# Introduction and Updates to **StreetLight Data**

SCAG Modeling Task Force Meeting

10/23/19

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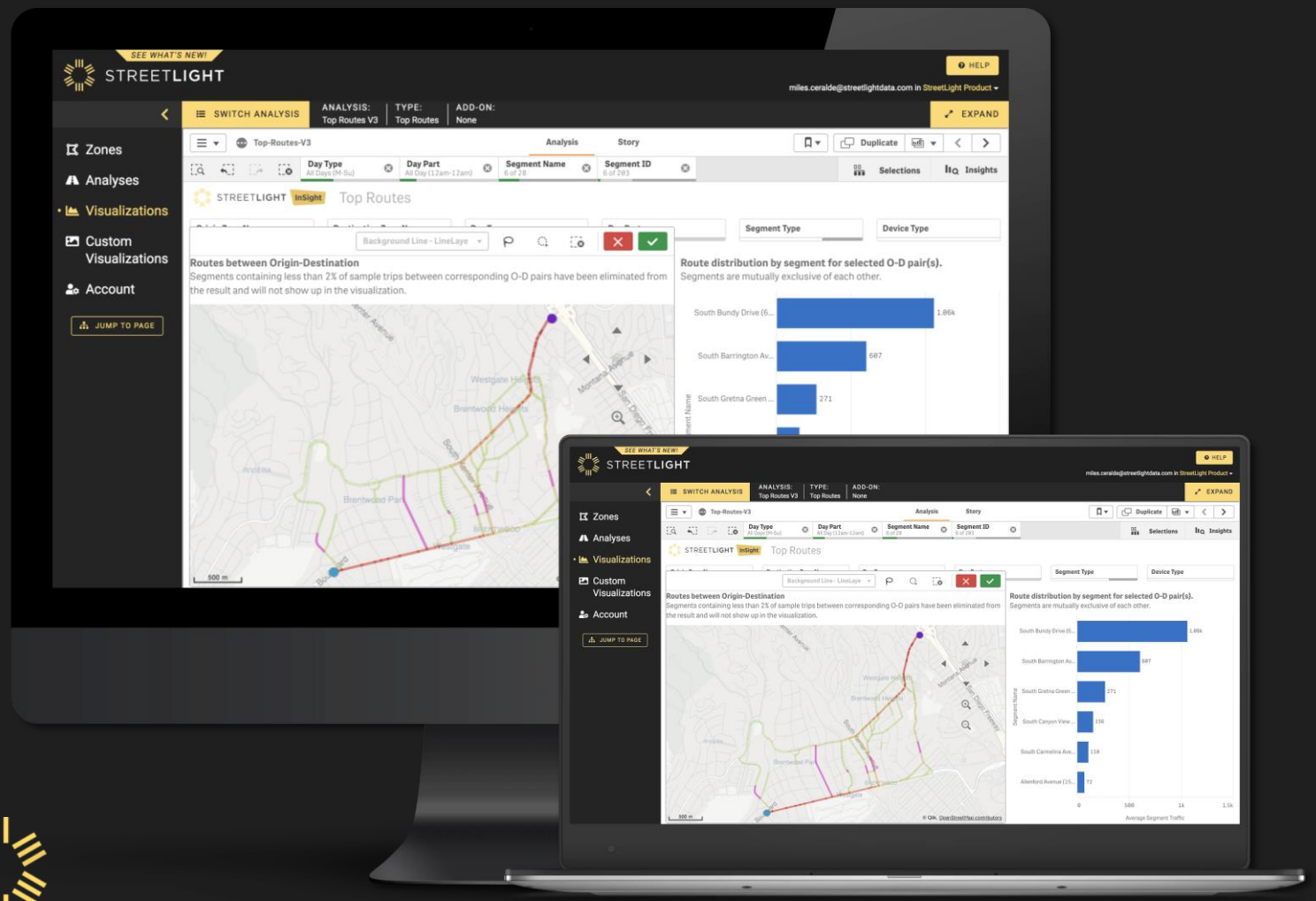
# Agenda

1. Who we are
2. Our data sources
3. How **StreetLight InSight®** changes transportation planning
4. StreetLight Data Modeling Applications
5. Q&A

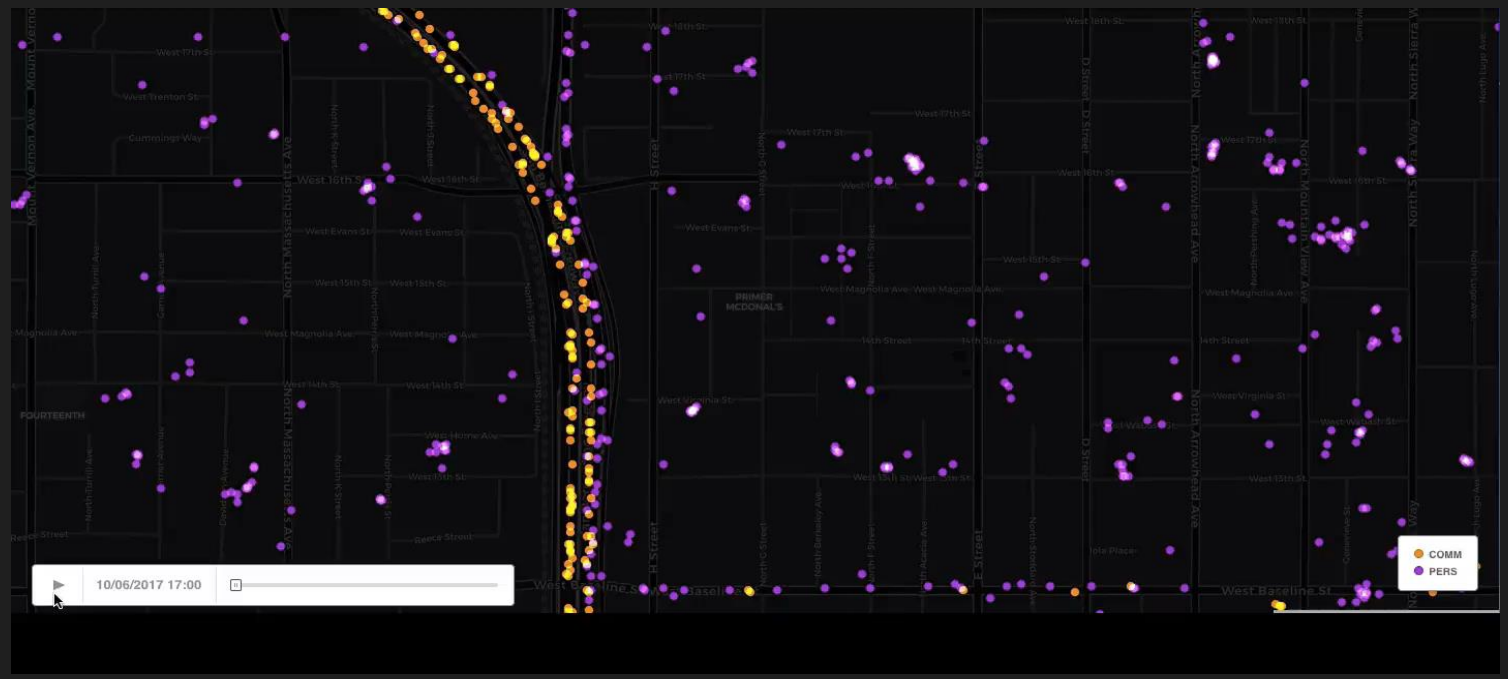
# A sea change is coming to transportation and cities.

# StreetLight InSight® is the only interactive transportation data platform.




- It's NOT a model, a report or a static heatmap.
- It's your self-serve desktop software with **on-demand access to accurate mobility metrics.**

# How we get there:
## Big Data and proprietary Route Science®




**MOBILE DEVICE DATA**
**from ~28% of U.S. and Canadian adults**

Example, San Bernardino, CA
Oct 8, 2017 24-hr snapshot

**CONTEXT**

Parcel Data
Digital Road Network Data
U.S. Census

- Every month, we process over 100 billion anonymized location records from **smart phones** and **GPS navigation devices** in cars and trucks.
- **Route Science®** transforms them into **contextualized**, normalized and aggregated travel patterns.

# 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
- Select Link
- AADT, MADT, hourly traffic

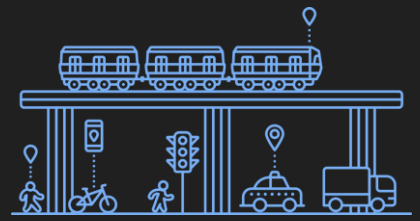
**TRIP ATTRIBUTES:**

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

**TRAVELER ATTRIBUTES:**

- Inferred trip purpose
- Demographics

# **Faster, better answers to your biggest problems**
Industry Use Cases:



## TRANSPORTATION PLANNING:

- Active Transportation
- Before & After Studies
- Congestion Studies
- Event & Tourism Studies
- Freight Studies
- First & Last Mile Studies
- Transit Studies
- Travel Demand Management

## TRAFFIC ENGINEERING & OPERATIONS:

- Congestion Studies
- Corridor Studies
- Travel Time
- Turning Movements
- Safety
- Circuity

## SMART CITIES & NEW MOBILITY:

- Before & After Studies
- EV Infrastructure Planning
- Greenhouse Gas Emissions & VMT
- Ride Hailing & Delivery Studies
- Social Equity
- Travel Demand Management

# A journey of innovation marked by transportation industry-firsts

**2015**

## World's first mobility SaaS platform

StreetLight InSight® software gives mobility professionals on-demand access to actionable analytics.

**2016**

## Industry first with LBS data

Boost in accuracy and data coverage by tapping into location-based services (LBS) data sources.

**2017**

## Industry first with on-demand AADT

Average daily traffic counts for 5 million miles of roadway, validated with more than 11,000 permanent counts.

**2019**

## Industry-first Bike and Ped metrics

Volume, trip and traveler attributes and other core metrics for bicycle and pedestrian traffic.

# 1.4 billion usable trips analyzed in Jan 2019

Increase of 4x vs. Jan 2018, with better accuracy

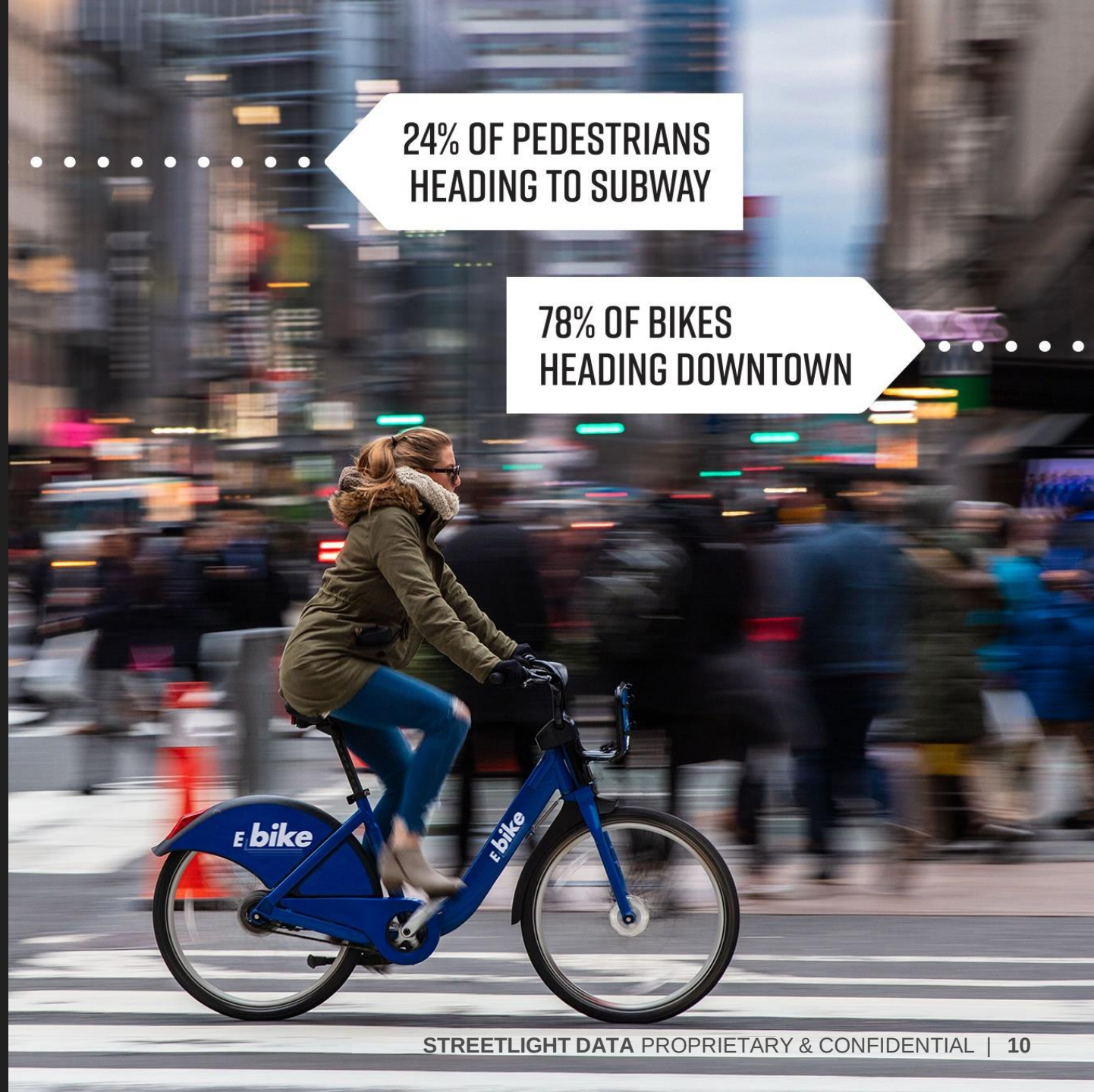
**4x**

**more trips in January 2019 vs. January 2018**

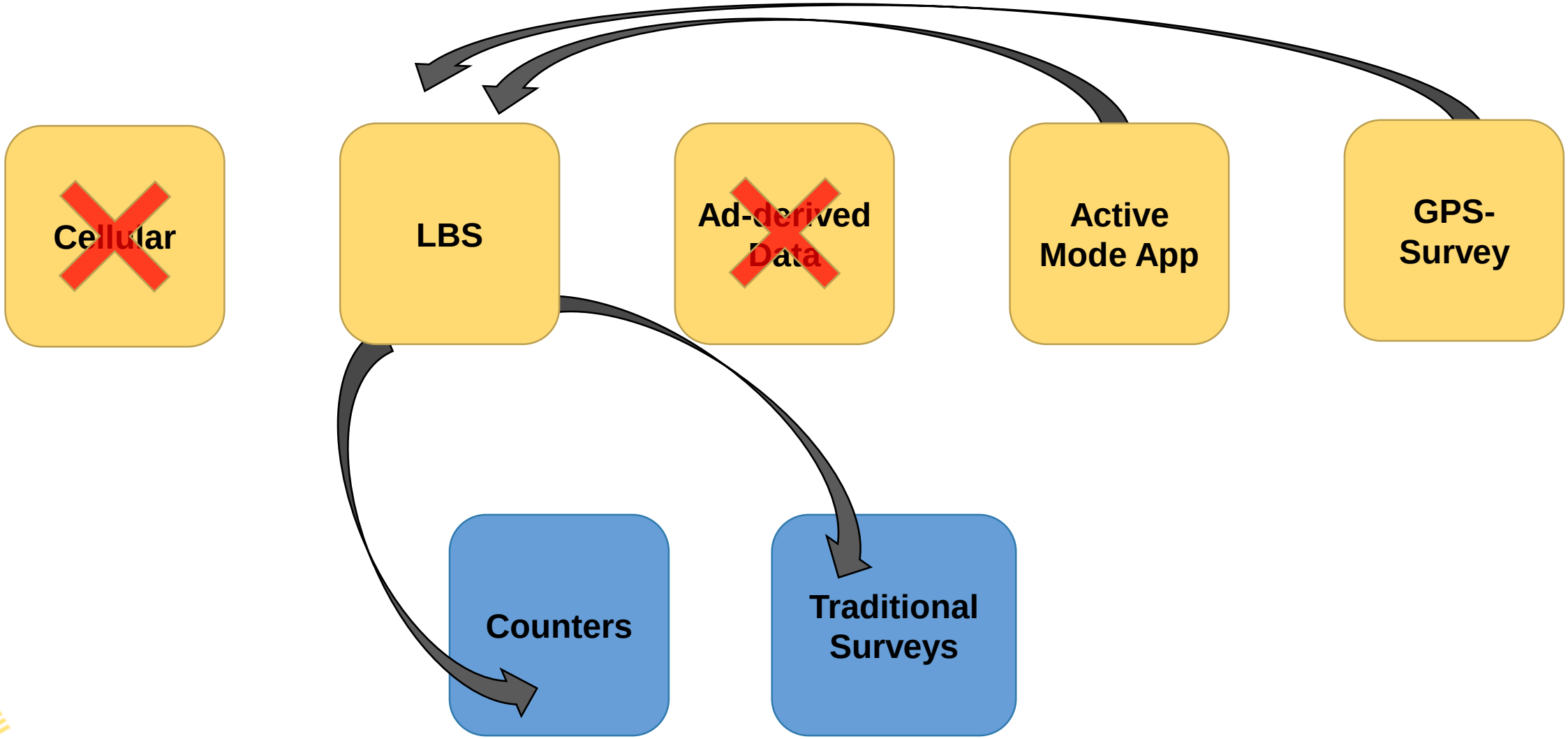
- **More confidence in your sample**, your recommendations, and their future success
- Increased coverage of **smaller roads and rural areas**
- More sample for **granular zones**, e.g. city blocks, parcels, gas stations and other destinations
- More sample for less frequent behaviors like **biking**.
- More sample for **special events**, e.g. games and festivals

## StreetLight's Mission

# Measure all modes and how they INTERACT.



# Step 1: Pick the Right Data

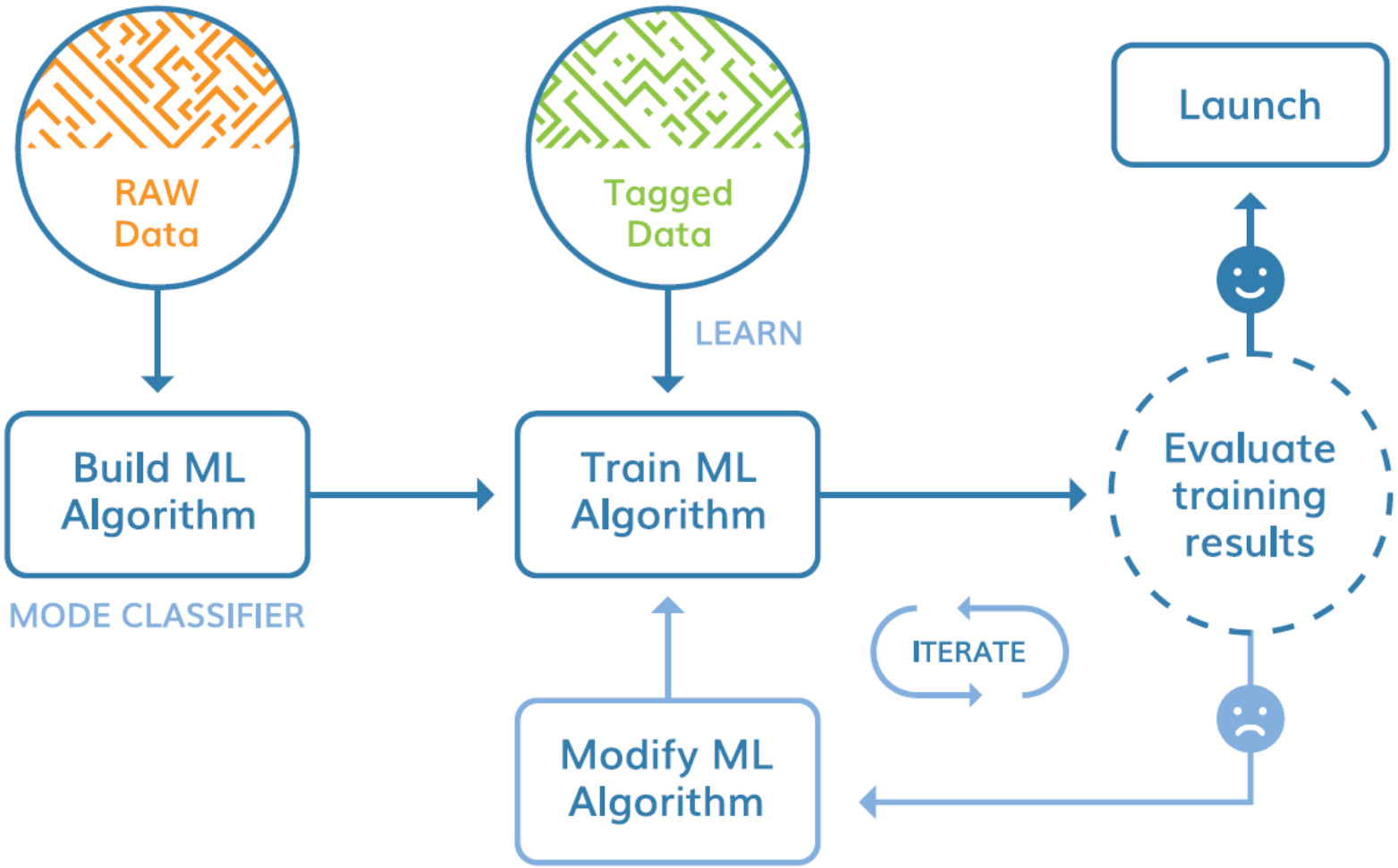


# Step 2: Machine Learning to Recognize Modes at the Ping Level

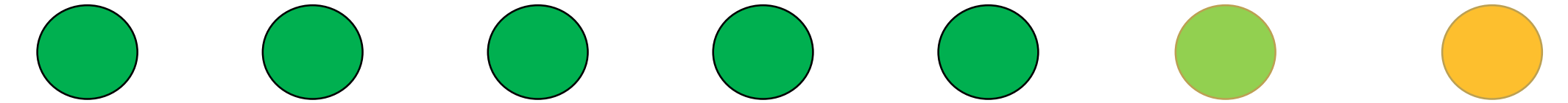
**Training a Random Forest Classifier –** Data Sets by Source

| Source | Tagged Points | Harvested Points |
|---|---|---|
| Caltrans Travel Survey (NREL**) | 26M | ~500K |
| Atlanta Regional Travel Survey (NREL) | 2.4M | ~75K |
| Mid-Region Travel Survey – Albuquerque (NREL) | 3M | ~92K |
| Southern Nevada Household Travel Survey (NREL) | 4.2M | ~133K |
| Capital Bikeshare | 334K | ~48K |
| Beijing Pedestrian (Microsoft) | 5.5M | ~27K |
| Total Number of Points in Training Data Set | | ~900K |

# 3 METHODOLOGY + VALIDATION



# Step 3: Group “Pings” into Mode-Assigned Trips

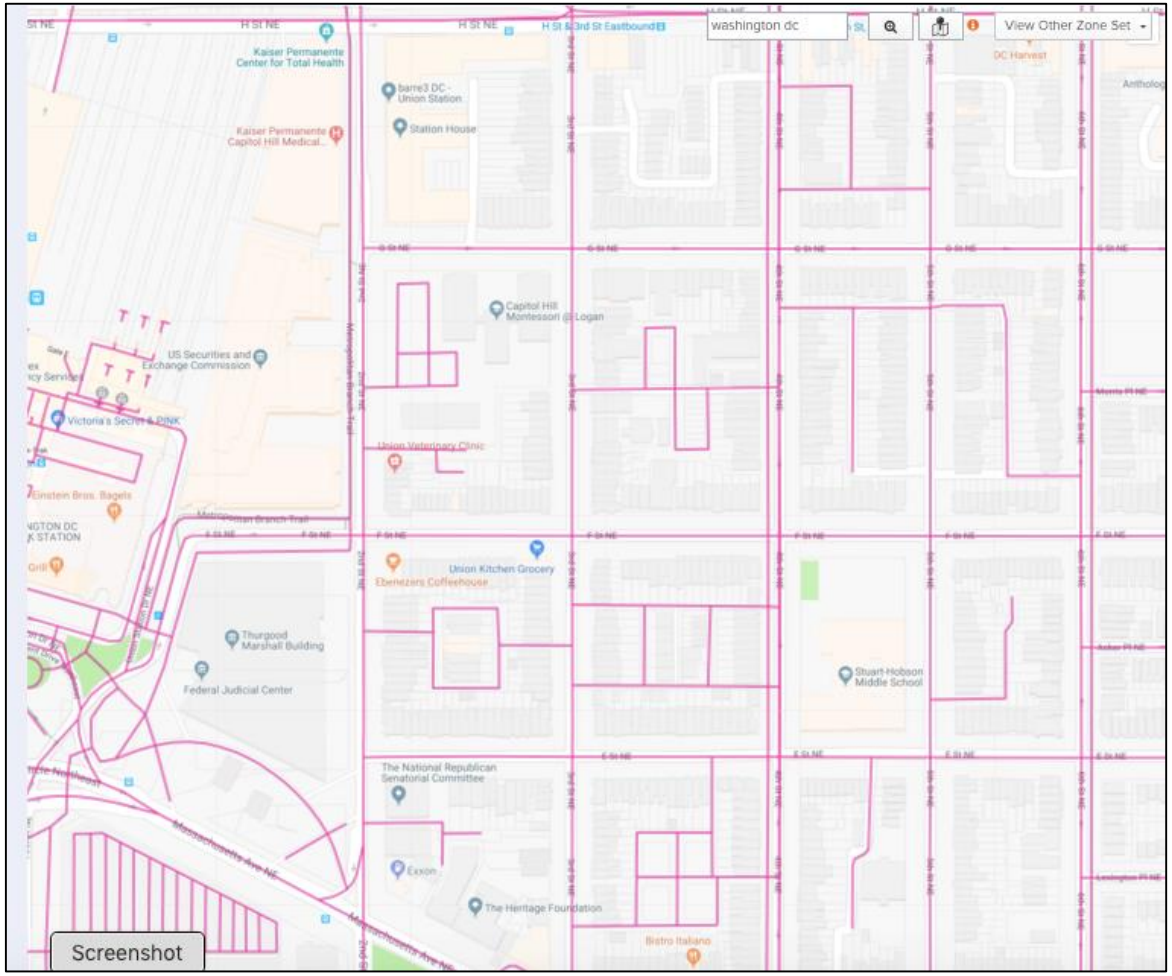


| Walk 80% Sta. 20% | Walk 90% Bike. 10% | Walk 80% Sta. 20% | Walk 60% Sta. 40% | Walk 50% Sta. 50% | Walk 20% Sta. 80% | Walk 20% Sta. 80% |
|---|---|---|---|---|---|---|

- Apply intelligence from machine learning process to infer probability of mode choice for each ping
- Stationary is a “mode”

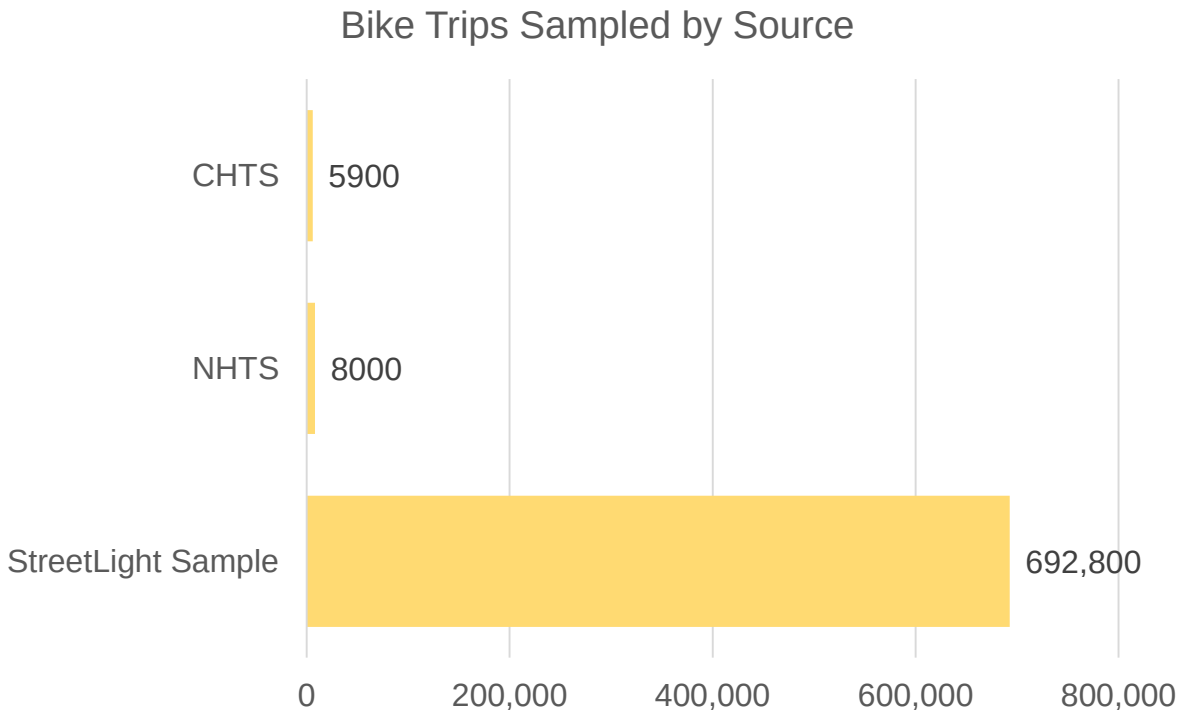
# Step 4: “Lock” to Allowable Networks

- No geometry subtracted from car Open Street Map (OSM), only added
- Implications for Pedestrians
  - Complexities with pedestrians: jaywalking can be missed
  - Very large and spread out buildings, like conferences centers, can be confusing



# Validation – Compare to NHTS/CHTS Surveys (Bike Only)

## StreetLight's nationwide sample (May 2017) is 86 times larger than NHTS!

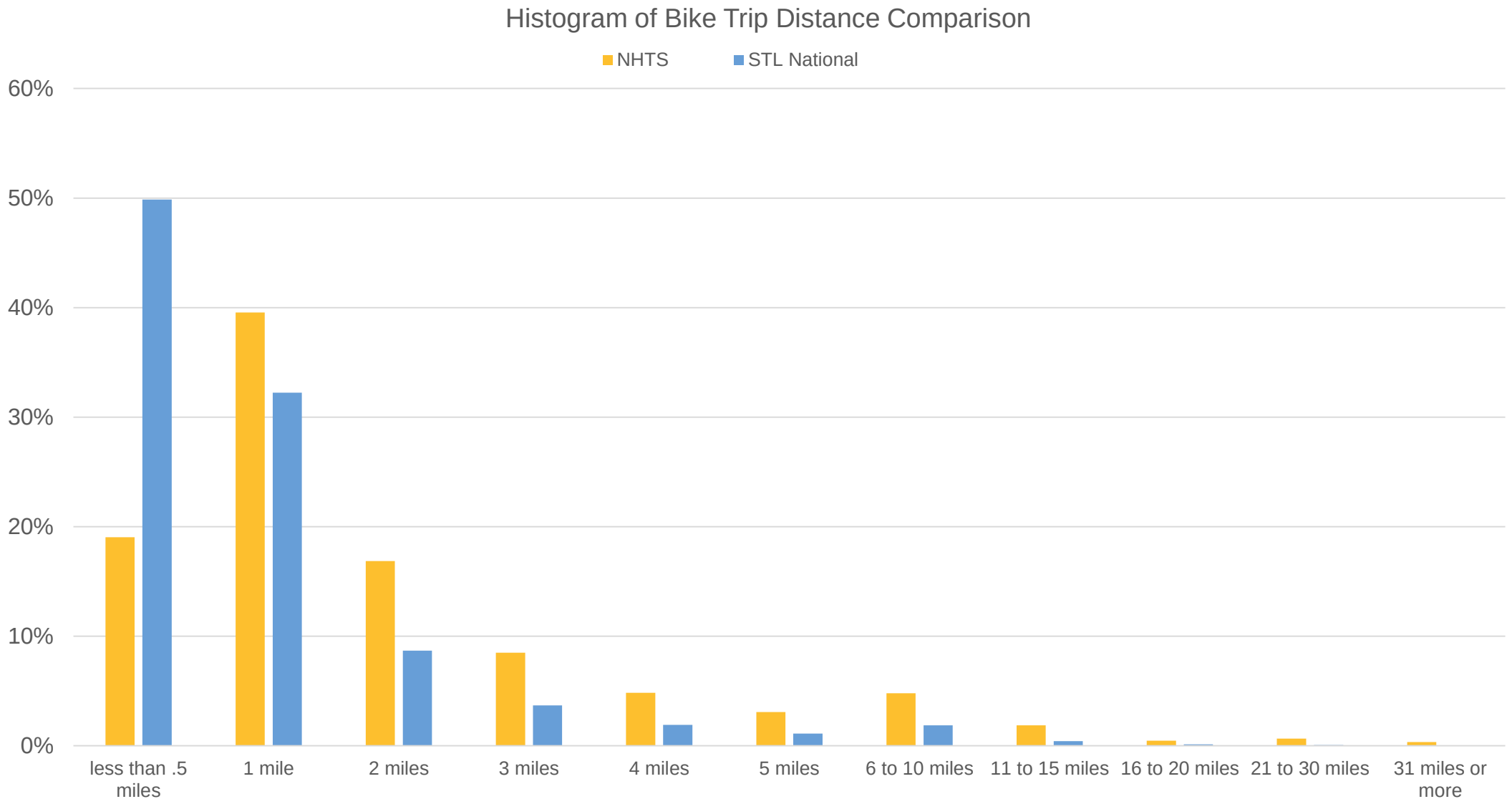



## StreetLight's average trip distance are shorter than surveys, especially NHTS

**Average Trip Length from Different Sources**

| Mode | NHTS (miles) | SL – Nat'l (miles) | CHTS (miles) | SL – CA (miles) |
|---|---|---|---|---|
| **Bicycle (all)** | 2.38 | 1.09 | 1.50 | 1.11 |
| **Bicycle (>300m)** | | 1.30 | | 1.30 |

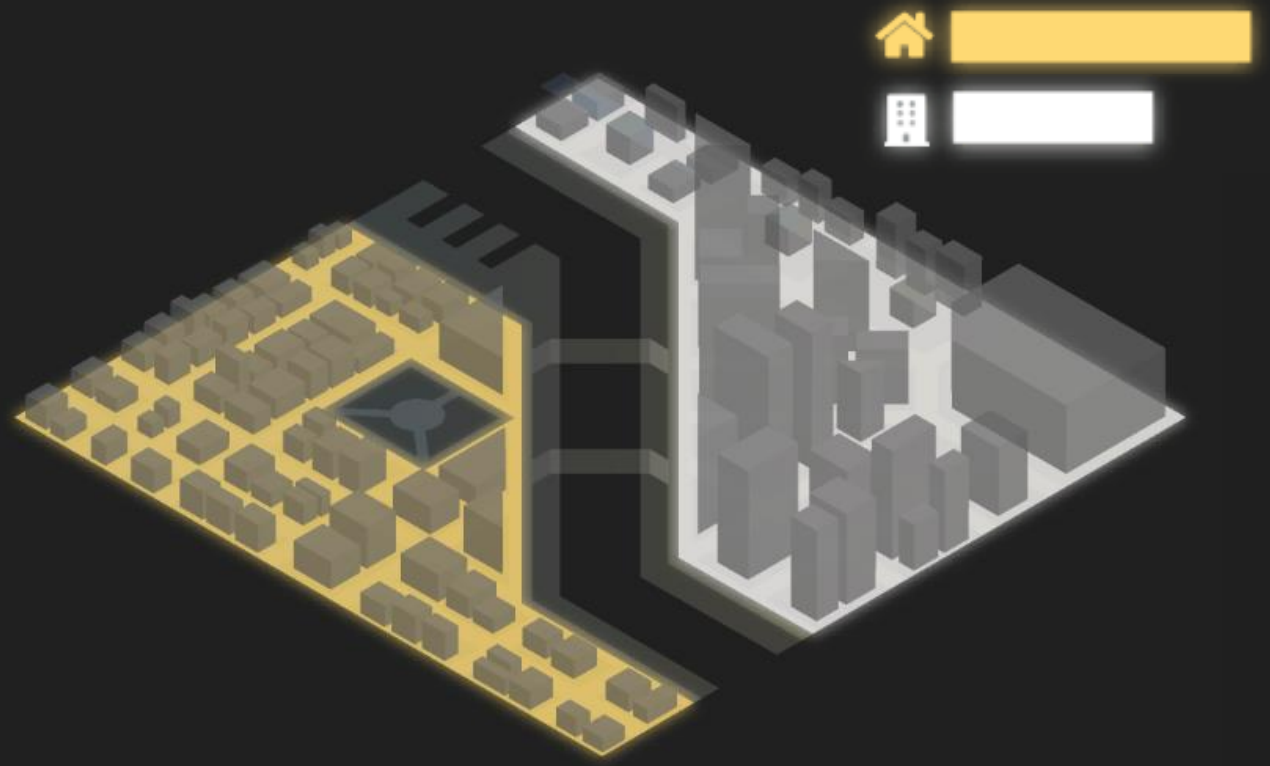
# LBS Mobile Applications reveal a much higher share of short trips



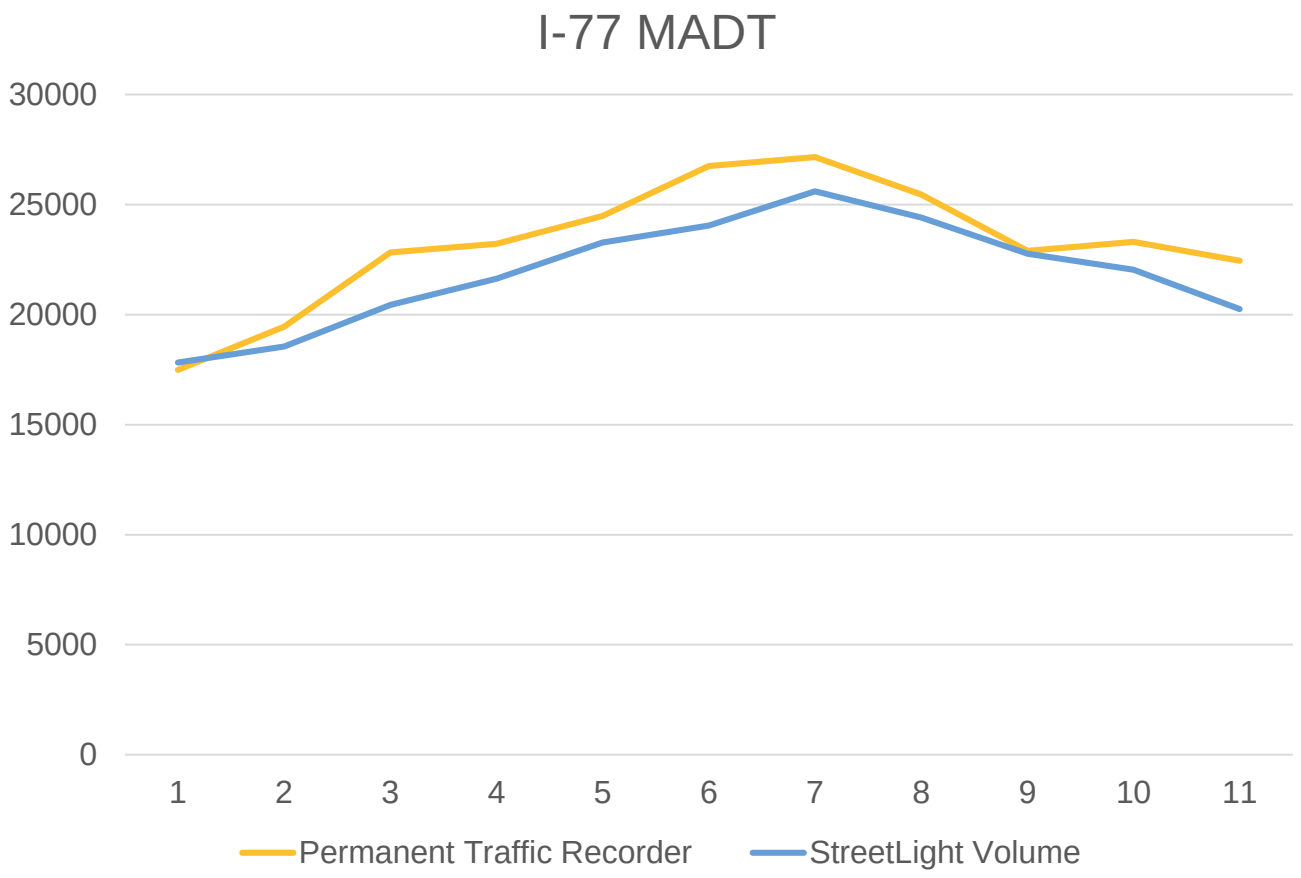
# Mobility Analytics as Real-World Counts by Hour, Month, or Year.

3. The output is **unbiased, population-representative mobility analytics** — accessible through StreetLight InSight®.

- **Traffic counts**
  - **Annual** (AADT)
  - **Monthly** (MADT)
  - **Hourly** (AAHT)
- **Origin, destination, and routes**
- **Trip speed, duration, length,** and more

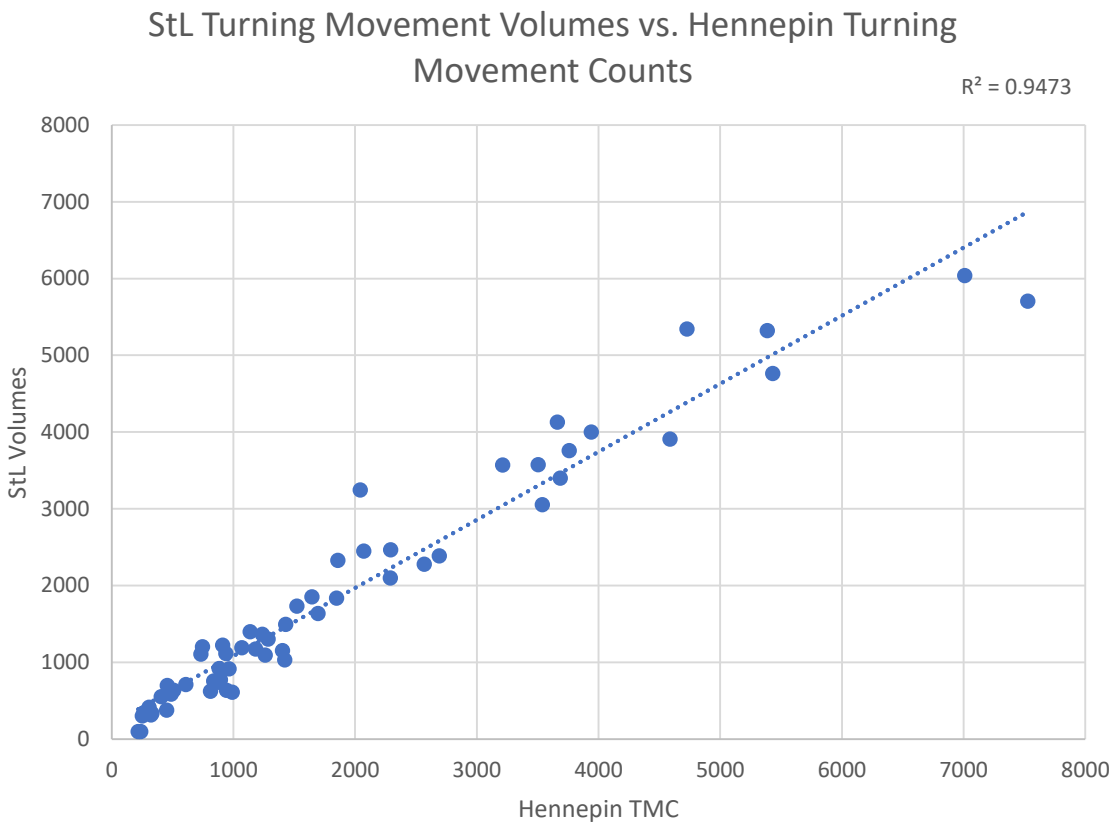


# Result: A Validated Big Data MADT at Your Fingertips




- In our validation, StreetLight MADT was found to be **closely aligned** with a known permanent counter on I-77.
- Get MADT to calculate **vehicle miles traveled (VMT) for all roads** in the region, not just highways.
- Accurately **measure seasonal traffic conditions to support better forecasts,** future traffic capacity, and congestion.
- Understand the growth and impact of traffic seasonality to better **support policy planning.**

# Result: On-Demand Turning Movement Counts, Validated and Proven as Accurate as Real-World Counts




- We **compared** our results to counts gathered using a traditional data collection method.
- We saw a high correlation, **R2 of 0.947**.
- StreetLight Volume reliably captures turning movement counts **without the hassle** of installing sensors, or any manual post-processing.
- Transportation experts can easily get tens, if not **hundreds**, of turning movement counts **within minutes**.

# Agenda

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4. StreetLight Data metrics
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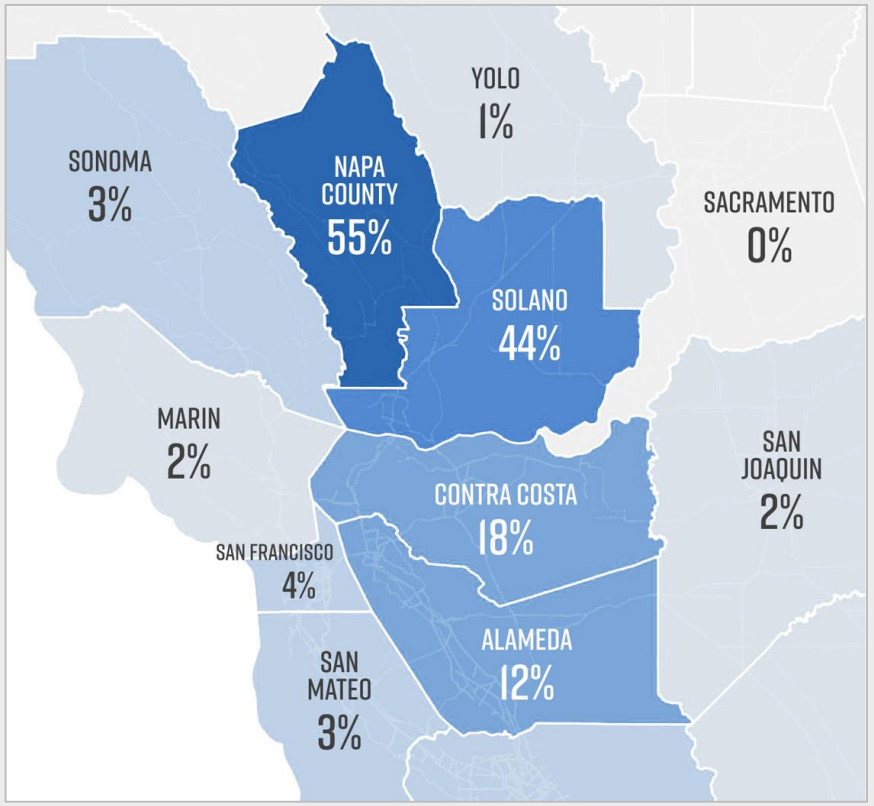
# Pass-Through Congestion Study

## Challenge

Napa residents felt that growing numbers of tourists and pass-through tech workers were causing growing congestion. Planners wanted to know for sure.

## Big Data-Driven Solution

The analysis revealed that commuters working in Napa were the top cause of traffic. Tourists and pass-through trips from neighboring counties were less significant.




Data visualization showing that congestion trips originate within Napa county and neighboring counties

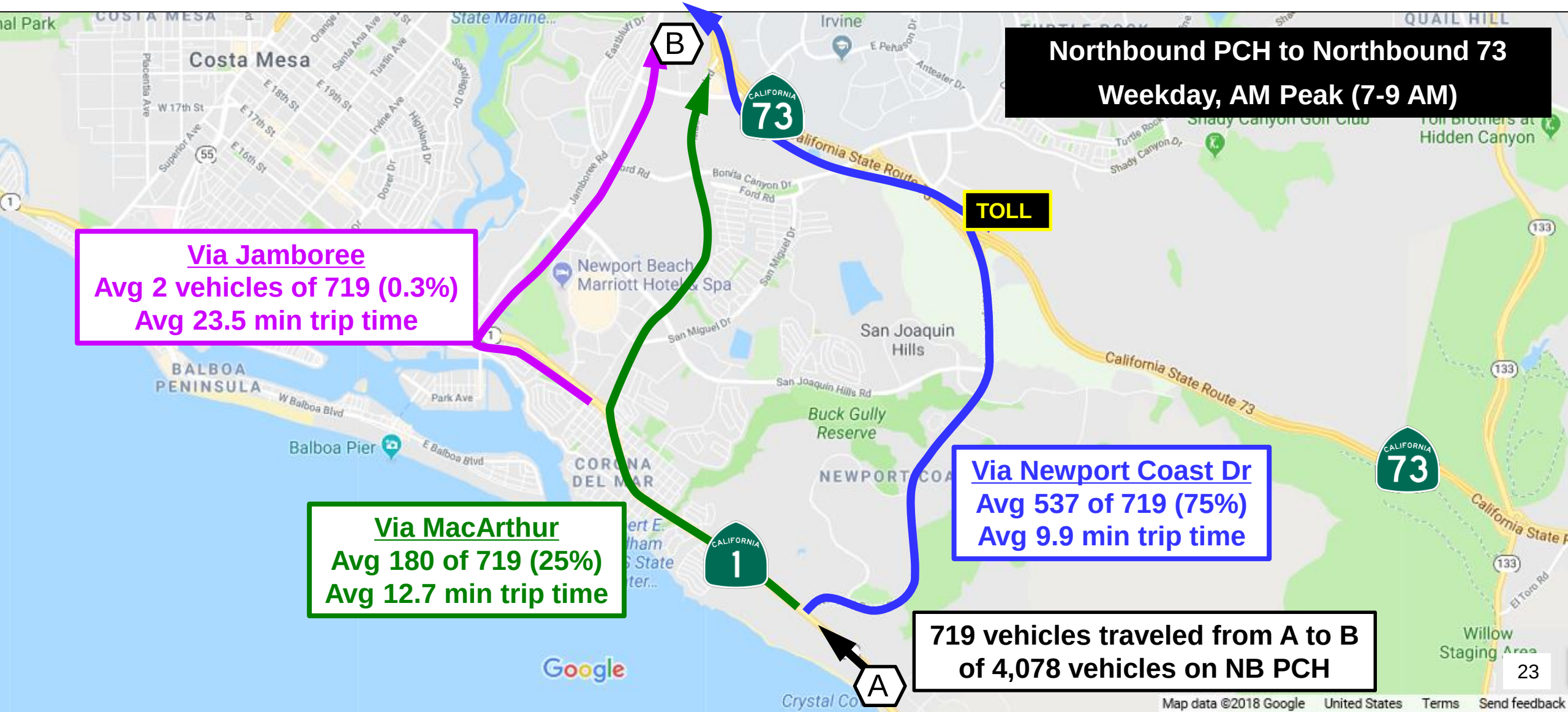
FEHR PEERS

**"StreetLight helped us answer questions that are too costly and time consuming to analyze with traditional methods."**

KEVIN JOHNSON
Fehr & Peers

# Pricing + Stakeholder Outreach

The Toll Roads of Orange County



# Freight Studies for Long-Haul Traffic

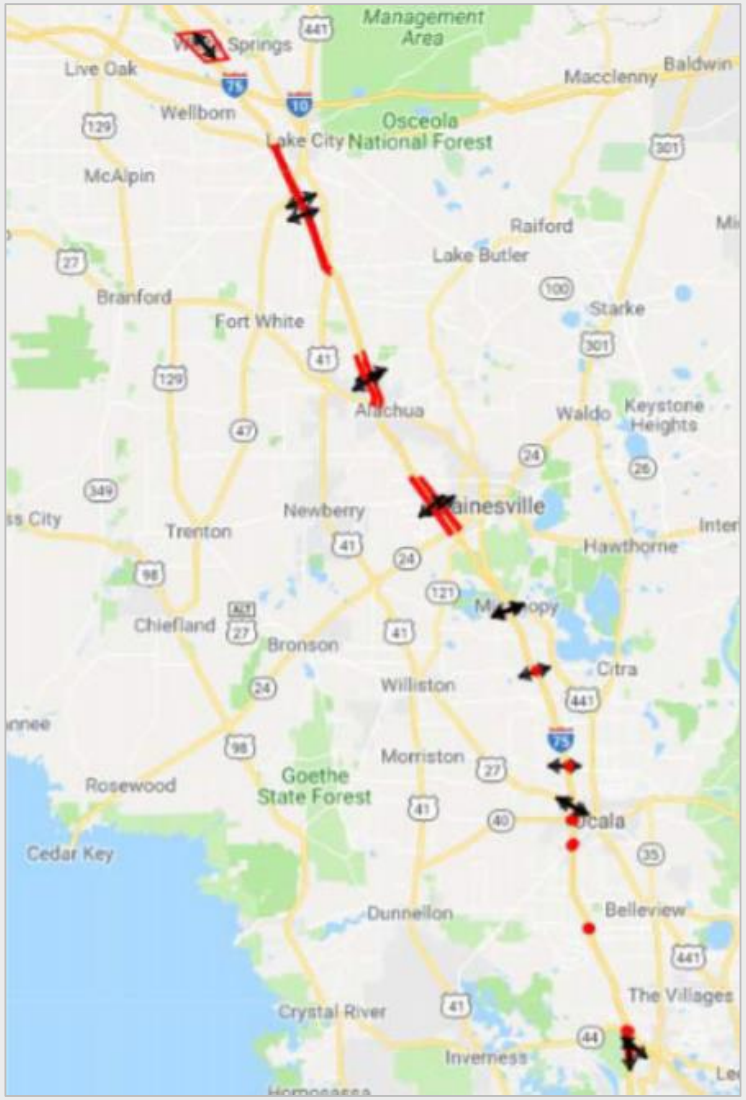
## Challenge

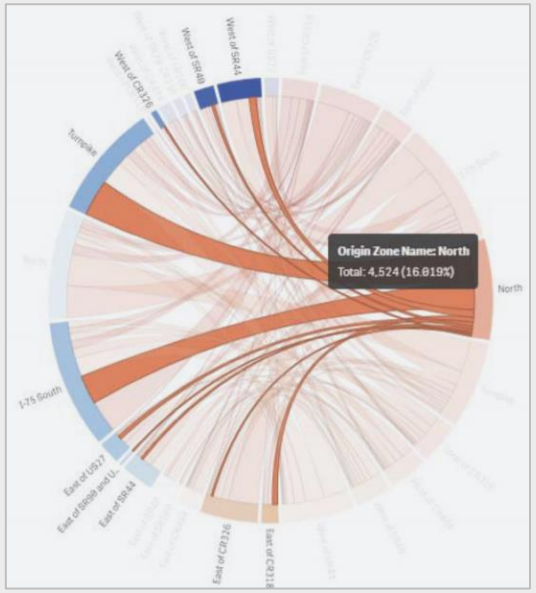
To study potential congestion mitigation tactics, planners needed to know what percentage of Florida highway traffic was long-haul trucks.

## Big Data-Driven Solution

Big Data told FDOT that 15-20% of vehicles in the corridor are freight trucks, and a significant portion are long-haul, and worth analyzing for possible shift options.

Freight study area of I-75 in central Florida




Chord diagram of freight traffic

**"StreetLight Data is the most efficient way for us to differentiate if the truck traffic was long-haul or short-haul "**

CHUN-YU LU
AECOM Florida

AECOM

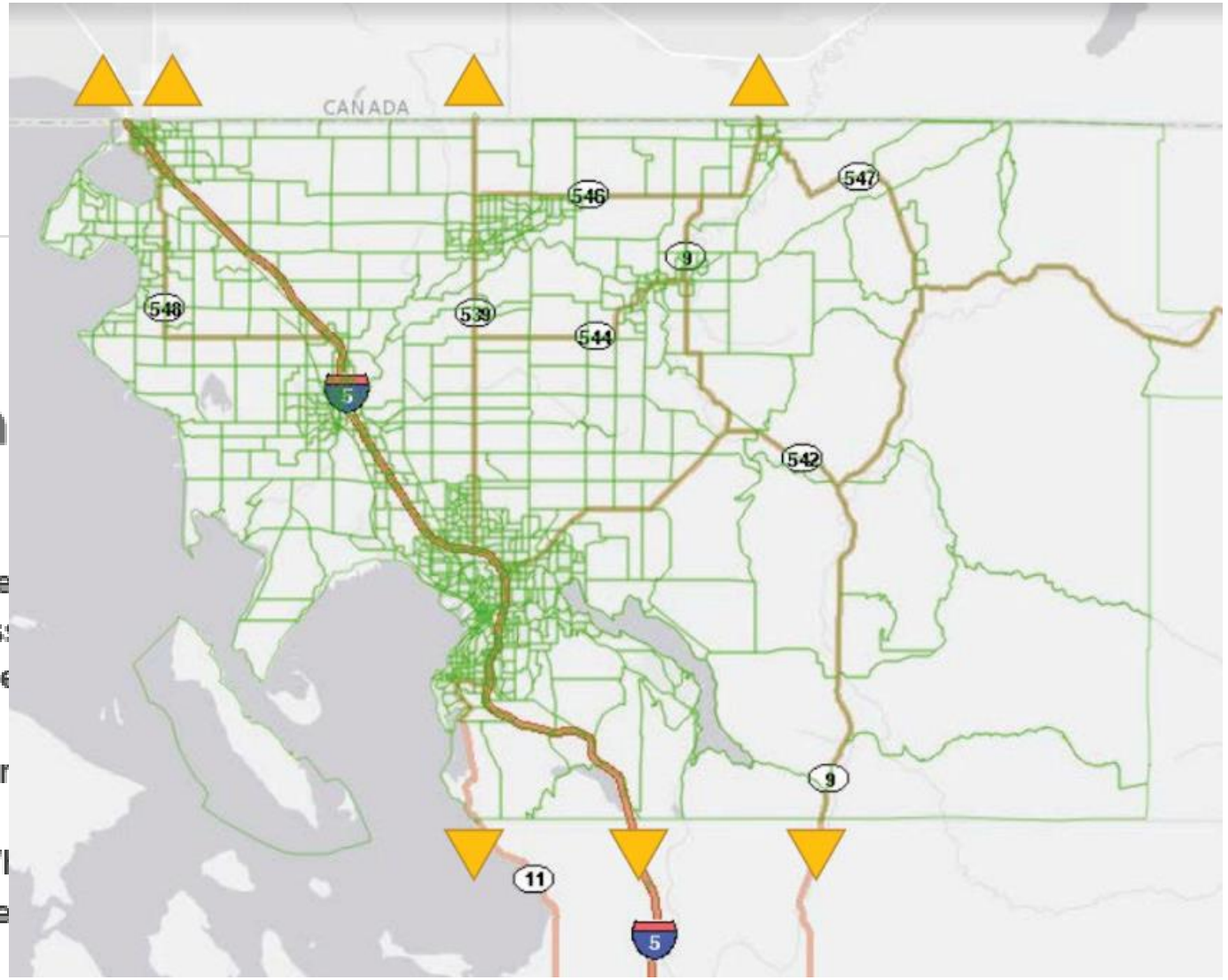
# Understanding External Trips in Whatcom County, Washington

## 1 WHY IT MATTERS

**4**
US-CANADIAN
PORTS OF ENTRY

External trip activities are an important pie
County. Many of the cross-border trips pas
north (e.g. Vancouver, B.C.) or south (e.g. Se

Increased congestion along Interstate 5 thr
safety of pass-through trips. In addition to
region originate at a location outside of WI
within Whatcom but have destinations else



# Understanding External Trips in Whatcom County, Washington

## 2 THE DATA COLLECTION CHALLENGE

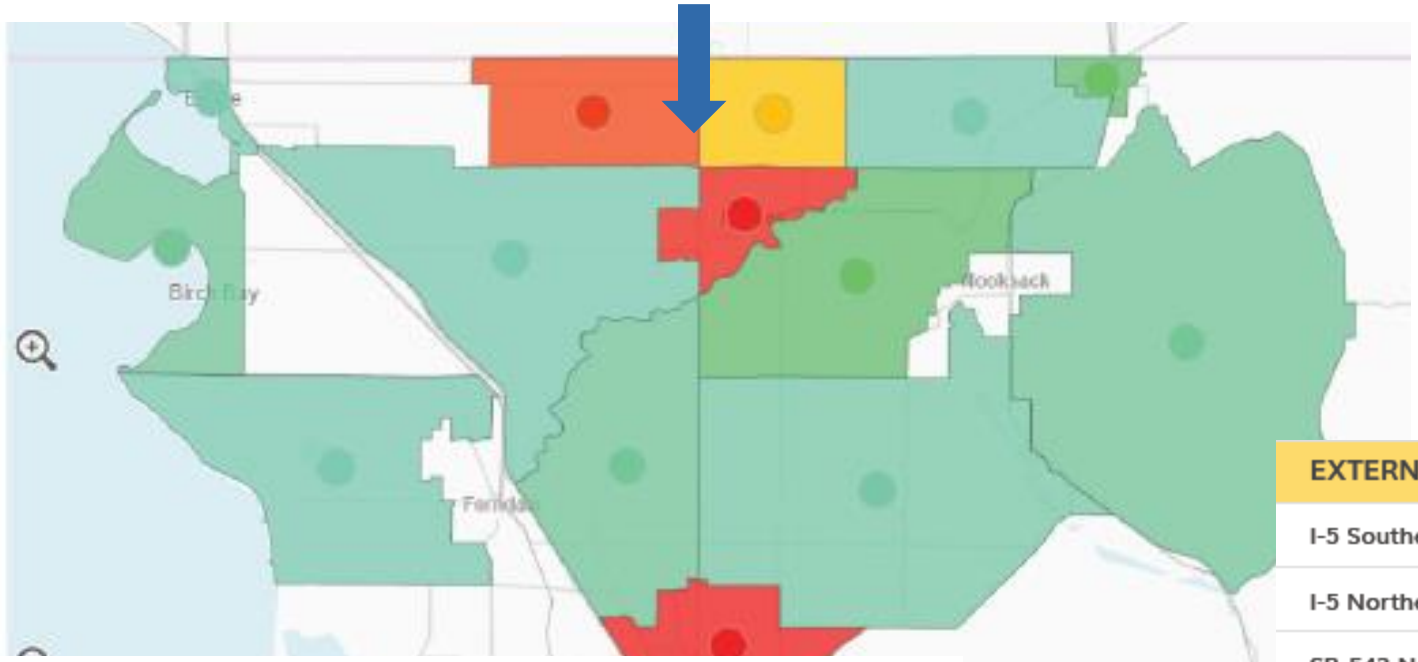
The current methodology for pass-through trips is **time consuming, costly, and logistically difficult:**

**SENSORS**
Captures increased traffic flow, but not the origin and destination (O-D) of those vehicles.


**LICENSE PLATE STUDIES**
Can be costly for a smaller jurisdiction like Whatcom County.

**MODE SPLITTING**
Difficult to distinguish or capture different modes.

# Understanding External Trips in Whatcom County, Washington




| EXTERNAL STATION | 2013 | 2018 |
|---|---|---|
| I-5 Southern External | 5% | 3.8% |
| I-5 Northern External | 19% | 24.5% |
| SR-543 Northern External | 21% | 19% |
| SR-539 Northern External | 7% | 6.3% |
| SR-9 Northern External | 7% | 14.5% |
| SR-11 Southern External | 0% | 0.8% |
| SR-9 Southern External | 0% | 2.8% |
| SR-542 Eastern External | 0% | 0% |

## 3 NEXT STEPS

### UPDATE THE TRAVEL DEMAND MODEL

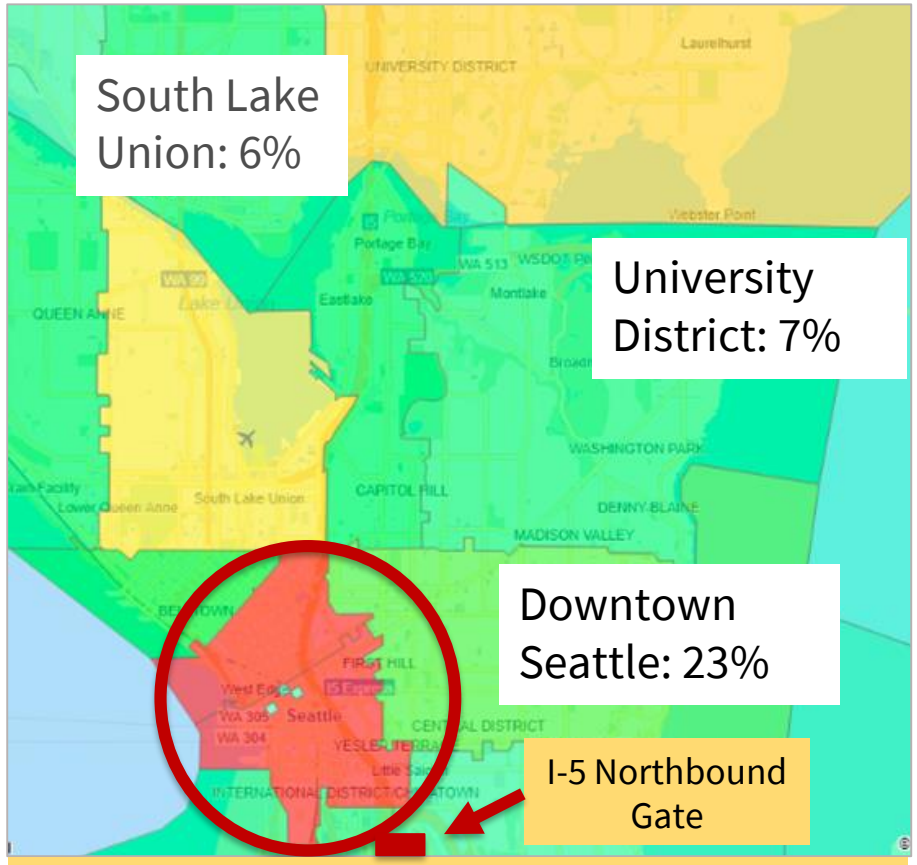
With the updated travel behavior information, Whatcom Region (COG) can now use the updated travel demand model in preparation for the upcoming regional transportation plan process: Whatcom Mobility 2040.

### IMPROVING MOBILITY

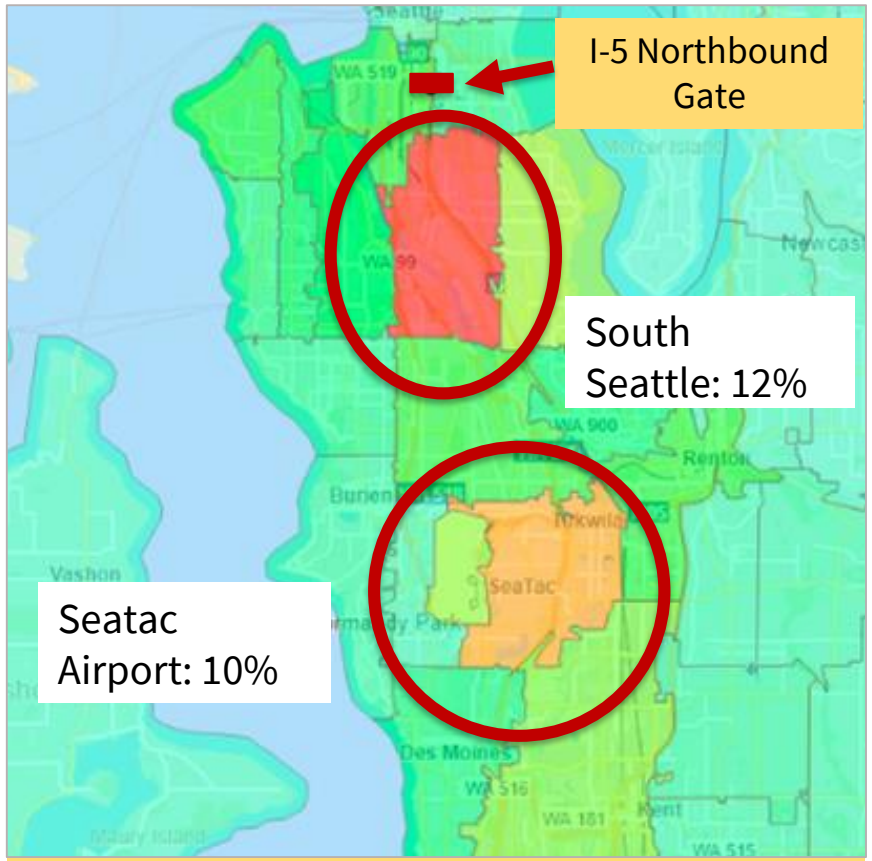
Whatcom 2040 will assess local and regional projects to improve mobility for the next 20 years.

# Understanding Incident Impacts on the I-5 Corridor and Roadway Conditions

# Top Origins and Destinations of Trips on I-5 Northbound

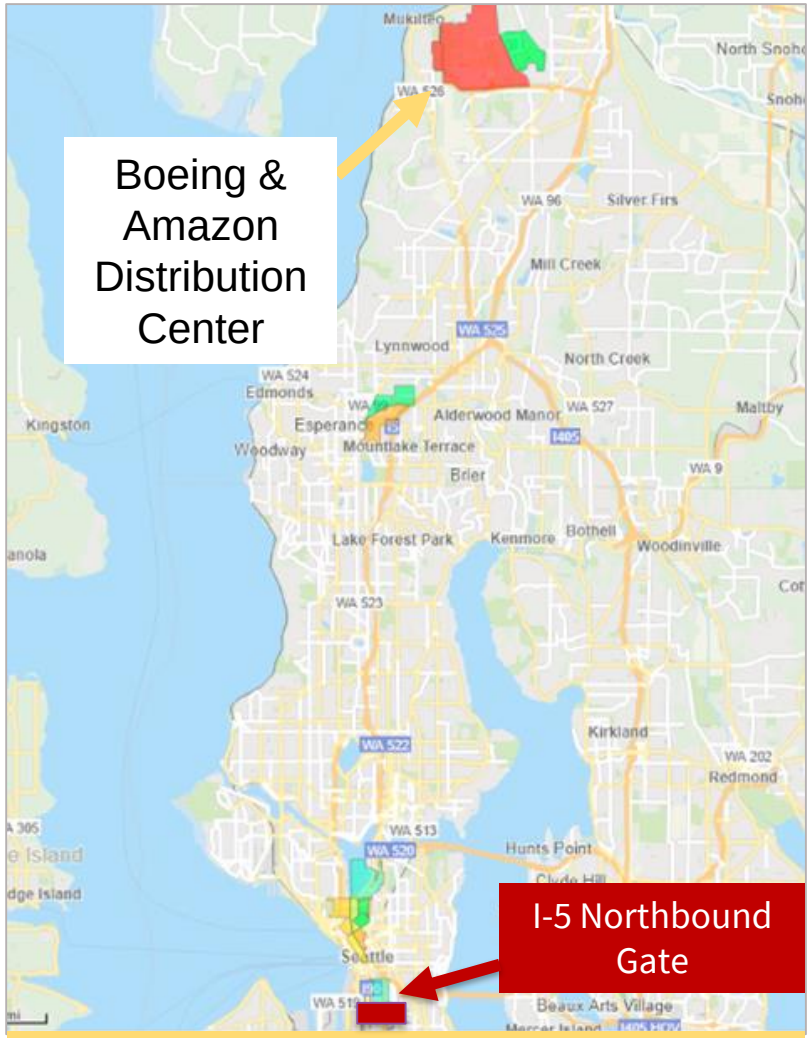



Destinations AM Peak Period (6AM-10AM)

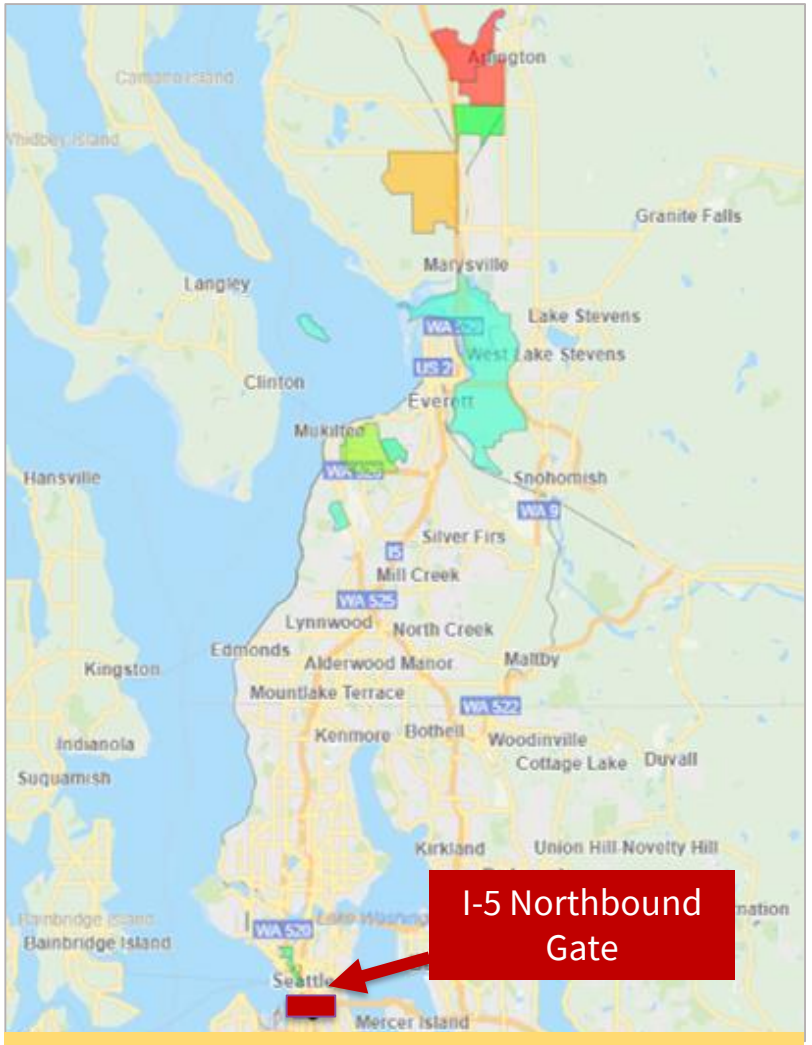



Origins AM Peak Period (6AM-10AM)

# Top Truck Destinations AM Peak & Midday Periods



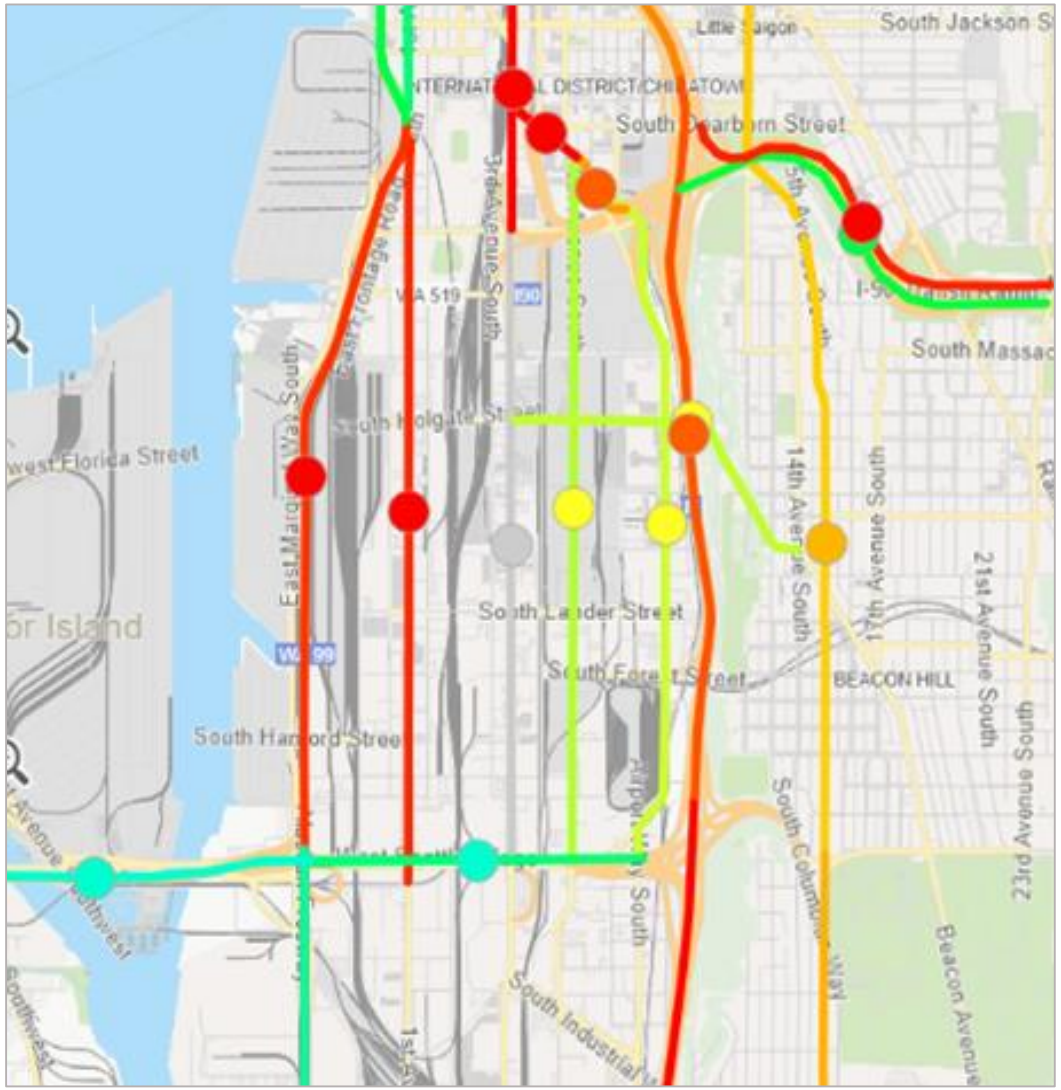

Destinations AM Peak Period (6AM-10AM)



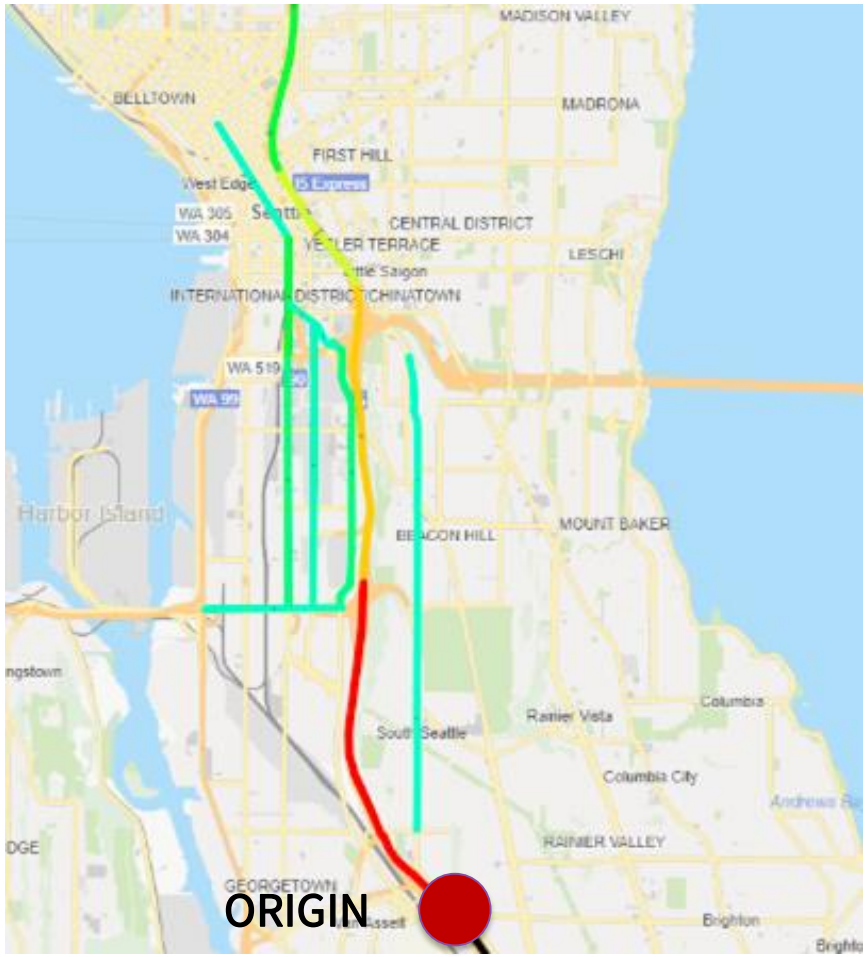

Destinations Midday (10AM-4PM)

# Northbound Streets are Congested at Peak AM Hour (8-9am)

- Some alternative corridors are already congested in the AM Peak Period including the 99 corridor and 1st street
- But other corridors like 4th Street, 15th Street and Martin Luther King have capacity



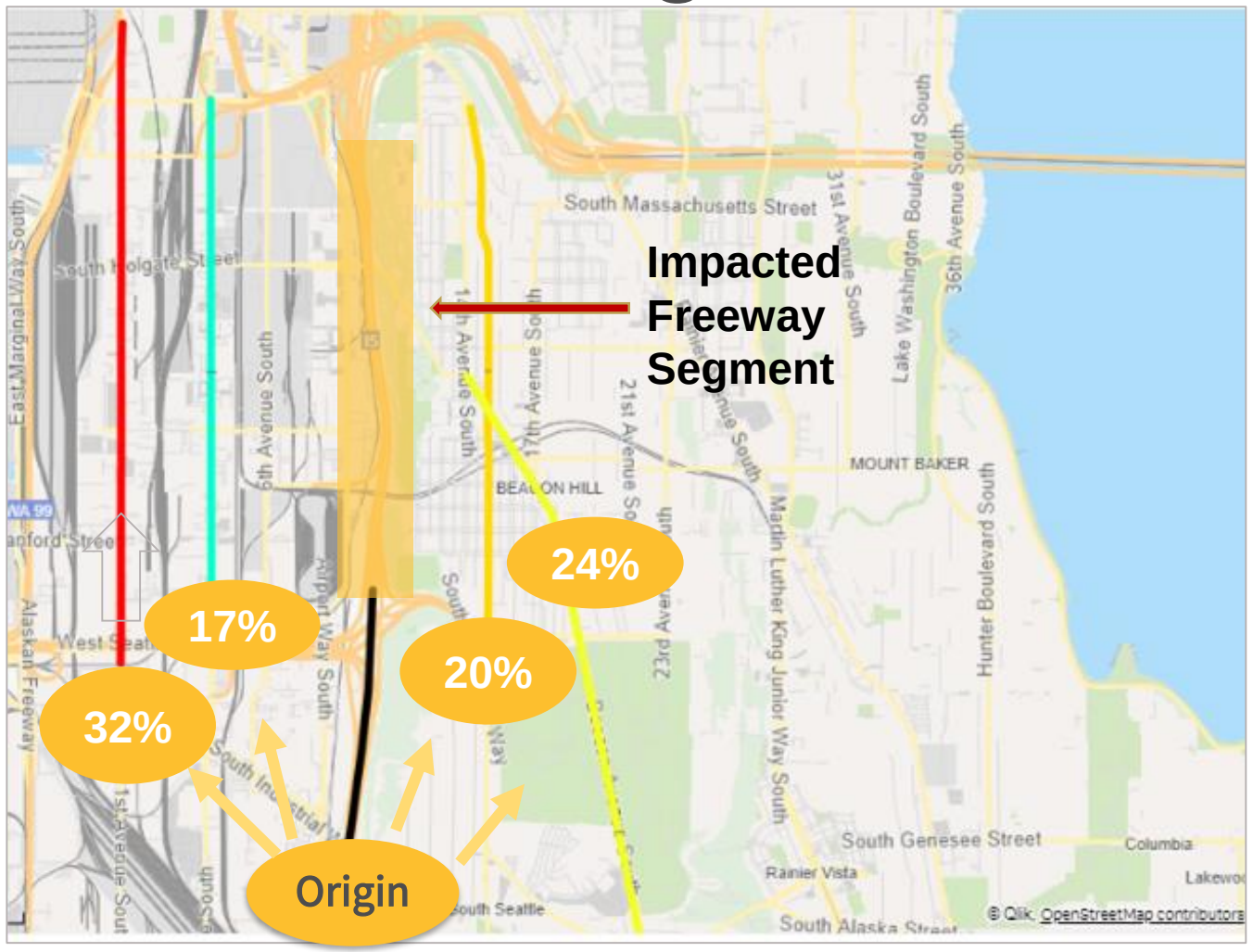
# Changes in Route Choices NB Travelers After Incident



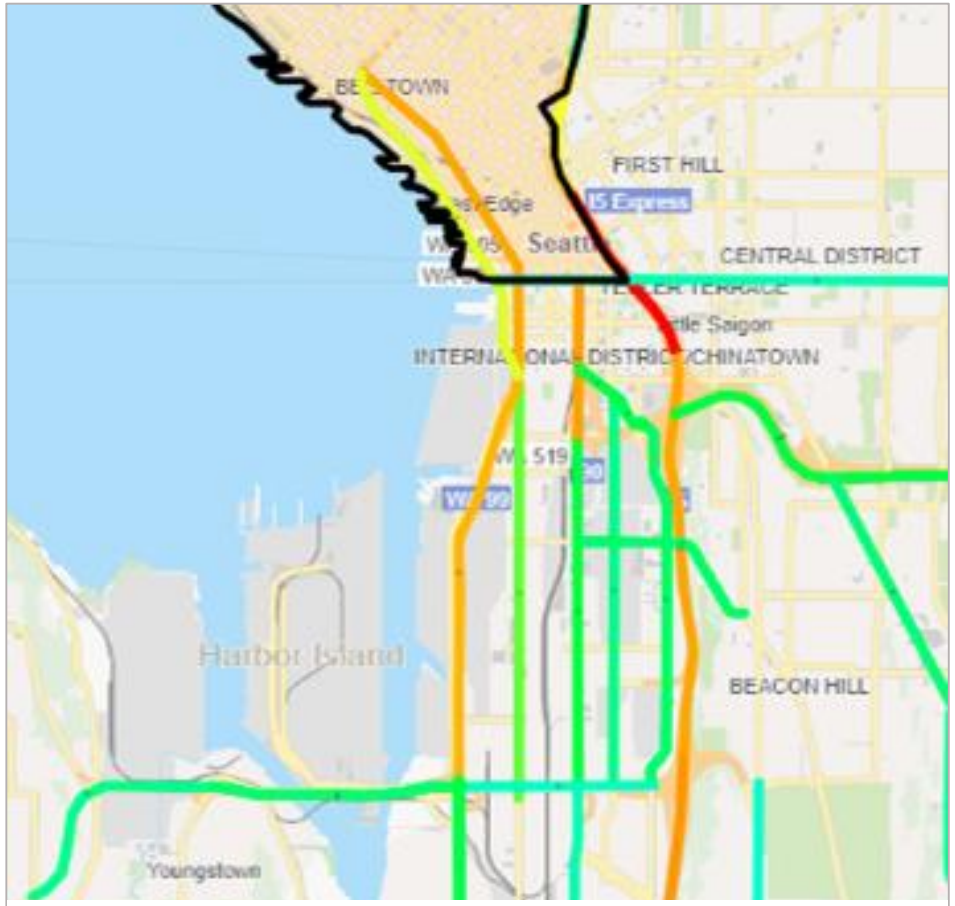

Before Incident


During Incident

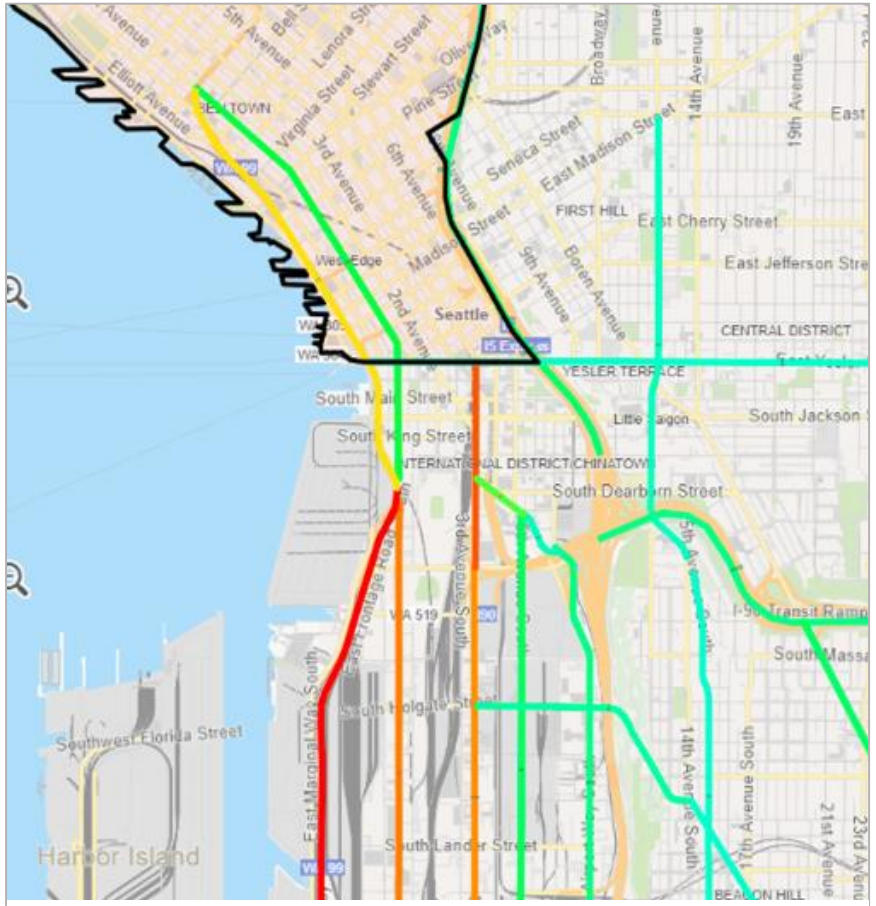
# Focus on I-5 Route Choice at West Seattle Bridge



# Route Choice Changes for  Southbound Trips from Downtown Seattle

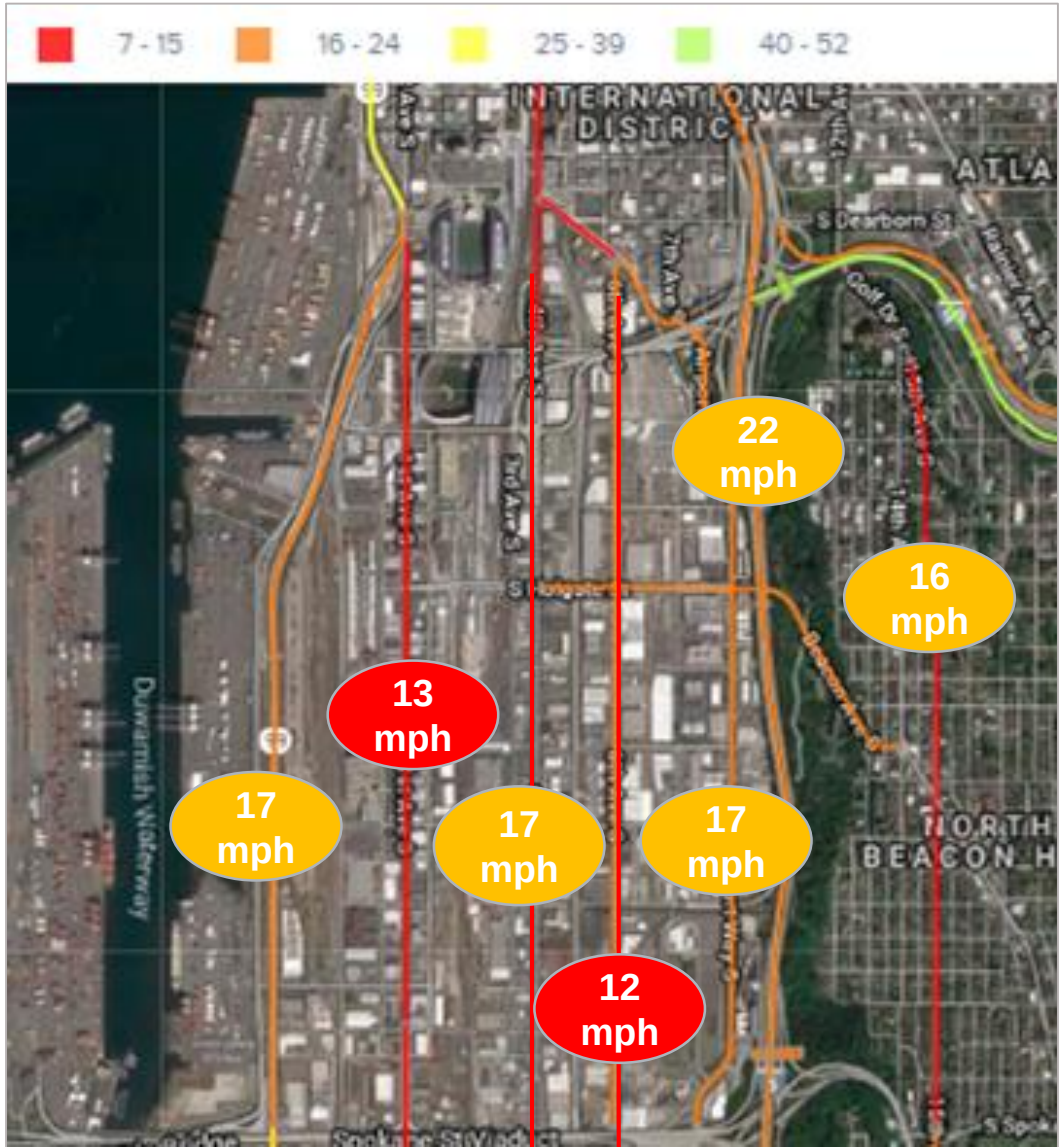


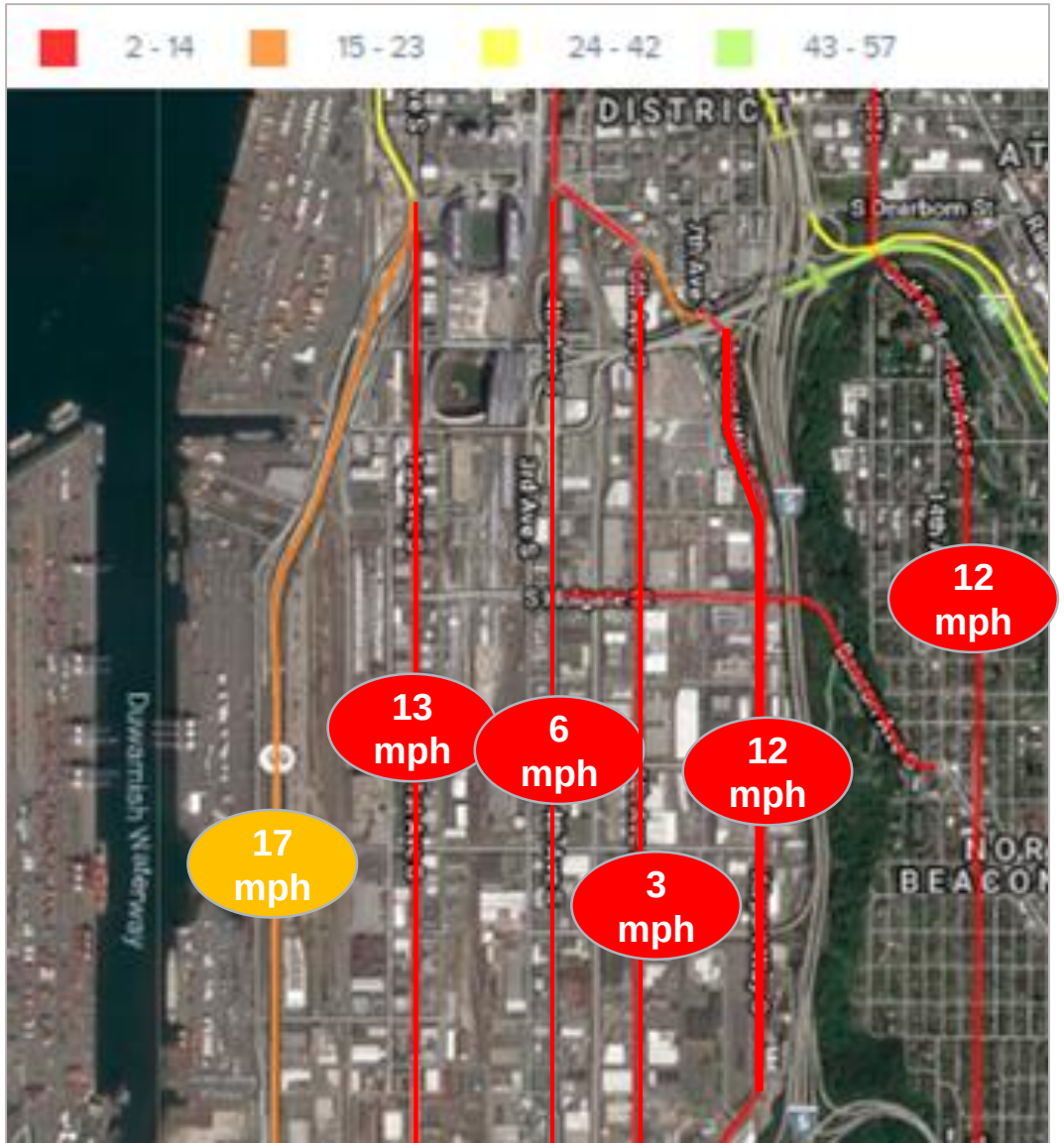

Before the Incident (6AM-10AM)




During the Incident (11AM-4PM)

# Local Roadways Experience Severe Drop in Speeds, particularly airport Way and 4th Street Northbound



# Modeling Applications in SCAG Region

# Measuring External and Internal Trips

## General Information

INFO | VALIDATION DETAILS

**Analysis Type:** O-D Analysis
**Mode of Travel:** All Vehicles (LBS)
**Output Type:** StreetLight Volume
**Additional Project Configuration:** Trip Attributes, Traveler Attributes
**Created By:** matt.pettit+admin@streetlightdata.com
**Description:**
Analysis does not have a description.

## Zones

ORIGIN ZONES | DESTINATION ZONES

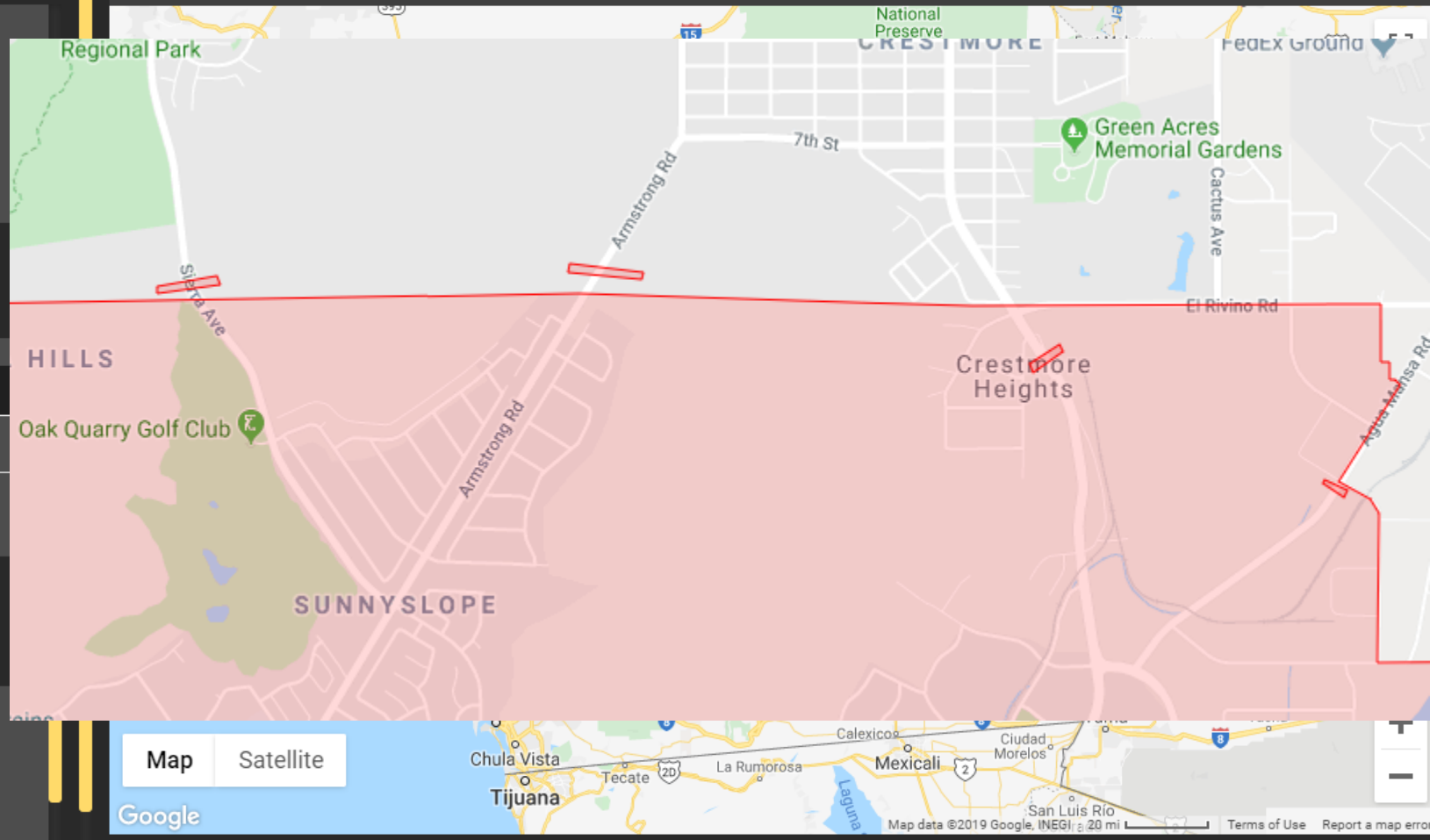
Search

| Zone Name | Pass-through | Direction | Bi-directional |
|---|---|---|---|
| Riverside County w Externals - Polygon Set with 42 Zones. | | | |

## Options

STANDARD | TRIP ATTRIBUTES | TRAVELER ATTRIBUTES

**Data Period(s)**
Sep'18, Oct'18, Mar'19, Apr'19
**Specific Date(s)**
All Days
**Day Types**
All Days : M-Su
Weekday : M-Th



# Measuring External and Internal Trips – All Trips

Basic Project Metrics

Personal Travel

Weekday (M-Th)

Peak AM (6am-10am)

Zone Type: Origin

Origin Zone: I-15 North

Excluding Origin = Destination

O-D Traffic

View as %

O-D Traffic

11.43k - <15.24k

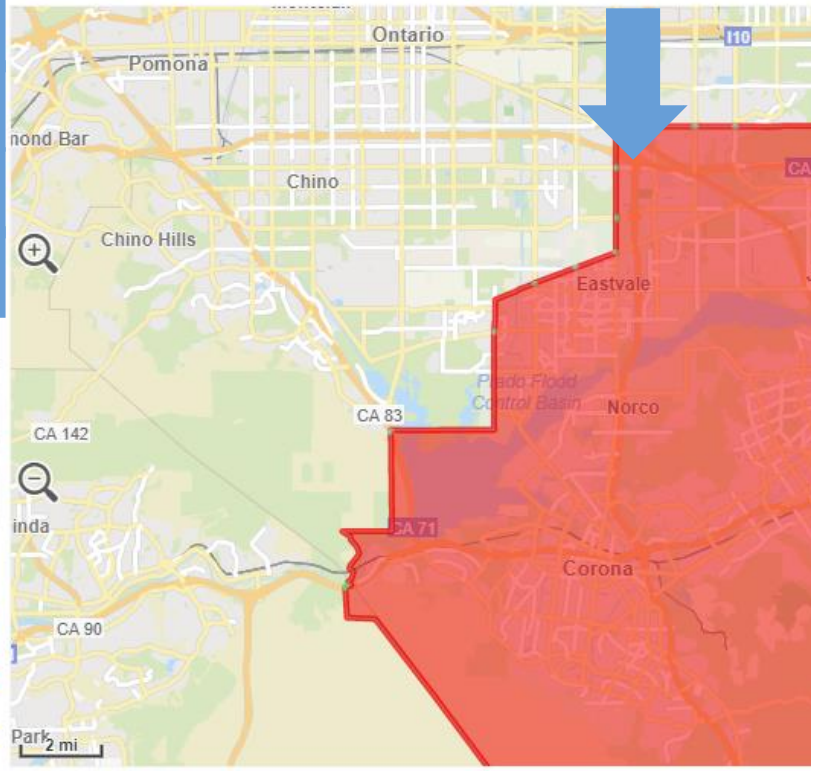
7.62k - <11.43k

3.81k - <7.62k

0 - <3.81k

**Heatmap of O-D Traffic**

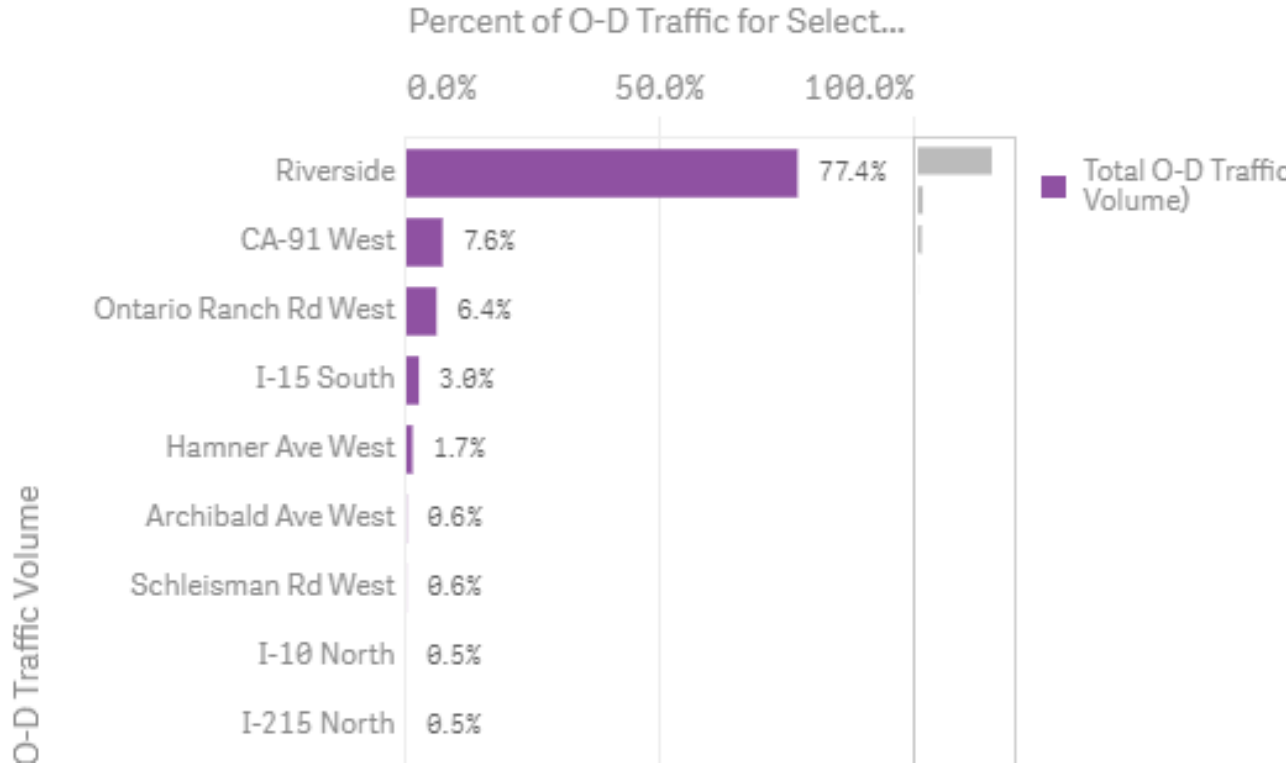
Colors indicate the O-D Traffic to each destination Zone during the selected time p




Origin Zone

To get more information on how to interpret your analys
us/articles/360029642992

**O-D Traffic %**



# Measuring External and Internal Trips – Commercial Trips

Basic Project Metrics

Commercial Travel

Weekday (M-Th)

Peak AM (6am-10am)

Zone Type: Origin

Origin Zone: I-15 North

Excluding Origin = Destination

O-D Traffic

View as %

O-D Traffic

32.73k - <43.64k

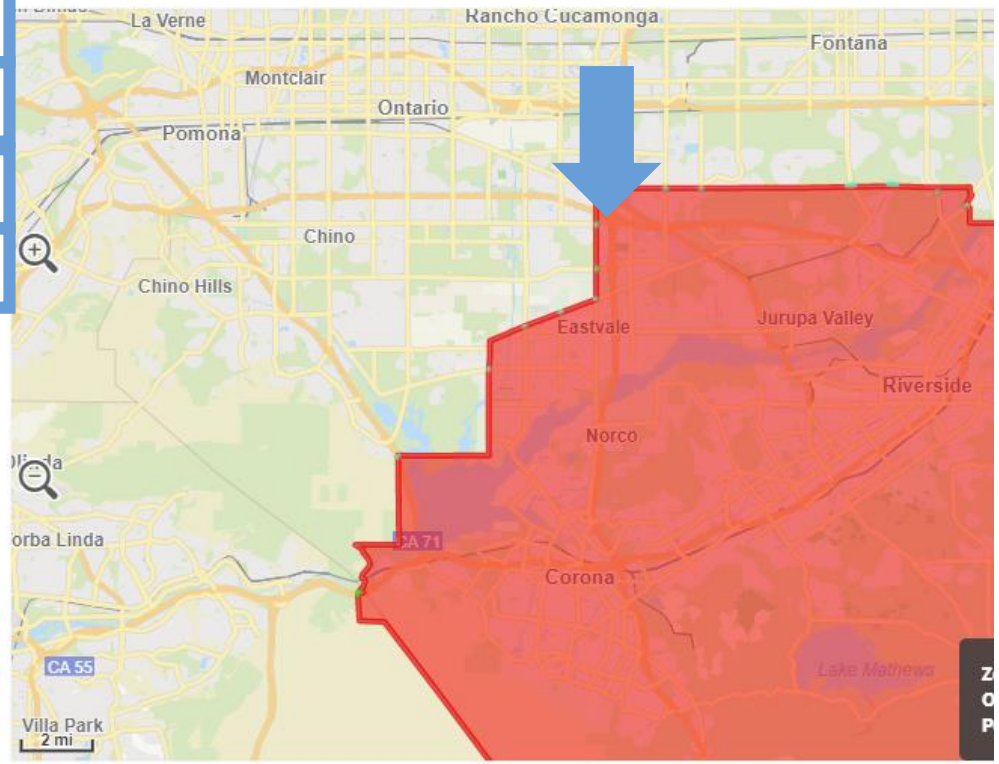
21.82k - <32.73k

10.91k - <21.82k

1 - <10.91k

**Heatmap of O-D Traffic**

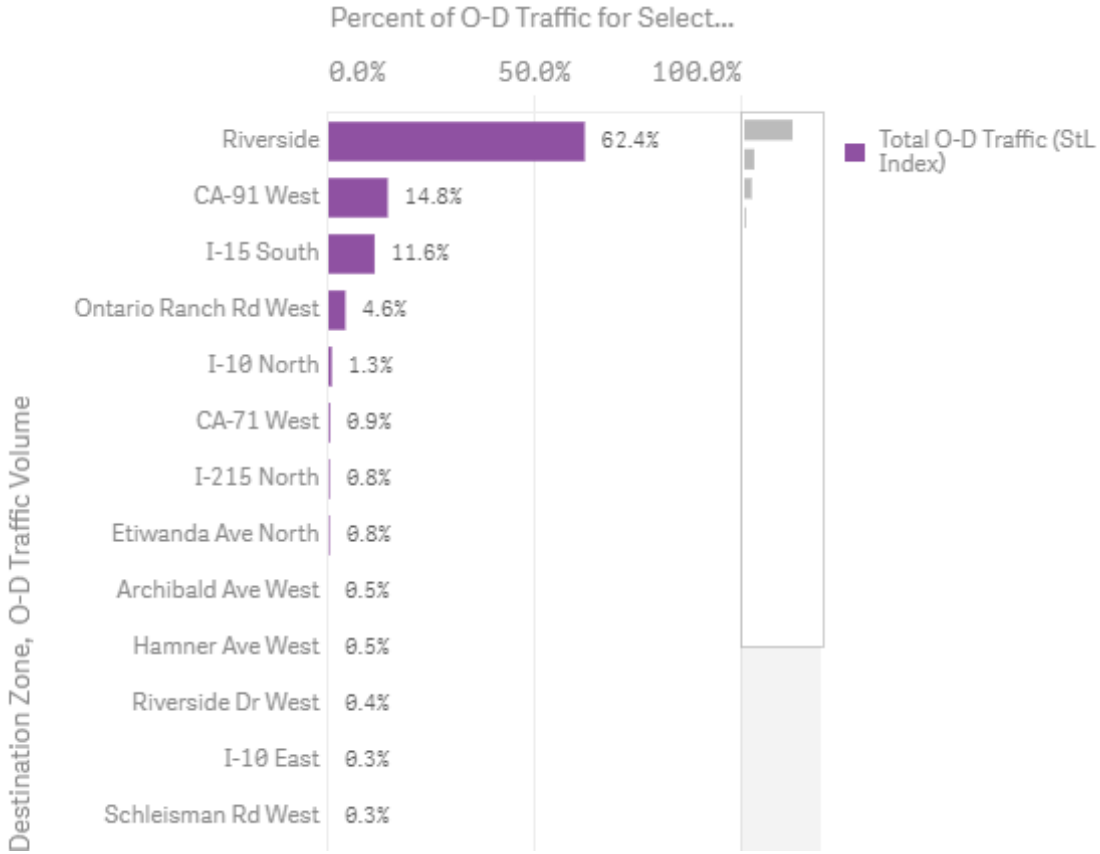
Colors indicate the O-D Traffic to each destination Zone during the selected time period.



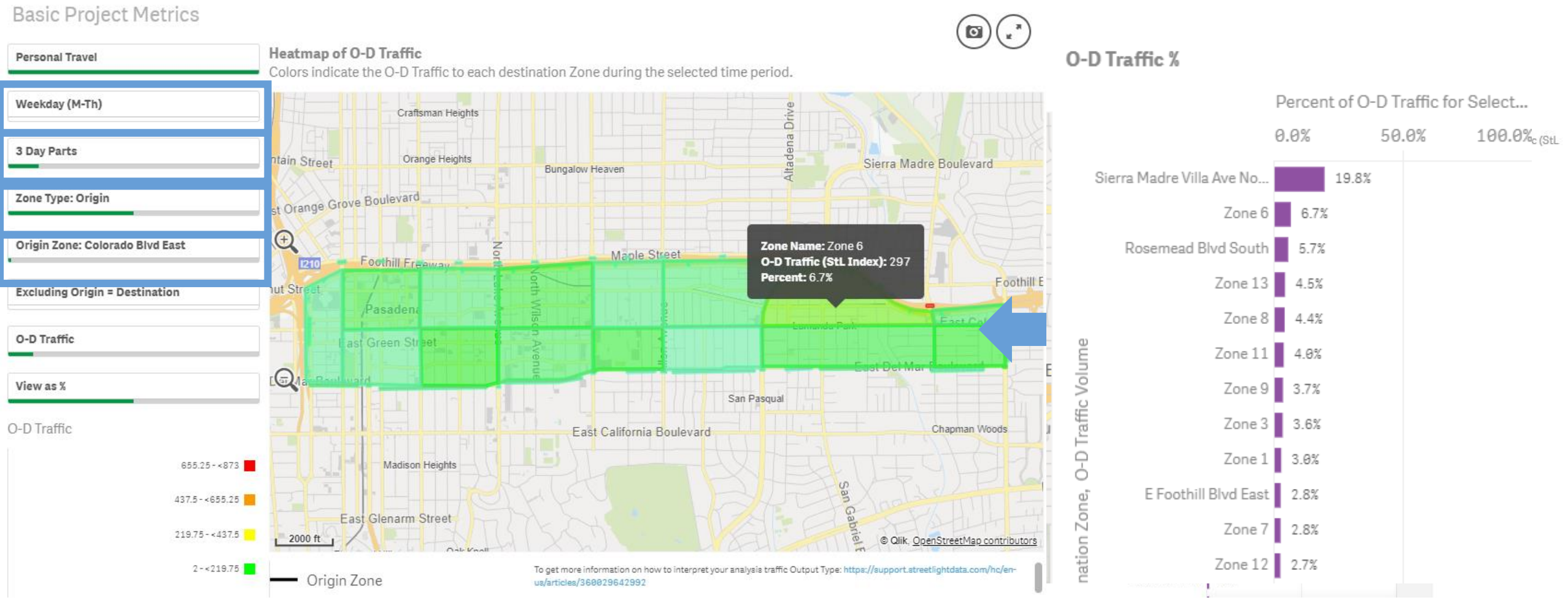

Origin Zone

To get more information on how to interpret your analysis traffic Output Type: https://us/articles/360029642992

**O-D Traffic %**



# More Detailed Sub Area Modeling and Corridor Simulations



# Origin Destination Scanning

Basic Project Metrics

Personal

Weekday (M-Th)

Peak PM (3pm-7pm)

Origin

Origin Zone: Long Beach Fwy NB On-Ramp

O-D Traffic

View as StreetLight Index

O-D Traffic

76.75 - <99

54.5 - <76.75

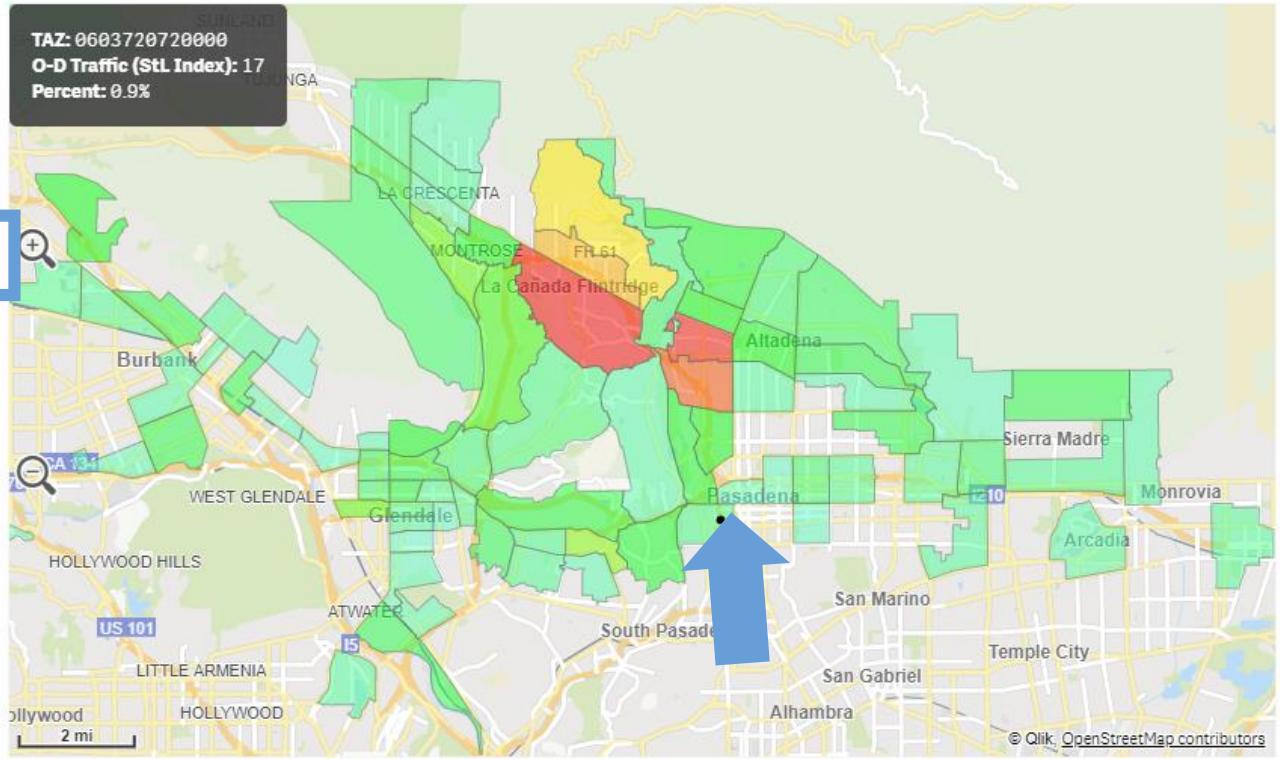
32.25 - <54.5

10 - <32.25

Zone

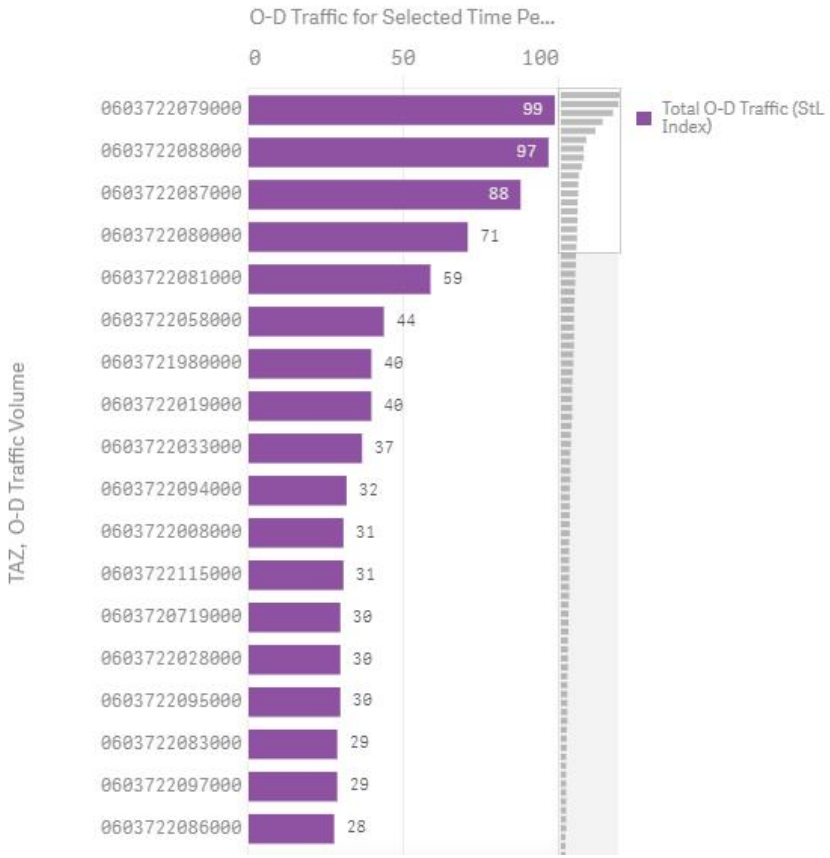
**O-D Traffic Volume**

Colors indicate the O-D Traffic to each TAZ during the selected time period.




To get more information on how to interpret your analysis traffic Output Type: https://support.streetlightdata.com/hc/en-us/articles/360029642992

**O-D Traffic Volume**



# Pedestrian – Sample Trip Tables

Basic Project Metrics - ZA

Personal - Pedestrian Travel

Weekday (M-Th)

Peak AM (6am-10am)

Intersection: Trips that End Only

15 Zones

Zone Traffic

View as StreetLight Index

Zone Traffic

4.25k - <5.57k

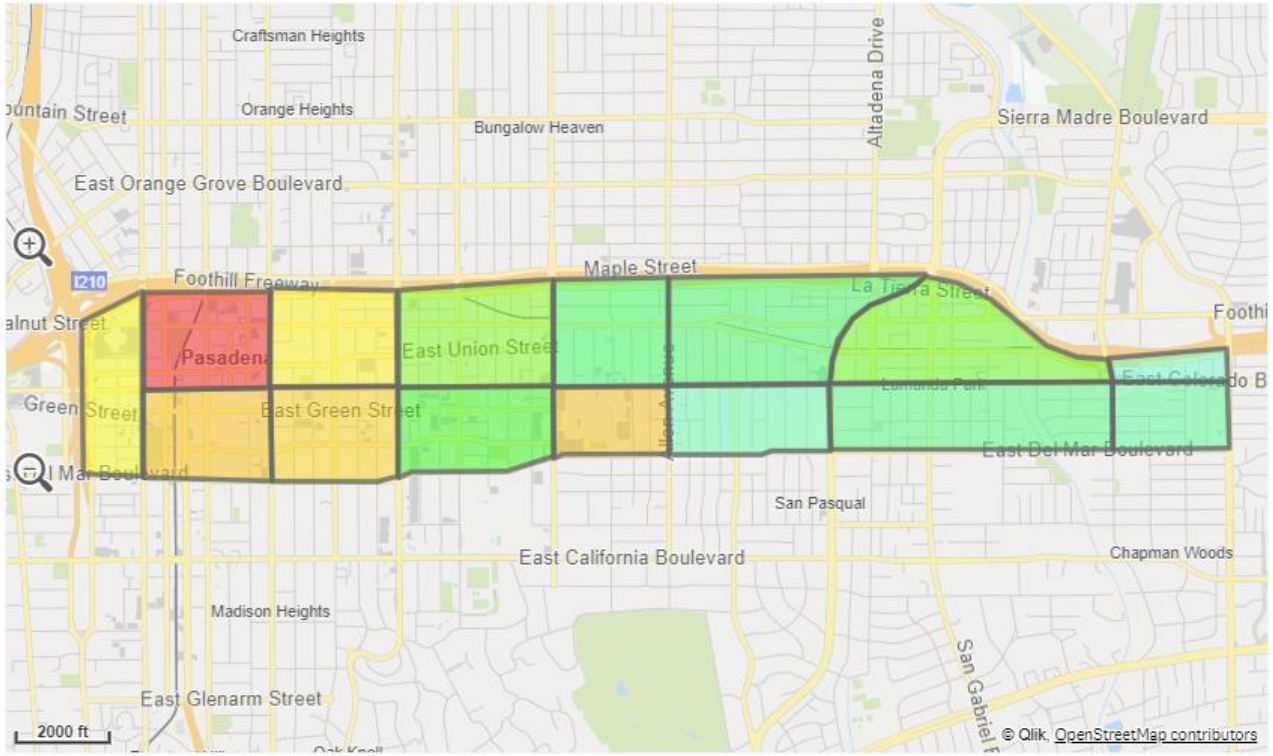
2.93k - <4.25k

1.61k - <2.93k

284 - <1.61k

**Heatmap of Zone Traffic**

Colors indicate the Zone Traffic to each Zone during the selected time period.

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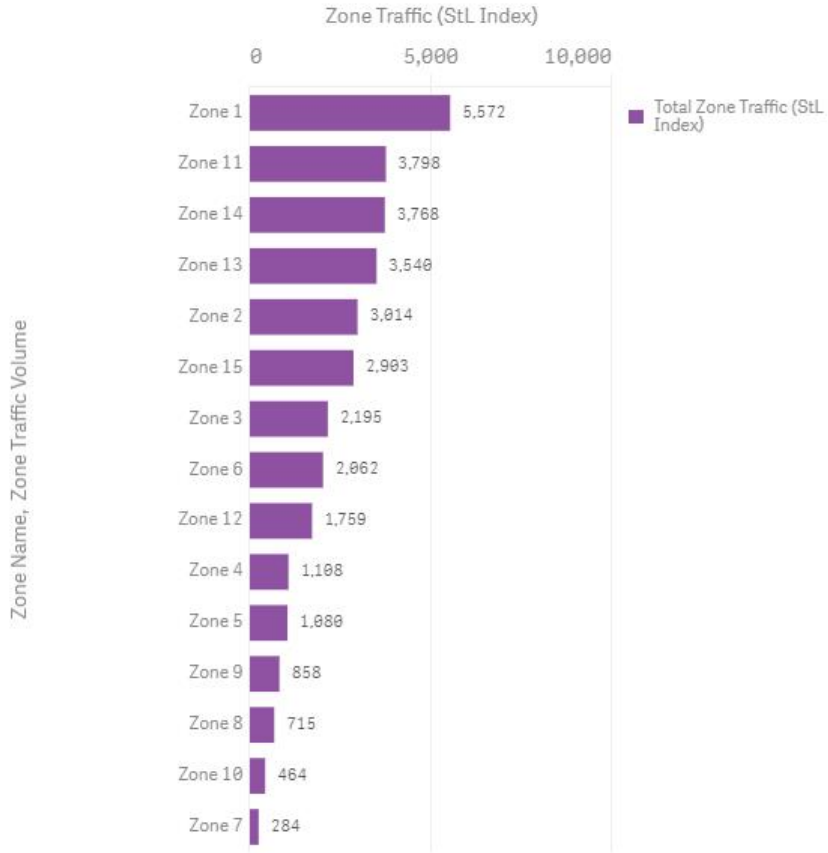
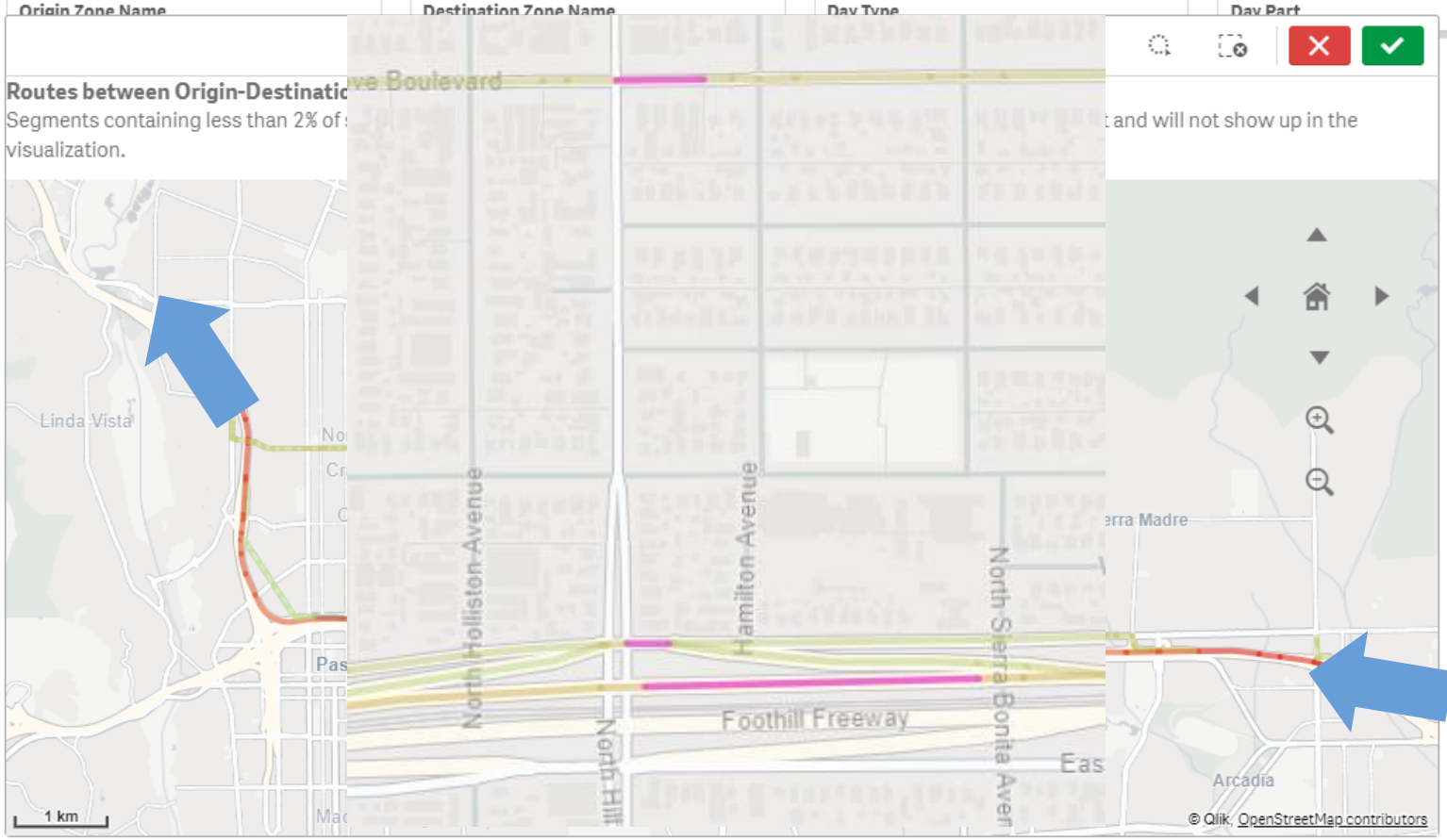
**Zone Traffic Volume**

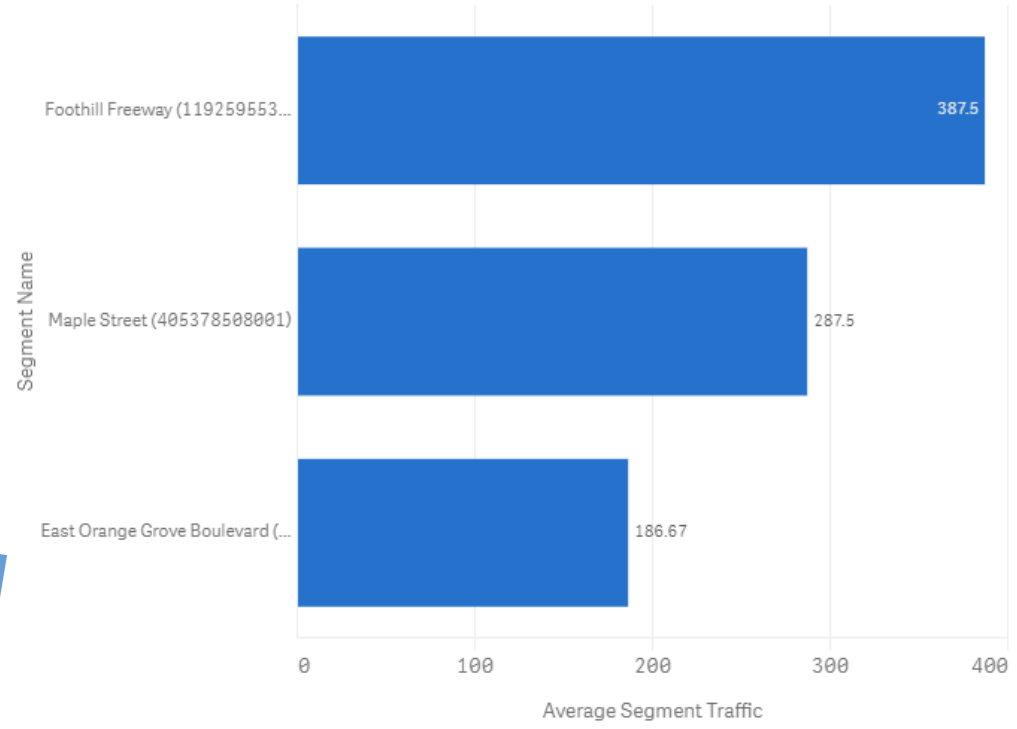


# Route Choice and Select Link Analysis

STREETLIGHT InSight Top Routes

Origin Zone Name | Destination Zone Name | Day Type | Day Part | Segment Type | Device Type

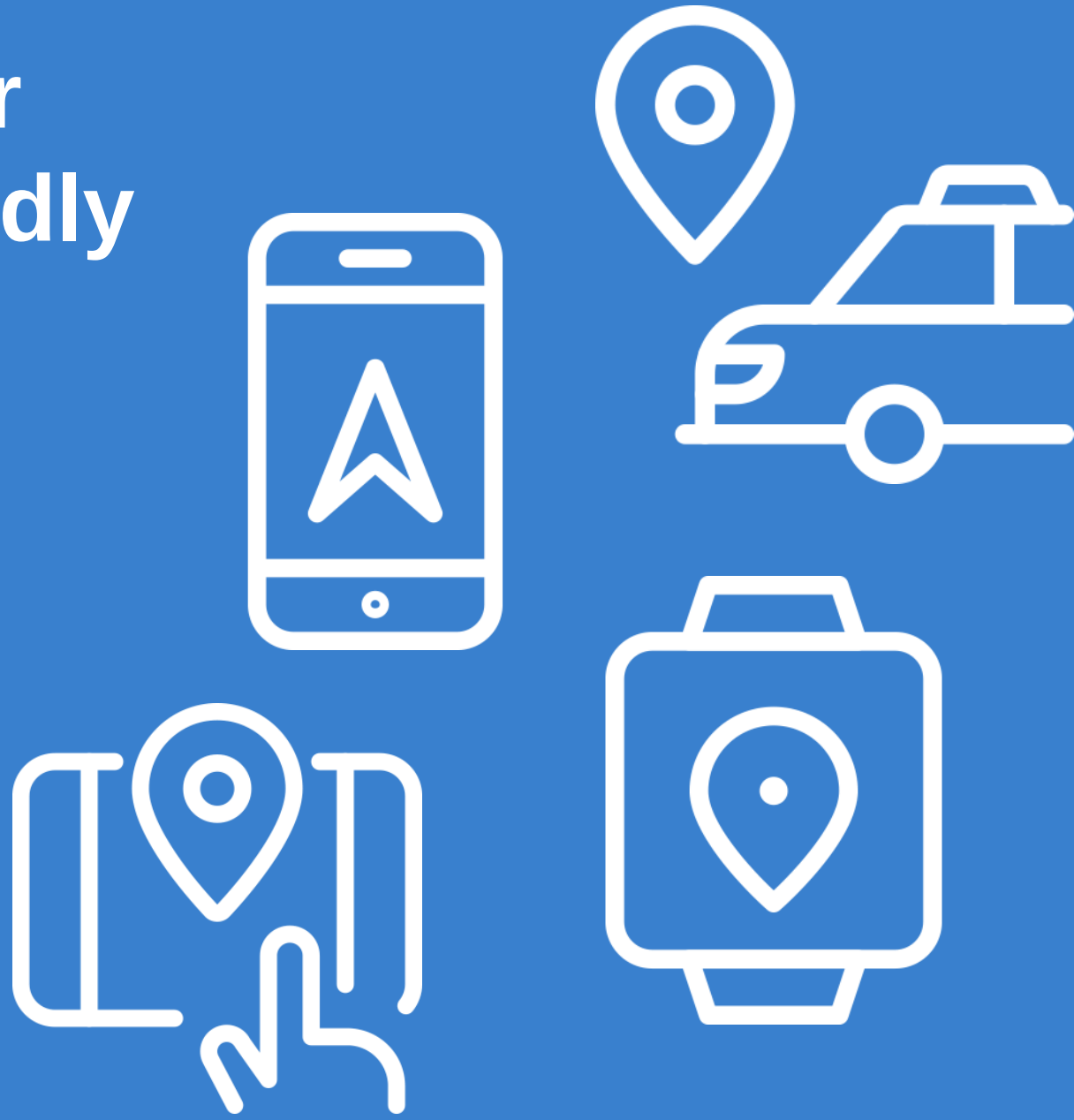


# Transportation Behavior Today is Changing Rapidly

To keep up with fast-changing travel behavior, we need data that:

1. Describes current behavior
2. Measures change over time
3. Is diagnostic & predictive



# STREETLIGHT DATA

Big Data for Mobility

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