

Chittenden County Regional Transportation Model – A Brief Overview

The Chittenden County Transportation Model (the “model”) simulates the interaction between development, travel demand and a multi-modal transportation system. System-wide transportation models have been used in Chittenden County since the mid 1980’s. The current model was developed in 1994 and updated in 1998. It uses custom designed computer software developed by Resource Systems Group, Inc. (RSG) of White River Junction, VT. It includes several advanced features such as a feedback loop between development location and transportation system improvements, the ability to estimate bus, commuter rail, walk/bike and shared and single occupancy vehicle trips, and is sensitive to the affect transportation projects have on where trips are made.

Model Structure.

For the purposes of the model, the County has been divided into 325 transportation analysis zones (TAZs). See Figure 2 on the reverse side. Each TAZ includes the number of households and the number of retail, office, industrial, institutional and hotel employees. The urban municipalities are divided into a larger number of TAZs. Burlington and South Burlington for example, have 81 and 69 TAZs respectively. The rural areas, such as Hinesburg and Underhill, are divided into generally less than ten TAZs each. The amount of travel demand is directly related to the number of households and employees in each TAZ.

Travel demand is generated by households and employees in each TAZ and loaded on the model’s transportation network which includes the highway system and transit routes. The highway network includes all arterials and significant collectors in the County. In transportation modeling terms, roads are described as links and intersections as nodes. Road characteristics such as length, class (freeway, principal arterial, local, ramp, etc.), speed limit, number of lanes, and capacity are assigned to each link. In addition to road characteristics, the CCTA route system is also coded into the links. Intersection characteristics such as control type (signalized, coordinated signals, stop, yield, no control, etc.), geometry (number of turning lanes), and capacity are assigned to nodes. The model does not currently include a pedestrian and bicycle network.

Model Process.

The model uses the five step process presented in Figure 1 to estimate location of new development and the subsequent AM and PM peak hour travel demand. **Trip Generation** estimates the number of person trips produced and attracted for each TAZ. **Trip Distribution** connects the person trips between TAZs. **Mode Choice** splits person trips into single occupant vehicle, shared vehicle, bus, commuter rail or walk/bike trips. The trip generation and trip distribution modules contain formulas calibrated to a 1998 household trip diary survey conducted throughout the County. The mode choice module was developed based on a stated preference survey conducted in 1993 in Chittenden County. The **assignment** module selects the shortest route for each vehicle and transit trip from one TAZ to another. As volumes increase on a particular route, the model assigns trips to other less congested routes.

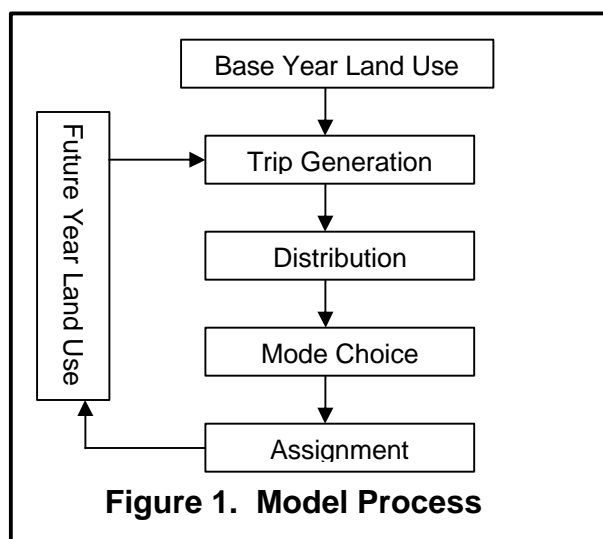
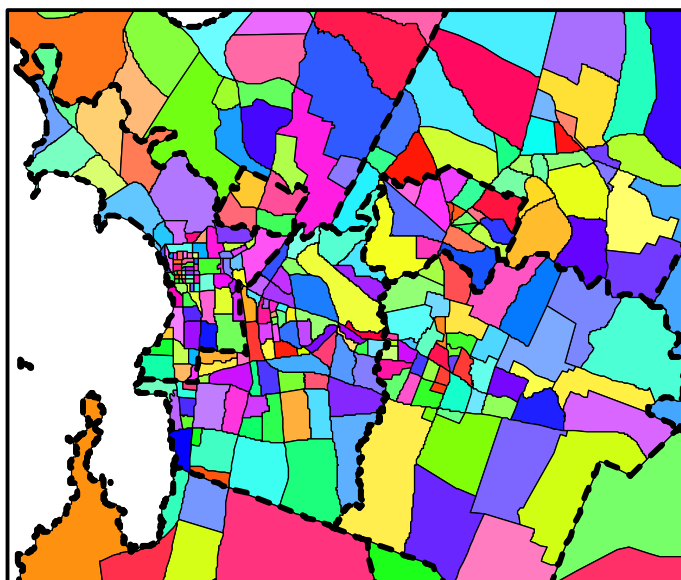
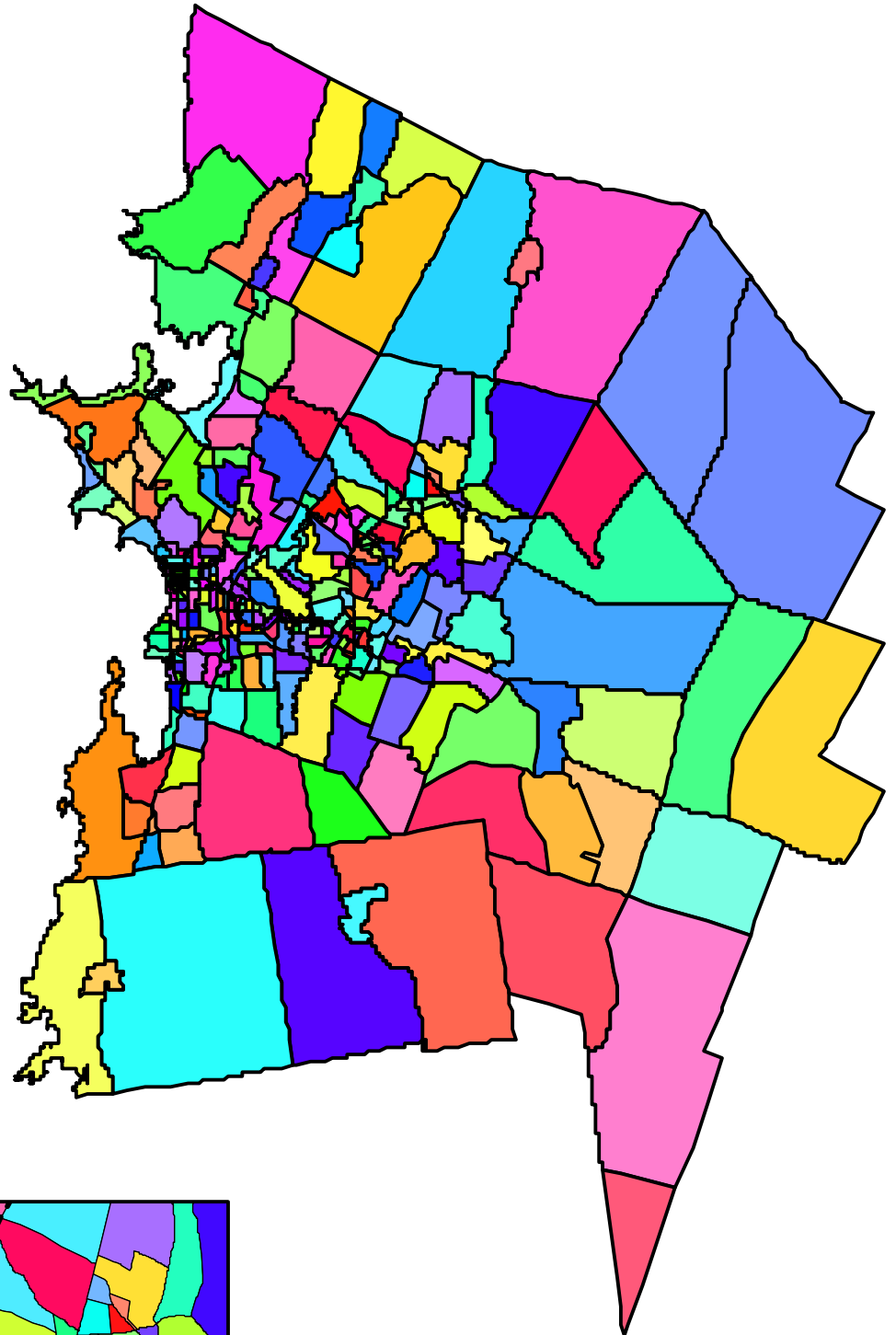


Figure 1. Model Process

The model captures the dynamic relationship between development location and the transportation system through the feedback loop indicated in Figure 1. In the base year, trip generation is affected by the base year land use which eventually affects distribution, mode choice and assignment. The resulting transit and vehicle travel times between TAZs affects location of new housing and employment for the next study year period (usually 5 years). The land use distribution is also affected by physical constraints, zoning and the type of sewer service available (public, septic system or none). The future year land use is used as an input to estimating future year travel demand and vehicle and transit travel time between zones. Those travel times are then used to distribute the next 5 years worth of growth to the TAZs, and so on. Using this approach, the model attempts to capture the impact new transportation facilities and services have on land use distribution and the affect the resulting land use distribution has on the transportation system.

**1998 Model
Transportation
Analysis Zones
(TAZs)**



TAZs in the Urban Area

FIGURE 2