Big Data: Changing How We Measure Impact, Performance, and Access

ITS Washington, December 2, 2019

Teresa Tapia
Teresa.tapia@streetlightdata.com

STREETLIGHT DATA PROPRIETARY & CONFIDENTIAL

Agenda

1. Introduction
2. Big Data Overview
3. Measuring Sustainability, New Mobility and Performance
4. Q&A

Section I

Introduction

Increasing need to measure performance and track change

- FAST Act
- Shrinking budgets
- Government visibility
- New mobility
- Focus on people
- Increasing connectivity

PROPRIETARY AND CONFIDENTIAL

“Traditional” Data: field collection and surveys

PROS:

- Direct observation
- Refined methods
- Familiarity

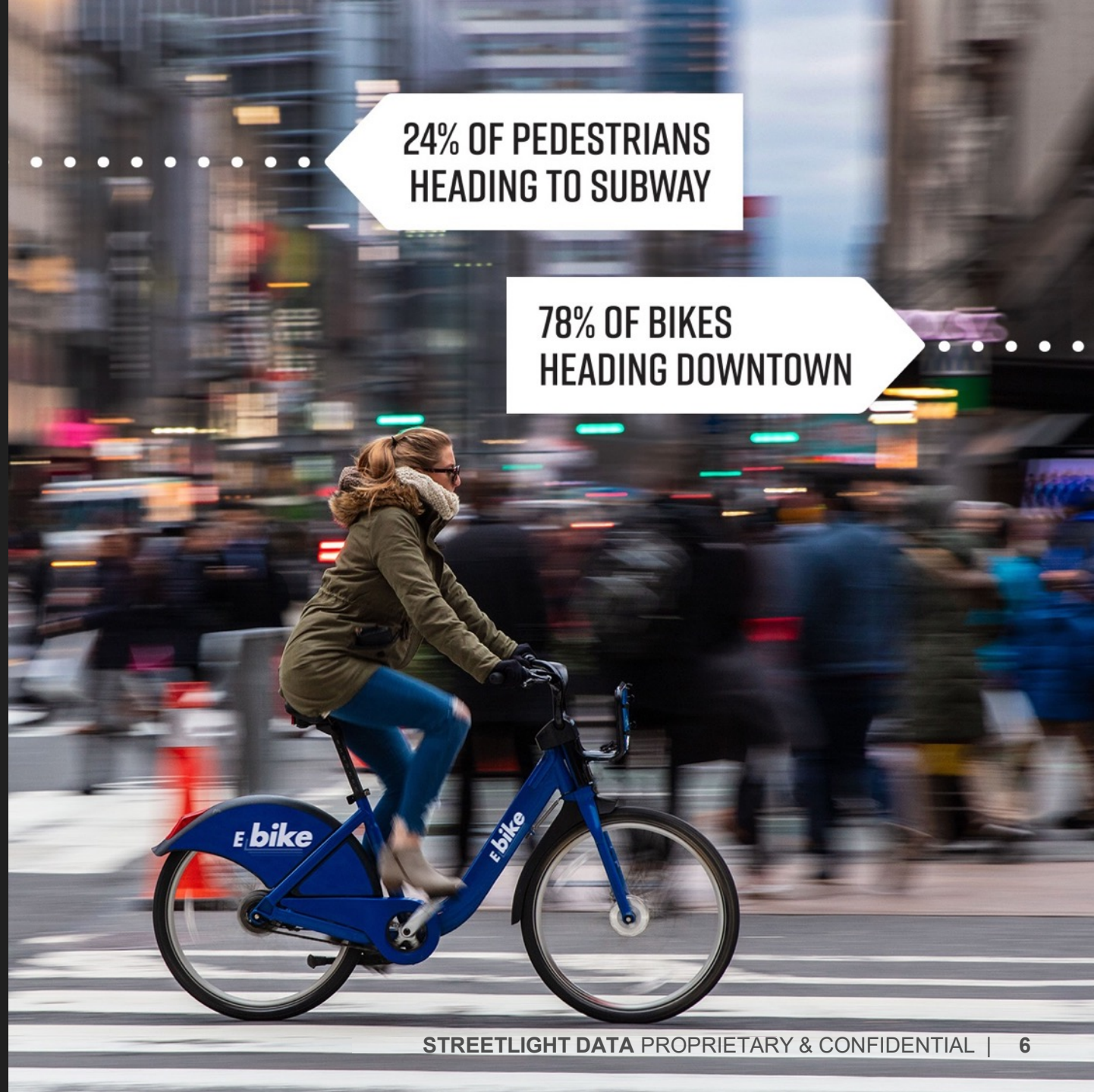
CONS:

- Expensive
- Small sample size
- Infrequent
- Potentially labor intensive and risky
- Cumbersome data integration

PROPRIETARY AND CONFIDENTIAL

The Data Challenge

1. Trillions of dollars of decisions are based on virtually no data.
2. Old assumptions + models often point to more highway and/or less congestion.
3. Moving forward, mobility solutions and their impact must be measured to be managed.

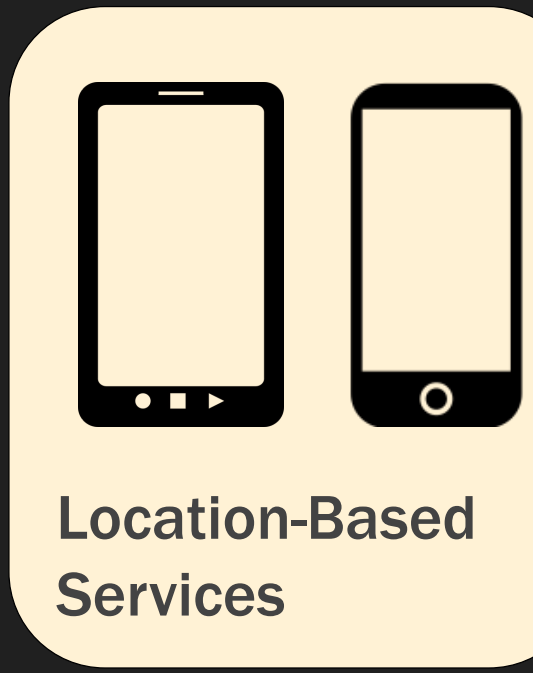


Section II

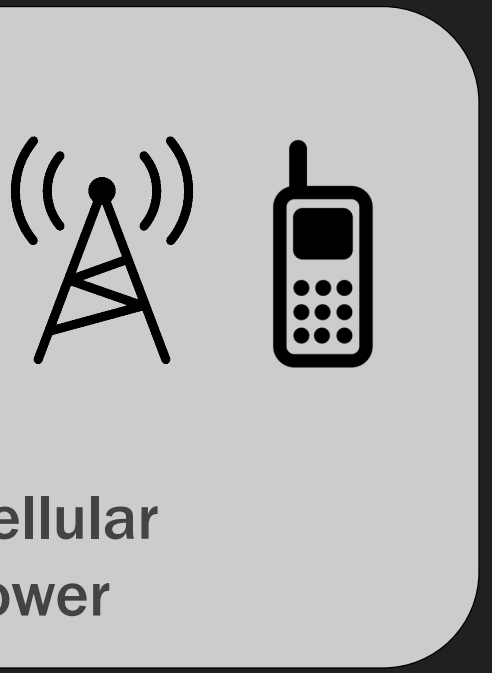
Big Data Overview

The Three Main Types of Big Data for Transportation

Navigation-GPS



Location-Based Services



Cellular Tower

PROPRIETARY AND CONFIDENTIAL

Big Data for Transportation

PROS

- Significant cost savings
- Continuous collection
- More granularity
- Multi-modal/Variety of Sources
- Connects the dots

CONS

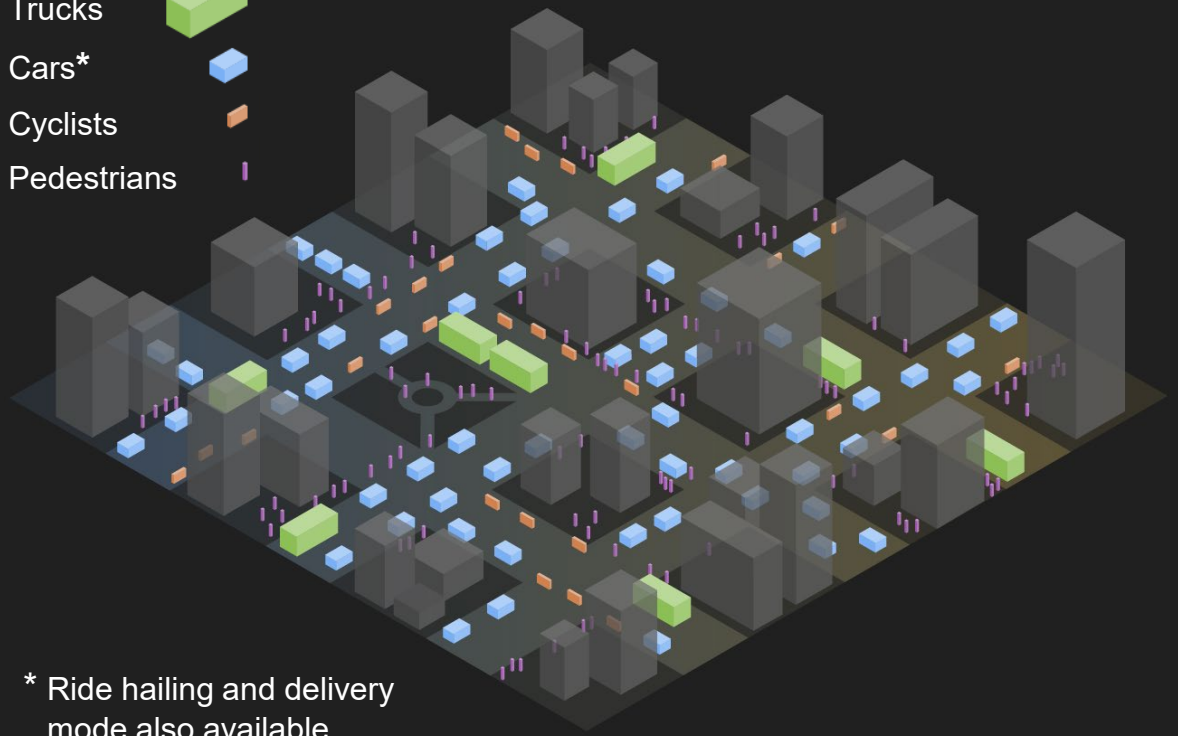
- Passive collection
- New, unfamiliar
- Proprietary, “black box” methods

PROPRIETARY AND CONFIDENTIAL

At your fingertips:
Analytics for every road, bike lane and Census Block

MODES:

Trucks
Cars*
Cyclists
Pedestrians



* Ride hailing and delivery mode also available

FUNDAMENTAL ANALYTICS:

- Origin Destination
- Routing
- Route Choice
- AADT, MADT, hourly traffic

TRIP ATTRIBUTES:

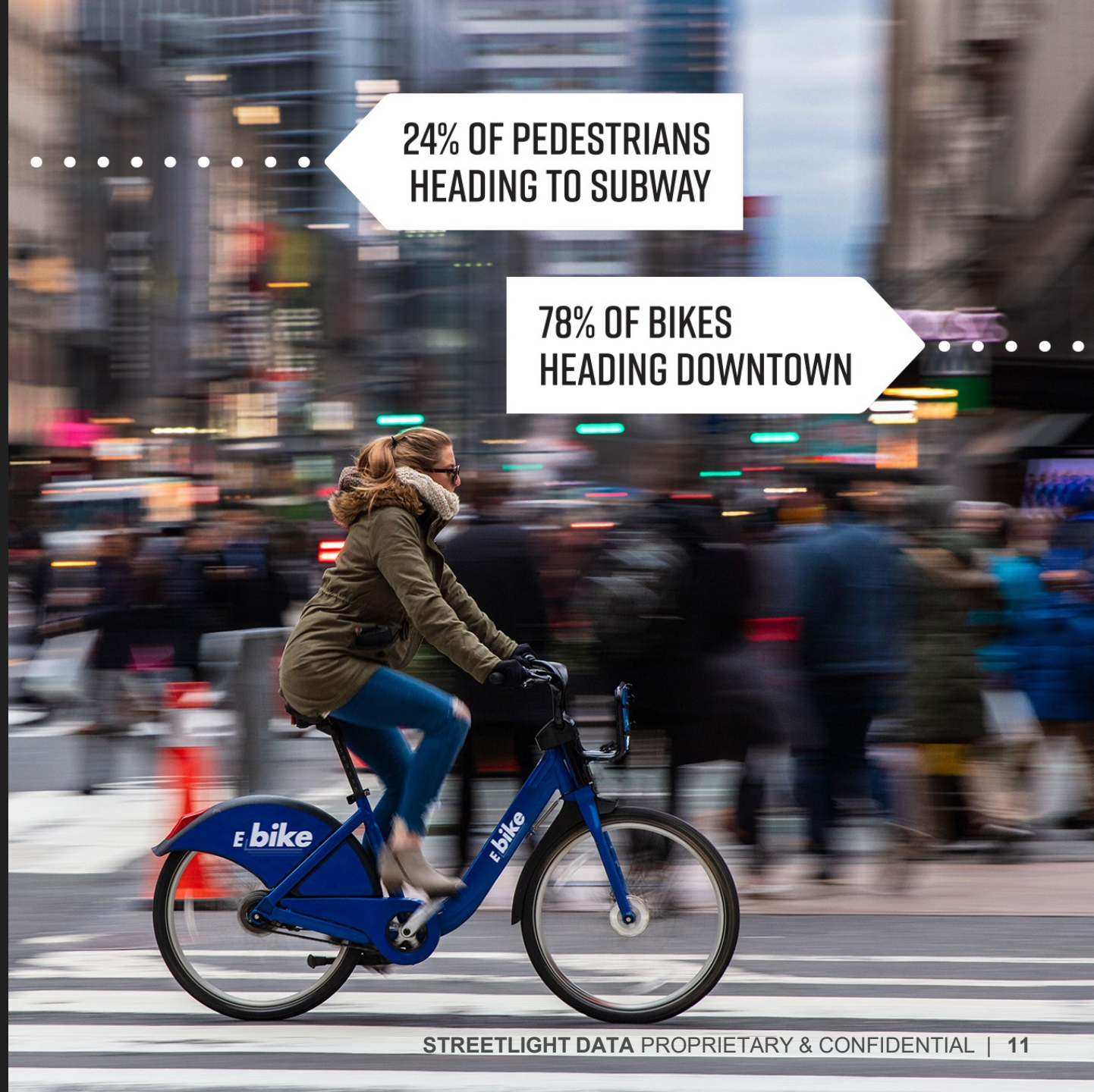
- Trip speed, duration, length
- Travel time
- Trip circuity

TRAVELER ATTRIBUTES:

- Inferred trip purpose
- Demographics

StreetLight's Target

Measure all modes and how they INTERACT.



Section III

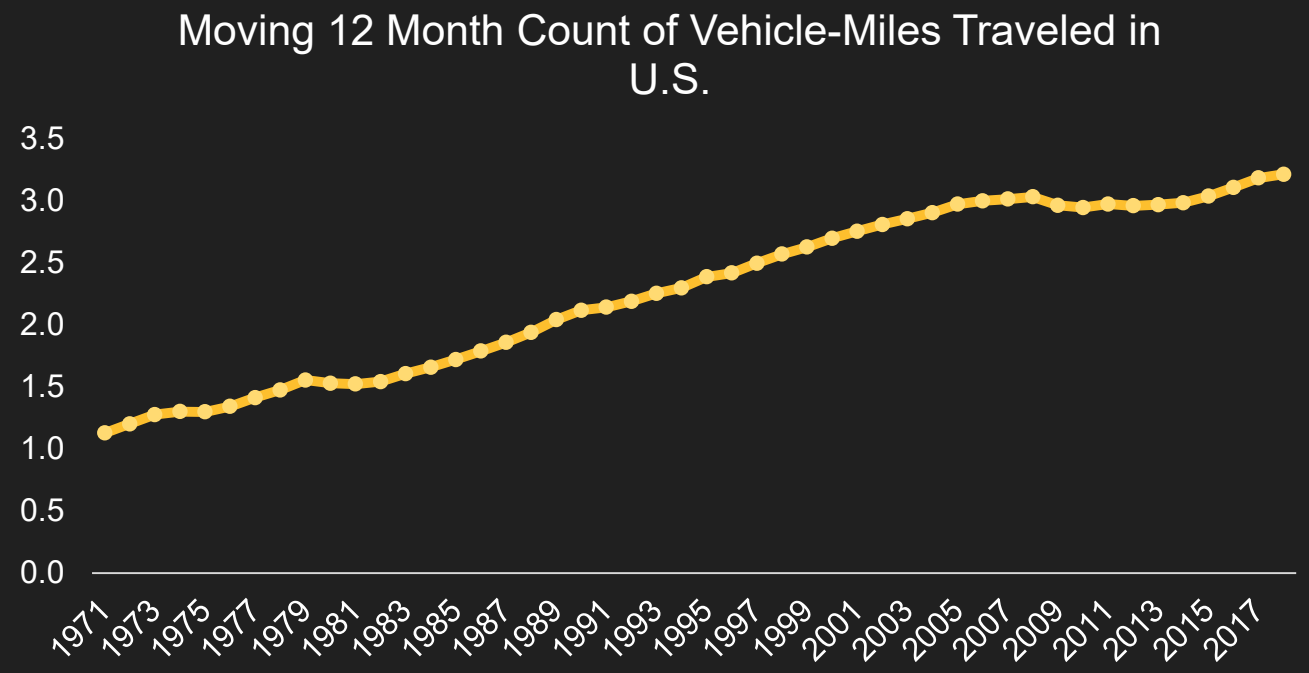
Measuring Environmental Sustainability

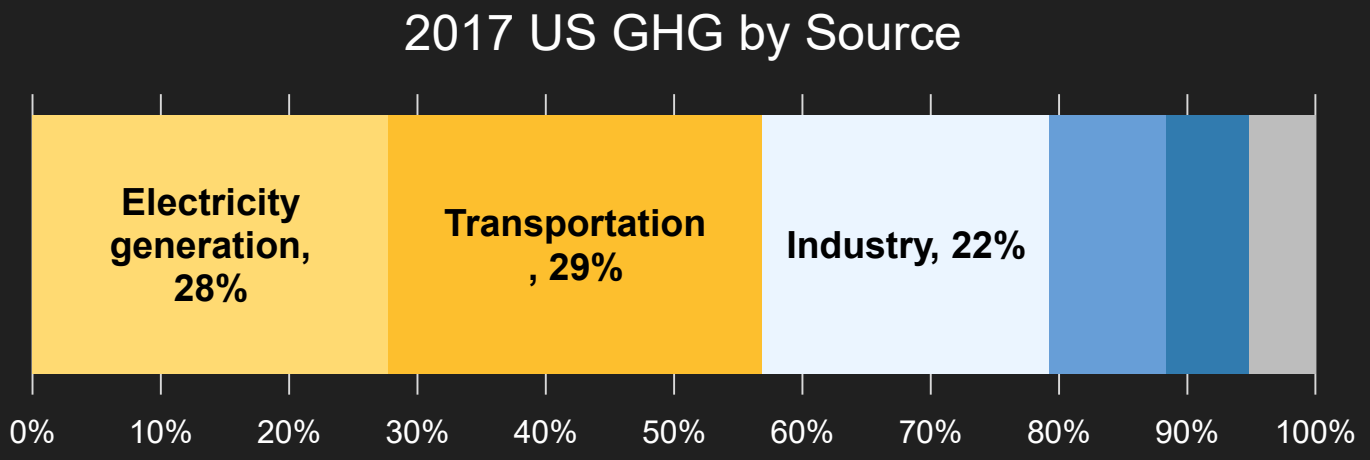
With Vehicle Miles Traveled Derived from Big Data

Challenge

Analytics to Support Better* Transport Infrastructure and Policy

*Better ➔ Fewer VMT in petroleum powered, single occupancy vehicles





How Big Data Can Measure VMT

1

Road Segment VMT

How many veh. miles are driven on this road segment in a year? This is an input for lots of things like maintenance budget calculations.

2

Regional VMT

How many veh. miles were driven in this region in the given time period? This is used to check overall eco-performance of the region.

3

Parcel/ Land Use VMT

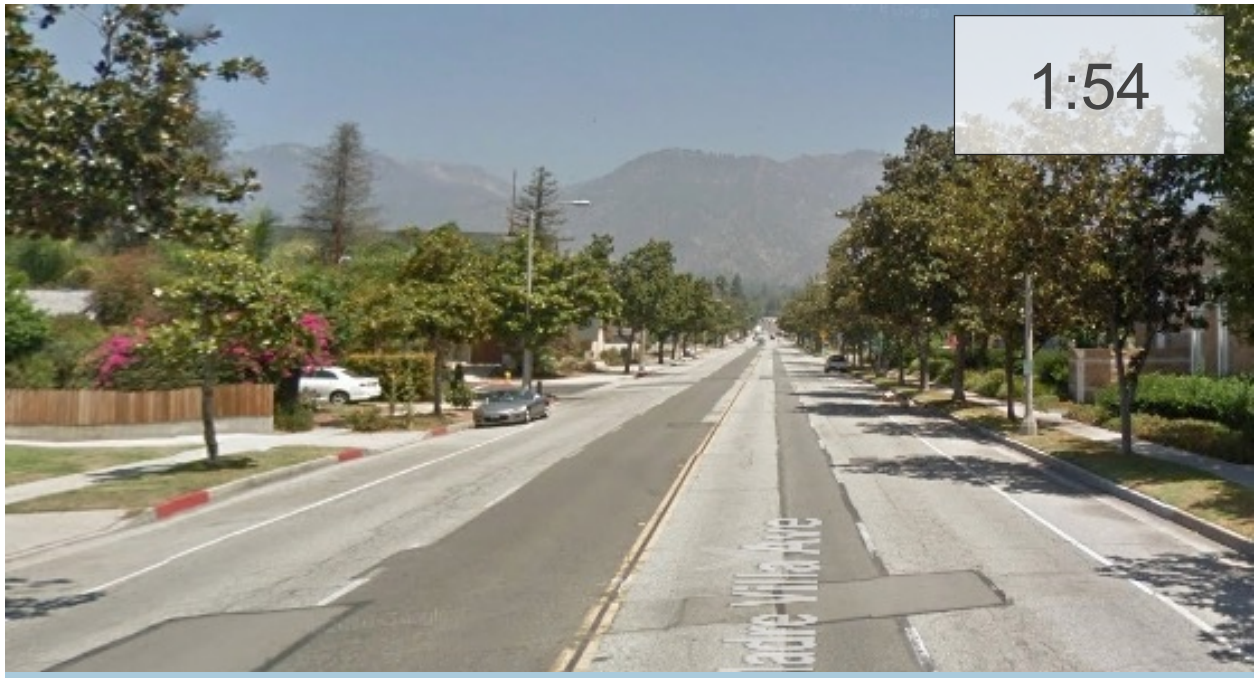
How many veh. miles are generated by this/similar parcels? This is usually an input to predicting VMT for future development.

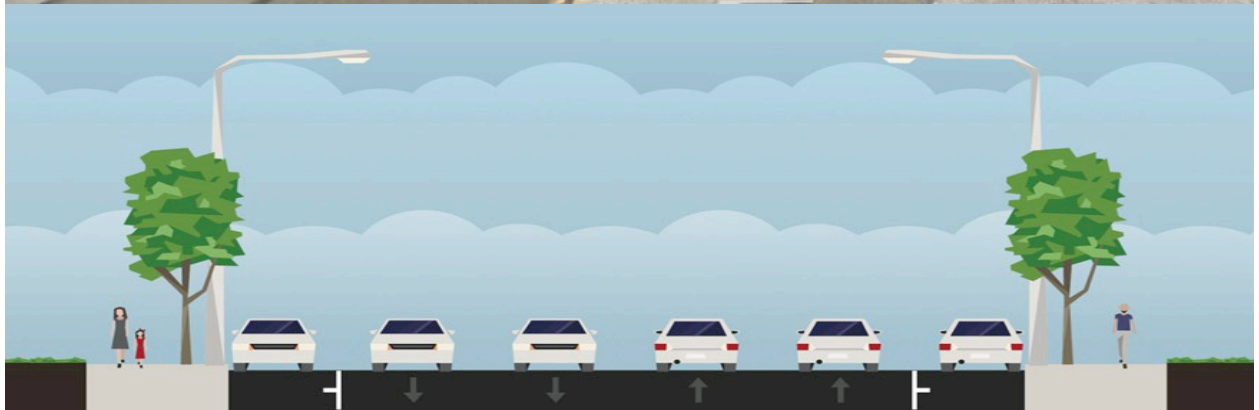
Section IV

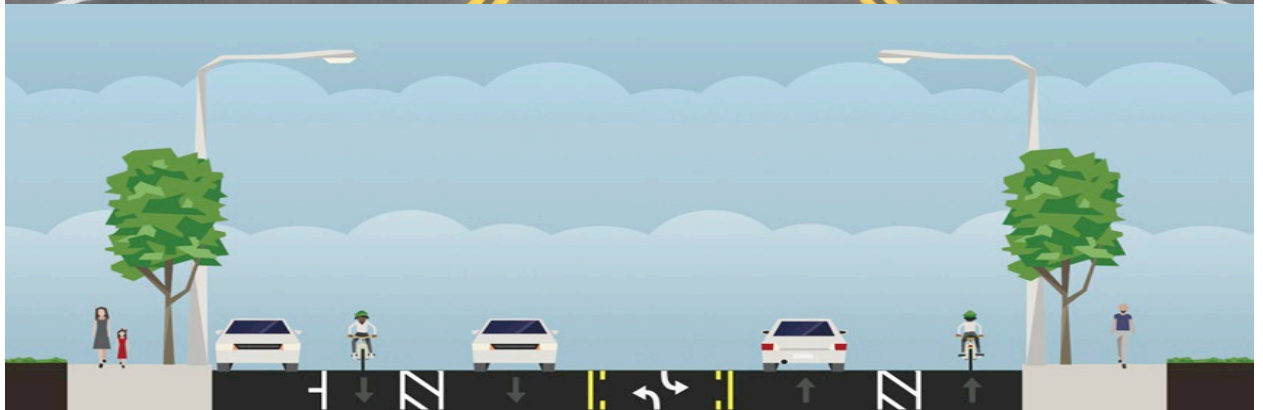
Measuring Performance and Access

With Commercial Truck and Vehicle Probe Speed and Travel Time Data

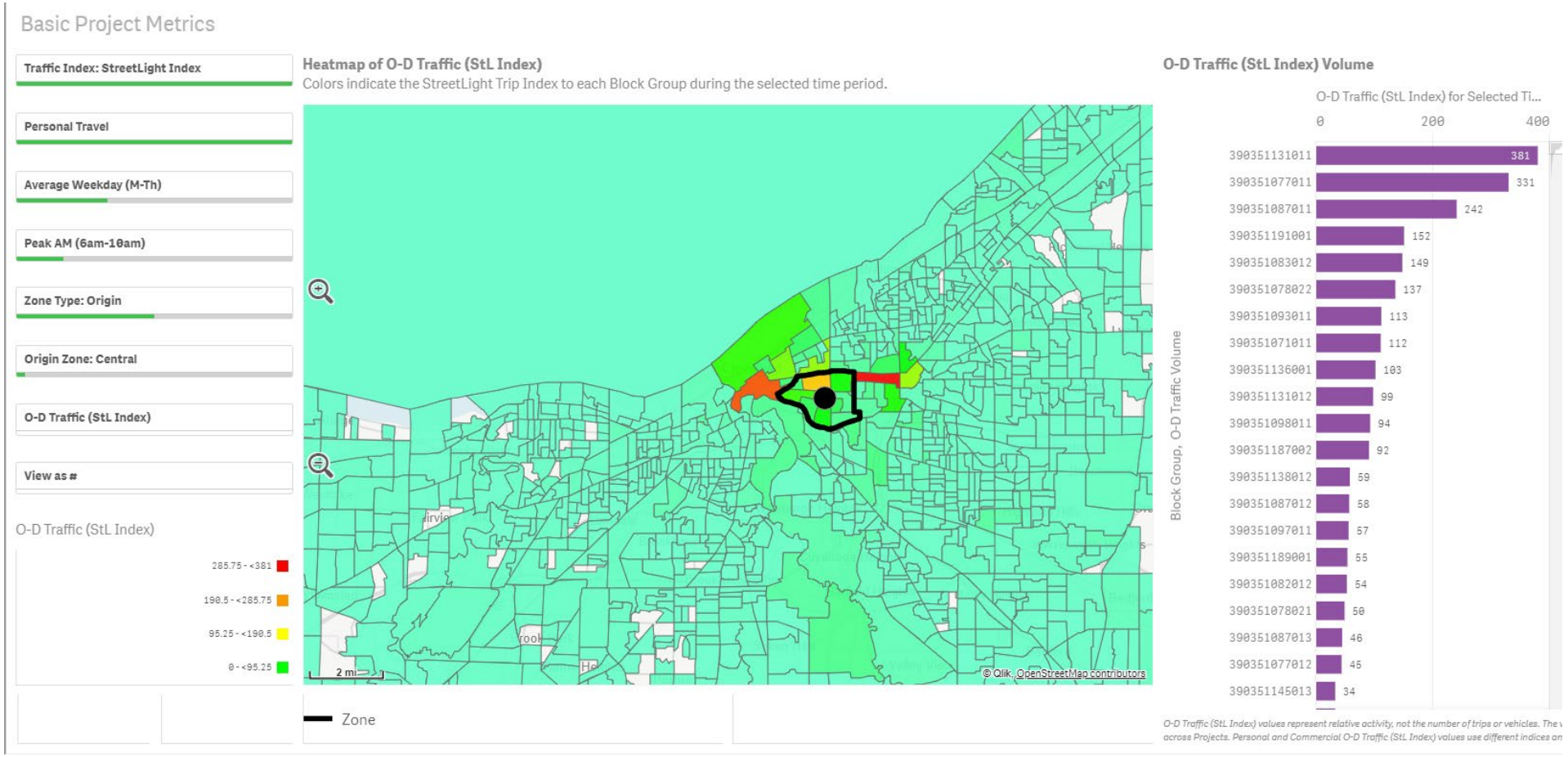
Before and After: Road Diets Impact Assessment





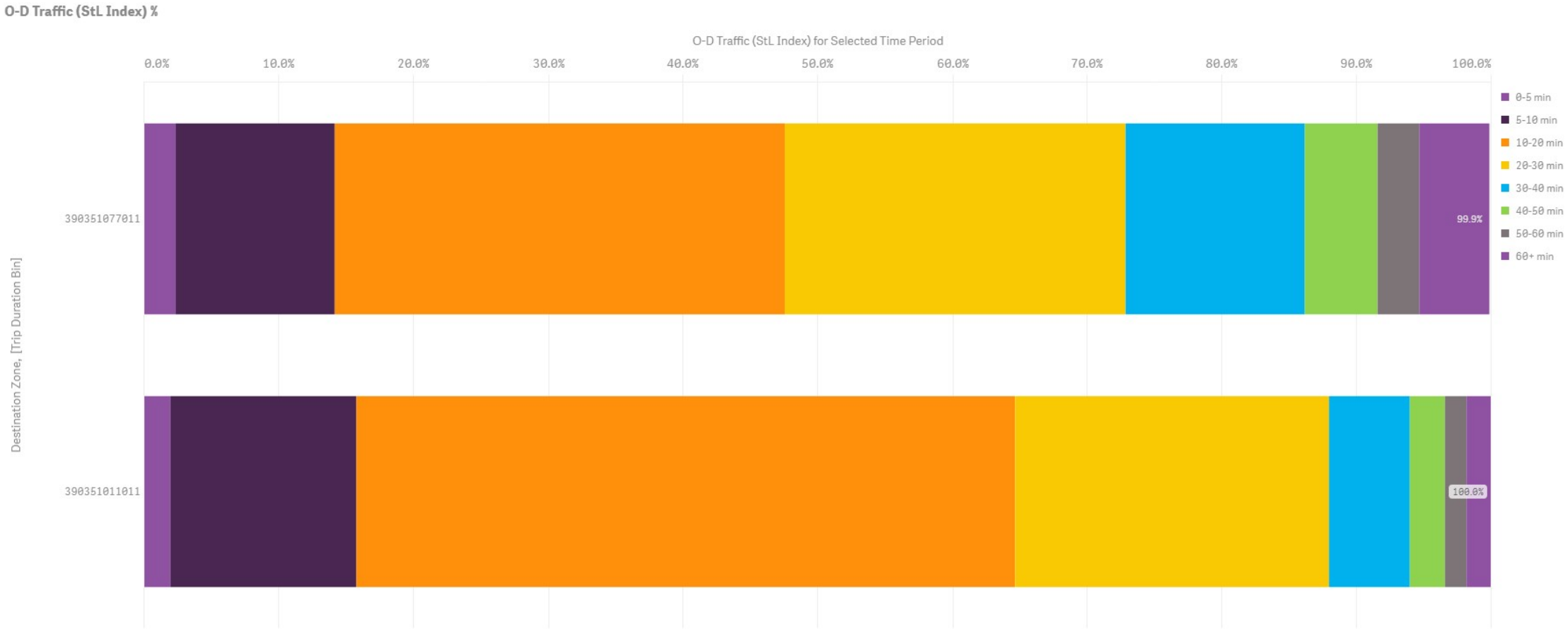


Measure Accessibility: Identify Top Destinations for People in the AM Peak Hours Leaving Central Neighborhood



Measure the Distribution of Travel Time Between Central Neighborhood and the Top Two Destinations by MODE!

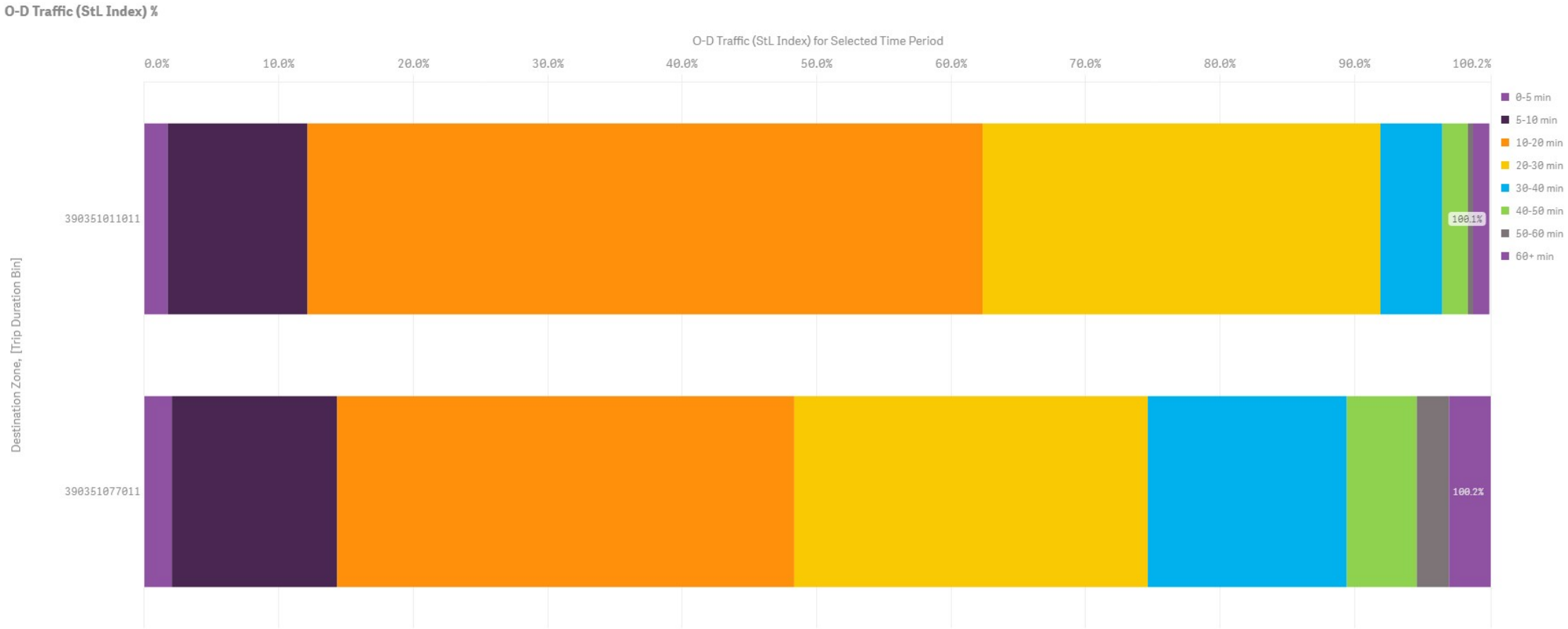
Distribution of Travel Time on a typical weekday, anytime during the day



O-D Traffic (StL Index) values represent relative activity, not the number of trips or vehicles. The values are indexed to allow comparison across Projects. Personal and Commercial O-D Traffic (StL Index) values use different indices and therefore can not be compared. In addition, O-D Traffic (StL Index) values for Projects in Canada and the US use different indices and therefore cannot be compared.

Average Travel Times Appear to Decrease for One Destination, But Increase for the Other

Distribution of Travel Time on a typical weekday, AM Peak (6am – 10am)



O-D Traffic (StL Index) values represent relative activity, not the number of trips or vehicles. The values are indexed to allow comparison across Projects. Personal and Commercial O-D Traffic (StL Index) values use different indices and therefore can not be compared. In addition, O-D Traffic (StL Index) values for Projects in Canada and the US use different indices and therefore cannot be compared.

Section VI

Measuring the Impact of New Mobility

Big Data and the New Mobility: TODAY

Planning for LAUNCHED modes

Planning for FUTURE modes

What happens when they interact?

Core infrastructure investment

Big Data itself as a proxy for innovative New Mobility adoption

Measuring and Managing Impact of v1 Connected Vehicles

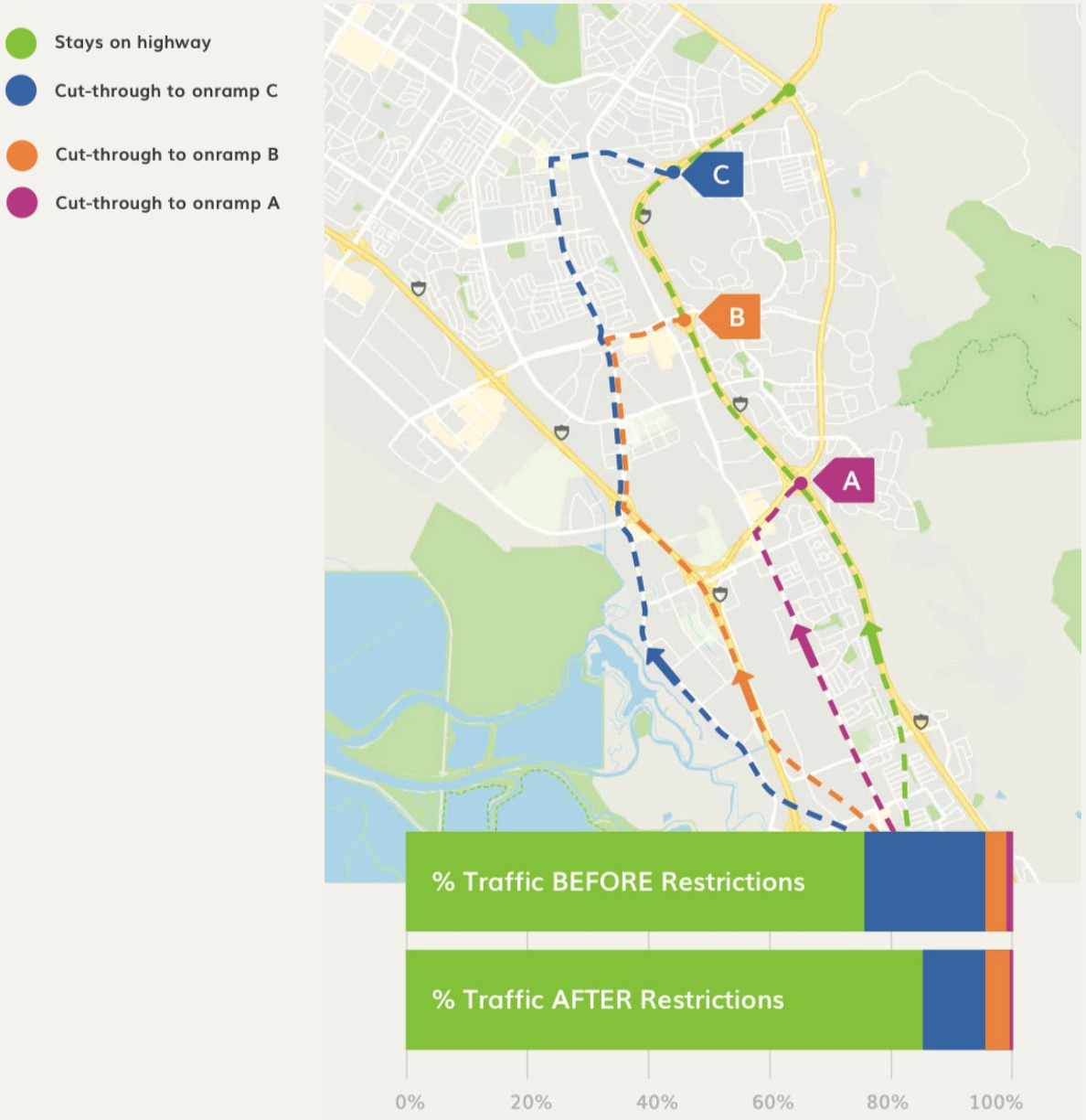
Challenge

Traffic in our client city was at near parking-lot conditions during rush hour. Local citizens blamed the “Waze Effect”

Big Data-driven **Solution**

The city used StreetLight to confirm the “cut through traffic”, ID the most popular cut through routes, and make bollard/turning restrictions to discourage them.

Then they set up on going monitoring to measure the impact and communicate it to citizens.



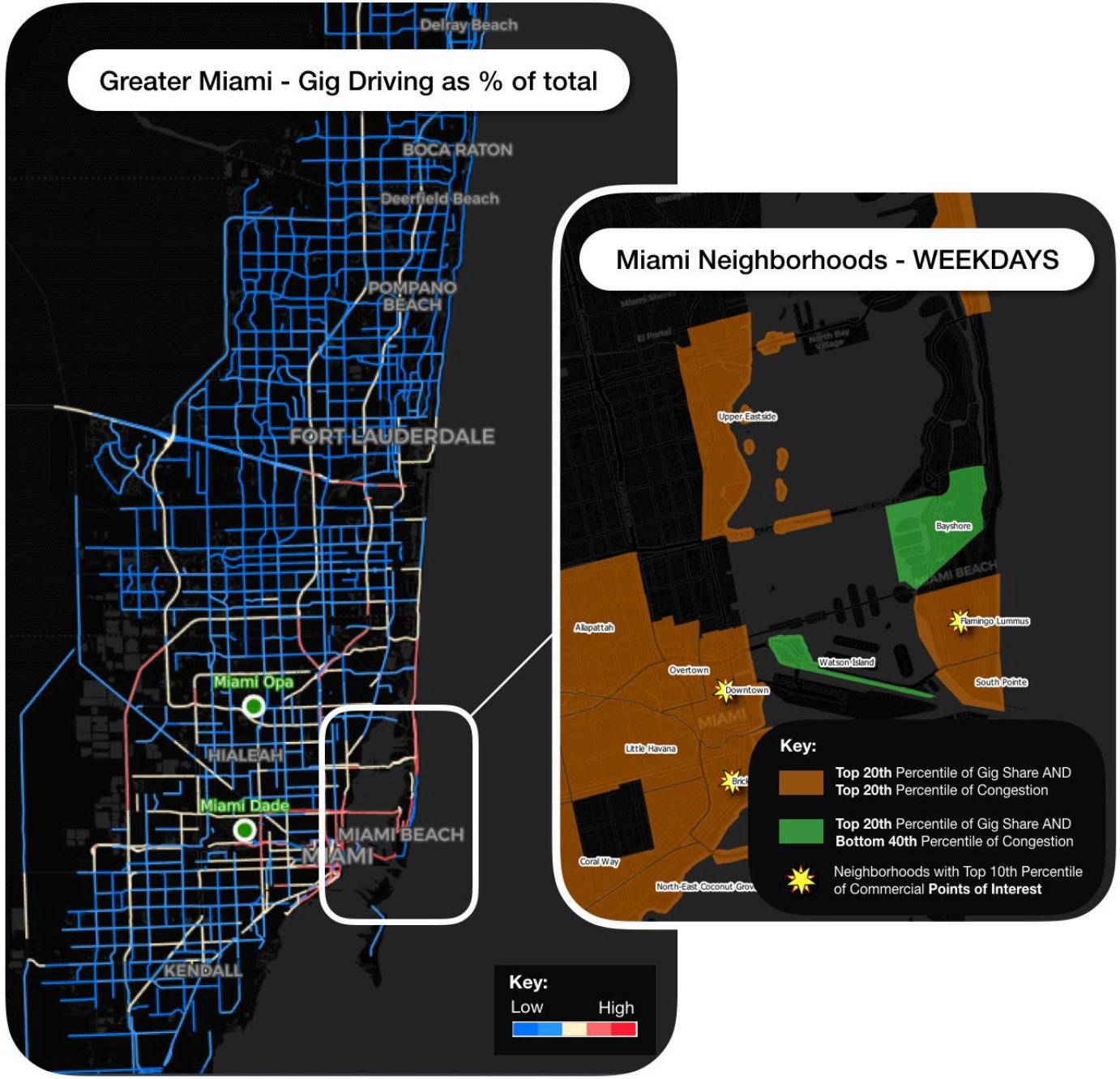
How does Gig Driving Impact Congestion?

Challenge

We need to know how new private modes are interacting on city streets – but as of now data sharing is extremely rare and limited.

Big Data-driven **Solution**

Infer ”Gig Driving Trips” with thoughtful data science, measure interaction with other attributes like congestion.



Section VII

Challenges in Adoption of New Methods

All customers go trough the Big Data adoption curve (even the New Mobility Ones)

1

Save Time and Money

Mobility hub planning, Toronto

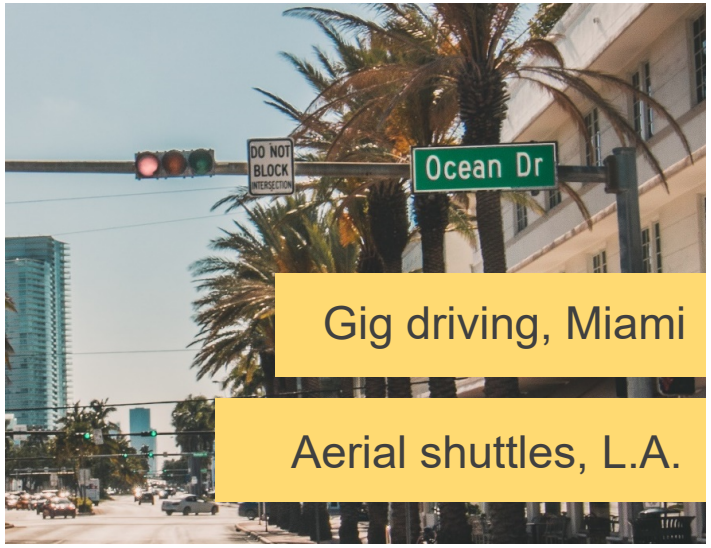
2

Go Bigger

Connected vehicles V1, CA

3

Go Beyond



Gig driving, Miami

Aerial shuttles, L.A.

Hurdles – New technology working within public sector

Proper data privacy

Procurement and "death by pilot"

The most important New Mobility Technology = Paint

STREETLIGHT DATA

Big Data for Mobility

info@streetlightdata.com