Land Use and Travel Demand Model Forecasts

6.1 Land Use Forecasting

The forecasting of land use consists of two parts: A regional economic and demographic forecast, and then allocation of the county totals into small zones for the purpose of forecasting future traffic volumes and travel times. For the purpose of this plan, the model evaluated all of Ottawa and Erie County. Within the planning area there is a small portion of Lorain County (in and near the city of Vermilion) that is included. This last area has forecasts developed that are not based on countywide totals but estimated to "mirror" adjacent portions of Erie County.

Traffic forecasts are used for guidance in designing transportation systems. Typically, a 20-year forecast is required beyond the date that the project is anticipated to be completed and opened to traffic to cover a "design period." Therefore, transportation planning horizons that include traffic forecasting should ideally extend at least 30 years, to provide forecasts for projects that may have design work currently in progress, but for which the final year of construction may still be five to ten years into the future. The base year for traffic forecasting for this plan was set to the year 2020 due to the most recent data availability. As a result of this plus demographic forecast availability, the plan horizon year was established as 2050.

****Since there was very little growth between the year 2015 and 2020 in both Erie County and Ottawa County, levels of growth forecast for years 2020-2050 from the sources discussed below are applied as levels of growth from 2020-2050 for this transportation plan.****

The Ohio Department of Development (ODOD) has an ongoing program to develop population forecasts statewide broken down by county for 30 years beyond the date of the most recent decennial Census (which in this case was 2020). Details of this program which provides forecasts of population for Ottawa and Erie County at five-year intervals out to Year 2050 by five-year age and gender cohorts can be found online[1]. This detail is valuable for addition forecasting of such things as school kids and local workforce (via age and gender-specific workforce participation rates from the US Bureau of Labor Statistics). The population totals, historical trend lines, and persons and vehicles per household allows for the forecast of dwelling units and private vehicle ownership. In turn this information can be used to determine future rates of travel.

As shown in the ODOD data, the forecasted 30-year decline in population for Erie County is about 20% (from 75,622 in the 2020 Census to 60,049 for the Year 2050), driven in large part by the aging of the "baby boom" generation. Ottawa County has a forecasted 30-year decline of 22% (from 40,364 in 2020 to 31,371 in Year 2050). In the absence of any previously developed and adopted employment forecasts for the county locally, a variety of other forecasts are available. Forecasts available from public-sector employment agencies, however, are typically short-term (eight to ten years) and not sufficient for the needs of transportation planning.

A nationally based interregional economic model called Impact Analysis for Planning (IMPLAN), has been used for the Ohio statewide traffic forecasting model and was utilized here. While the IMPLAN forecasts are statewide and not county-specific, forecasted growth rates by 20 general industrial categories

[1] https://development.ohio.gov/reports/reports_pop_proj_map.htm

can be applied to current county-wide employment levels by industry to develop forecasts of employment by industry for the future. These 20 industrial categories were then collapsed down into four categories (retail, two service groups, and industry/warehouse/other) for local traffic analysis.

Due to "inter-county" commuting patterns where workers cross county lines to travel to work, there can be and are gaps between the number of jobs in a county and the workforce living within the county, both now and in the future. However, to ensure that this gap is not forecast to grow excessively large in the future, a check of inter-county commuting gaps for other small metro areas in northern Ohio was reviewed to provide a reasonability check of the initially generated forecasts of employment versus workforce as a function of local population.

To allocate county-level population and employment growth (or decline) figures by zone, first priority goes to known land development plans. Land development changes since the last plan update include the following:

- Aligned Data Center at State Route 4 and Perkins Avenue in Perkins Township
- Redwood Apartments Development along Perkins Avenue in Perkins Township
- Villas of Sandy Creek apartment complex in Perkins Township
- Mucci Farms Expansion on Rye Beach Road in Huron
- Sandusky Intermediate and Primary School Campus
- Lake Erie Arms sports complex on US 250 in Milan Township
- Waterview at Bay Point Development in Marblehead along E. Bayshore Road

Translating these figures to employment by category by zone (as well as population, school kids, vehicles, workers as well as housing units) takes available information from development plans and combines with current data, with adjustments as necessary to ensure that overall county-level forecasts are met.

6.2 Travel Demand Model (TDM)

The traffic forecasting process consists of taking land use data in the form of population and employment figures by zone, breaking it down into different categories, estimating vehicle trip generation rates for each category by different vehicle types (cars versus trucks) and purpose of travel (such as work-related vs. non-work), and then "assigning" the traffic to and from all origins and destinations onto a digital roadway network, which was developed from the Location Based Response System (LBRS) road centerline file that local agencies have developed in collaboration with the state of Ohio (with data added to it from other local state and federal sources, including Roadway Inventory files from the Ohio Department of Transportation (ODOT)). The traffic forecasting process for any given year, summer or off-season, is then conducted as shown in the flowchart (see **Figure 6-2.1**).

Several items in **Figure 6-2.1** (the traffic model flow chart) require some elaboration: OD means origin/destination, or zone-to-zone trip tables, MSA means Method of Successive Averages (where the results of the latest iteration of a traffic assignment to the road network are averaged with past iterations in a way that provides equal weight to each iteration) and the "dynamic loop" refers to traffic being broken into and assigned in one hour intervals to the road network (to better estimate times of day as well as locations of forecasted traffic volumes and congestion). Finally, "path building" refers to estimating the shortest-time travel path thru the road network for every zone-to-zone travel combination, which after the

first time through the flow chart process than incorporates the congestion effects and intersection delays that were estimated after the previous iteration of traffic assignment.

The boxes on the lower left summarize how trip tables for truck traffic are developed and difficult-to-locate employment (such as construction, utilities, and temp services) can get re-allocated to different zone locations, using an "OD table re-estimation" method that is done before the main model process is finalized. This method uses the traffic count figures to track and adjust the zone-to-zone traffic movements thru each of these count stations. The resulting trip table for trucks along with other travel thru the area made in cars on such major routes as the Ohio Turnpike (I-80/90) and State Route 2 represents the "supplemental OD tables" in the chart on the left, which is retained for later modeling steps while the two boxes on the bottom row of the chart are then discontinued and traffic assignment - after looping “dynamically” thru each hour of the day - then goes to the “equilibrium loop” several times. Such multiple iterations are needed due to the feedback needed between selection of an individual’s travel path to a destination and the modeled travel time - which depends in part on the choices that other travelers are making.

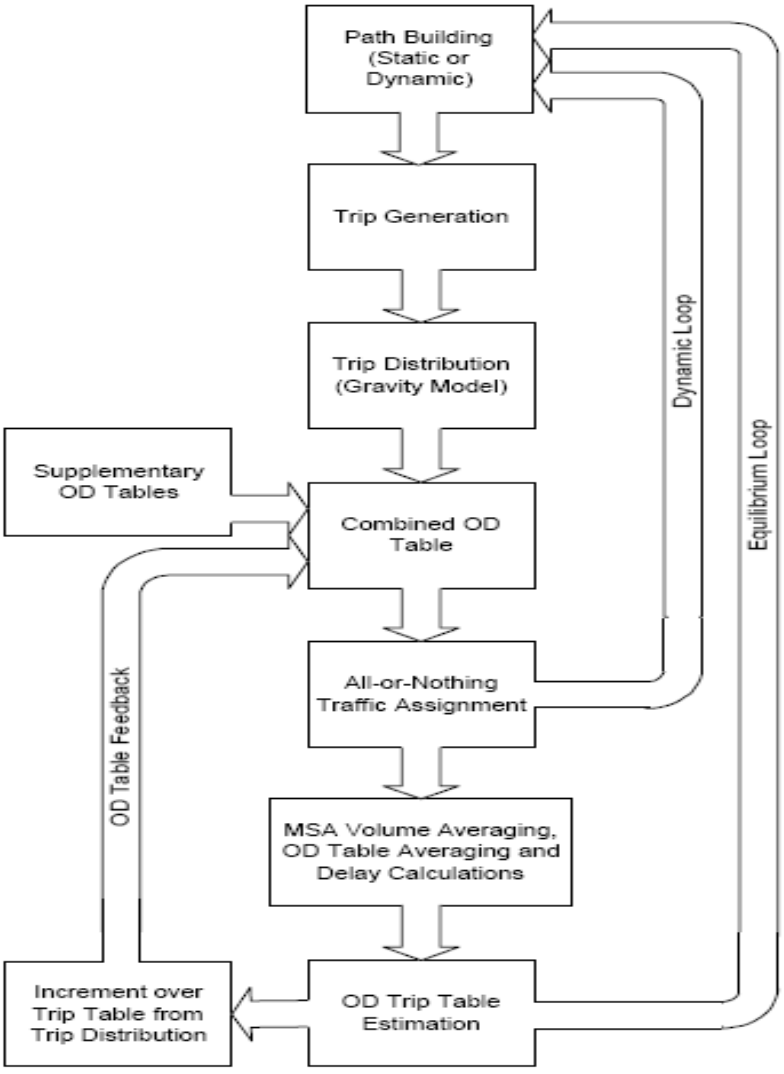


Figure 6-2.1: Traffic model flow chart

The rationale for this type of process, rather than the more traditional use of historical trendlines in traffic along a particular road, is that the latter cannot be used for new or extended segments of roads, and often not adequate in areas where buildup of congestion begins to tempt motorists to change their travel path to save time. The output of the forecasting process is a database that can be used to derive congested roadways, total vehicle miles traveled (VMT), and vehicle hours traveled (VHT).

6.3 Calibrated Model Base Year

For a base year (2015), extensive testing of the modeling process is done to ensure that it produces traffic flows reasonably in accord with traffic counts conducted by both local agencies and ODOT. As shown in **Figures 6-3.1 and 6-3.2**, the overall pattern is found to be quite close to such counts (given the expected level of sampling error inherent in such counts) for both summer and off-season conditions.

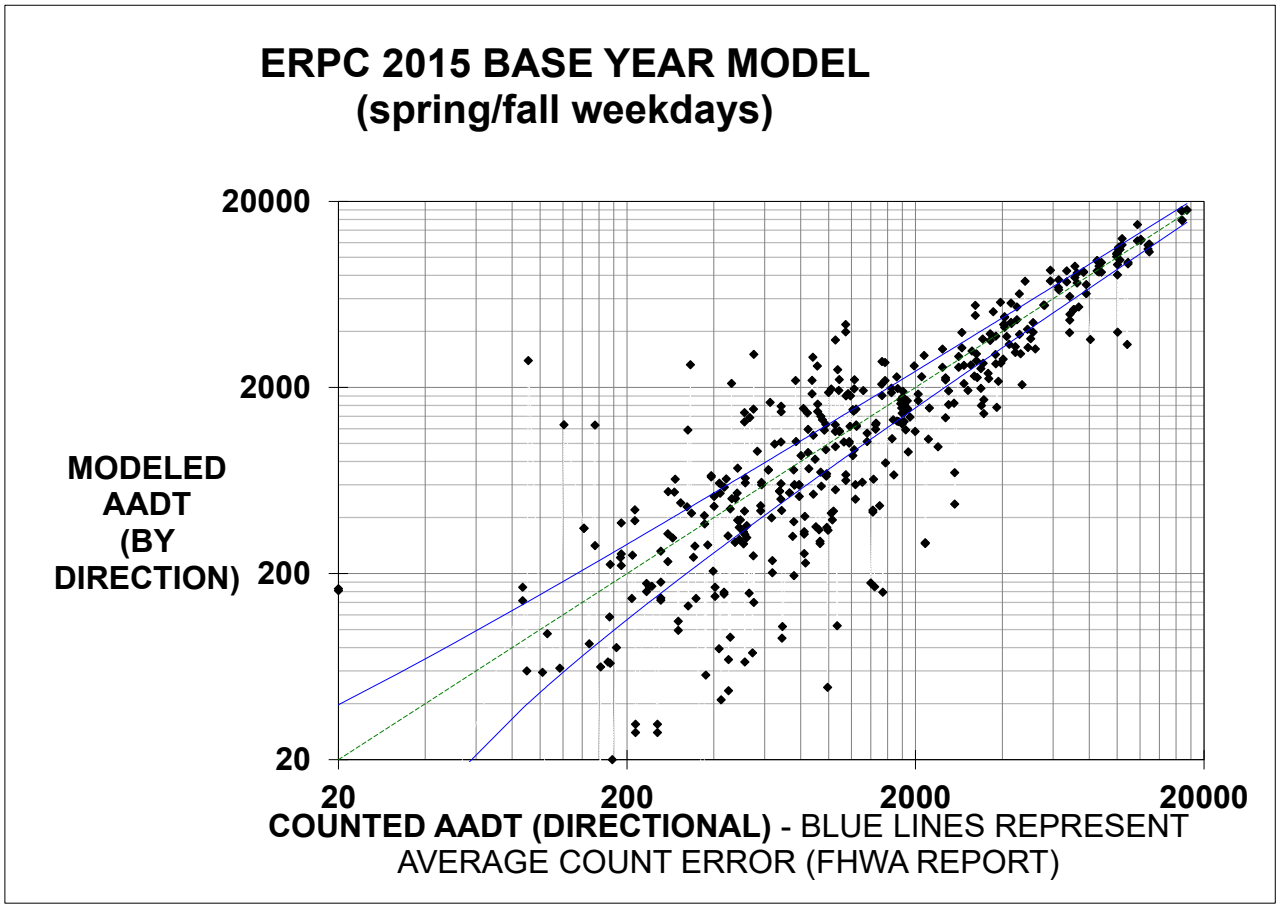


Figure 6-3.1: ERPC 2015 Base Year Model, Spring/Fall

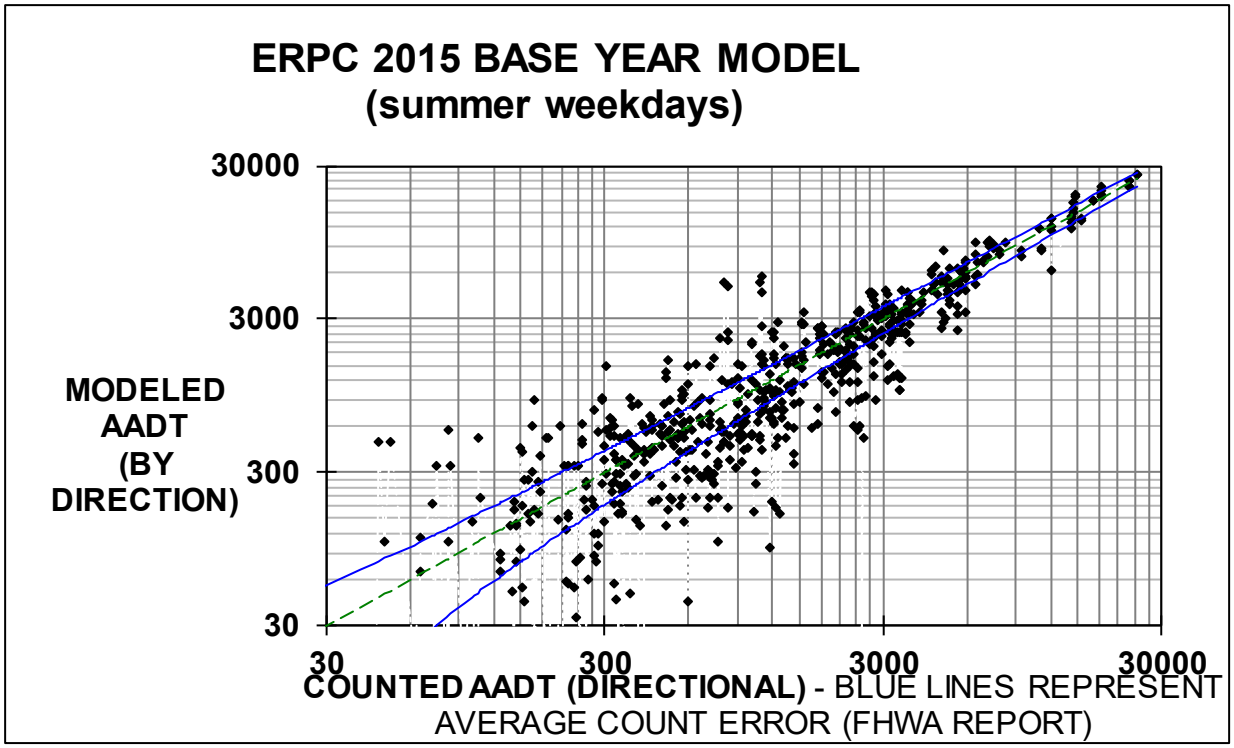


Figure 6-3.2: ERPC 2015 Base Year Model, Summer

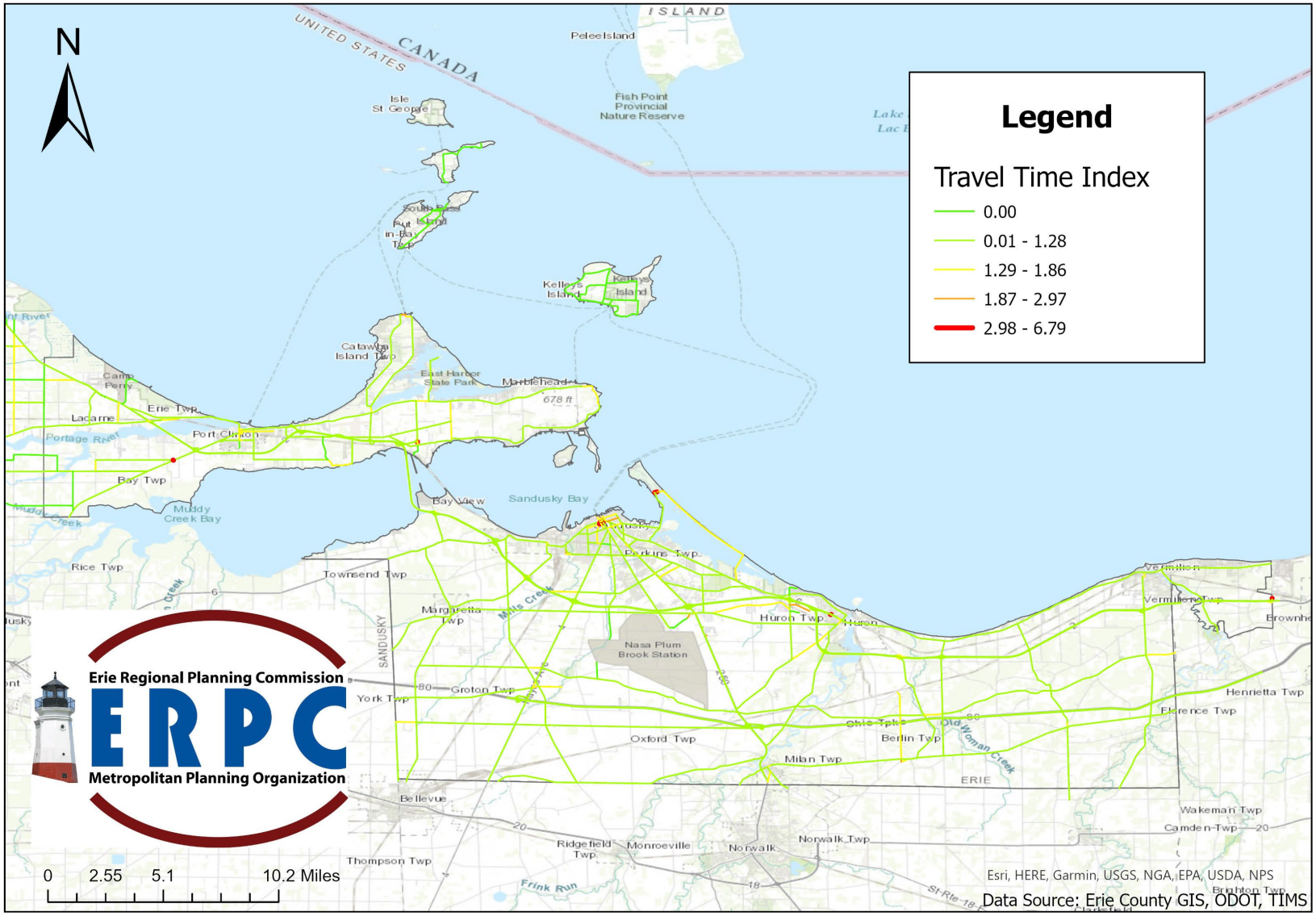
(The dashed line indicates where modeled daily traffic volume (by direction) is exactly equal to counted traffic; with the blue lines indicating expected sampling error for a one-day count.)

There are about 454 traffic analysis zones (TAZ) within the MPO region, including all of the City of Vermilion in Lorain County and the eastern portion of Ottawa County, which represent the origin and destination for trips assigned to the network and have boundaries that reflect access to that network. The network contains all the "collector-and-above" major streets and some local streets that make up the MPO's transportation system.

The separate model for the summer season reflects the local importance of tourist-based travel. Tourism forecast assumptions and parking needs for individual sites may be used as input in the future.

6.4 Existing Plus Committed Work

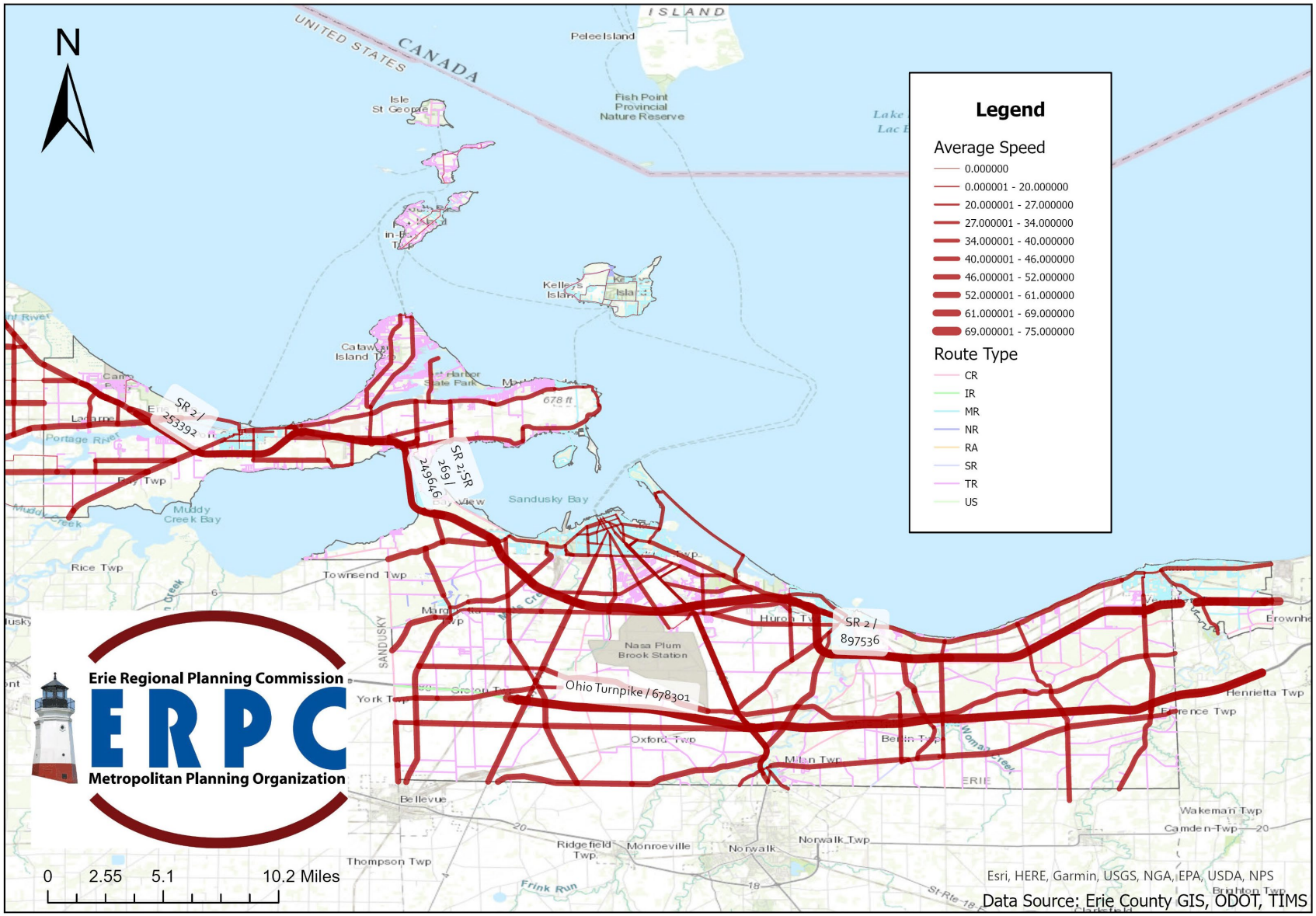
Existing and committed projects were identified through the MPO's Transportation Improvement Program list. The person trips generated through the trip generation module were run through similar trip distribution and assignment modules as the 2020 base condition. The resulting assignments from the equilibrium assignment were adjusted based on assignment-to-count deviation observed in the 2020 base year to be used as a measure against future improvements.



Map prepared by Erie Regional Planning Commission, and is intended for illustrative purposes only. Erie County, Ohio assumes no responsibility or liabilities for any errors or omissions contained here in.

Figure 6-4.1 Travel Time Index

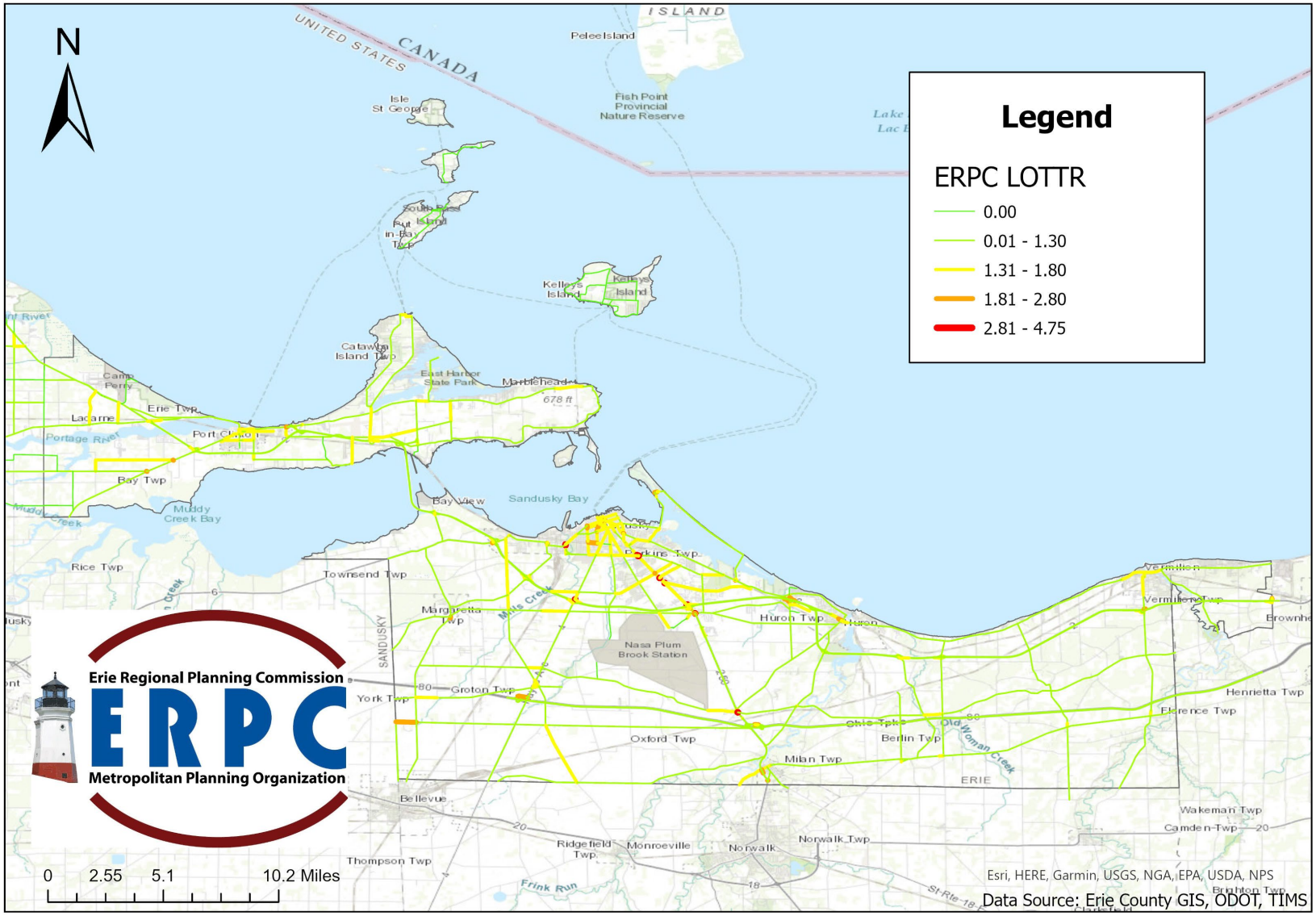
ERPC MPO 2050 Long Range Transportation Plan



Map prepared by Erie Regional Planning Commission, and is intended for illustrative purposes only. Erie County, Ohio assumes no responsibility or liabilities for any errors or omissions contained here in.

Figure 6-4.2 Summer Weekday Average Travel Speeds

ERPC MPO 2050 Long Range Transportation Plan



Map prepared by Erie Regional Planning Commission, and is intended for illustrative purposes only. Erie County, Ohio assumes no responsibility or liabilities for any errors or omissions contained here in.

Figure 6-4.3 Level of Travel Time Reliability

ERPC MPO 2050 Long Range Transportation Plan

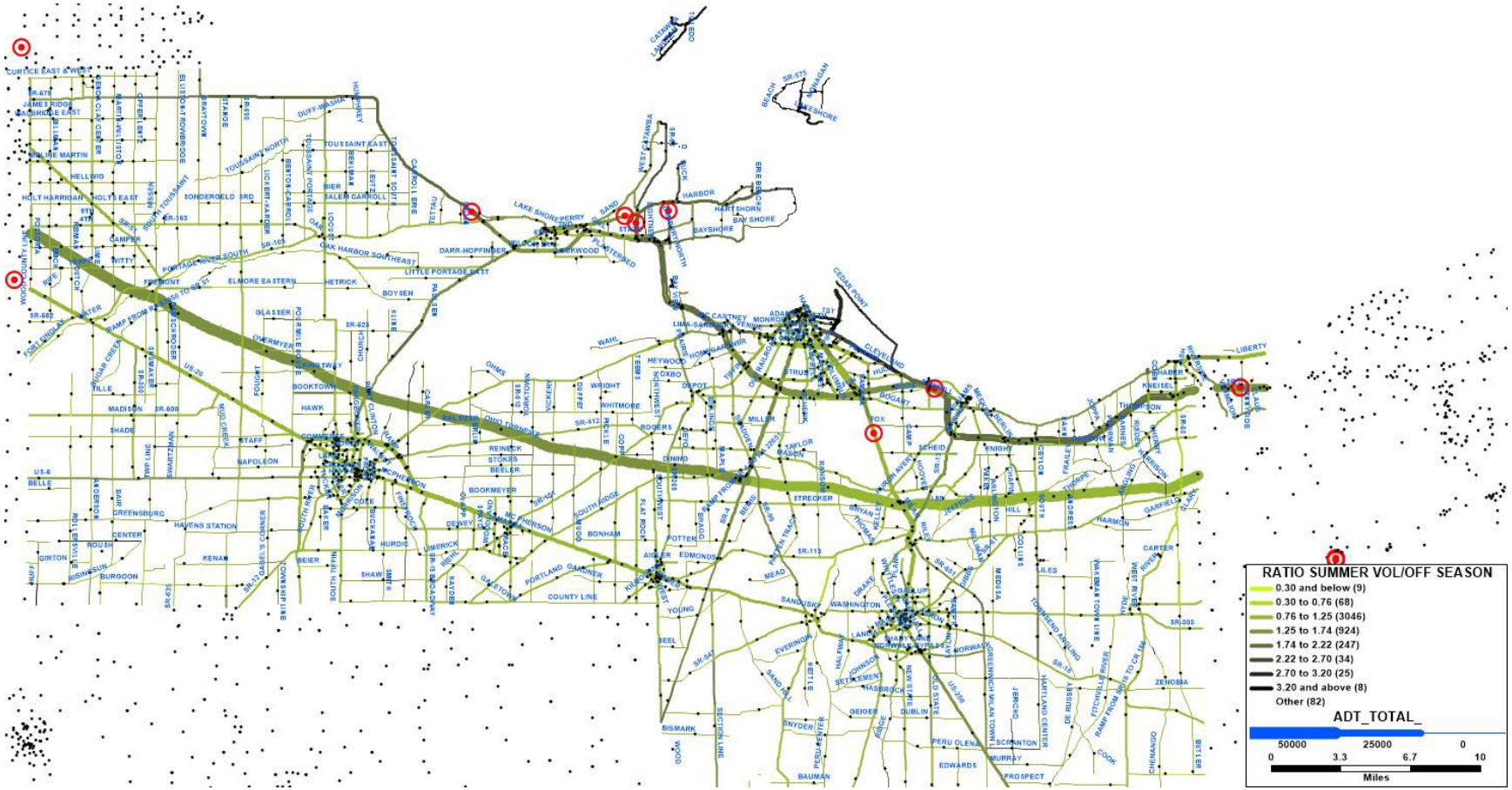


Figure 6-4.4: Ratio of Summer and Off-Season Volumes

6.5 Existing Plus, Committed Plus Planned

The planned and future projects represent studies and improvements that should be undertaken to help satisfy the long-term arterial street system needs across the MPO region. Many of these projects are new projects related to the forecasted growth of the region, its growing impacts of tourism travel, and to the region's related transportation needs. Planned/ future projects are intended to span a period of approximately 30 years and are based upon current deficiencies and the best estimates of anticipated needs, past trends, projections, input and comments received over the last several years from elected officials, business representatives and individuals.

Base year model data (2020) has been reviewed against existing Streetlight Data, a data resource for transportation analysis and planning. Future modeling for the plan horizon year (2050) is still a work in progress based on the new planning area, ODOD projections, and the current pipeline of land use changes. Future updates to the travel demand model will be updated here and Appendix B when available, and modeling form the 2045 Long Range Transportation Plan has been included in Appendix B to serve as a reference for the planning area.

All of the above modeling information was compiled by ERPC staff and Sam Granato, Ohio DOT, Office of Statewide Planning and Research