

Modeling at the Washington State Department of Transportation

There are a wide variety of models that currently exist in the Transportation Planning arena that forecast everything from the location of households, the volume and speed of vehicles on the roadways down to the emissions of certain pollutants. At the Washington State Department of Transportation, we focus on modeling that predicts the travel demand, and resulting transportation performance, of the transportation system.

In the field of transportation modeling, there are three main types of models. The use of specific model types vary based upon the output desired. The three types of models are:

1. Macroscopic Travel Demand Forecasting Models
2. Mesoscopic Operational Models
3. Microscopic Simulation Models

Macroscopic Travel demand models are designed to do one thing well – forecast travel demand. As transportation issues have become more complex, travel demand models have changed in complexity as well. Despite this fact, travel demand models are still intended to forecast future travel demand – not traffic operations. Macroscopic models are generally maintained by the Metropolitan Planning Organizations and are used to help assess the performance of large scale multi-modal plans.

Mesoscopic models are fairly new to modeling practice. The theory behind a Mesoscopic model is to provide more detailed operational factors to the assignment model without spending the resources required to go to a microsimulation. A mesoscopic model can be thought of as a bridge between the macro and micro modeling worlds. An ideal use of a mesoscopic model would be to test the benefits of ITS infrastructure improvements on route diversion.

Microscopic models are used to simulate very detailed operations of specific facilities. They model the interactions of every single car, bus or person in the simulation and can provide very detailed operational measures. Because of their detail, microscopic models can be very difficult to apply to larger areas and require an immense amount of detail to construct. A situation to use a microscopic model in would be to test the operational improvements of transit signal priority in a corridor.

WSDOT has built all three types of models, although most applications to date have centered on macroscopic models. As WSDOT moves forward with the modeling requirements of SSB 5412, as well as future implementations of the Highway System Plan, meso and microscopic models may become the standard modeling tools used by the organization.