models work.

The white paper accentuates the need for Oregon to invest in a continuous model improvement program. The program must address state applications and the needs of the metropolitan planning organizations (MPOs), and investment must include research, data collection, professional services, and staff. Current investments in modeling are very limited, and the program is important to provide models that effectively support good public decision-making and emerging policy needs.

The title of the white paper, *Travel Demand Model Sufficiency*, is somewhat misleading. The white paper includes good research on tolling and modeling. However, it appears to be based on travel demand models and implies that findings on these models apply to all of the modeling work in Oregon. The Oregon modeling program includes fully integrated models that are not really travel demand models, including the Statewide Integrated Model (SWIM) and the Metro modeling suite. Although these are mentioned in the white paper, it is not clear whether all available models were included in the research for the white paper. The Land Use Scenario Developer (LUSDR) and Metroscope models are complementary land use models that are important for tolling/pricing analysis and risk assessment, but they are only briefly mentioned in the report.

It is likely that the Executive Summary will be read by many more people than the report itself. As written, the Executive Summary seems to focus on modeling sufficient to support investment grade analysis. For the broader audience, it should also include a summary of the levels of scope and detail for tolling and pricing studies, and the capabilities of the existing models to be used in these studies. It should also include a paragraph on the need for more data collection to support model improvements.

The white paper addresses the technical needs for tolling analysis and risk assessment. However, the need for overall project management and a solid management plan is equally important. The burden for good tolling practices does not lie solely with the technical modeler. The importance of the decision-making elements to support modeling analysis cannot be overstated. This includes developing the parameters or assumptions needed to define the tolling analysis, and development of scenarios or alternatives to be analyzed. The time and effort devoted to assessing the risk surrounding the forecast is understandable, but a streamlined process, especially with respect to land use uncertainty, needs to be developed. These efforts are often not included in "modeling" considerations and it should be noted that sufficient budget, time, and staff resources need to be provided for these activities.

It should be noted that the degree of sophistication used in analysis will vary by the project needs. Not all projects require sophisticated modeling. Techniques used for feasibility analyses could vary from those used in a bonding exercise.

It would be useful to include a section on current research being conducted in the state. For example, Metro is working with Portland State University (PSU) to develop a dynamic tour-based model. This will offer the opportunity to segment vehicle classes in a very informed way and, like SWIM, offers the opportunity to use distributed rather than aggregated value of time (VOT). Departure time choice for activity and travel scheduling will be addressed in a comprehensive way. ODOT is also working with PSU to investigate dynamic assignment methods. The intent is for Metro, ODOT and PSU to work together to link the two, which will be a big step in improving the ability to address toll analysis at the MPO level.

Several recommendations to the Metro model, although desirable, would be difficult to implement in Metro's current model structure. These include pre-route choice, additional class and car occupancy segmentation, and flexible trip generations. However, the work being done by Metro, ODOT and PSU may be ideally suited to tolling analysis, and the recommendations in this white paper may help shape implementation. The white paper also offers a straightforward example of a simplified approach to incorporating reliability measures, which looks promising.

It should be noted that a comprehensive data collection program is being conducted in Oregon, coordinated by the OMSC. The Oregon Household Activity Survey (OHAS) includes a core survey instrument with a provision for additional questions to address unique issues for different areas of the state. It also provides the opportunity to include specialized surveys, such as a stated preference survey on tolling in the Portland Metro area. The survey is underway in several areas of the state and will be completed in all MPOs and ODOT regions by 2011.

A table of contents would be useful. Generally, the paper should be reviewed to ensure that information on figures and tables is legible and that they are numbered correctly (for example, there is no Table 3 in the report). The appendices provide documentation on advanced techniques and are valuable, but it is not clear that this information belongs as part of the white paper.

Specific Comments

There are several important clarifications to make sure that the reader is correctly informed regarding current practice in Oregon.

- The author states that SWIM "is in a category all by itself: in fact, it is among the most advanced … models worldwide". SWIM is clearly a highly advanced model but this statement by the developer of the tool makes one question the objectivity of the white paper. (page 4 and others)
- The white paper states that VOT should be treated equally across mode choice and route choice. It is not clear that this is supported by the evidence. For example, the toll perception could vary depending upon the immediacy of the choice. A toll may be more important when the route choice is made – the decision has to be made as the driver proceeds on the roadway. The mode choice is a bit more removed and more considerations come into play in this choice. (page 17)
- It should be clarified that the SWIM model is not a travel demand model. (page 17)
- The white paper implies that congestion and pricing influences time of travel decisions, which is likely true. However, household obligations (picking up children, non-work appointments, etc.) or work hour rigidity often override congestion and pricing effects. Some travelers do not have a choice as to when to travel. This point is important because peak spreading is not a direct (linear) result of pricing and other forces must be considered. (page 18)
- The Metro VOTs are low. Much of this has been dictated by the need to comply with Federal Transit Administration (FTA) guidelines. Models have been estimated with higher VOTs in Portland that are not endorsed by FTA. (page 19)
- It should be noted that the white paper focused its model review of tolling practices at Metro on the techniques used in the Columbia River Crossing (CRC) project. These techniques were endorsed by a study team that included CRC consultants (including Stantec Consulting Services). Metro also conducted other studies, including the Highway 217 Tolling Study and Traffic Relief Options Study, using a segmentation of autos by purpose and income stratifications in assignment. The capability exists to conduct a more rigorous analysis, as encouraged by the white paper. (page 19)
- It is mentioned passively, but it should be clearly stated that Metro demand models can link with a land use allocation tool. The analysis technique as to whether to include household and employment allocation influences is defined by the project sponsor and is influenced by the time and budget. More research is needed to quantify the impact that a toll would have on a residential choice decision since housing decisions are primarily driven by other factors – cost, neighborhood amenities, school quality, etc. (page 21)
- It should be noted that the implementation of the model features described in Table 5 will require extensive "borrowing" of coefficients from other regions, which may not be desirable. Coefficients could vary by corridor due to project characteristics and any

uniqueness that could be found in the corridor population, so survey work for each corridor study is a better approach. This also depends, of course, on the stage of analysis – i.e., alternative analysis vs. bonding analysis. (page 26)

- Models are calibrated at a consistent level region wide. If more data is collected for one part of the data (a corridor) and the model is calibrated consistent with that select data, overall calibration may be brought into question. (page 29)
- Recent studies indicate that models underestimate auto travel. The Optimism Bias figures should be verified. (page 30)
- A better title for Section 3.1.3 is *Post Modeling Requirements*. The white paper does not speak to post-processing of model output data, which is very important and specific to the technical modeling process. Post-processing is an important element of the analysis process to adjust "raw" forecast volumes produced by the trip assignment model, and this process should be discussed in the white paper. (page 31)
- It may be useful to identify which of the top drivers of forecast failure are modeling related and which are due to decisions/actions external to the model. This clarification should also be made in the introduction to risk factors, as the factors listed are model input and not a result of running the models. The importance of a good decision-making process to develop model inputs and scenarios cannot be overstated. (page 36)
- The white paper recommends modeling "optimistic" and "pessimistic" variants on each important risk variable. This could produce an unworkable array of scenarios to model and a data accounting nightmare. The author suggests a process to reduce the number of possible scenarios, but this would probably require a sophisticated statistical analysis of the results. Producing appropriate "optimistic" and "pessimistic" variants for some of the variables (for example, the land use affecting a particular tolled facility would depend on regional forecasts and accessibilities that may differ given the presence or absence of the facility itself or the toll levels charged), judging what would constitute suitably "optimistic" and "pessimistic" variations, and implementing those in the integrated model will be challenging. (page 38)
- The author suggests that trip distribution be conducted by time of day. It is not clear that this is supported by the evidence. A person's daily travel is linked to a time budget and more time may be spent in the work commute at the expense of doing non-work travel later in the day. Ideally, a model should account for the travel budget in distribution. In the absence of this approach, Metro has found that a weighted impedance between peak and midday accessibilities yields a much better distribution (in terms of matching survey results). (page 42)
- It should be noted that Metro does extensive corridor-level auto and transit validation, as required for New Starts analysis. Clarifications on Metro improvements include: (pages 43-44)
    - Additional vehicle class segmentation: This can already be done (Highway 217 Tolling Study, Traffic Relief Options Study).
    - Detailed model validation: This is already done for New Starts and regionally significant projects.
    - Car occupancy segmentation: Very few 3+-occupant vehicles are found in the Portland region. Implementing this feature would require the porting of values from other locations and this approach introduces uncertainty.

    - Corridor level transit validation: Extensive validation is already done for New Starts.
- It should be noted that the CRC project is investing in significant Stated Preference (SP) survey work now that it is entering the bonding phase. (page 46)
- It should be noted that new household surveys are already underway in Oregon. (page 48)
- The author states that risk analysis is "not beyond the modeling resources already available". The skill set definitely exists, however, project schedules typically do not permit time for the risk analysis. Furthermore, as more time is spent on a particular project, staff time available for other projects diminishes. It must be clear that if scope increases are required, decisions need to be made to delay other projects or more resources need to be made available. (page 51)

Thank you for the opportunity for the OMSC members to review and comment on this white paper.

Sincerely,

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