AirSage Data use in Travel Demand Modeling and Project Development Studies

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Florida Transportation Data Symposium

Omni Orlando at ChampionsGate

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Partners

District Three Planning

AirSage Data use in Travel Demand Modeling and Project Development Studies

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

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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
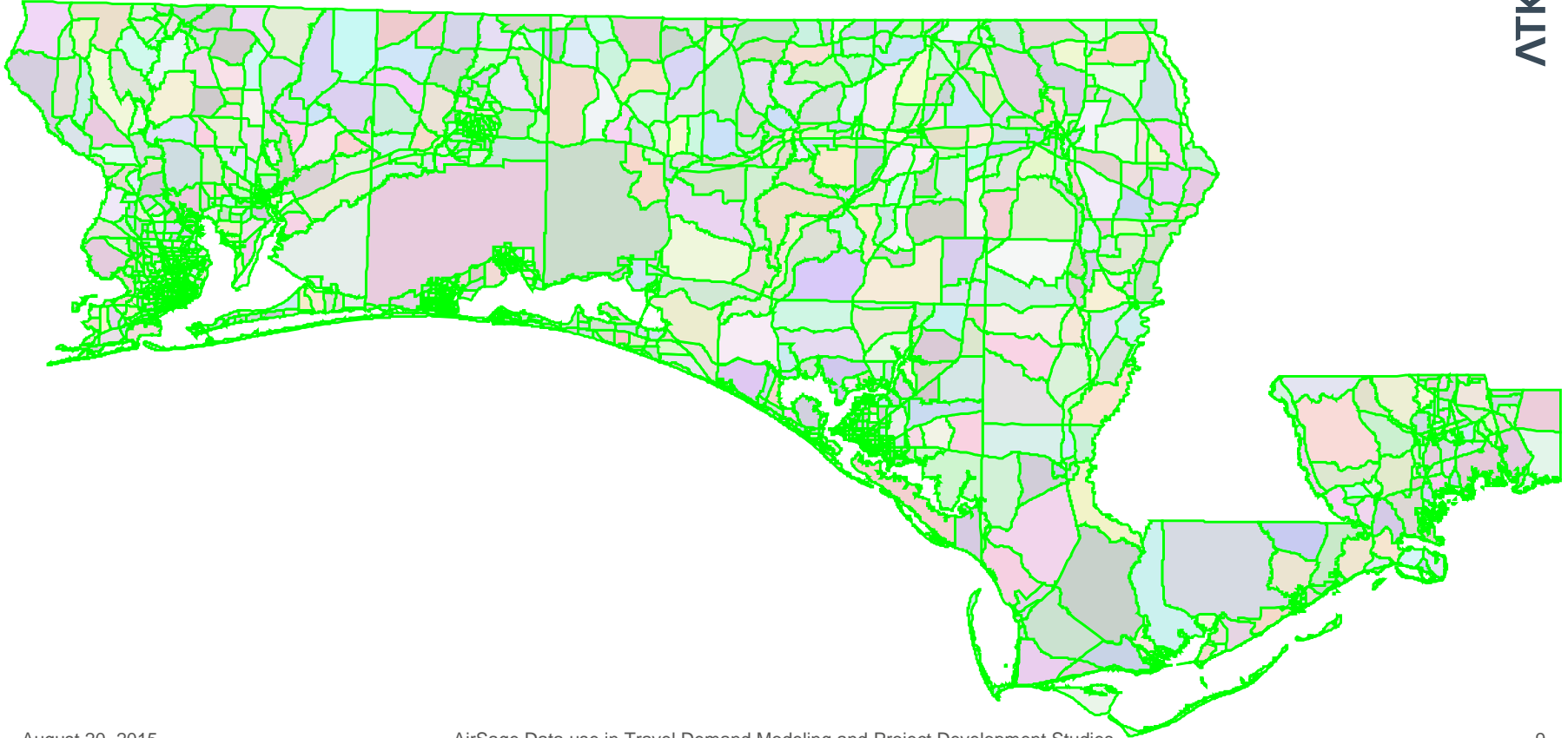
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Available Data - Composition

- 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)

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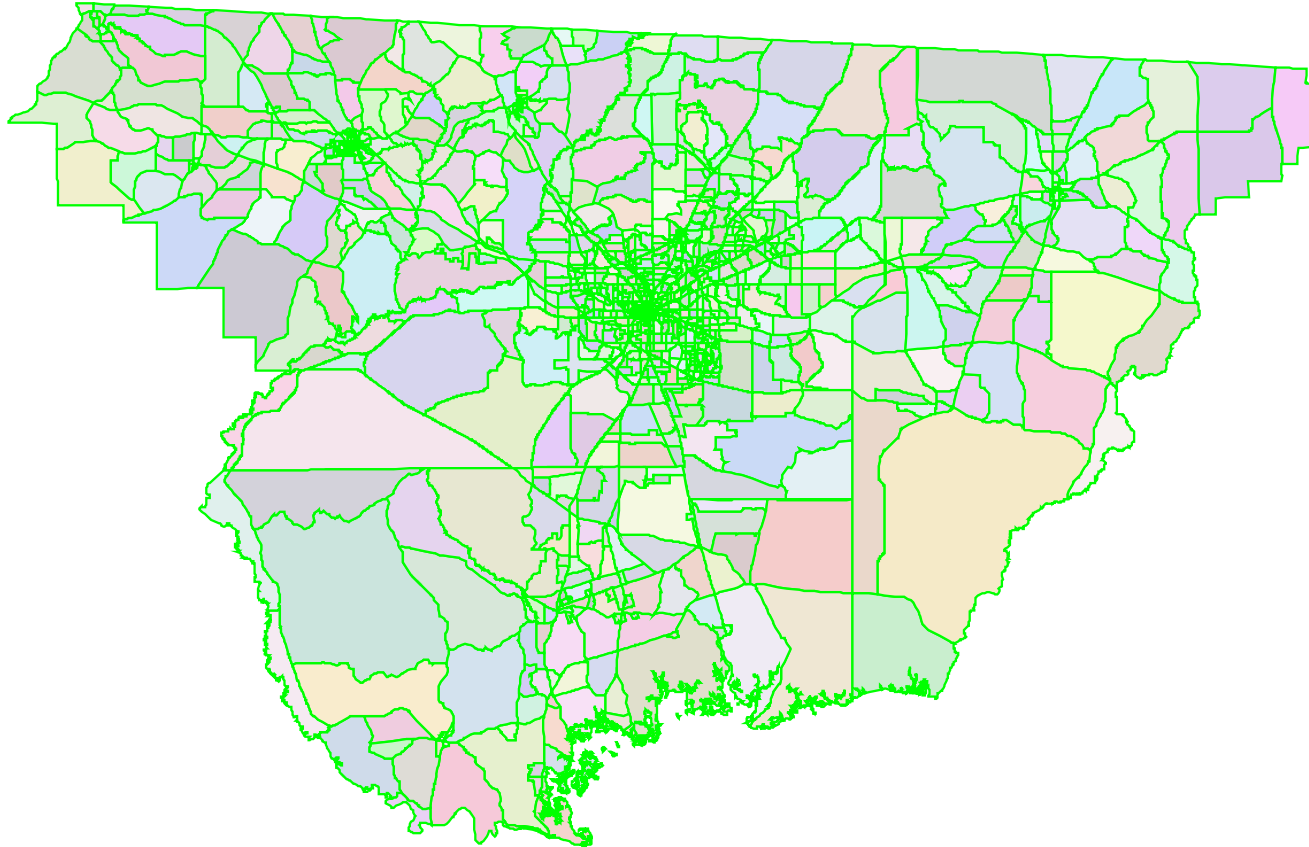
Geography

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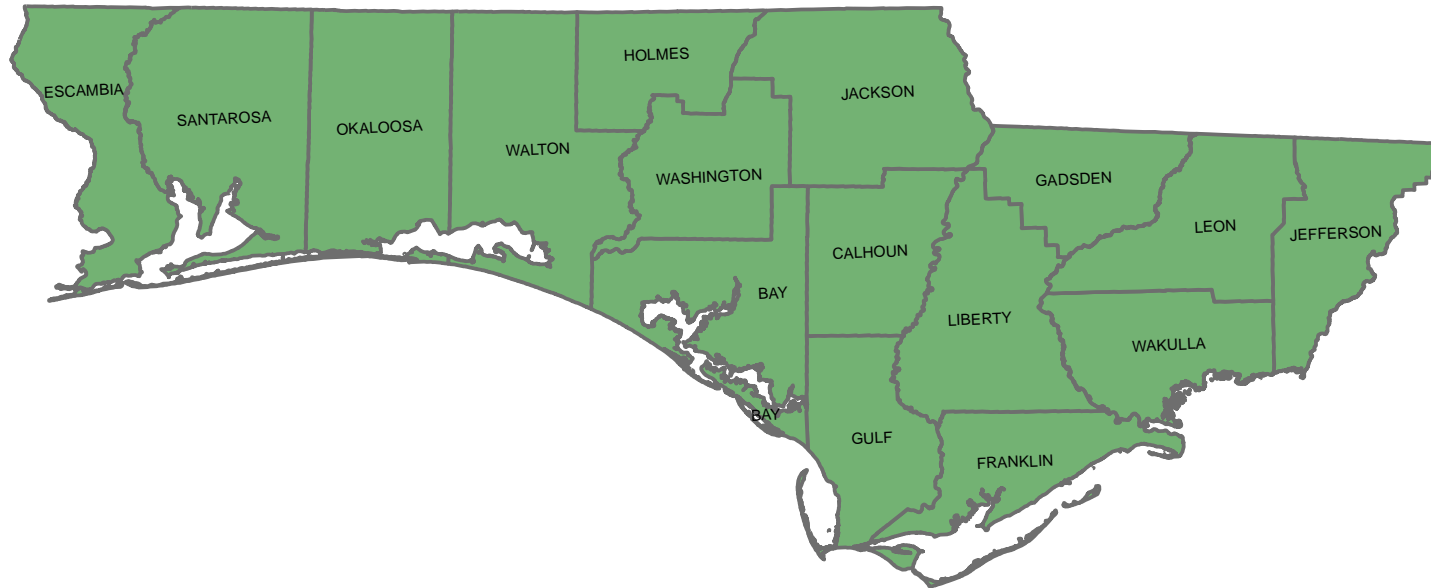
- Capital Region Transportation Planning Agency Model TAZs

NWFRPM TAZs

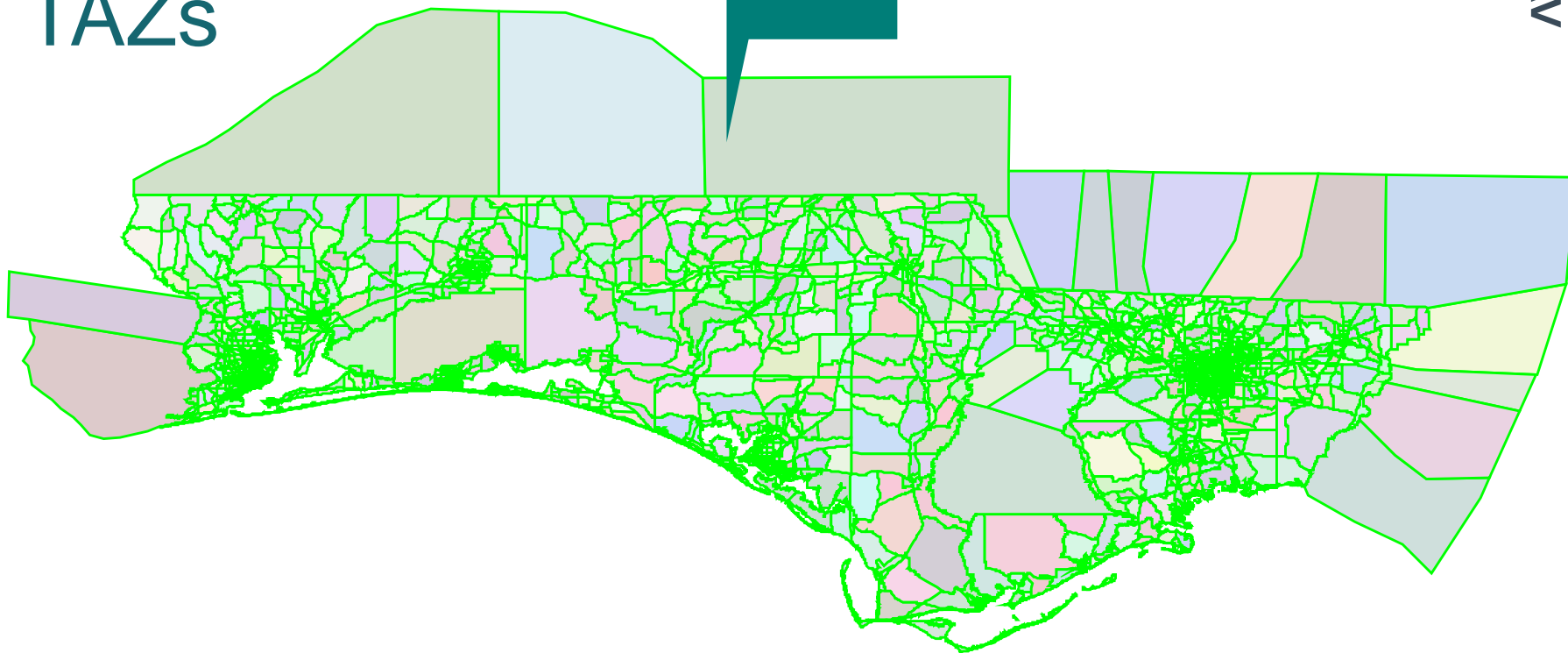AirSage Data use in Travel Demand Modeling and Project Development Studies

CRTPA TAZs

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FDOT District Three Boundary

Final Combined TAZs

Large Zones on the outside are the externals

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Content of Data Set

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Data Time Periods

- All Data for Month of April 2014

- Days: Mondays – Thursdays only

- 24 Hour

- AM Peak = 6am – 9am

- PM Peak = 3pm – 6pm

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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

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AirSage Process Overview

Patented ***Population Analytics***

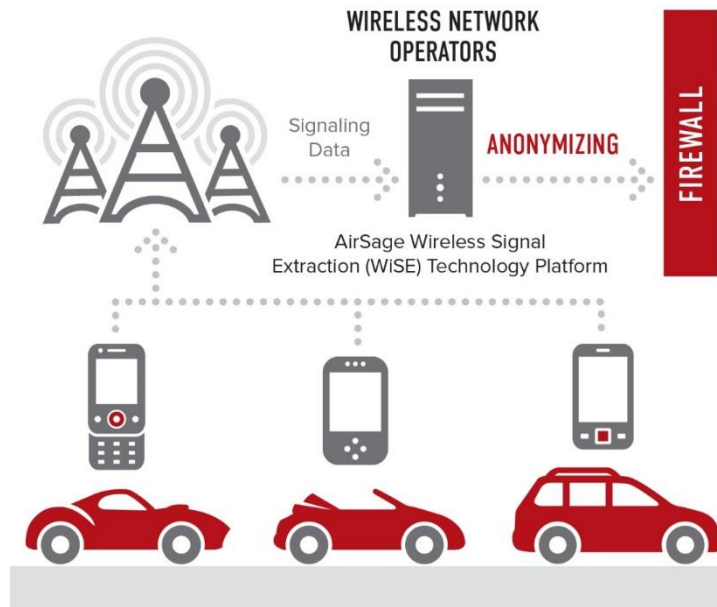15 billion location data points per day

100 million mobile devices

Consumer privacy protection
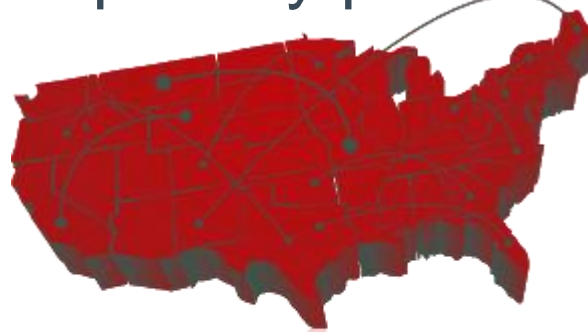
AirSage Process Overview WISE Platform

Behind the Firewall:

WIRELESS NETWORK OPERATORS

Signaling Data

ANONYMIZING

FIREWALL

AirSage Wireless Signal Extraction (WiSE) Technology Platform

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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
Devises on the Move

Devices on the move create Transient Points.

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AirSage Process Overview
How is each new location handled?

Each location is analyzed and compared to
other locations
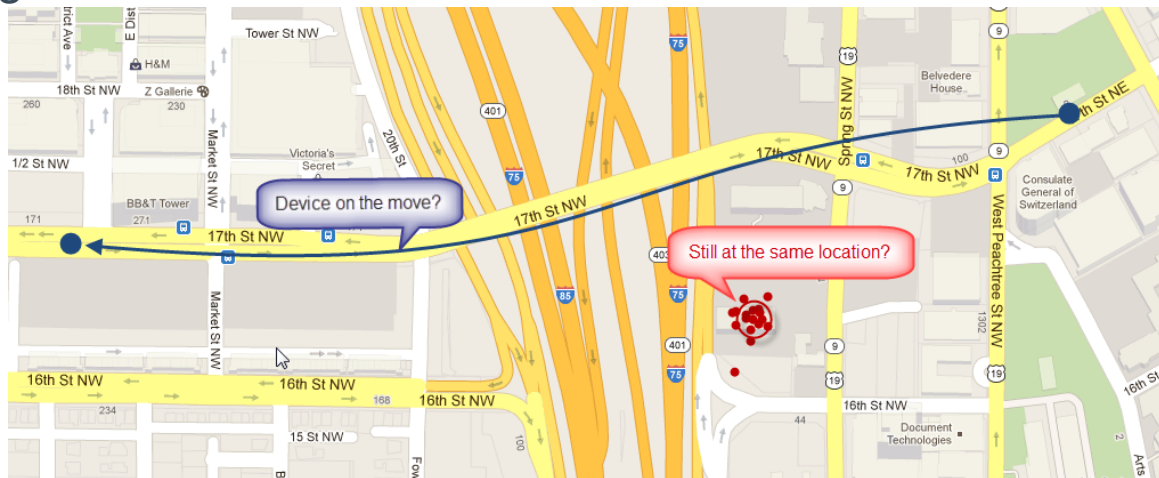
AirSage Process Overview
Devices at the Same Location

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

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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:

| Low Accuracy High Precision | High Accuracy Low Precision | High Accuracy High Precision |
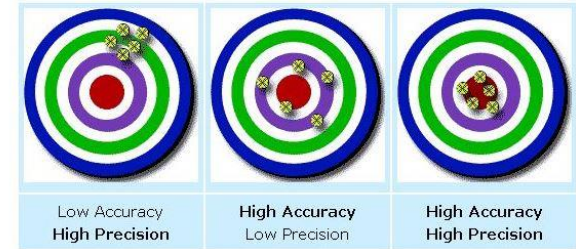
Examples

- 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

August 20, 2

34

August 20, 2
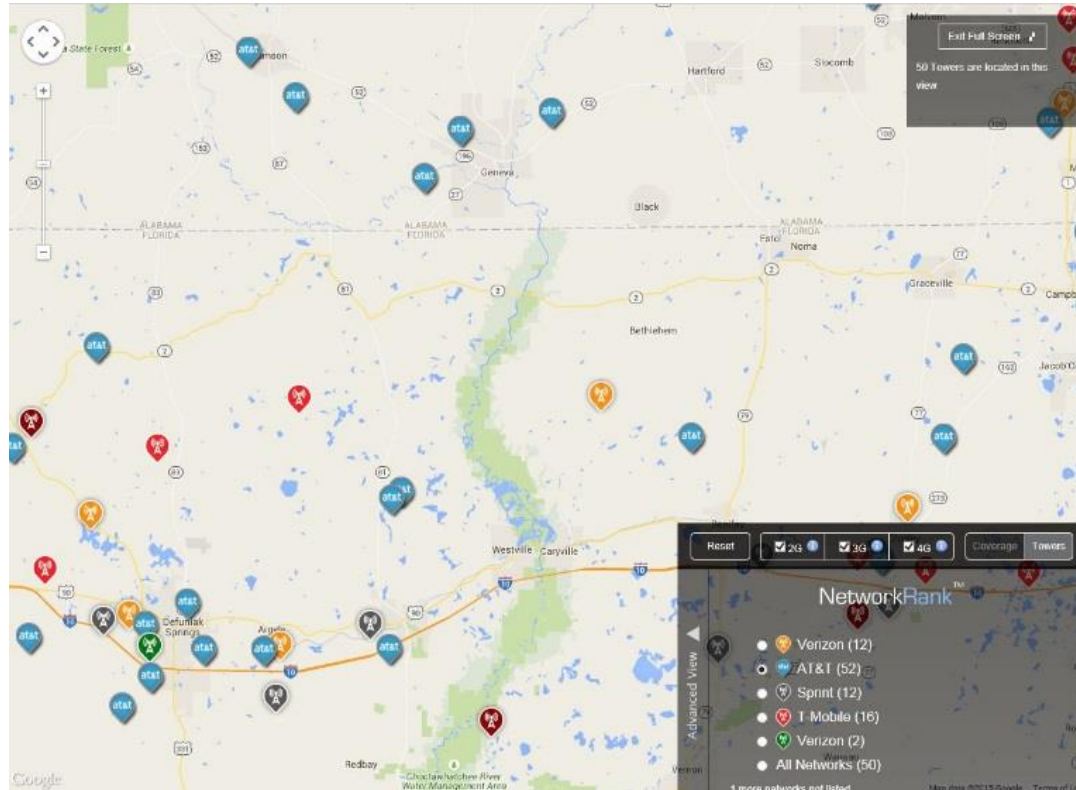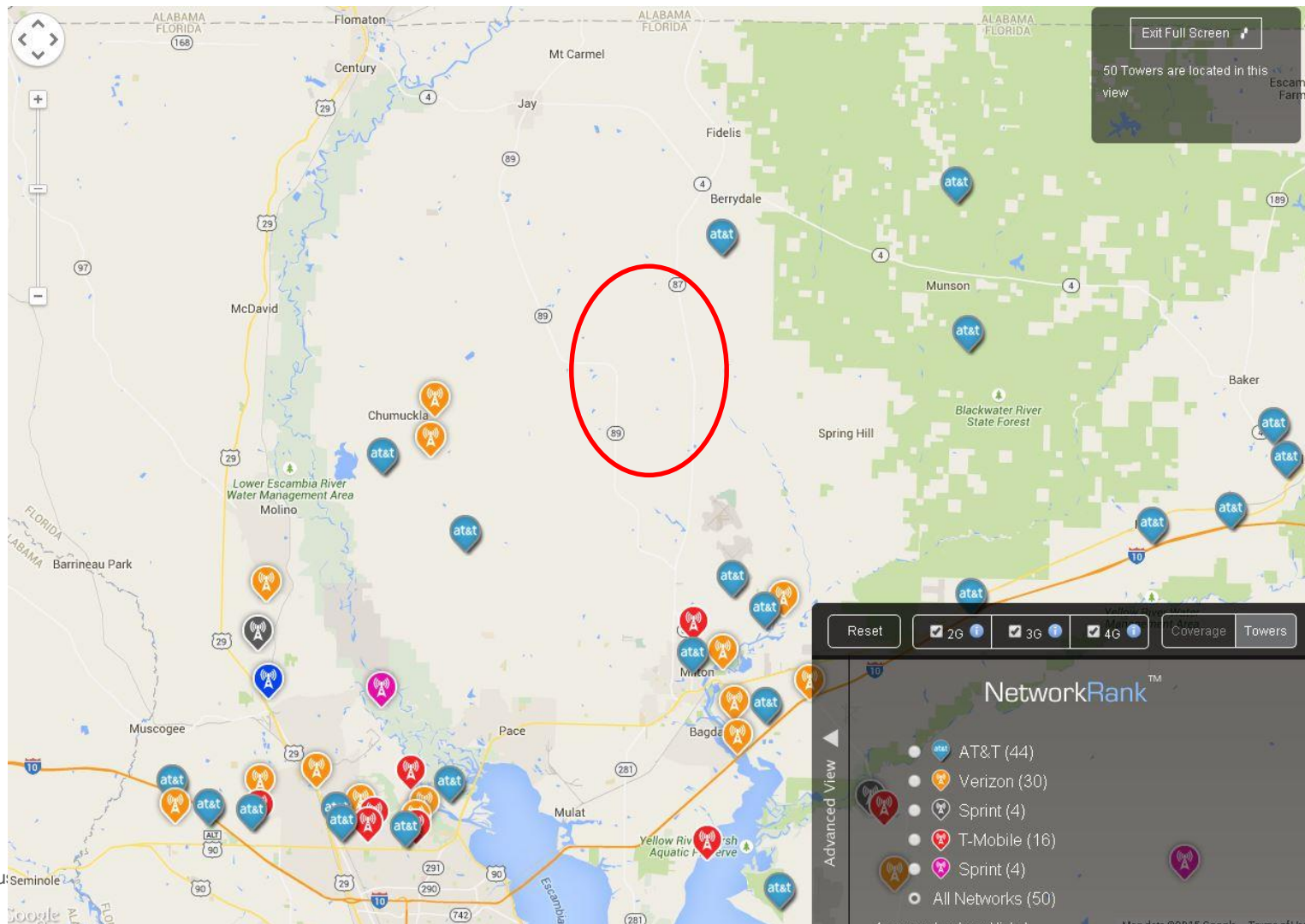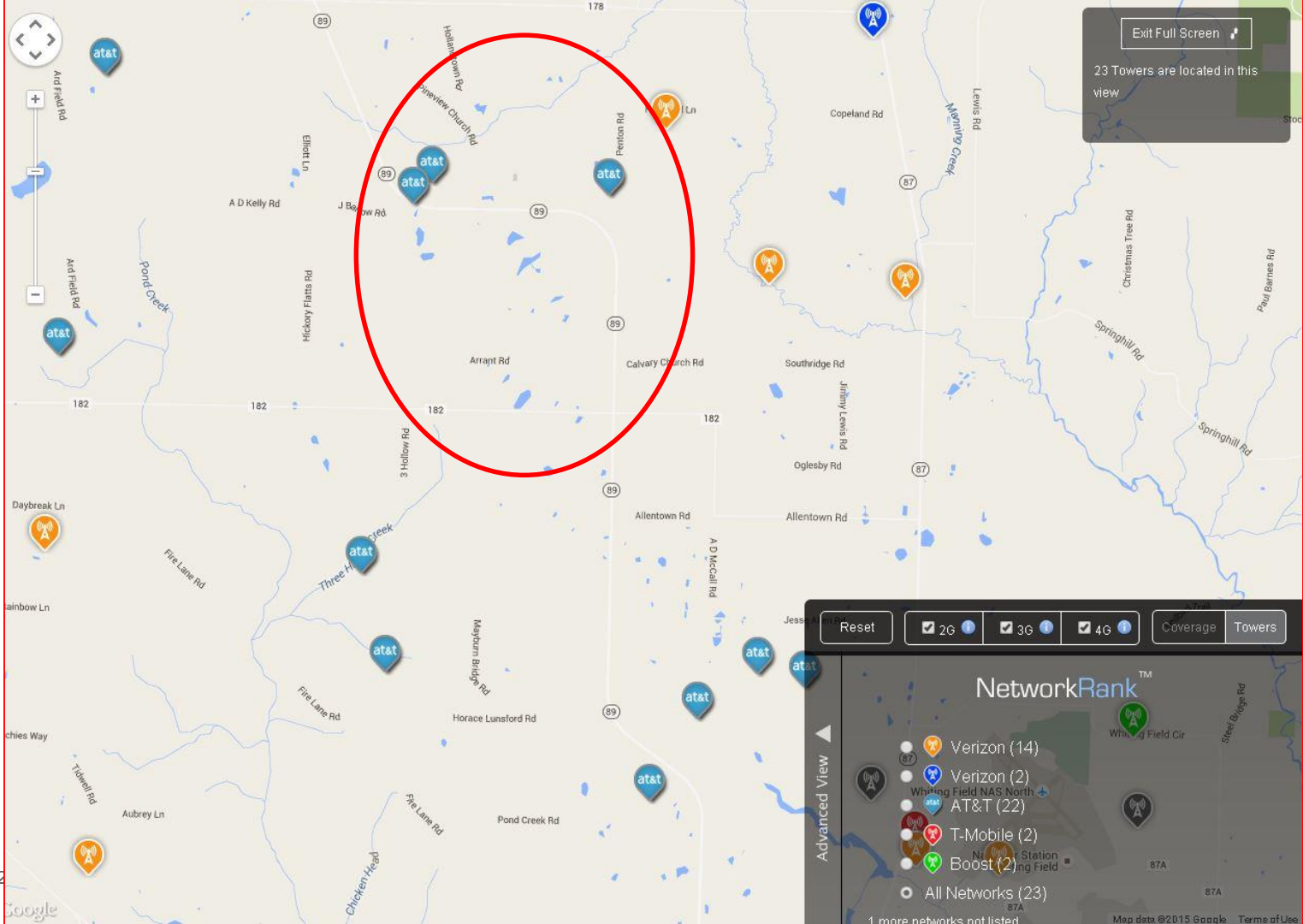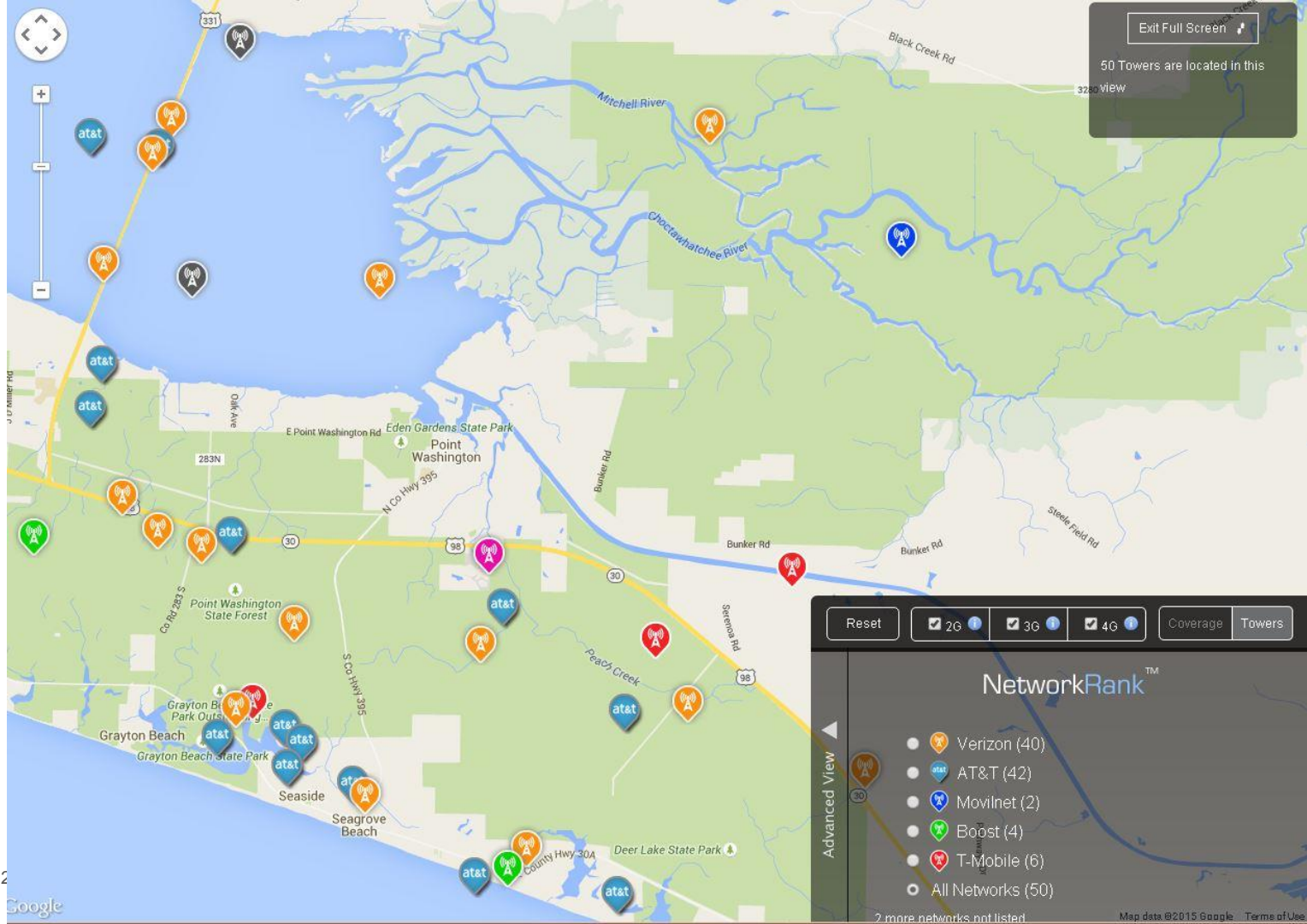
Traffic Count Data Comparison

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

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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)
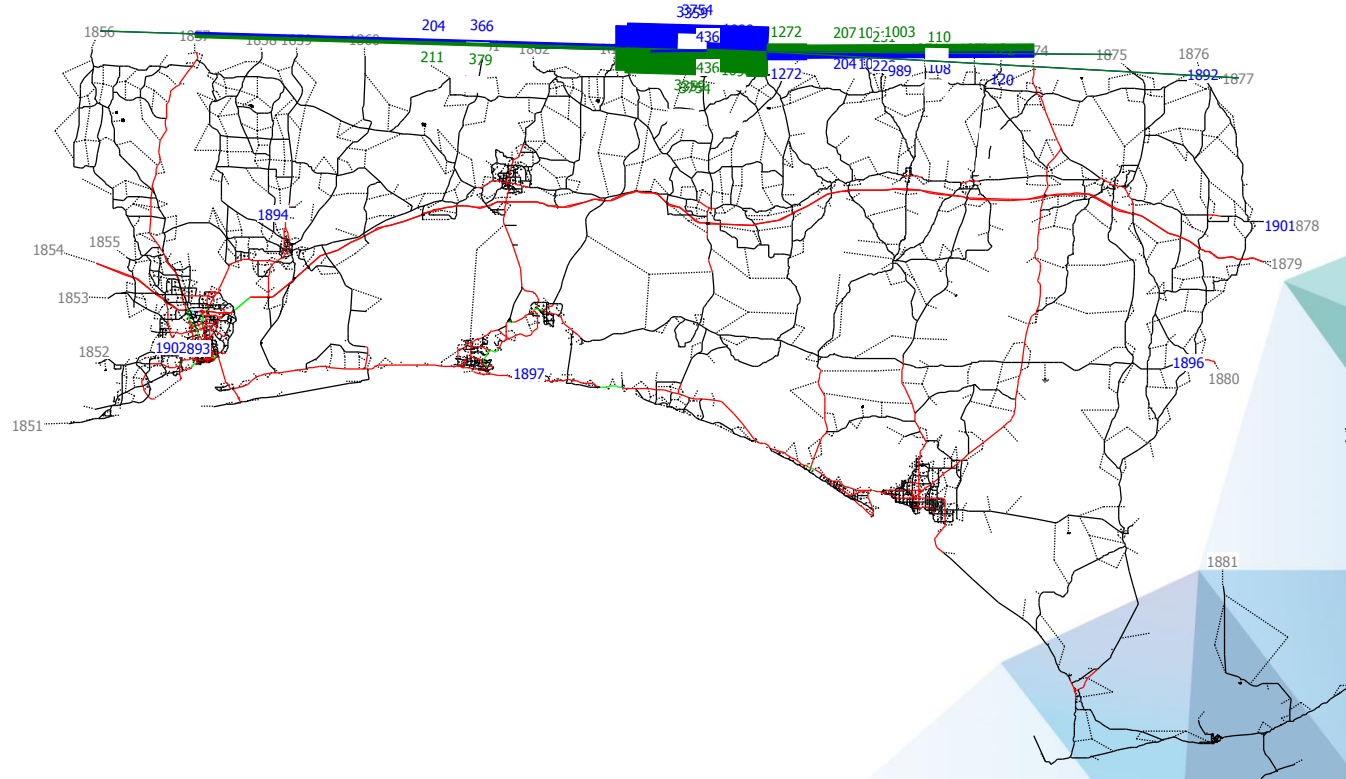 - Age (Also from Census)

- TOD

Desirelines - AirSage Data

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Desirelines - AirSage Data
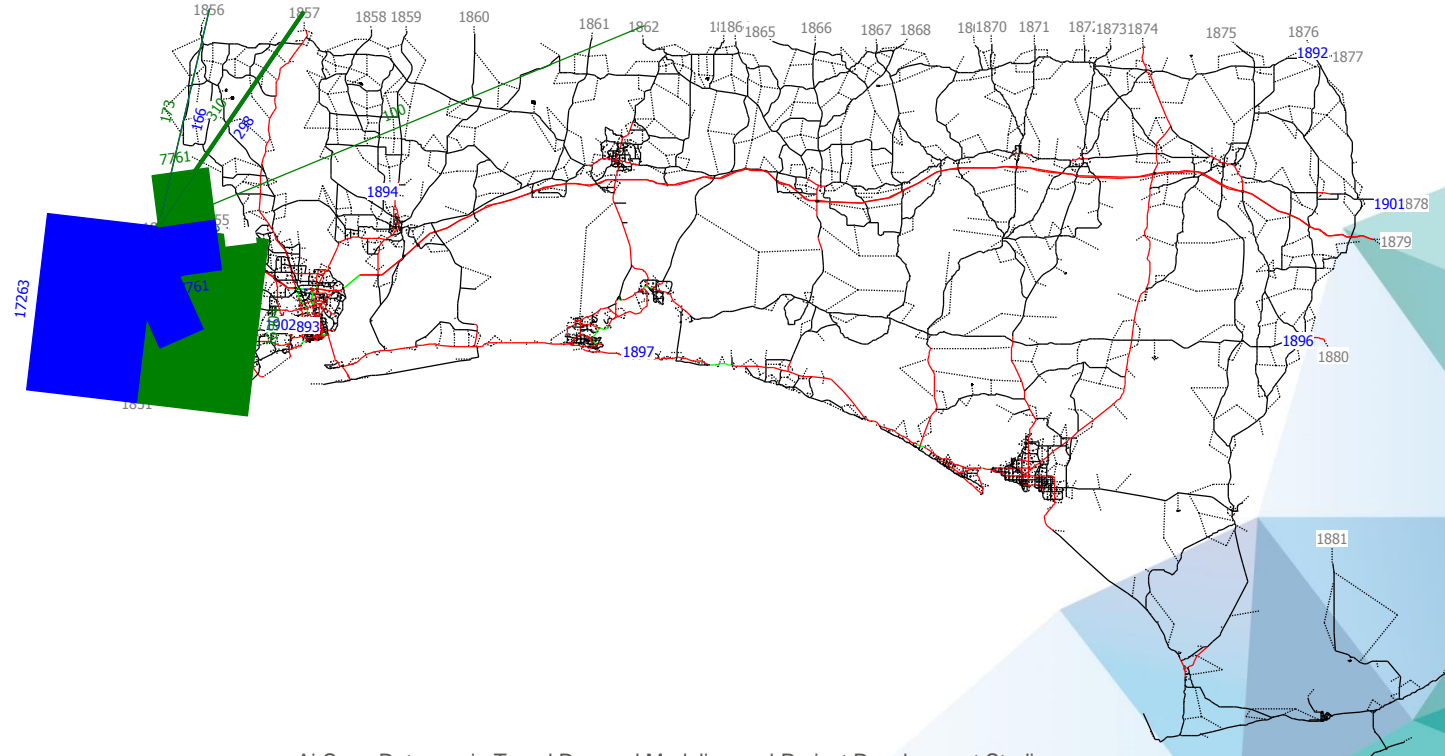
Desirelines - AirSage Data

Project Development Studies

- ## 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

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Corridor Travel Patterns

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Corridor Travel Patterns

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Conclusions
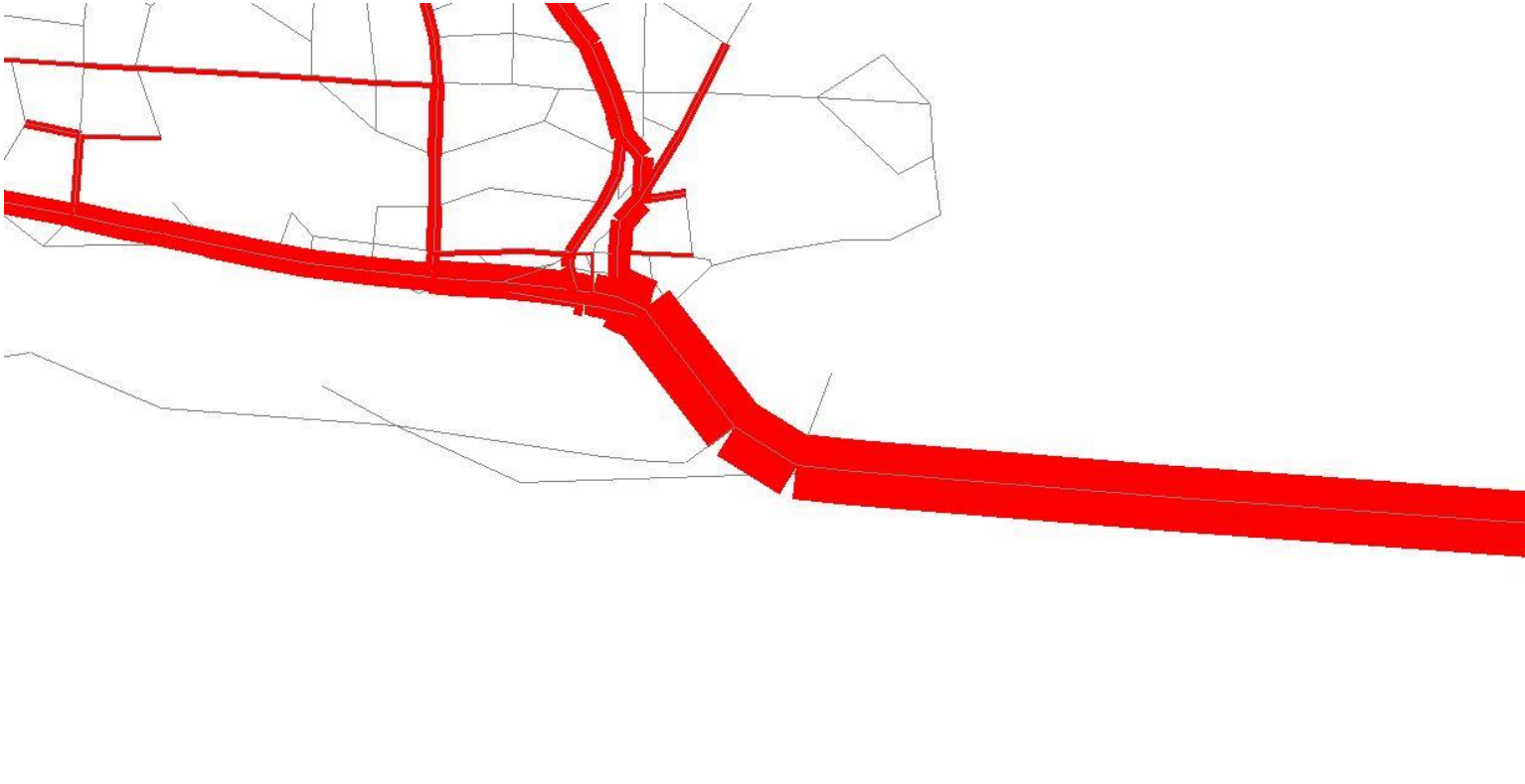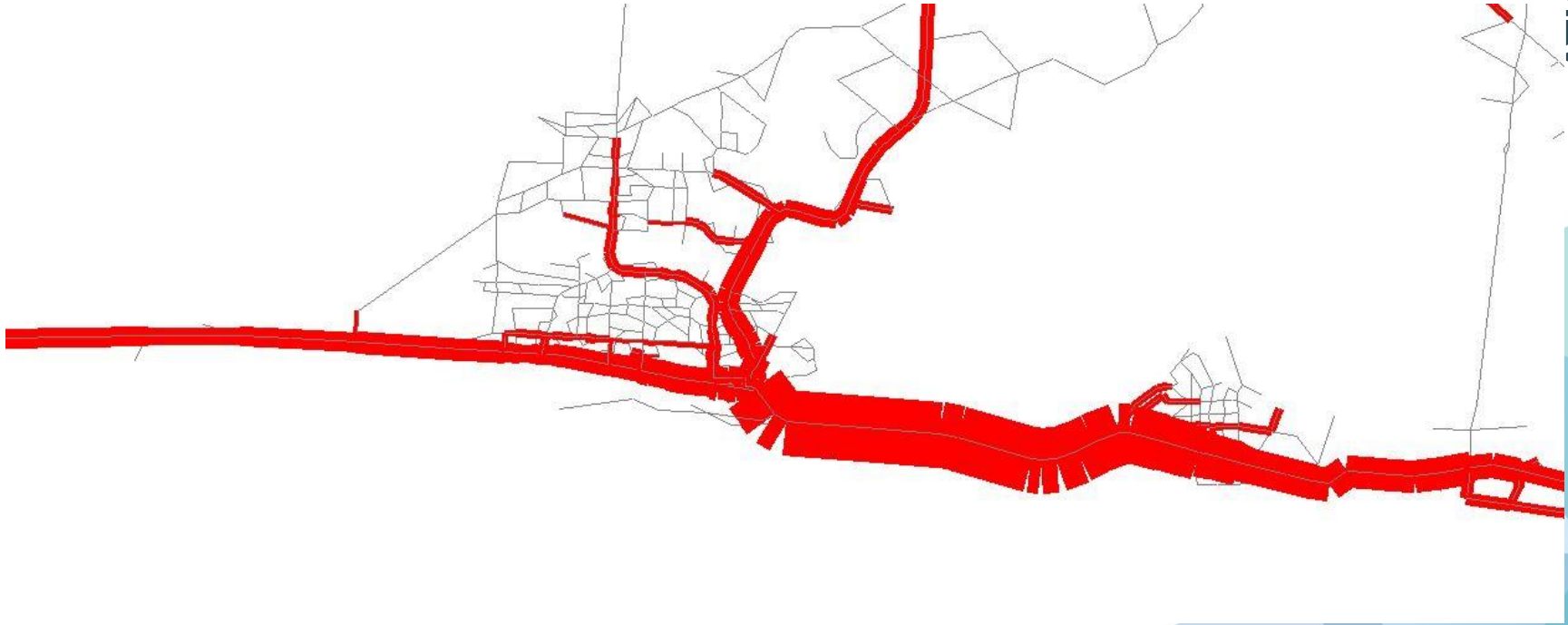
AirSage Data use in Travel Demand Modeling and Project Development Studies

- Work with vendor upfront to create parameters for your data set. <u>Take time on this!</u>

- Understand the limitations of the process before ordering.

- Work with the vendor to get questions answered after you receive the data. <u>This is critical!</u>

- 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

- <u>The data has proven to be useable for our projects</u>.

Questions?

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Thank you

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