TRANSIT REDESIGNS AND COVID-19 RECOVERY PLANS USING LOCUS

presented by

Cambridge Systematics, Inc.

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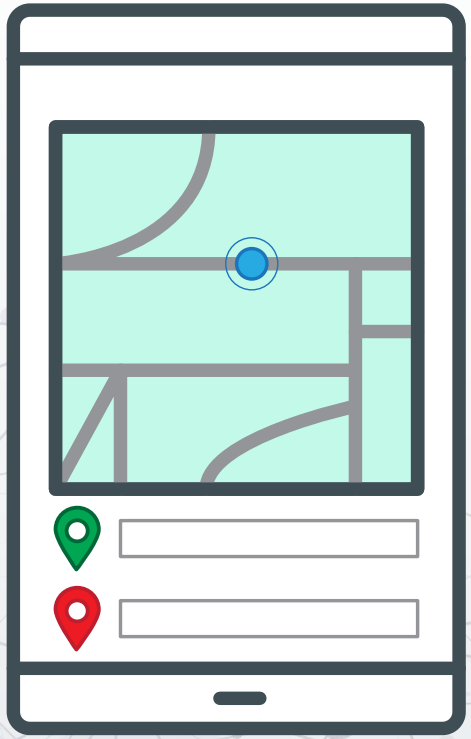
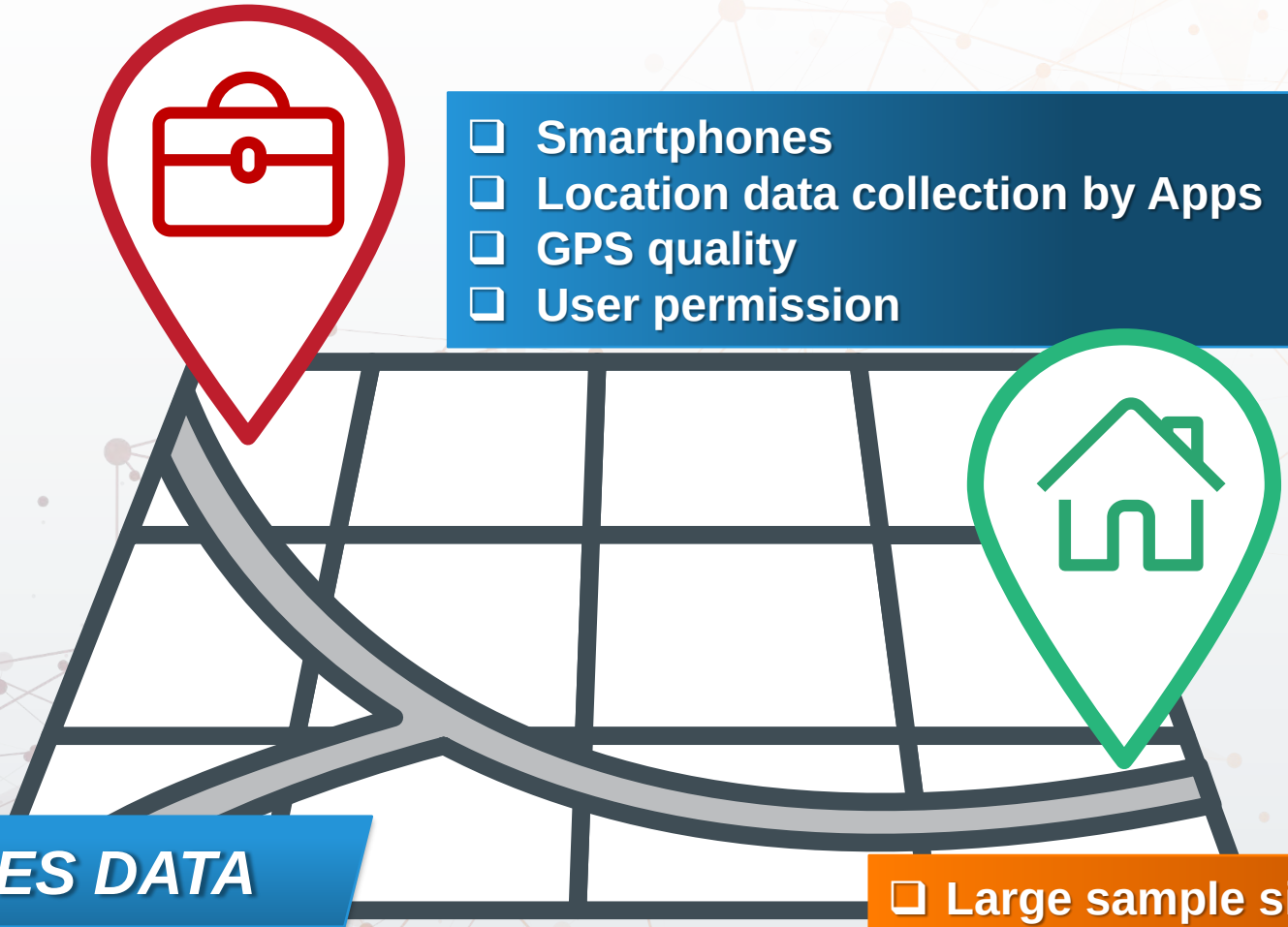
June 2020

What are LBS Data?





- Smartphones
- Location data collection by Apps
- GPS quality
- User permission

LOCATION-BASED SERVICES DATA

DATA CHARACTERISTICS

- Large sample size
- Messy datasets
- Spatial precision
- Persistent ID
- Anonymized

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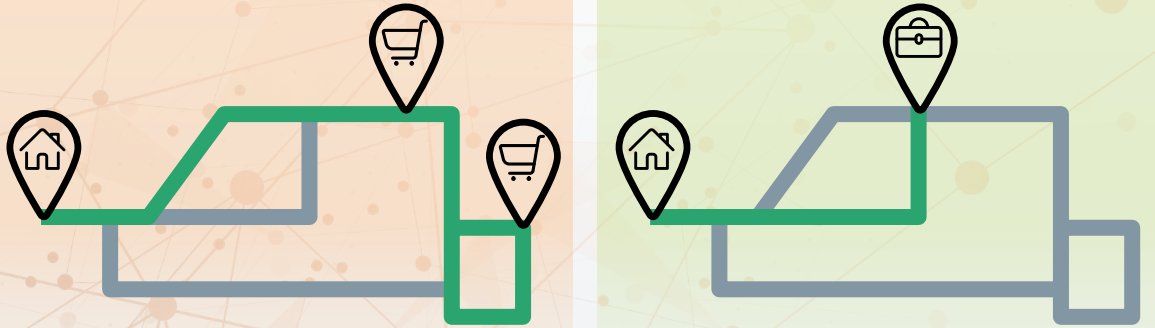
Four Core Algorithms

IDENTIFY TRIP ENDS

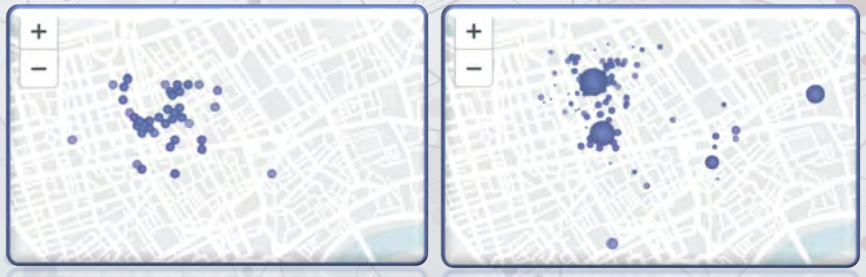
Process Activity Stays

EXPAND THE DATA



IDENTIFY HOME & WORK LOCATIONS

Determine home and work locations



SCALE TRAVEL PATTERNS

Normalize the Trips

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Benchmark/Calibrate Mobility Metrics

Sample Size

Market Penetration
Valid Devices
Valid Days
Tract-level Stats

Activity Patterns

Duration
Start & End times
Activity Type

Trip Statistics

Trip Rates
ToD Distribution
Trip Length
Travel Purpose

Travel Flows

Screen lines
Traffic Counts
VMT
RMSE

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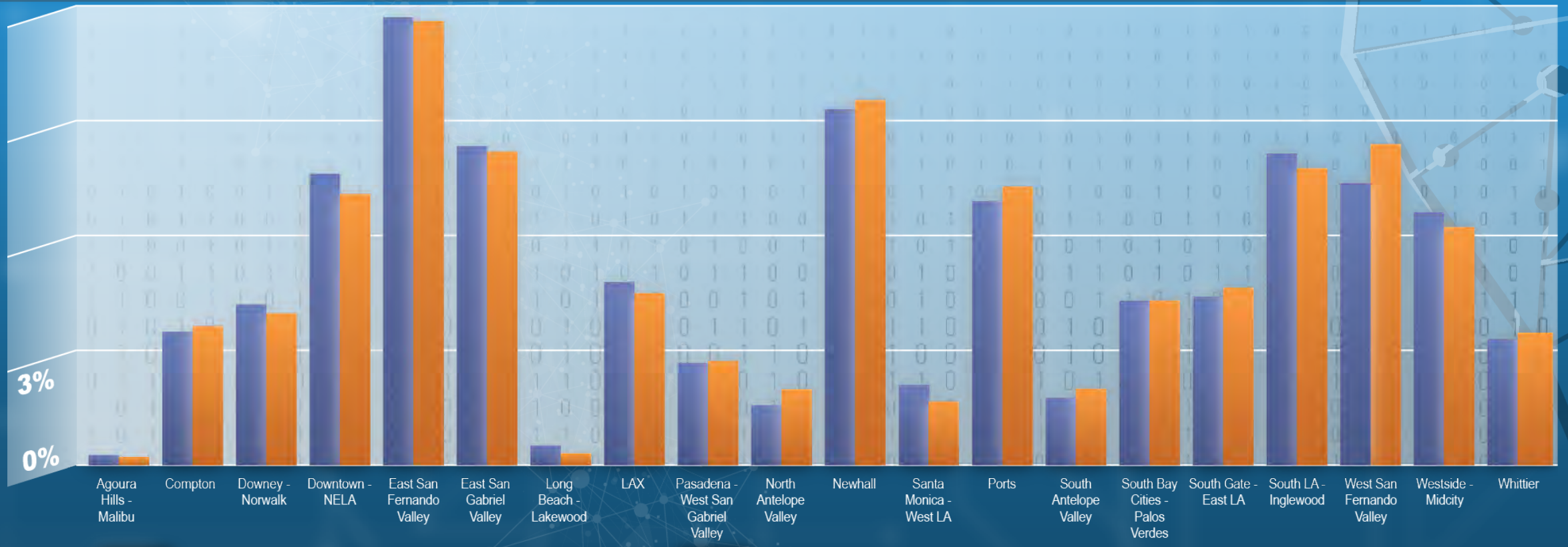
Trip Origins Compared to Regional Model

Trips by Origin District – LBS shares vs. SCAG model (for LA County)



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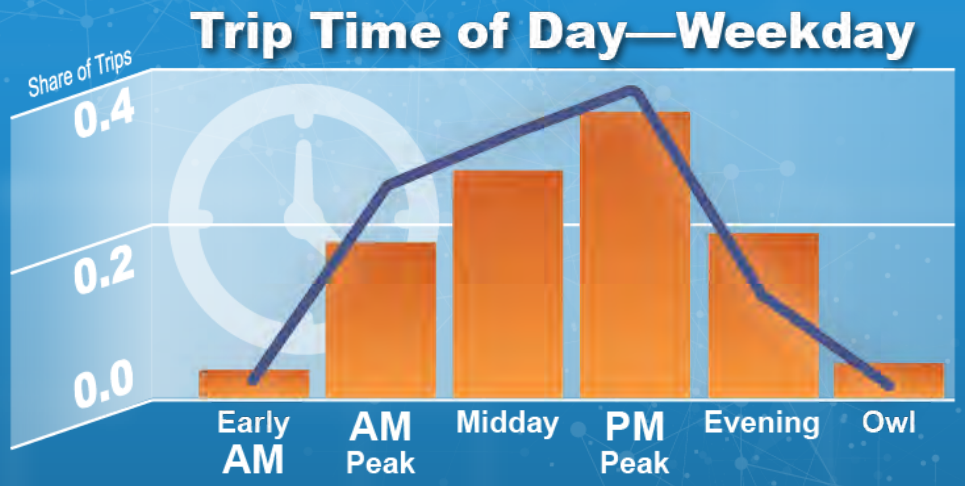
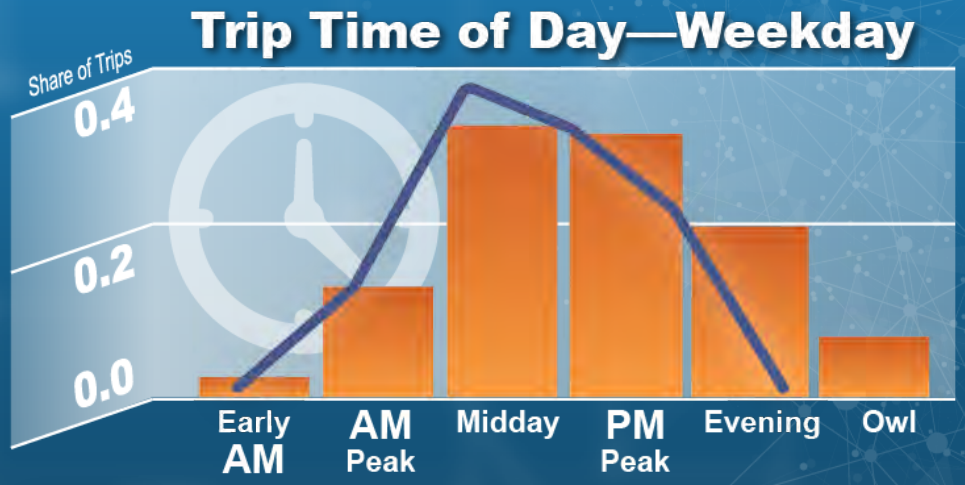
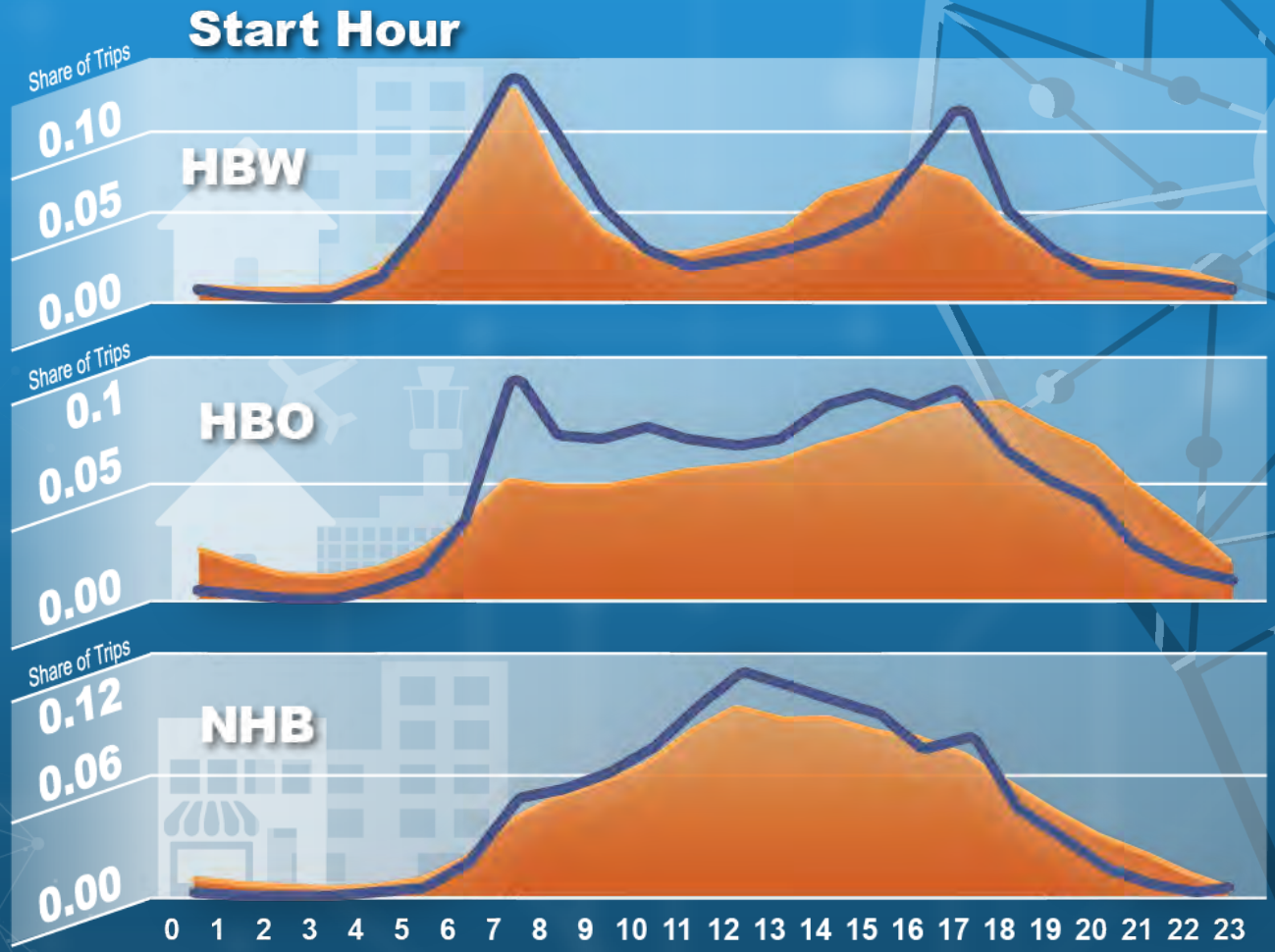
Temporal Segmentation vs. NHTS







LBS Data NHTS Data

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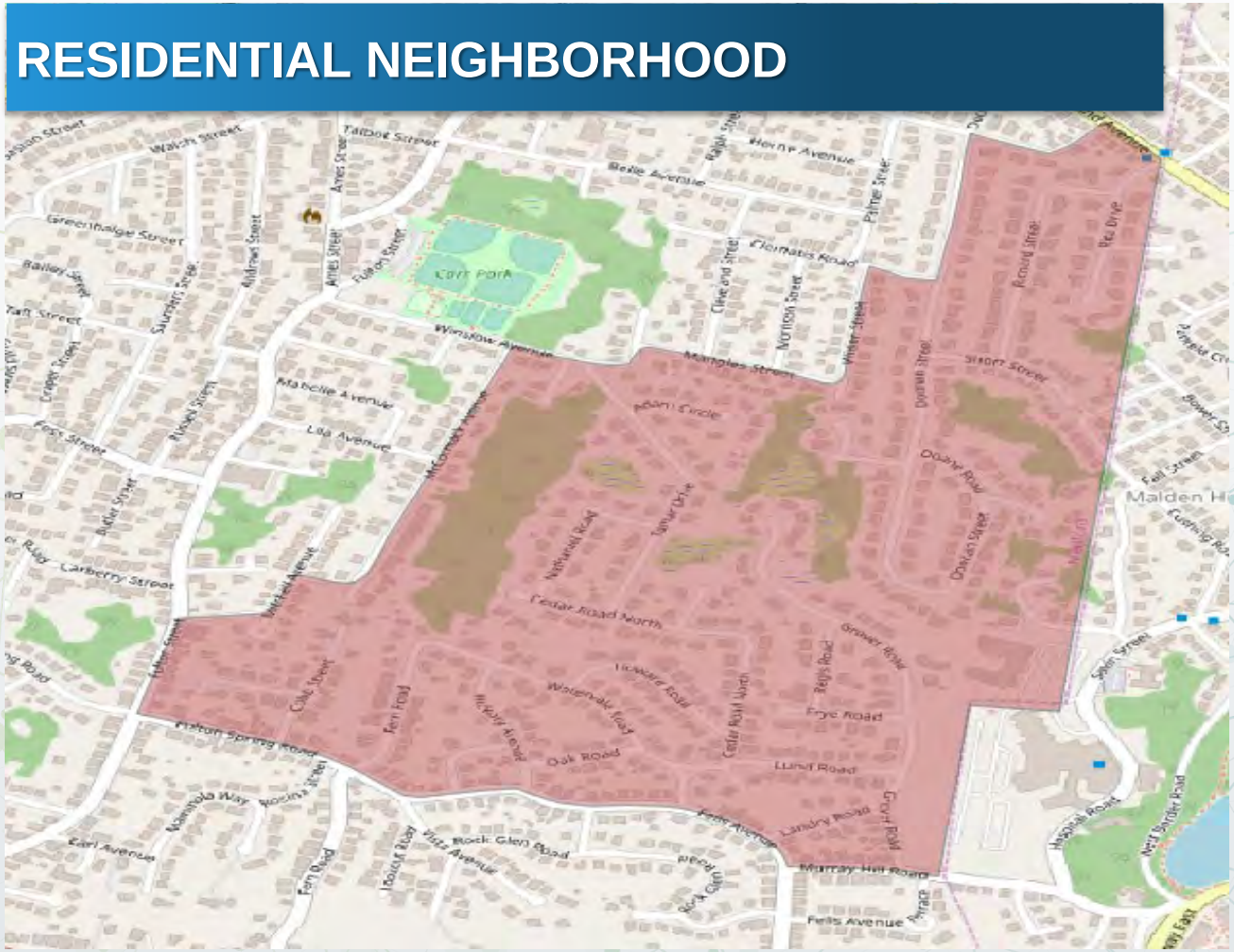
Activity Duration Analysis – Variation by Land Use Features

RESIDENTIAL NEIGHBORHOOD



	Activity Type		
Duration Bin mins	Home	Work/School	Other
[0, 5)	0%	0%	2%
[5, 10)	0%	0%	1%
[10, 15)	1%	0%	1%
[15, 20)	1%	0%	1%
[20, 30)	1%	0%	2%
[30, 40)	1%	0%	1%
[40, 50)	1%	0%	1%
[50, 60)	1%	0%	1%
[60, 90)	3%	0%	2%
[90, 120)	2%	0%	1%
[120, 150)	2%	0%	1%
[150, 180)	2%	0%	1%
[180, 210)	1%	0%	1%
[210, 240)	1%	0%	0%
[240, 300)	2%	0%	1%
[300, 360)	2%	0%	1%
[360, 420)	1%	0%	1%
[420, 480)	2%	0%	1%
8 hours or more	52%	2%	2%
Grand Total	76%	4%	21%

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Activity Duration Analysis – Variation by Land Use Features

CBD – DOWNTOWN BOSTON

Duration Bin mins	Activity Type: Home	Work/School	Other
[0, 5)	0%	0%	2%
[5, 10)	0%	0%	1%
[10, 15)	0%	0%	5%
[15, 20)	0%	0%	3%
[20, 30)	0%	0%	4%
[30, 40)	0%	0%	3%
[40, 50)	0%	0%	2%
[50, 60)	0%	0%	2%
[60, 90)	0%	1%	5%
[90, 120)	0%	1%	3%
[120, 150)	0%	1%	2%
[150, 180)	0%	1%	2%
[180, 210)	0%	1%	1%
[210, 240)	0%	2%	1%
[240, 300)	0%	3%	2%
[300, 360)	0%	3%	1%
[360, 420)	0%	4%	1%
[420, 480)	0%	9%	1%
8 hours or more	3%	23%	3%
Grand Total	4%	51%	44%

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LA Metro NextGen Bus Plan

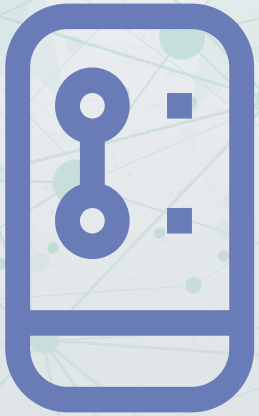
Transit Competitiveness Analysis

STEP 1

Use farecard data to explain **TRANSIT** travel market

STEP 2

Use cell phone data to explain **TOTAL** travel market



STEP 3

Compare **TRANSIT** travel to **TOTAL** travel in each market

STEP 4

Use trip planners to **compare transit and driving** travel times

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Transit Riders Frequency of Travel

USING 4 MONTHS OF FARECARD DATA

	USAGE FREQUENCY	# OF FARECARDS		COUNT OF BOARDINGS	
Frequent	>150 Transactions	152,532	5%	43,680,893	52%
	50 – 150 Transactions	248,851	9%	22,027,882	26%
Occasional	10 – 50 Transactions	552,374	20%	12,585,194	15%
Infrequent	<10 Transactions	1,905,501	66%	5,614,072	7%
	TOTAL	**2,859,258**	**100%**	**83,908,041**	**100%**

Source: TAP data - Metro and Municipal Operators (July through October, 2017)

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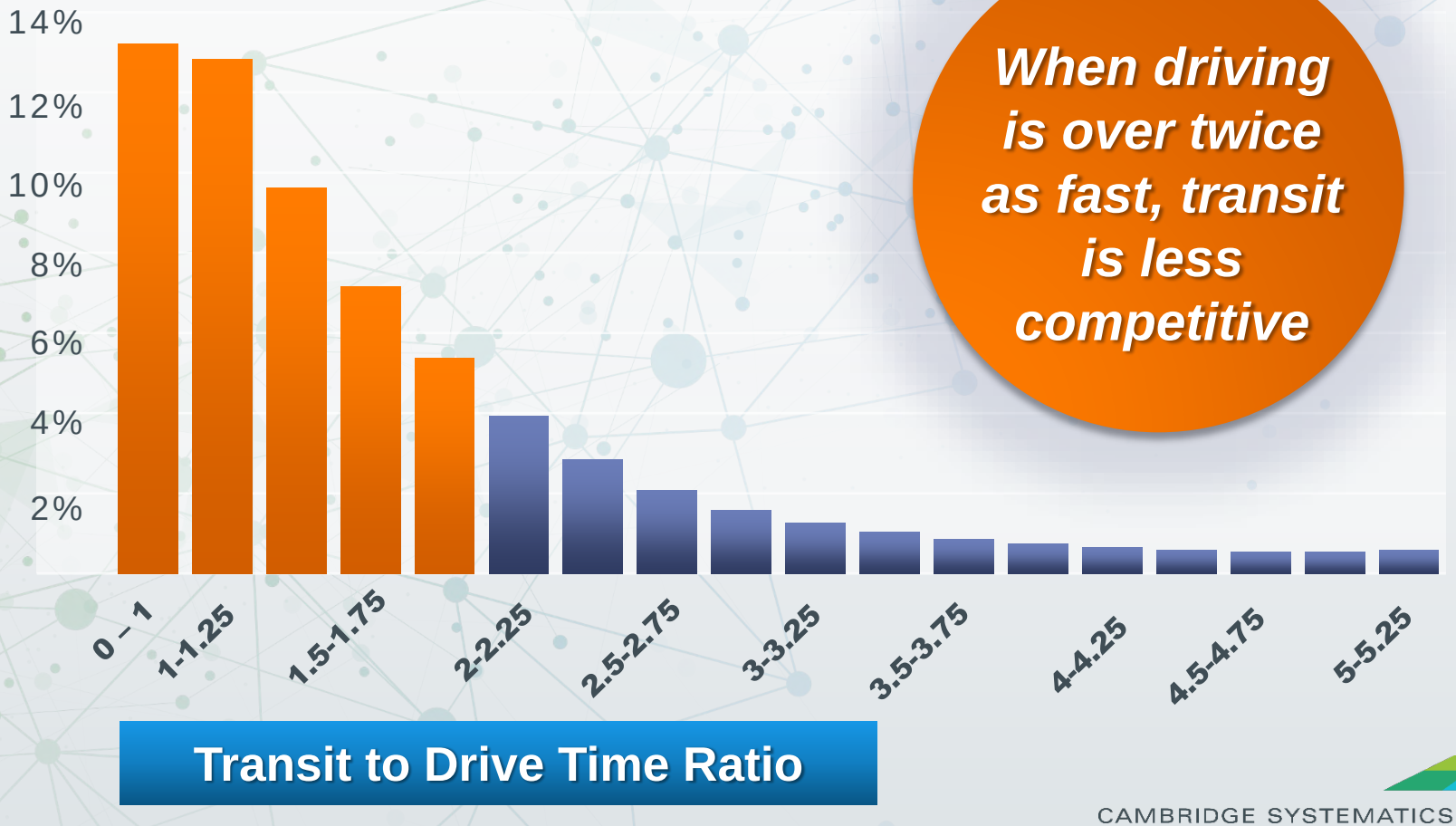
Competitiveness of Relative Travel Times

Transit Market Share



When driving is over twice as fast, transit is less competitive

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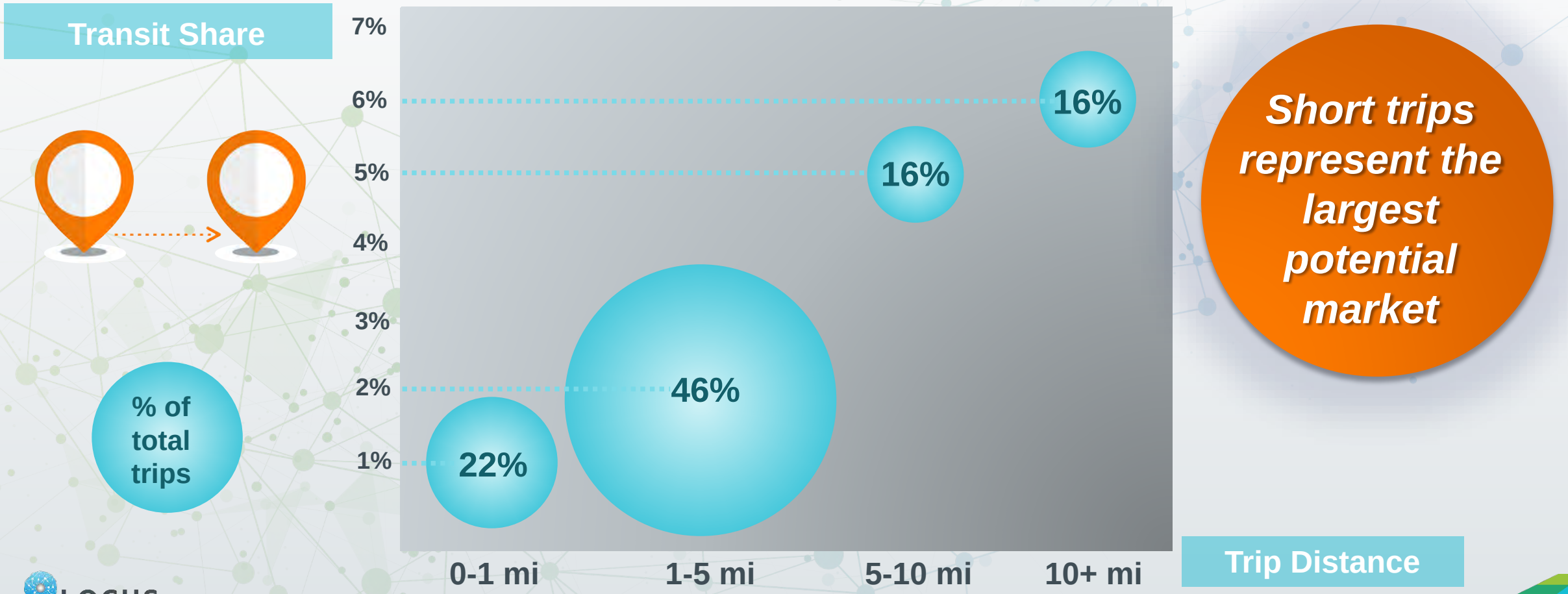
Long-Distance Commute Trips and Transit

TRANSIT SHARE BY DISTANCE & PERCENT OF TOTAL TRIPS



Short trips represent the largest potential market

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Redesign in Action

Sylmar/San Fernando Key Facts

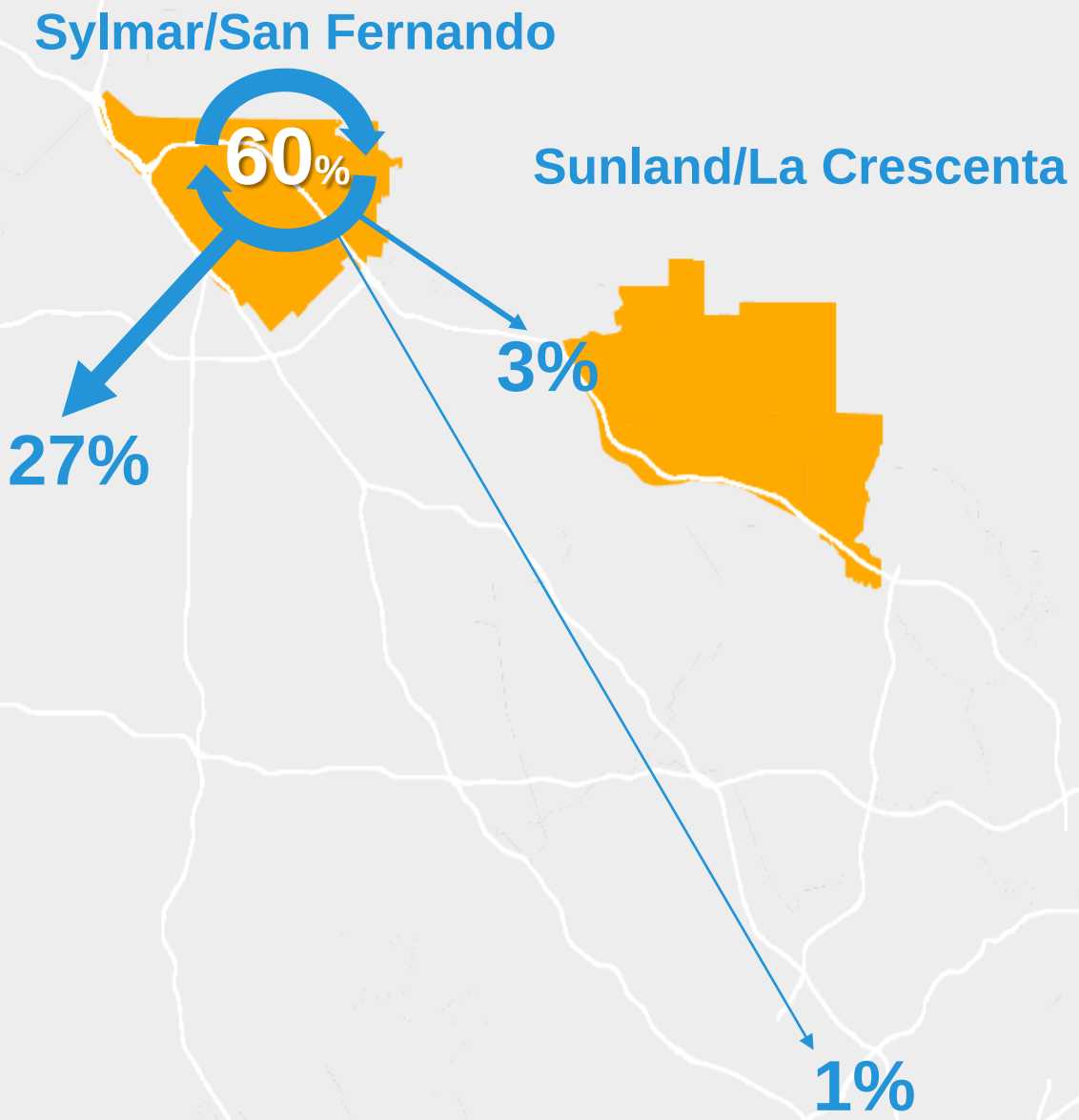
Trips: 380,000 trips

Market Share: 1.4% market share

Mileage: 76% of trips under 2.5 miles

Travel time competitiveness: 3.25-3.50

60% of trips occur within the area
27% of trips are to the Valley
1% of trips are to Downtown LA
3% of trips are to Sunland/La Crescenta



Percentages do not equal 100%. Additional trips dispersed throughout the County.

Redesign in Action

Sunland/La Crescenta Key Facts

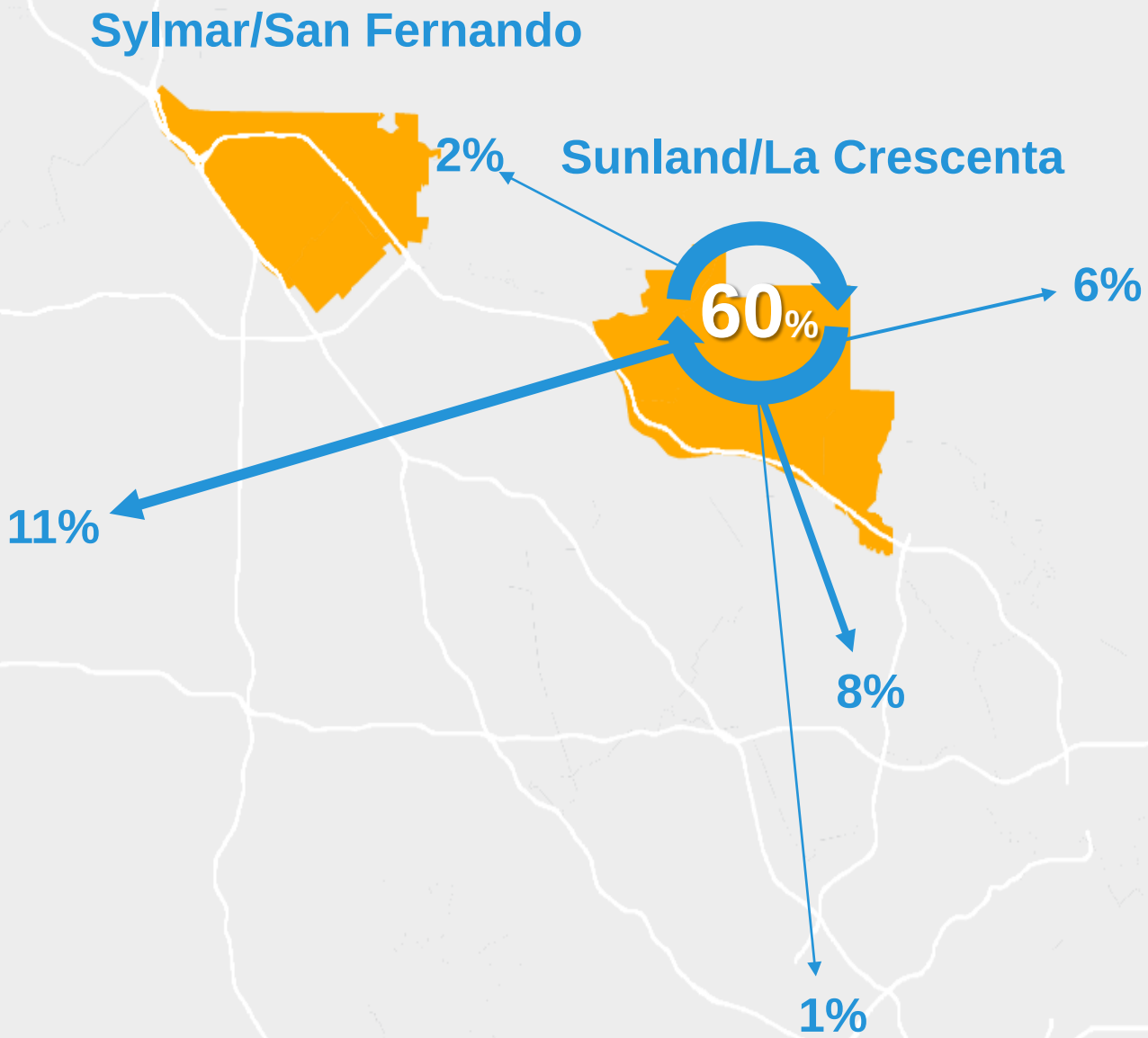
Trips: 325,000 trips

Market Share: 0.7% market share

Mileage: 44% of trips under 2.5 miles

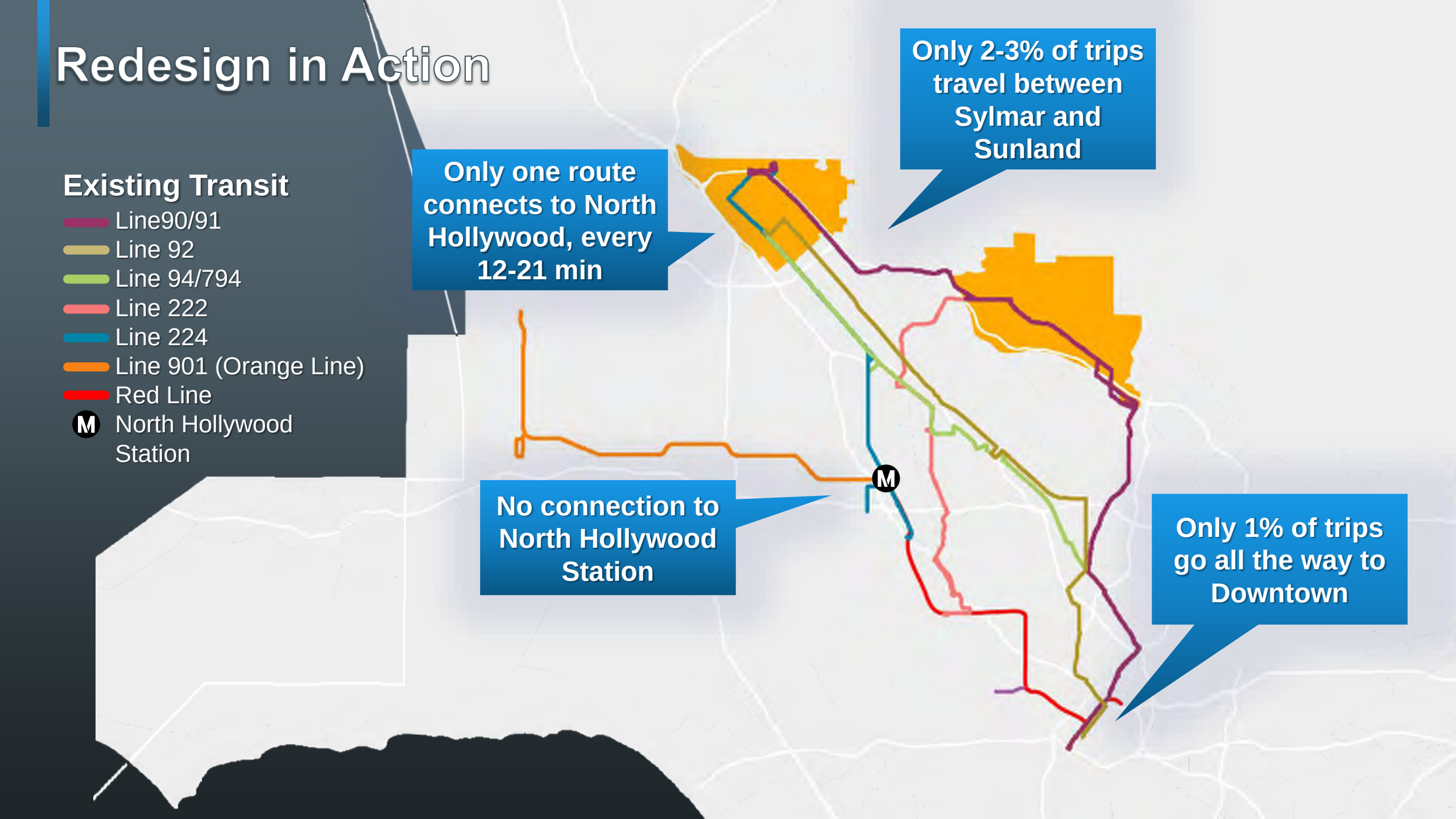
Travel time competitiveness: 3.00-3.25

60% of trips occur within the area
2% of trips are to Sylmar/San Fernando
11% of trips are to the Valley
1% of trips are to Downtown LA
8% of trips are to Glendale
6% of trips are to Pasadena

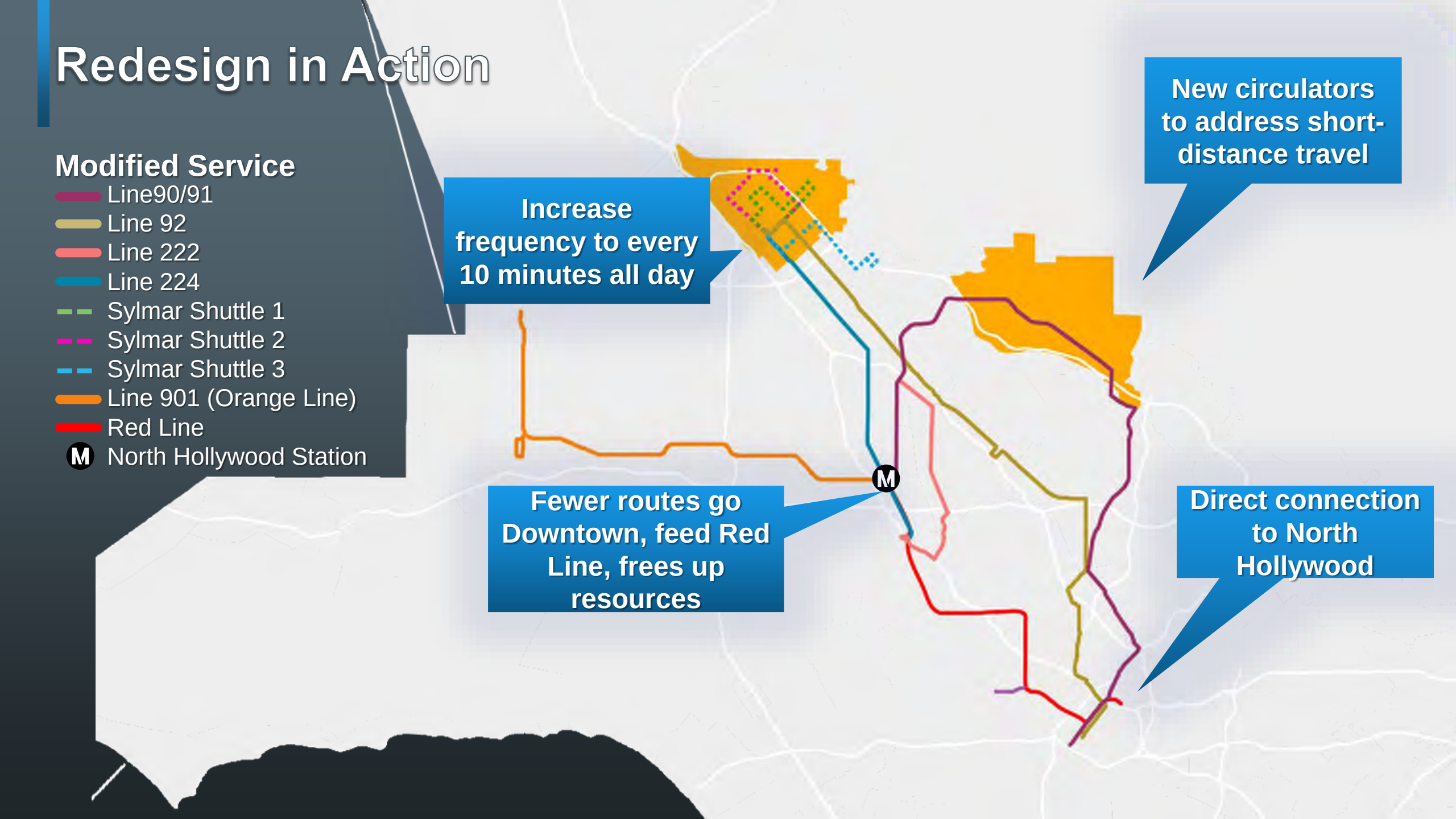


Percentages do not equal 100%. Additional trips dispersed throughout the County.

Redesign in Action



Redesign in Action



COVID-19 Recovery Planning for Transit

To Help with COVID-19 Recovery for Transit

1. What is the impact of work-from-home?
2. Have travel patterns stabilized?
3. Are automobile sales going up?
4. Are equity-focused communities impacted disproportionately?
5. What role does social distancing play?

Our Data Approach

To help agencies assess the changes in travel behavior as a result of COVID-19, we have developed a suite of near real-time LOCUS products powered by Location Based Services (LBS) data.

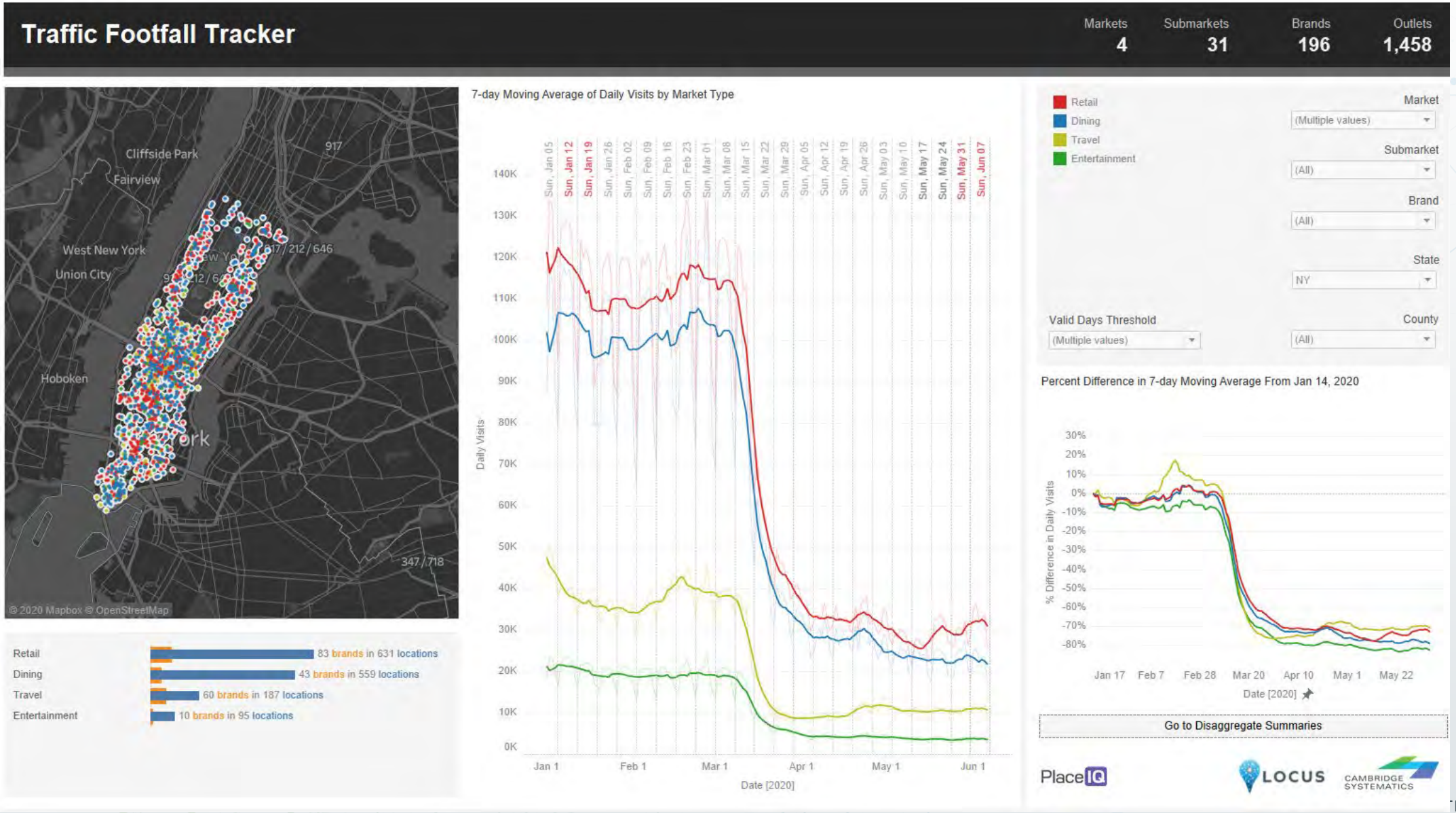
Traffic Footfall Tracker

Measures store visitation trends by location, day of week, brand, and category

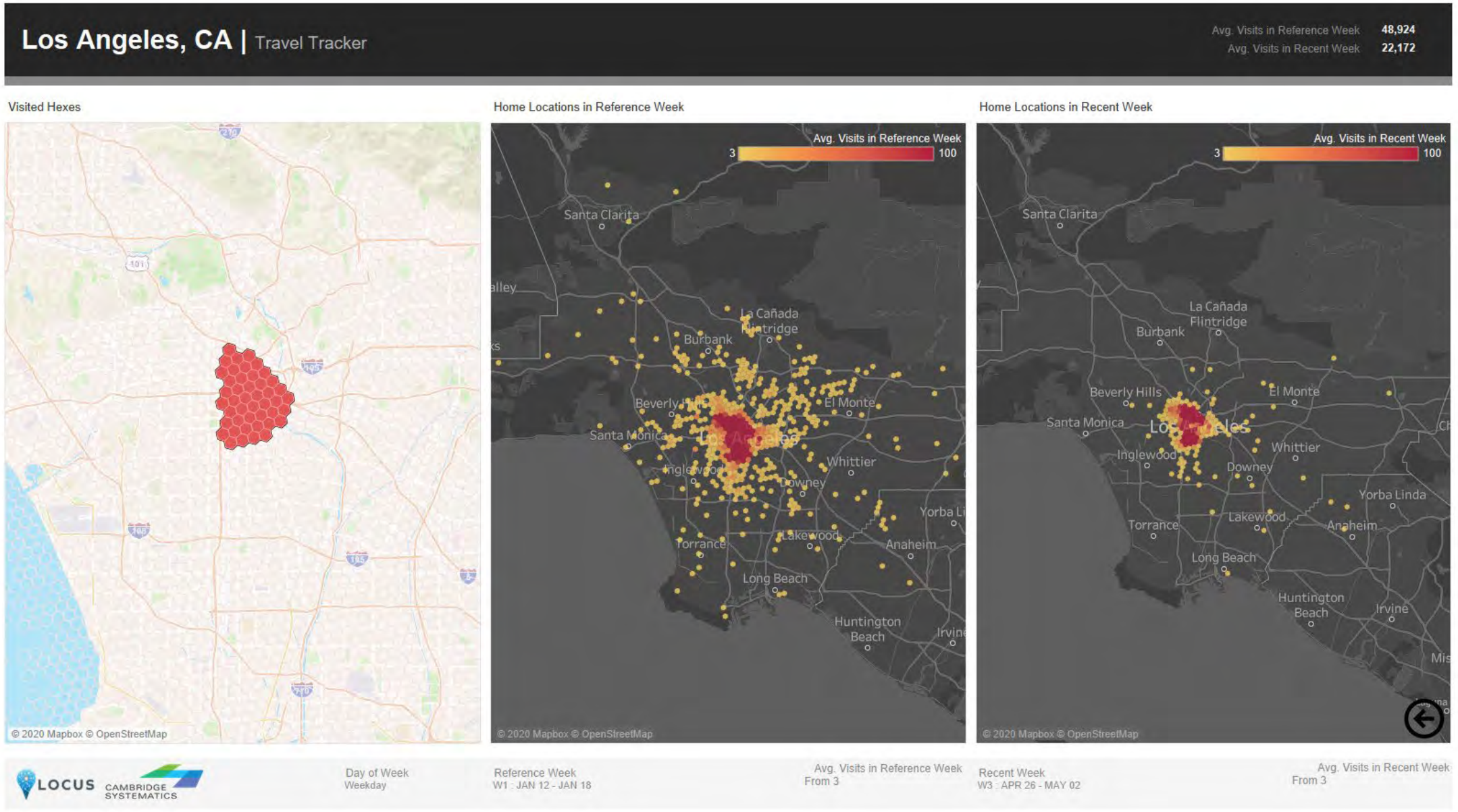
Travel Tracker

Measures resident travel patterns – travel sheds, time-of-day of travel, VMT – to study changes in behavior.

1. Impacts on City Centers/Downtowns – New York



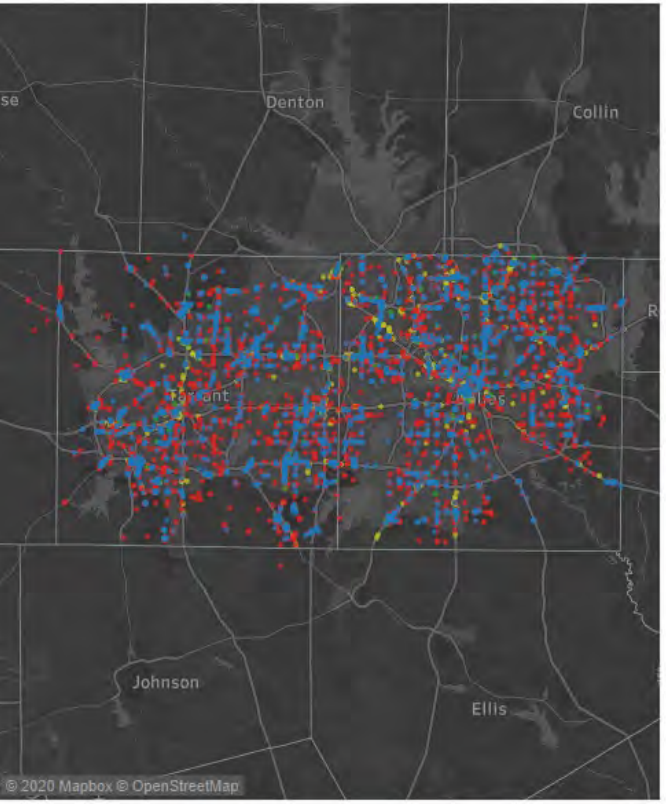
1. Impacts on City Centers/Downtowns – Los Angeles



2. Travel Pattern Stabilization - Dallas and Houston

Traffic Footfall Tracker | TX

Markets	Submarkets	Brands	Outlets
4	38	320	8,375



Retail
Dining
Travel
Entertainment

Market: Multiple values
Submarket: All
Brand: All
State: All
County: Multiple values
Valid Days Threshold: Multiple values

Percent Difference in 7-day Moving Average From Jan 14, 2020

Retail	155 brands in 4,828 locations
Dining	79 brands in 2,731 locations
Travel	71 brands in 660 locations
Entertainment	15 brands in 176 locations

Go to Disaggregate Summaries

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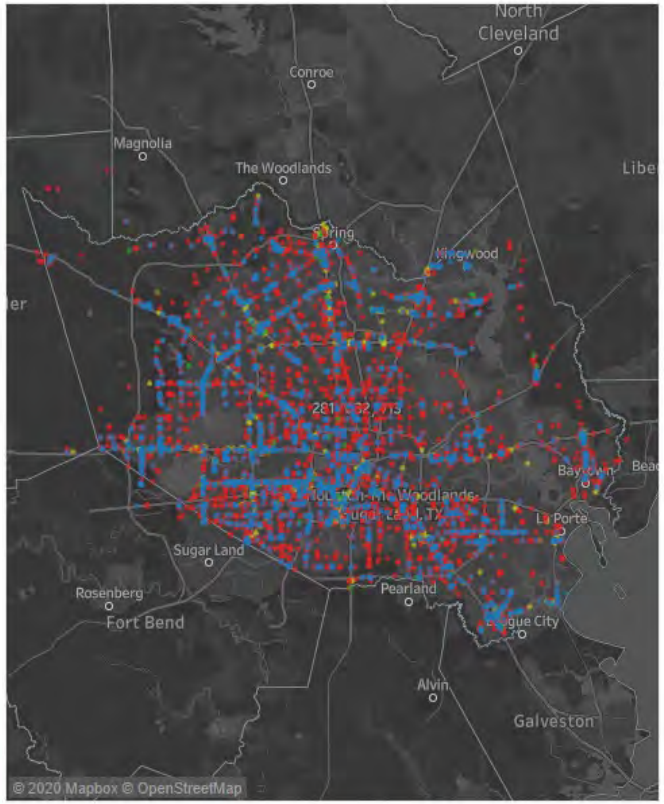
Traffic Footfall Tracker

Markets	Submarkets	Brands	Outlets
4	39	316	8,416



Retail
Dining
Travel
Entertainment

Market: (Multiple values)
Submarket: (All)
Brand: (All)
State: TX
Valid Days Threshold: (Multiple values)
County: TX - Harris County

Percent Difference in 7-day Moving Average From Jan 14, 2020

Retail	146 brands in 5,104 locations
Dining	80 brands in 2,575 locations
Travel	74 brands in 636 locations
Entertainment	16 brands in 132 locations

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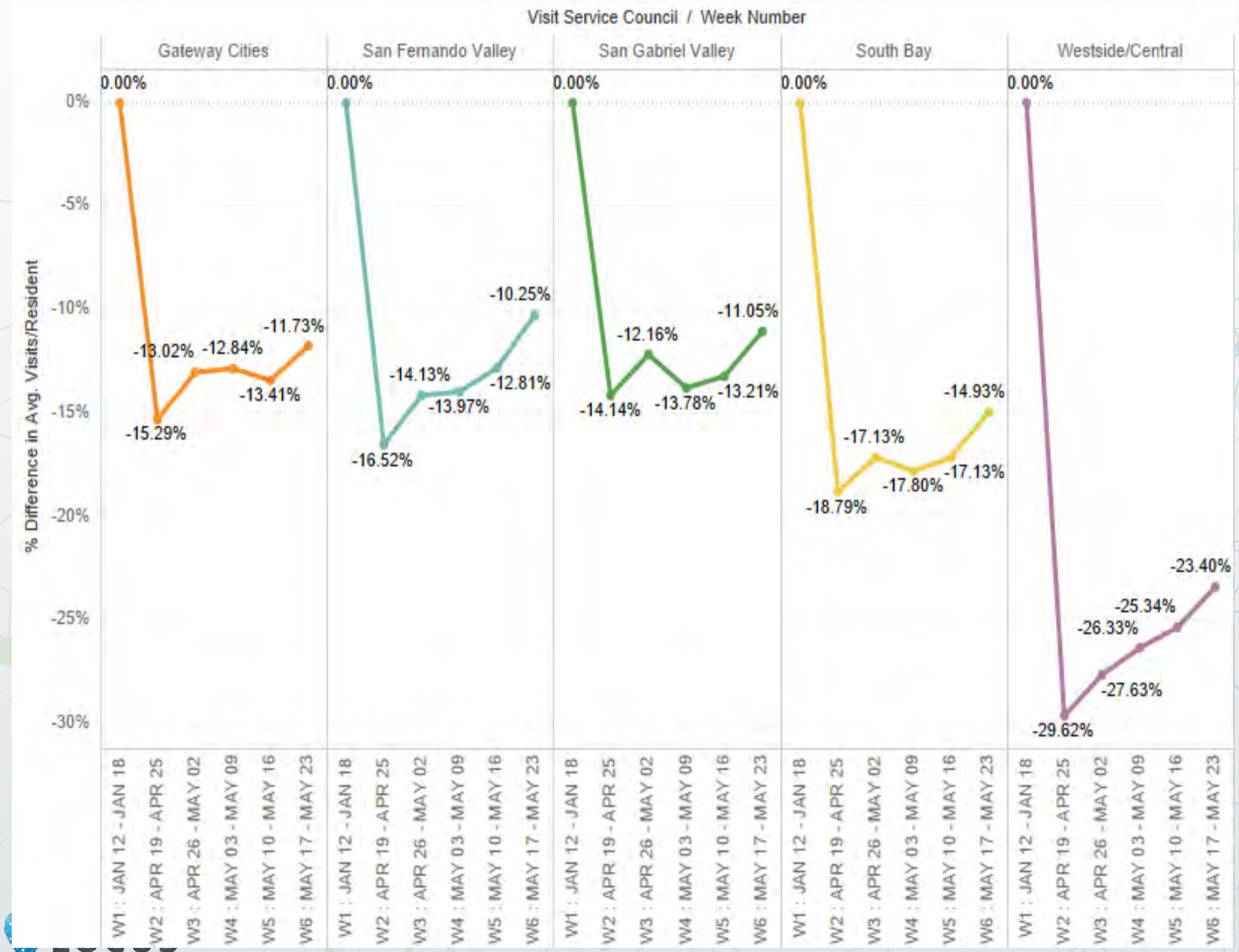
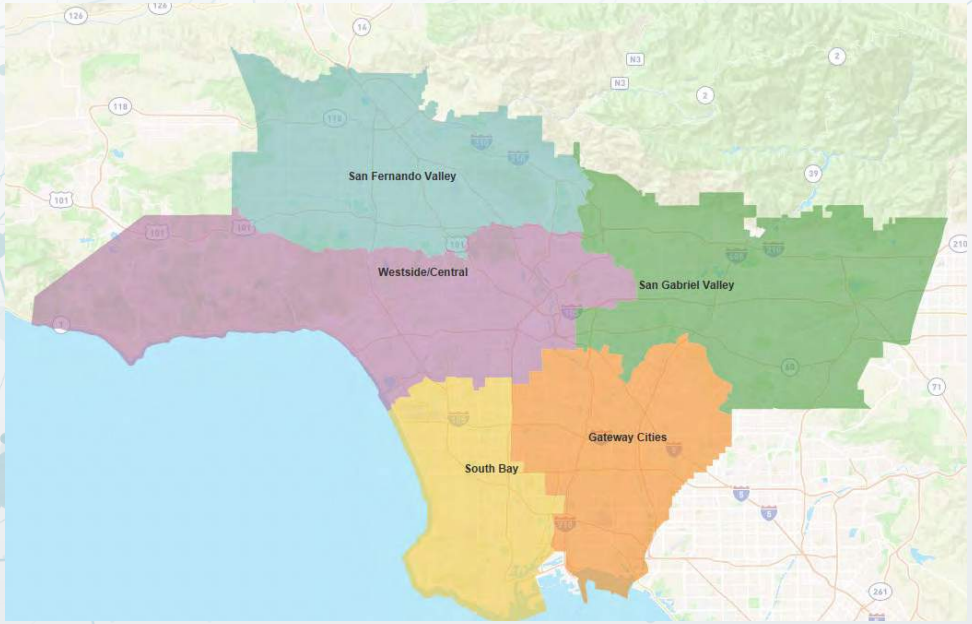
2. Travel Pattern Stabilization - Los Angeles





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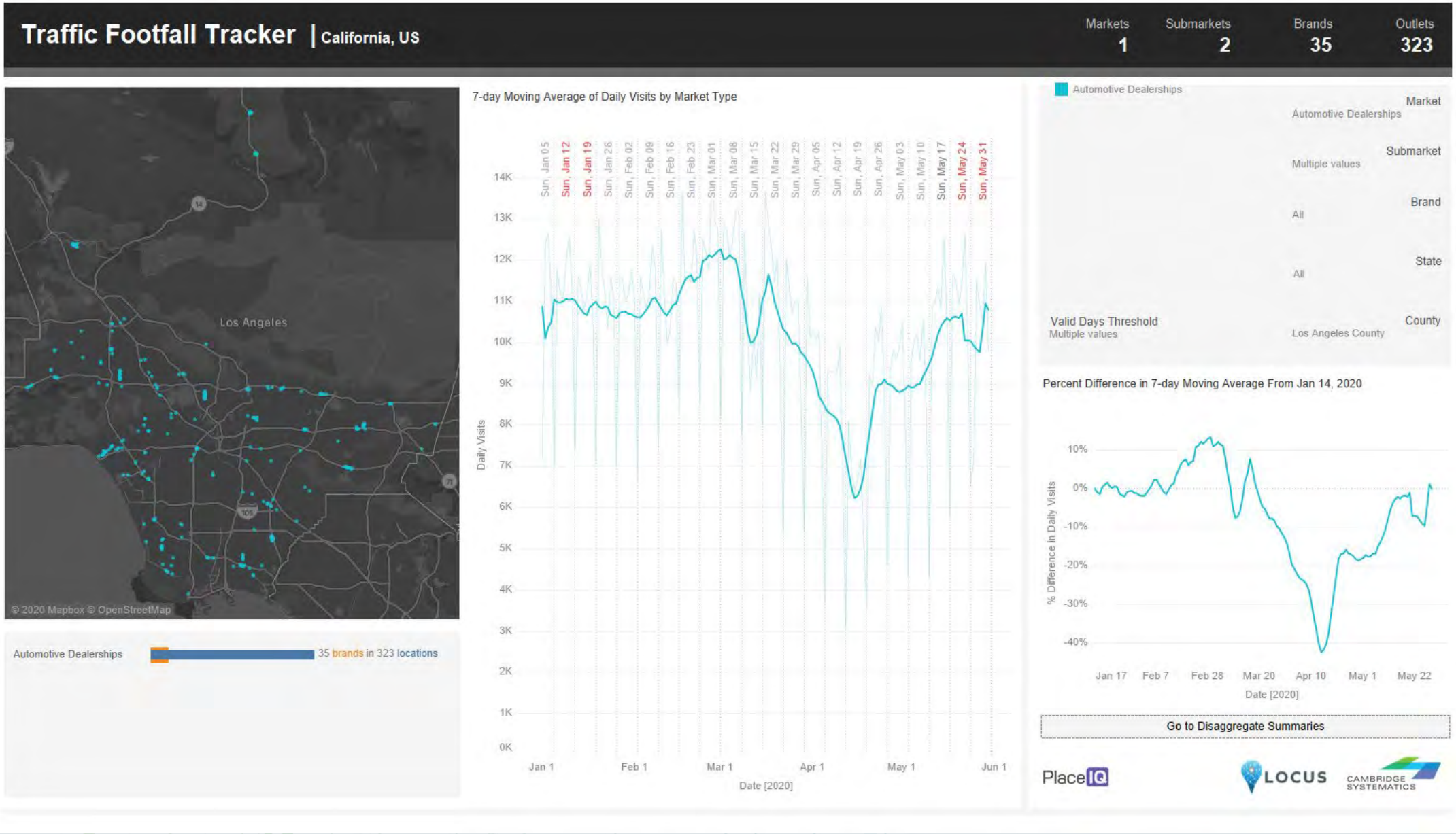
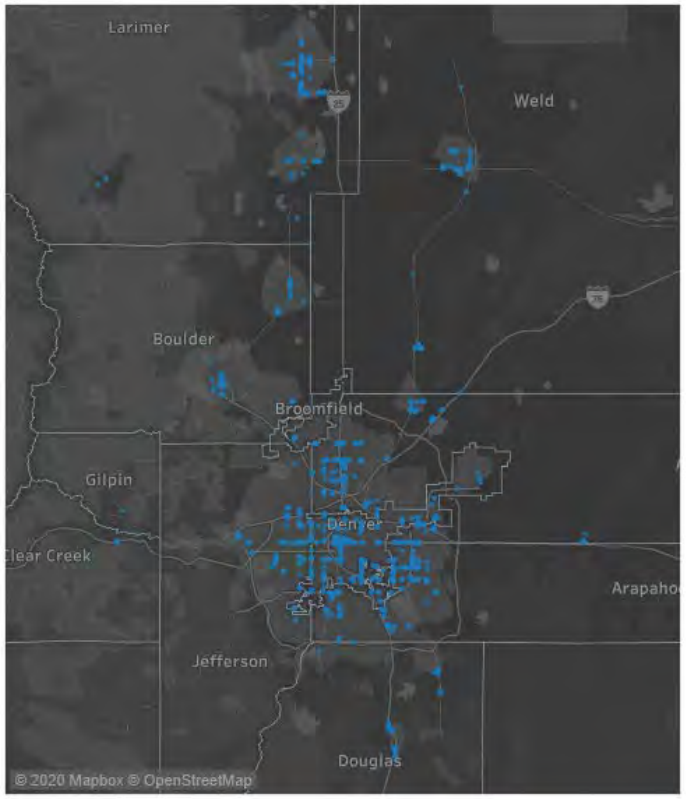
3. Automobile Dealership Traffic Trending up in LA County



4. Dining Trends in Equity Communities in Denver

Traffic Footfall Tracker | Colorado

Markets	Submarkets	Brands	Outlets
1	5	78	976



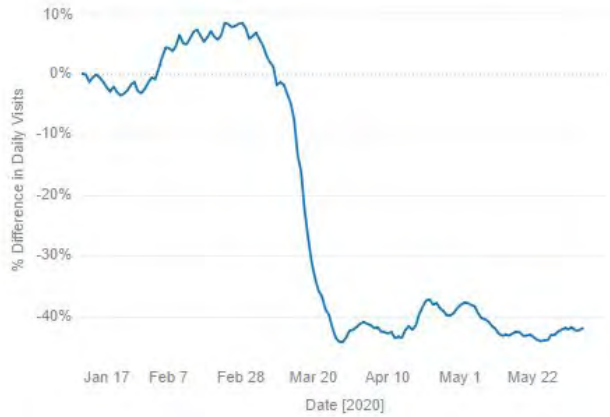
Dining — 78 brands in 976 locations

7-day Moving Average of Daily Visits by Market Type

Dining

Market	Dining
Submarket	All
Brand	All
State	
Equity Tag Equity Zone	All
County	
Valid Days Threshold Multiple values	All

Percent Difference in 7-day Moving Average From Jan 14, 2020



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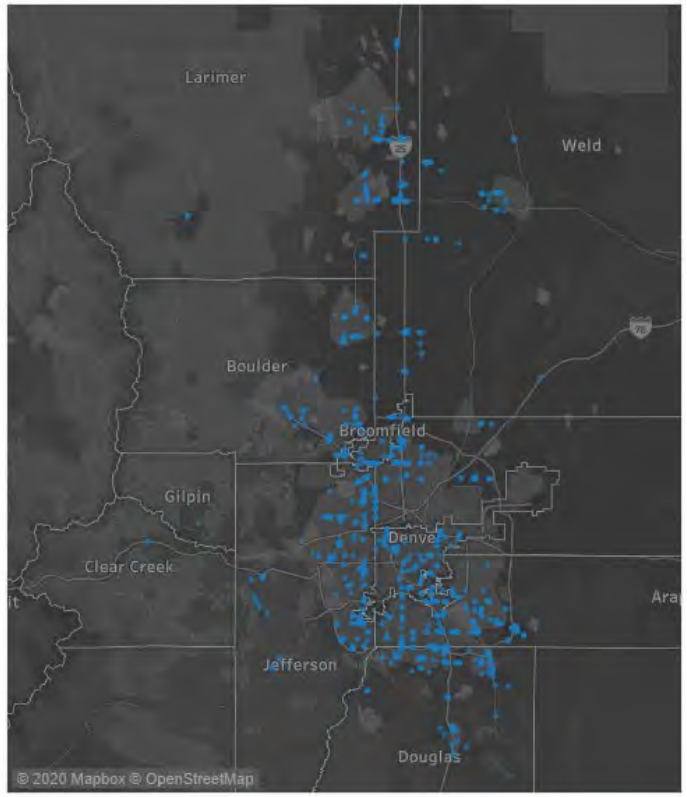
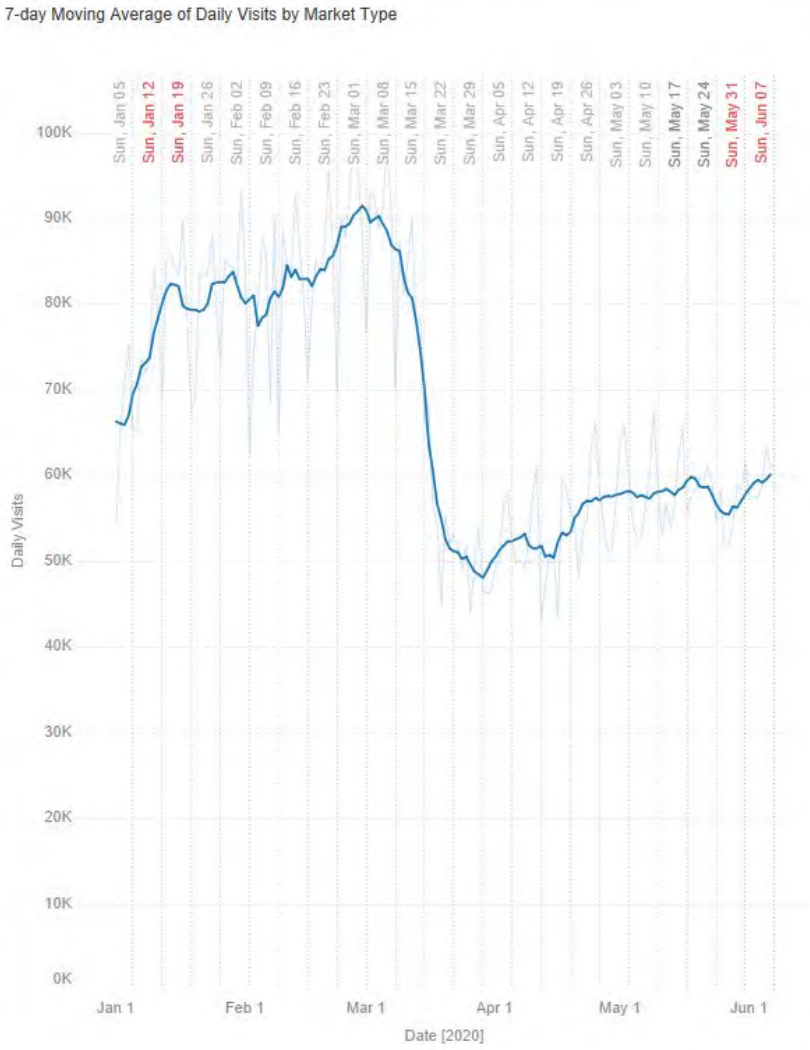
4. Dining Trends in Other Communities in Denver

Traffic Footfall Tracker | Colorado

Markets	Submarkets	Brands	Outlets
1	5	82	1,144



Dining — 82 brands in 1,144 locations

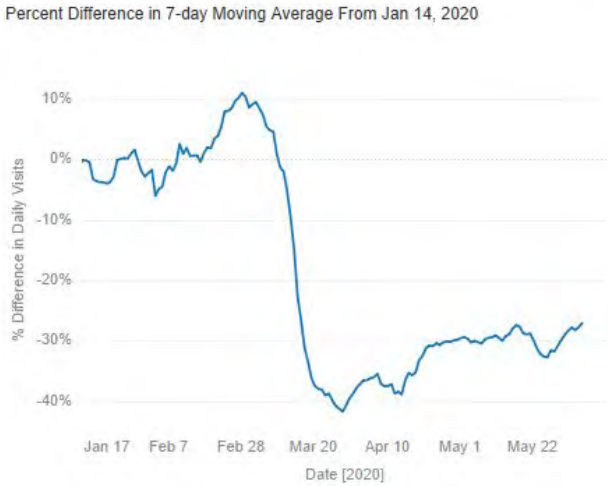


Dining

Market	Dining
Submarket	All
Brand	All
State	All
County	All

Equity Tag: Non-equity Zone

Valid Days Threshold: Multiple values



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Forecasting Travel Behavior in Uncertain Times

We are developing and implementing an integrated method of forecasting and planning that is driven by near real-time LOCUS data. Our approaches are refined based on what we learn from these data. Given the uncertainty, we recommend supplementing traditional modeling with best practice risk analysis tools

Scenario Planning: Define "what if" scenarios that you want to test

LBS Data: Develop a clear picture of what is happening in real time to study impacts

Modeling Tools: Assess scenarios by ingesting LBS data to calibrate models

Risk Analysis: Bound the future given the uncertainty of key input variables

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