Using Land Use Model Output as Input for a Travel Demand Model Data Set

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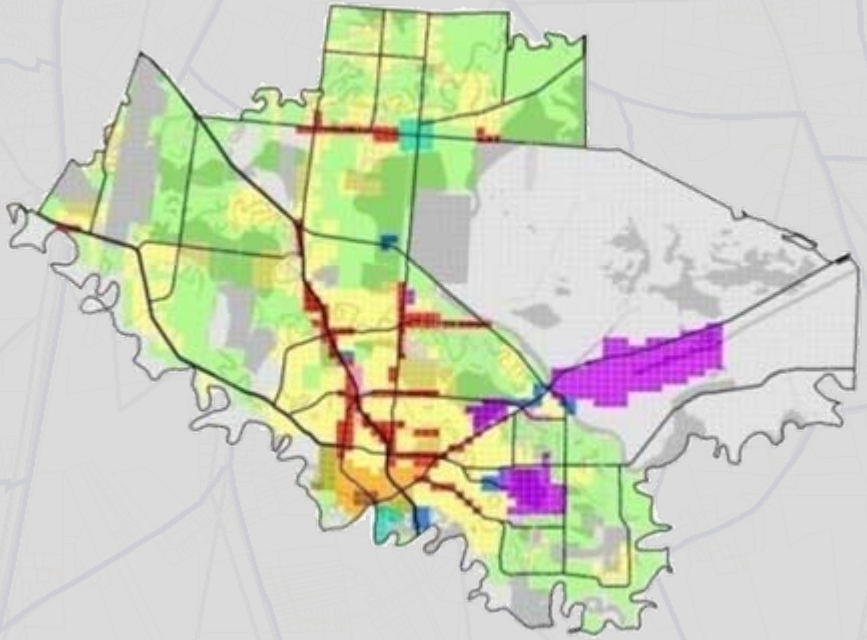
Traditional Approach to Forecasting

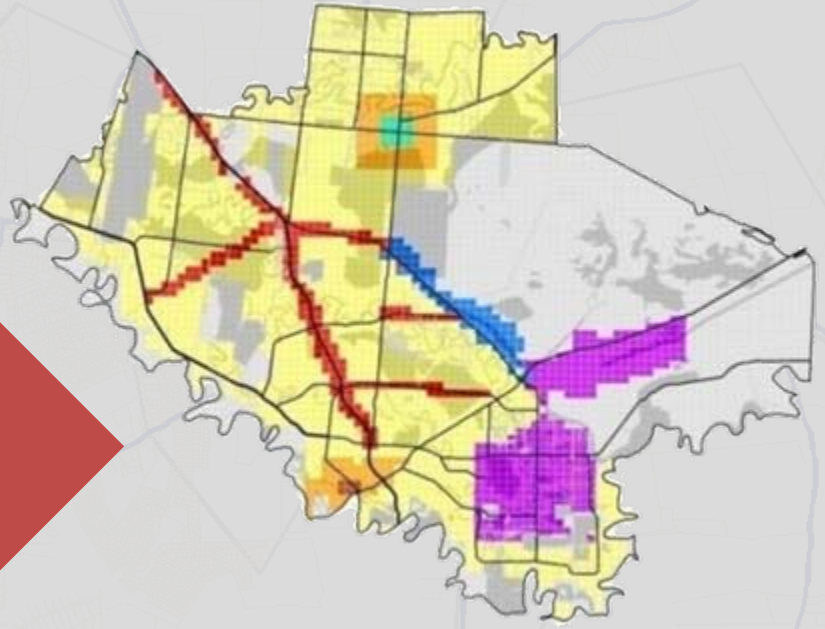
- Stakeholders carry forward current trends to a pre-defined future planning horizon
- Based on some control total of model socioeconomic inputs (housing and employment data)
- Growth areas identified through knowledge of local planning staff

Traditional Approach to Forecasting

"Base Year"



"Future Year"



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Scenario Planning

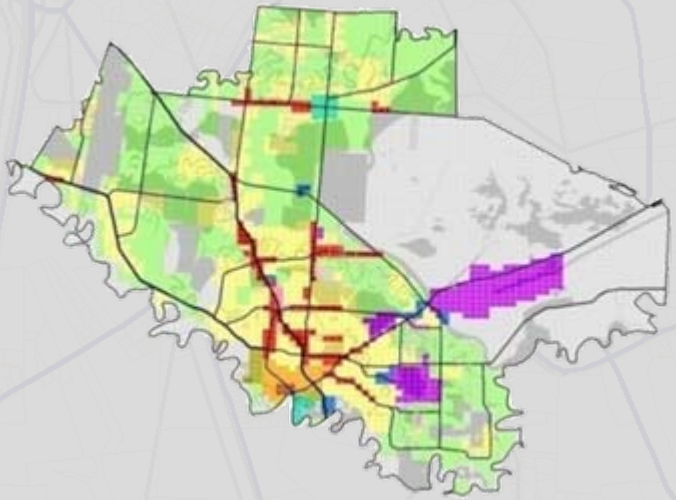
- Used to evaluate the influence of development intensities and land use patterns on the efficiency of a proposed transportation system
- Visualization of the interaction between land use and transportation decisions provide community leaders with the information they need to evaluate the consequences of potential actions

Scenario Planning Approach to Forecasting

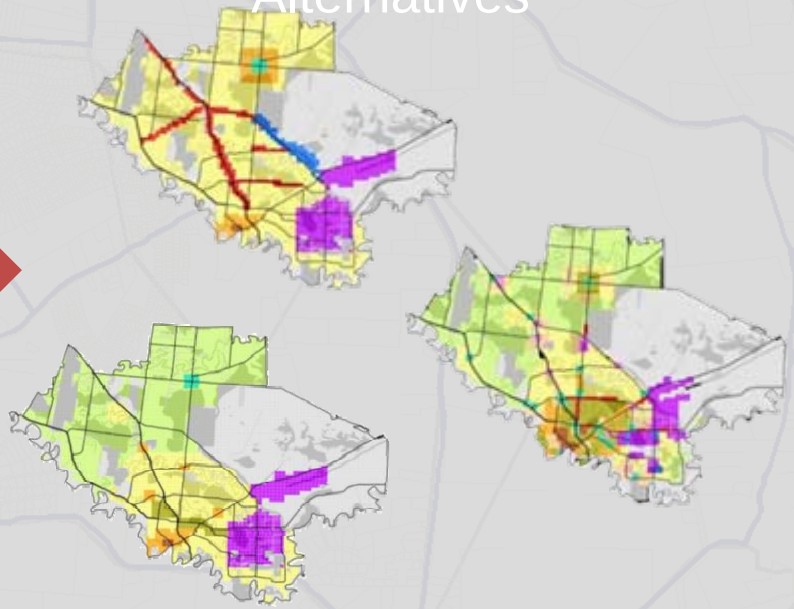
- Stakeholders consider several plausible futures for a region assuming a pre-defined future planning horizon
- Based on a control total of model socioeconomic inputs (housing and employment data)
- Growth areas identified through GIS exercise (Community Viz)

Scenario Planning Approach to Forecasting

"Base Year"



"Future Year Alternatives"



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Future Growth

- Growth patterns and intensities observed in a region are influenced by:
  - Natural features
  - Transportation network
  - Available utilities
  - Market conditions
  - Local policies
- NOT necessarily influenced by what the local planner thinks is going to happen in 30 years.

Typical Scenario Planning Process

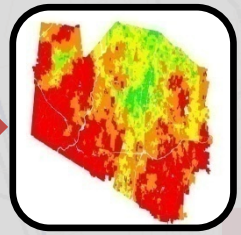
Public Outreach

Resource Maps

Concept Maps

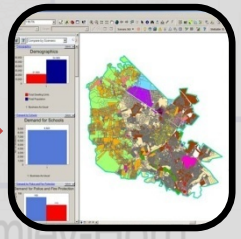
Model Calibration

Trend Analysis



Land Suitability Analysis

Synthesize Growth Scenarios



Scenario Analysis

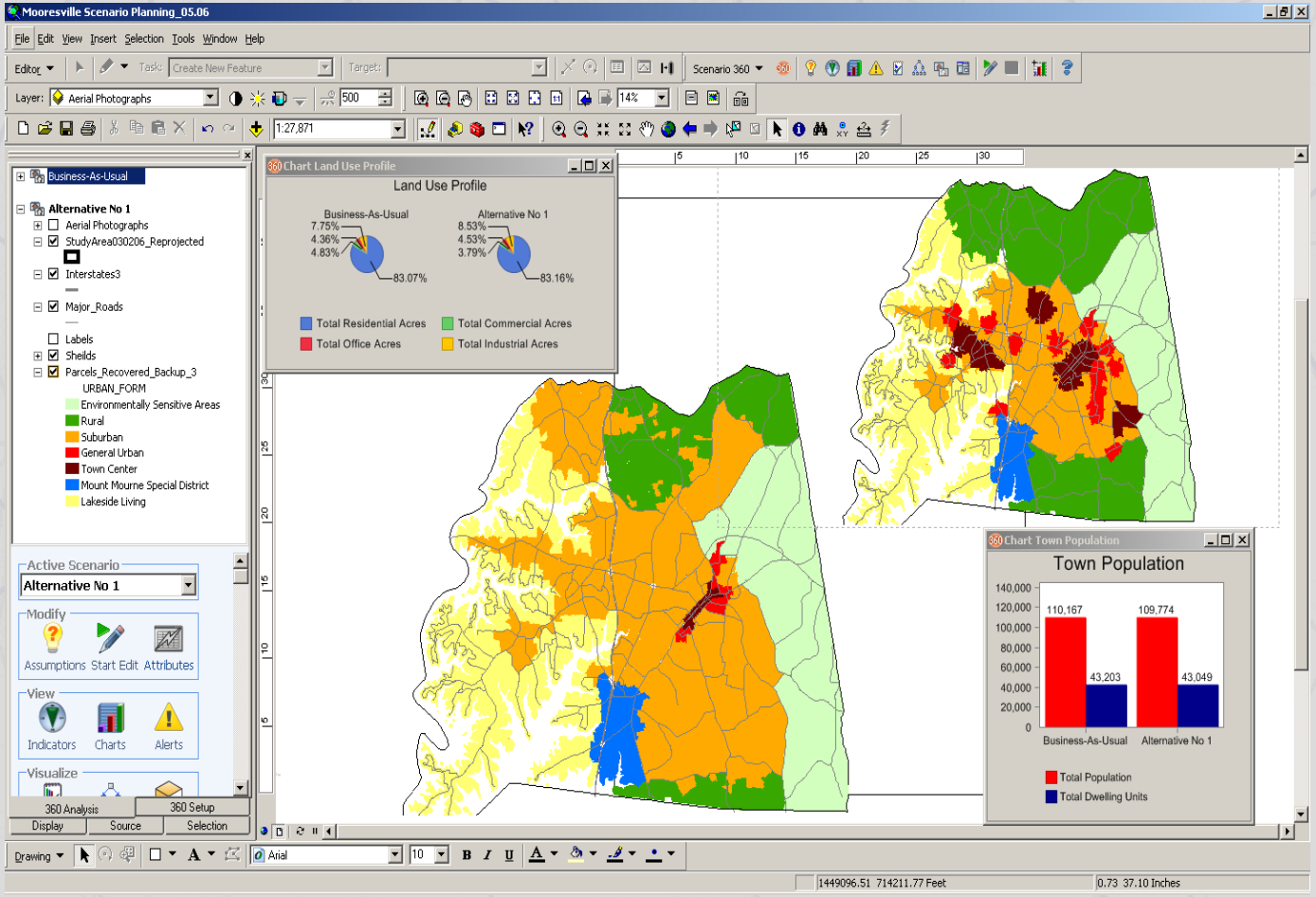
Growth Allocation

Reality Check

CommunityViz

- A land use planning decision-based software that evaluates competing future year growth scenarios under consideration for a region.
- Uses GIS based analysis to determine location and intensity of growth.

CommunityViz



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Two Step Approach

- Community Viz used to provide better future year socioeconomic forecasts including different scenarios.
- Travel Demand Model used to produce transportation MOE's for each of the competing scenarios.

Case Studies

- Two case studies were developed
  - Mooresville, North Carolina
  - Sumter, South Carolina
- CommunityViz was used to develop the future land use information which was output for the travel demand model in different scenarios
- TransCAD and Tranplan travel demand model software was used to test the transportation impacts

Mooresville, NC

- Located approximately 25 miles north of Charlotte, NC
- Study area population – 110,000
- Study area land area – 91 square miles
- Mooresville is part of the Metrolina Travel Demand Model which encompasses portions of 10 counties in North and South Carolina
- The model was developed in TransCAD in 2005 with a base year of 2002 and a future year of 2030

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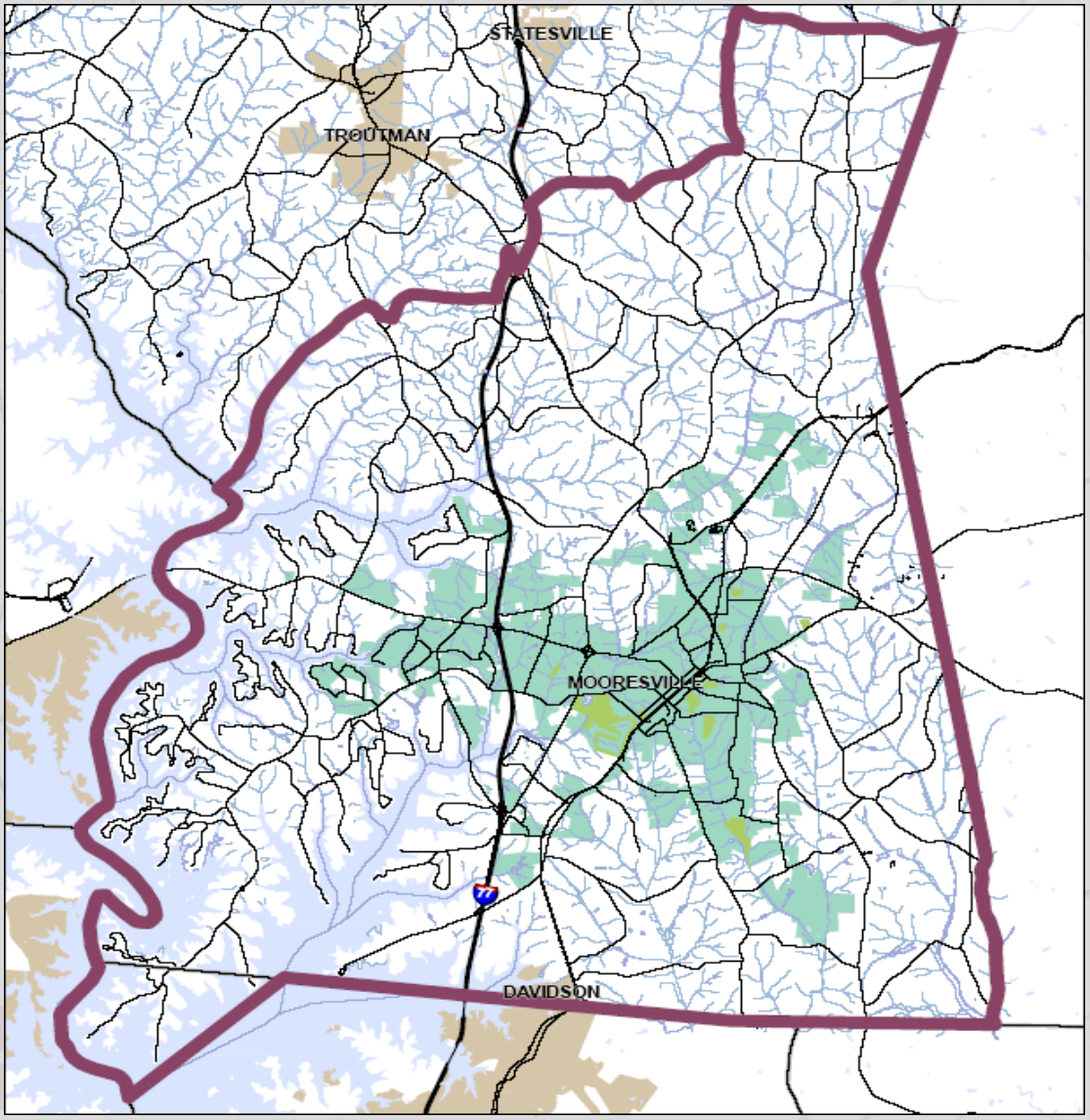
Mooresville, NC



Mooresville, NC

- Two CommunityViz scenarios for future growth
  - "Sprawl Development"
  - "Compact Development"
- CommunityViz output
  - Parcel level, aggregated to model TAZ's
  - Population, dwelling units, employees (retail, non-retail, other)

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Mooresville, NC

- The required input data for the travel demand model was not the same as the CommunityViz output
- Travel model input data consisted of population, households, employees (manufacturing/industrial/wholesale/telecommunications/utility, retail, highway retail, low and high service, bank, and educational), and school enrollment

Mooresville, NC

- The output CommunityViz data had to be converted to the same “categories” as the travel model input data needed
- A set of rules was developed using engineering judgment (For example: CommunityViz Output Retail = Travel Model Retail + Highway Retail)

Mooresville, NC

- The travel demand model was set up with the new data output from CommunityViz and run for both the “Sprawl Development” scenario and the “Compact Development” scenario
- Travel demand model MOE’s were calculated

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Mooresville, NC

Mooresville Measures of Effectiveness

Measure of Effectiveness (MOE)	Sprawl Development Scenario	Compact Development Scenario	Percent Change
Total Person Trips (1,000s)	511	521	1.92%
Total Population	110,269	110,204	-0.06%
Person Trips per Person	4.64	4.73	1.87%
Walk/Bike Trips	7,303	8,100	9.84%
Vehicle Miles Traveled (1,000s)	4,020	3,928	-2.34%
Vehicle Miles Traveled per Person	36.5	35.6	-2.28%
Vehicle Hours Traveled (1,000s)	108	104	-3.85%
Vehicles Hours Traveled per Person	0.98	0.94	-3.78%
Average Vehicle Speed (mph)	37.2	37.8	1.59%
Vehile Miles Traveled @ LOS E (1,000s)	942	835	-12.81%
% Vehicles Miles Traveled Over Capacity	23%	21%	-2.00%

Sumter, SC

- Located approximately 60 miles east of Columbia, SC
- Study area population – 110,000
- Study area land area – 187 square miles
- The Sumter Travel Demand Model was developed in the early part of this decade in Tranplan and has a base year of 2000 and a future year of 2030

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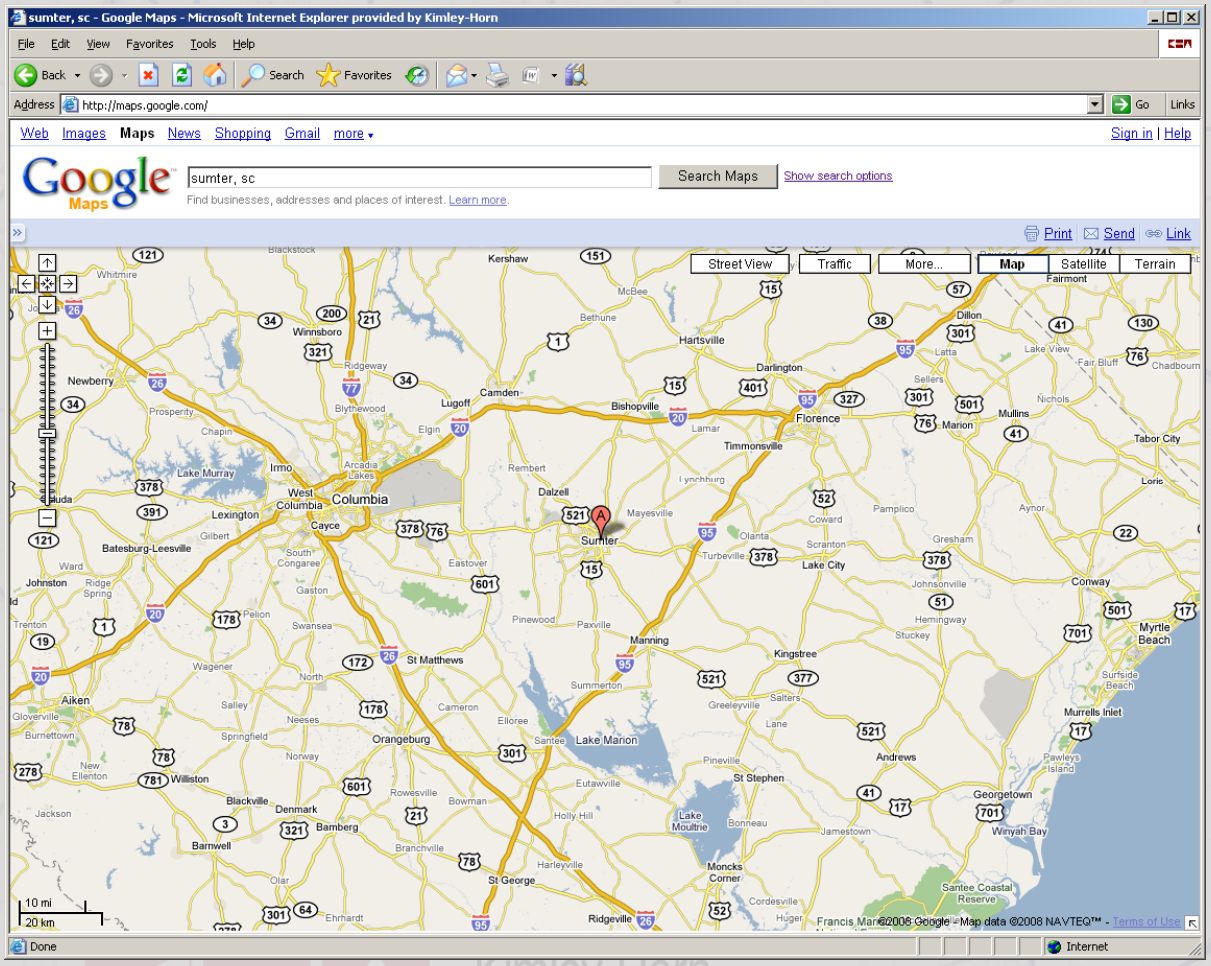
Sumter, SC



Sumter, SC

- Two CommunityViz scenarios for future growth
  - "Business as Usual"
  - "Compact Development"
- CommunityViz output
  - Parcel level, aggregated to model TAZ's
  - Population, dwelling units, employees (commercial, office, industry)

Sumter, SC

- The required input data for the travel demand model was not the same as the CommunityViz output but was more similar than Mooresville data
- Travel model input data consisted of population, dwelling units, employees (total, retail, and “other”), and school attendance

Sumter, SC

- The travel demand model was set up with the new data output from CommunityViz and run for both the “Business as Usual” scenario and the “Compact Development” scenario
- Travel demand model MOE’s were calculated

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Sumter, SC

Sumter Measures of Effectiveness

Measure of Effectiveness	Sprawl Development Scenario	Compact Development Scenario	Percent Change
Total Trips (1,000s)	638	628	-1.57%
Total Population	108873	111123	2.07%
Trips per Person	5.86	5.65	-3.65%
Vehicle Miles Traveled (1,000s)	3219	2946	**-8.48%**
Vehicle Miles Traveled per Person	29.57	26.51	**-10.35%**
Vehicle Hours Traveled (1,000s)	103	95	**-7.77%**
Vehicle Hours Traveled per Person	0.95	0.85	**-10.09%**
Average Vehicle Speed	31.16	31.07	-0.29%
Vehicle Miles Traveled @ LOS E (1,000s)	478	427	**-10.67%**
% Vehicle Miles Traveled Over Capacity	14.86%	14.49%	-2.46%

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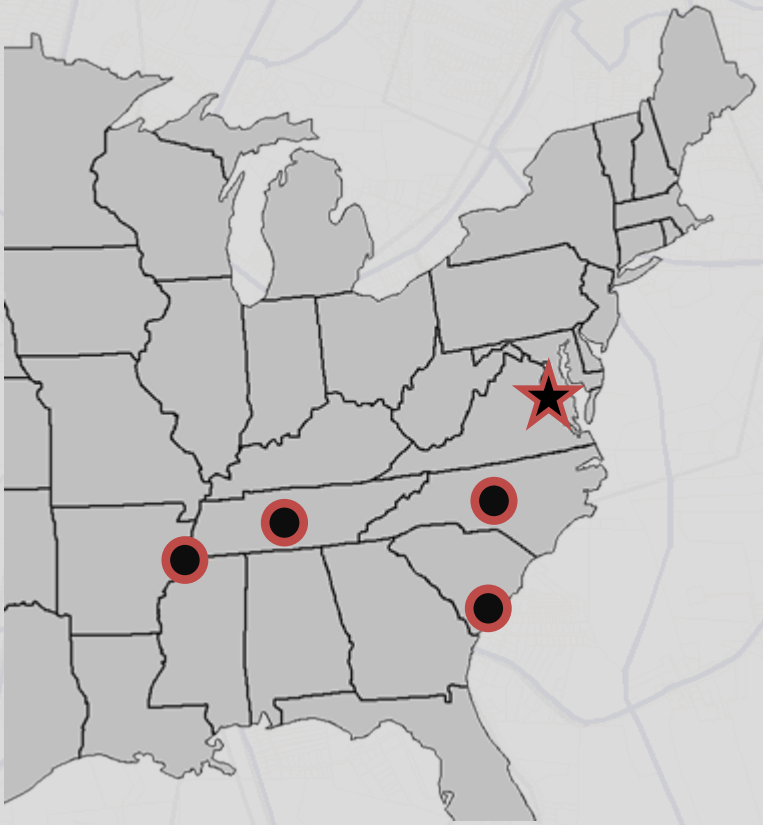
Conclusions/Lessons Learned

- Process is transferrable to different software platforms
- Results show a clear picture for policy makers
- It is better to tailor the input data for CommunityViz to the the required travel demand model input then to tailor the CommunityViz output to the travel demand model (i.e., plan ahead)
- Every travel demand model is different, so while the approaches are similar, the actual implementation can be very different
- TAZ size matters. It is very difficult to show differences in scenarios without the proper TAZ/Network detail

Other Applications



Regions, cities, counties, and towns throughout the nation and nearby are doing scenario planning:

- Fredericksburg, VA
- Nashville, TN
- Memphis, TN
- Charleston, SC (BCD COG)
- Durham, NC
- And many others…

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