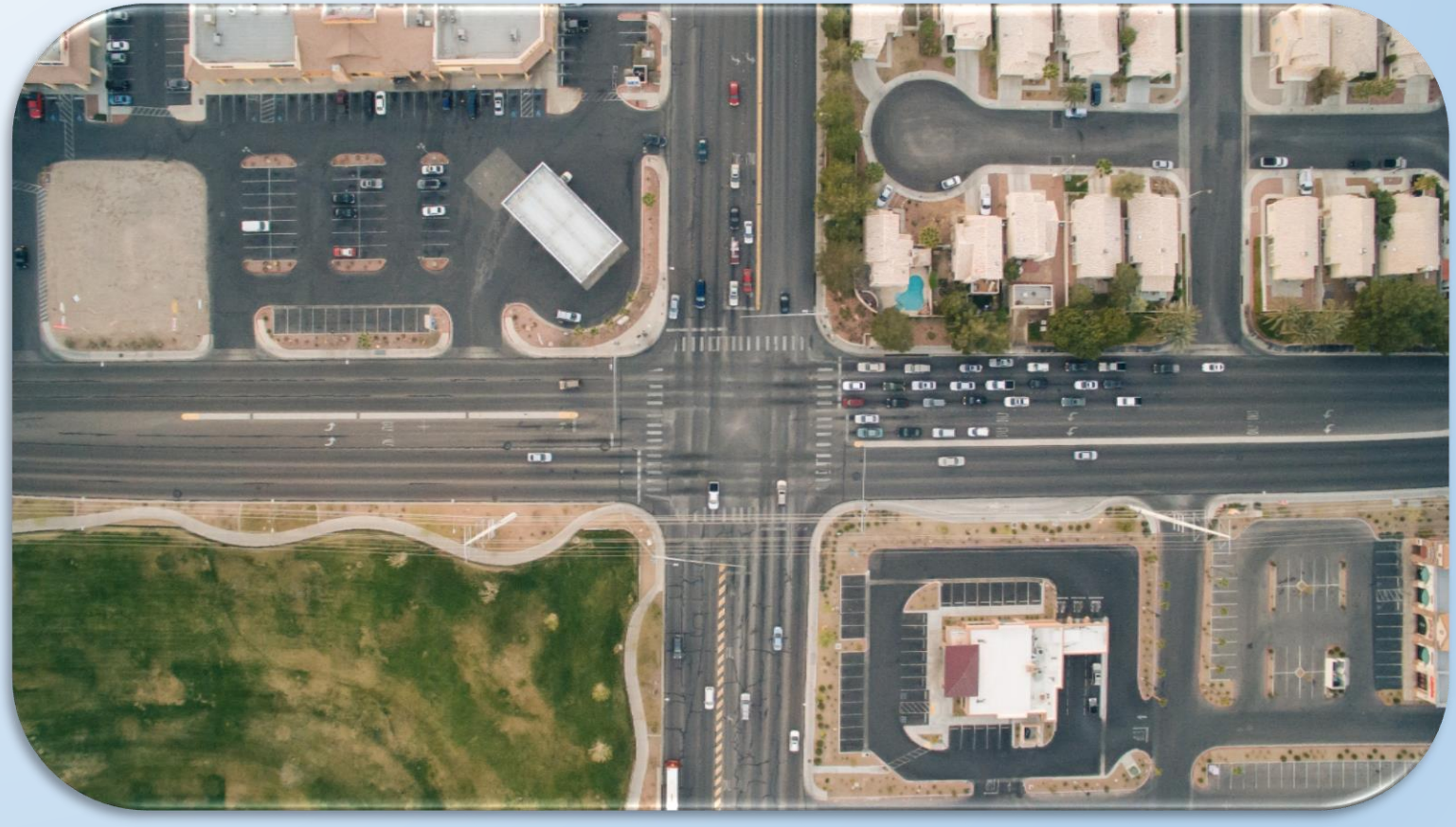
# Performance Based Transportation Project Assessment

## Utilizing Travel Demand Model Data and Dynamic Economic Modeling



Colin Belle, Metropolitan Planner

Region 1 Planning Council (R1PC), Rockford Illinois

March 28th, 2018

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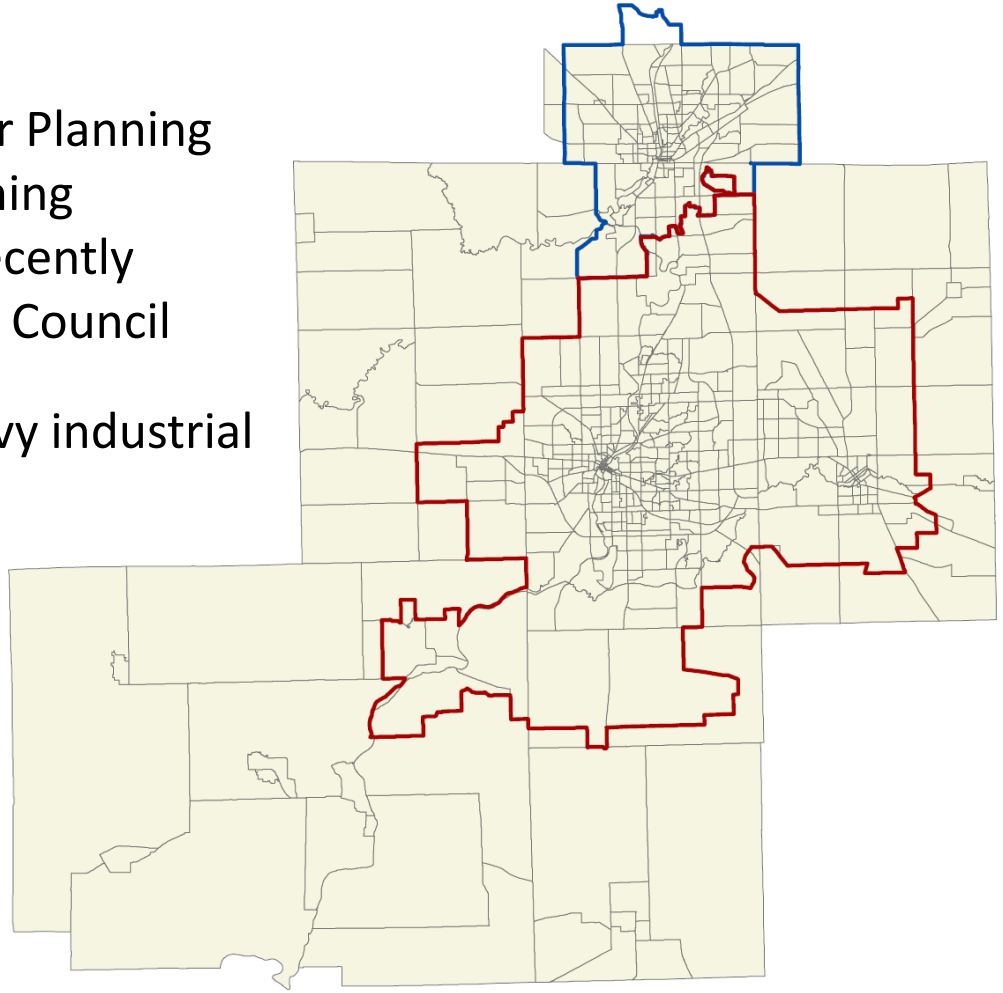
# Regional Context

- 80 miles NW Chicago, 60 miles from O'Hare Airport, <100miles to Milwaukee
- Population of 441,000
  1,640+ sq/mi (TDM model)
- U.S. Route 20, Interstate 39/90
- Rockford International Airport
  - 3rd busiest airport in Illinois
    29th for cargo in the nation
  - UPS, Amazon

# Local Context

- Rockford Metropolitan Agency for Planning (RMAP) is the Metropolitan Planning Organization (MPO), under the recently formed R1PC – Region 1 Planning Council
- Past, economy was based on heavy industrial processes
- Today, health care, manufacturing, tourism, agriculture, freight and cargo transportation.
- Transportation Mgmt. Area, about 700 TAZ's



# Federal and State Recommendations

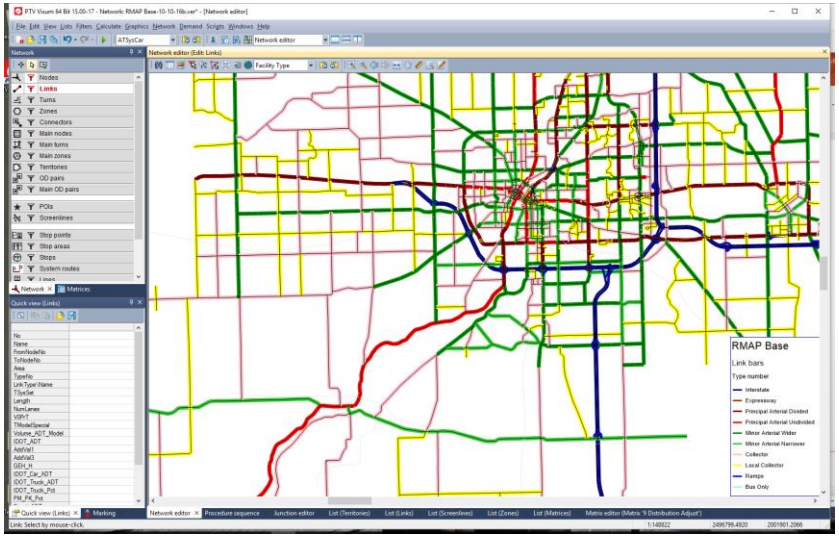
- During RMAP's last Transportation Management Area Certification Review from the Federal Highway Administration and Federal Transit Administration a *Recommendation* was provided for our Long Range Transportation Plan. It was recommended to "implement a Benefit-Cost Analysis, or comparable analysis, for aiding in project selection; RMAP should re-evaluate the methodology for rating and selecting major capital investment projects in the LRTP." (2015)
- Fixing America's Surface Transportation Act, (FAST) 2015 (Previously MAP-21)
  - The U.S. DOT should require state DOTs and MPOs to perform economic analysis and incorporate regional priorities as part of state regional transportation improvement plans TIP.
  - Performance assessment and reporting should be expanded to include performance areas beyond those currently established. Reporting should be accessible to the community to increase transparency and accountability.

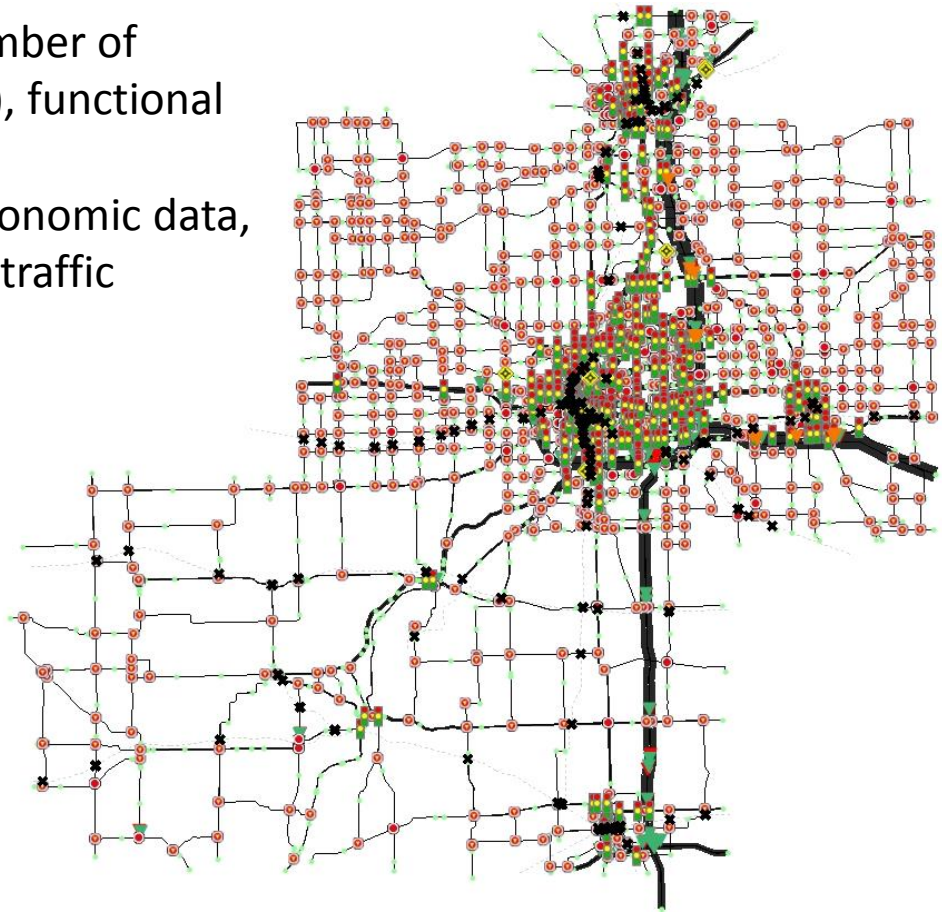
# R1PC Regional Travel Demand Model (PTV VISUM)

- 3-County Model (Boone, Winnebago, Ogle), and urbanized portion of Stateline Area Transportation Study (SLATS).
- Traditional 4-Step Model, Trip Generation, Trip Distribution, Mode Choice, and Trip Assignment. Core Network was calibrated using collected AADT data from IDOT.
- Integrated Illinois Department of Employment Security (IDES) employment data into the TDM to accurately allocate employment by TAZ/2-digit NAICS.
  - Suppressed employment data down to the business address allows assignment to the proper TAZ.
  - This data was used to calibrate our REMI software for the base-year.
  - REMI projections used to calculate TDM 2040 transportation projections.

# R1PC Regional Travel Demand Model (PTV VISUM)

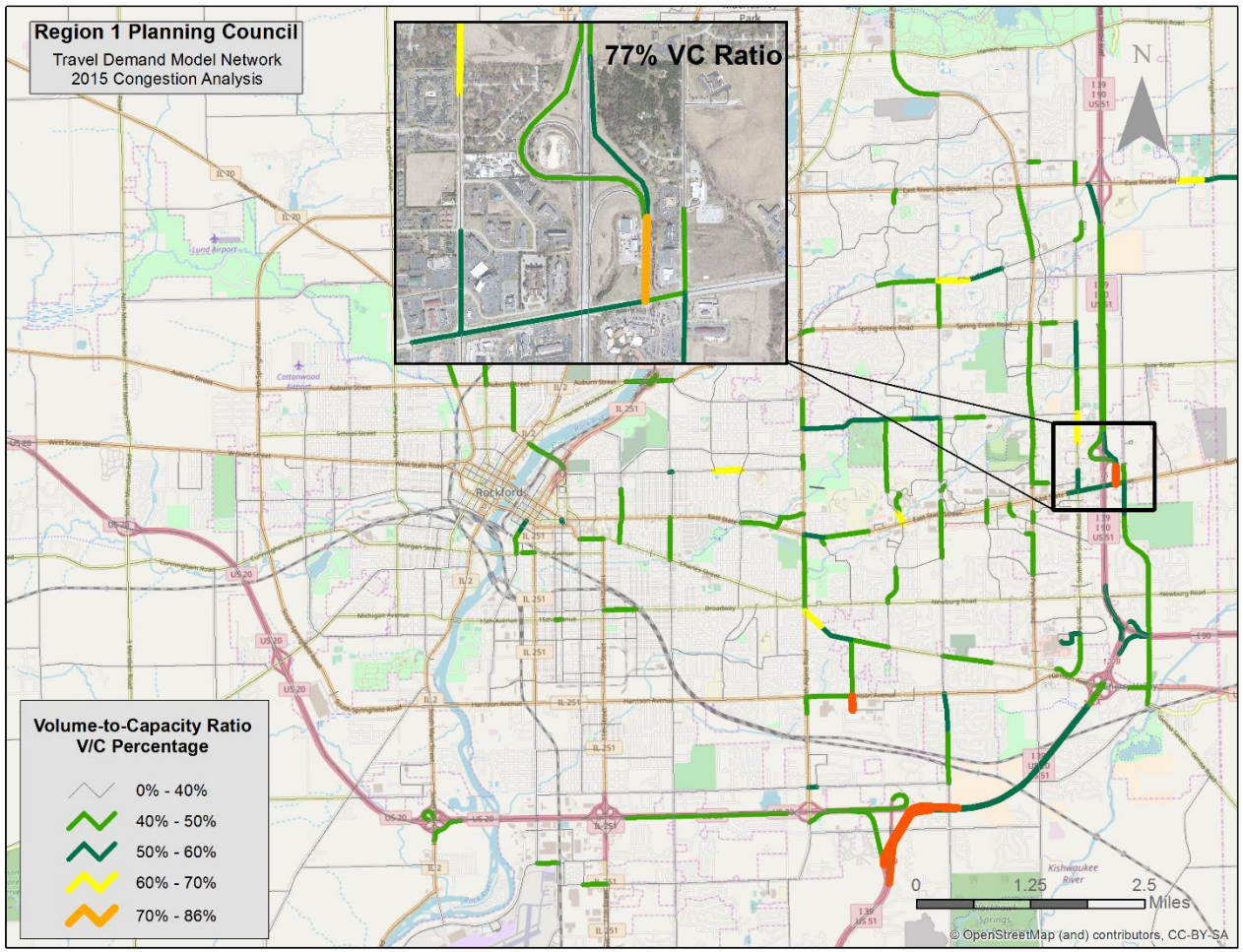
- Road network comprised of links and nodes that contain attribute information such as number of lanes, capacity, average daily traffic( ADT), functional classification, roadway design speed, etc.
- Traffic Analysis Zones containing socio-economic data, employment, dwelling units, population, traffic generators, & building ratings.



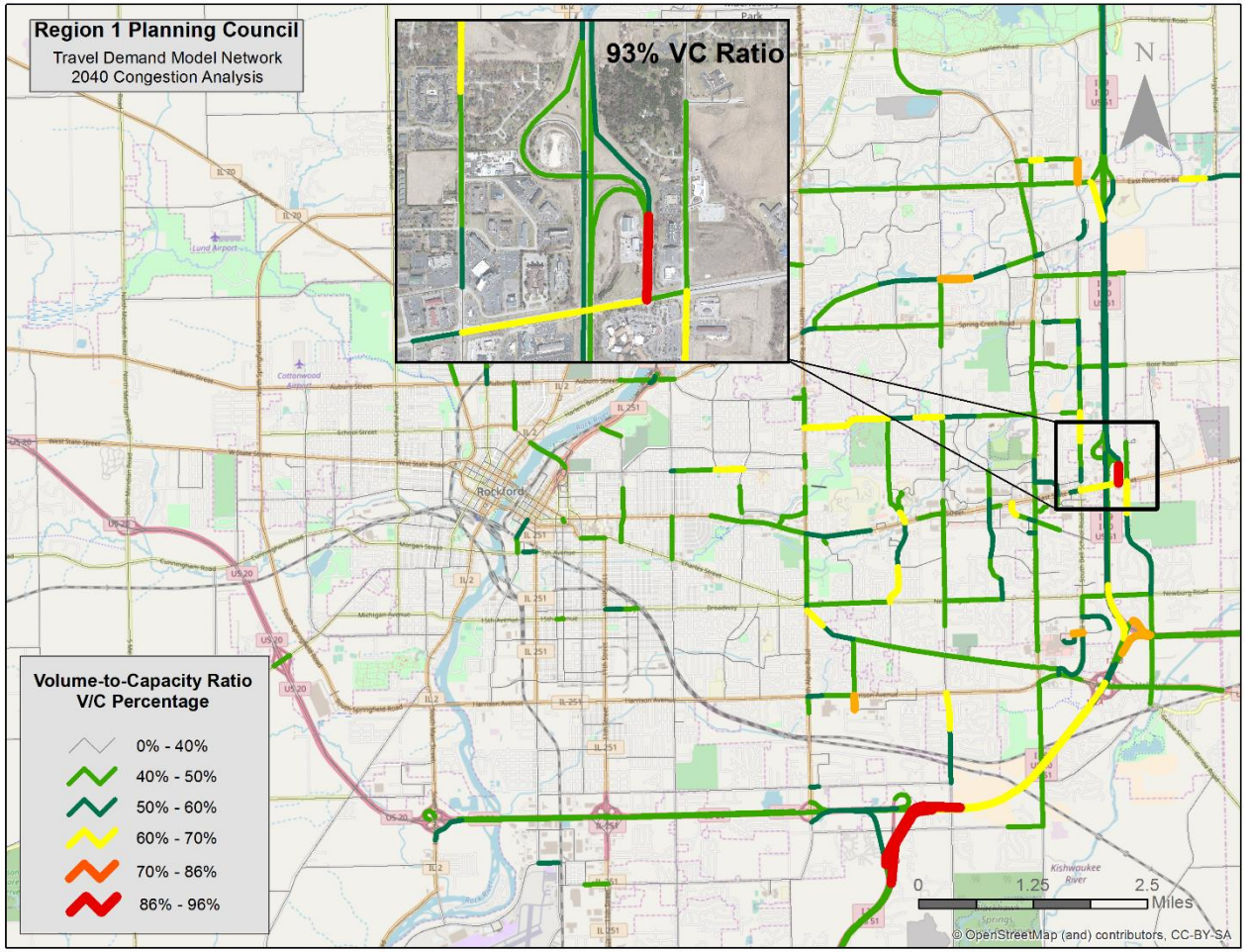
# R1PC Regional Travel Demand Model (PTV VISUM)

Volume-to-Capacity is a measure that reflects mobility and quality of travel time of a roadway. It compares roadway demand (ADT) with roadway supply (capacity). For example, a V/C of 1.0, or 100% is operating at full capacity, while .5 or 50%, is operating at half capacity.

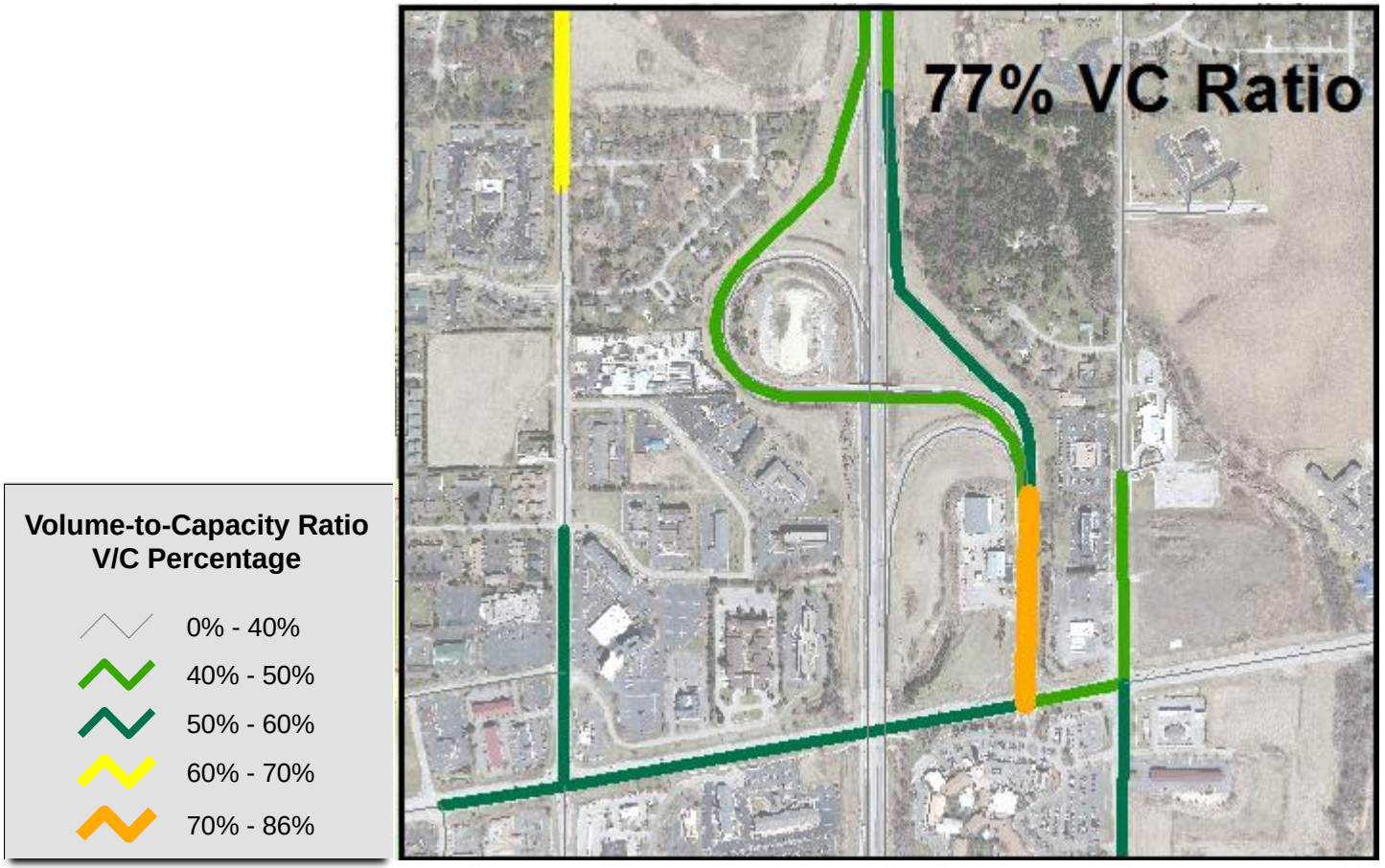


# R1PC Regional Travel Demand Model (PTV VISUM)

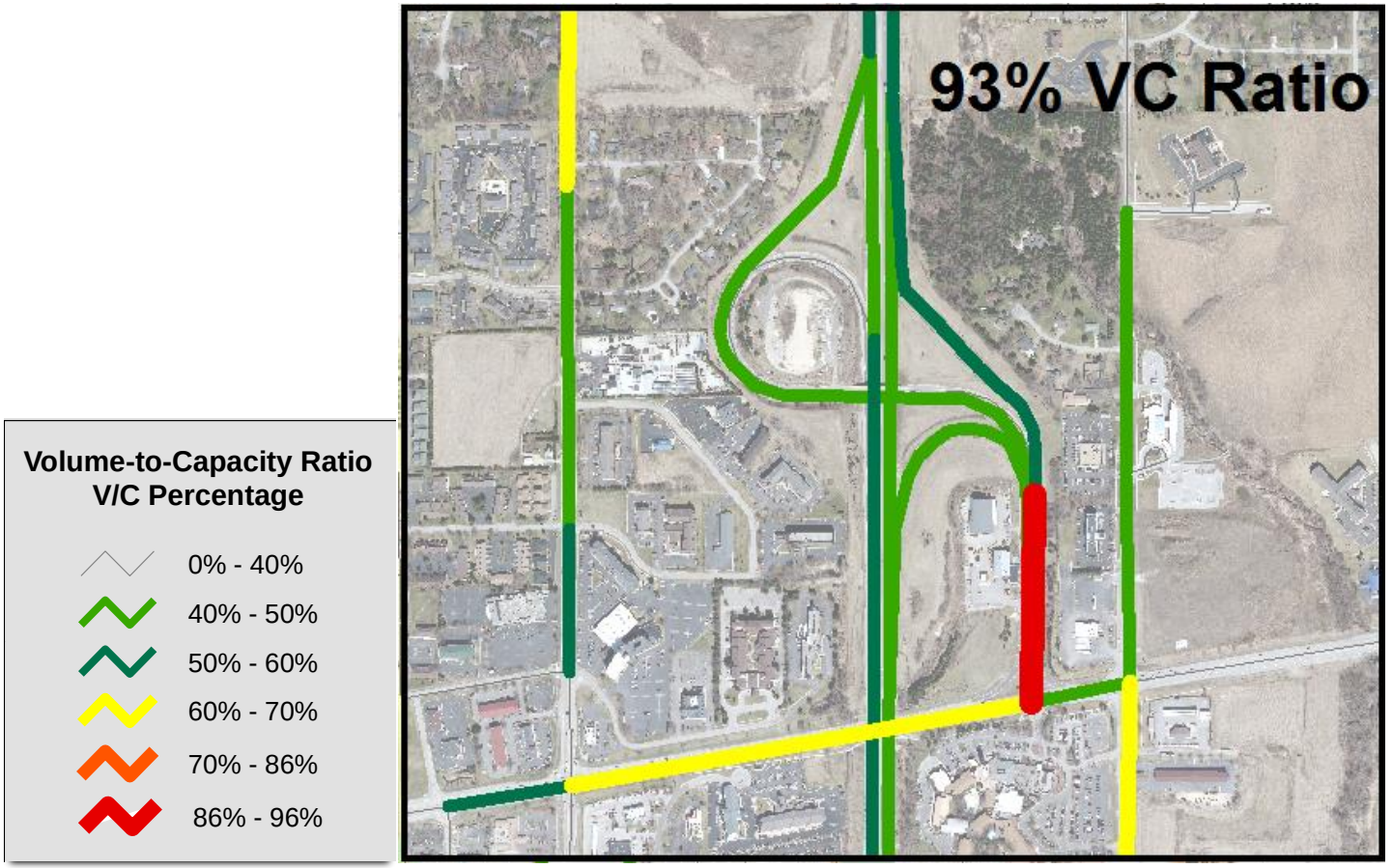
Volume-to-Capacity projected to year 2040 based on current transportation system with projected increases in population, employment, and Dwelling Units from REMI = a change in VMT, VHT, and Trips, can be positive or negative



# I-90 and E. State Street 2015 Network Congestion Rockford, Illinois



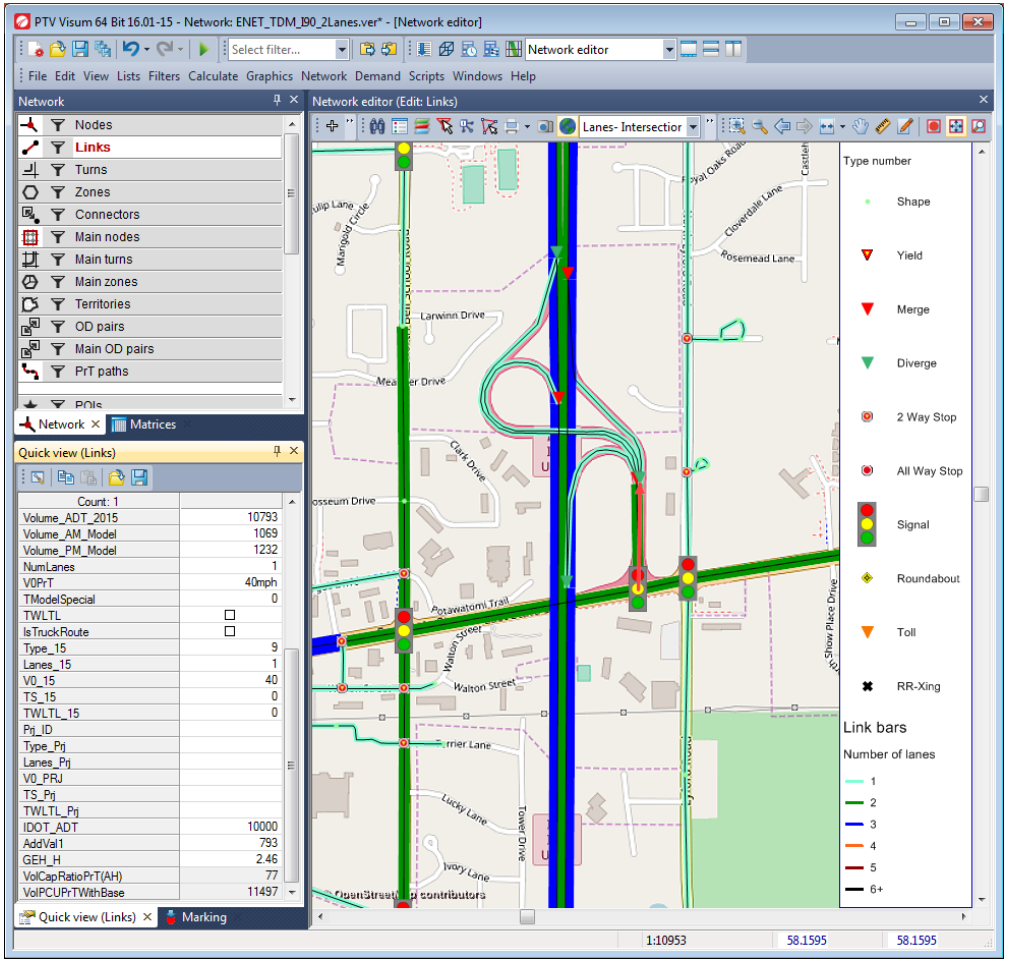
# I-90 and E. State Street 2040 Network Congestion Rockford, Illinois



# Travel Demand Model Integration

Infrastructure projects are entered into the Travel Demand Model with as much detail as possible.

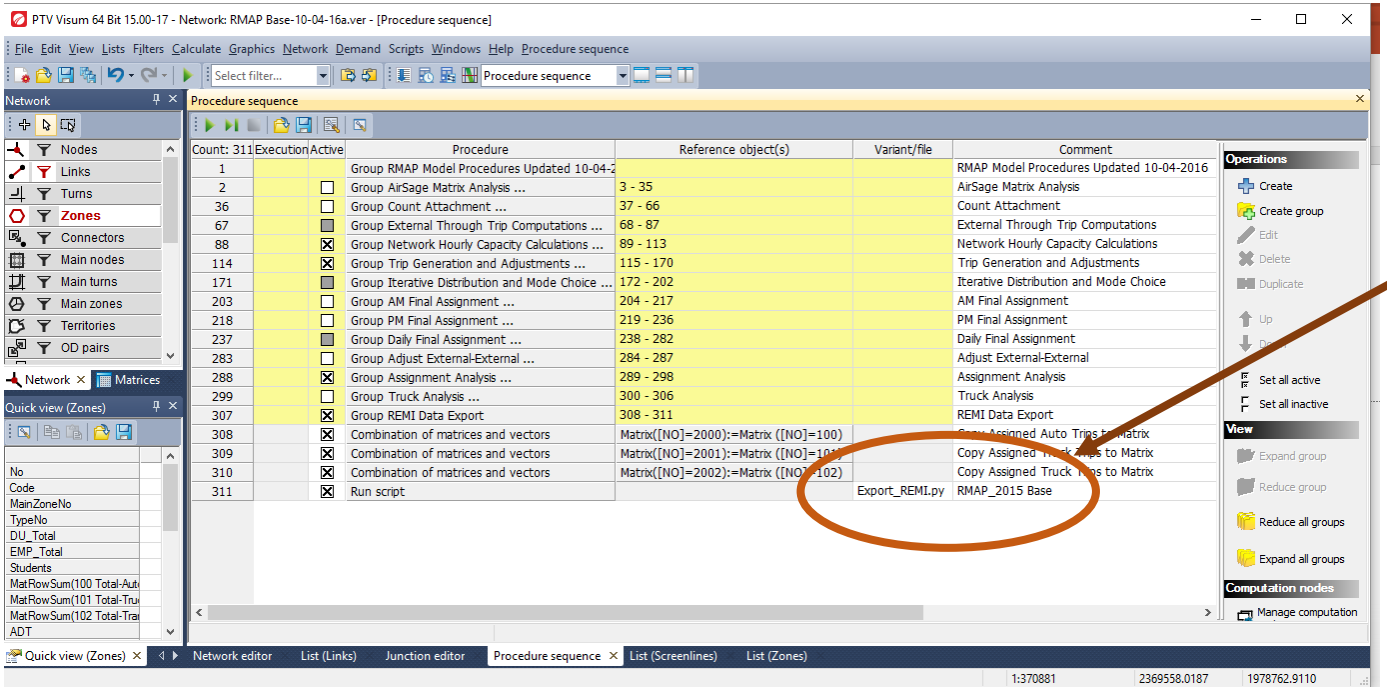
- Functional classification
- Operating speeds
- Number of Lanes
- Intersections, including type
- Future employment data if known, by Traffic Analysis Zone, TAZ



# Export Data for REMI Integration

Export changes in VMT, VHT, and Trips which are used to compare against the baseline transportation, economic, and demographic model results.

Data is exported into excel in a format developed by our TDM consultant which allows for a seamless upload into REMI TranSight for analysis.

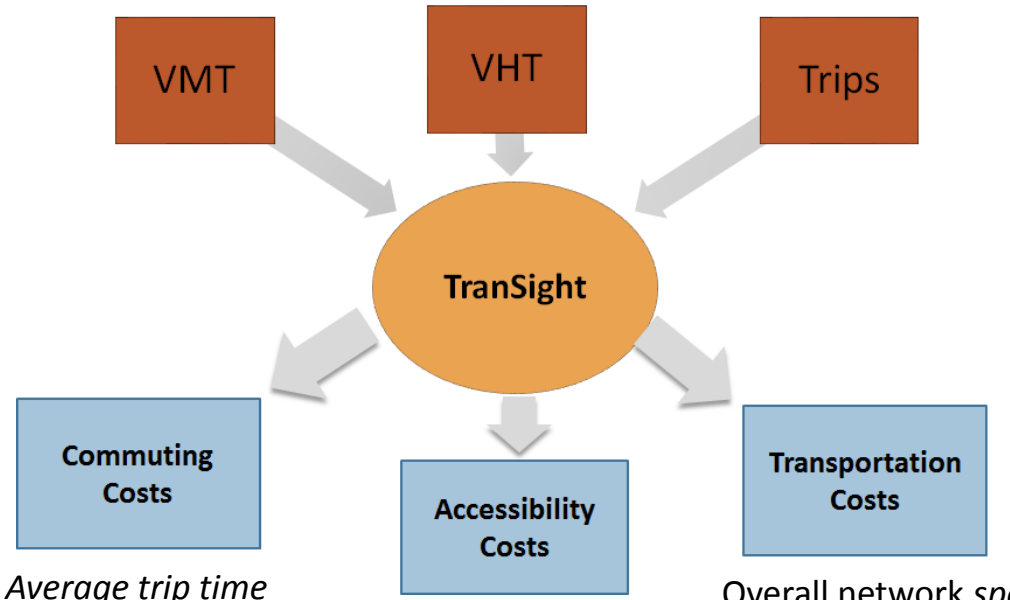



Export Data to REMI Format

# VISUM and TranSight Integration

TDM Outputs needed

as inputs to TranSight



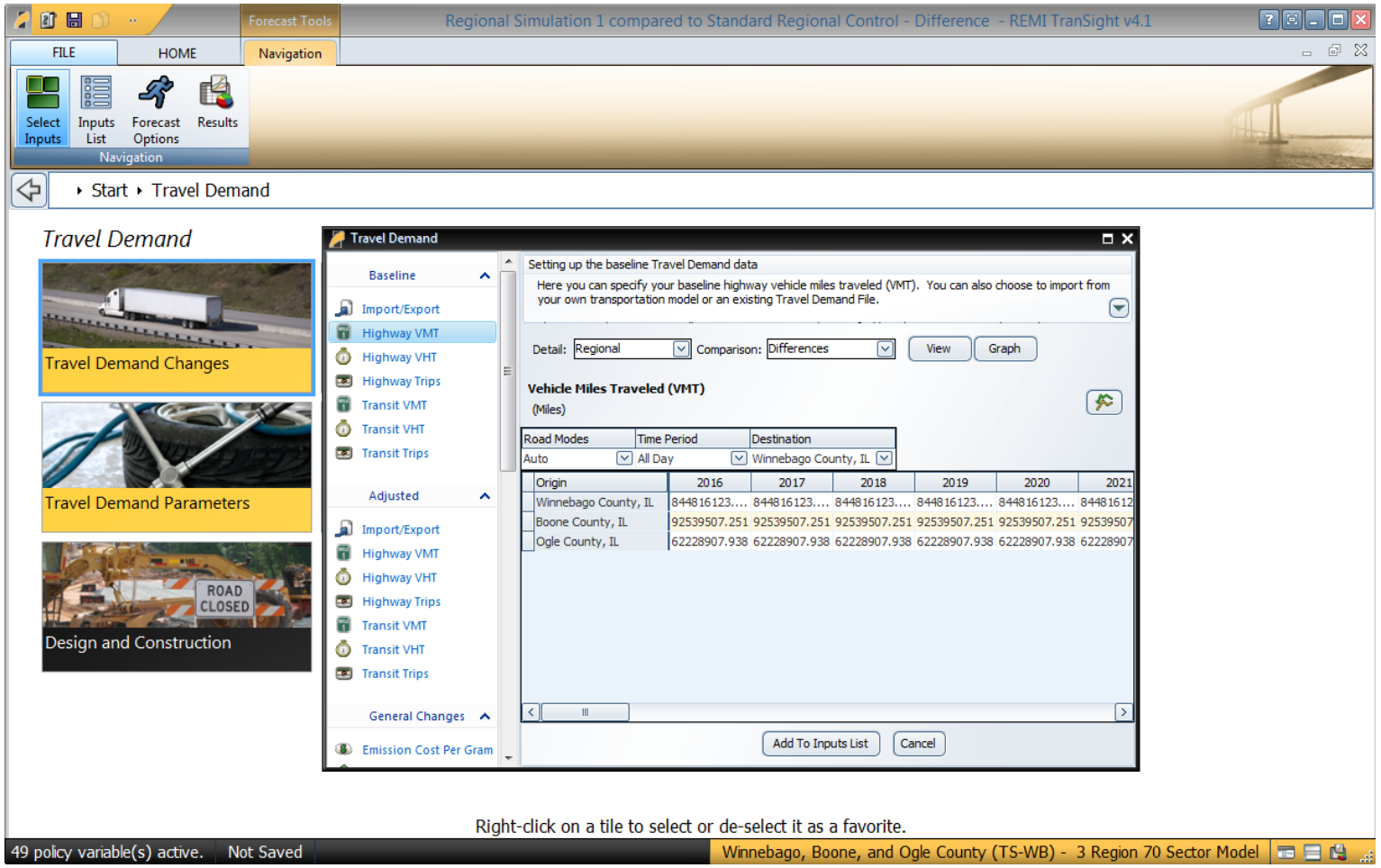

REMI TranSight Calculates…

*Average trip time*

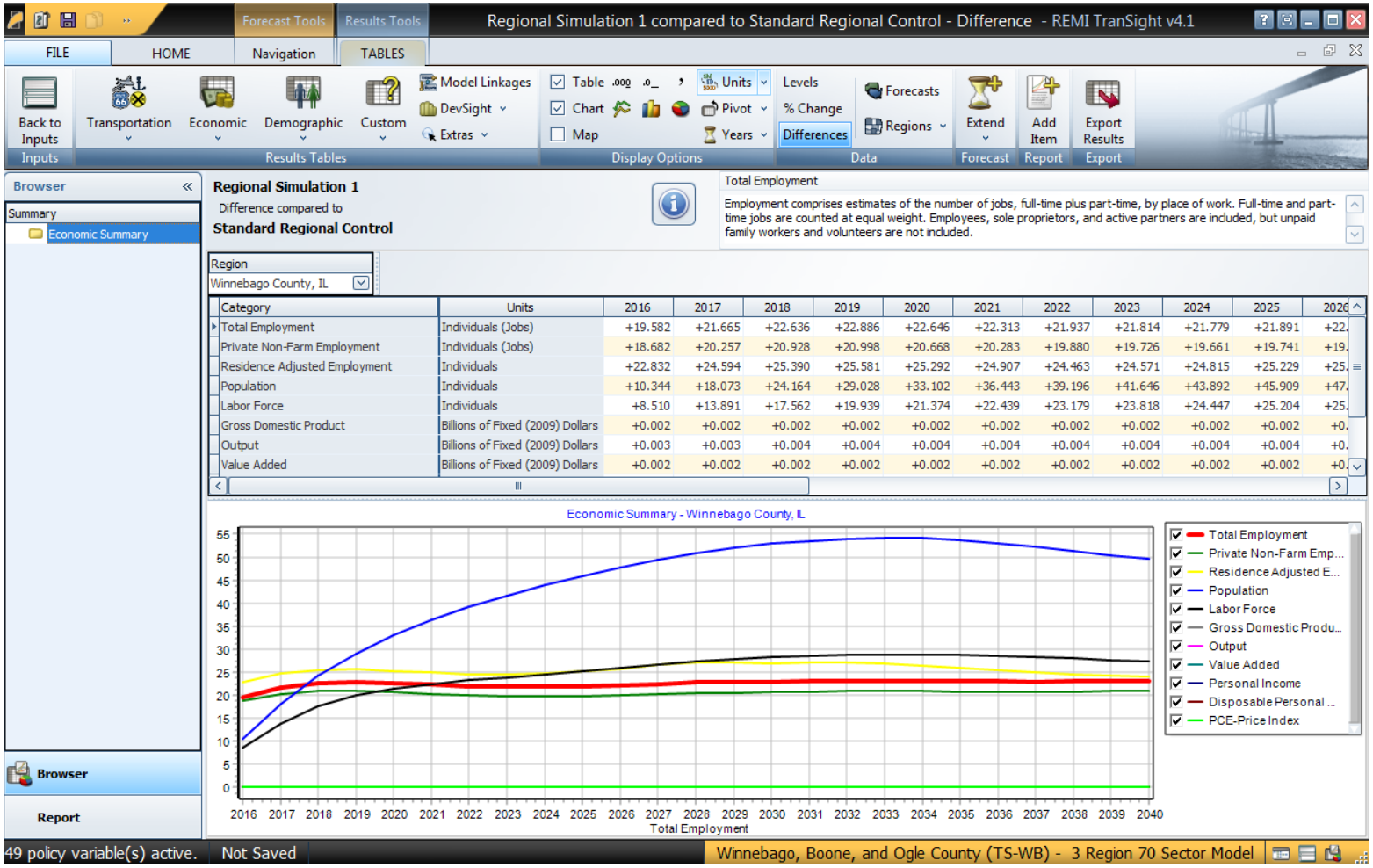
*Number of truck Trips per hour*

Overall network *speeds*

# VISUM – REMI Import Procedure



# REMI TranSight Economic Summary

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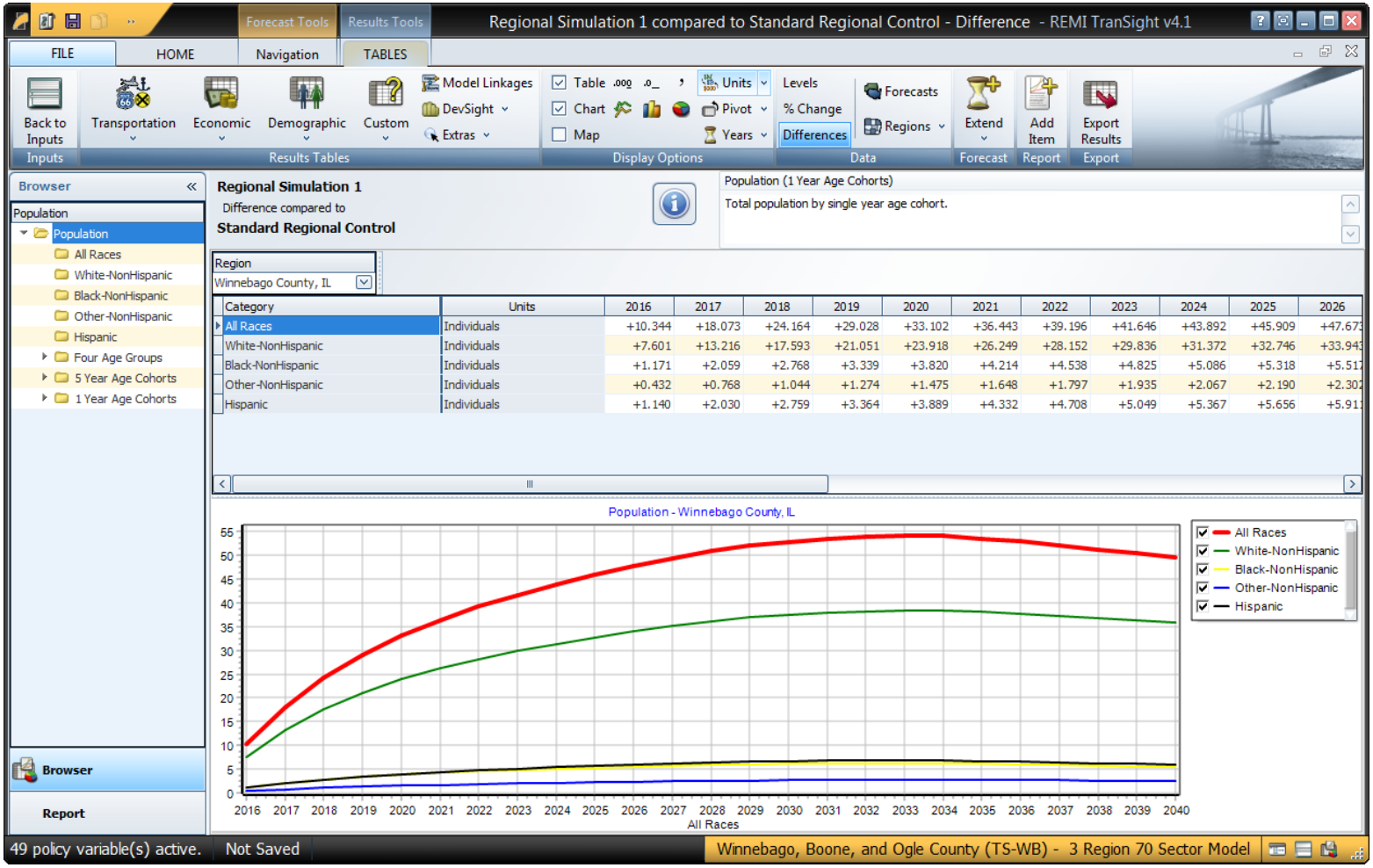
# REMI TranSight Demographic Summary

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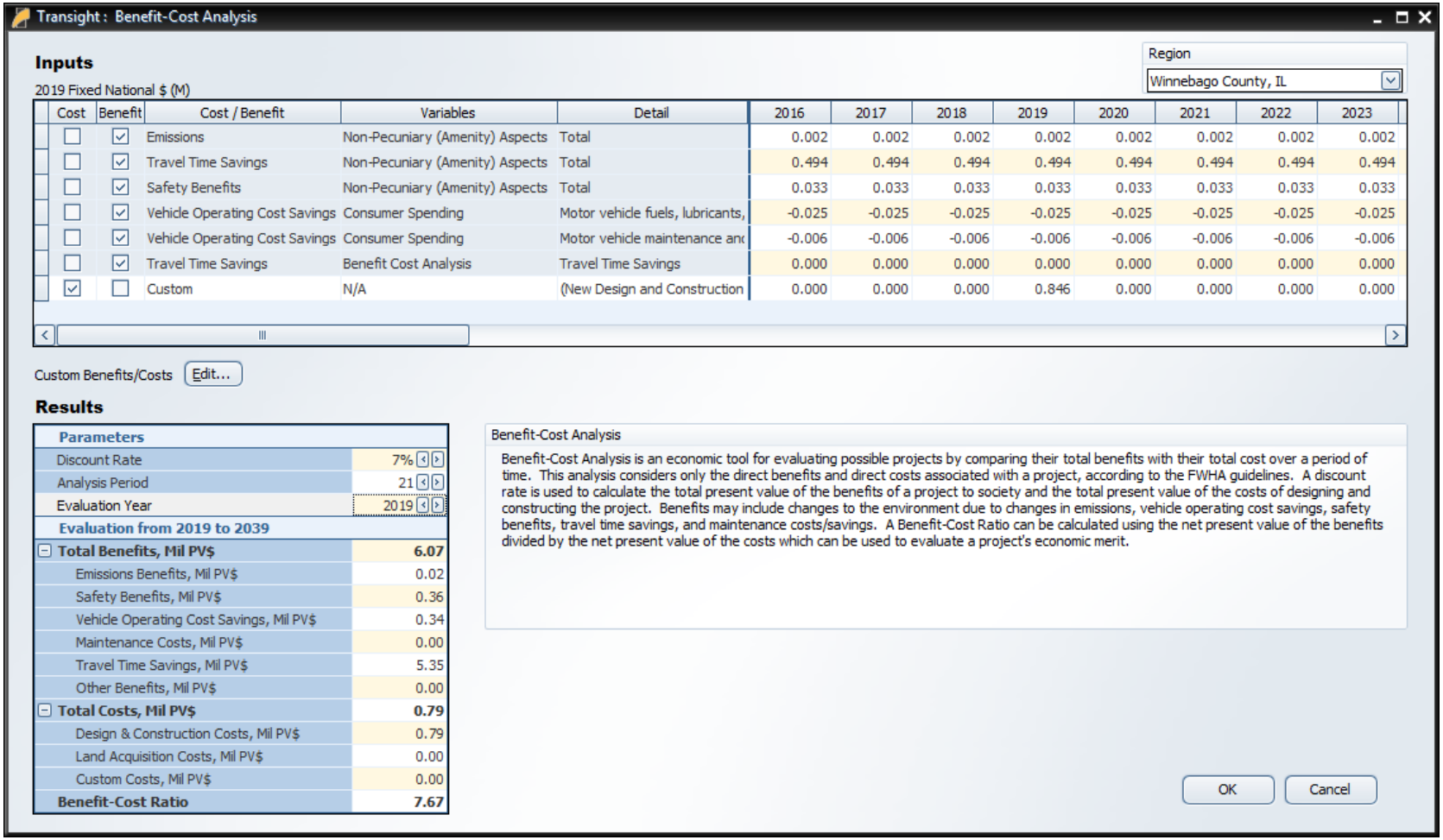
# REMI TranSight Benefit-Cost-Ratio (BCA)



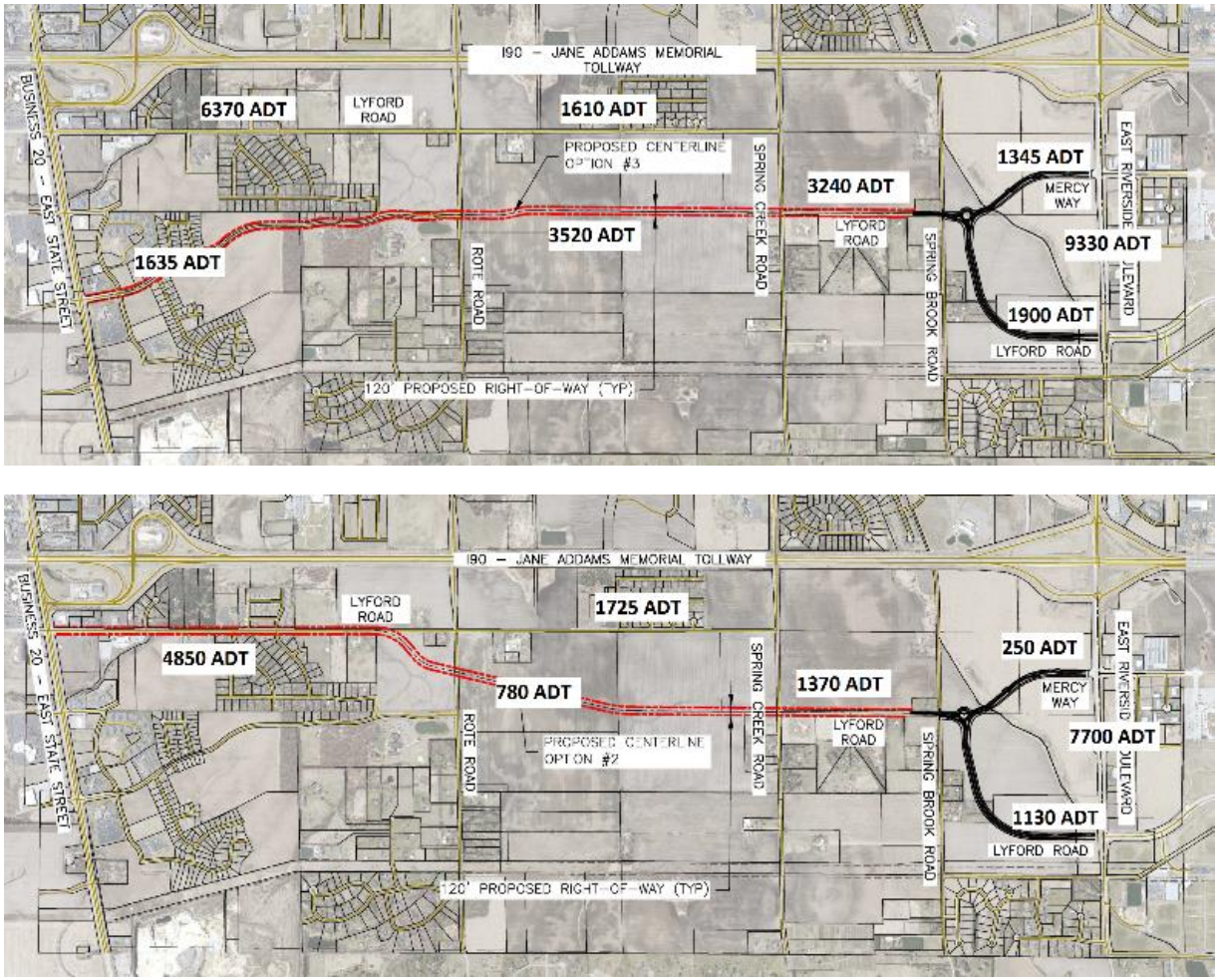

| Cost | Benefit | Cost / Benefit | Variables | Detail | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ☐ | ☑ | Emissions | Non-Pecuniary (Amenity) Aspects | Total | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 |
| ☐ | ☑ | Travel Time Savings | Non-Pecuniary (Amenity) Aspects | Total | 0.494 | 0.494 | 0.494 | 0.494 | 0.494 | 0.494 | 0.494 | 0.494 |
| ☐ | ☑ | Safety Benefits | Non-Pecuniary (Amenity) Aspects | Total | 0.033 | 0.033 | 0.033 | 0.033 | 0.033 | 0.033 | 0.033 | 0.033 |
| ☐ | ☑ | Vehicle Operating Cost Savings | Consumer Spending | Motor vehicle fuels, lubricants, | -0.025 | -0.025 | -0.025 | -0.025 | -0.025 | -0.025 | -0.025 | -0.025 |
| ☐ | ☑ | Vehicle Operating Cost Savings | Consumer Spending | Motor vehicle maintenance an( | -0.006 | -0.006 | -0.006 | -0.006 | -0.006 | -0.006 | -0.006 | -0.006 |
| ☐ | ☑ | Travel Time Savings | Benefit Cost Analysis | Travel Time Savings | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| ☑ | ☐ | Custom | N/A | (New Design and Construction | 0.000 | 0.000 | 0.000 | 0.846 | 0.000 | 0.000 | 0.000 | 0.000 |

| Parameters | |
|---|---|
| Discount Rate | 7% |
| Analysis Period | 21 |
| Evaluation Year | 2019 |
| **Evaluation from 2019 to 2039** | |
| **Total Benefits, Mil PV$** | **6.07** |
| Emissions Benefits, Mil PV$ | 0.02 |
| Safety Benefits, Mil PV$ | 0.36 |
| Vehicle Operating Cost Savings, Mil PV$ | 0.34 |
| Maintenance Costs, Mil PV$ | 0.00 |
| Travel Time Savings, Mil PV$ | 5.35 |
| Other Benefits, Mil PV$ | 0.00 |
| **Total Costs, Mil PV$** | **0.79** |
| Design & Construction Costs, Mil PV$ | 0.79 |
| Land Acquisition Costs, Mil PV$ | 0.00 |
| Custom Costs, Mil PV$ | 0.00 |
| **Benefit-Cost Ratio** | **7.67** |

# Travel Demand Model & Land-Use Planning

A scenario where a new road is planned to be built will include land-use planning and zoning decisions that will impact new traffic generators such as residential units, businesses, hospitals etc.

- Projected employment entered into the TDM by TAZ for projected impacts due to the transportation system.
- REMI regional analysis of additional jobs generated for project.



# Conclusions

- The integration of REMI and the Travel Demand Model has given the region an additional assessment tool to help planners and elected officials make more informed decisions
- Travel Demand Model integration with TranSight gives planners a better understanding of economic drivers and impacts on transportation facilities
- Tool to help guide investment for economic development and Regional Competitiveness, especially for funding
- Scenario planning can help planners and engineers better understand “what-if” scenarios such as new road connections, road closures, increased roadway capacity, or even the construction of new businesses or residential units
- Quantify return on investment from publicly funded projects
- Strategic investments in the transportation system are necessary with limited local funding resources to leverage state and federal match
- Increase government transparency with performance-based project selection
- Strengthen the MPO and RPC Long- Range Transportation Plan with data-driven recommendations and implementation strategies.

# Contact Information

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