APPENDIX A

TRAVEL DEMAND MODELING

Travel Demand Modeling

TRANPLAN

The DelDOT's TRANPLAN computer model uses a "three step" process to model travel. The first step, called *trip generation,* uses a series of linear regression equations to convert estimates of population and employment into "trips" according to trip purposes (such as work, shopping, non-home based, and "other" trips). The estimates of trip generation activity are made for each traffic analysis zone (TAZ) comprising Kent and Sussex Counties.

The second step, called *trip distribution*, uses a so-called "gravity model" equation to allocate trips among the traffic zones. The reason the term gravity model applies is that the concept for trip allocation is very similar to Newton's general law of "gravity". According to this theory as it applies to travel patterns, the "attraction" or probability of traveling between two places is directly related to their size (in terms of population or employment) and indirectly related to the distance between them. In other words, travel is most likely to occur between residential and employment areas that are larger, relatively speaking, and least likely to occur between similar areas that are farther apart in terms of distance or travel time. It should be noted that this is a general theory of travel behavior and that each county has many unique circumstances that affect travel patterns.

The third step, called *trip assignment*, chooses the roadway routes or paths over which travel between various origins and destinations takes place. Trips are assigned to paths along the highway network based on minimum travel times. The minimum path between zones is calculated on the basis of link length, highway type, and link volumes.

The travel modeling process summarized above was used in two separate elements of this transportation plan:

- the capacity deficiency analysis, and
- the conformity analysis.

The capacity deficiency analysis identified the individual roadway segments that would experience projected volumes that exceed typical roadway capacities for the years 2005, 2015 and 2025. Those estimates were based on the projected population and employment data for each TAZ, the travel modeling equations, and the "current" or existing condition roadway network. The purpose of this step was to estimate the number, locations, and severity of projected capacity deficiencies that would occur within the Dover/Kent County MPO roadway coverage if "all projected development takes place" by 2005, 2015, and 2025 and no additional roadway capacity is added beyond the current network. This estimate provides the long range plan update with a "worst case" assessment of "how extensive" capacity deficiencies would be, based on the assumptions made for demographic growth.

The conformity analysis provided the basis for the Dover/Kent MPO's conformity determination for this long range transportation plan. According to federal laws and regulations issued by the EPA and the FHWA, the MPO must demonstrate that its long and short range transportation plans are "in conformance" with State of Delaware plans for air quality improvement. The MPO must demonstrate that the amount of ozone precursor emissions resulting from the estimates of travel contained within the plan contribute mobile source emissions that are within allowable estimates, as defined by State of Delaware "State Implementation Plans" submitted to and approved by the EPA.