Orth-Rodgers & Associates, Inc. was retained by the Pennsylvania Department of Transportation (PennDOT) to develop and build a regional Travel Demand Model for SEDA-COG. The SEDA-COG region is located in Central Pennsylvania and includes eleven counties: Centre, Clinton, Columbia, Juniata, Lycoming, Mifflin, Montour, Northumberland, Perry, Snyder, and Union. Many transportation planning efforts rely on such models to produce detailed link-by-link projections of traffic flow for some future year, given a forecast of population, households, and jobs for that year. These models are usually based on the relationships between travel and land use that exist in the study area in some base year (2000, in this case). The models are calibrated using data on observed travel behavior in the study area and structural relationships that have been tested in other areas. The models are then validated by applying them to produce a base year estimate of traffic volumes. These estimates are then compared with traffic counts and other data to ensure that the models are capable of replicating known travel volumes with sufficient accuracy for the needs of local and state planners.

The SEDA-COG Region Travel Demand Model could be useful in analyzing other transportation system impacts due to a wide variety of changes in the urban environment. This could support long-range highway and transit planning in the region. Finally, the model can be used to support short-range studies of traffic, transit, and bicycle/pedestrian improvements throughout the area.

The SEDA-COG Model includes all or a portion of seven counties in Central Pennsylvania. They are the entire counties of Lycoming, Union, Snyder, Northumberland, Montour, and Columbia, and the municipalities of Salem Township, Nescopeck Township, and Nescopeck Borough in Luzerne County. Luzerne County is not part of the SEDA-COG Region but was included to encompass all of Berwick Borough. Figure 1 illustrates the study area of the Travel Model. The model was developed using the transportation planning software package TP+.

The zone structure for the model was developed based on Census Geographic information as well as township boundaries and major roadway alignments. Geographic features, land use uniformity, and activity center locations are also factors in the development of zonal boundaries. There are a total of 586 traffic analysis zones located within the study area.

The SEDA-COG Region Travel Demand Model uses a set of basic zonal factors as follows:

1. Household Population
2. Group Quarters
3. Total Population
4. Households
5. Number of Retail Employees
6. Number of Office Employees
7. Number of Industrial Employees
8. Number of Other Employees
9. Total Employment
10. School Enrollment
11. Zonal Area Type
For the SEDA-COG Region Travel Demand Model, the socioeconomic data was primarily compiled using the 2000 U.S. Census data set and data purchased from INFOUSA.

The existing road system in the SEDA-COG Region is represented by a database known as a highway network. This is a mathematical abstraction of the real system that is intended to estimate values of time and distance between any two points, which are sufficiently close to the actual values, to support the estimation of future travel volumes. The model consists of 586 zones and has 8,683 roadway links and 2,618 centroid links (11,301 total links). Where, two-way links are counted as two links and one-way links are counted as one link.

For the development of the SEDA-COG Region Model, ArcView (GIS) was used to create the network links. These links were created by overlaying the PennDOT Traffic and Legislative Route Maps. Once all of the roadways that were to be included in the new highway network had been selected, the Arcview highway network was exported to a TP+ ready format. TP+ is a PC-based, transportation planning software package that was used for this model. The highway network is comprised of a series of links and nodes, which describe the physical route of each roadway. On each link are a series of link attributes that describe the geometric makeup of each roadway segment. These attributes include such information as number of lanes and facility type. Sources of data for the link attribute coding includes a roadway inventory conducted as part of this and previous studies, existing highway network information, SEDA-COG, and the Pennsylvania Department of Transportation’s Roadway Management System.

The majority of the network is composed of arterials and collectors (approximately 48 percent), which is typical. Links that may be added to future networks, or links which are improved, should adhere as closely as possible to these definitions. Local roadways were included to provide access to larger facilities. The area type (AT) categories were determined by an examination of zonal population and employment density ranges.

The trip generation model estimates the number of trips entering and leaving each zone, on the basis of that zone’s land use and socioeconomic characteristics. The trip generation model estimates person travel by residents and non-residents. Trips are stratified as follows:

- I/I – Trips entirely within the study area. These trips are considered “Internal”
- I/X – Trips by study area residents to points outside the study area.
- X/I – Trips by non-residents to points inside the study area.
- X/X – Through trips, which pass through the study area without stopping.

Trip distribution is based on the well-known gravity model. The traffic counts used to validate the highway assignments are a combination of Orth Rodgers and PennDOT counts. The counts represent many different years, but have been adjusted to represent 2000 average weekday traffic conditions.

The existing conditions travel demand model for SEDA-COG has been developed and fully calibrated by Orth Rodgers under prior contract with PENNDOT based on the 2000 Census population and employment data. SEDA-COG was unsuccessful in securing funds to develop a future conditions (Year 2030) travel projection model. Therefore, the model data have not been used for regional analyses; however PennDOT’s consultant considered the SEDA-COG model
data when preparing the PA Statewide Travel Demand Model as part of the state’s Mobility Plan. SEDA-COG does not own modeling license software, nor does it have the actual Region Travel Demand Model source data or codes.

A future conditions traffic model would be used for the following purposes: comprehensive planning, major new highway proposals, determination of growth rates for standard highway projects, evaluating Developments of Regional Significance that are large traffic generators, testing new public transit alternatives, potential scenario-based simulations, and air quality conformity (if future conditions warrant).

**Figure 1: Model Study Area**