

AirSage Data use in Travel Demand Modeling and Project Development Studies

presented by
Daniel J. Beaty, AICP

December 8, 2015





Partners



District Three Planning



Presentation Outline



- Data available from AirSage
- Design of Data Set (geography)
- Content of Data Set
- Limitations of Data Set
- Uses of Data Set
- Conclusions
- Questions



Data Available from AirSage

Available Data - Transportation



- Long-range transportation
- Travel demand modeling
- DRI
- Special Event
- Toll Road, HOV & HOT Projects
- Transit & Air Quality Studies
- Understanding commuter patterns
- Reducing traffic flow restriction, congestion & system bottle necks
- Determining whether proposed roadways will offer improvements or create new problems
- Logistics improvement & predicting cut-through traffic

Available Data - Composition



- Duration of Data (How many days)
- Size of Geography
- Detail of Geography
- Types of Trips
- Data Totaled or Averaged
- Time Periods
- Census Information
- Residence Class

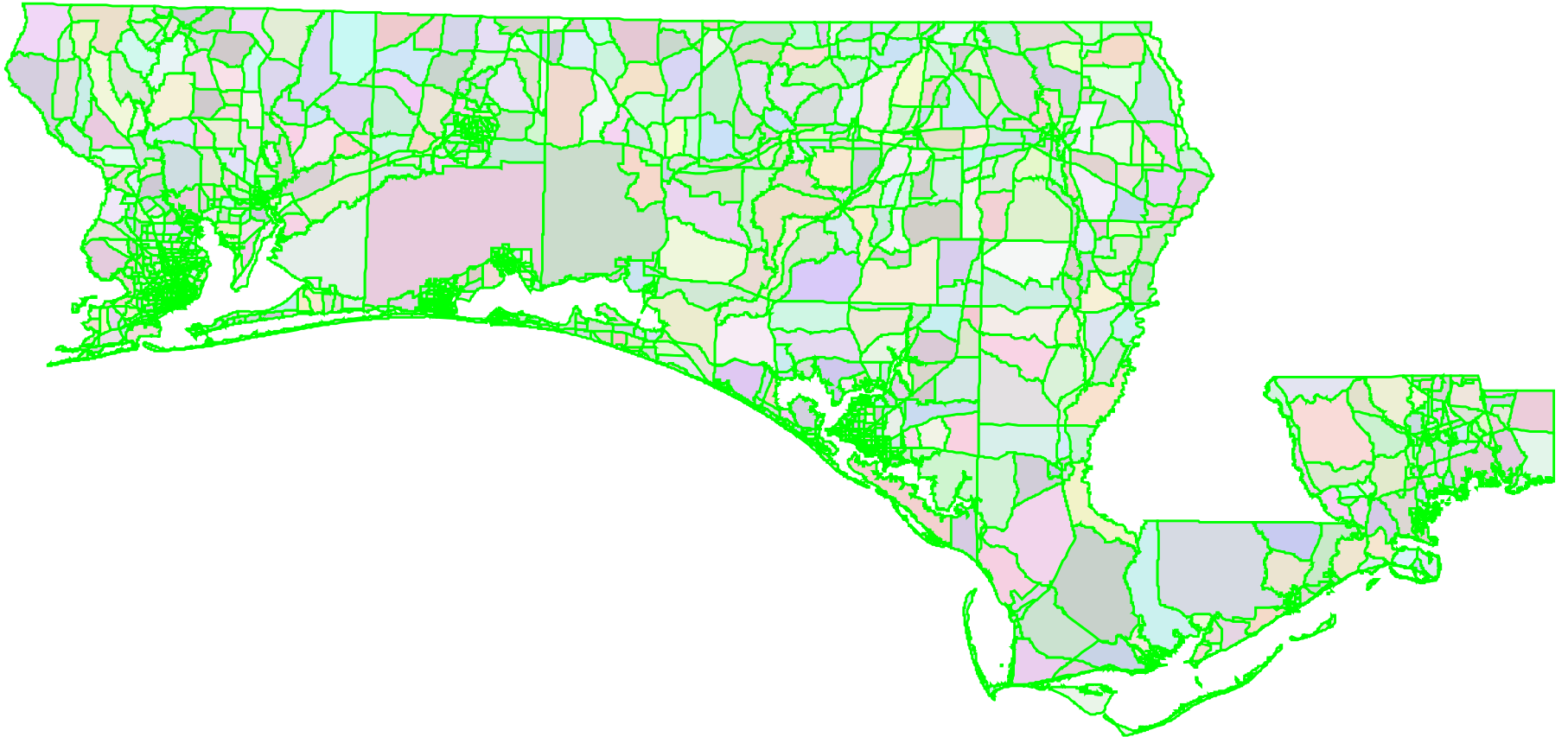


Design of Data Set (geography)



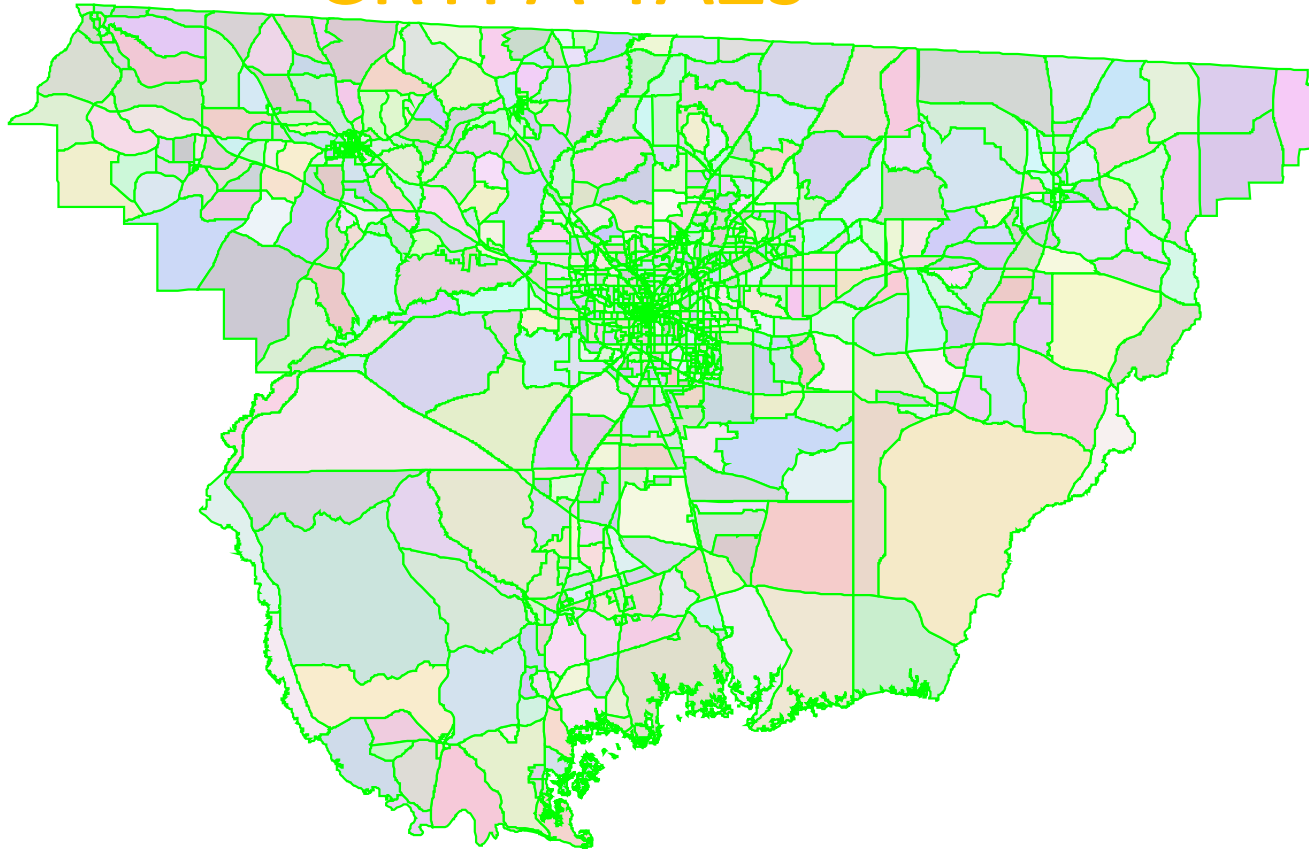
- Northwest Florida Regional Planning Model Traffic Analysis Zones (TAZ)
- Capital Region Transportation Planning Agency Model TAZs

NWFRPM TAZs

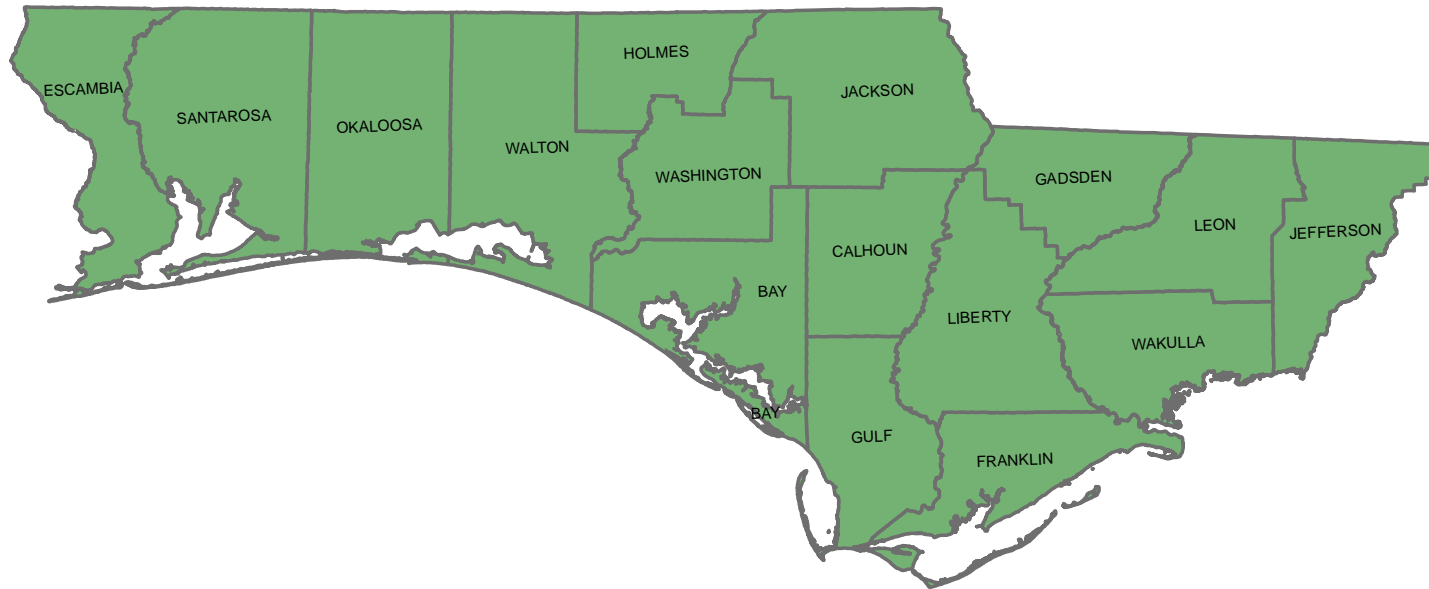




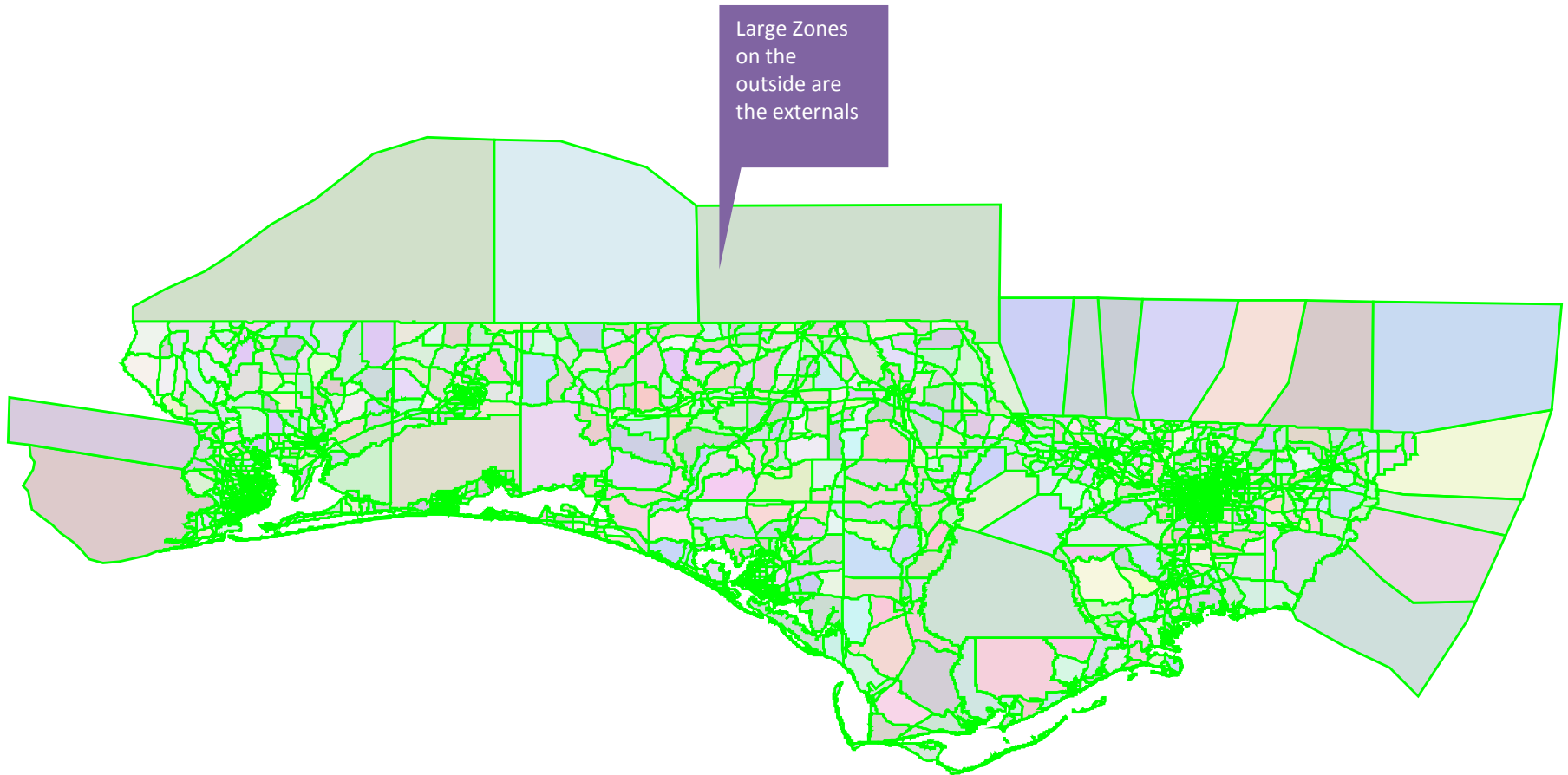
CRTPA TAZs



FDOT District Three Boundary



Final Combined TAZs





Content of Data Set

Data Time Periods



- All Data for Month of April 2014
- Days: Mondays – Thursdays only
- 24 Hour
- AM Peak = 6am – 9am
- PM Peak = 3pm – 6pm

Data File Elements (In all files)



- Origin Zone
- Destination Zone
- Start Date
- End Date
- Aggregation (24 Hr. vs. Period)
- Purpose (HBW, HBO, NHB)
- TOD – 24 Hour & AM/PM Peak

Data File Elements (File Specific)



- Trips
- By Age/Sex (23 Stratifications per Sex)
- By Income (16 Stratifications)
- By Auto Availability/Home Ownership
- (5 Stratifications of AA Plus Own/Rent)
- Total of 8 Data Sets

File Example



Origin Zone	Dest. Zone	Start Date	End Date	Aggr	Class	Purpose	TOD	Count
2005	2451	20140401	20140430	M-Th	Res	HBO	H00: H24	0.62
486	230	20140401	20140430	M-Th	Res	HBO	H00: H24	6.71
1269	1546	20140401	20140430	M-Th	Visitor	NHB	H00: H24	1.46
222	281	20140401	20140430	M-Th	Res	HBW	H00: H24	0.63

File Example



Origin Zone	Dest. Zone	Start Date	End Date	Aggr	Class	Purpose	TOD	Count
1853	2401	20140401	20140430	M-Th	Res	NHB	H06:H09	0.47
1345	1214	20140401	20140430	M-Th	Visitor	NHB	H06:H09	0.66
1304	1264	20140401	20140430	M-Th	Res	NHB	H06:H09	3.08
2476	2405	20140401	20140430	M-Th	Res	HBO	H15:H18	0.58



Limitations of Data Set

AirSage Process Overview

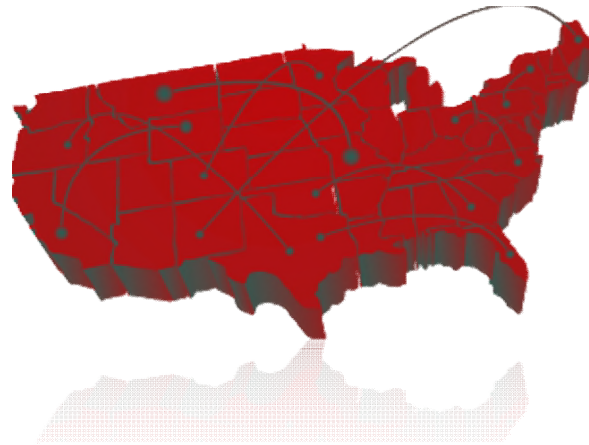


Patented **Population Analytics**

15 billion location data points per day

100 million mobile devices

Consumer privacy protection

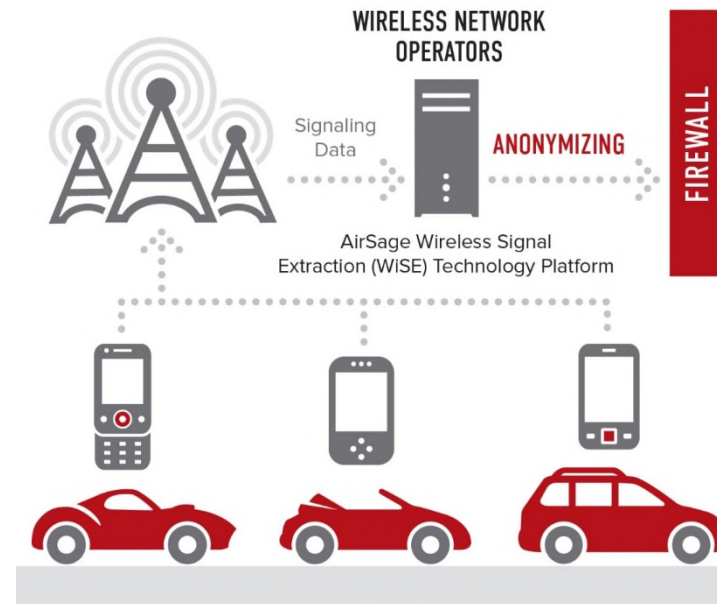


AirSage Process Overview

WISE Platform



- Behind the Firewall:



AirSage Process Overview

When are locations processed?



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



AirSage Process Overview

Devices on the Move



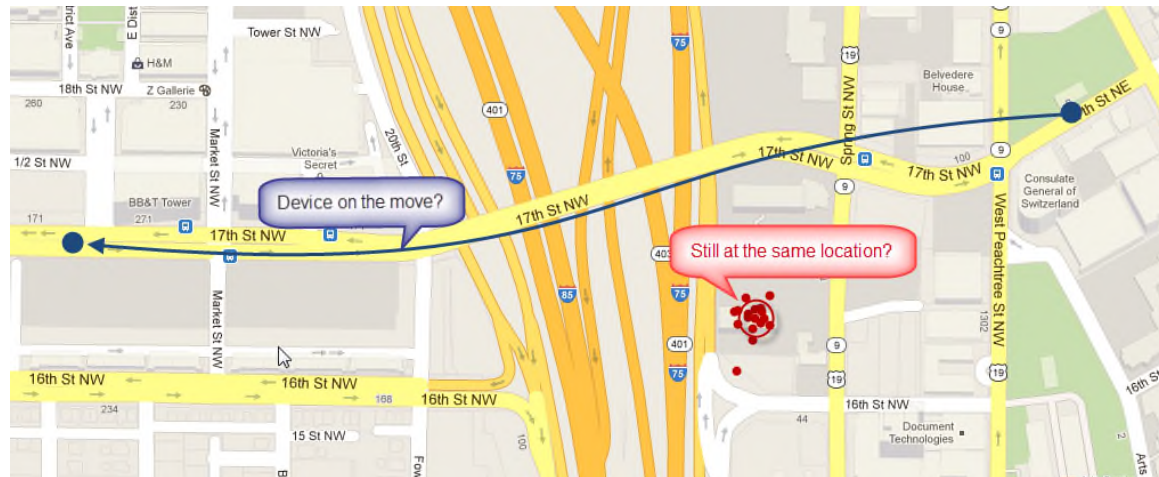
Devices on
the move
create
Transient
Points.

AirSage Process Overview

How is each new location handled?



Each location is analyzed and compared to other locations



AirSage Process Overview

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

AirSage Process Overview

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

AirSage Process Overview

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.

AirSage Process Overview

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)

AirSage Process Overview

Understanding Activity Patterns



- Additional Analysis Options:
 1. Demographics
 2. Long Distance Filter
 3. External Zones Tier Structure
 4. Nationwide Home Assignment of Visitors
 5. Select Zone transient OD Analysis
 6. Super (2nd leg) and Sub (Corridor) Matrix.

Accuracy vs. Precision



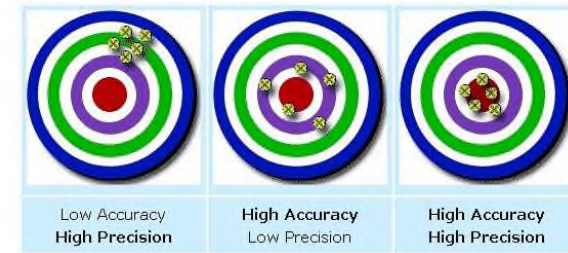
- **ACCURACY**

Accuracy describes the nearness of a measurement to the standard or true value, i.e., a highly accurate measuring device will provide measurements very close to the standard, true or known values.

Example: in target shooting a high score indicates the nearness to the bull's eye and is a measure of the shooter's accuracy. Refer to pictures below:

- **PRECISION**
- Precision is the degree to which several measurements provide answers very close to each other. It is an indicator of the scatter in the data. The lesser the scatter, higher the precision.

Examples of Precision and Accuracy:

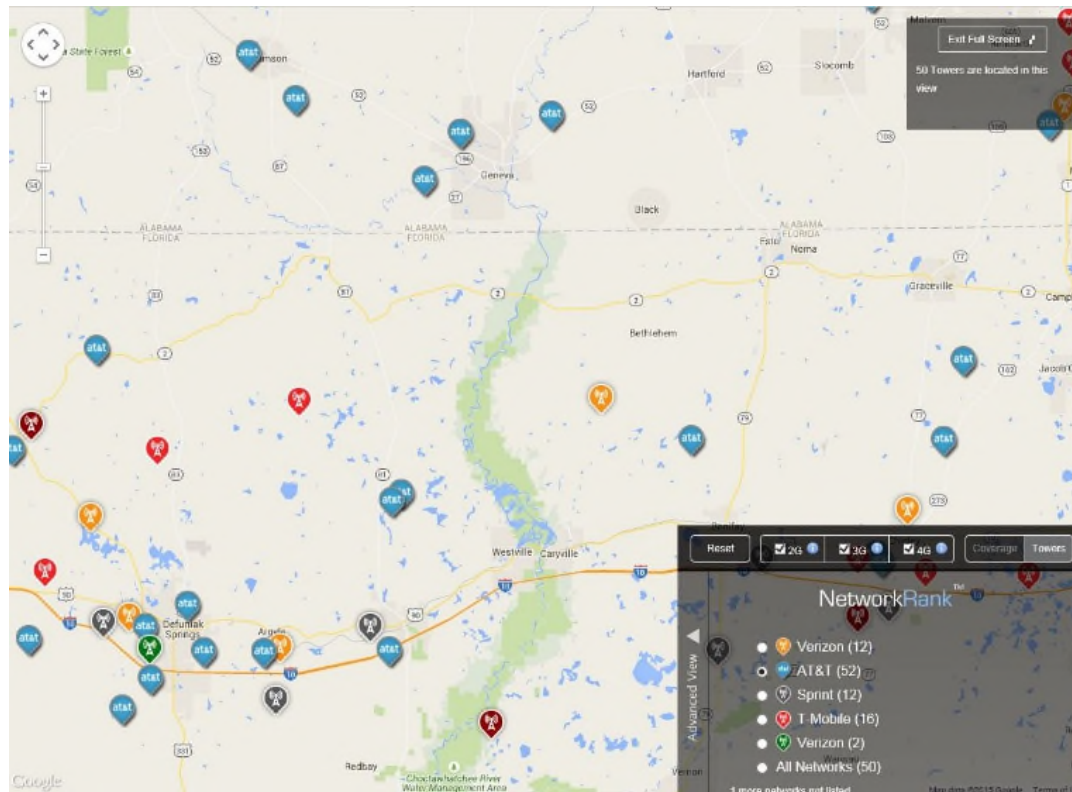


Examples

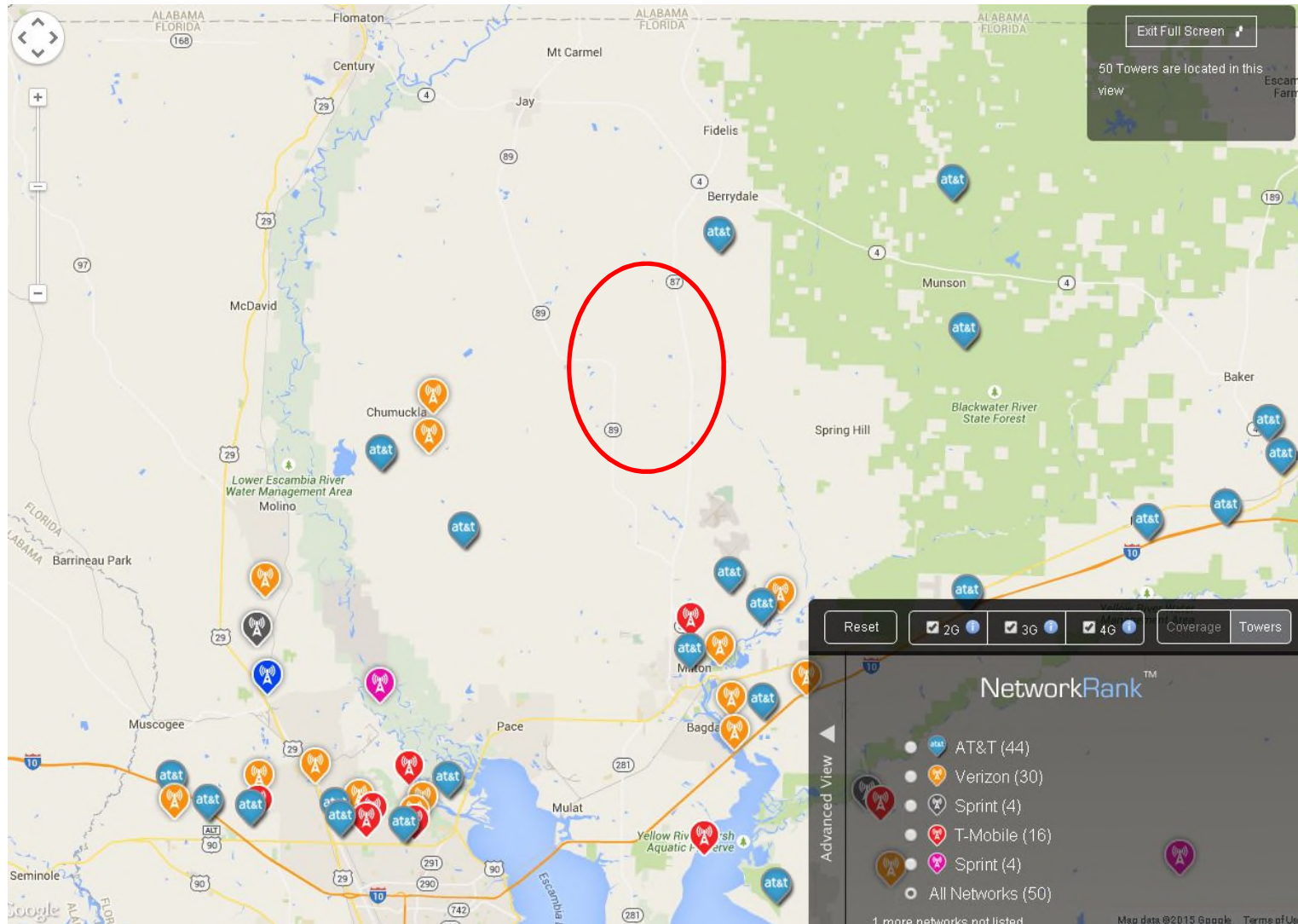


- www.opensignal.com
- Site does not show the 1G data and other “low level transactions”
- AirSage assured us the map they see has very few holes in our study area. They cannot share their map due to confidentiality with the providers
- Data is more precise in areas with dense tower coverage and less precise in rural areas that are covered with fewer towers
- 2 Examples follow with 1 being in an urban area and 1 in a rural area

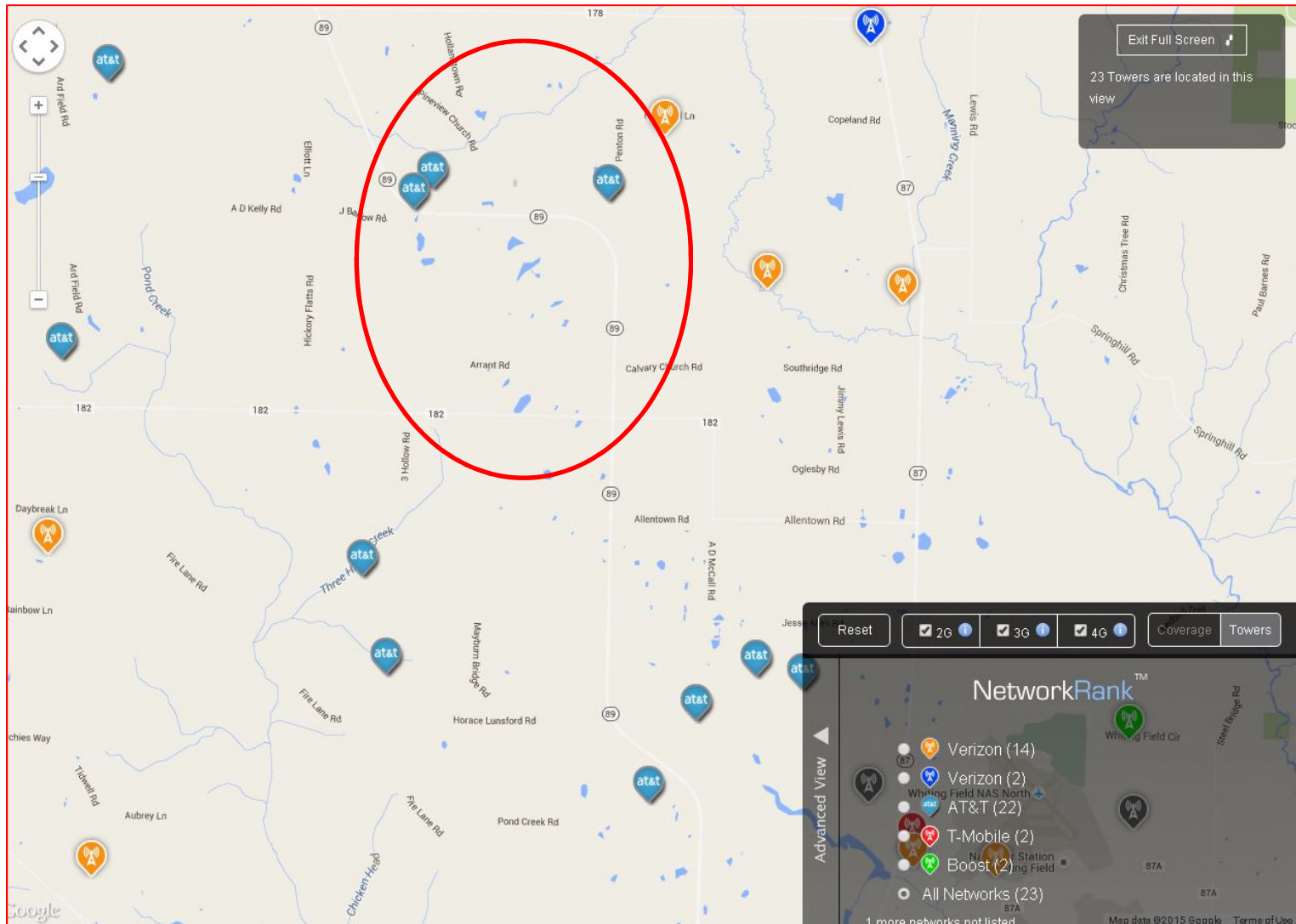
Towers Example 1



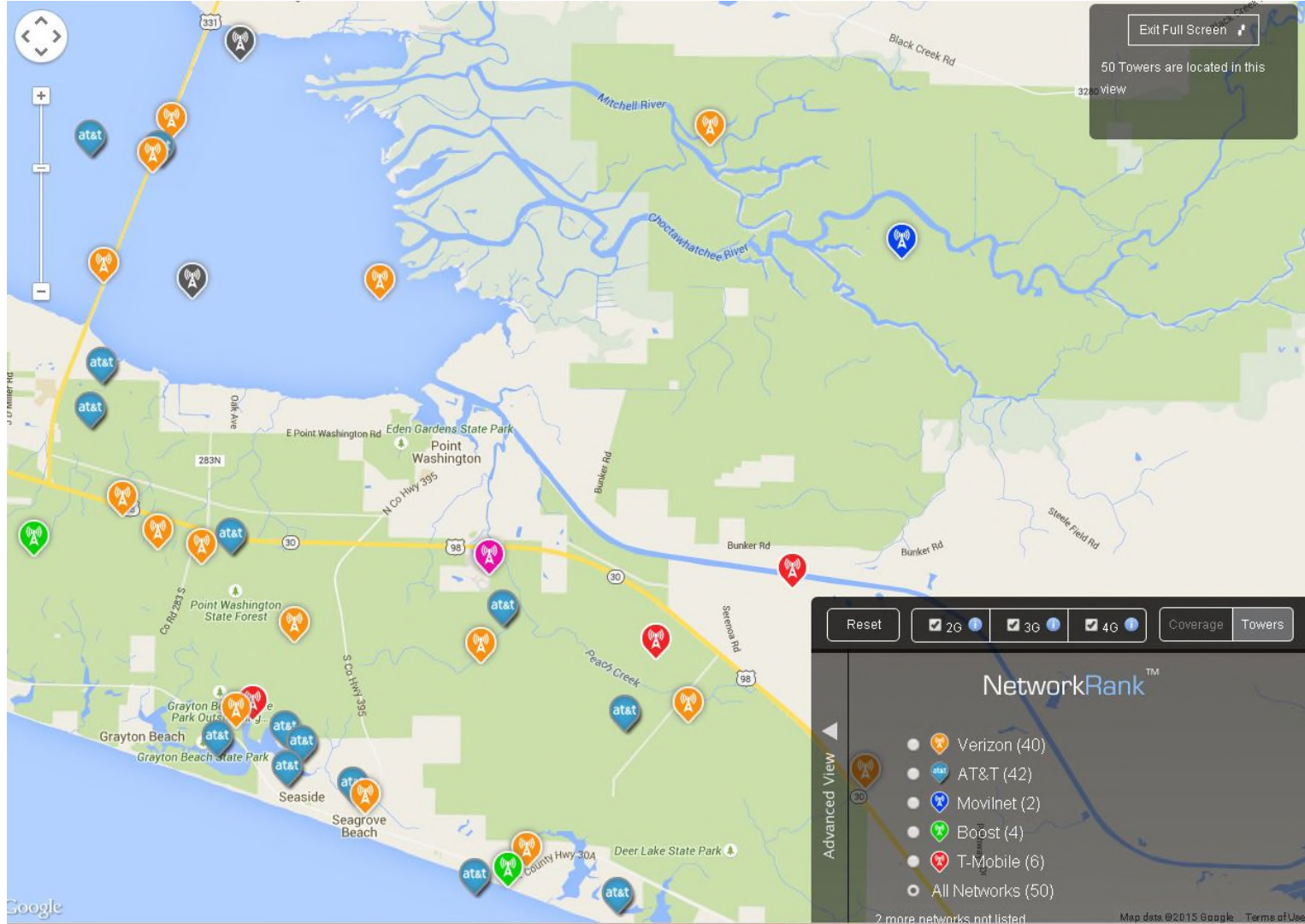
Towers Example 2



Towers Example 2



Towers Example 3



Traffic Count Data Comparison



SR 292	FDOT 2014	AirSage Adjusted*	Difference
@Theo Baars Bridge	17,000	14,047	-2,953 / 17.37%
W of River Road	11,000	13,684	+2,684 / 24.40%
@FL/AL Stateline	11,000	13,665	+2,665 / 24.22%

- *April 2014 Data Divided by 18 days Factored by FDOT 2014 Peak Season Factor Category for Escambia Countywide ALL



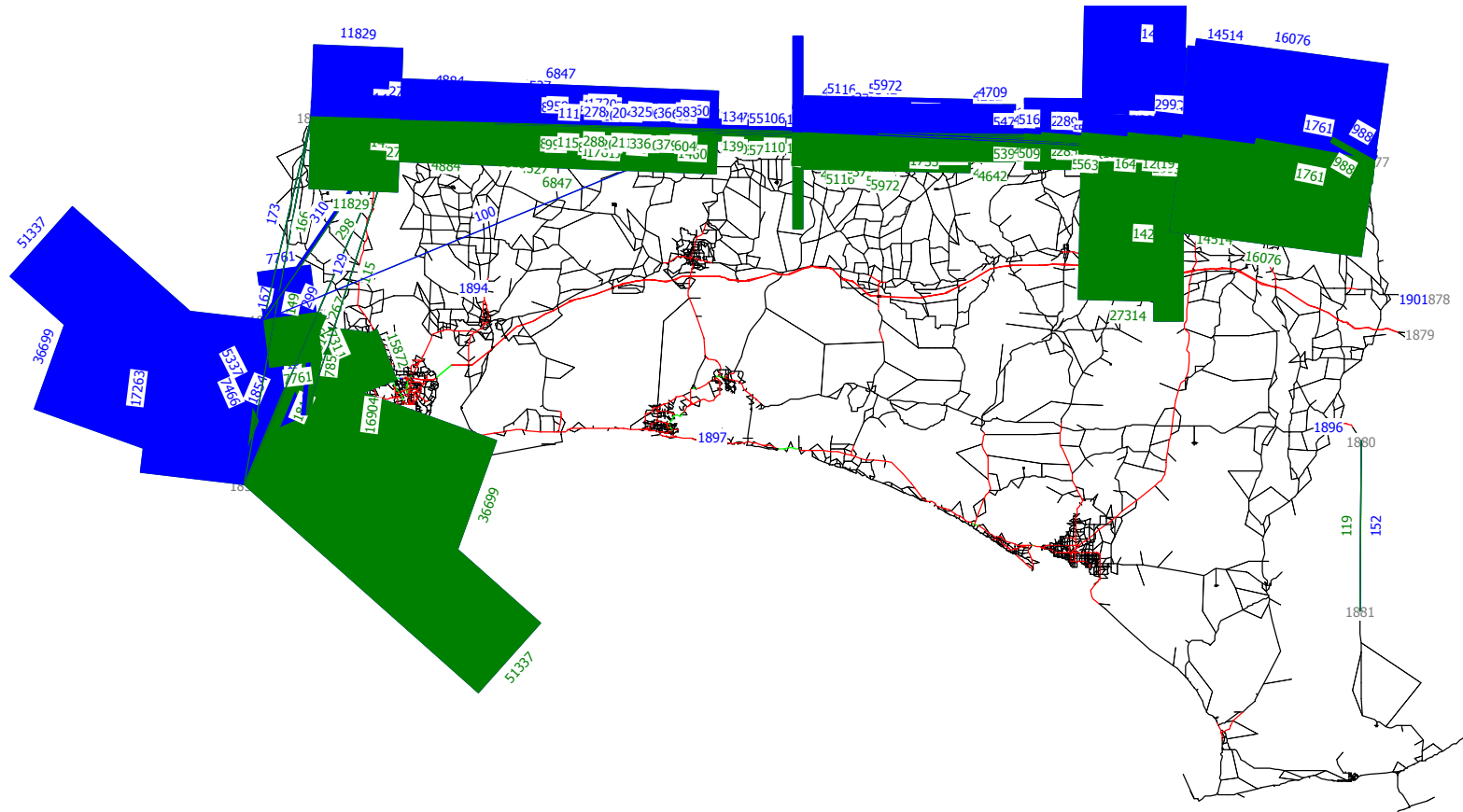
Uses of Data Set

Travel Demand Modeling

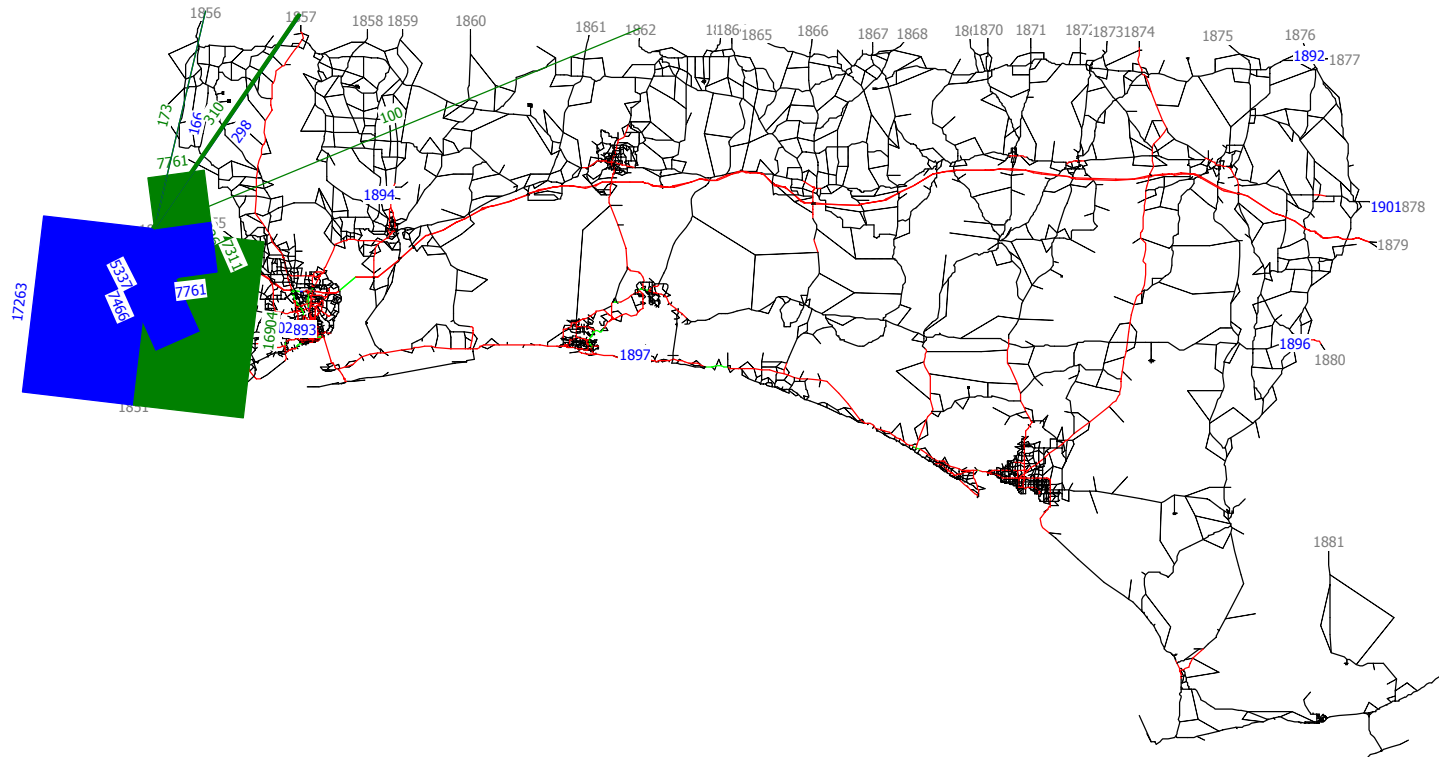


- External Trips
 - External to External
 - External to Internal
- Trip Distribution
 - Trip Patterns (O&D)
- Demographic Data
 - Auto Availability (Already used from Census)
 - Age (Also from Census)
- TOD

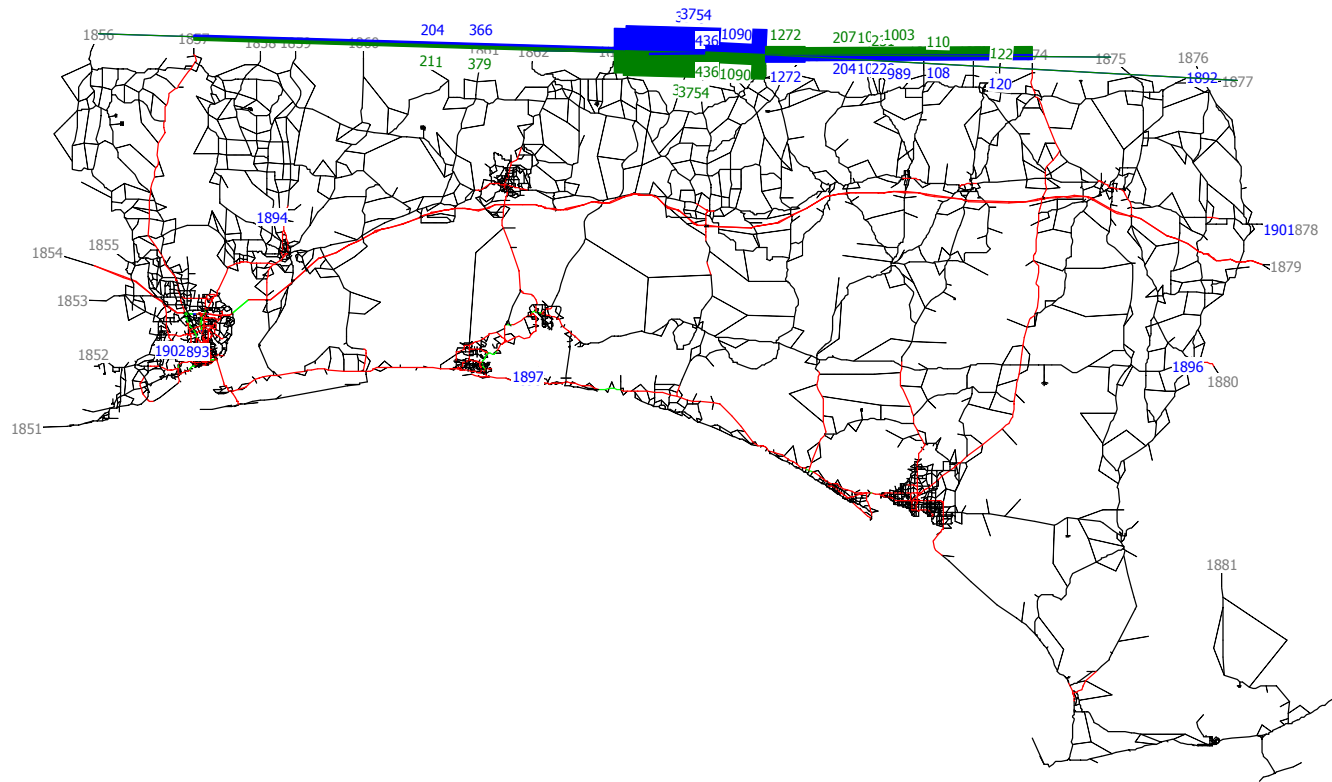
Desirelines - AirSage Data



Desirelines - AirSage Data



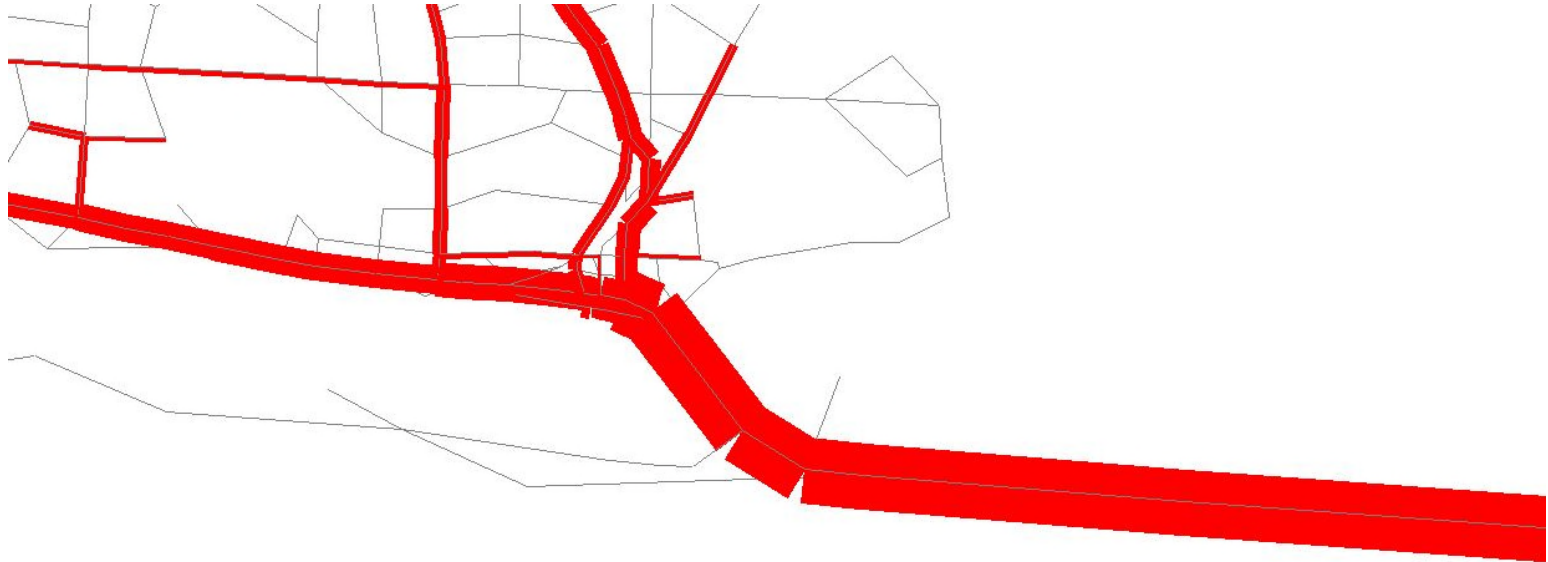
Desirelines - AirSage Data





- Corridor Travel Patterns
 - Load trip table into Travel Demand Model
 - Save all paths
 - Ability to do on the fly Select Link Analysis with Bandwidth plots
- District Travel Patterns
 - Combine TAZs into Districts

Corridor Travel Patterns



Corridor Travel Patterns



Corridor Travel Patterns



Conclusions



- Work with vendor upfront to create parameters for your data set. Take time on this!
- Understand the limitations of the process before ordering.
- Work with the vendor to get questions answered after you receive the data. This is critical!
- Understand that some of the uses of the data will have to be relative and not absolute.
- Understand the factoring of the data
- Understand the grouping of the data
- The data has proven to be useable for our projects.

Questions?



- Dan Beaty
- Daniel.Beaty@atkinsglobal.com
- Linda Little
- Linda.Little@dot.state.fl.us
- Bill King
- bking@airsage.com

Thank you