

# Moore County Travel Demand Model Update



By Rhett Fussell & Craig Gresham  
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# Who Are We?

## Rhett Fussell, PE - Parsons Brinckerhoff

- 16 years experience in modeling
- Developed and taught small area modeling here in NC
- Project Manager for the NC Statewide Model
- Worked recently on Orlando, Nashville, Honolulu



## Craig Gresham, PE - Clearbox Forecast Group

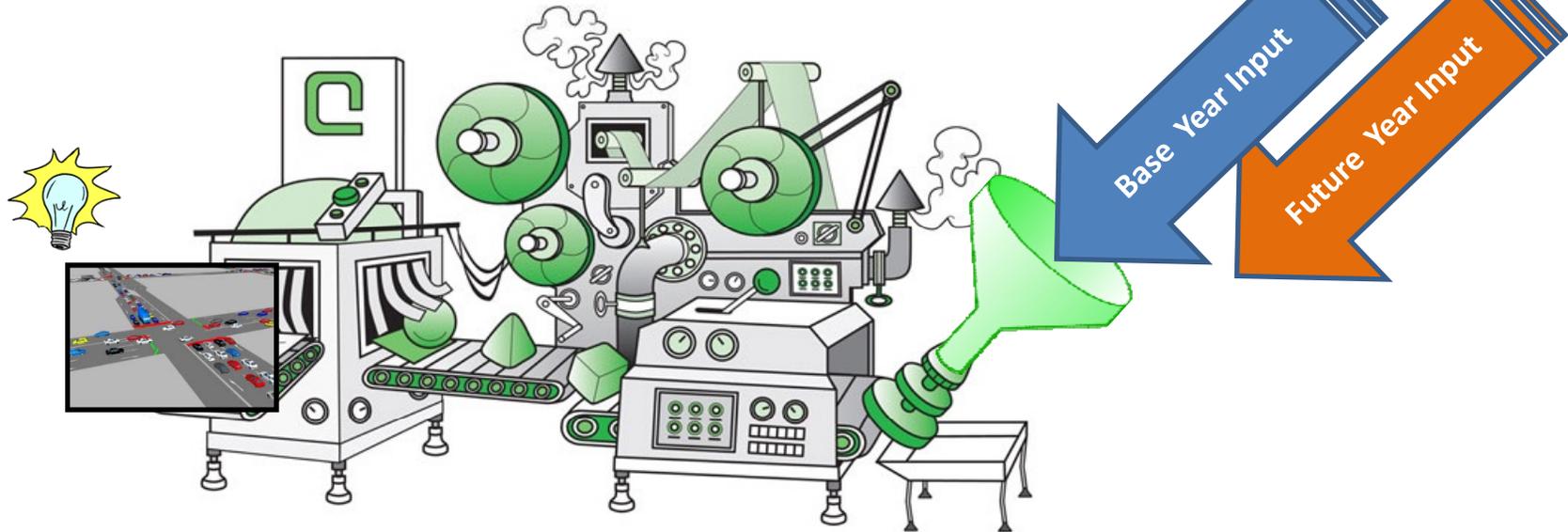
- 16 years experience in modeling
- Has either helped developed or has performed project level work with all MPO models in the State
- Has worked recently on Charleston SC, Charlotte, NC Statewide Models



## We both.....

- Develop Models and Use for Project Application
  - (and can explain in non tech terms 😊)
- Understand the acceptable rates/parameters in NC
- Have Developed/Analyzed Survey Data for Many Places
- Provide Practical/Usable Model Results

# The Model – The Big Picture



- Step I Build a Replica of the Roadway System: **Mapping**
- Step II Highlight the Roads You Want to Study: **NETWORK**  
(**Significant Roadways: # lanes, lane width, shoulder, speeds, type**)
- Step III Think About Boundaries: **Study Area, Municipal, Land Use**
- Step IV Divide Study Area into Smaller, Manageable Sections For Study: **TAZs**
- Step V Load Model with Population, Housing, Employment Data: **Census**
- Step VII Load Traffic - **Counts**
- Step VIII Calibrate – **Are the outcomes consistent with known data?**

# What is a Travel Demand Model?



- It is just **ONE** of the tools used in the analysis of transportation systems . Key word being **System**.
- It can be used to help forecast travel characteristics in the future at various planning levels: local, regional, and statewide.
- It is a mathematical approach to understanding how changes in land use, population, and area employment will impact the transportation system.
- It is a way to measure the future impacts of growth and development by examining the limits of the existing infrastructure.





## Purpose of the Travel Demand Model is ....

**...To Help Decision Makers See What the Future May Hold.  
Is it absolute? *Nope!***

**BUT IT IS A GOOD WAY TO ESTIMATE PROBABLE OUTCOMES.**

Travel Demand Model analysis is performed to assist decision makers in making informed transportation planning decisions.

The strength of modern travel demand forecasting is the ability to ask critical “what if” questions about proposed plans and policies.

# Building A Travel Demand Model

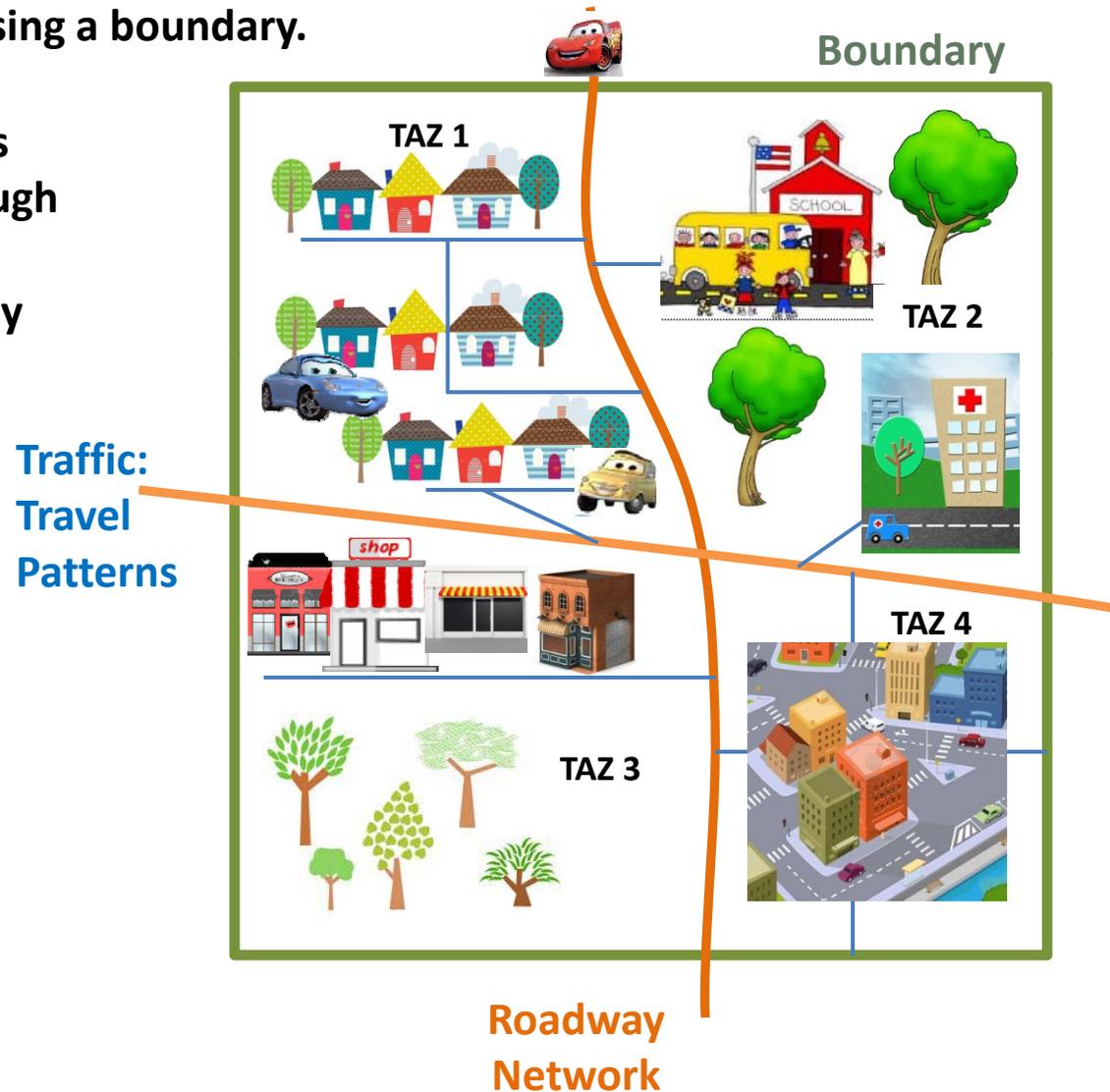
## The Foundation – Network and Data

1. Define a study area using a boundary.

2. Apply the major roads within and passing through the area: all NC and US routes plus heavily or key local routes.

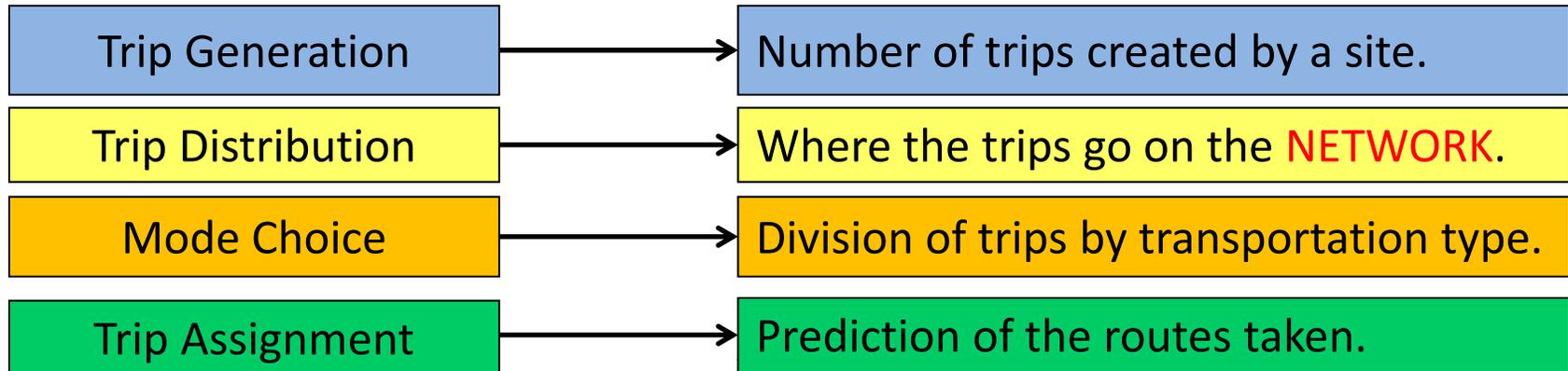
3. Input Census and local data about population, employment, and travel patterns.

4. Divide study area into smaller areas for closer study called Traffic Analysis Zones or TAZs.



# How A Travel Demand Model Works

## Modeling 101 – The Basics



## Travel Patterns and User Characteristics

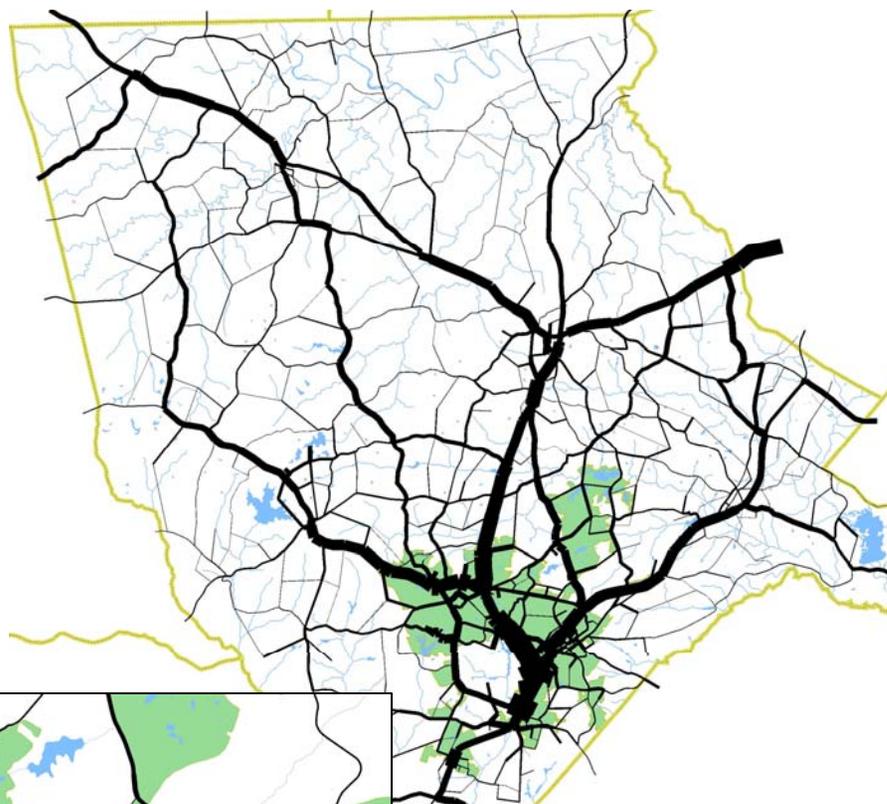
How people move from place to place on the network.



# Output from the Model

**FUTURE YEAR: 2040**

- Future Capacity Deficiencies
- Scenario Testing
- Improvements to Existing
- Impacts of New Routes
- Classification of Routes
- Number of Lanes
- Air Quality
- Vehicle Miles Traveled
- Route Volumes



Example Output Not Actual Final Results

# Where We Are.....



## MODEL UPDATE

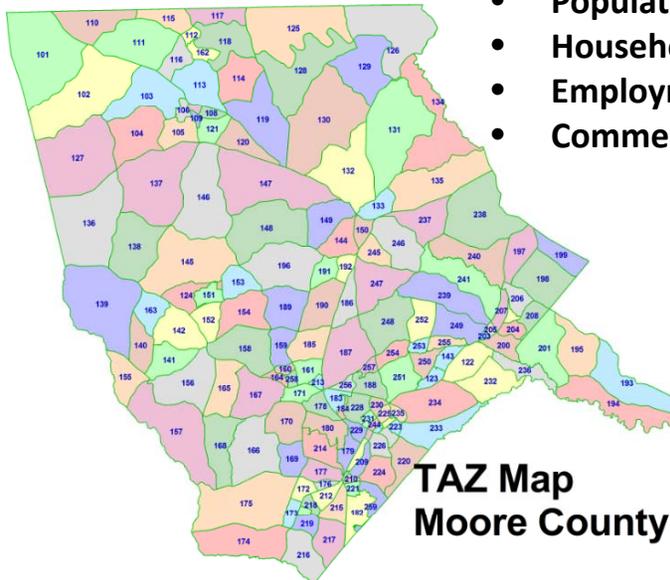
1. SE data finalized and TAZ adjusted and tested
2. Roadway Networks Completed and Checked for Consistency



### 2010 Base Year Census Data

- Population
- Households
- Employment
- Commercial Vehicles

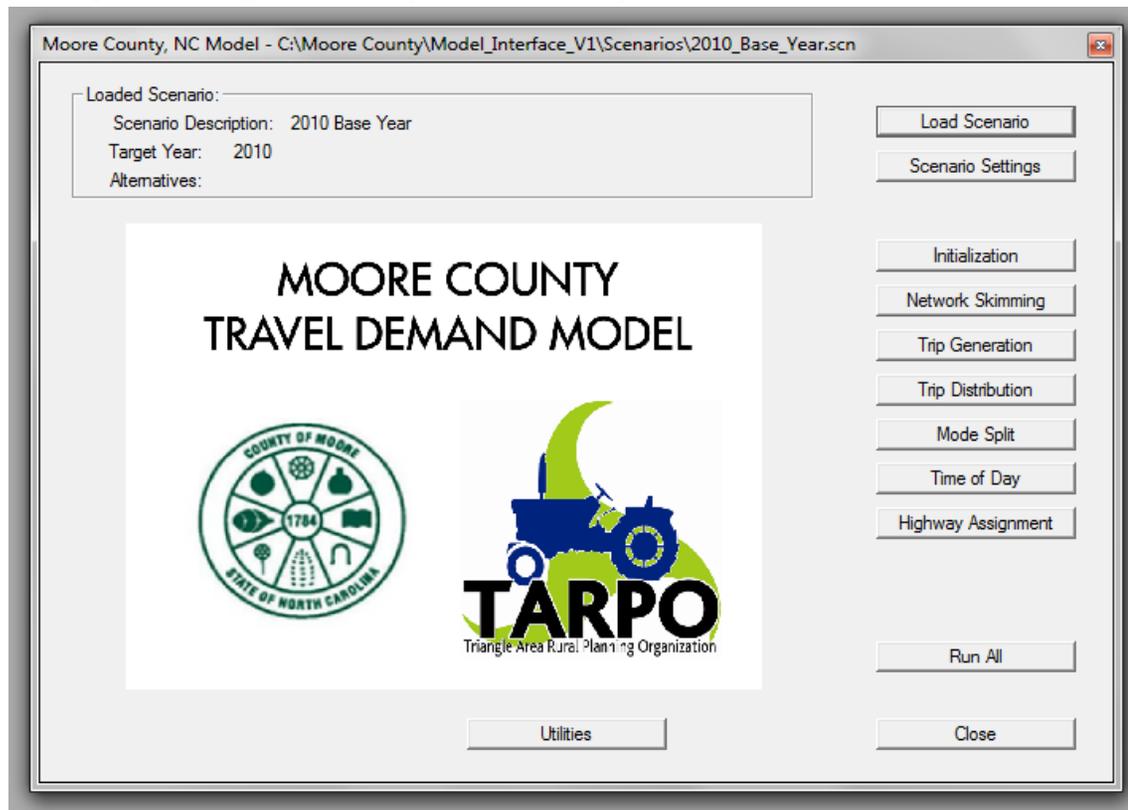
- Insert Roadway File



# Where We Are.....

## MODEL UPDATE

1. SE data finalized and TAZ adjusted and tested
2. Roadway Networks Completed and Checked for Consistency
3. Model Scripts and User Interface Works and Tested
4. Model Has Been Run Completely Through with preliminary parameters- and looks good!



# Travel Model Interface – Trip Generation

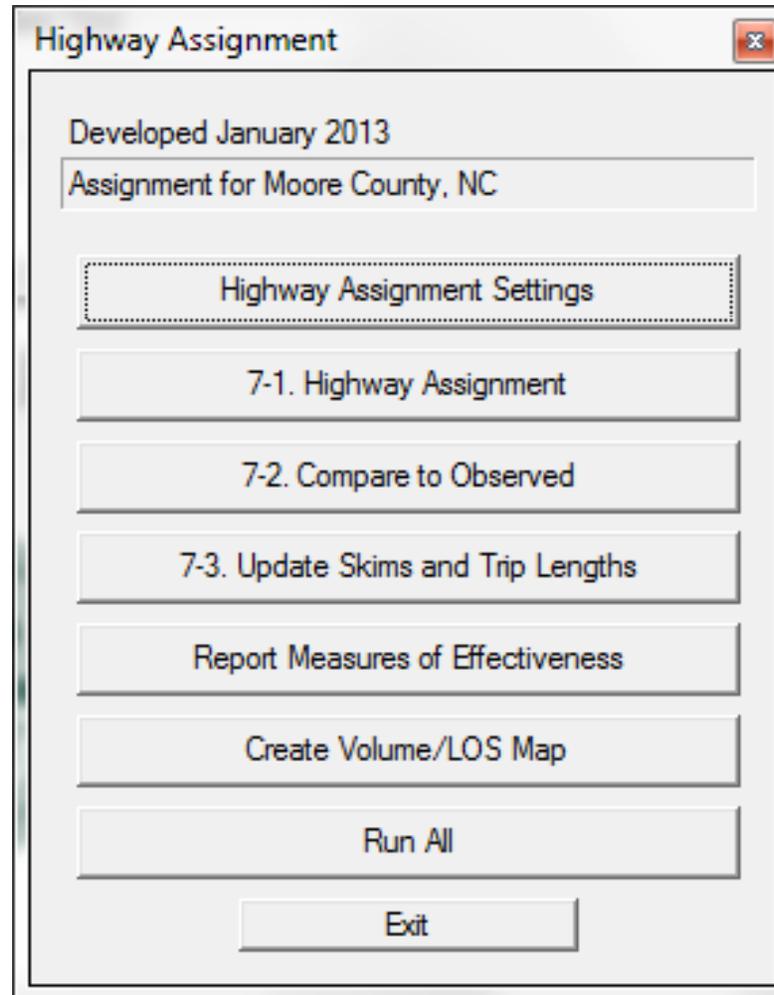
The screenshot shows a software window titled "Trip Generation for Moore County Model". At the top, it says "Developed January 2013" and has a text box containing "Trip Generation for Moore County, NC". Below this are two tabs: "3.1 Internal Trip Generation" (which is selected) and "3.2 IE/CV Trip Generation". The main area contains two columns of input fields. The left column lists "Productions" for various categories: HBW, HBO, HBSH, NHB, IE Auto, IE Truck, CV Auto, and CV Truck. The right column lists "Attractions" for the same categories. Each category has a corresponding empty input box. Below the input fields are several buttons: "3.3 NHBNR Trip Productions", "View Unbalanced P&A", "3.4 Balance Productions & Attractions", "View Balanced P&A", "Run All", and "Exit".

Productions	Attractions
HBW Productions	HBW Attractions
HBO Productions	HBO Attractions
HBSH Productions	HBSH Attractions
NHB Productions	NHB Attractions
IE Auto Productions	IE Auto Attractions
IE Truck Productions	IE Truck Attractions
CV Auto Productions	CV Auto Attractions
CV Truck Productions	CV Truck Attractions

Buttons:

- 3.3 NHBNR Trip Productions
- View Unbalanced P&A
- 3.4 Balance Productions & Attractions
- View Balanced P&A
- Run All
- Exit

# Travel Model Interface – Traffic Assignment



# Origins & Destination Data

## 1. Why O & D Data?

- Important to know travel patterns since we don't have household surveys
- Cell phone technology much higher rate of capture and cheaper
  - Survey~300k    AirSage~10k
- Want localized data(not borrowed)
- Want unbiased samples and representative data
- Un-intrusive methods of getting data

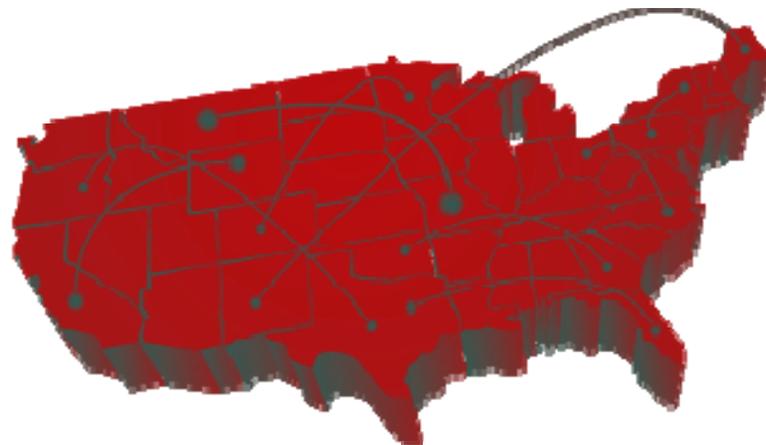
## 2. Why Select Link Data?

- Same as above
- Don't have to stop traffic to get results
- Provides exact points of reference along corridors
- PB is validating rate of success against existing measured data
- Gives us External flows and specific link capabilities

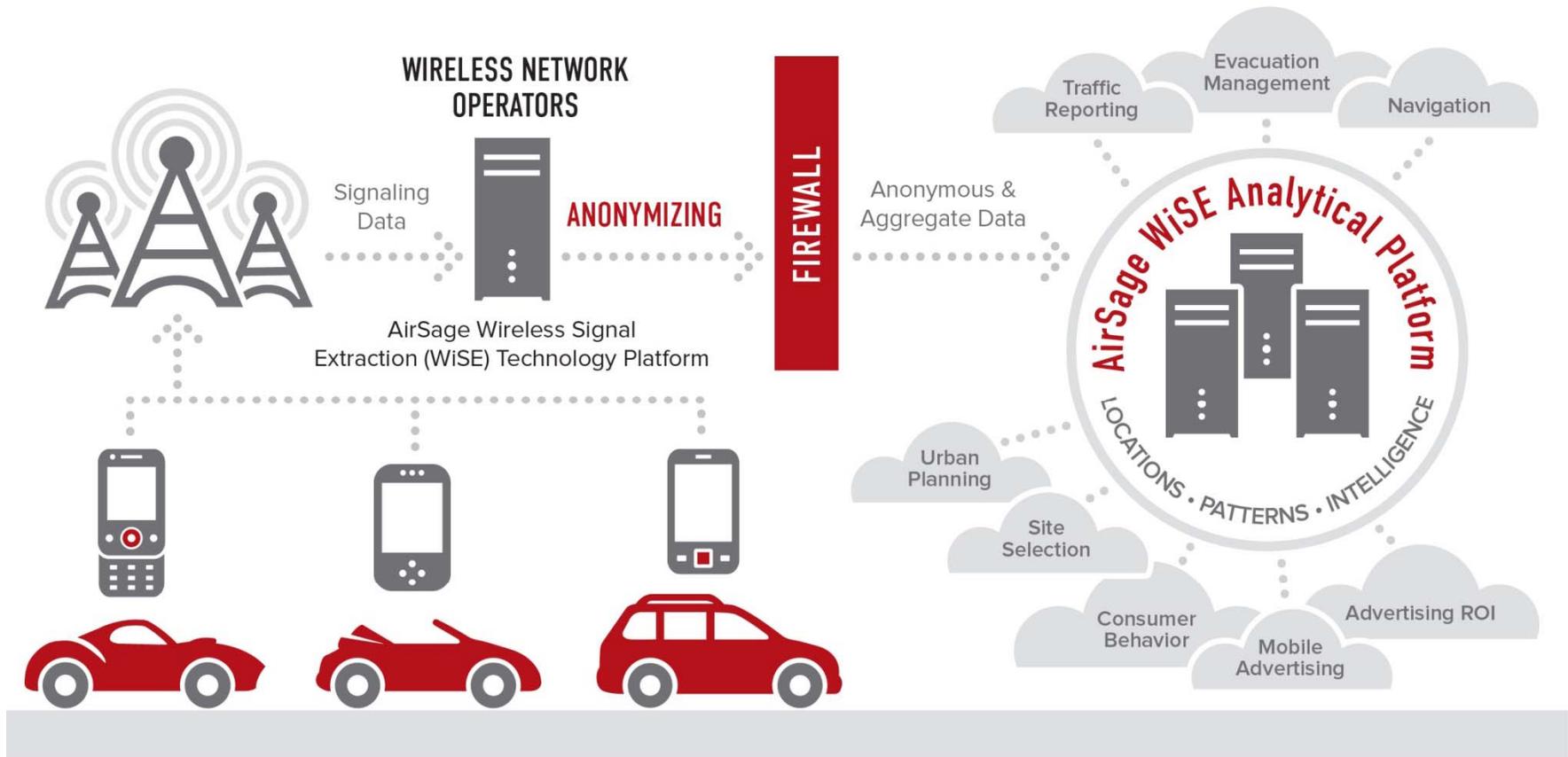


# AirSage Company Overview

- Patented **Population Analytics**
- 15 billion location data points per day
- 125 million mobile devices
- Consumer privacy protection



# AirSage WiSE Platform



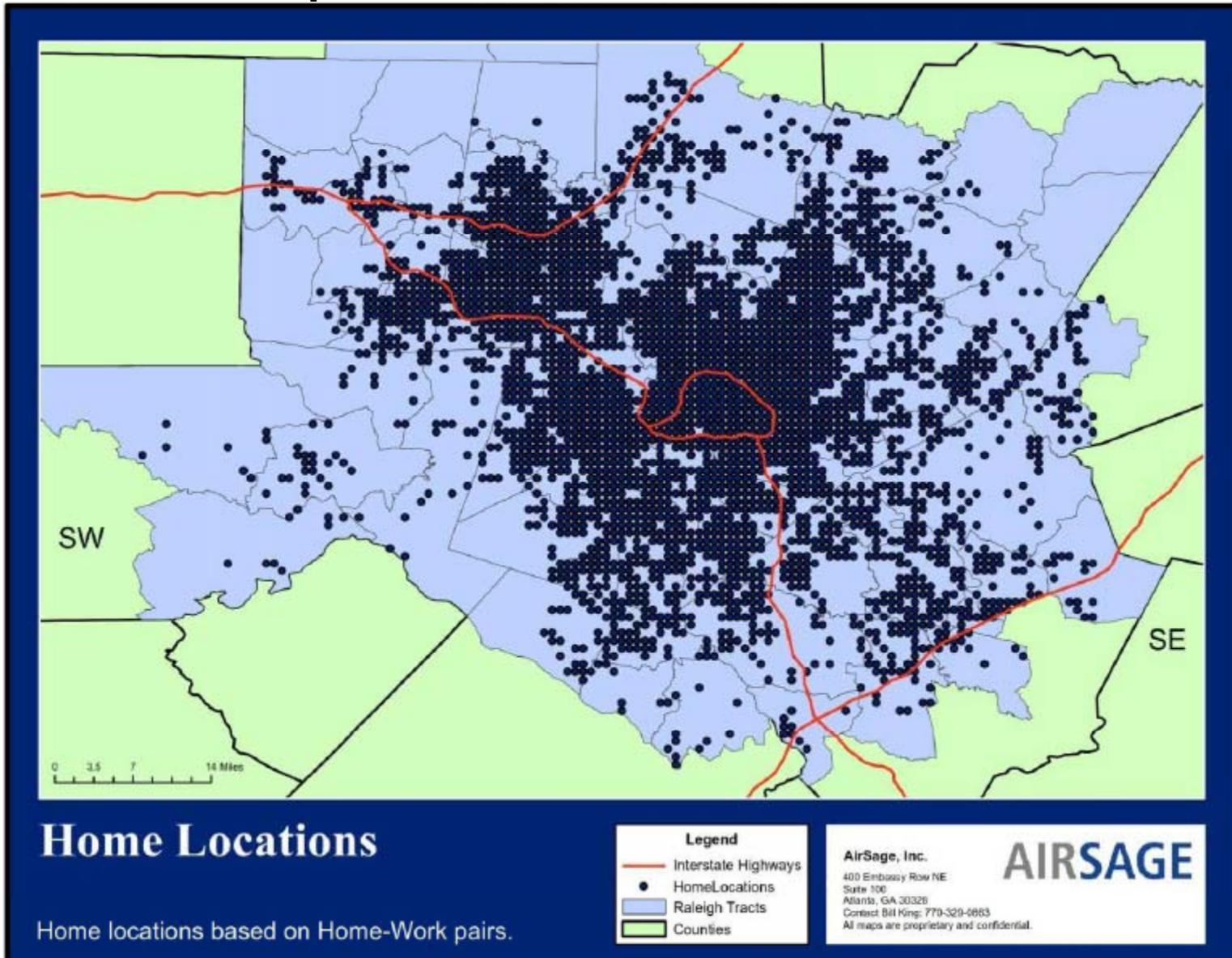
## AirSage – What we do

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**AirSage aggregates and analyzes wireless network data to determine the location and movement of cell phones, while maintaining strict user privacy.**

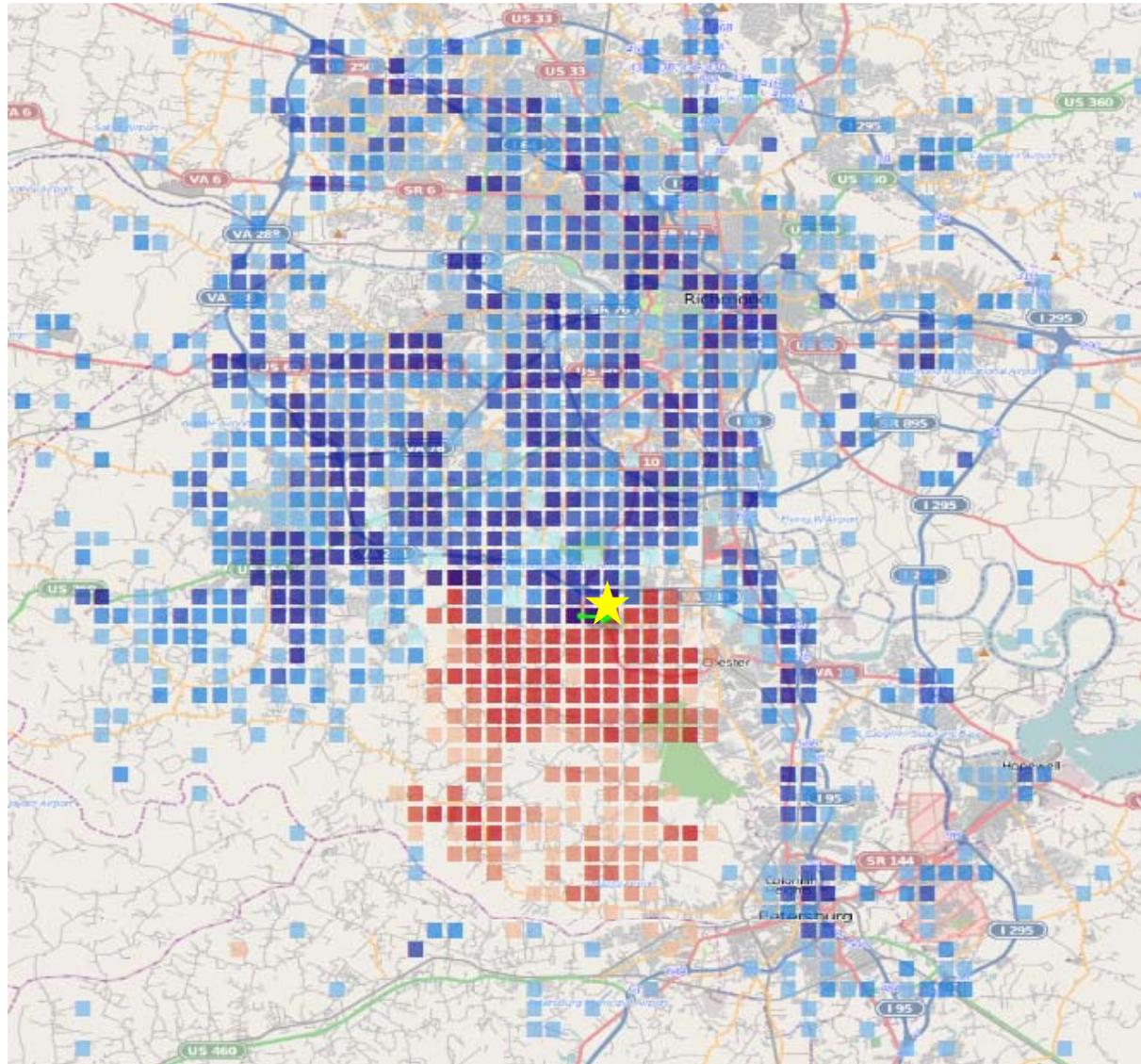
- AirSage analyzes signaling data that is continuously generated during normal operation of the wireless network – **covering mobile devices** connected to that network.
- AirSage is **the only company with access to this unique data**, via contracts with major wireless carrier partners.
- The AirSage system **operates transparently to mobile users** and the wireless network. There is no user opt-in or handset software (embedded or otherwise) required.
- With current partners , Sprint and Verizon, the AirSage platform supports real-time, network-wide coverage of **over 125 million mobile devices**.
- These 125 million “mobile sensors” generate about **12 billion location events per day**.
- The AirSage system **fully protects user privacy**. AirSage does not have access to subscriber-identifying information, and AirSage data products cannot be used to locate or “track” individual subscribers.

# Snap Shot of Data Points at 12:01 AM

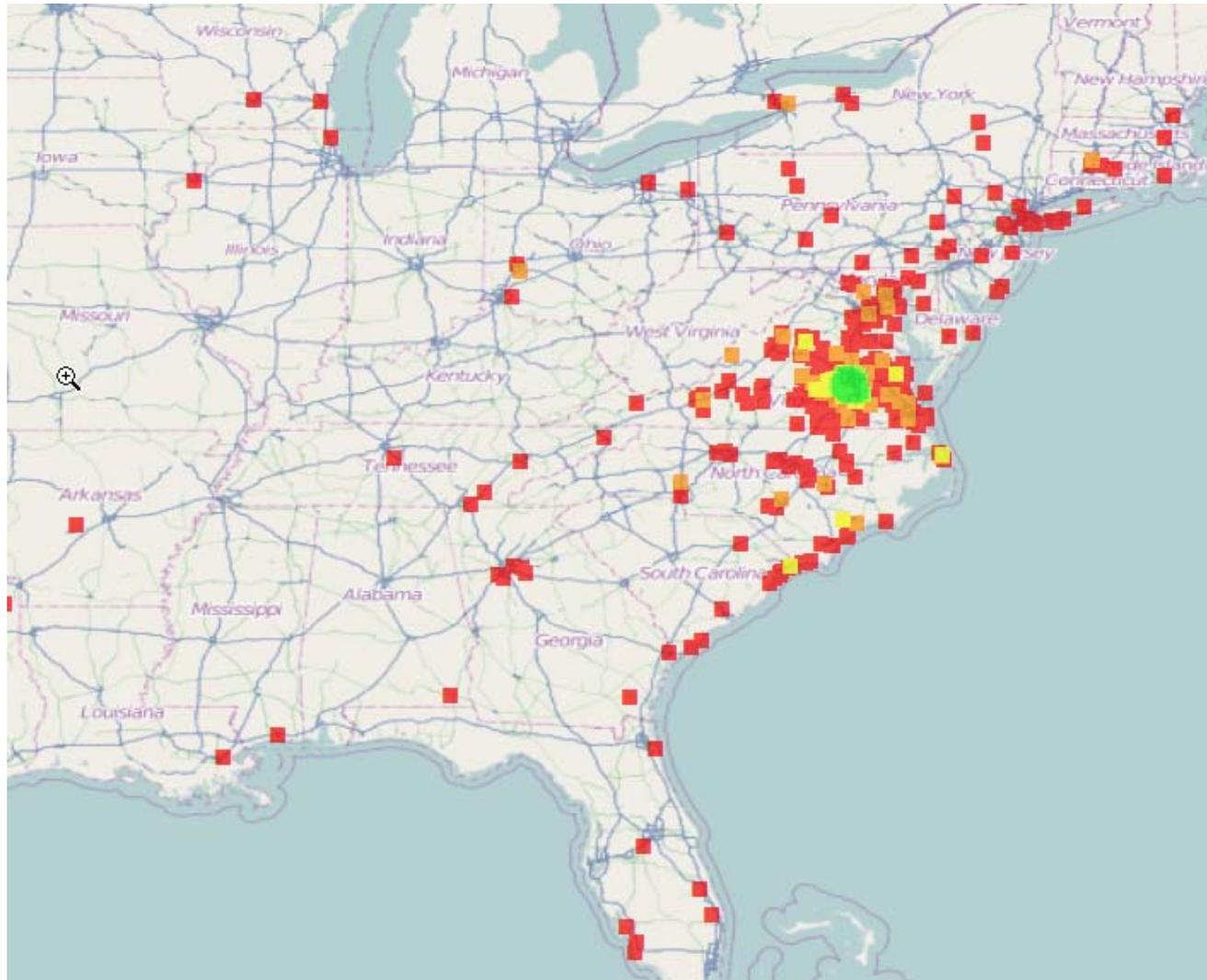


# Example Select Link

Blue –Origins  
Red-Destinations  
★ Select Link



# Example Select Link & O/D



# Data Validation

Table 4: % Daily Trips by Purpose

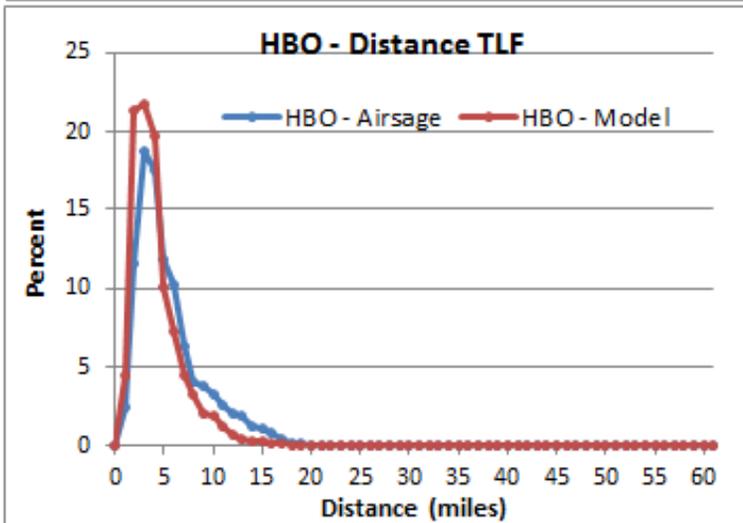
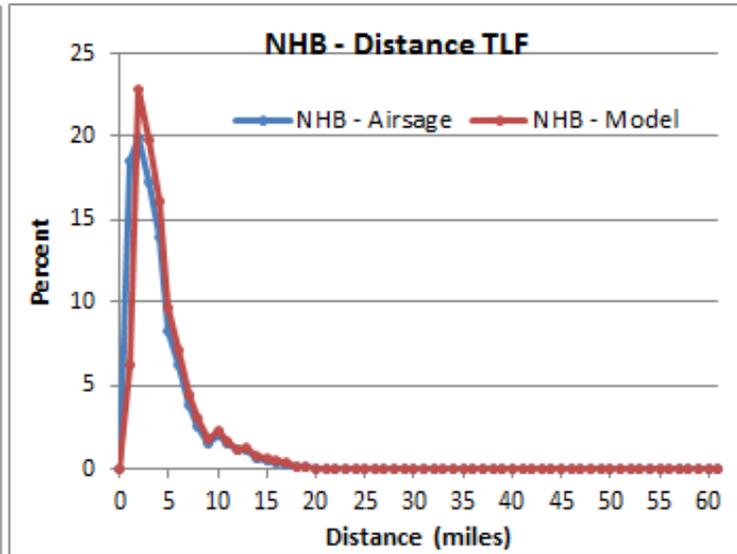
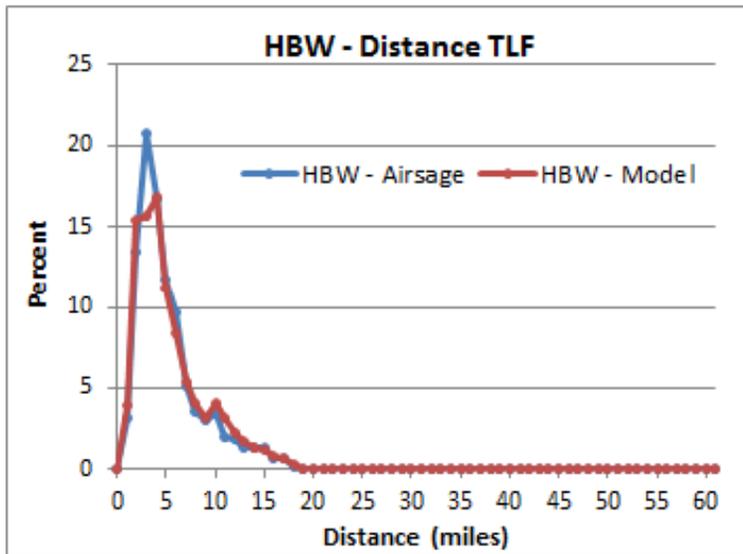
No. of Person Trips by Purpose (only Internal-Internal Trips)						
Purpose	MWC0G 2007		MWC0G 2011		AirSage 2012	
	Trips	Percent	Trips	Percent	Trips	Percent
HBW	3,522,945	20%	4,756,097	18%	3,710,309	15%
HBO	9,324,240	54%	14,865,979	58%	13,232,163	52%
NHB	4,446,044	26%	6,216,076	24%	8,553,970	34%
<b>TOTAL</b>	<b>17,293,229</b>	<b>100%</b>	<b>25,838,152</b>	<b>100%</b>	<b>25,496,442</b>	<b>100%</b>

When compared to existing models:

- Total Trips are in range
- Home-based trips are lower
- Non-Home-based trips are higher\*

\*Explained by consideration of Non-Resident Travelers

# Data Validation



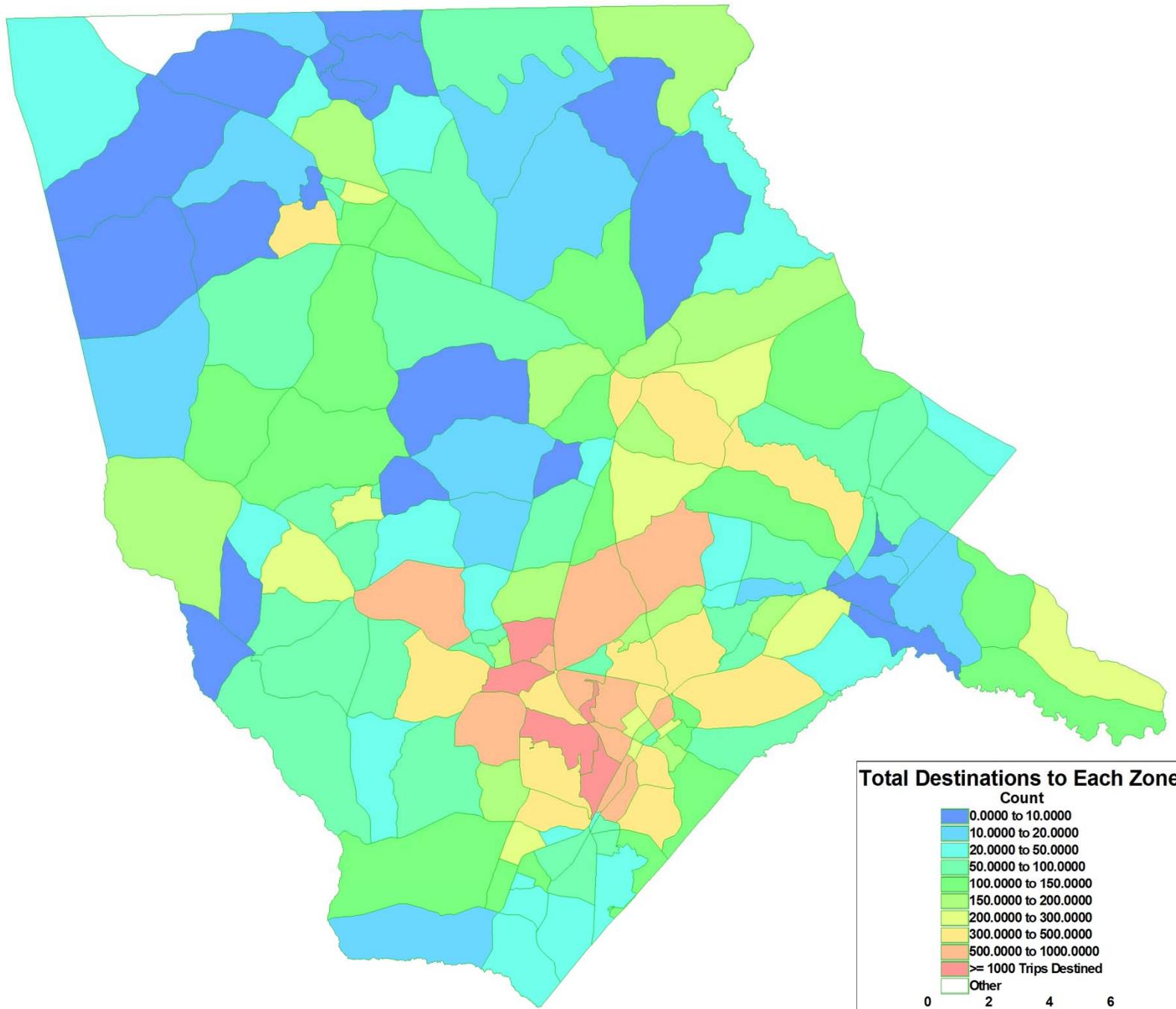
AVERAGE TRIP DISTANCES		
Purpose	Airsage	Model
HBW	4.83	5.00
HBO	5.07	3.76
NHB	5.16	3.98



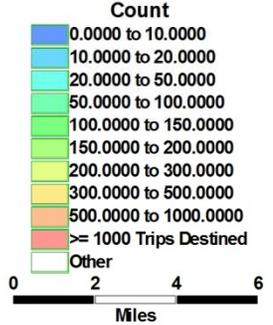
# Why Does it Help Moore County?

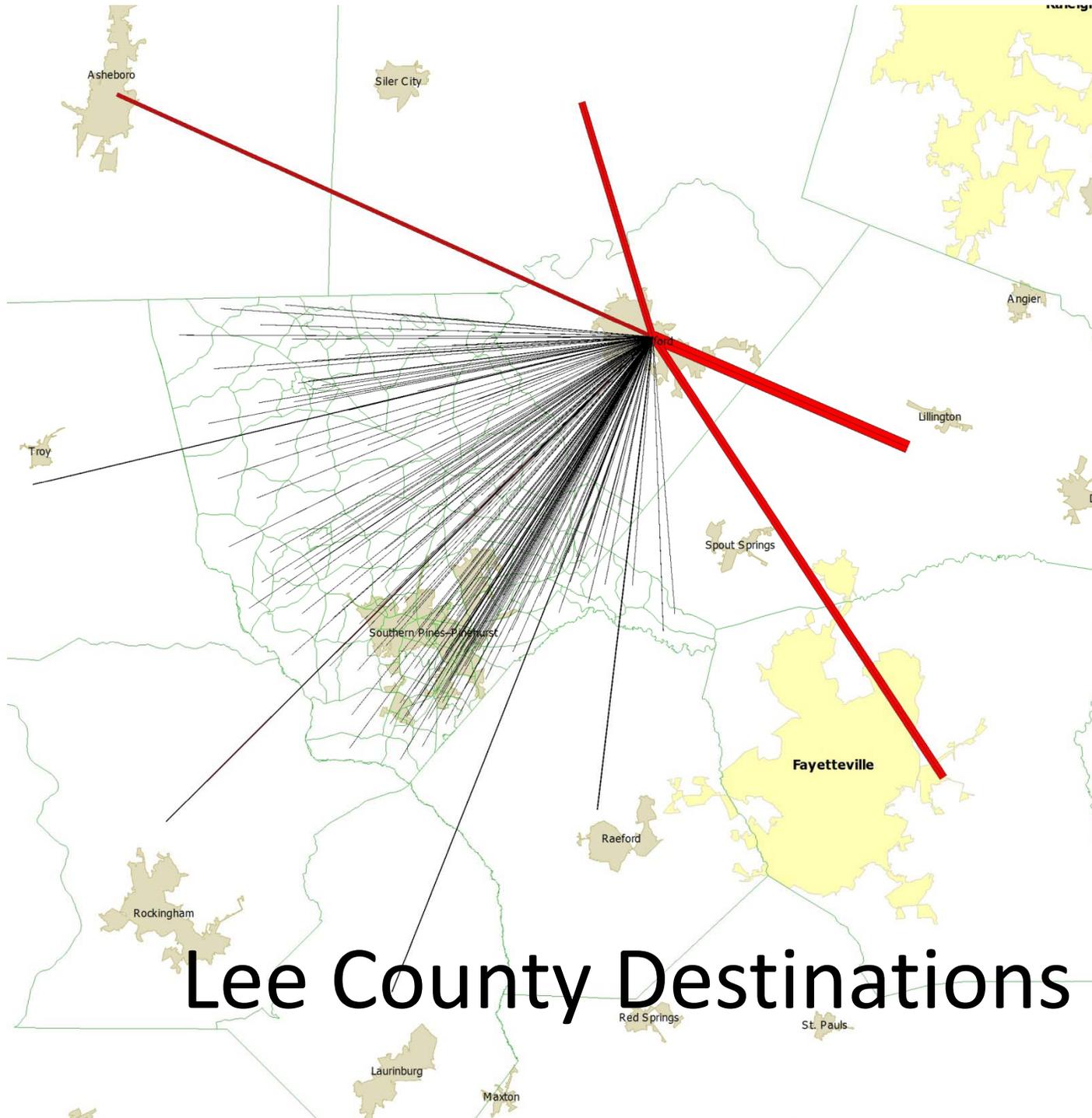
- Gives us LOCAL ACCURATE travel data to calibrate model
  - Very unusual to have in smaller modeled areas
- Allows us to determine just where people are going on specific links
- Gives unbiased samples and representative data
- Un-intrusive/easy to collect
- Provides visual (live/accurate) information to decision makers

**Data you can hang your results on 😊**



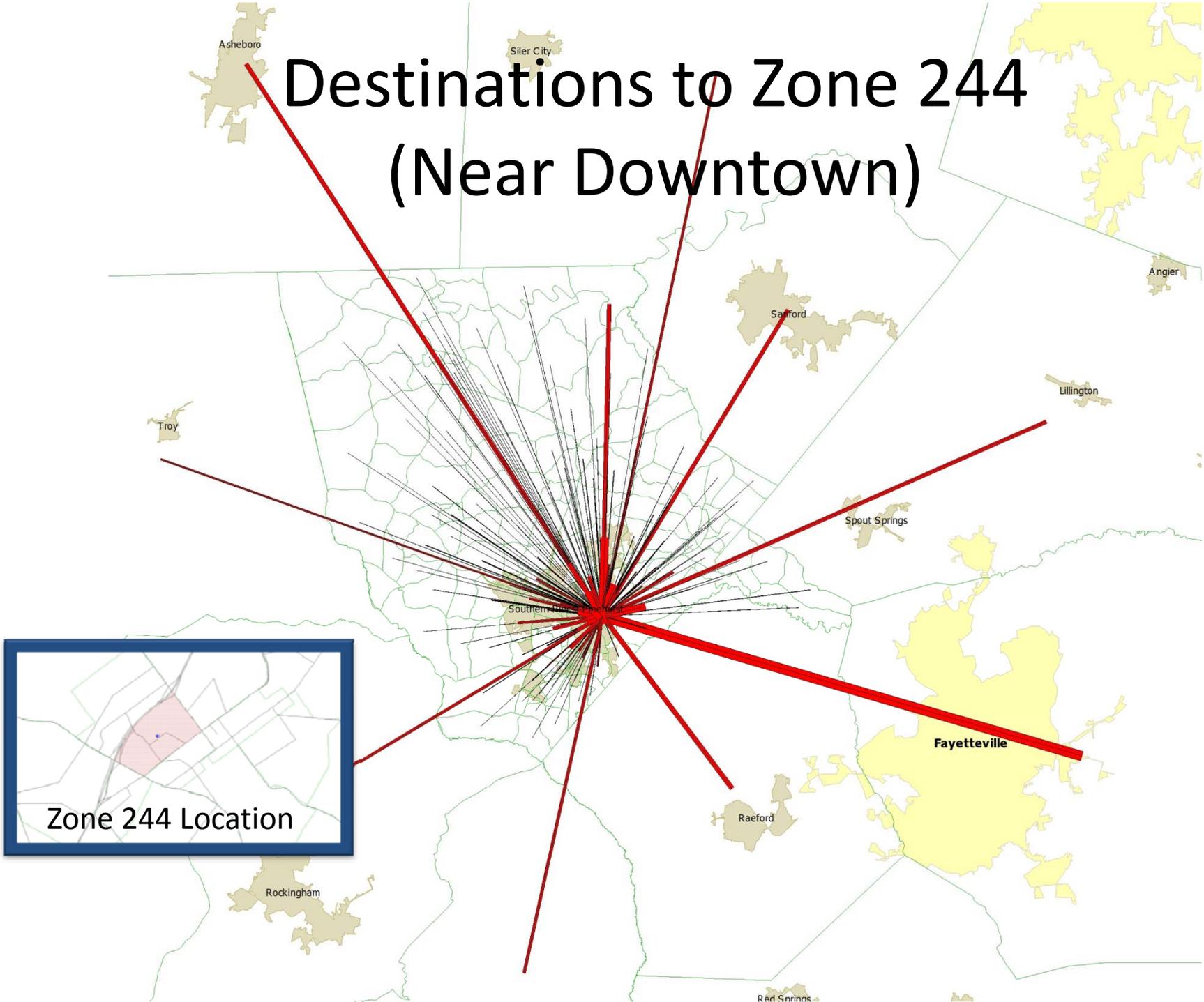
**Total Destinations to Each Zone**





# Lee County Destinations

# Destinations to Zone 244 (Near Downtown)



## Next Steps.....

1. More Airsage Data Analysis
2. Use Airsage Data to help develop external trips & validate county flows (O/D)
3. Calibrate to 2012 counts
4. Project future traffic using 2040 input data
5. Analyze, analyze, analyze

