



# Population Movements

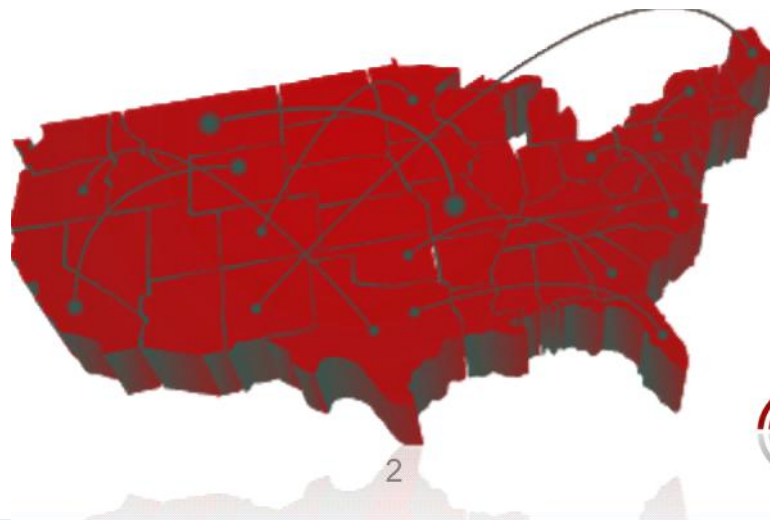
Data Solutions for your Transportation Studies

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# AirSage Company Overview

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

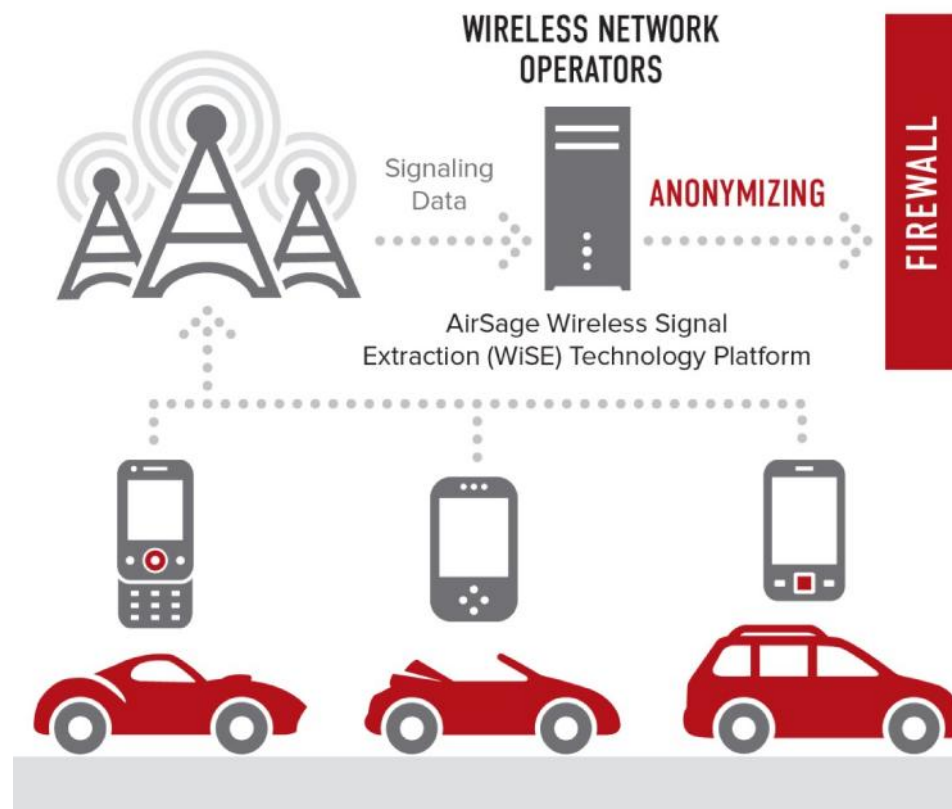


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# AirSage WiSE Platform

Behind the Firewall:



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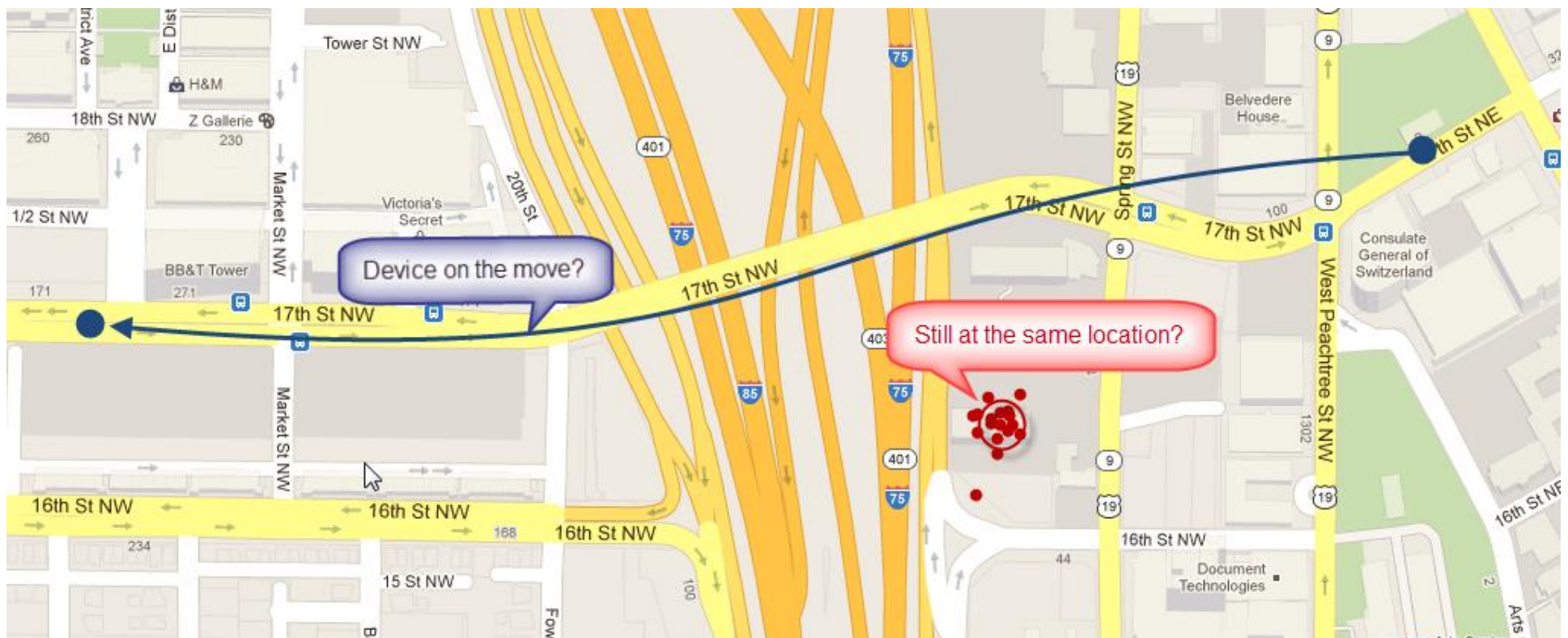
# When are locations processed?

AirSage processes and archives a location each time a mobile device interacts with the network...

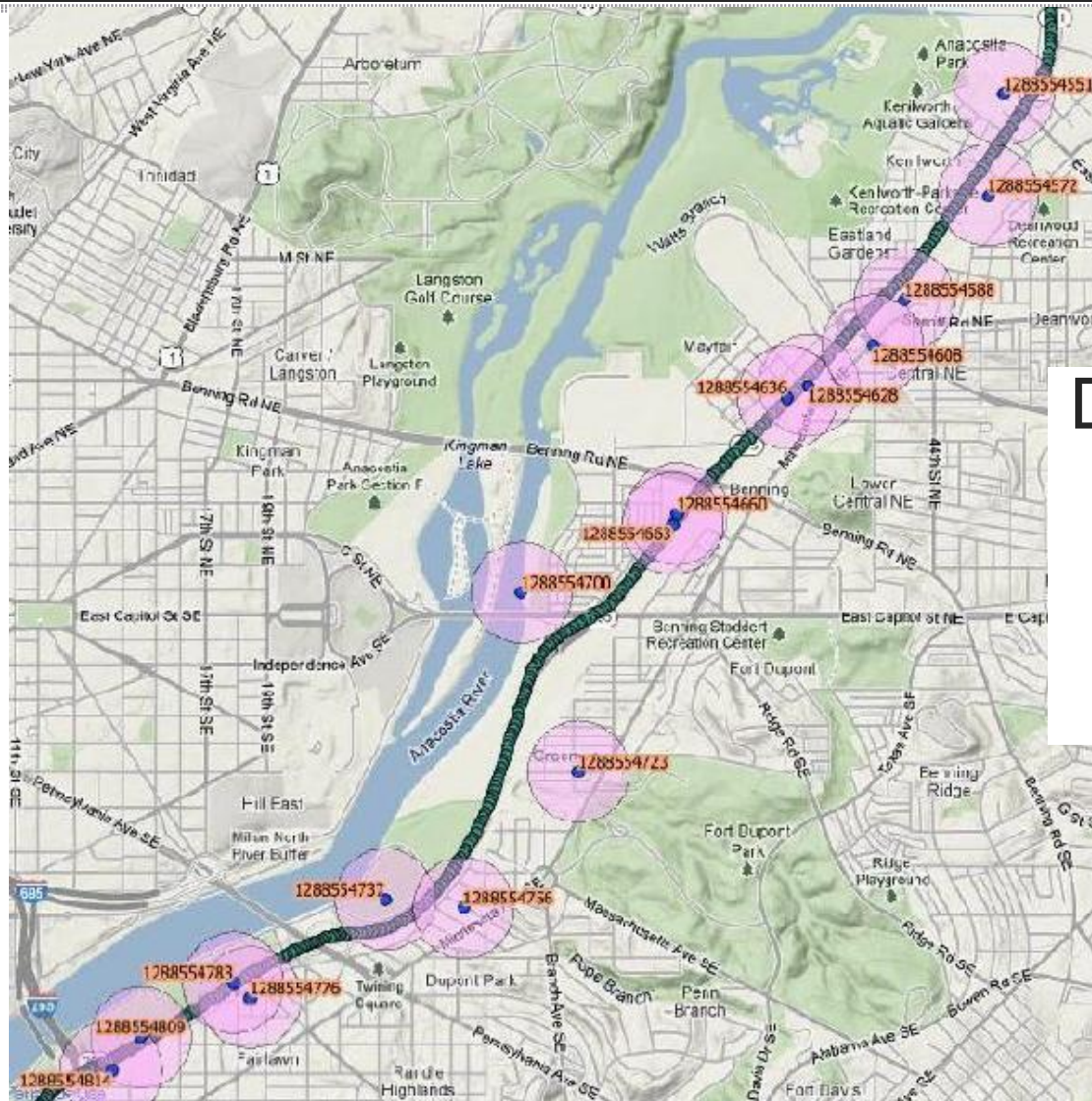


# How is each new location handled?

Each location is analyzed and compared to other locations.



# Devices on the Move



Devices on  
the move  
create  
Transient  
Points.



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# Devices at the Same Location

Devices remaining at the same location (over 5 minutes – 300 meters) create Activity Points whose location is refined and then analyzed for:

- Arrival time at location
- Departure time from location
- Activity duration

# Understanding Activity Patterns

“The average person doesn’t visit more than 13 unique locations per month” – Marta Gonzalez, MIT

## Activity Patterns:

- Top 20 location clusters for every device
- Cluster frequency summarized
- Cluster schedule summarized
- Cluster purpose research

# Understanding Activity Patterns

Activity Points are examined to determine the most common nighttime location.

This is deemed the “Home Location”

A penetration analysis is done at the Census Block Group level to determine the extrapolation factor for each device

The sample is then scaled to represent the movements of 100% of the Population.

# Understanding Activity Patterns

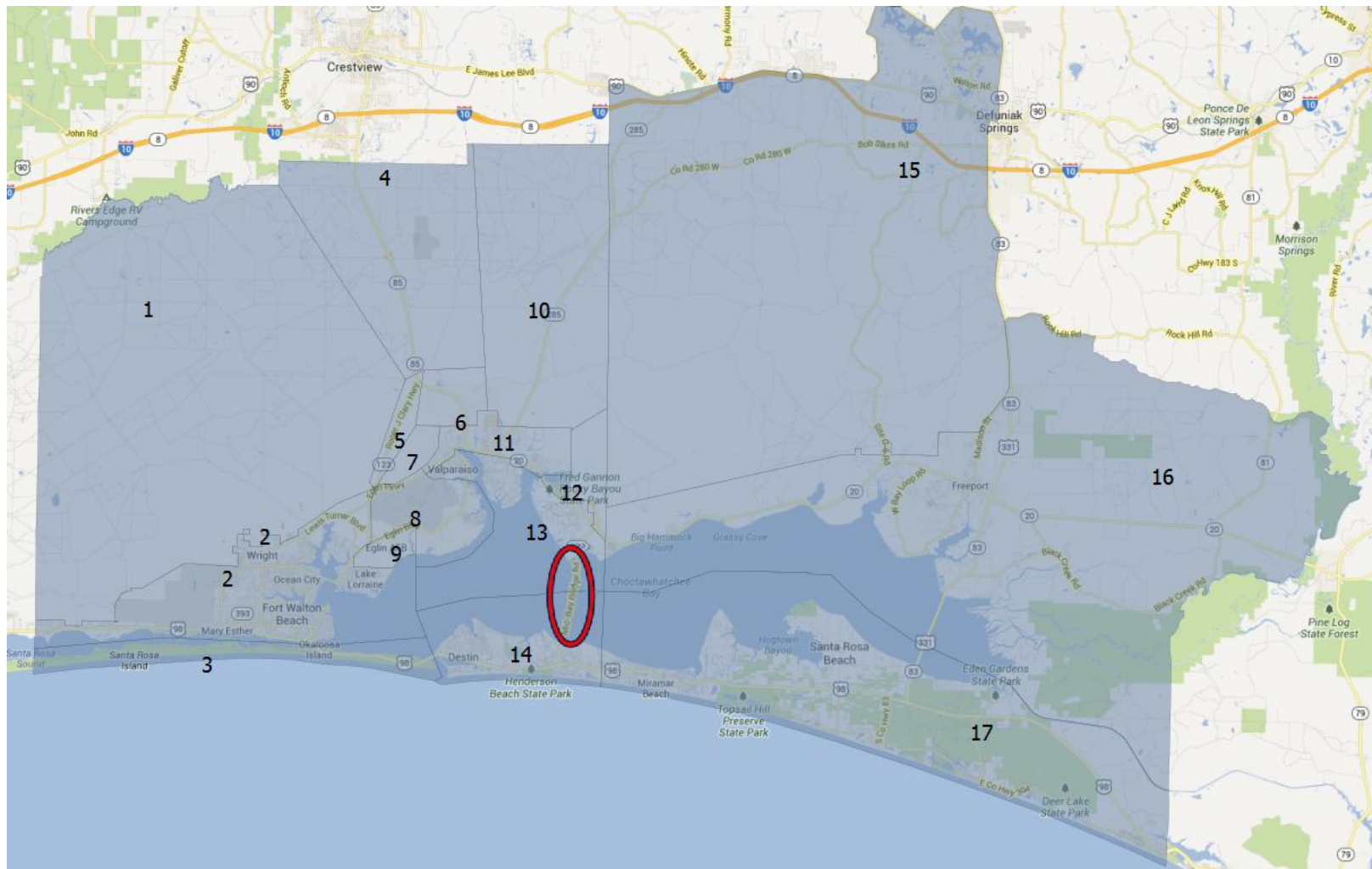
Activity Points are examined to determine:

- Home Location
- Work Location

And then Linked to generate Trips by

- Daypart by Type (Home, Work, Other)
- Time of Day Information (Minimum 3hr bracket)
- Resident Classifications (Resident Worker, Home Worker, Inbound Commuter, Outbound Commuter, Short-Term Visitor, Long-Term Visitor)

# Bridge Crossing: Niceville, FL



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# Niceville, FL: Results

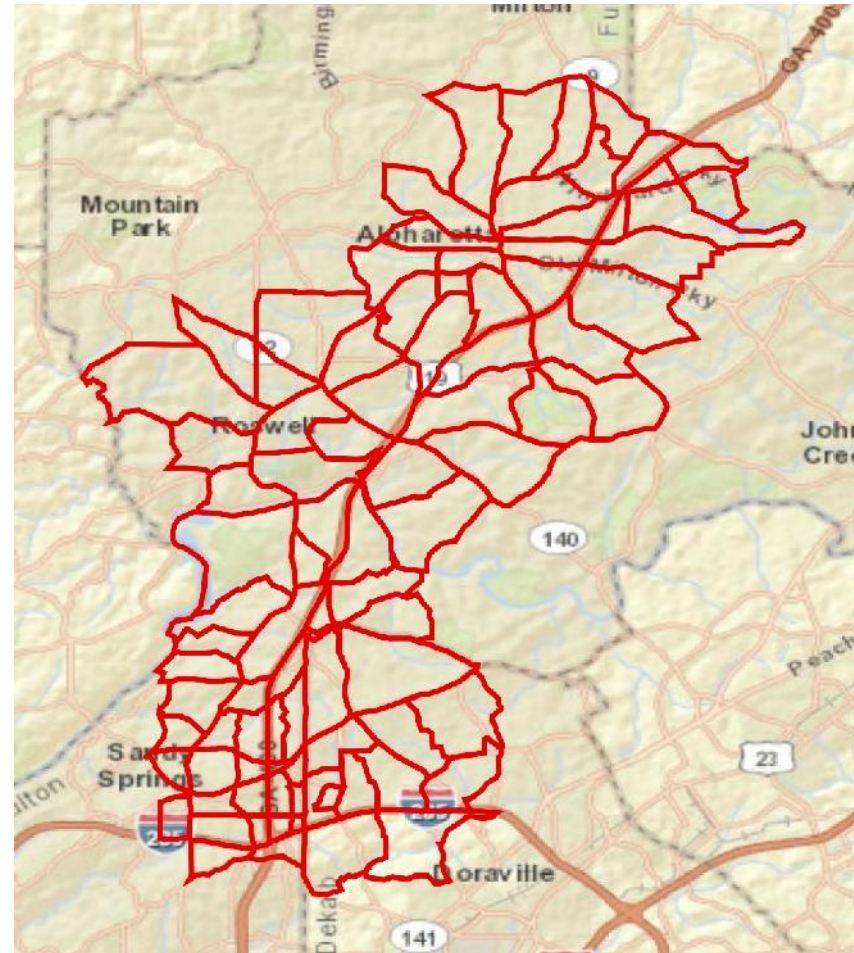
*“The estimation of traffic flows using the **AirSage data compares within 3% of the average daily machine counts** for the same period. This is within range of counter error and provides **very good correlation with the origin and destination data.**”*

*Tom Hiles, HDR*

# Transit Example - MARTA

2012 SR 400 Corridor  
extension of MARTA for:

AECOM  
Atkins



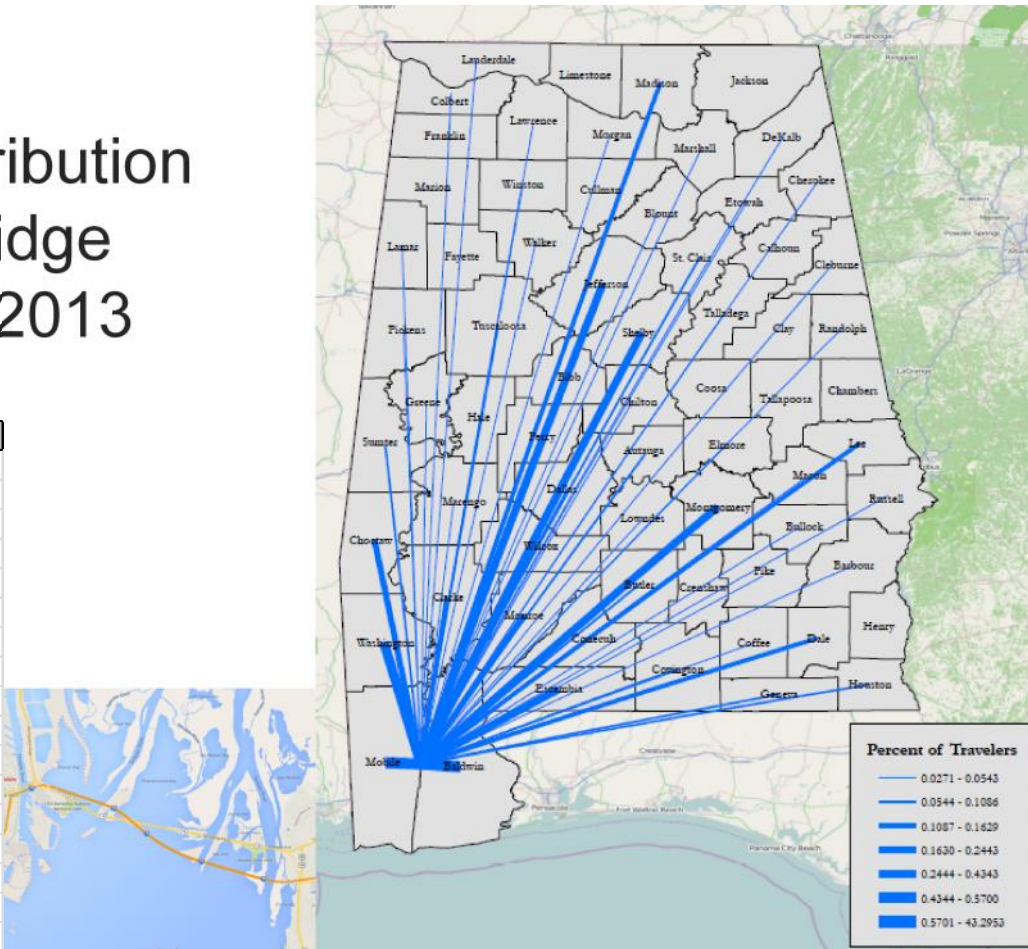
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# Select Zone Analysis

## Proportional Distribution Mobile Bay Bridge November 13, 2013

stateID	STATE	countyID	COUNTY	End	Proportion
01	Alabama	001	Autauga	Home	0.04%
01	Alabama	003	Baldwin	Home	21.58%
01	Alabama	005	Barbour	Home	0.03%
01	Alabama	009	Blount	Home	0.03%
01	Alabama	011	Bullock	Home	0.01%
01	Alabama	013	Butler	Home	0.04%
01	Alabama	019	Cherokee	Home	0.01%
01	Alabama	021	Chilton	Home	0.01%
01	Alabama	023	Choctaw	Home	0.11%
01	Alabama	025	Clarke	Home	0.08%
01	Alabama	031	Coffee	Home	0.03%
01	Alabama	033	Colbert	Home	0.01%
01	Alabama	035	Conecuh	Home	0.01%
01	Alabama	039	Covington	Home	0.05%
01	Alabama	045	Dale	Home	0.07%
01	Alabama	047	Dallas	Home	0.05%
01	Alabama	049	DeKalb	Home	0.03%



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# Home Locations



Sampled Lake Mead Visitors  
October 13, 2012



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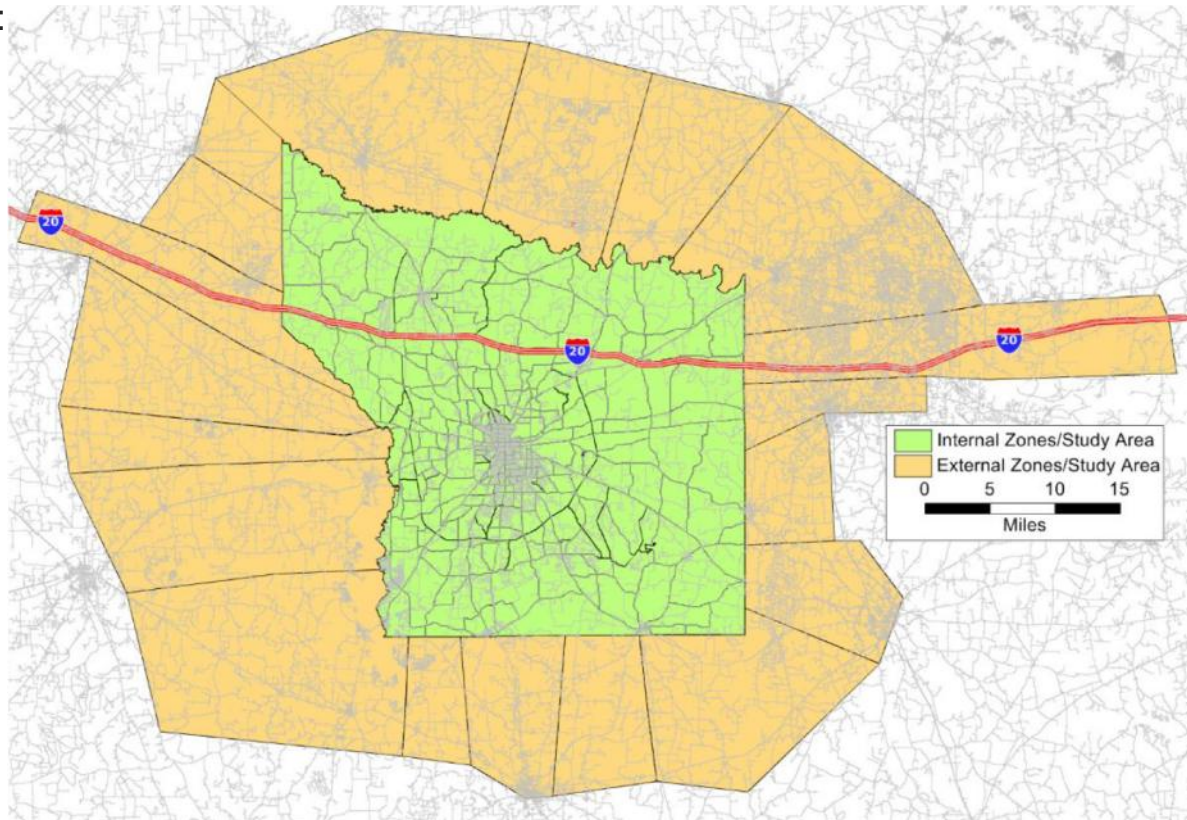
# External Trips Matrix

For an **Internal & External** Study Area Analysis containing:

- **More than 1** type of geography for internal and external zones (ex. Internal – census tract, External - county)

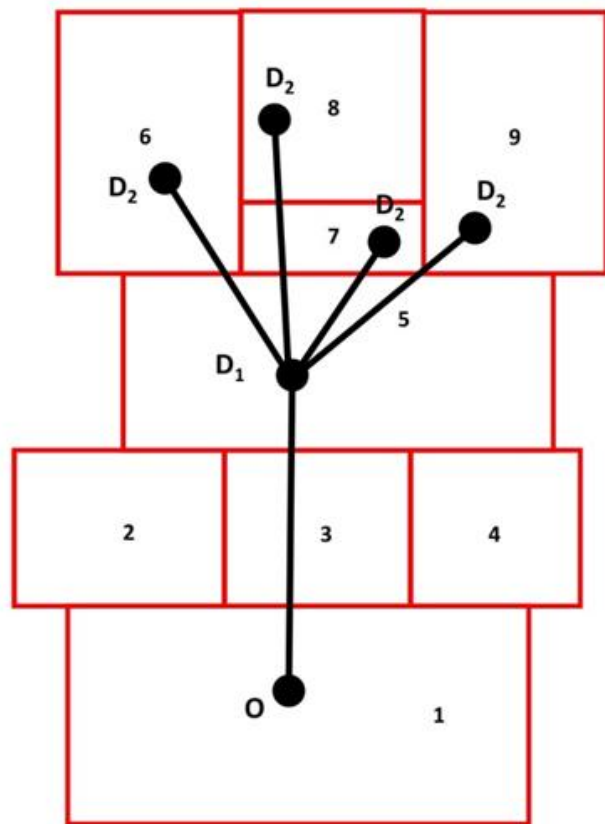
Includes:

- ✓ **Internal – Internal Trips**
- ✓ **Internal – External Trips**
- ✓ **External – Internal Trips**



# Super Matrix

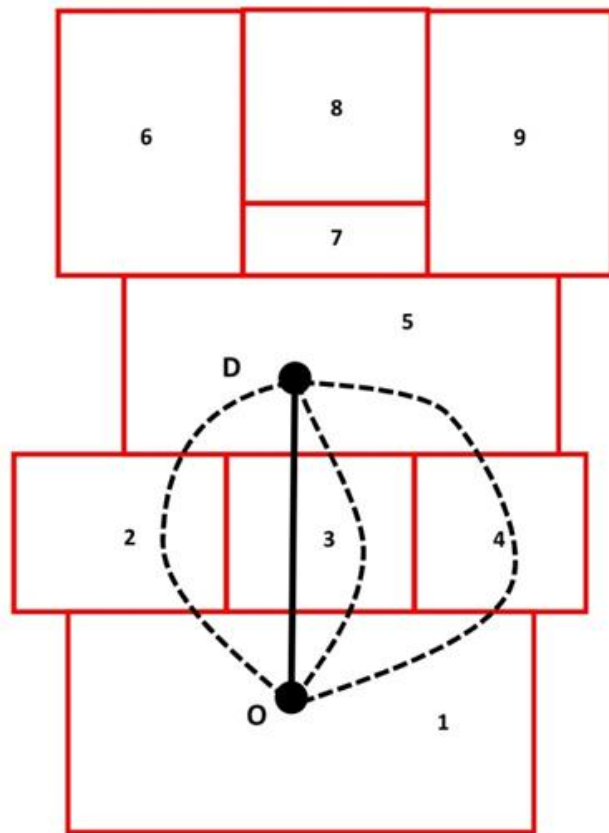
## Super Matrix



- Super Matrix is a breakdown of trips that were made after a completed trip leg.
- EXAMPLE: For the Zone 1 to Zone 5 trip leg, the count or % of subsequent trips. The subsequent trips have an origin  $D_1$  and new destination  $D_2$ .

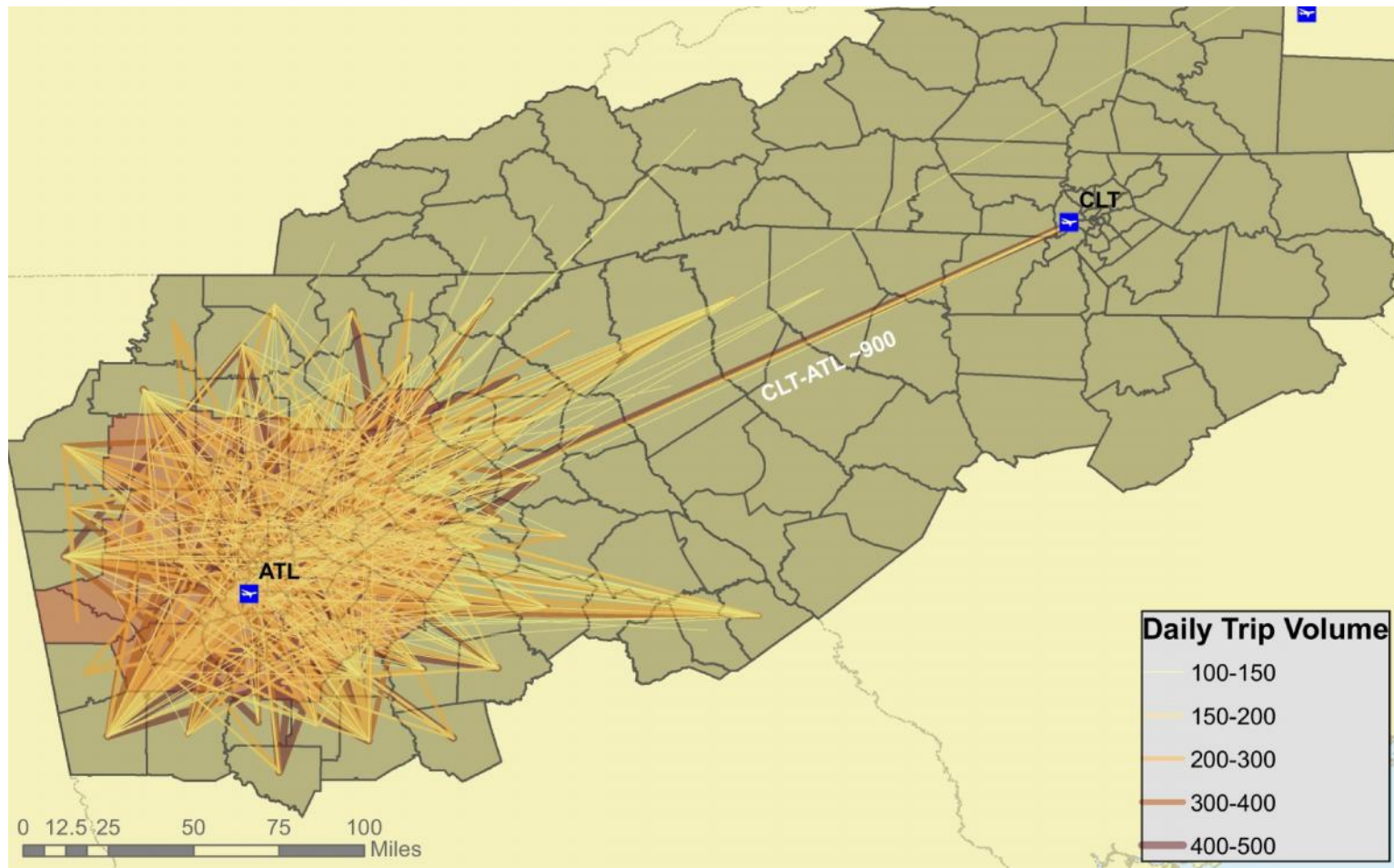
# Sub Matrix

## Sub Matrix



- Submatrix is a breakdown of trips that were made through any new zones between the origin and destination.
- EXAMPLE: For the Zone 1 to Zone 5 trip leg, the count or % of trips that pass through intermediate Zones 2, 3, and 4.

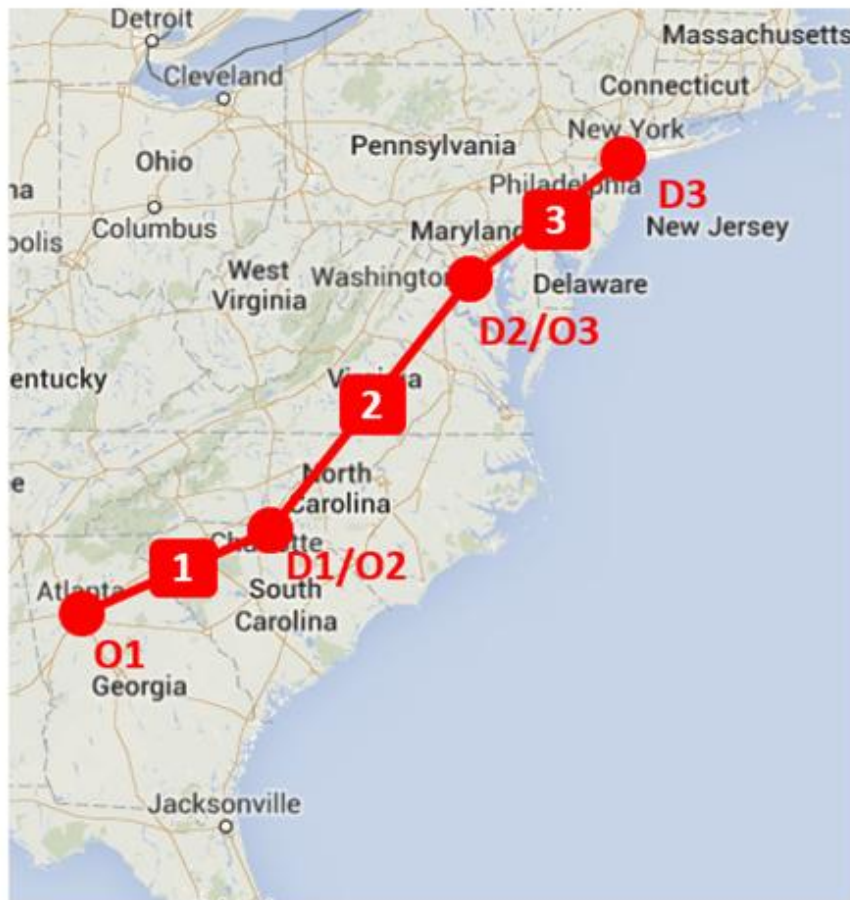
# Long Distance



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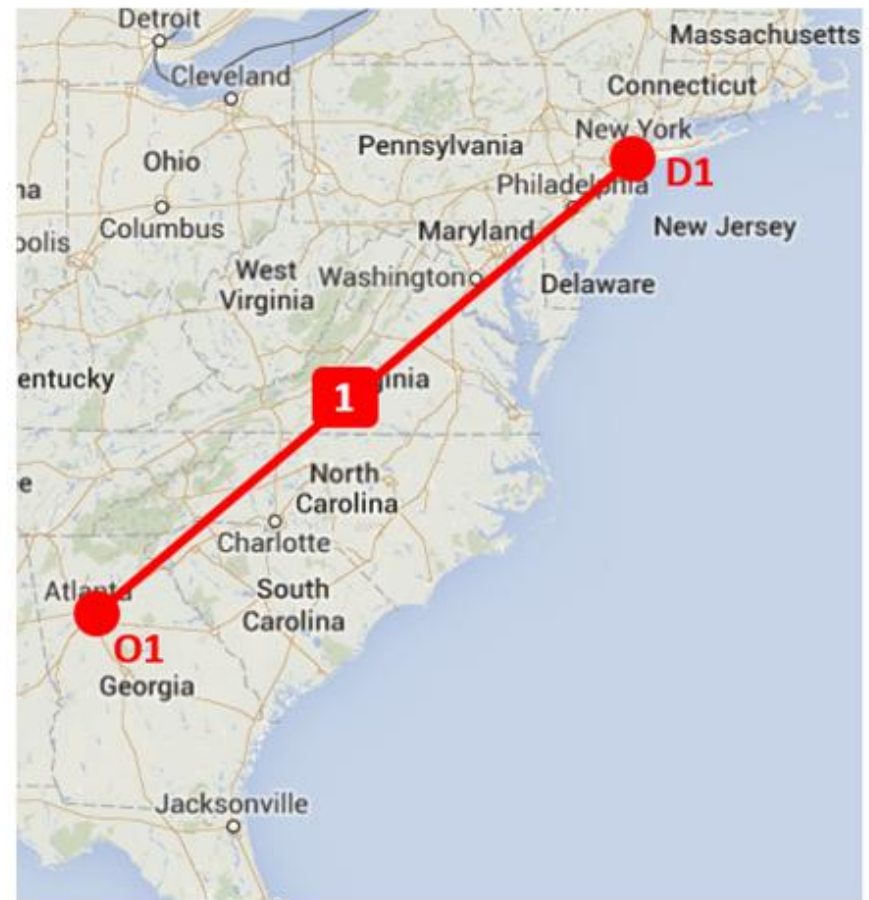
# Long Distance

Standard Trip Leg (No Filter)



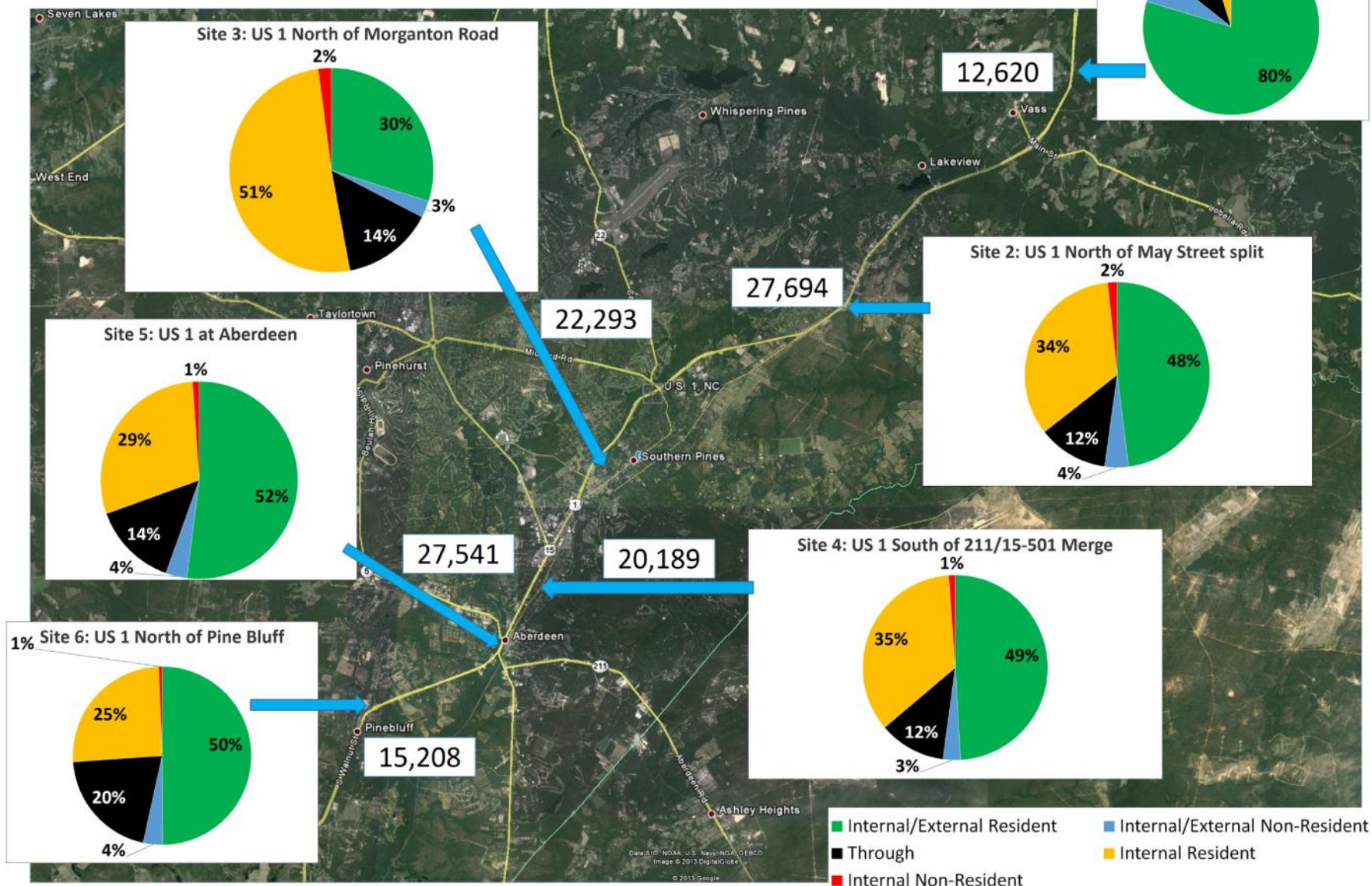
Three trip legs with 3 separate origin (O1, O2, O3) and 3 separate destination (D1, D2, D3) points.

Long Distance Trip Leg (Filter Applied)



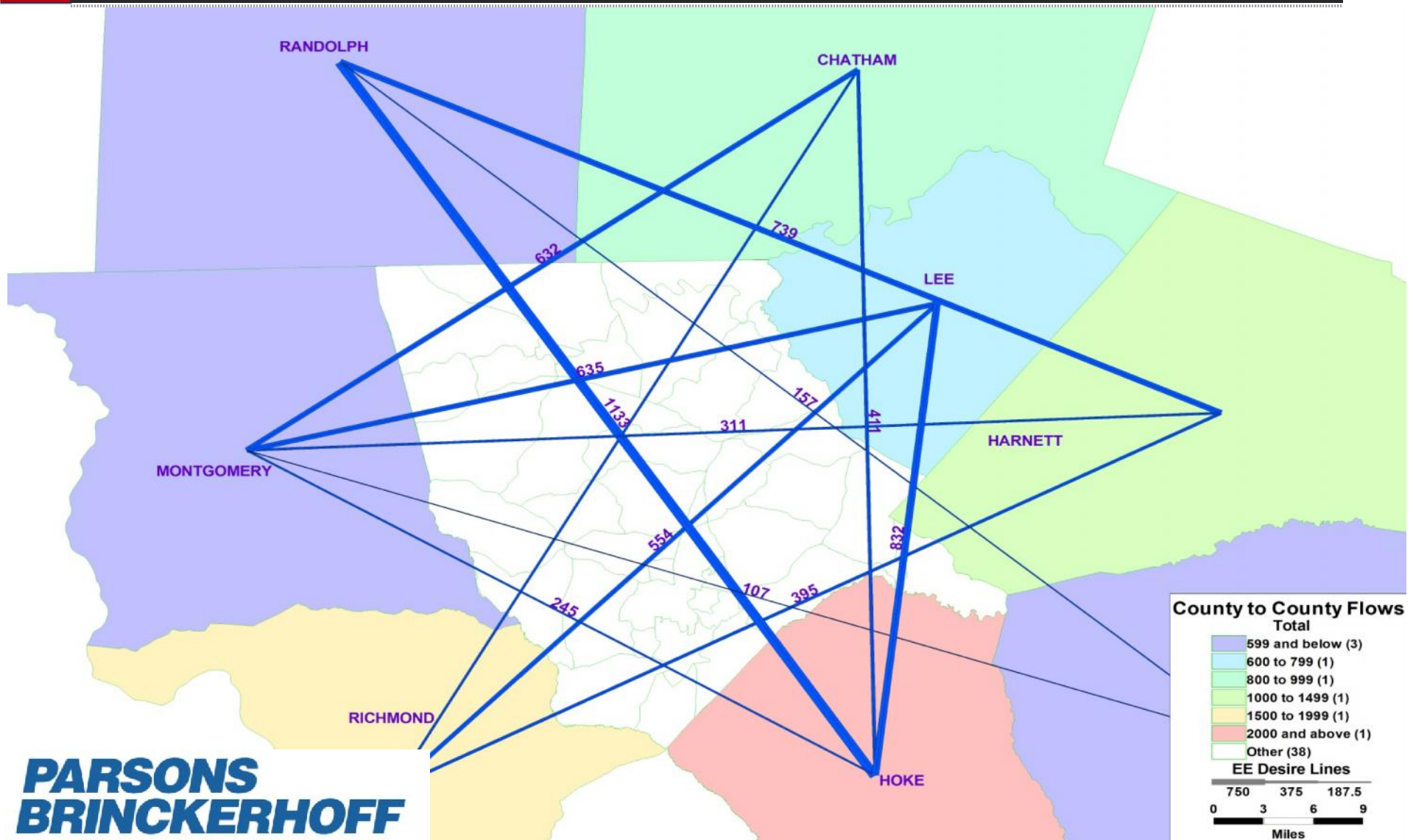
Single trip leg with one origin (O1) and one destination (D1) point.

## US 1 in Moore County OD Flows By Trip Type Using AirSage Data



\*Flows are assigned OD's not official AADT's & may not match exact 2013 counts

# County to County Flows (Through Trips)



# Assigning AirSage Matrices

*“The biggest difference noted is for rural facilities...the TRM (Triangle Regional Model) and AirSage are quite different... **AirSage data actually matches the traffic counts for these rural facilities better than the TRM.**”*

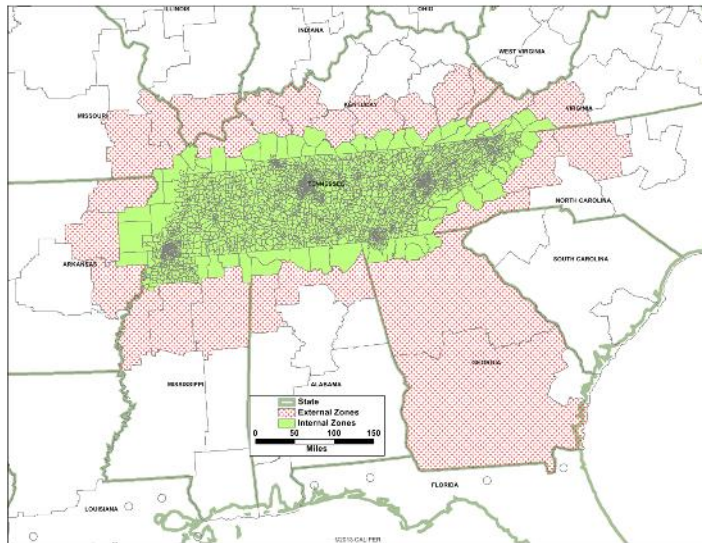
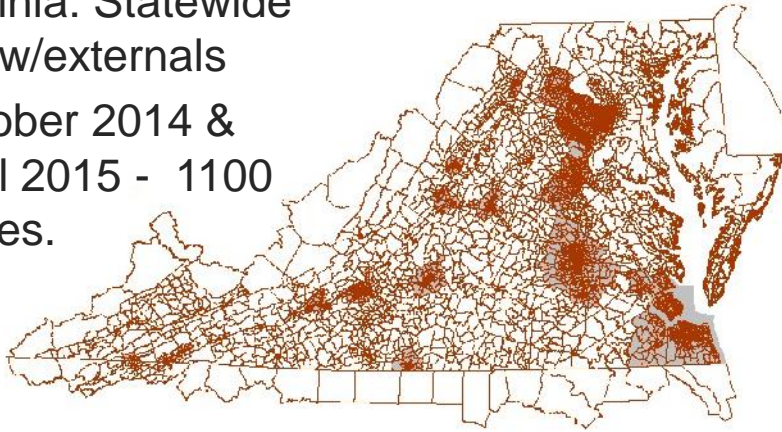
*Leta Huntsinger, PhD, P.E.*

*Parsons Brinckerhoff Systems Analysis Group*

*“Reconciliation of Regional Travel Model and Passive Device Tracking Data”*

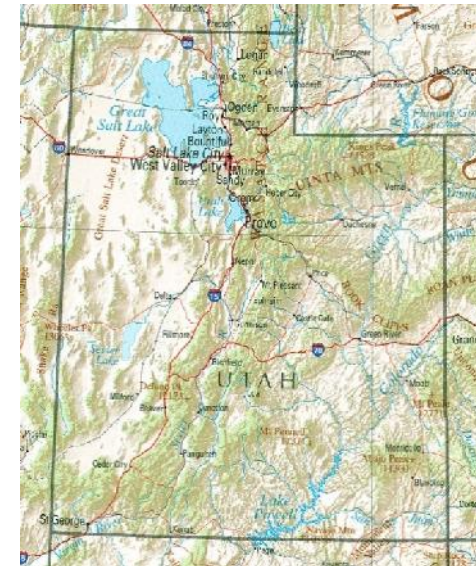
# Statewide Models

Virginia: Statewide  
OD w/externals  
October 2014 &  
April 2015 - 1100  
Zones.



UTAH: Statewide OD

- Study Seasonal Variation
- Sep 2012 and Jan-Feb 2013



Tennessee: Statewide OD w/externals

- October 2014 – 1225 Zones.



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# Sample of Data Format

	A	B	C	D	E	F	G	H	I
1	Origin_Zone	Destination_Zone	Start_Date	End_Date	Aggregation	Subscriber_Zone	Purpose	Time_of_Day	Count
2	94	37	20130702	20130731	WD	Visitor	OO	H00:H24	5.08
3	420	343	20130702	20130731	WD	Resident	HW	H00:H24	1.49
4	548	33	20130702	20130731	WD	Resident	WO	H00:H24	5.01
5	68	164	20130702	20130731	WD	Resident	OO	H00:H24	4.96
6	256	400	20130702	20130731	WD	Resident	HO	H00:H24	5.97
7	498	62	20130702	20130731	WD	Resident	HW	H00:H24	4.37
8	1	176	20130702	20130731	WD	Resident	OH	H00:H24	4.71
9	54	33	20130702	20130731	WD	Resident	OO	H00:H24	18.54
10	255	311	20130702	20130731	WD	Resident	HO	H00:H24	1.65
11	543	85	20130702	20130731	WD	Resident	HO	H00:H24	1.19
12	268	62	20130702	20130731	WD	Resident	OH	H00:H24	25
13	110	425	20130702	20130731	WD	Resident	WH	H00:H24	0.41
14	1005	249	20130702	20130731	WD	Resident	WH	H00:H24	2.63
15	1003	3	20130702	20130731	WD	Visitor	HO	H00:H24	4.36
16	221	102	20130702	20130731	WD	Resident	HO	H00:H24	1.82
17	12	45	20130702	20130731	WD	Resident	HH	H00:H24	2.97
18	290	286	20130702	20130731	WD	Visitor	OO	H00:H24	2.59
19	400	593	20130702	20130731	WD	Visitor	OO	H00:H24	0.46
20	122	160	20130702	20130731	WD	Resident	HO	H00:H24	1.26



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# Sample of Pricing Variables

Product	Trip Matrix
# of Zones	51
# of Months Covered per Report	1
# of Reports *	1
Population Covered	3,000,000
Long Distance Trip Filter	No

## Internal & External Zones Options:

Internal Zones Only	Yes
Internal & External (Include all I-I, E-E and E-I-E trips)	No
Internal & External (Include only I-I and E-I-E Trips)	No

## Day Aggregation Options:

Average Weekdays (T-Th)	Yes
Average Weekend Day (Sat-Sun)	Yes
Average Full Week (Sun-Sat)	No
Total Weekdays (M-F)	No
Total Weekends (Sat-Sun)	No
Total Full Week (Sun-Sat)	No
Avg. Specific Day of Week*	No
All Individual Days* (enter #)	0
Total Specific Day(s)* (enter #)	0
Total	2

## Day Part Aggregations (3 hr min\*)

Early AM	no
AM Peak (6am-9:30am)	Yes
Mid-Day	No
PM Peak (3pm-6:30pm)	Yes
Late PM	no
24 hour Total	yes
Total	3

## Trip Purpose Attributes

3-Class (Home-based Work, Home-based Other, Other-based Other)	Yes
9-Class (HBW, HBO, WBO, WBH, WBW, HBH, OBO, OBH, OBW)	No
Total	3

## Residence Class Attributes

2-Categories (Residents, Visitors)	Yes
6-Categories (Res Worker, Home Worker, In-Commuter, Out-Commuter, Short-Term Vis, Lg-Term Vis) Requires Int/Ext Zone option	No
Total	2

## Demographic Attributes

Bundle includes the 3 below:	No
Annual Household Income (census bins) (Or customer-specific bins*)	
Age (census bins) (Or customer-specific bins*)	
Autos (census bins) (Or customer-specific bins*)	
Total	0

## Optional Add-on Reports

### Home-Work Matrix Report

County to County	No
Use Study Zones	No

### Home Location Report

Home Locations Only Within Study Area*	No
Home Locations Nationwide*	No

## Quote Summary

# of Zones/Pairs	2,601
# of Day Aggregations	2
# of Day Part Aggregations	3
# of Trip Purpose Attributes	3
# of Res Class Attributes	2
Total # of Records	93,636
Base Report Calculation	\$ 12,439

Adjusted for Min Price (\$10k)	\$ 12,439
Population Adjustment	\$ -
Subtotal	\$ 12,439

Demographic Attributes Option	\$ -
External Zone Adjustment	\$ -
Time Frame Adjustment	\$ -
Long Distance Adjustment	\$ -

Total Base Price (1 report)	\$ 12,439
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Total Base Price (all reports)	\$ 12,439
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Transient Zone	\$ -
Home-Work Matrix	\$ -
Home Location Report	\$ -
Total Price with Optional Reports	\$ 12,439

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# IBM and MIT Research

- Research Concludes AirSage Data
  - Allows for **lower collection cost**, a **larger sample size**, **higher update frequency**, and a **broader spatial and temporal coverage**
  - Produces audience measurements that are **more credible than current static measurements**, thus providing **rich information to support transportation planning and operation**



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*Bill King, PE*

