

### **5.3 Triangle Region Transportation Model**

The Triangle Regional Model (TRM) is a tool that was developed for understanding how future growth in the region impacts transportation facilities and services. The TRM can help identify the location and scale of future transportation problems, and proposed solutions to those problems can be tested using the TRM. The TRM is developed and maintained by the TRM Service Bureau housed at the Institute for Transportation Research and Education on behalf of the Durham-Chapel Hill-Carrboro MPO, Capital Area MPO, North Carolina Department of Transportation, and Triangle Transit, the four organizations that fund the modeling effort and guide its development and use.

The modeled area covers approximately 2,600 square miles, and includes all of Wake, Orange and Durham counties and part of Chatham, Franklin, Granville, Harnett, and Johnston counties. This area is divided into approximately 2,300 geographic areas (traffic analysis zones) for which detailed population and employment information is maintained. The highway system is represented by about 15,000 roadway links in 2005 and about 16,000 roadway links in 2035. The roadway links are described by detailed characteristics including: length, number of lanes by direction, speed, and traffic carrying capacity. Transit services are represented in 2005 by about 180 transit lines (430 in 2035) operated by Capital Area Transit, Durham Area Transit Authority, Chapel Hill Transit, Triangle Transit, C-Tran, Wofline, and Duke University Transit. Transit services are described by detailed characteristics including: length, stop locations, speed, frequency of service, and cost or fare paid.

The model produces summary statistics including: vehicle miles of travel, vehicle hours traveled, degree of traffic congestion, number of trips taken by travel mode, and transit riders. The model also computes trip statistics for each of the approximately 2,300 traffic analysis zones, categorized by mode, general trip purposes, and origin or destination zone. These statistics are shown elsewhere in the report in tables and maps. Statistics on speed and vehicle miles of travel by type of roadway are used to make air quality conformity determinations for the plan.

The model is an advanced four step travel demand forecasting model. Models like the TRM forecast travel using the following sub-models, or steps:

- Trip Generation – based on population and employment data for each traffic analysis zone, calculate the number of trips people will make for various trip purposes, and the number of trips likely to go to destinations throughout the region.
- Trip Distribution – based on the number of trips generated for each trip purpose, the cost to travel from zone to zone, and the characteristics of the zones, calculate the trips from each zone to all other zones.
- Mode Choice – based on the trips calculated in trip distribution, characteristics of the traveler, transit service characteristics, highway congestion, and other service characteristics, calculate for trip purpose the number of trips made by automobile, carpooling, and transit.
- Trip Assignment – based on highway speeds and transit speed, find a route that takes the shortest time to get from one zone to another zone and sum the trips on that roadway or transit route. The model includes feedback to allow the travel times to include the effects of traffic congestion on the calculation of the shortest time on roadway links or transit services.

Model relationships were developed using 1995 household survey data, 2000 census data, transit survey data, traffic counts taken throughout the Triangle, and a survey of travelers entering from outside or leaving the modeled area. The model was validated to 2005 traffic count and transit rider data. The model version used for this analysis was adopted for use in April, 2008 by the Durham-Chapel Hill-Carrboro MPO, Capital Area MPO, North Carolina Department of Transportation and Triangle Transit and is referred to as TransCAD v4-2008.