Data and Getting Things Done

STREETLIGHT

TOOLE DESIGN

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Today's agenda

1

"Big Data" Based Metrics and the Data Landscape

2

"Big Data" in Practice

Safety ✓

Congestion ✓

Equity

3

"Big Data" in Newberry

"Big Data" Based Metrics and the Data Landscape

How Does this Work?

New modes and new behaviors have raised the bar on the data you need to help South Carolina move better.
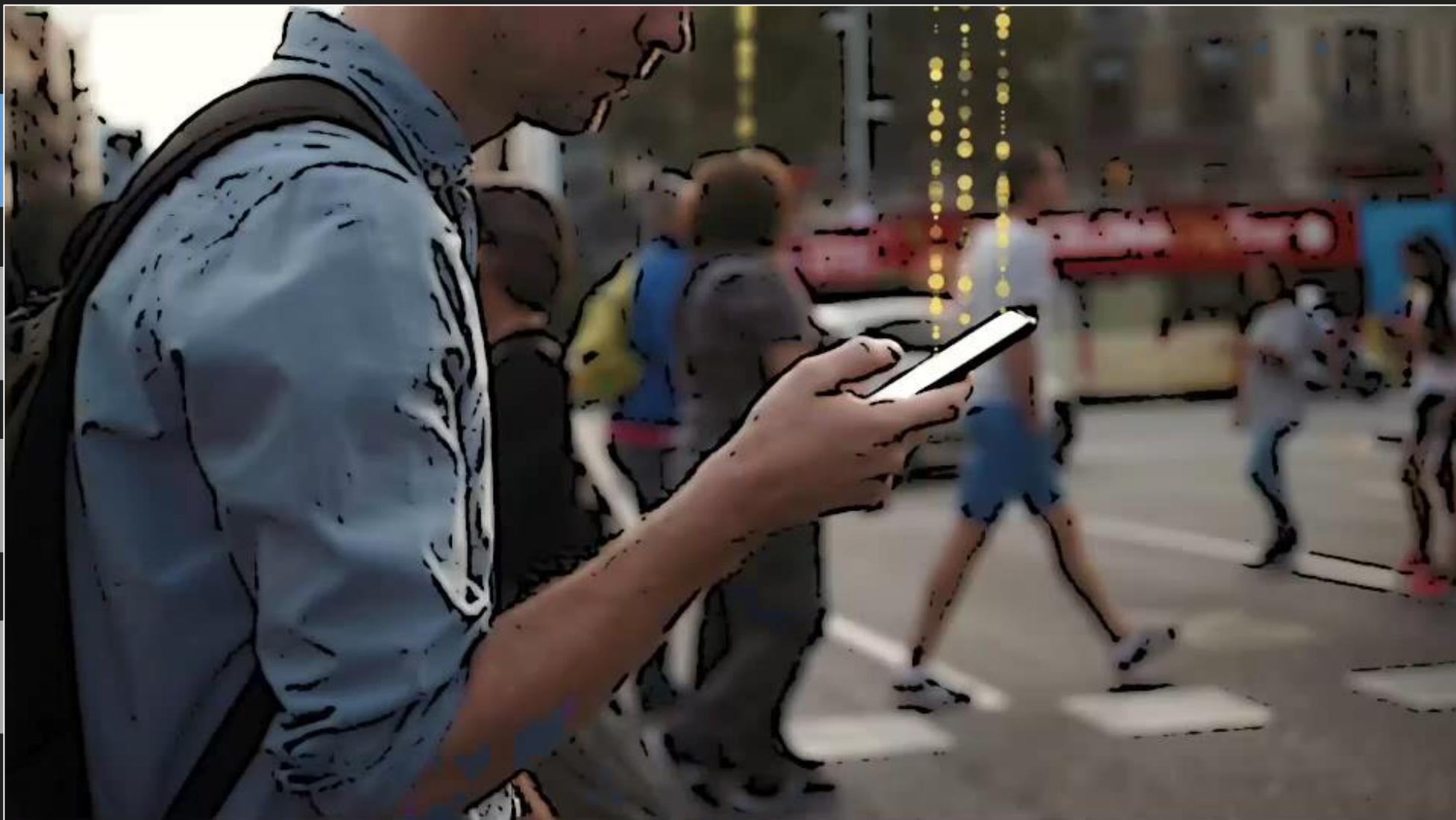
Deliveries

Remote work

Ride hailing

Infrastructure reinvestment

EV adoption

WHERE TO?

Mode shift

Big Data

Data Processing

Metrics & Modes

App Experience

Big Data

Data Processing

Metrics & Modes
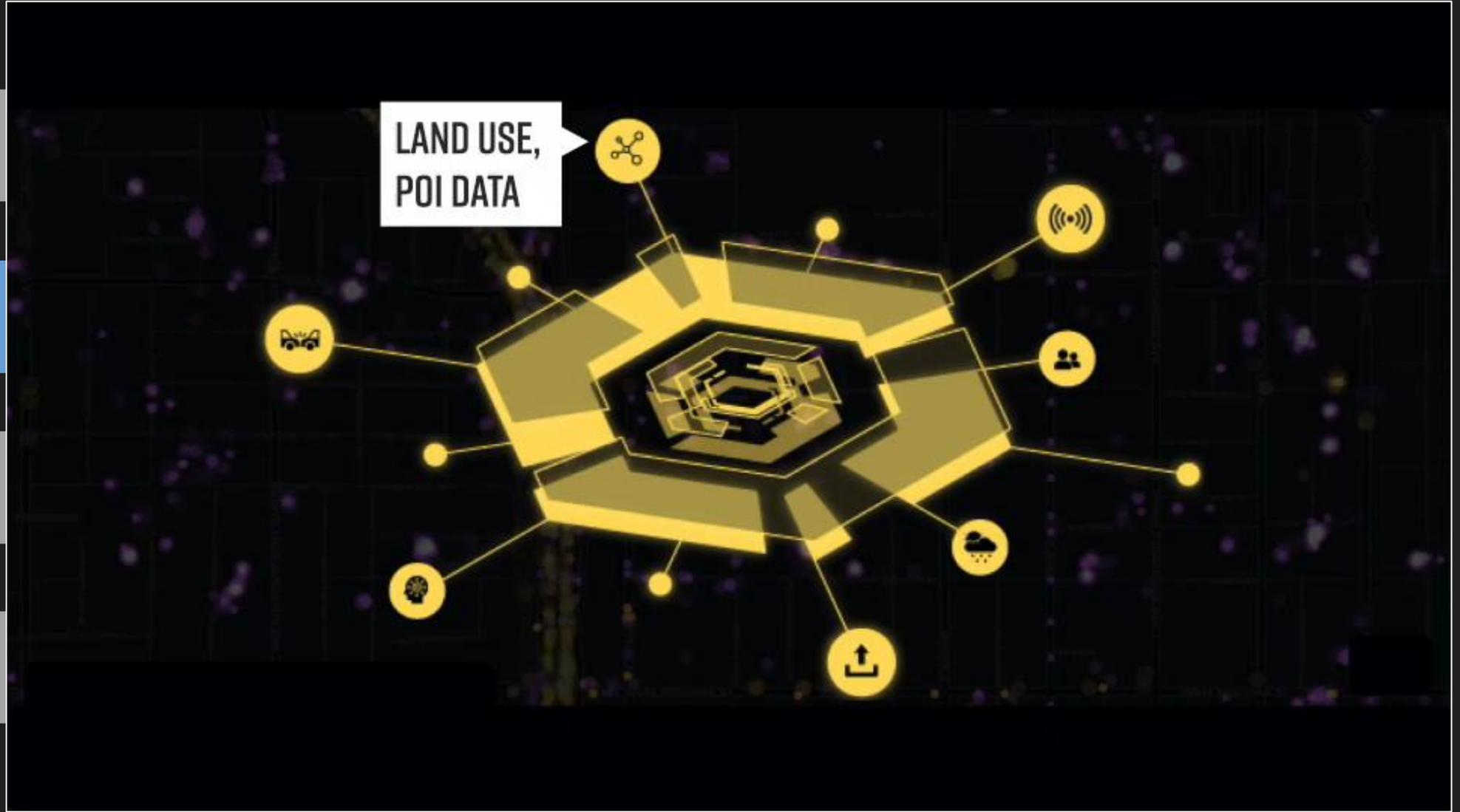
App Experience

Big Data

Data Processing

Metrics & Modes

App Experience

ORIGIN-DESTINATION

NEW ANALYSIS ▶

VEHICLE VOLUME

SELECT ▶

SELECT LINK

SELECT ▶

Big Data

Data Processing

Metrics & Modes

App Experience

What kind of data? StreetLight **pioneered the use of location data** and continuously adds new data sources to measure mobility.

MOBILITY DATA
- GPS COMMERCIAL
- CONNECTED VEHICLE
- LBS
- GPS PERSONAL
- TELCO

CONTEXTUAL DATA
- ROAD NETWORK DATA
- CENSUS DATA
- VEHICLE COUNTERS
- BIKE AND PED COUNTERS
- PLACES AND LANDMARKS, LAND USE, POI, WEATHER AND OTHER DATA
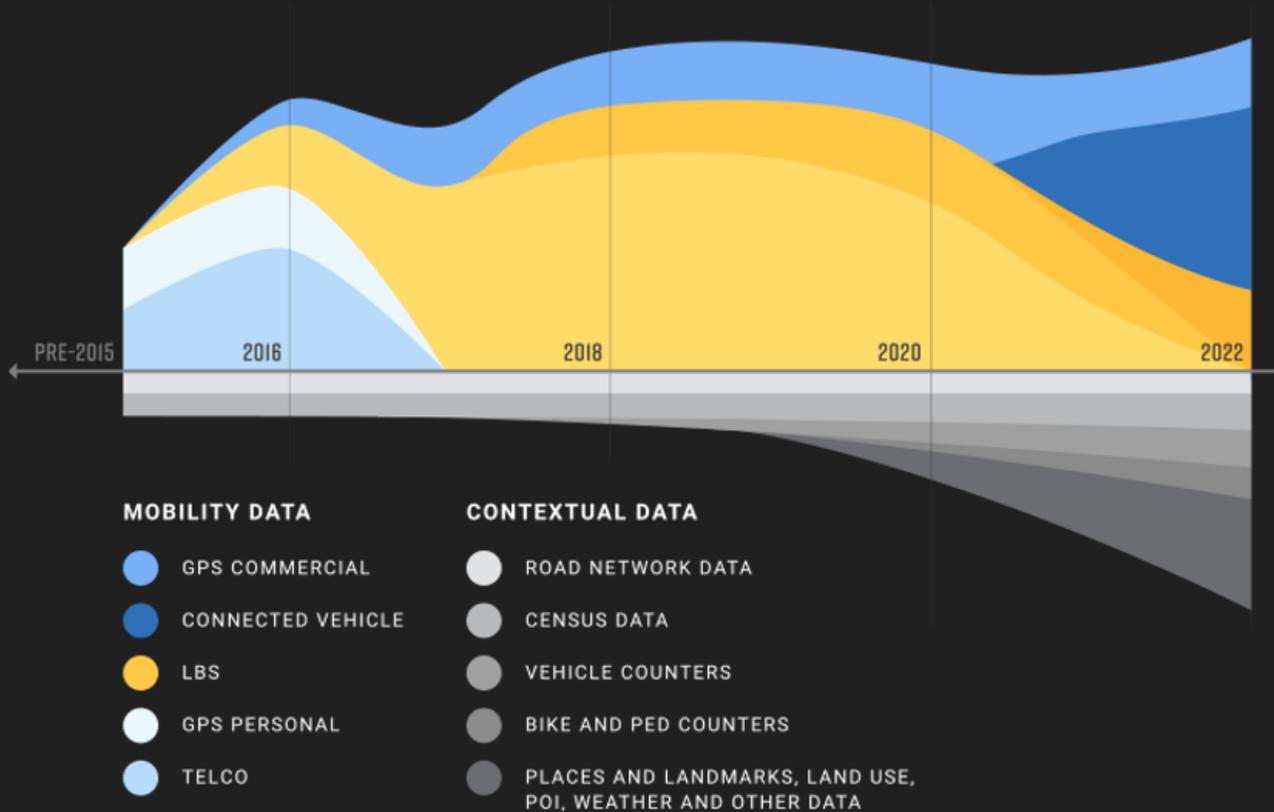
Since 2011, we have harnessed 100s of data sources that contribute to our **RouteScience®** engine, developing unmatched transportation data processing capabilities and a deep, empirical understanding of how North America's roads and sidewalks interact.

We have built a trusted data science foundation, **so you don't have to.**

Upcoming Bicycle and Pedestrian mode updates

Summer 2023

Currently in StreetLight InSight®

- **January 2019 - April 2022 data months** are available

- Bicycle and Pedestrian available for Zone Activity, Origin-Destination, and Trips to and From Pre-Set Geography analyses and Trip Attributes

- Traveler Attributes, Trip Purpose, and Home and Work Locations

- OD and Volume metrics available down to segment level

- More improvements to come!

Coming to StreetLight Services

- **January 2019 – January 2023 data months** will be available (U.S. only)

- Seasonal Bicycle and Pedestrian Average Daily Volume for Census Tract-level and larger areas

- Delivered as a CSV and shapefile output from StreetLight Services

⬤ Bicycle and Pedestrian Census Tract trends

⬤ Historical Bicycle and Pedestrian Metrics

Ongoing seasonal trend data for **January 2019 – January 2023+**

Historical data through **Apr 2022**

Benefits of Connected Vehicle Data

- Richer dataset
  - Precise location
  - Better trips starts/ends
  - Frequent (3s) pings
  - Improved accuracy in metrics such as speed

- Implications for Active Modes
  - Better speed data for safe and complete streets work
  - Refined trip attributes to identify potential for mode shift
  - All Vehicle and Truck Volumes for Level of Stress

Mobile device data

Connected vehicle data
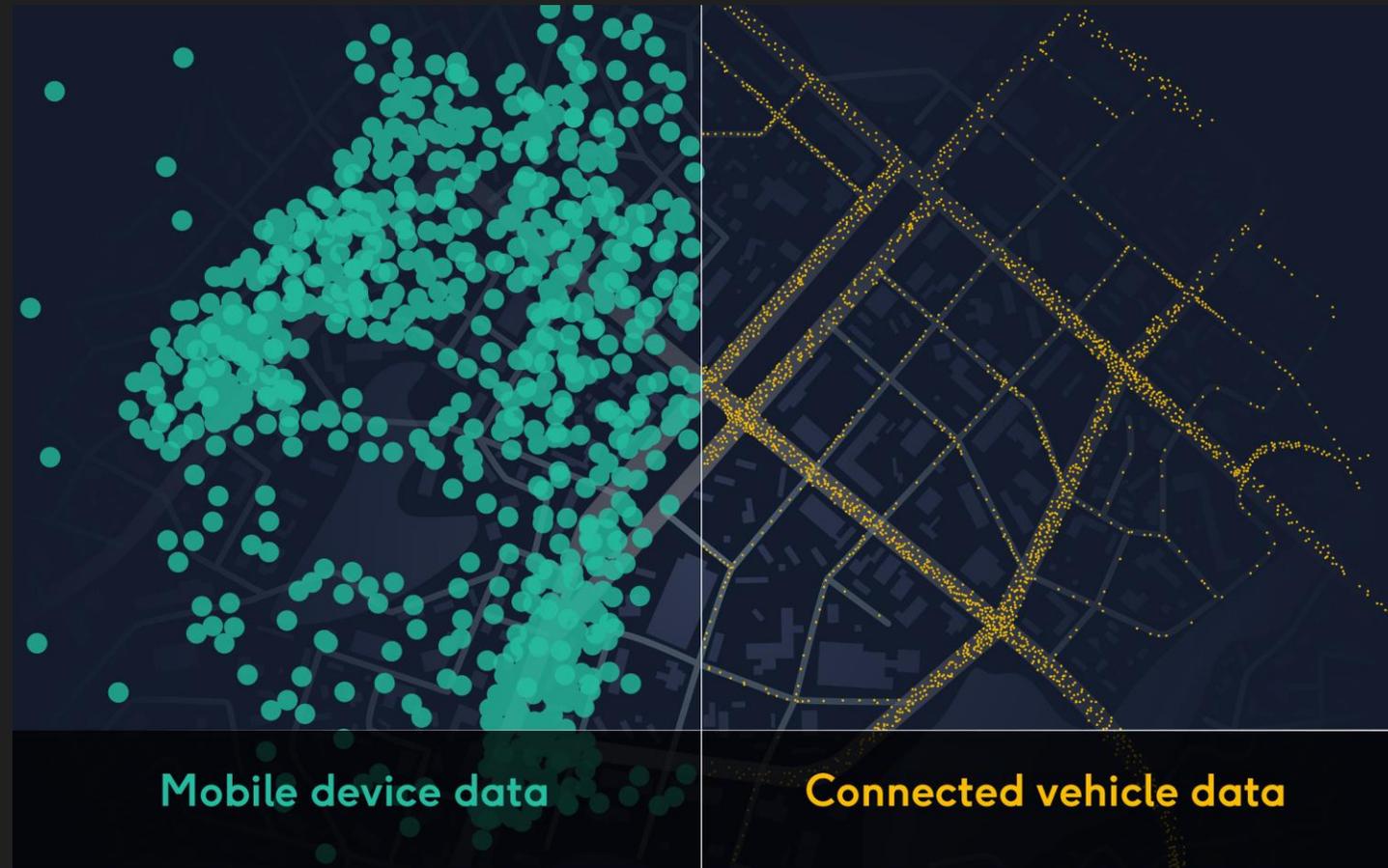
StreetLight distills massive amounts of transportation data into **actionable insights you need to make decisions.**

It's not just about the **data**

It's about the **decisions** it enables
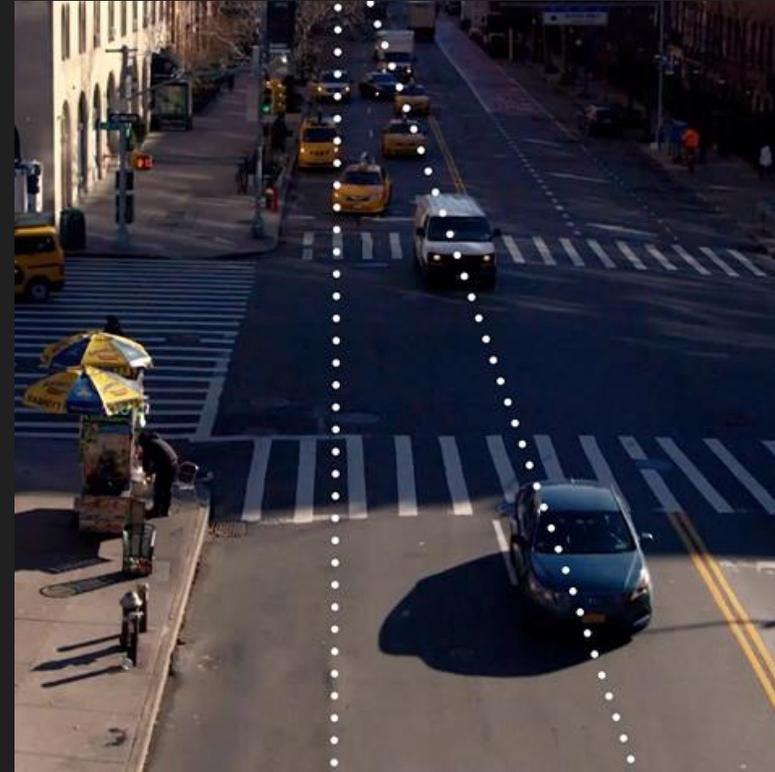
"Big Data" in Practice

Toole Design Best Practices and Case Studies

Sources

- StreetLight

- Replica

- INRIX

- RITIS (Regional Integrated Transportation Information System)
  - USDOT/State DOT partnership

- Continuous collection (e.g., bikeshare, scooters, transit vehicles, parking meters, bike counters, etc.)

- Others

Typical Access Methods

- Project or client specific
  - Purchase particular data sets for a zone(s) or area(s)
- Subscription
  - Can be based on level of use

Typical Types of Data

- Origin-destination
- Travel speeds
- Travel time
- Trip length
- Top routes between locations
- Turning movement counts
- Average daily traffic
- Parking
- Traveler and geographic based demographics

Why Big Data?

- Adds the dimension of time
  - Traditional manually collected data captures a moment in time
- Can be used when traditional methods are not available/feasible
- Can be combined with other types of data for a more comprehensive approach
  - Traditional turning movement counts
  - Automatic traffic recorders (e.g., tube counts)
  - Census data
- Quick graphic tools

Considerations

- Client comfort
- Availability of data access
- Project budget
- Project scale
  - Corridor, street network, city/county, or region vs. single or small group of intersections

Big Data is a Tool

- Does not replace professional judgment and analysis
- Limitations
  - Reliability of data for non-vehicular modes
  - Accuracy of non-trend-based metrics due to how data is collected
  - Potential for bias due to lack of data for some demographics
  - Potential lag time for certain types of data

Tips

- Specific volume is preferred over trends
  - Use traditional turning movement counts and tube counts for comparison
  - Adjust as needed
- Use local count data to validate trend data
- Always ask "Is Big Data the right fit?"
  - Manage time and provide focus
  - Big Data can provide a nearly unlimited amount of information – can be overwhelming

Comparison

Provider	Data Types*	User Groups	Considerations
Replica	• O-D • Trip length • Demographics • Economics • AADTs • Turning movements	• Anyone with paid access	• Resolution level of O-D data (i.e., census block group and higher) • Specific date ranges not available on all data • Some data lag
StreetLight	• O-D • Travel speeds/time • Trip length • Top routes between locations • AADTs/volume • Turning movements	• Anyone with paid access	• Extremely flexible platform • Multiple avenues of analysis (i.e., positive and negative) • Some data lag
RITIS^	• O-D • Travel speeds/time • AADTs • Freight movement • Signal analytics	• USDOT • State DOTs • MPOs • Counties, municipalities, and consultants with access agreements	• Near real-time • Local street data gaps
INRIX	• Travel speeds/time • AADTs • Signal analytics	• State or municipal transportation agencies • Anyone with paid access	• Local street data gaps

*Primarily vehicular

^RITIS uses raw data provided by INRIX, TomTom, and others as well as member DOT senor feeds depending on agreement with member DOT. Tools and data available for use vary by State DOT.

# PROJECT APPLICATION

Bike Trip Potential

Newport covers **7 square miles** of land.

Aquidneck Island

Hilton Head, SC

Aquidneck Island, RI
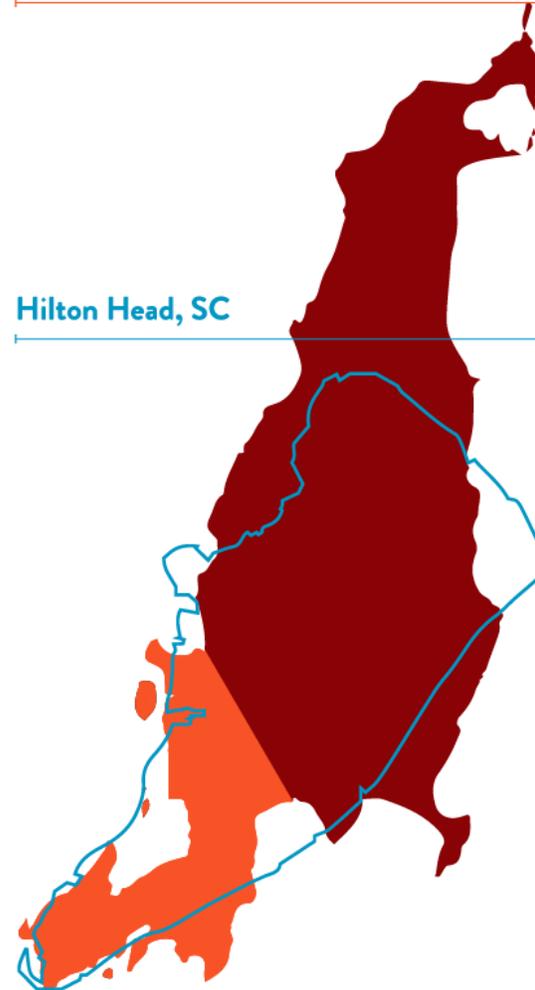
Aquidneck Island is **5 miles wide** and **15 miles long**.

For comparison, Hilton Head, SC, is **5 miles wide** and **12 miles long**.

How and Why People Get Around Aquidneck

Primary Mode

Private auto	48.5%
Auto passenger	29.9%
Walking	14.8%
Commercial vehicle	2.86%
Taxi/TNC	1.75%
Other	1.26%
Biking	0.573%
Public transit	0.300%

0   23.1k   46.2k   69.3k   92.4k

Trip Purpose

Home	31.6%
Shop	26.5%
Eat	12.1%
Social	7.70%
Recreation	7.21%
Work	6.44%
Commercial (freight)	2.91%
Errands	2.87%
Other	1.17%
Lodging (hotels etc.)	1.06%
School	.0471%
Region departure (airport)	
Pass-through traffic	

0   15.1k   30.1k   45.2k   60.3k
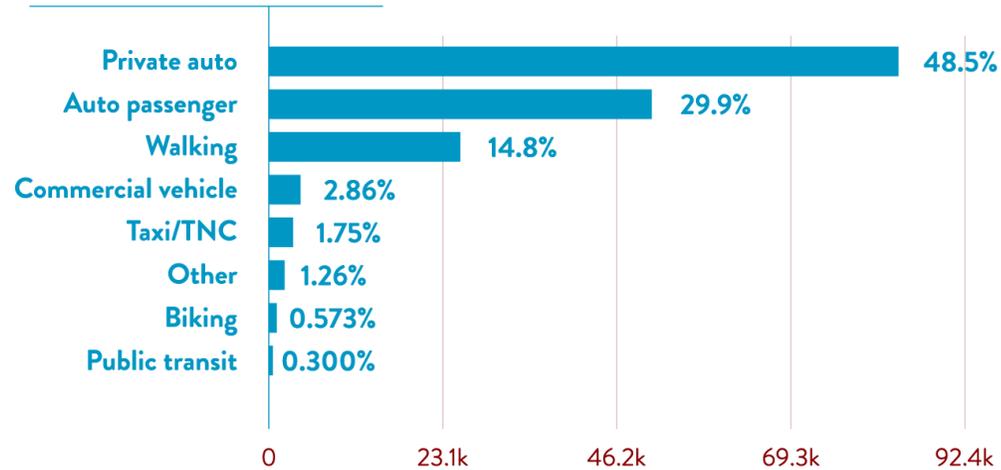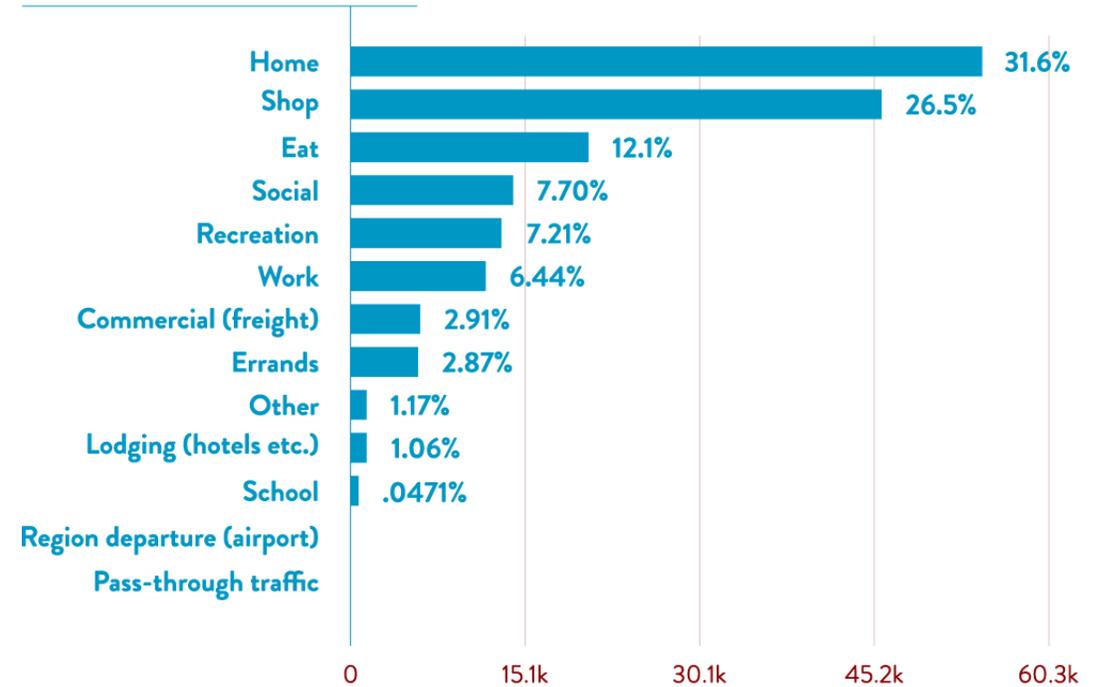
How and Why People Get Around Aquidneck

80% of all trips are **less than 4 miles,** which is easily bikable.

Trip Distance (Miles)

| Distance	Percentage
Under 0.5mi	14.2%
0.5-1mi	13.2%
1-2mi	24.1%
2-4mi	28.1%
4-8mi	15.6%
8-16mi	4.71%
16-32mi	0.00924%
32-64mi	
Over 64mi	

0   13.4k   26.8k   40.2k   53.6k

4mi
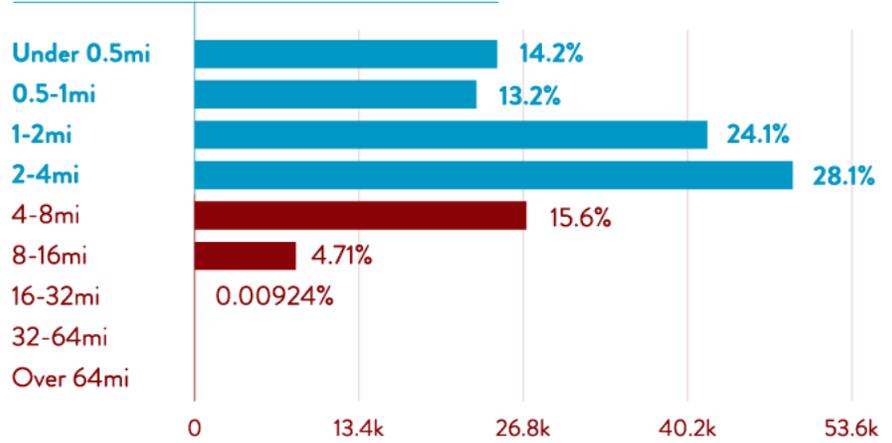
Potential for Biking
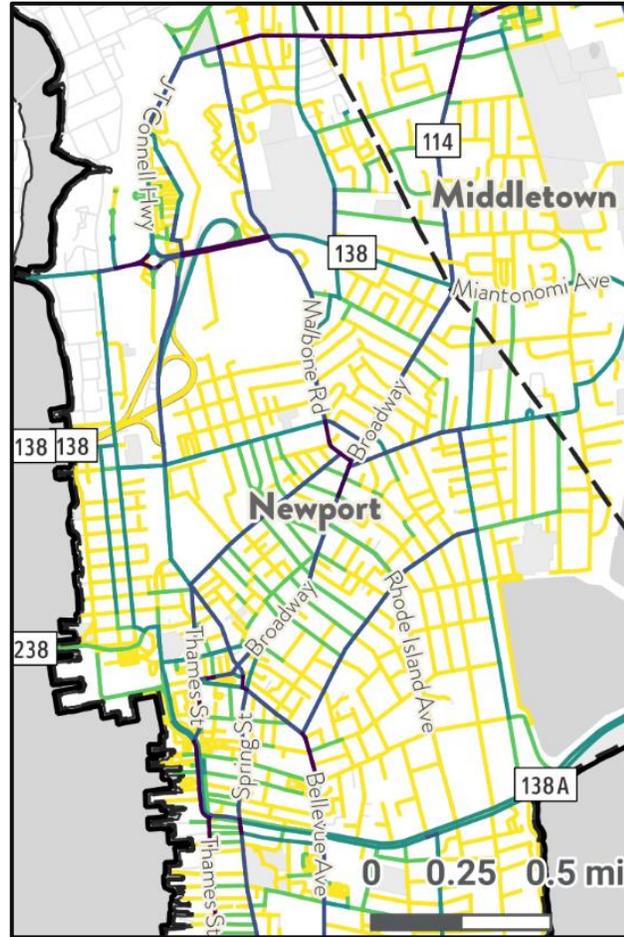
Number of Short Trips Relative to Municipality
- More trips
- Fewer trips
- Municipal Boundaries
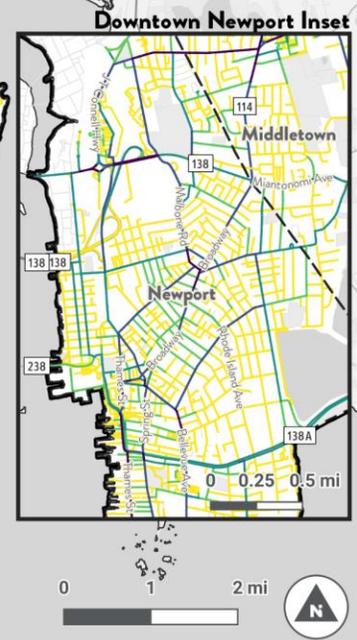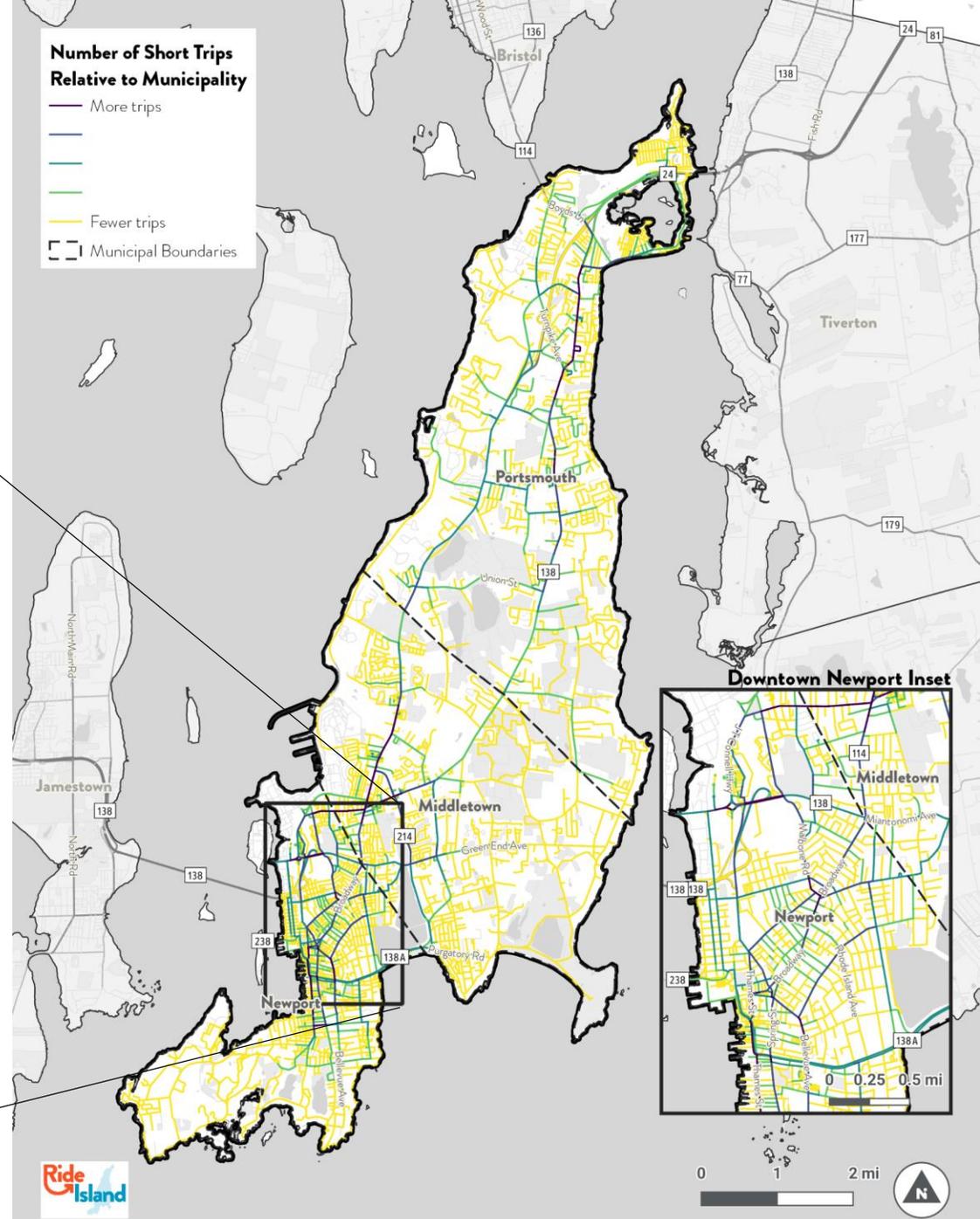
Route 1's Role in a Turnpike Closure

Route 1 Lane Reduction – Network Evaluation
Kittery, ME

Maine Turnpike

INTERSTATE 95

Spur Road

Project Area

US 1

4-5 lanes

2-3 lanes

Spruce Creek
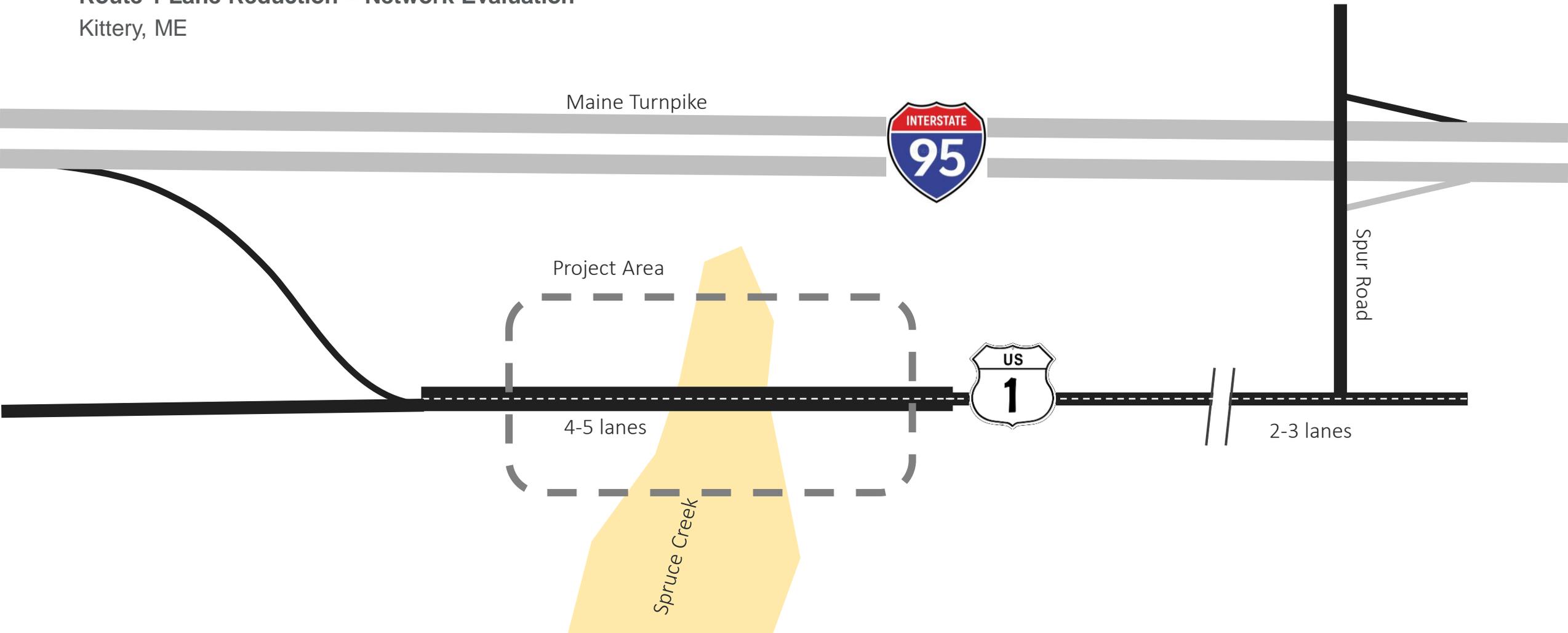
Use Big Data to understand regional impacts
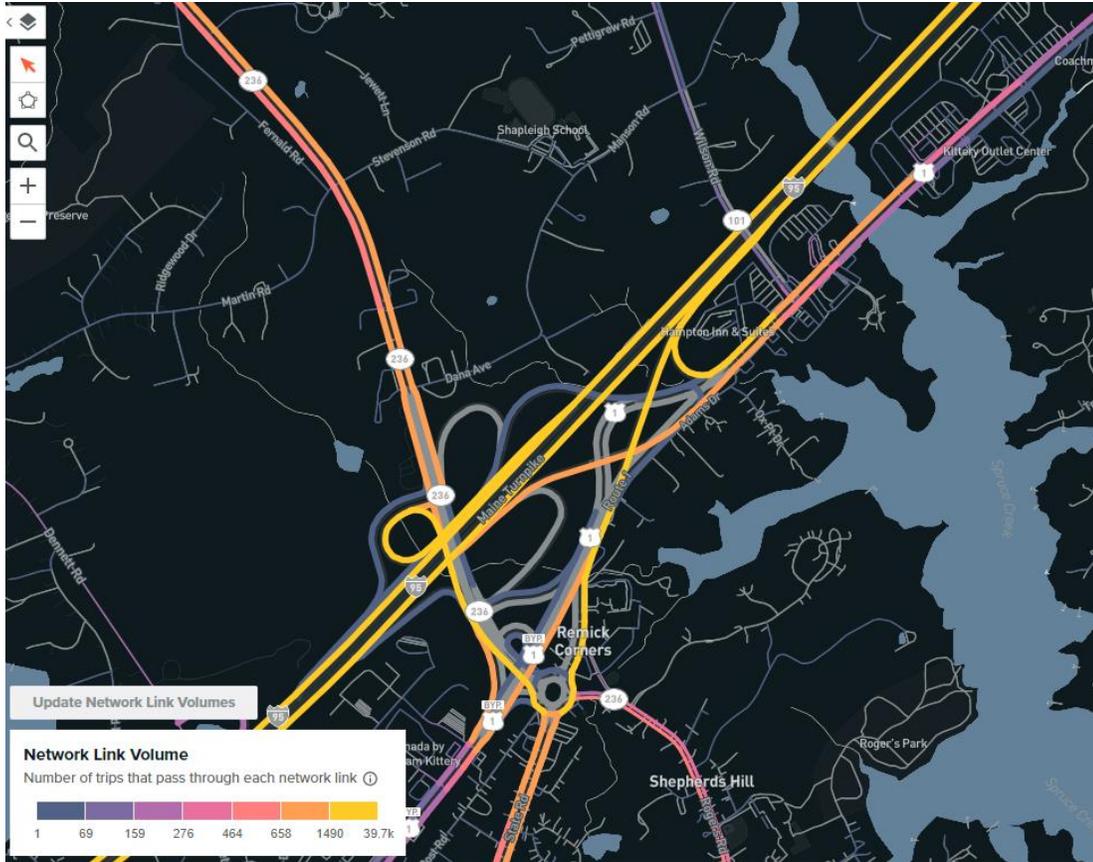
Trip Purpose

Trip Purpose	Percentage
Home	30.2%
Shop	20.9%
Eat	10.8%
Social	9.02%
Commercial (freight)	7.23%
Recreation	6.72%
Errands	4.36%
Region departure (airport...	3.42%
Work	2.97%
Other	2.49%
Pass-through traffic	0.853%
Lodging (hotels etc.)	0.789%
School	0.266%

0   6420   12.8k   19.3k   25.7k
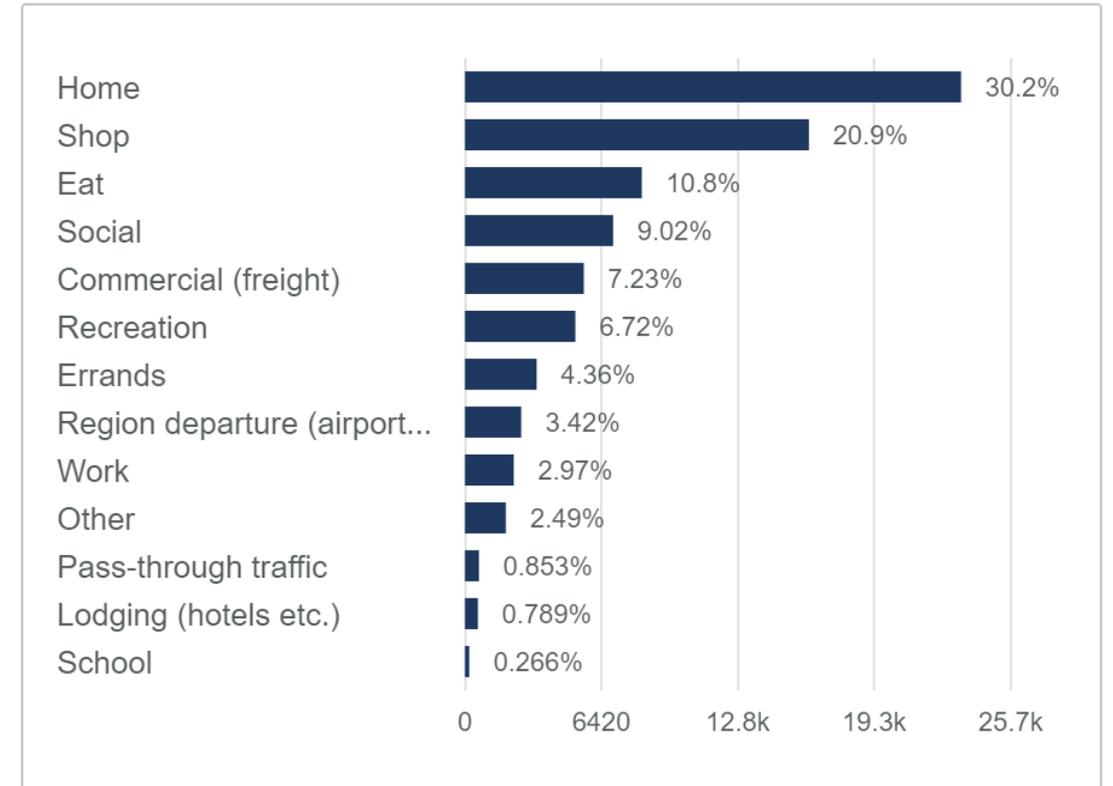
# Network Performance: Quality vs Ridership

Network Performance: Quality vs Ridership
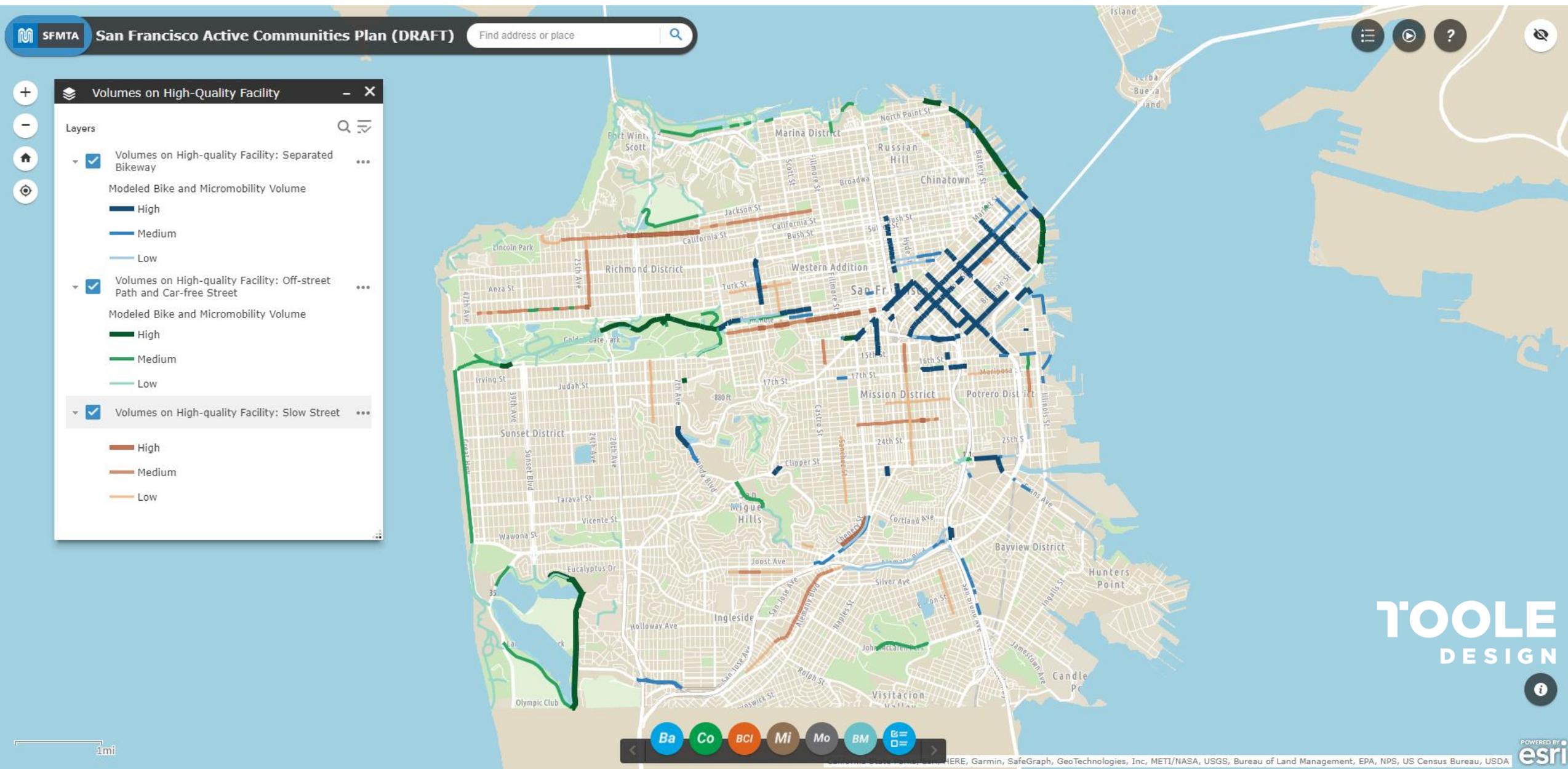
Micromobility: Where are People Riding?
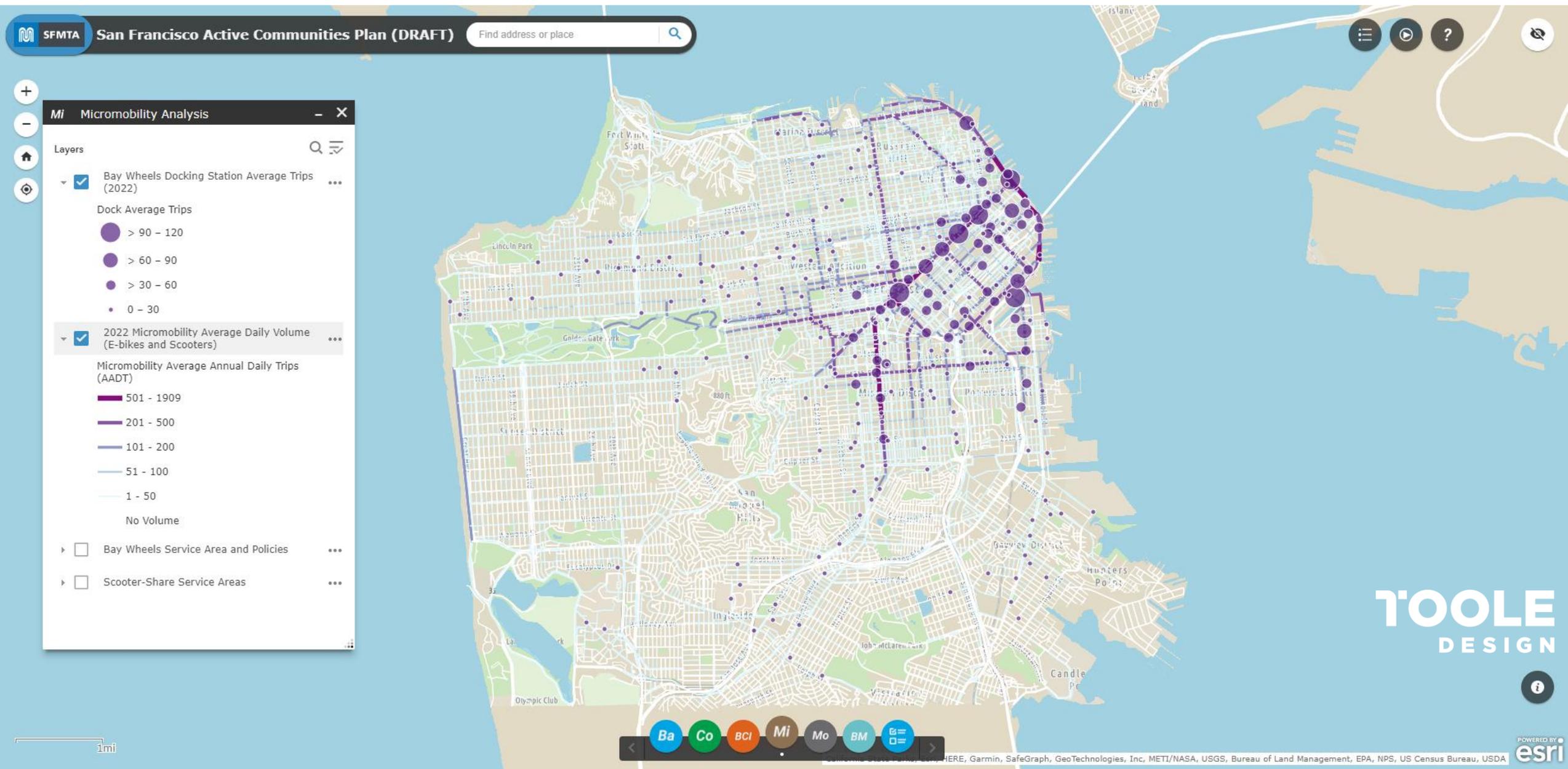
# Work and School Trips

Mankato, MN Transit Development Plan

North Mankato has limited hours

Eastern Mankato has limited hours/service

MSU-downtown is well served

MSU Campus

External Trips
(Number of Work and School Trips that have origin and destination in different blockgroups)

50 or less
51 - 100
101 - 200
201 - 300
300 or more

Internal Trips
(Number of Work and School Trips that have origin and destination within the same blockgroup)

Less than 30
30 - 100
100 - 200
200 - 400
400 or more

Block Group Boundary

0   0.5   1 mi

Prepared for: Prepared by:

Other Trips

Mankato, MN Transit Development Plan

North Mankato has limited hours

Eastern Mankato has limited hours/service

MSU-downtown is well served

MSU Campus

External Trips
(Number of All Other Trips that have origin and destination in different blockgroups)

— Less than 100
— 100 - 300
— 301 - 700
— 701 - 1,510
— More than 1,510

Internal Trips
(Number of All Other Trips that have origin and destination within the same blockgroup)

· Less than 90
· 90 - 300
● 301 - 700
● 701 - 1,250
● More than 1,250

□ Block Group Boundary

Prepared for: Prepared by:

City of MANKATO
Leading the way...

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0   0.5   1 mi

O-D Analysis

Average Origin Rate

	To Hyattsville	To DC + Virginia	To Maryland
From Hyattsville, daily avg.	15.1%	32.9%	52.0%
From Hyattsville, 6-9pm, M-F	16.2%	30.6%	53.3%

Average Destination Rate

|	From Hyattsville	From DC + Virginia	From Maryland
To Hyattsville, daily avg.	16.2%	33.5%	50.9%
To Hyattsville, 6-9pm, M-F	18.6%	33.5%	47.9%

Hyattsville, MD
Transportation Master Plan
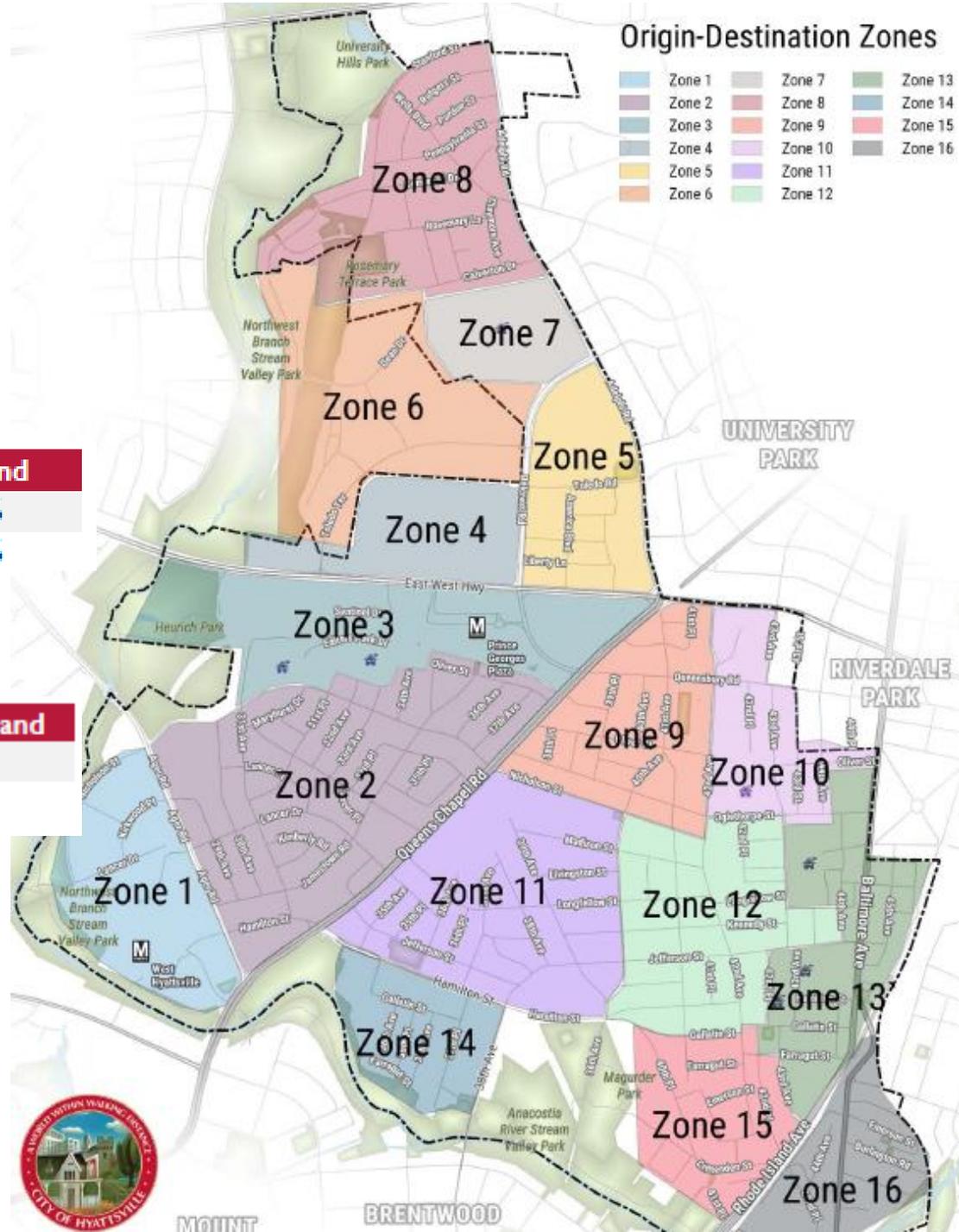
O-D Analysis

Origin Maps: Trips Originating in GREY zone
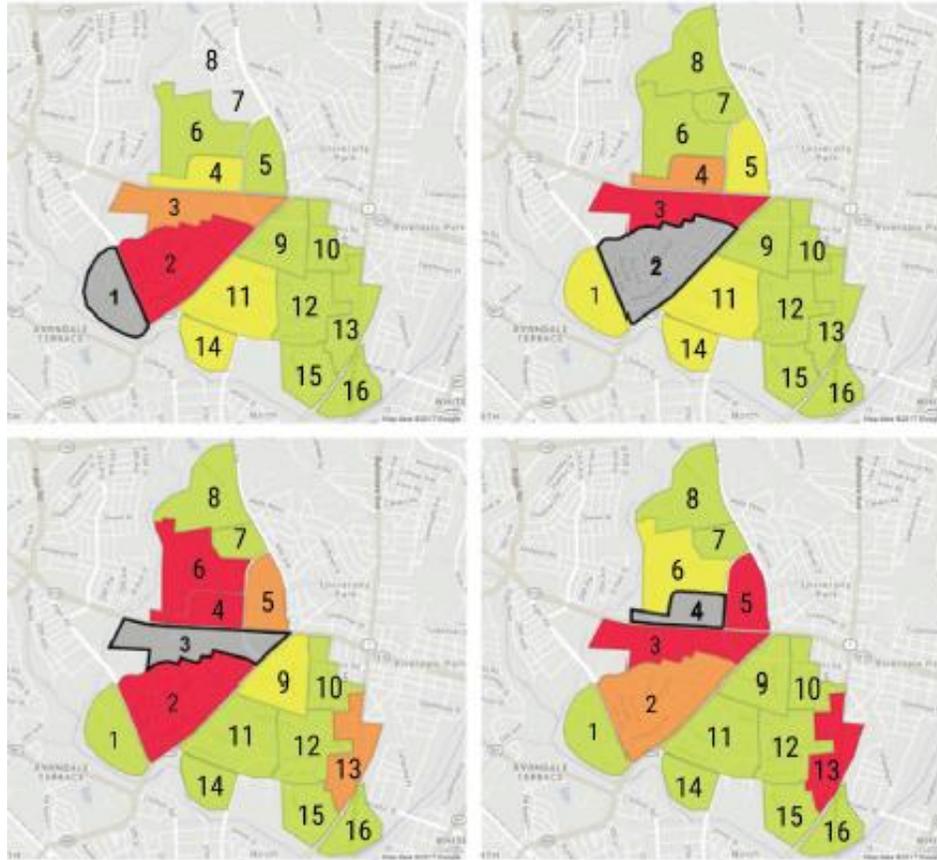
Destination Maps: Trips ending in GREY zone

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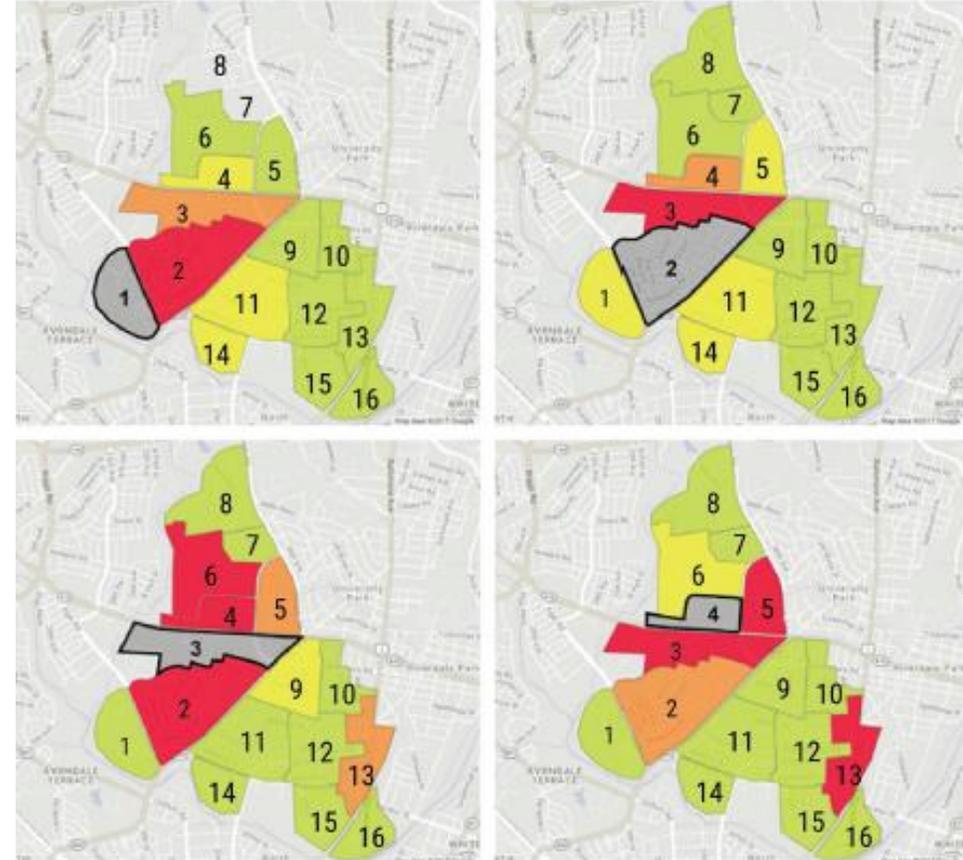
Travel Patterns

- Most trips beginning in Hyattsville end somewhere else, and most trips ending in Hyattsville begin somewhere else

- Many short trips take place within Hyattsville – focusing on key destinations and Metro stations

- Also enabled identification of the busiest city streets

TOOLE
DESIGN

"Big Data" in Newberry

Live (and Local) Demo!

Where are People Walking in Newberry

8-11 2021 Average Pedestrian Volume All Day, Weekdays

Zones
- 2715-2880
- 2427-2714
- 2262-2426
- 1478-2261
- 1232-1477
- 790-1231
- 368-789
- 111-367
- 1-110
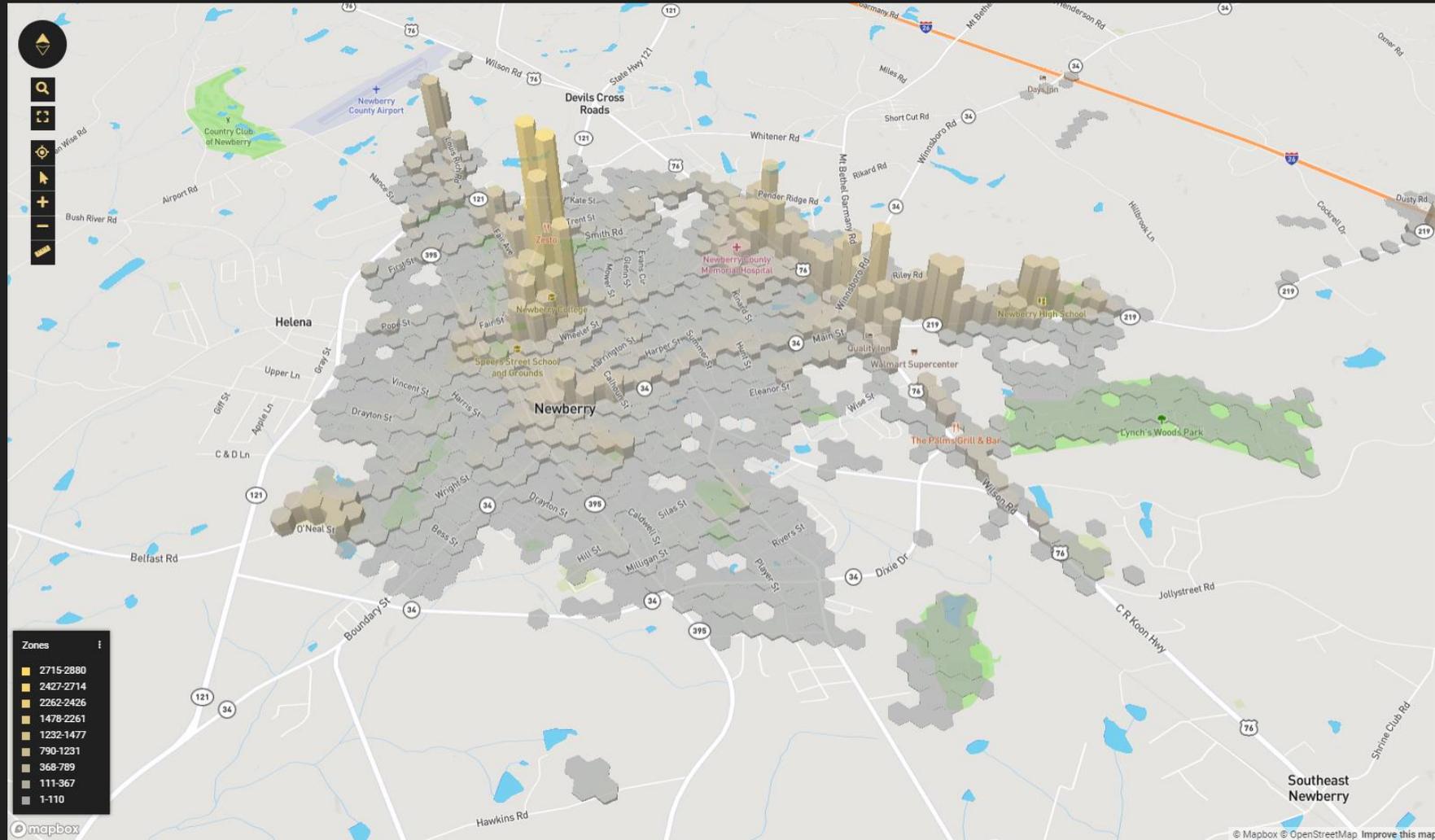
Popular Routes for Biking in Newberry

2021 Average Bike Volume All Days, All Day
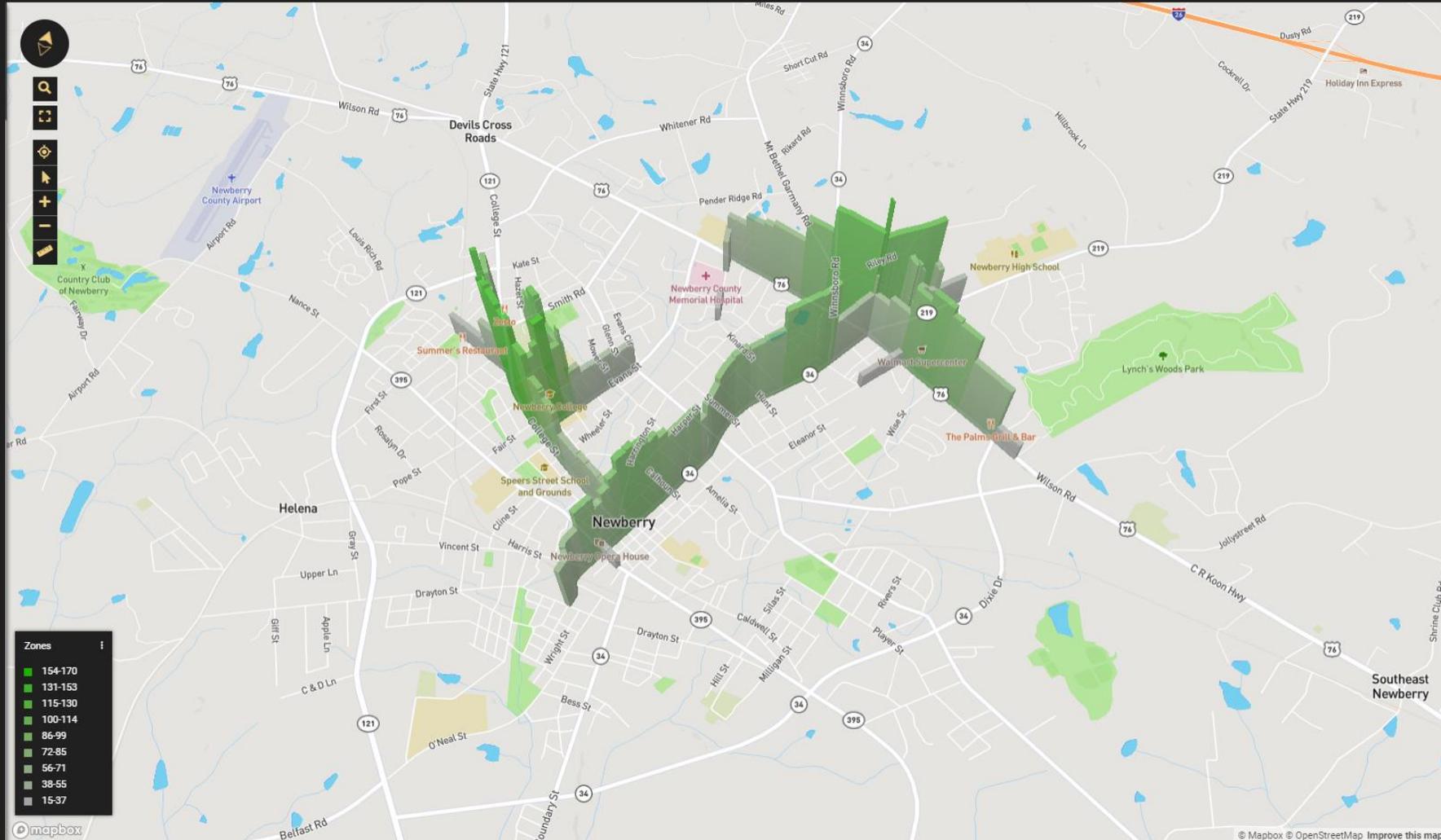
Thinking about Journeys

2021 Pedestrian Origins of Trips Destined for the Library All Days, All Day
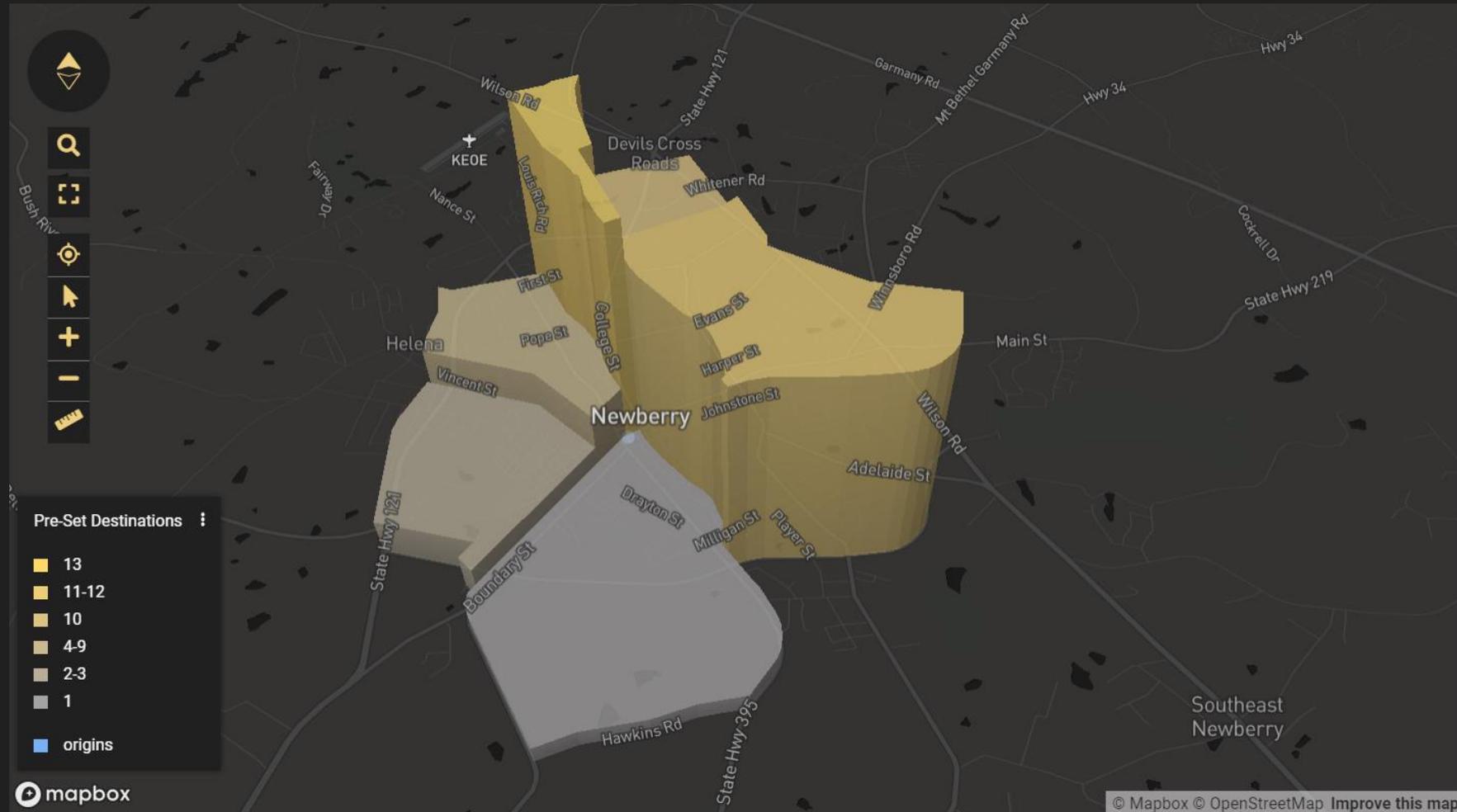
Thinking about Paths

2021 Pedestrian Volume of Trips Destined for the Library All Days, All Day
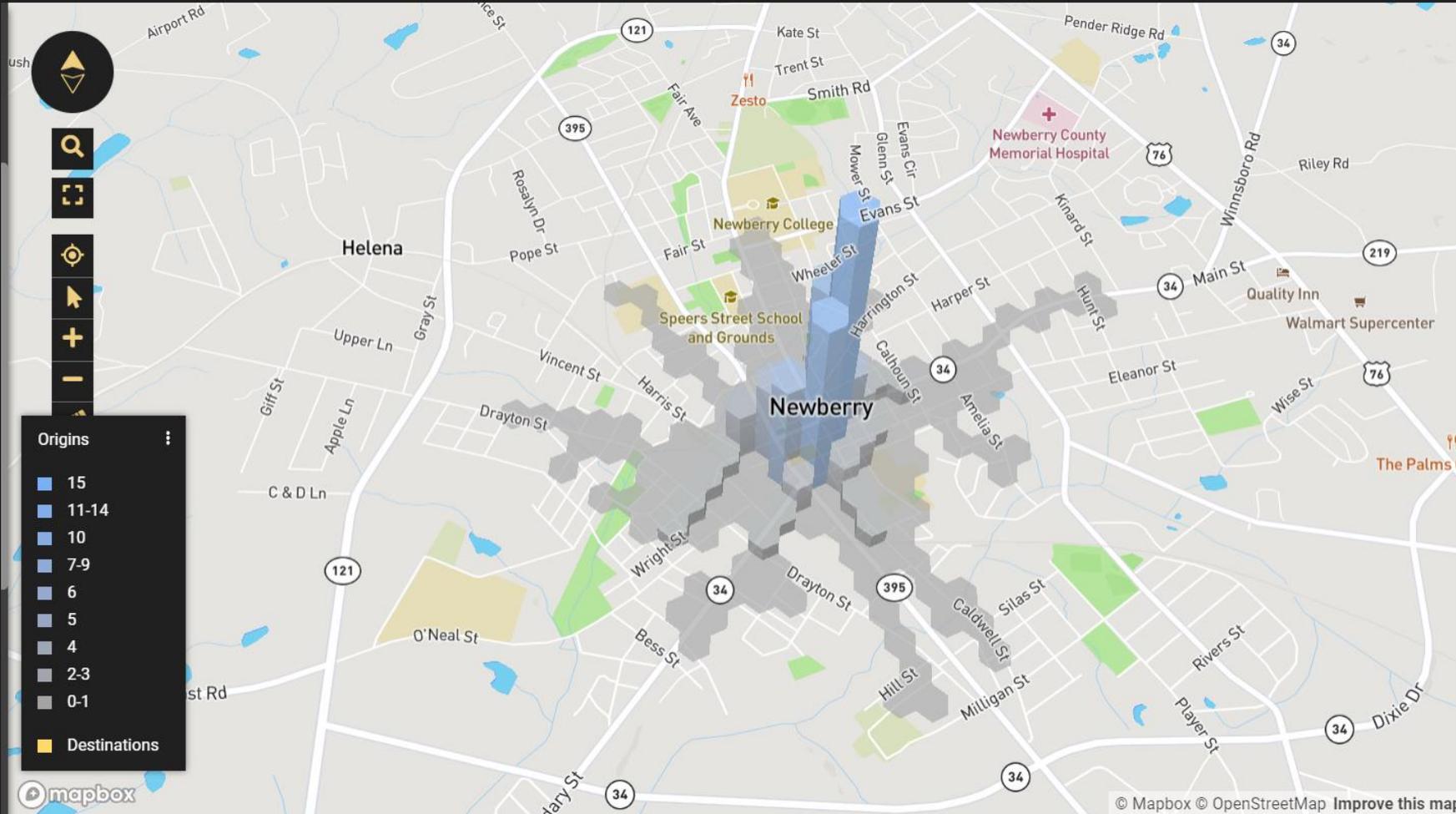
Where are potentially dangerous/stressful corridors?

2021 Average Vehicular Volumes Weekdays, All Day
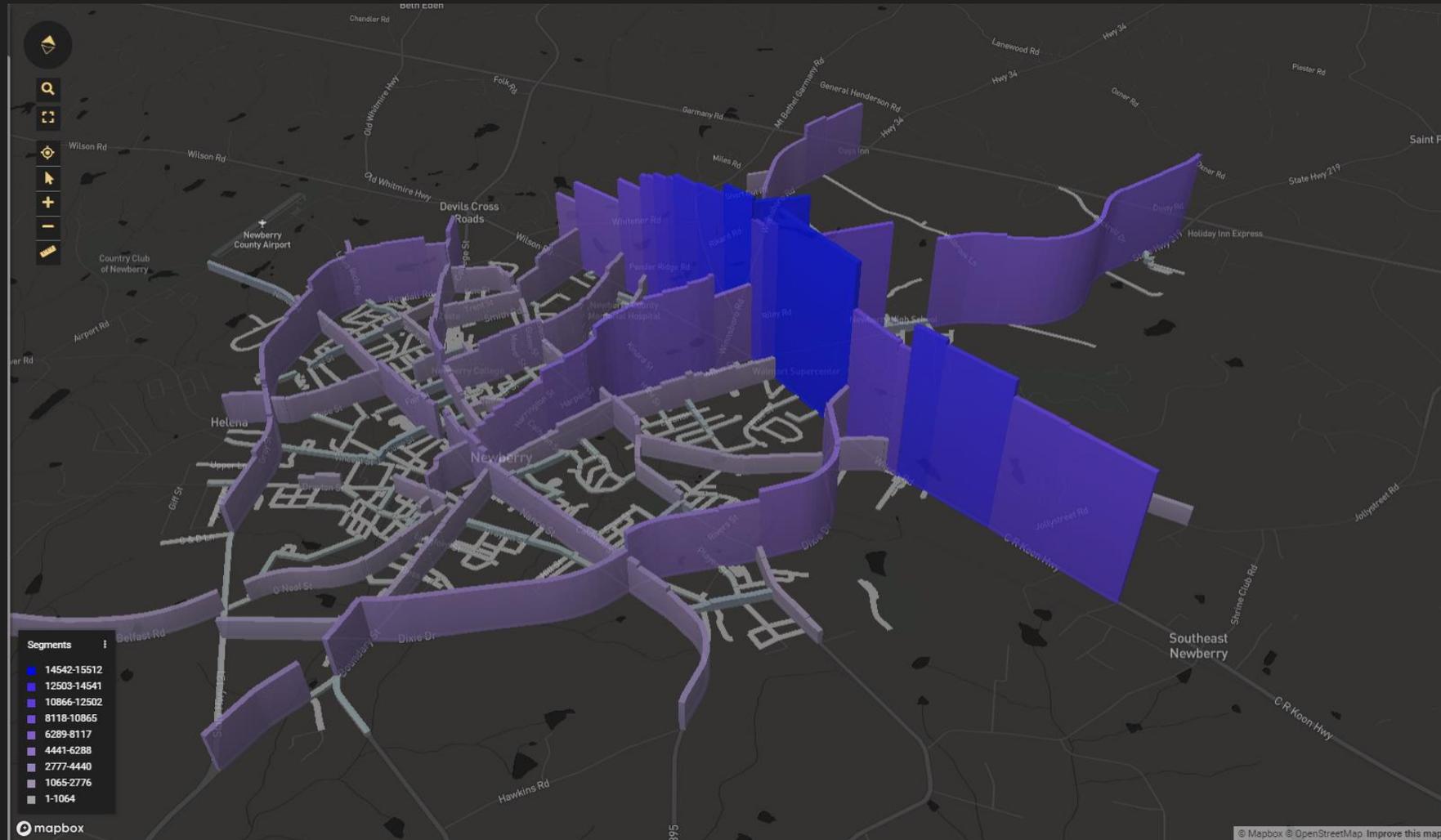
Where are potentially dangerous/stressful corridors?

2021 Average Truck Volumes Weekdays, All Day
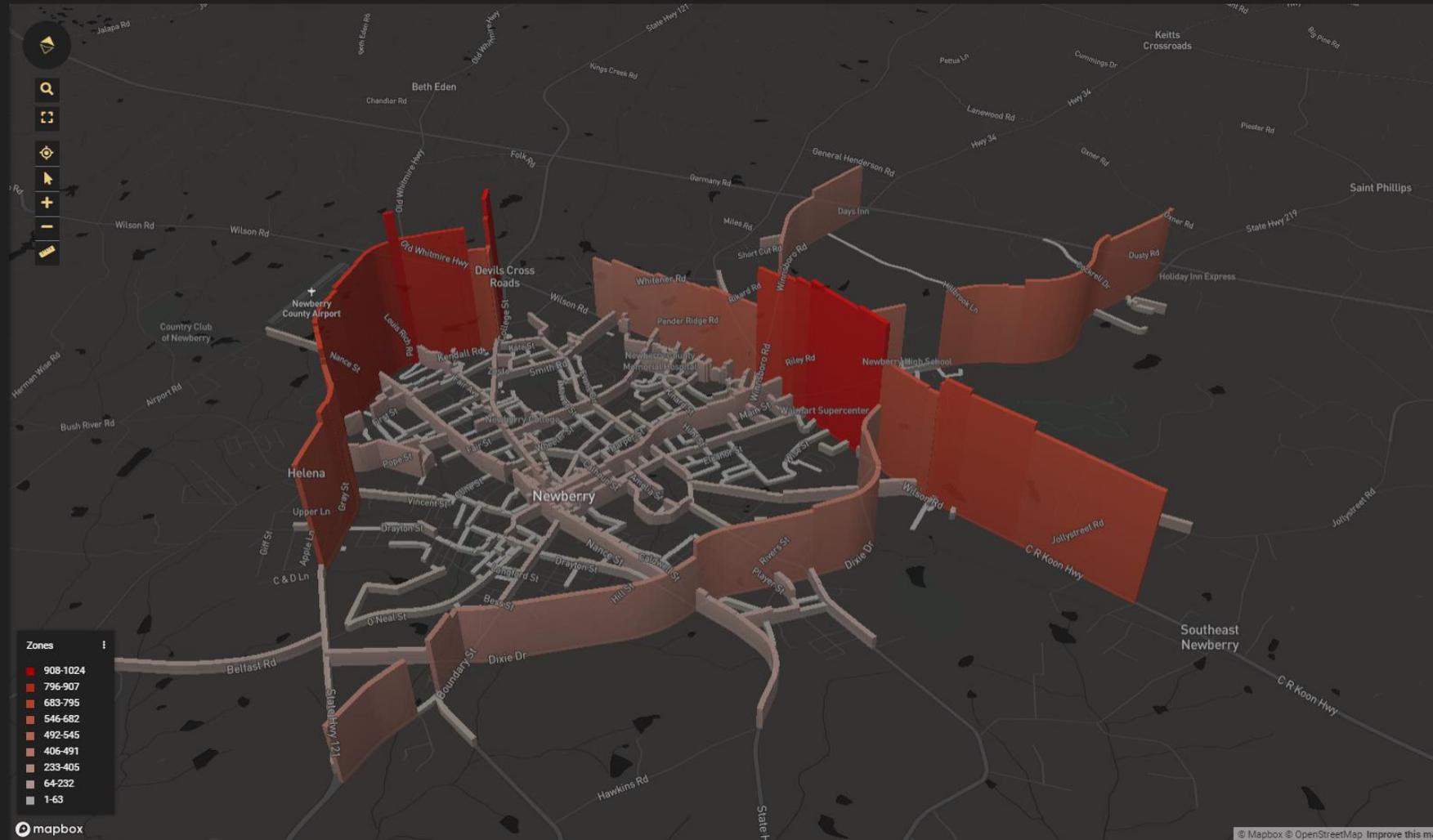
Where are potentially dangerous/stressful corridors?

2021 Average Vehicle Speeds Weekdays, 11 AM to 1 PM

Diving into the details: Speeds on Wilson Road

2021 Vehicle Speed Averages & Distribution Weekdays, 11 AM to 1 PM

Diving into the details: Speeds on Wilson Road

2021 Vehicle Speed Averages & Distribution Weekdays, 11 AM to 1 PM
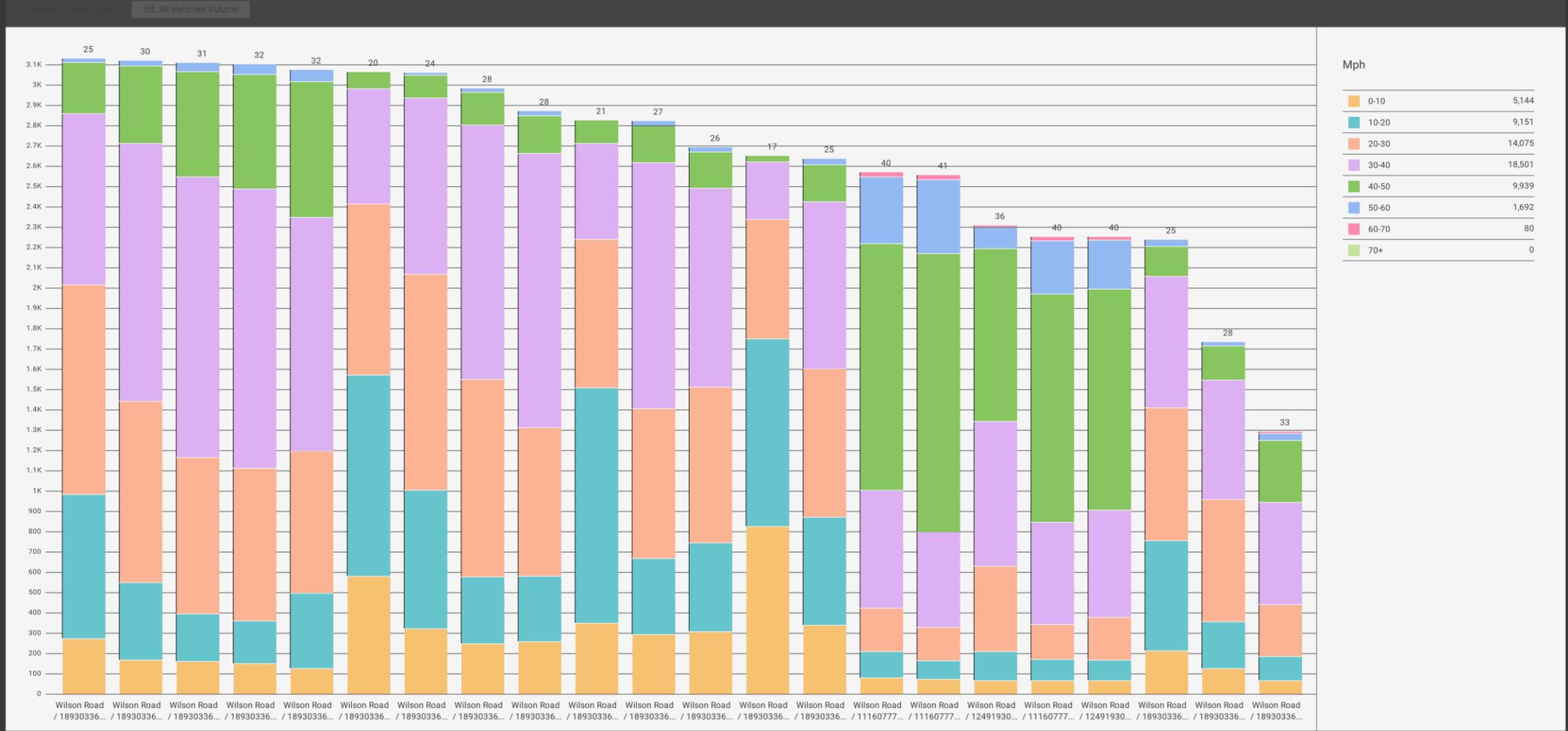
Enriching other Data Sources

Greenville Ped Safety 2021 Pedestrian Activity, Vehicle Average Speed, Historical Crashes, and Bike/Ped Infrastructure