



Transportation Commission

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TO: Chair Wu and Members of the Transportation Commission

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SUBJECT: Progress report on the development of the new BKR Model

DIRECTION REQUESTED

☐	Action
☒	Discussion
☒	Information

This agenda item provides a briefing to the Commission on the Transportation Department's completion of the new Bellevue-Kirkland-Redmond (BKR) Travel Demand Forecast Model development. Staff will discuss how the new features of the model, and how it will be used in future applications.

BACKGROUND

Through an interlocal agreement with the cities of Kirkland and Redmond, the City of Bellevue developed the first BKR model in 1989. Since then, many improvements have been made to the model to support on-going planning and engineering functions in the three partner cities. Meanwhile, there have been many on-going efforts by research institutions and large Metropolitan Planning Organizations to explore new model platforms to improve the quality of travel demand forecast. Three years ago, after many years of model development, the Puget Sound Regional Council decided to move to a new model platform called activity-based model. It was prime time for us to leverage the Puget Sound Regional Council (PSRC) work and the innovations elsewhere in the world.

After two years of intensive work and overcoming many technical and data challenges, we are happy to report that the model development is complete successfully – on time and under budget!

INFORMATION

Compared to the existing BKR model, the new model, called BKRCast, has more details and new features. The table below compares the two models:

Basic Model Inputs and Outputs Comparison: Existing Model vs. New Model

Components	Existing	New
Zones	474	1086
Job Categories	5	9
People	Household	Person
Modes	4	9
Bike		X
Walk		/*
HOVs	/*	X
Park & Ride	X	X
Tolls	X	X
Parking Price	X	X
Travel Forecasts	Trips	Tours

Note: * partially represented.

Compared to the existing BKR model, the new model has many more traffic analysis zones, job categories and travel modes. More details in the new model will enable it to perform more robust travel forecasts. Particularly, the new model has added features for conducting more comprehensive multimodal analyses. For example, pedestrian travel is fully accounted for and bike travel is explicitly represented in the model. This directly supports City efforts to develop and implement multimodal level-of-service (MMLOS) measures and standards.

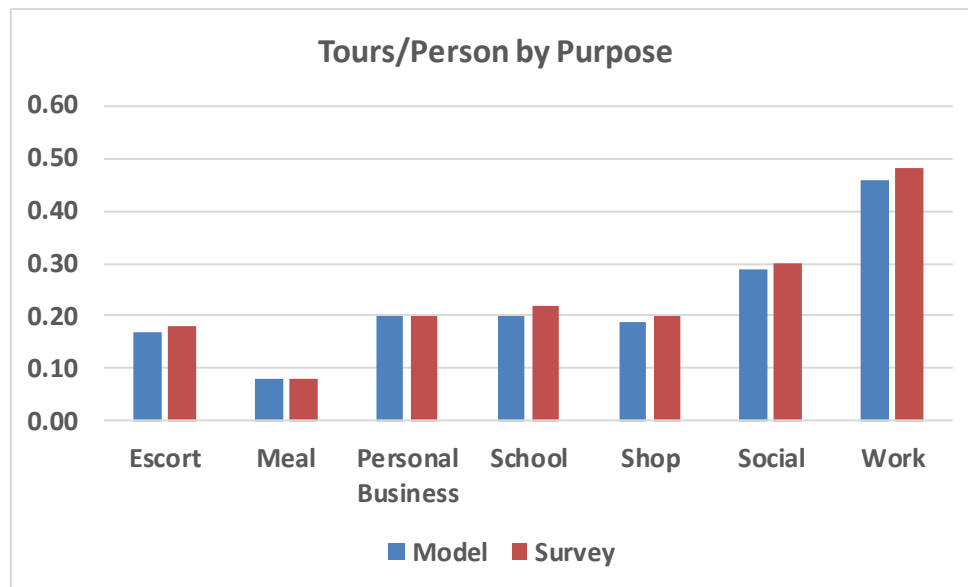
The new model is designed to be more sensitive to many of the land use and transportation policies that the city is dealing with. For example, the new model is more sensitive to land use density and mixed uses than the current model. About parking price, the new model looks at not only the parking charges at the destination, but also the parking availability and pricing at nearby facilities within walking distance. Additionally, because the new model simulates individual travel activities, it is more robust in forecasting people's willingness to pay a toll and therefore can more realistically evaluate transportation toll policies whether it be individual facility tolling or VMT based, regionwide congestion pricing.

Model Sensitivity Comparison: Existing Model vs. New Model

Factors	Existing	New
Mixed Land Use		
Land Use Density		
Parking Price		
Tolls		
Congestion		
Transit Pass Ownership		
New Technologies		

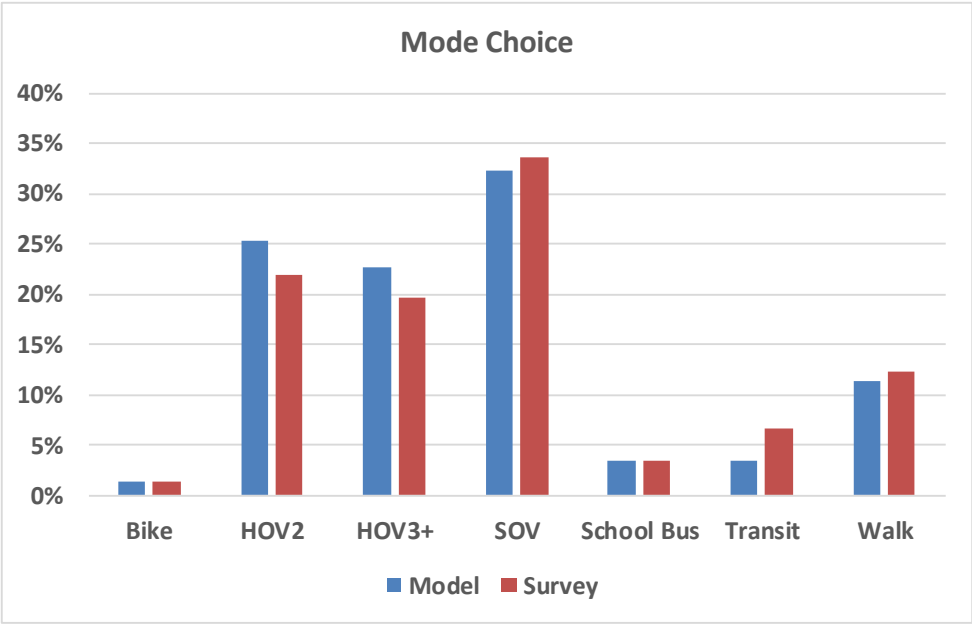
Before a new model is applied to real projects, it must go through a vigorous calibration and validation process using real world data such as traffic counts and travel surveys. The charts below summarize some of the key indicators of the model calibration results:

Modeled Tour Rates Compared to the 2014 PSRC Travel Survey

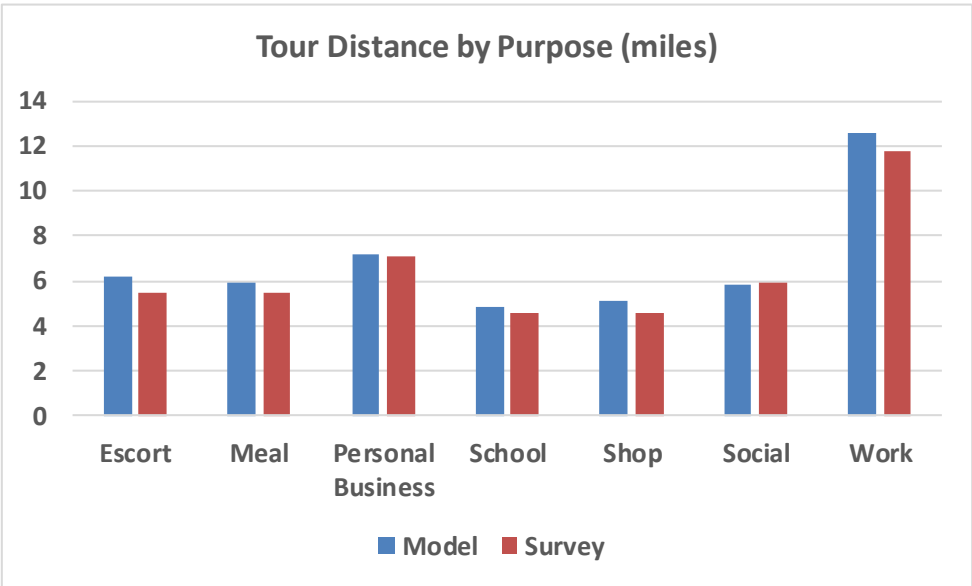


Unlike the existing model which forecasts travel by relatively isolated trip segments, the new model forecasts travel by tours which includes intermediate stops. This enables the model to more accurately forecast not only the purpose of travel (see chart above) but also the modes they likely to use throughout the tour consistently (see the chart immediately below).

Model Predicted Mode Choice Compared to the 2014 PSRC Travel Survey

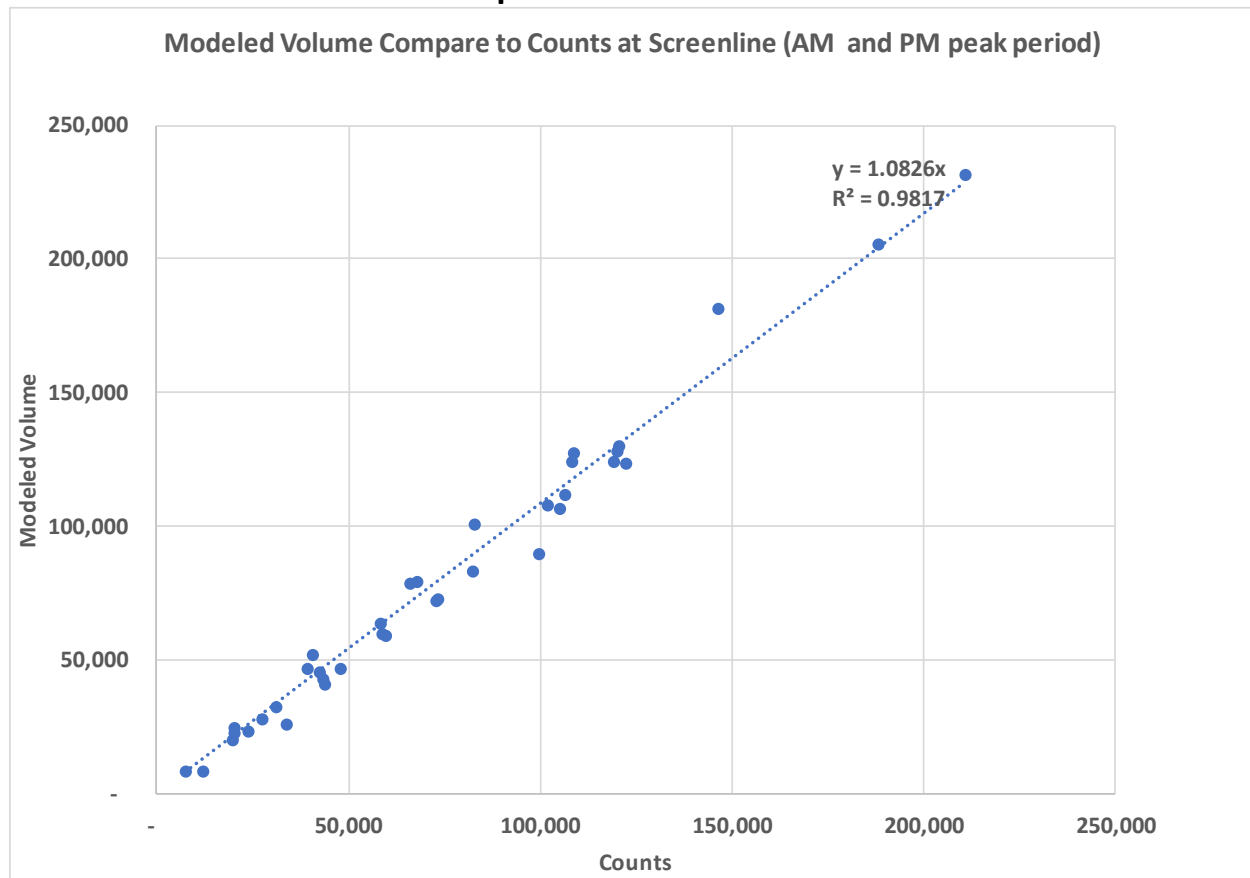


Modeled Tour Distance Compared to the 2014 PSRC Travel Survey



Travel distance and traffic volume are among important indicators of a model’s accuracy and reasonableness. As shown in the charts immediately above and below. The new model is capable of replicating the real world very closely.

Modeled Vehicle Traffic Compared to Actual Counts at Screenline Locations



In summary, of all the key performance measures, the new model meets and exceeds the calibration and validation standards commonly accepted in the industry.

NEXT STEPS

From this point on, the new model will be used in parallel to the existing model in project applications. The first of the projects to try the new model is the Eastgate Transportation Study. The new model will be used, at a minimum, to inform mode choices. For continuity and consistency, staff anticipates there will be a transition period during which the new model and existing model co-exist, with the BKRCast being gradually phased in and the existing BKR model phased out. The transition period is expected to last one to two years.