TRANSPORTATION RESEARCH AND MODELING SERVICES

Metro transportation modeling

Transportation modeling is an essential component of planning for regional infrastructure improvements, such as highway and transit projects. The process of travel demand forecasting uses what we know about the existing world to predict what conditions will be like in the future. It is not a guess or an estimate, but a projection based on empirical data and foreseeable circumstances. The transportation modeling used in the Portland metro region is peer-reviewed and validated against observed data. Past model performance on project forecasts is another relevant indicator for model validation.

To understand how people will make trips, modelers look at the reasons why people travel. The model takes into consideration the real choices made by residents in our region. This information is collected from rigorous surveys. Metro's last survey--the Household Travel Behavior Study--tracked 6,000 households to understand how factors such as age, income, children, car ownership, and transportation infrastructure characteristics affect travel choices.

Data input into the transportation model includes population and employment, both existing conditions and forecast, in a way that is consistent with local comprehensive plans as well as roadway and transit routes.

In the model, our region is divided into over 2,000 discrete geographic areas called transportation analysis zones. Census data, land characteristics, economic factors and accessibility measurements feed into land use models that project the number of households and jobs located in each zone.

Metro uses a standard four-step modeling process for travel demand forecasting. This four-step process consists of the following parts:

1. Trip generation
2. Trip distribution
3. Mode choice
4. Trip assignment

Trip generation: Do I want or need to take a trip?

The first step in the modeling process forecasts the number and types of trips generated from each transportation analysis zone. The projection is based on the number and demographic profiles of households and employment in each zone.

Households are separated into 64 profiles stratified by size, income and age. Employment is categorized into nine types, ranging from service sector and retail, to finance and agriculture. Using behaviors identified in the Household Travel Behavior Study, the model forecasts the likelihood of households to make certain types of trips based on household type and employment mixes in each zone. Trip types are classified as work, shopping, recreation, college, school, and other.

Trip distribution: Where do I want to go?

Next, the model predicts where the trips produced in the first step are destined. Each zone's availability of attractions—work, shopping, recreation and other opportunities—and the accessibility (access to auto networks and transit) from the zones where trips are produced determines where trips are likely to go.

continued

For more information on transportation modeling in the Portland Metro region, contact the Metro Research Center at 503-797-1915.

Metro

Clean air and clean water do not stop at city limits or county lines. Neither does the need for jobs, a thriving economy and good transportation choices for people and businesses in our region. Voters have asked Metro to help with the challenges that cross those lines and affect the 25 cities and three counties in the Portland metropolitan area.

A regional approach simply makes sense when it comes to protecting open space, caring for parks, planning for the best use of land, managing garbage disposal and increasing recycling. Metro oversees world-class facilities such as the Oregon Zoo, which contributes to conservation and education, and the Oregon Convention Center, which benefits the region's economy

Mode choice: How will I get there?

As in the real world, travelers in the model have many transportation choices, including walking, biking, driving alone or with others, and walking or driving to transit. For the model to forecast travel demand with a reasonable degree of confidence, it must account for why people make those decisions.

The model considers the following factors when determining mode choice:

- Cost - What are the expenses of operating and maintaining a car? Are there parking expenses? How much does transit cost? Are there tolls?
- Travel time - Is it faster to drive, take transit, walk or bike?
- Auto availability - Do I have access to a car?
- Transit access - Can I get to transit easily?
- Urban design - Am I in a high-density, mixed-use area where I'm more likely to walk or bike?
- Socio-economic relationships - What is my household income? Are there as many cars as employed people in my household?

Trip assignment: What route should I take?

The model uses data from the previous three steps to simulate the way people will travel. For auto trips, the model assigns traffic to streets in specified time periods. The model assumes the availability of multiple routes between origins and destinations, accounting for congestion.

The base year assignment of vehicle trips is validated against actual traffic counts to ensure that the model is performing well. To forecast the transit trips route, the model considers the time segments of the journey, including walk time, wait time and time in vehicle. Again, the results of a model run are validated to actual transit boarding counts.

Model review

Transportation modeling plays a crucial role in funding and implementing transit projects. Therefore, the Federal Highway Administration and Federal Transit Administration require regular reviews of the travel demand model to ensure that it meets federal guidelines. Metro's transportation model and its outputs are regularly peer-reviewed by modeling professionals from academia, consulting firms, and metropolitan planning organizations, as well as the Federal Transit Administration.

For more information on transportation modeling, visit Metro's Transportation Research and Modeling Services program:

www.oregonmetro.gov/transportationmodeling

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