

Big Data - Use Cases in the Metrolina Region

Charlotte Department of Transportation

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Today's Presentation

1. How has CDOT used “Big Data” over the past five years
2. Use Cases:
 - Metrolina Regional Model
 - NC 49 Forecast
 - 7th Street Corridor
3. Lessons Learned and Discussion

Our Big Data Journey

Airsage Data (2015)

- Corridor comparisons, external station volumes

Passive Data (2018)

- Prepared by RSG
- OD Trip Tables
- Corridor (I-77, NC 49)
- External Station Volumes

RITIS – Eastern Transportation Coalition

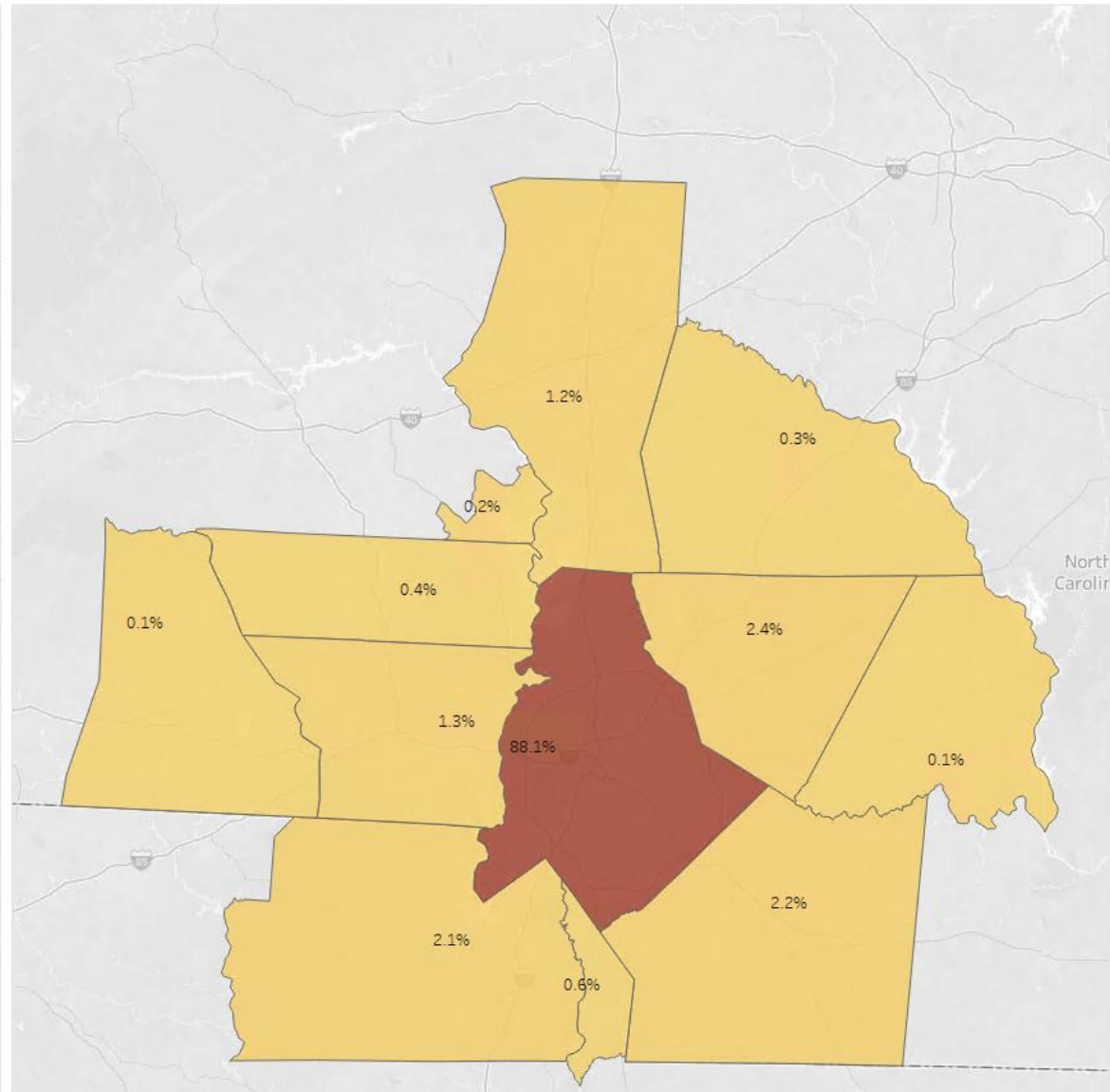
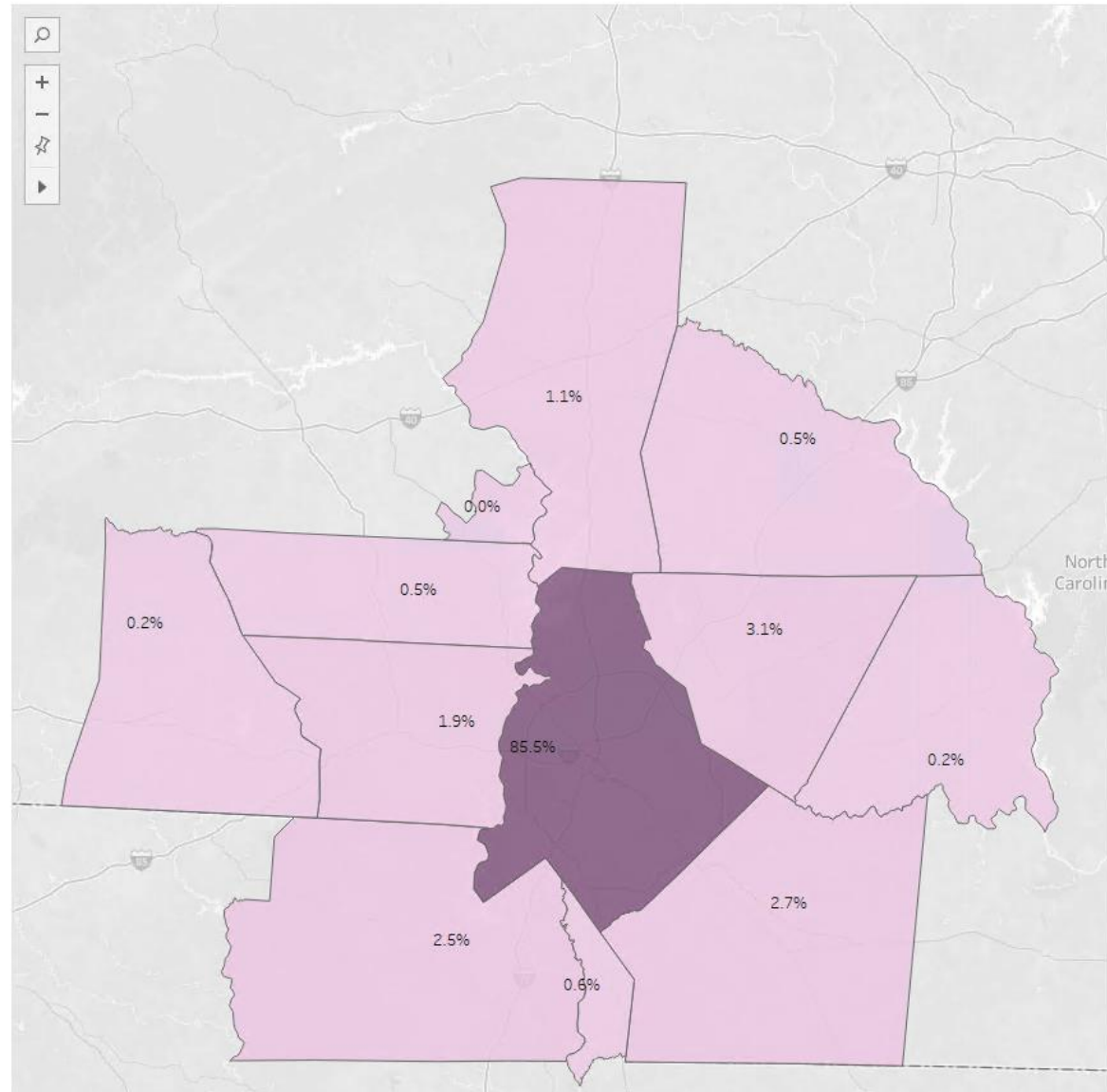
StreetLight (Since 2022)

- OD Trip Tables
- Select link analysis
- AADT/TMCs

Secondary Source – OD Flows

MRM22v1.0

Streetlight



TOD

- ☐ (All)
- ☒ AM
- ☐ MD
- ☐ NT
- ☐ PM

Origin

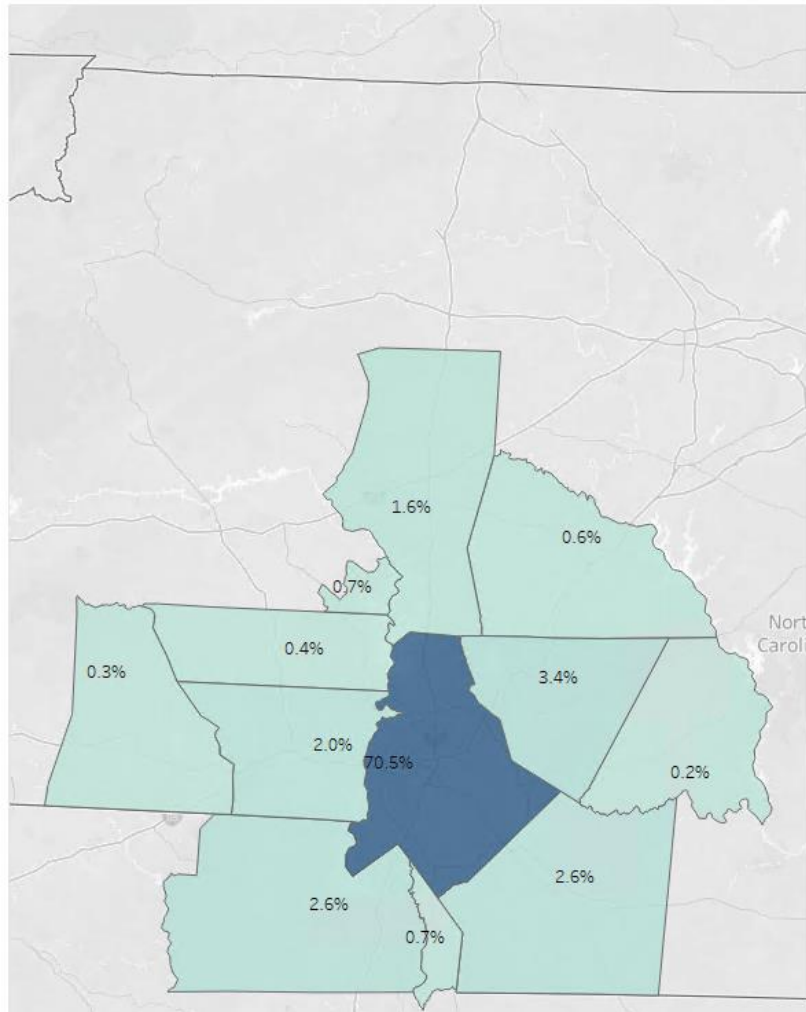
- ☐ (All)
- ☐ Cabarrus
- ☐ Catawba
- ☐ Cleveland
- ☐ External
- ☐ Gaston
- ☐ Iredell
- ☐ Lancaster
- ☐ Lincoln
- ☒ Mecklenburg
- ☐ Rowan
- ☐ Stanly
- ☐ Union
- ☐ York

Destination

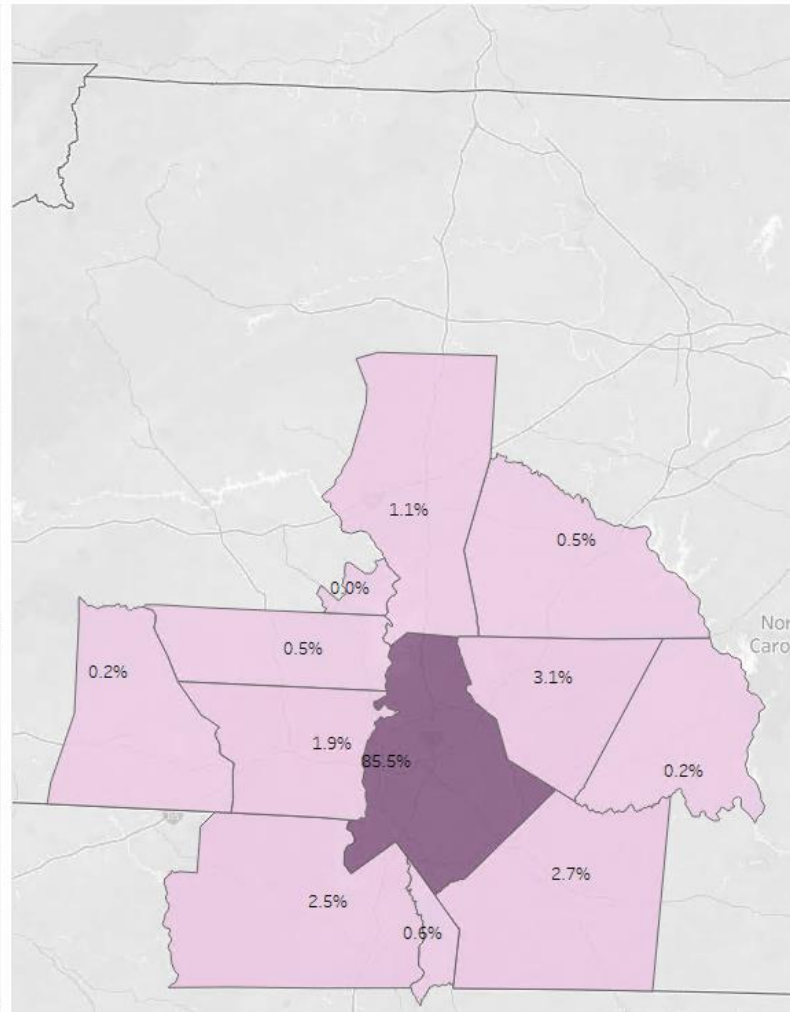
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Secondary Source – OD Flows

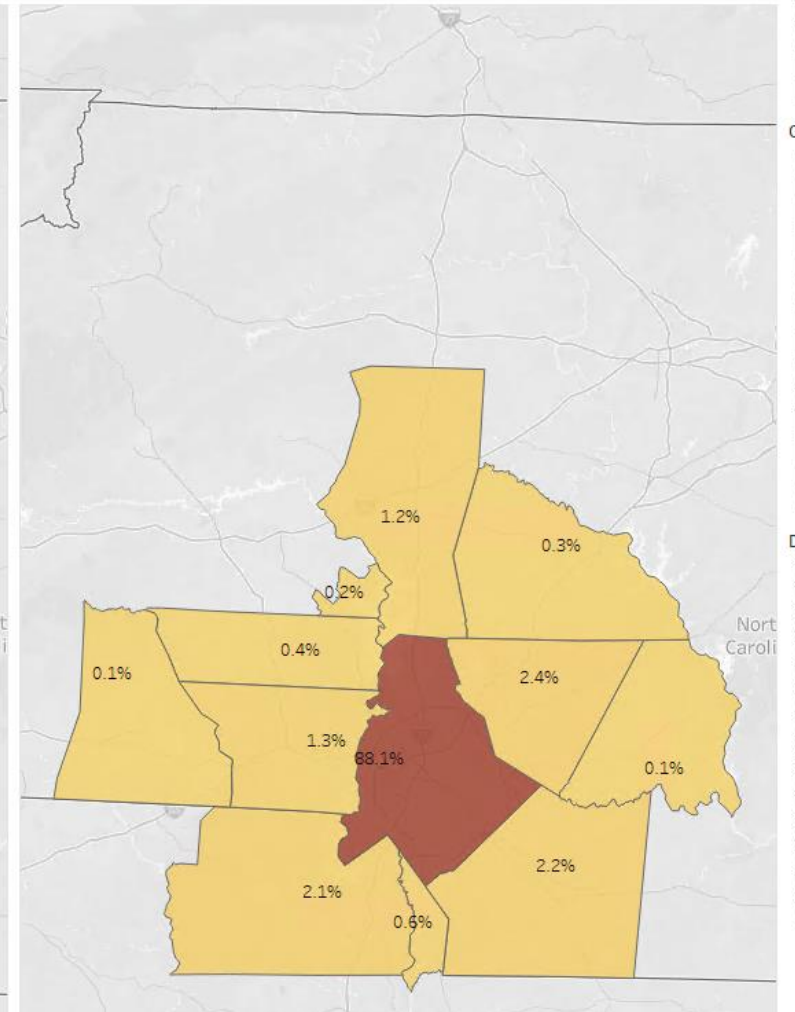
LEHD LODES



MRM22v1.0



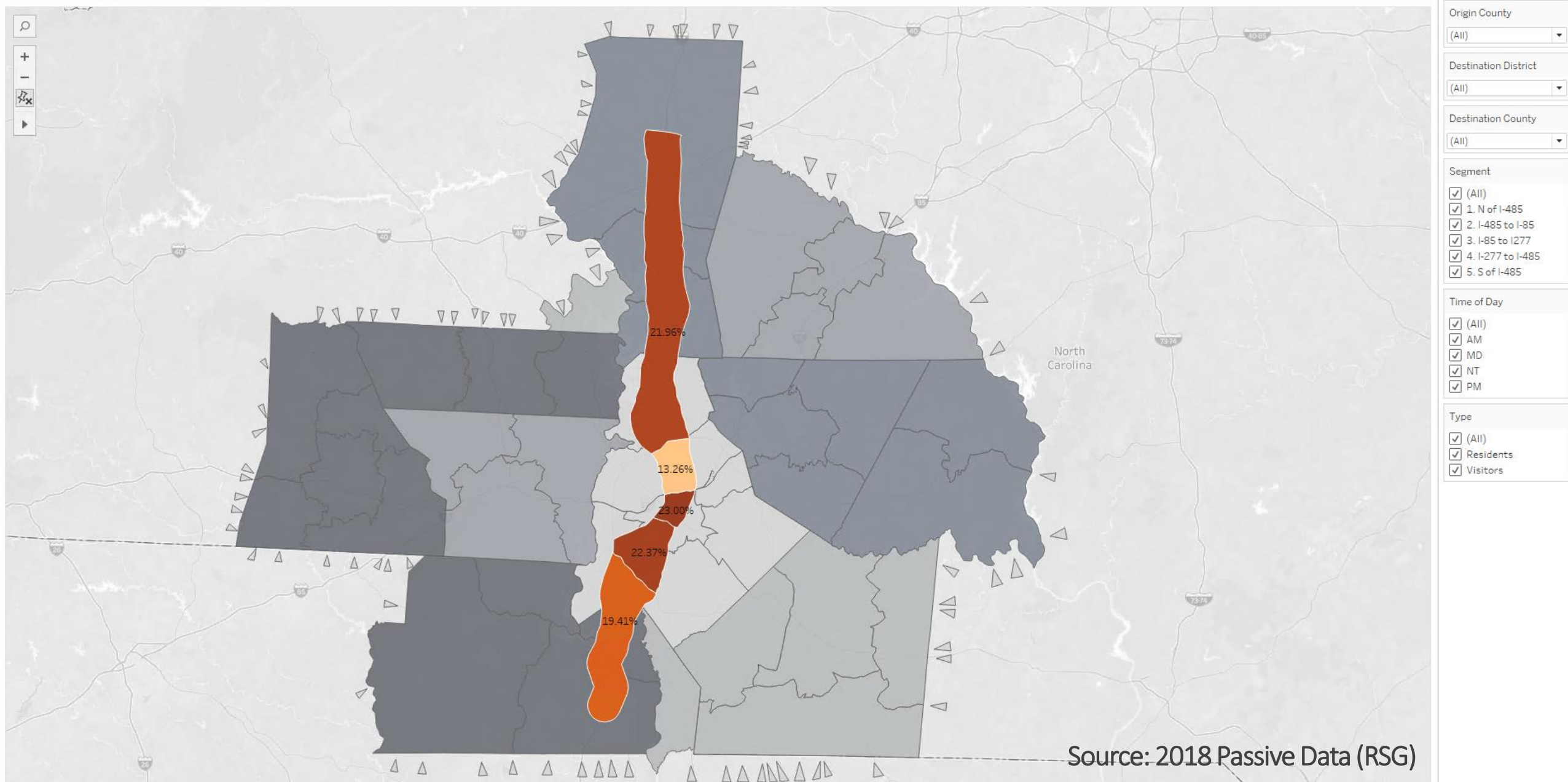
Streetlight



- TOD**
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 - ☒ AM
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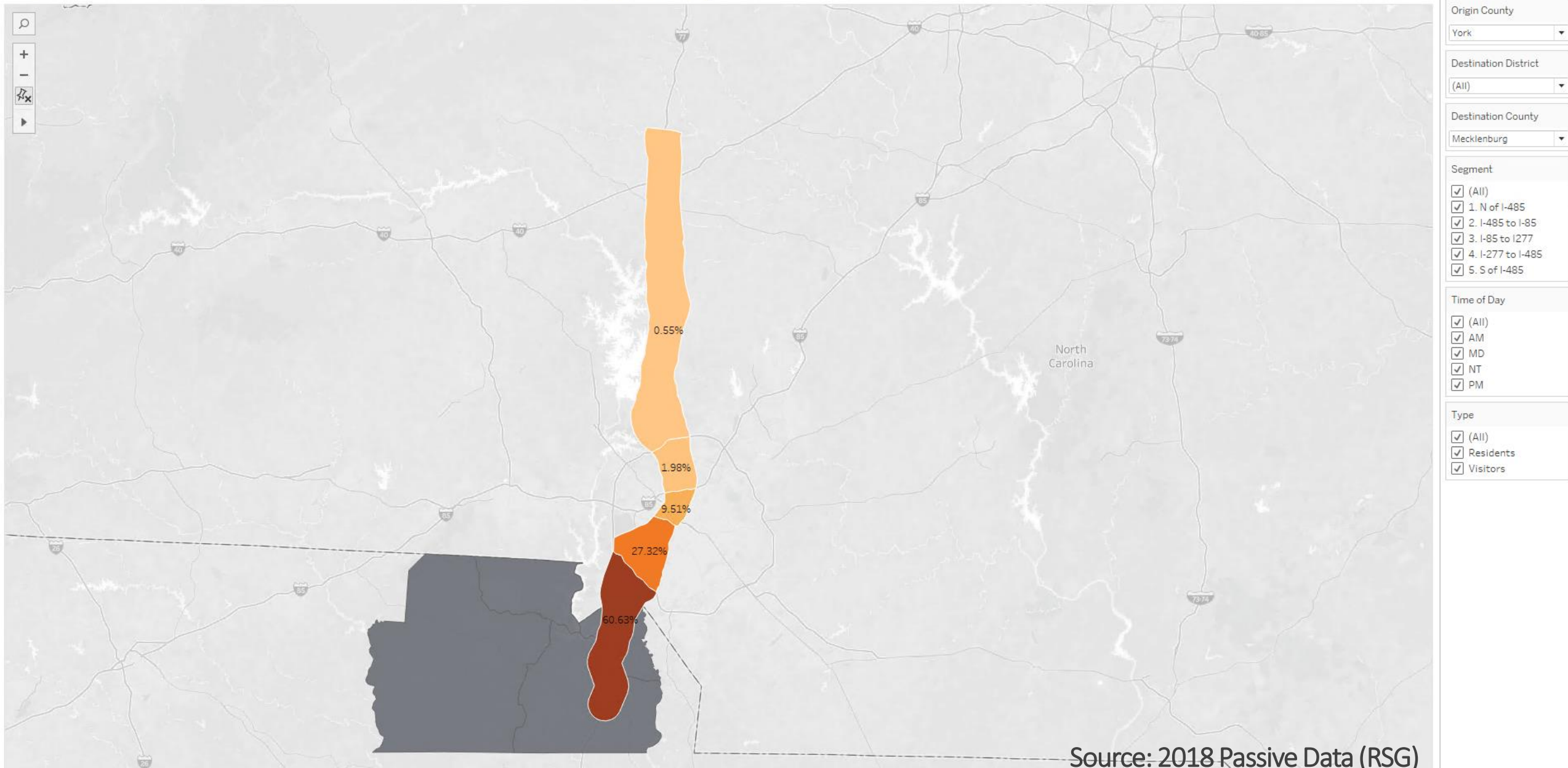
District Trip Share | Destinations

Filter on Destinations --- allows you to view percentage of origin(s) that are associated with specific destination(s)



District Trip Share | Destinations

Filter on Destinations --- allows you to view percentage of origin(s) that are associated with specific destination(s)



Secondary Source – External Stations

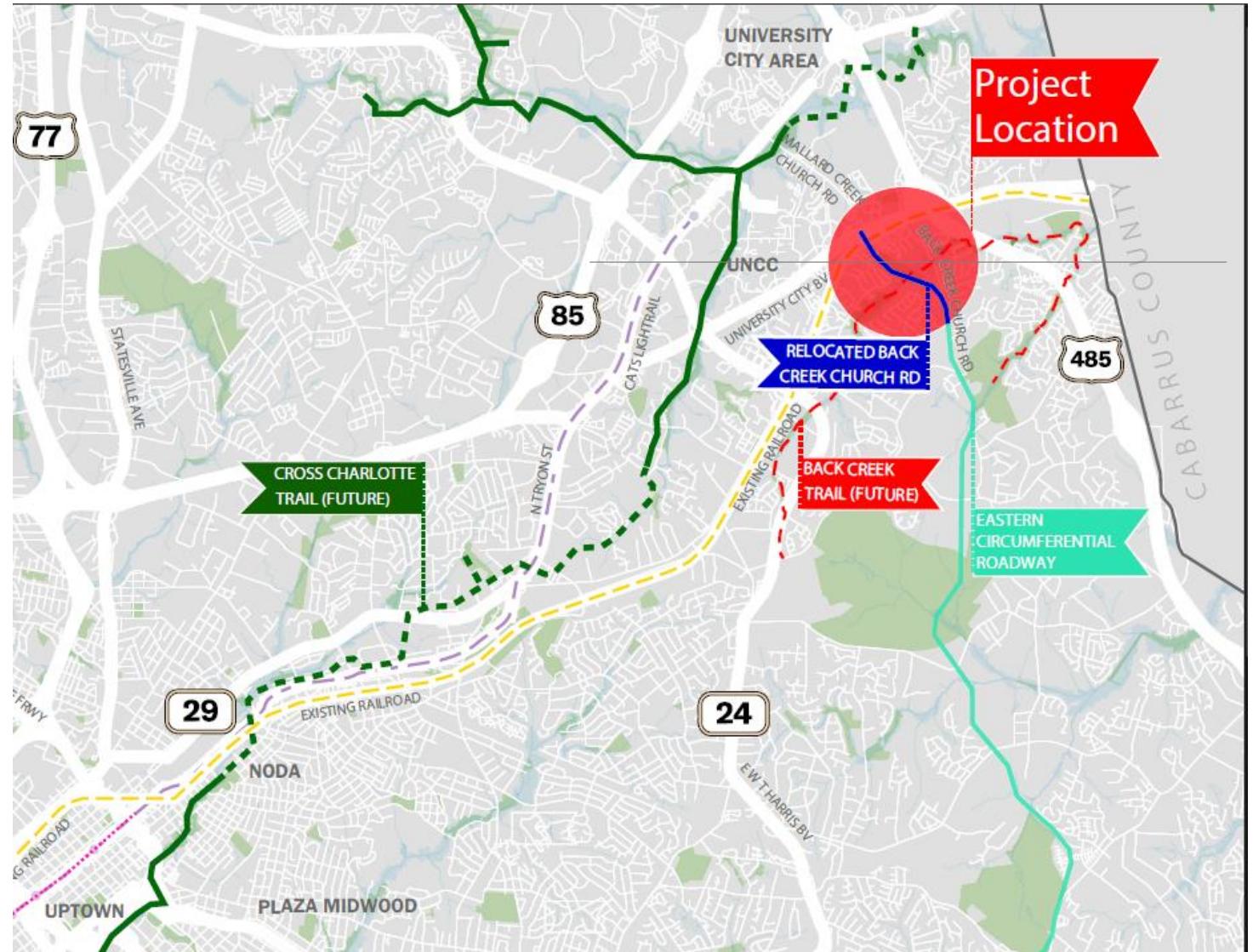
🔼 No Filters Applied - showing 61 of 61 it...

Zone Name	Zone Kind
<input type="text" value="filter"/>	Any ▾
→ 12001 (IB)	Custom Zone
← 12001 (OB)	Custom Zone
↗ 12002 (IB)	Custom Zone
↘ 12002 (OB)	Custom Zone
↑ 12003 (IB)	Custom Zone
↓ 12003 (OB)	Custom Zone
↖ 12004 (IB)	Custom Zone
↙ 12004 (OB)	Custom Zone
↗ 12005 (IB)	Custom Zone

Map showing the Charlotte, NC area with a custom zone boundary (red line) and blue dots indicating station locations. The zone covers areas around Charlotte, including Statesville, Mooresville, Huntersville, and Rock Hill.

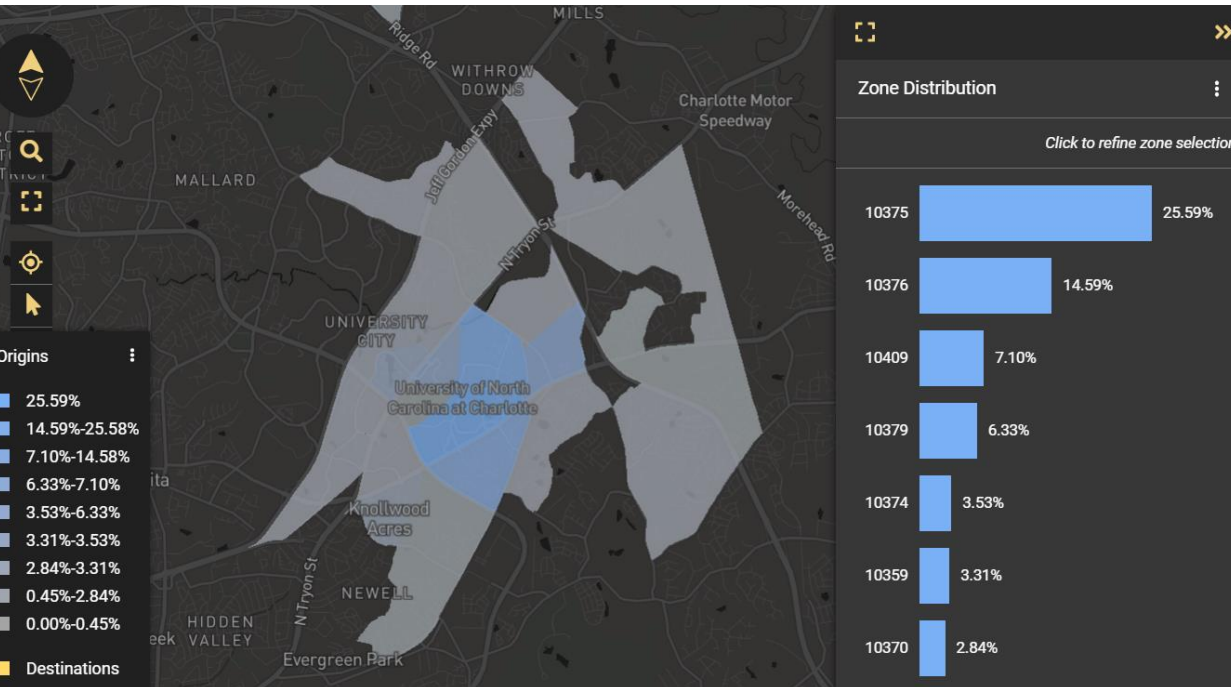
NC 49 Widening (U-5768)

- Widening from 4 to 6 lanes and constructing reduced conflict intersection
- UNCC would like to retain the existing cross-section with improvements where feasible
- Updated future volumes to understand project need
 - Metrolina Regional Model does not have a campus model for UNCC
 - StreetLight used as secondary source for understanding travel to/from UNCC

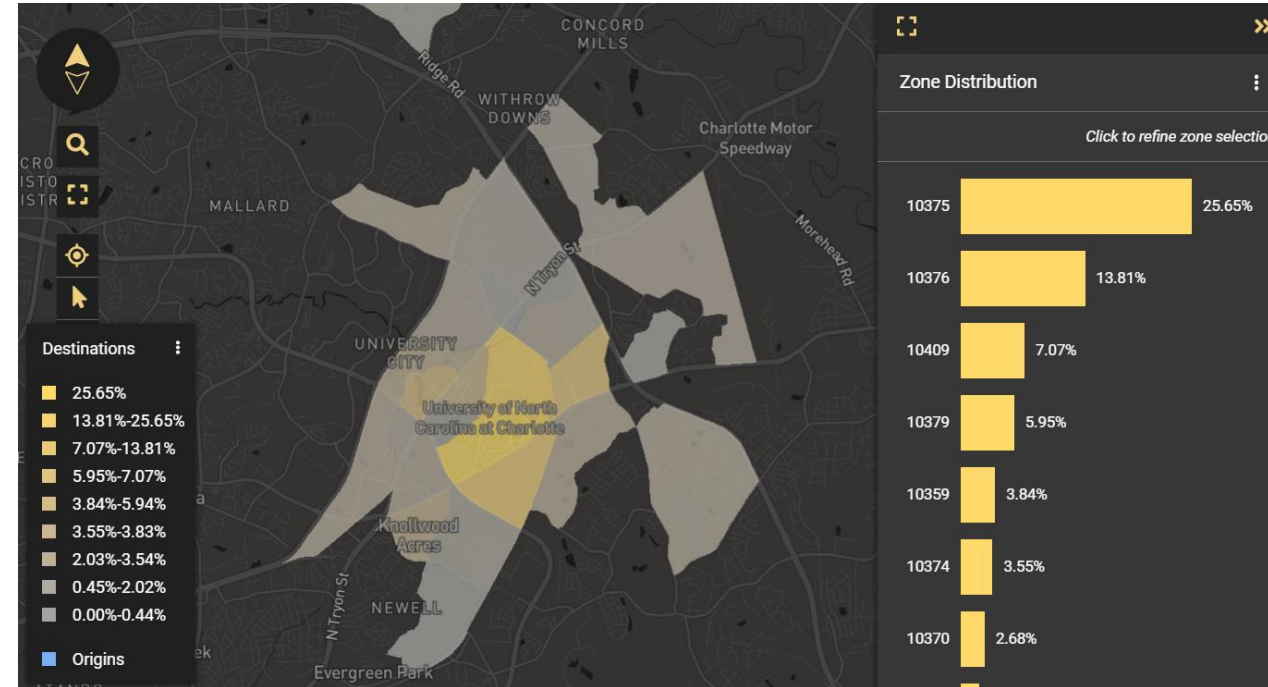


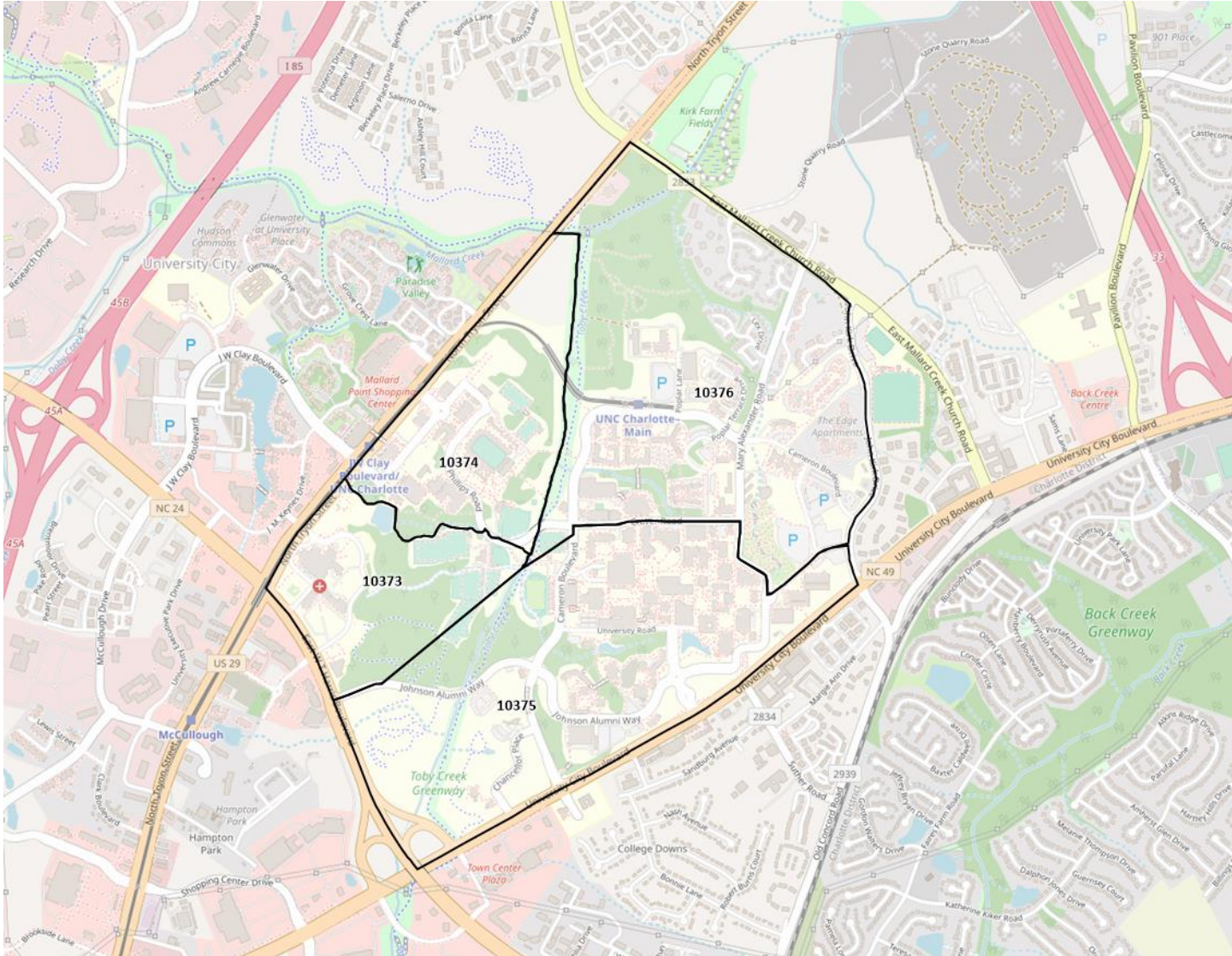


Travel to UNCC



Travel from UNCC



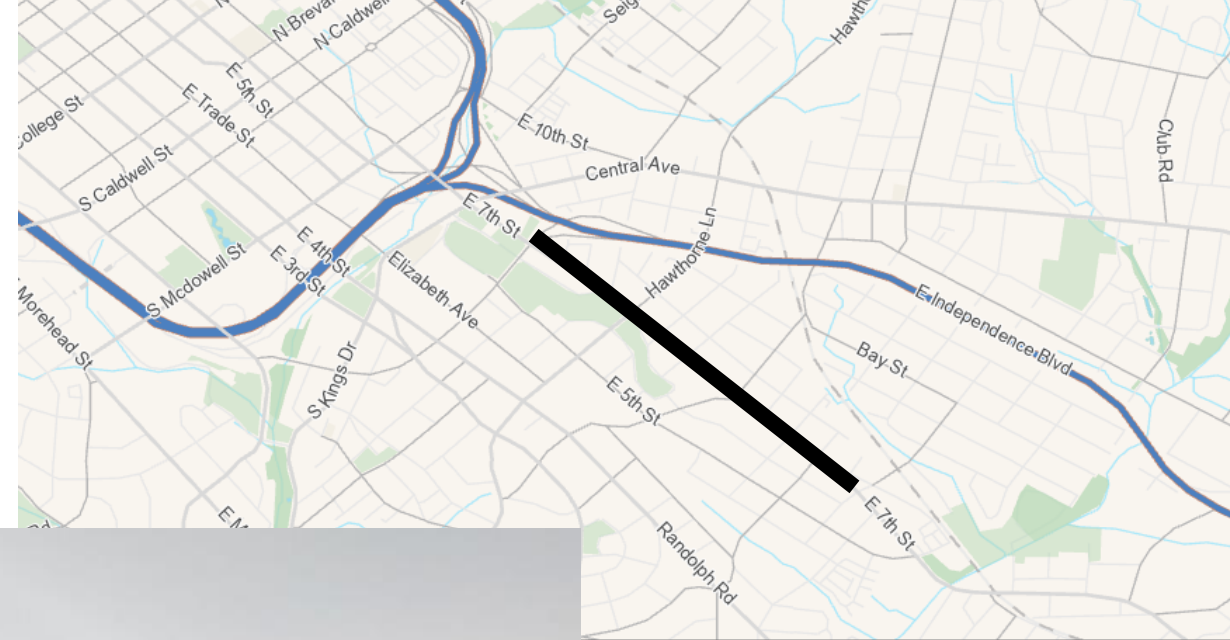


MRM22v1 and Streetlight

- Peak vs Offpeak
- Trips to campus within 10-20%
- Trips from campus within 5-10%
- Underestimating intrazonal trips
- Minor adjustments

Charlotte's 7th Street

- 3-lane cross section, reversible
- Problem: aging signal system, limits to hardscaped enhancements
- Solution: convert to 2 lane with center TWLT
 - Decreased capacity
 - **Does the roadway context support this? (thoroughfare versus main street)**
 - **Who does this impact? (local versus regional trips)**
 - **How do alternate routes compare?**
- Easy to test with a pilot project

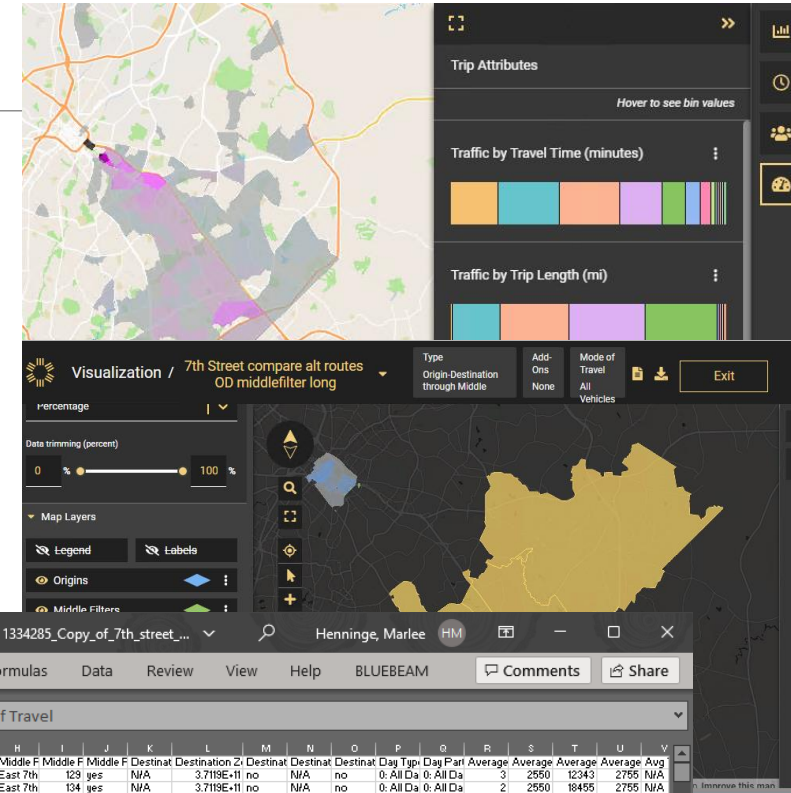


Big Data Analyses for traffic context

Traffic Context Question	Analysis
How does the corridor function? (thoroughfare versus main street) Who uses the corridor? (short versus long trips)	Origin-Destination (StreetLight)
What alternate routes are available?	Route Analysis (RITIS)

Streetlight: Distinguishing local and regional trips

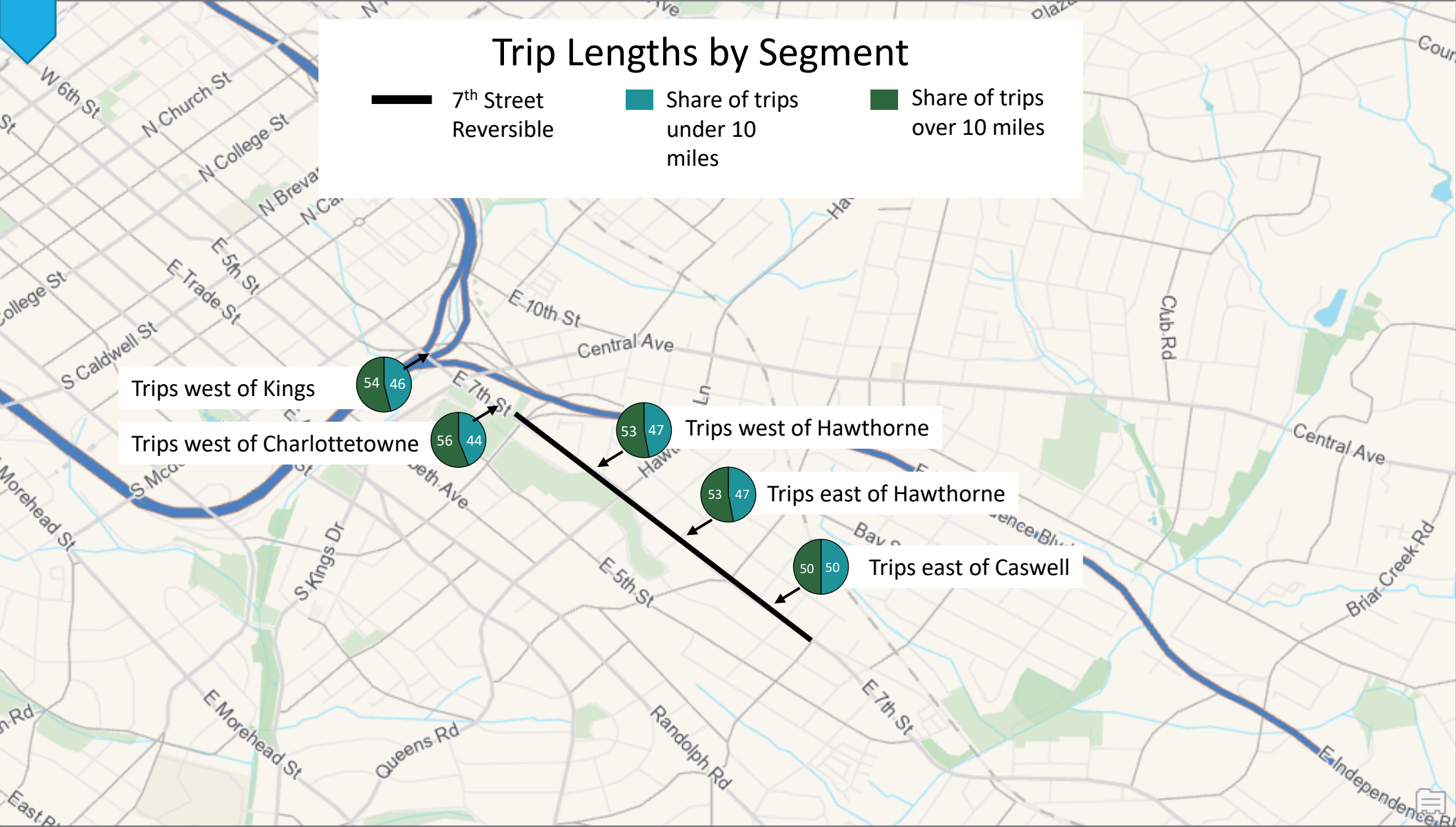
- Streetlight Platform:
 - Trip Attributes
 - Specific O-D groups we deem local or regional
- StreetLight Extract:
 - .csv Average Trip distance for each analysis unit
 - Spatial post-processing



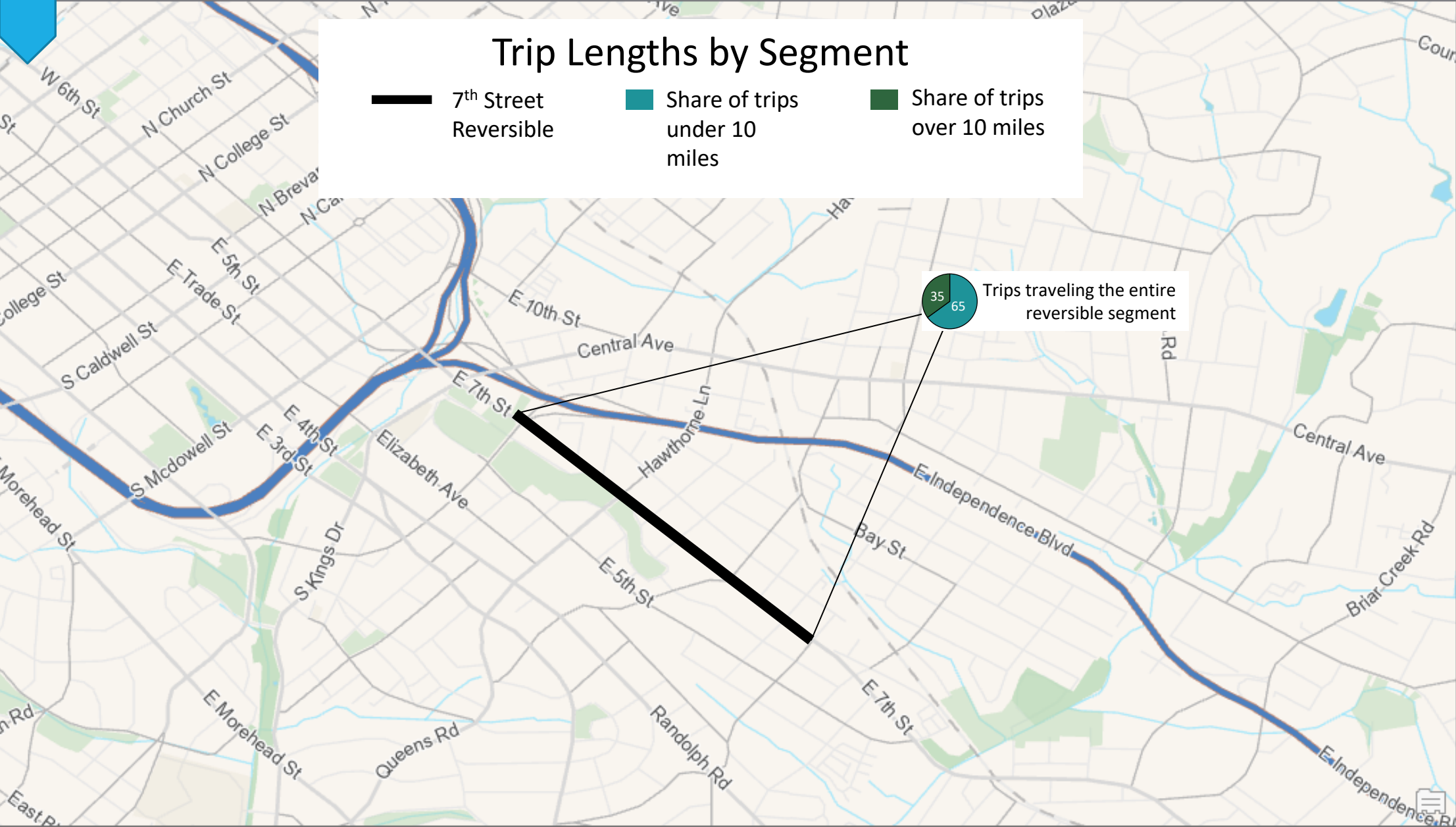
The screenshot displays the Streetlight Extract interface. On the left, a map shows a highlighted trip path in Charlotte. On the right, the 'Table' panel is visible, displaying a table of trip data.

OBJECTID	Zone	Sum of Average Daily O-M-D Traffic (Std. Volume)
1	371190024001	144
2	371190025001	103
3	371190018002	49
4	371190025002	41
5	371190011001	41
6	371190018011	37

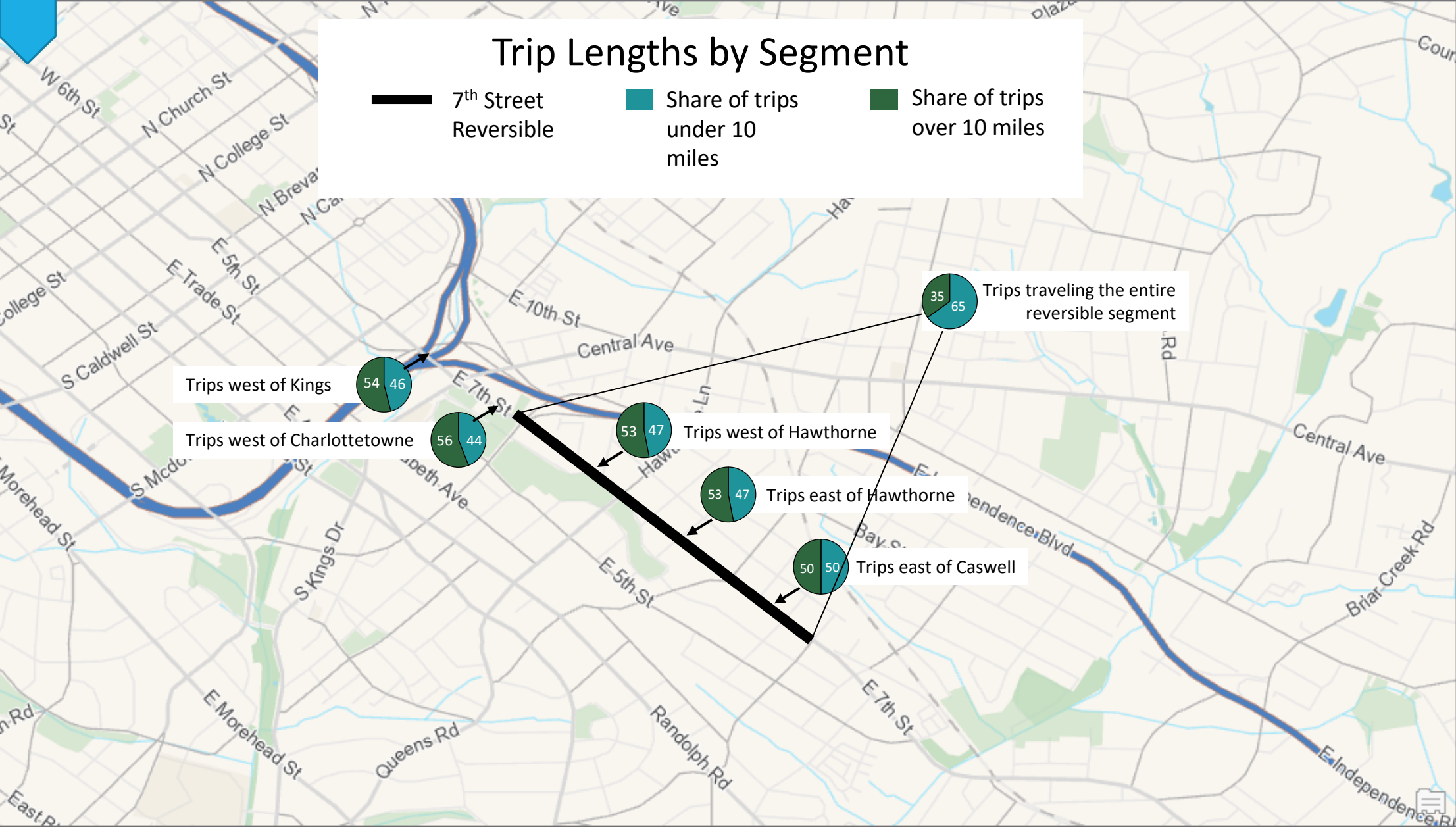
Analysis 1: ODMF by Segment



Analysis 2: ODMF Reversible Segment

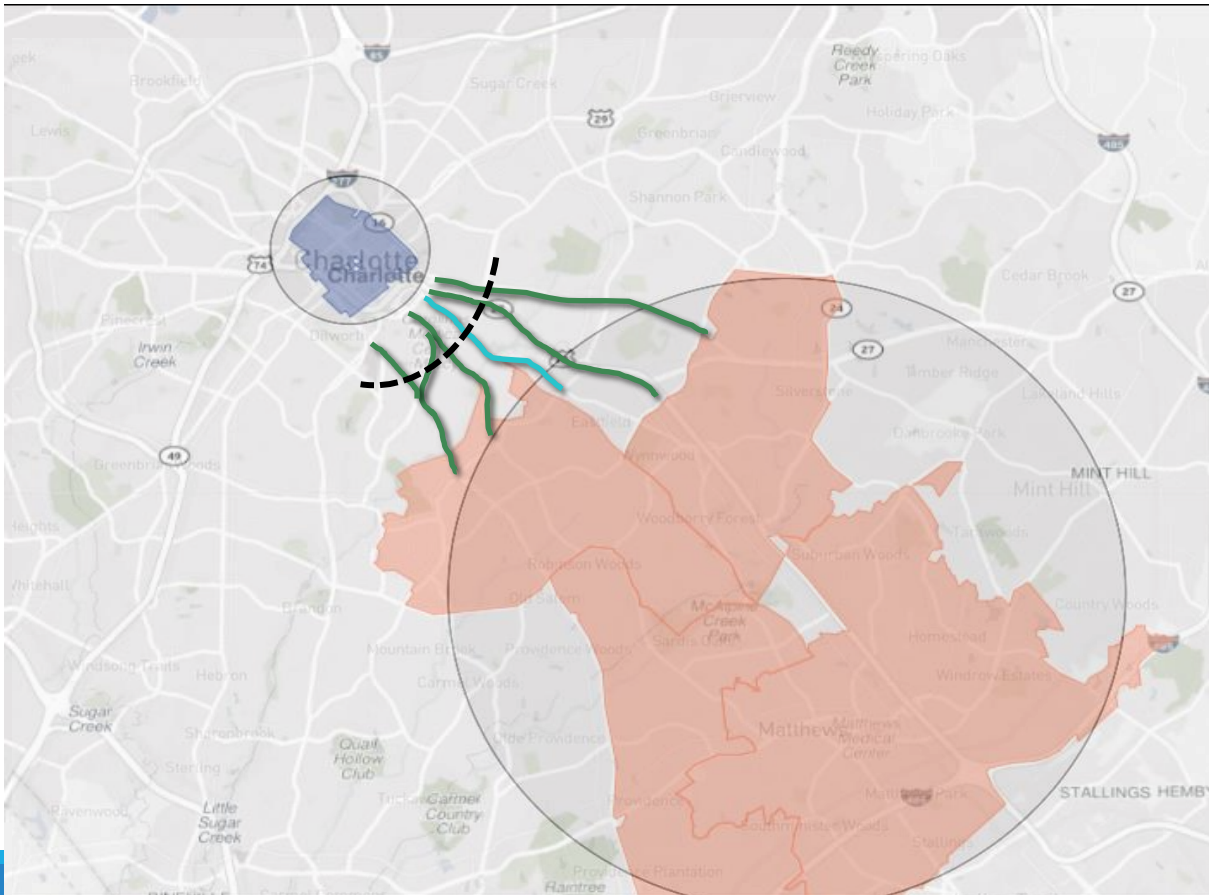


Side – by – side comparison



RITIS Route Analysis

- Determining route choices and route alternatives



ROUTE	INBOUND (6-10 AM)	OUTBOUND (3-7 PM)
Central Av	2%	2%
US-74	39%	52%
7 th St	7%	10%
4 th St	30%	15%
3 rd St	11%	10%
Morehead St	12%	11%

Analyses and Results

Traffic Context Question	Analysis	Results
How does the corridor function? (thoroughfare versus main street) Who uses the corridor? (short versus long trips)	Origin-Destination (StreetLight)	<ul style="list-style-type: none">• Majority do not travel the whole reversible (<1 mile)• Segments range from 50/50 short versus long trips
What alternate routes are available?	Route Analysis (RITIS)	<ul style="list-style-type: none">• There are a handful of alternate routes• US-74 captures the majority of trips that could use 7th street• 7th street carries about the same proportion of trips as the remaining options.

Lessons Learned & Discussion

Lessons Learned:

- Big Data is a great supplemental source
- Keep in mind that some sources are a blend of modeled and observed (probe) data
- Big data sources can be time-consuming to fully process and apply

Questions for us?

Questions for you:

- Have you used this type of data?
- If so, how?
- Pros/cons that you have seen... etc