

Socio-Economic Data

For the purposes of the 2035 Transportation Plan, seven types of socio-economic data were needed. These seven “variables” were needed for the base year, as well as for the target year of 2035. The seven variables used were:

- Population
- Number of households
- Median household income
- Automobiles per household
- Retail employment
- Non-retail employment
- School enrollment

Each variable was collected at the county level and then allocated to each TAZ through 2035 in 5-year increments. Variables were collected first by county, because each county has characteristics unique to itself, and because the county totals could be used as control totals for the allocation to TAZs.

In order to insure the accuracy of the data, several different methods were used to project each variable. Each projection was then matched to a county control total. Some of these control totals were obtained from national reports or were based on outside projections. Basing the 2035 Plan projections on national or state projections insures that we did not over or under estimate the data to be used in the TransCAD model. Of course, in some cases, national or statewide projections did not fit with local growth and development patterns. Where the national or state patterns did not fit with the county patterns, local historical data was used to find the most appropriate data projections. The final results represent the future outlook for St. Joseph and Elkhart County through 2035.

The following is a brief description of the process used to collect and allocate the data by TAZ and then project it to the target year of 2035.

Population Growth Trends

The most recent U.S. Census data and corresponding estimates, (April 1, 2000 Census and July 1, 2004 estimates), show the United States grew by 12.2 million people, or a growth rate of 4.3%. The total estimated U.S.

population as of July 2004 was 293 million persons. Indiana’s 2004 estimated population was 6.2 million persons. The State of Indiana grew by 157,052 people between 2000 and 2004 at a rate of 2.6%. Indiana was the 31st fastest growing state in the nation during those years and remains as the 14th most populous state. In comparison, during the same period, our neighboring states grew at the following rates: Kentucky 2.6%, Illinois 2.4%, Michigan 1.8%, and Ohio 0.9%. By contrast, Indiana was the 27th fastest growing state in the 1990s, with a growth rate of 9.7% between 1990 and 2000, compared to the national rate of 13.1%.

According to US Census Bureau estimates, of Indiana’s 92 counties, 28 grew faster than the state, with growth rates exceeding 1.9% between 2000 and 2003. Elkhart County’s population was 182,791 in 2000 when the Census was taken. The population estimate by July 1, 2003 was 188,779, with an increase of 5,988 persons and a growth rate of 3.3%. During this period, Elkhart County was the 16th fastest growing county in the state, and consisted of a 3.05% share of the states’ population. In 2000, the population for St. Joseph County was 265,559. The 2003 estimate was 266,348 persons; with an increase of 789 persons, a 0.3% increase. The population share in St. Joseph County counted as 4.3% of the states’ population.

Income and Employment Growth

Per capita personal income is often used to measure economic well-being. Indiana’s per capita personal income (\$27,010) ranked 32nd in the nation in 2000 according to Woods & Poole, which is under the national average (\$29,760).

The per capita personal income of Elkhart County ranked 14th in 1990 (\$17,907), and fell to 23rd in 2000 (\$26,436) among all counties in Indiana. The per capita personal income of St. Joseph County ranked 16th in 1990 (\$17,779), and fell to 17th in 2000 (\$27,534) among all counties in Indiana (Woods & Poole).

Elkhart County’s employment growth rate was 3.14% between 1980 and 2000, which was the 10th highest among Indiana counties. The employment growth rate of St. Joseph County

was 1.58% during the same period, which is the 49th highest of all Indiana counties (Woods & Poole).

From 1990 to 2000, the US employment grew by 20%. During the same period, Indiana employment increased by 19.3% (U.S. Department of Commerce).

Socio-economic Data and Projections

The projections of the socio-economic development are fundamental to long range transportation planning. Socio-economic data inputs determine the demand for an increase in roadway capacity. In the 2035 Transportation Plan, seven inputs of socio-economic data are used in the model to generate trip demand tables for the current base year, and the future projection periods. The 2035 Transportation Plan uses 2005 as the base year, and the target year or horizon is 2035. These seven “variables” used for the base year and the horizon year of 2035 are: population, number of households, median household income, number of automobiles per household, retail employment, non-retail employment, and school enrollment.

The socio-economic data and projections for the traffic demand model are obtained through two major procedures. In the first procedure, total numbers for each variable for each county for both base year and projection years have to be determined. These totals are used as controls. In the second procedure, these totals are allocated to the traffic analysis zones (TAZs) in each county. Therefore, this section consists of two subsections. The first section describes the methodologies to get the control totals and the results of the projections. The second section describes the methodology to allocate these totals and the final results of the socio-economic input into the travel demand model.

Control Totals for the Base and Target Years

The base year (2005) control totals for each variable for each county were identified by using data from the 2000 US Census and a regression process, smoothing average methods, and other methodologies. The base year control totals for each variable for each county were then

projected to the target year (2035) by using projections from other sources or growth factor methods. Finally, the base year and the target year control totals were allocated to TAZs to create base year and target year socio-economic data input files for trip generation models, which is the first step in traditional four-step travel demand forecasting models.

Population Projections

The control totals for each county were obtained from the 2000 US Census, Woods & Poole Economic Projections, and STATS Indiana.

Woods & Poole Economics is a nation-wide economic model that projects socio-economic data for every county in the US. It is a comprehensive database with over 180 million statistics and is revised every year based on updated historical data and new assumptions. Woods & Poole projection links the counties together to capture regional flows, and constrains the results to the national total, which avoids a common pitfall in regional projections. Such a pitfall may be too optimistic or pessimistic. If these county projections are added together, the total may differ considerably from any conceivable national forecast scenario (Woods & Poole). Woods and Poole data was used in part for the US 31 Corridor Study and Indiana’s statewide travel demand forecasting model.

The STATS Indiana projection model uses a cohort component method for population projections, which carries forward individual age cohorts in time, accounting for the separate impacts of deaths and migration. The model is developed specifically for developing population projections for the State of Indiana.

Census 2000 data is provided in a format known as the Census Transportation Planning Package (CTPP). The 2000 CTPP is a set of tabulations from the decennial census designed for transportation planners. The data is tabulated from answers to the Census 2000 long form questionnaire, mailed to one in six US households. Because of the large sample size, the data is quite reliable and accurate.

Table 1 Regional Population Growth 2000-2035

Year	2000	2005	2010	2015	2020	2025	2030	2035
Elkhart	183,171	187,766	193,991	201,352	209,442	218,195	227,570	232,999
St Joseph	265,720	268,671	273,798	280,600	288,078	295,818	303,829	308,488
Total	448,891	456,437	467,789	481,952	497,520	514,013	531,399	541,487
Increase								
Elkhart		4,595	6,225	7,361	8,090	8,753	9,375	5,429
St Joseph		2,951	5,127	6,802	7,478	7,740	8,011	4,659
Total		7,546	11,352	14,163	15,568	16,493	17,386	10,088

“CTPP provides comprehensive and cost-effective data, in a standard format, across the United States” (FHWA). CTPP data is aggregated to the TAZ level and can be used directly by the TDF model.

For total control numbers used in the Travel Demand Forecast (TDF) model, the CTPP 2000 data is extrapolated to generate base year inputs, and the average of Woods & Poole and STATS Indiana data is calculated for the projection years. Table 1 above shows the total controls of population for each county in the TDF model.

Total Number of Households

A Woods & Poole projection of households is used for the total controls of year 2005 through 2035. CTPP 2000 data is extrapolated to generate 2005 base household data.

Median Household Income

The Woods & Poole projection of household income is used for the total controls of year 2005 through 2035. The base year income is estimated by multiplying a flat growth rate from 2000 to 2005 of the Woods & Poole projection. Elkhart County experienced a very slight drop in median household income (0.02%) and St. Joseph County median household income increased (0.46%).

Woods & Poole uses a different income concept than the US Census Bureau. Census Bureau income is based on the money income (money income can exclude some types of non-monetary forms of income) and is usually lower than the actual income people earn. Woods & Poole uses disposable income, thus it is usually

higher than the income reported by the Census. To convert Woods & Poole income to Census income, the ratio of year 2000 income between Woods & Poole and Census is applied to all future years.

Woods & Poole projects mean household income instead of median, which is used in the TDF Model. To calculate mean from median income, a ratio of mean over median income is calculated from Census 2000 data for St. Joseph and Elkhart County. Woods & Poole uses 1996 dollars to adjust for inflation, but the data is from Census 2000. Therefore, Census 2000 median to mean ratio is used. The mean household income in Woods & Poole is multiplied by the ratio to generate median income. The assumption made here is that the income distribution will not change substantially over the forecasting period.

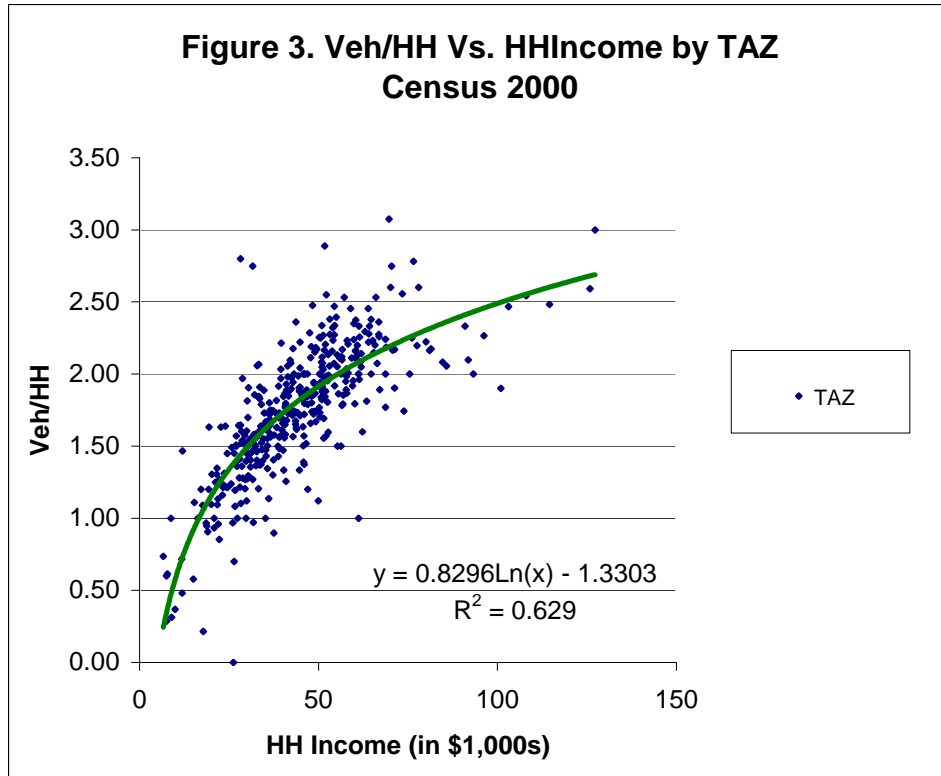
Automobiles per Household

The number of autos in a household has a strong correlation with household income. As a common practice, autos are calculated by other input variables, such as income, out of the model. (Lam, 2004) This requires a regression equation based on Census 2000 data.

The logit regression equation is:

$$Vehicles/HH = 0.8296 \times LN (HH \text{ Income}/1000) - 1.3303$$

The R-Square is 0.629 for this equation.



For base year 2005, it is assumed that the average household vehicles available of each TAZ will not change from 2000 to 2005.

Retail and Non-retail Employment

The employment data reported by the US Census is lower than the Woods & Poole data; this is because Woods & Poole uses employer side data and counts multiple jobs for a person. The Woods & Poole method is closer to the BLA (Bureau of Labor Statistics) and BEA (Bureau of Economic Analysis) method, reflecting the actual number of jobs, not just persons employed. When the model was developed, it used BLA and BEA employment data. Therefore, Woods & Poole employment data is used in the socio-economic data instead of US Census data.

School Enrollment

To determine the base year school enrollment, data was collected from the Indiana Department of Education (IDOE) for the 2002-2003 school years. The tabulated school data was geocoded and assigned to TAZs. Schools where information was missing were contacted to ensure complete inclusion of all students.

Allocation of Control Totals to TAZs

For all seven variables in the socio-economic data file, control totals have been developed for the base year 2005, the subsequent target year (2035), and other scenario years (five-year increments 2010, 2015, 2020, 2025, and 2030). There are many ways to approach the subject of allocating this growth to the TAZ level. These approaches can be grouped into quantitative land use models or group consensus methods. The method used in this plan was a combination of both.

Local panels incorporate the collective judgment of recognized experts. This is known as the Delphi method. MACOG staff conducted a series of discussion meetings with elected officials, land developers, urban planners, county and city engineers, citizens and business persons, as well as the area's Chambers of Commerce. Each has a key role to play in identifying, which areas of the region will experience what growth. MACOG displayed current maps of land use, zoning, population and so forth, as a generalized baseline so better judgments of future growth could be made. Growth areas were identified with respect to

residential growth (i.e., households or new apartment complexes), commercial growth (i.e., retail and non-retail jobs), and industrial growth. All of this was accomplished using the regional Geographic Information System (GIS).

To allocate future year growth to TAZs, a growth index method was developed to forecast the land use patterns. Using the GIS from each county, the two-county area was divided into 500' by 500' grids for analysis purposes.

Based on county GIS data, the number of house units in each grid is calculated. The Granger area (a suburban area northeast of Mishawaka, which has recently seen high concentrations of residential development) was identified as a typical growth pattern that would be likely to occur in the future, thus the average number of housing units in a grid in the Granger area is used as a threshold for development. Several neighborhoods in Granger were examined and the number of 10 housing units was chosen to be the threshold, which is a little bit over one housing unit per half acre.

Based on the current land use map (developed from 2002 aerial-photography and current zoning classifications), only AG (Agriculture), UV (Urban Vacant), and RV (Rural Vacant) classified land uses were identified as potential growth areas. Other areas are excluded from consideration of growth. Grids that have been developing or will be developed as commercial or industrial use were excluded from the potential residential growth area. Excluded grids also include those having 10 or more housing units and those within a flood plain. Some areas in Elkhart County are identified as favorable farmland based on local knowledge of various cultures, and were excluded as growth areas, as well. Other exclusions included areas where the soils are projected to be not suitable for septic systems. However, these areas were included if municipal water and sewer services were available. All of this information was compiled and reviewed for each 5-year increment scenario.

The following factors were considered in determining the growth in each grid square: local knowledge, water and sewer availability,

zoning, household income, school districts, and distance to economic corridors.

School districts were examined using two factors: expenditure per student and ISTEP (Indiana Statewide Testing for Educational Progress) pass rate. The average of the two is used for the school index. See Table 1.2 on the following page.

Economic corridors were identified as areas of business and industry based on the best local knowledge. They are classified as "regional", "city", and "town" level to accommodate their significance. The corridors are defined as within 0.1 mile of both sides of the street centerline. The distance index is subtracted from 10 to get the final index used in the growth index calculation, since the closer to the corridor the more likely that commercial and industrial growth will occur.

Sewer and water locations and planned locations were collected from local authorities.

Using the GIS systems of each county, MACOG staff developed a current zoning map. The following zoning classifications were selected as suitable for residential development: R, R1-4, C3, C5, SF1-2, PUD, MU, MF1-2, MHP, E-3, PD-R.

To comprehend information of different units, a relative evaluation index method is used to calculate a score based on a scale of ten. Table 1.2 shows the calculation of the school index as an example.

Each of the seven factors (population, number of households, etc.) is given a weighted number to calculate the final growth index. The weighted number indicates how important the factor is in determining growth as compared to the other factors. The weight is based on the best planning assumptions.

Local knowledge of growth areas and community growth characteristics, provided by elected officials, engineers and planners of jurisdictions are considered to be the most important factor, which was given a factor of 0.4.

Table 2 Calculation of School Index

$$\text{Score} = (\text{ISTEP (This school)} - \text{ISTEP (Min)}) / (\text{ISTEP (Max)} - \text{ISTEP (Min)}) * 9 + 1$$

School Corp	Expenditure per student	ISTEP Pass Rate	Expenditure Index	ISTEP Rate	Pass Index	Average of two Indexes	Final School Index
Elkhart City	\$8600	0.47	4.73	2.54	3.64	1.00	
Goshen	\$8600	0.48	4.73	2.80	3.77	1.24	
Baugo Comm.	\$7700	0.57	2.76	5.11	3.94	1.56	
Union-North	\$7400	0.6	2.10	5.89	3.99	1.67	
Fairfield	\$6900	0.65	1.00	7.17	4.09	1.85	
John Glenn	\$7700	0.62	2.76	6.40	4.58	2.79	
Mishawaka	\$8800	0.56	5.17	4.86	5.01	3.63	
Concord	\$8200	0.62	3.85	6.40	5.13	3.84	
New Prairie	\$7800	0.68	2.98	7.94	5.46	4.48	
South Bend	\$11000	0.41	10.00	1.00	5.50	4.55	
Middlebury	\$8600	0.67	4.73	7.69	6.21	5.91	
Wa-Nee	\$8900	0.68	5.39	7.94	6.67	6.78	
Penn-Harris	\$9500	0.76	6.71	10.00	8.35	10.00	

Source: Indiana Department of Education, 2002 – 2003 school year data

Access to water and sewer services was given 0.15. The current zoning classification was also given a weight of 0.15. Median household income was weighted as 0.1. The school index and distance to economic corridors were each given a weight of 0.1 (distance to economic corridors has the weight of 0.1 in total, and distance to “regional” corridors was given a weight of 0.06, “city” corridors 0.05, and “town” corridors 0.04). The growth index is calculated for each county based on a scale of 10, because the total control of growth was calculated for each county.

To quantify the speed of growth over a geographic area, a growth speed factor was calculated. An assumption made here is that growth will happen from the high growth index area to low growth index area. It can be determined where the growth boundary is located based on local knowledge for the year 2005. Therefore, the capacity for growth inside the boundary can be calculated. The growth speed factor equals the capacity of the grids where housing units are built divided by the total housing units built. Elkhart County had a speed factor of 8.6 and St. Joseph County had a speed factor of 9.5.

The future year scenarios continue this growth speed factor for each County. For instance, Elkhart County will have 2,798 new housing units from 2005 to 2010. The capacity of the grids where housing units are built from 2005 to 2010 is the number of housing units built (2,798) multiplied by the growth speed factor (8.6) or 24,063 housing units.

Based on multiple test runs and local knowledge, the growth was classified into three categories: low, medium and high. When calculating the housing unit growth for each grid, a growth index of over 7 or 8 is considered as high growth, 6 or 7 is considered medium, and below 6 is low growth based on each scenario. High growth areas were given 2 to 4 housing units, medium areas were given 1 to 2 units, and low growth area is given less than 1 unit. The calculations were also monitored for restriction on grid capacity and growth speed.

The allocation of population is based on housing units and a population to household ratio that was calculated to get housing unit growth. The ratio is derived from Woods & Poole data. The ratio reflects the population growth over housing unit growth projected by Woods & Poole for each five-year period.

After determining the growth ratio the household growth number for each county could be calculated. The fact that a housing unit may accommodate more than one household is not considered here because of the lack of sufficient data to accurately make that calculation. Therefore, new growth is forecasted to a large extent as single-family households.

future years. The data for this conformity year was extrapolated based on 2005 and 2010 data using a simple constant growth method.

The population of each TAZ is calculated as the same proportion of housing unit's growth rate for each County. Then the number is adjusted proportionally to the total control value for each of the two Counties.

Income forecasting is based on the assumption that a TAZ will continue the same growth trend as it did from 1990 to 2000 for the forecasting period. An annual growth rate is calculated based on CTPP 1990 and CTPP 2000 data. The rate is then applied to TAZs for future year income calculations. The annual growth rate is proportional (+/-5%) to eliminate unrealistic growth in the future years.

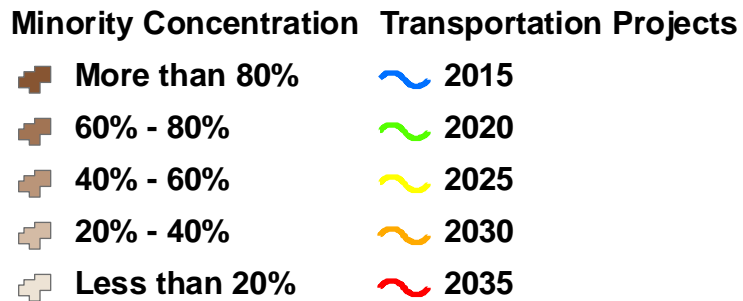
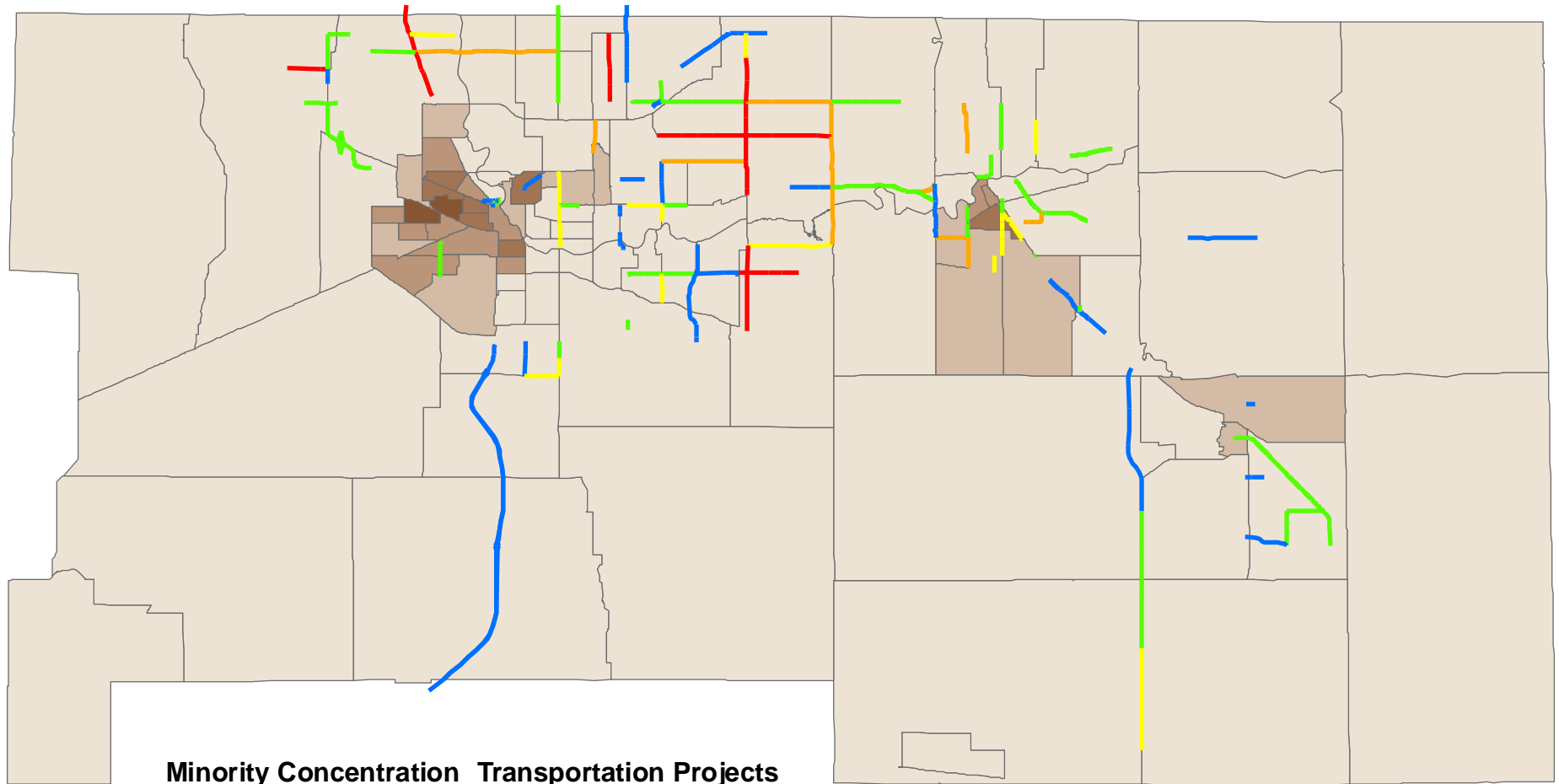
Employment data allocation to the TAZs follows the same methodology that was used to allocate population, except the analysis unit is at TAZ level rather than at the 500' by 500' grid level. Local knowledge had a 0.50 weight, economic corridors had a 0.30 weight, access to water and sewer had a 0.15 weight, and zoning had a weight of 0.05.

Population from age 5 to 19 represents most students enrolled in a school. Therefore, the growth rate of this age group of population forecasted by Woods & Poole is applied to school enrollment growth for TAZs.

Extrapolation of data for 2009

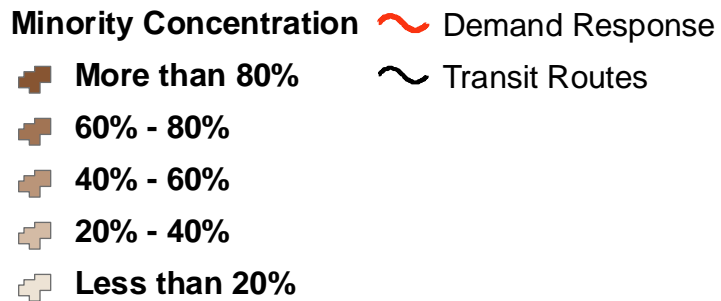
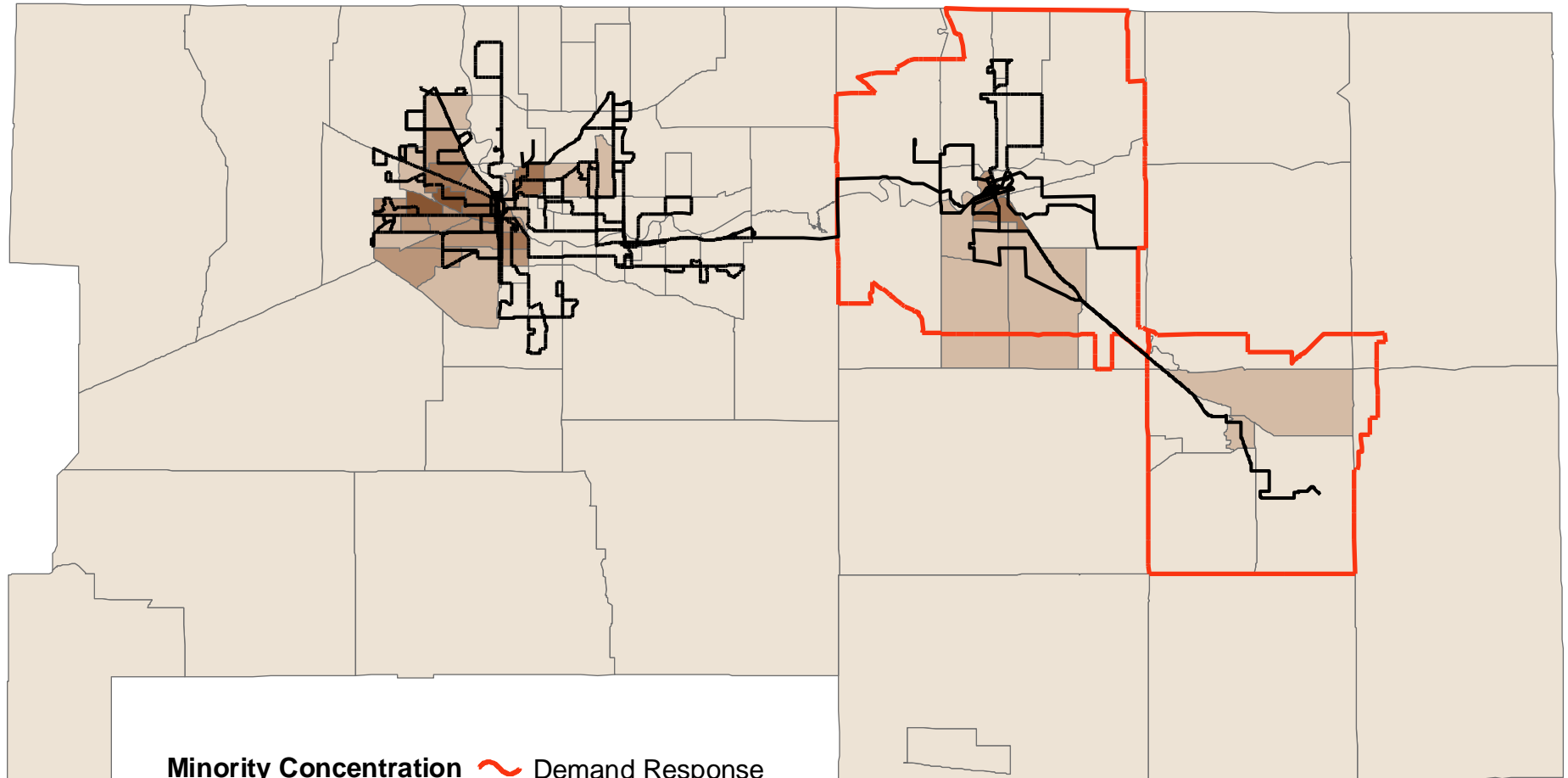
Elkhart and St. Joseph Counties have been designated as "basic" non-attainment areas under the Clean Air Act. Air Quality Conformity regulations require that the attainment year of 2009 also be modeled to determine if the Plan conforms to the National Ambient Air Quality Standards. As previously mentioned, the Plan scenario years are in five-year increments from 2005 through 2035. This is because of the tradition of model development, as well as the ease of making necessary assumptions for

Minority Concentration by Census Tract in Relation to 2035 Transportation Plan Update Projects



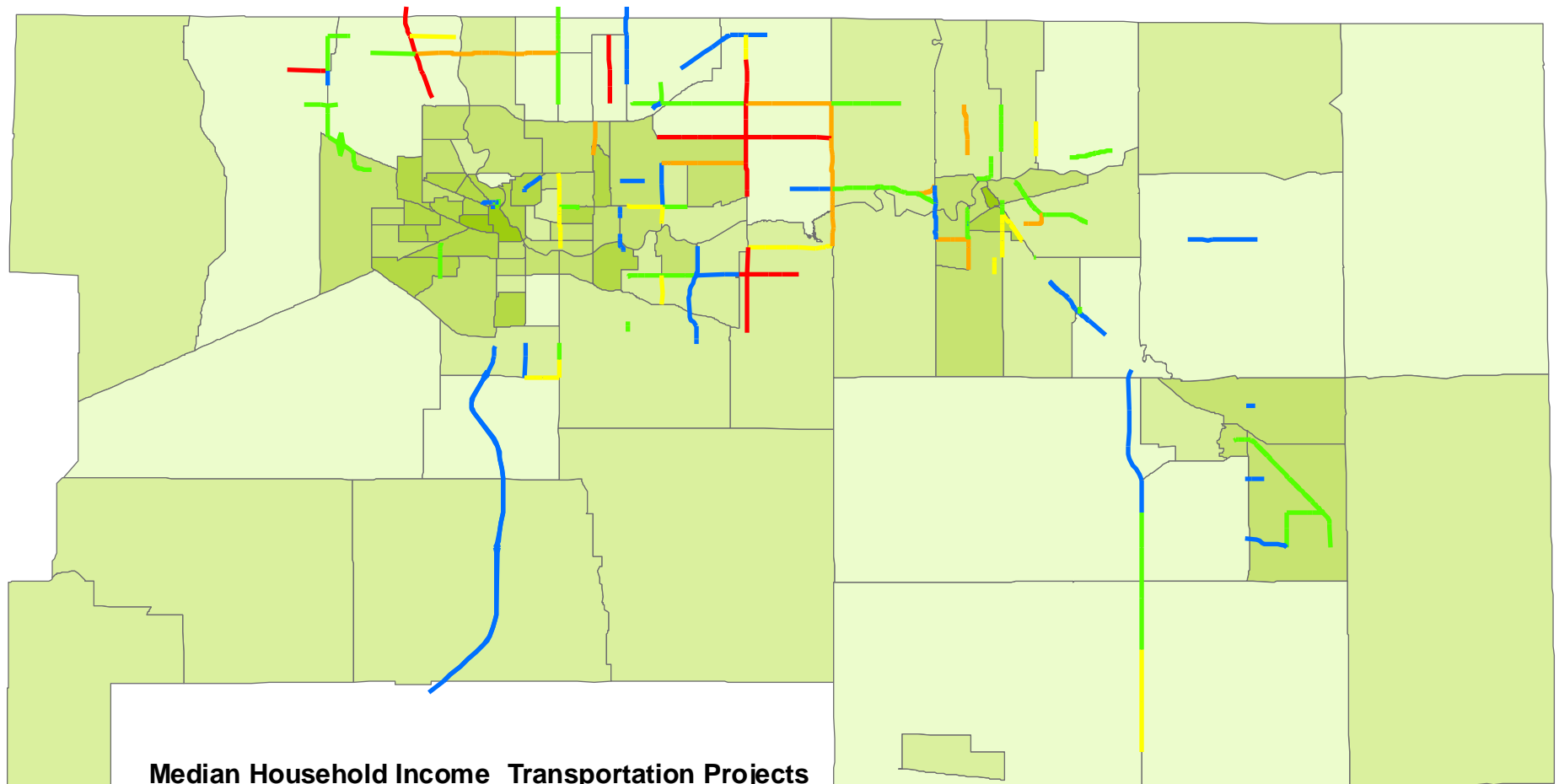
Racial distribution calculated from 2000 Census Tract data. The percentage of minority residents was determined by dividing the count of white individuals by the total population and inverting the results.

Minority Concentration by Census Tract in Relation to Public Transit Service Areas



Racial distribution calculated from 2000 Census Tract data. The percentage of minority residents was determined by dividing the count of white individuals by the total population and inverting the results.

Median Household Income by Census Tract in Relation to 2035 Transportation Plan Projects

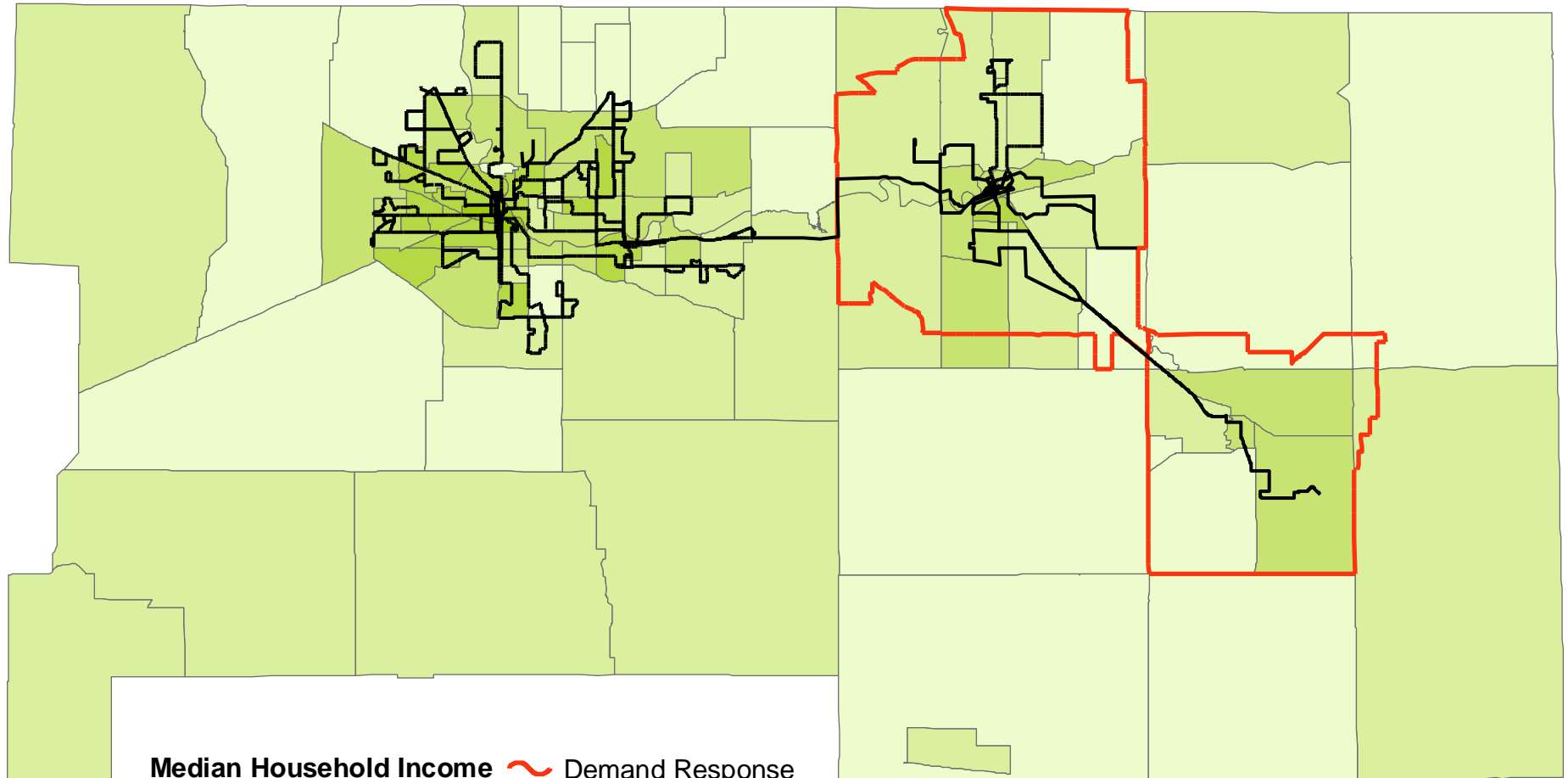


Median Household Income Transportation Projects

- | | |
|---------------------|------|
| Less than \$20,000 | 2015 |
| \$20,000 - \$30,000 | 2020 |
| \$30,000 - \$40,000 | 2025 |
| \$40,000 - \$50,000 | 2030 |
| More than \$50,000 | 2035 |

Median Household Income based on 1999 dollars from the Census Summary File 3 (SF-3) tables.

Median Household Income by Census Tract in Relation to Public Transit Service Areas



- Median Household Income**
- Less than \$20,000
 - \$20,000 - \$30,000
 - \$30,000 - \$40,000
 - \$40,000 - \$50,000
 - More than \$50,000
- ~ Demand Response
- ~ Transit Routes

Median Household Income based on 1999 dollars from the Census Summary File 3 (SF-3) tables.