wejo

May 20th, 2020

COLORADO SMART CITIES ALLIANCE

COLORADO Crisis Innovation

Jaap van den Hoek

Director Solutions Engineering

2014	200+	167bn+	4 trillion+	NORTHERN TECH *Awards* Presented by GP.Bullhound	FROST & SULLIVAN 2019 BEST PRACTICES AWARD
Founded	Employees	miles curated	data points captured	**Winner**, Fastest Growing Company 2019	**Winner**, Customer Value Leadership 2019

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Introduction to wejo

Our story

2014
Founded

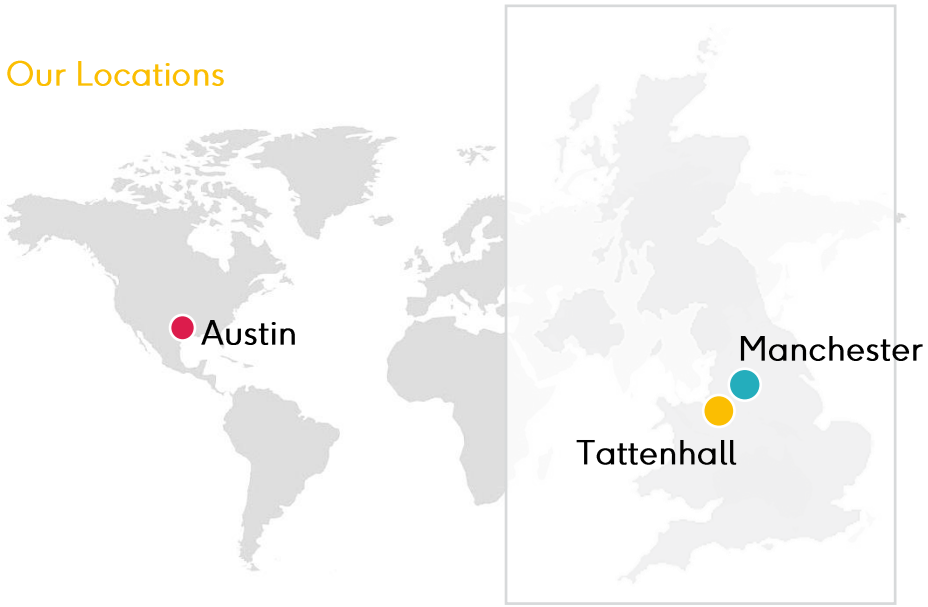
17M
vehicles on platform

4 Trillion+
Data points captured

167B+
Miles curated

17B
Data points collected daily, streaming & batch

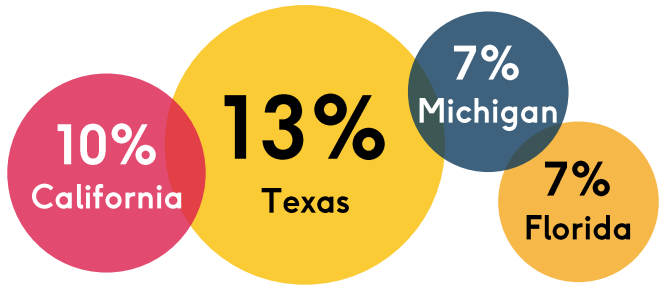
Our Locations



Super-low latency, transmitted every **1-3 seconds** from the vehicles, 95% to customers in under 32 seconds

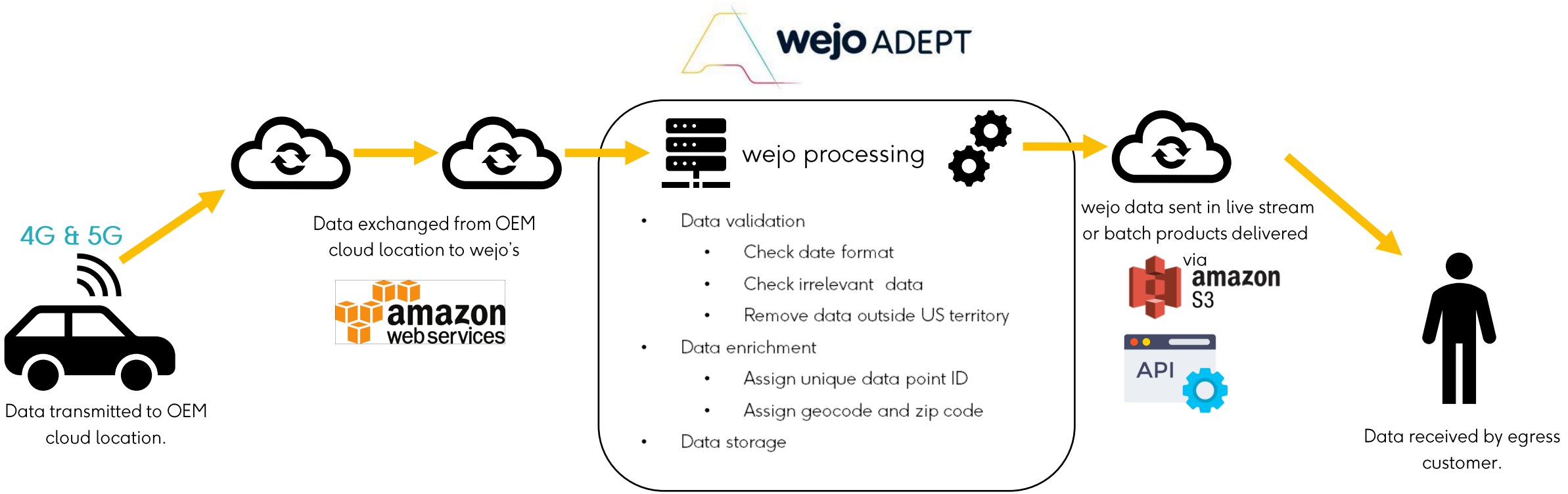
Our data is, **cleaned**, **normalized** and **structured** in a **common data model.**

The anonymised vehicle data that wejo receives represents **one in every 28 vehicles** in the USA:



Multiple OEMs, multiple geographies

wejo data process

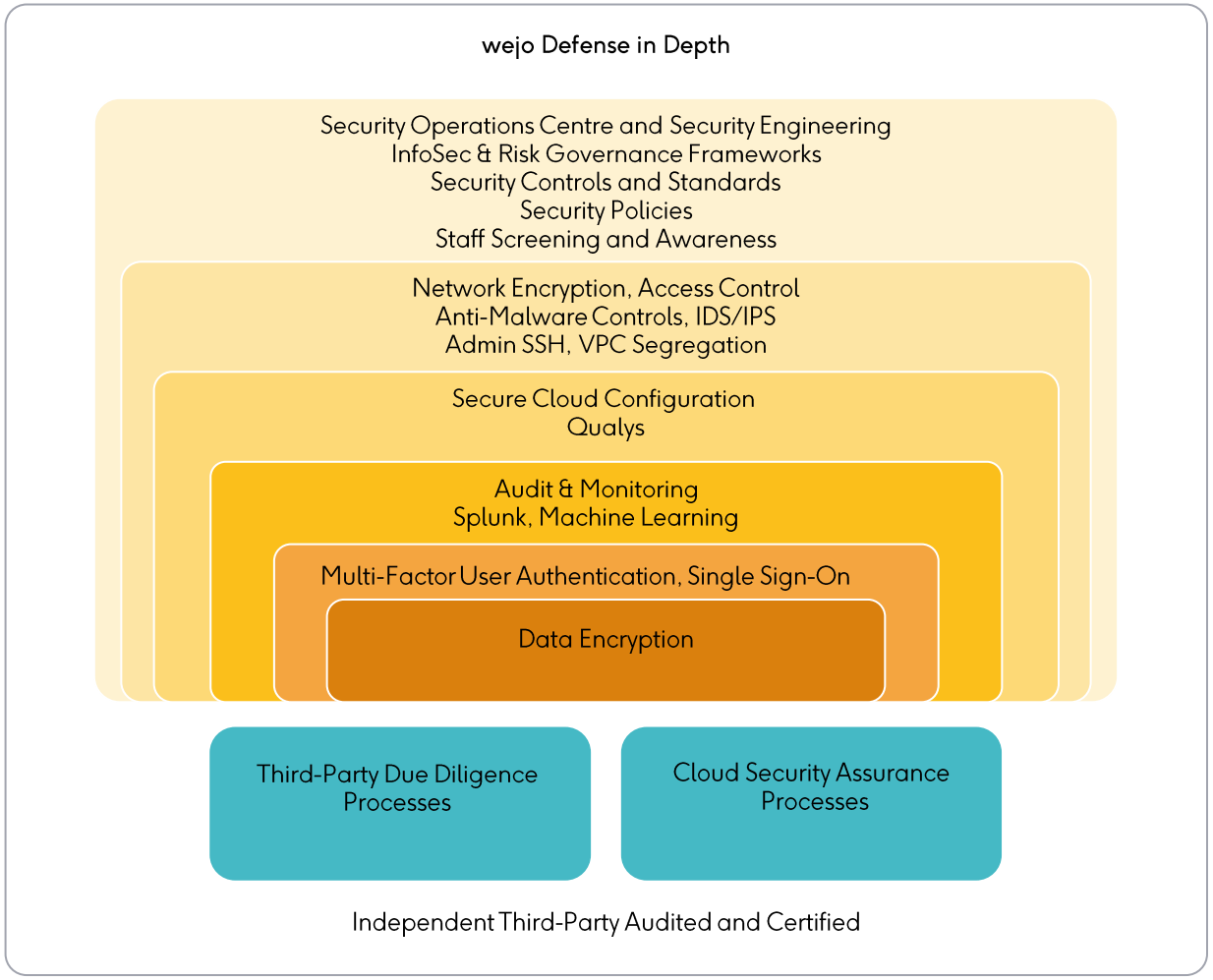


* 95% of data points received by partners in 30 seconds. wejo SLA 60 seconds

First class security

The wejo architecture and all supporting processes are secure-by-design

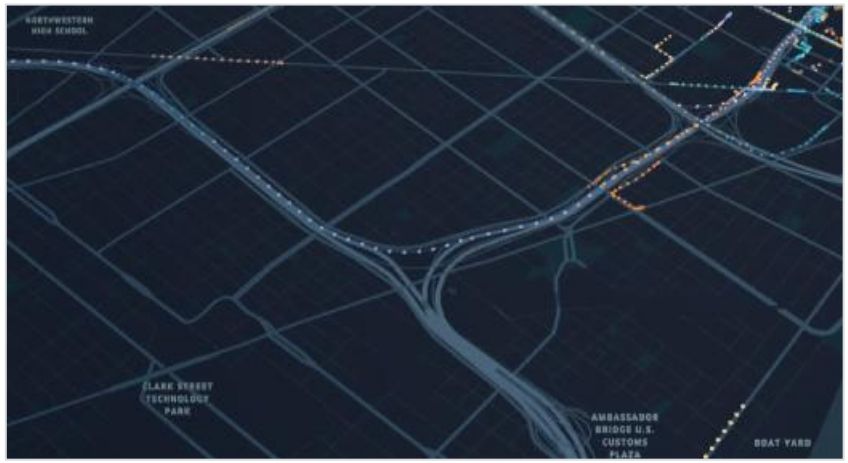
- **Certifications (Audited):**
  - IASME Gold (May 2019)
  - GDPR Compliance (May 2019)
    (aligns with the Alliance of Automobile Manufacturers, Consumer Privacy Protection Principles & CCPA)
  - Cyber Essentials (April 2019)
  - Cyber Essentials Plus (May 2019)
- **Certification Roadmap (Q1 2020):**
  - ISO 27001 (ISMS), 27005 (Risk Framework)
  - TISAX
- **Pen-Testing (Independent):**
  - Full Company scope (April 2019)



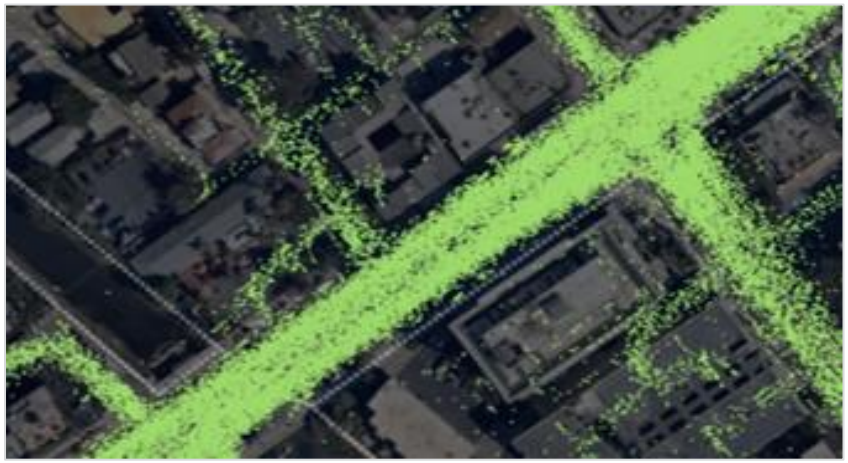
Introducing wejo's connected car data

Key features of our rapidly growing, high resolution connected car data asset

3 second capture rate, with a latency of 30 seconds*.



High volume of journeys tracked, 1.3 billion per month.



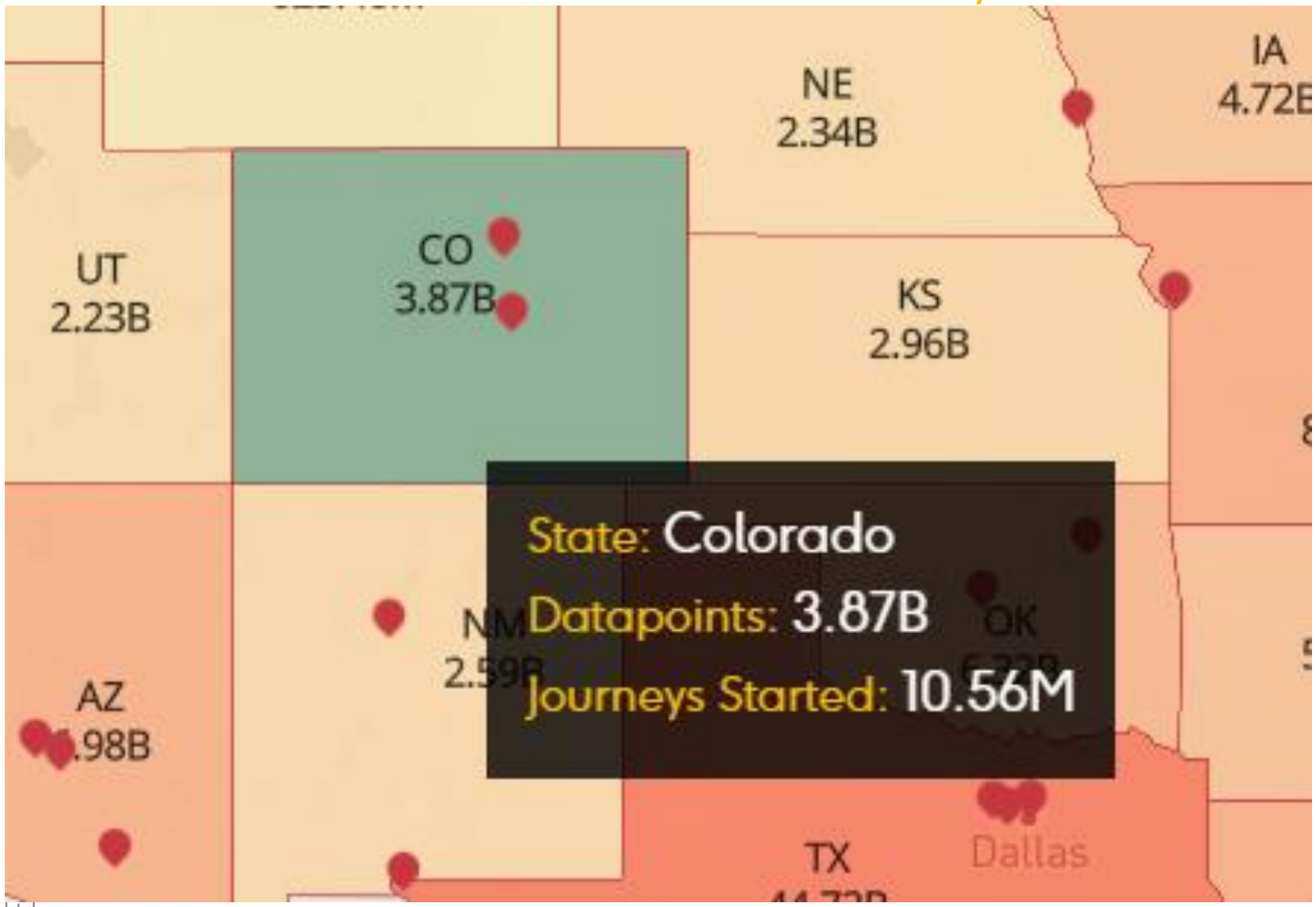
Accuracy down to 3 metres† allowing identification of parking areas and speeds on highway lanes.

Historic events providing insight into incident hotspots.

* 95% of data points received by partners in 30 seconds. wejo SLA 60 seconds

†95% of data points accurate to 3m, biased on location.

Colorado data counts May 2020



ADEPT Portal

Data Background

Jaap van den Hoek

Director Solutions
Engineering

Connected vehicle Attributes

Vehicle Movement Data

Core Attributes

Name	Description
Data Point ID	Unique identifier for an individual captured datapoint.
Journey ID	Unique identifier for individual vehicle's movements through to an ignition off event happening.
Captured data and time	Timestamp captured for each datapoint. (ISO8601). Including UTC off-set.
Latitude	The North-South positioning of the vehicle on the Earth's surface.
Longitude	The East-West positioning of the vehicle on the Earth's surface.
Speed	The speed in kilometres per hour that the vehicle was travelling at the time datapoint was captured
Heading	The direction that the vehicle was heading at the time the datapoint was captured
Ignition Status	The ignition status as the time the datapoint was captured

Optional Attributes

Name	Description
Geohash	Representation of a square on the Earth's surface.
Zip Code	The zip or postal code in which the vehicle was located at the time of datapoint capture.
State / Region Code	The region/state code in which the vehicle was located at the time of datapoint capture.
Country Code	The country in which the vehicle was location at the time of datapoint capture.
Squish VIN	A subset of the characters in a standard 17 character VIN solely to describe the vehicle make, model and production year and not to identify individual any vehicle. The first 8 characters with the 9th character skipped and then the 10th and 11th characters.
Vehicle Make	The make of the vehicle at the time of datapoint capture.
Vehicle Model	The model of the vehicle at the time of datapoint capture.
Vehicle Year	The year in which the vehicle was manufactured at the time of datapoint capture.

Driver Event Data

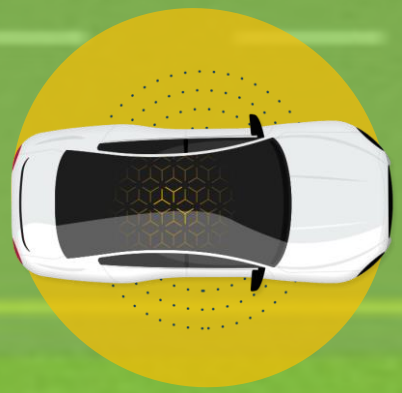
Core Attributes

Name	Description
Datapoint ID	Unique identifier for the for the event
Trip ID	Unique identifier for an individual vehicle's movements through to an ignition off event happening.
Device ID	Unique identifier for the vehicle that the event was recorded by
Captured Date and Time	Timestamp captured for each datapoint.
Time zone offset	Time zone offset of the captured timestamp
Latitude	The North-South positioning of the vehicle on the Earth's surface.
Longitude	The East-West positioning of the vehicle on the Earth's surface.
Speed	The speed in kilometres per hour that the vehicle was travelling at the time datapoint was captured.
Heading	The direction that the vehicle was heading at the time the datapoint was captured
Ignition State	Representation of ignition state when the datapoint was captured
Event Type	An identifier for the recorded event (See "Event Types" section)
Journey Event Change Type	Ignition on or ignition off
Seatbelt Change Type	Latched or unlatched
Acceleration Change Type	Harsh braking or harsh acceleration
Speed Threshold Event Type	Speed above or below threshold

Optional Attributes

Name	Description
Geohash	Representation of a square on the Earth's surface.
Zip Code	The zip or postal code in which the vehicle was located at the time of datapoint capture.
State / Region Code	The region/state code in which the vehicle was located at the time of datapoint capture.
Country Code	The country in which the vehicle was located at the time of datapoint capture.

Data type	Accuracy
CVD yellow	Up to 3m*
Telematics Green	Up to 20m
Mobile Green	Up to 20m
Road sensor blue	10m – 100m



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For illustrative purposes not to scale

How Maps finds your current location

Maps estimates where you are from sources like:

- **GPS**: This uses satellites and knows your location up to around 20 meters. **Note**: When you're inside buildings or underground, the GPS is sometimes inaccurate.
- **Wi-Fi**: The location of nearby Wi-Fi networks helps Maps know where you are.
- **Cell tower**: Your connection to a cellular network can be accurate up to a few thousand meters.

Source: Google Maps Help
https://support.google.com/maps/answer/2839911?hl=en&co=GENIE.Platform=Android

1. **Class 1** transmitting at **100 mW** with a range of **100 meters** or **328 feet**.
2. **Class 2** transmiting at **2.5 mW** with a range of **10 meters** or **33 feet** (most Bluetooth headsets and headphones are common Class 2 devices).
3. **Class 3** transmitting at **1 mW** with a range of fewer than **10 meters**.

Source: Science ABC https://www.scienceabc.com/innovation/what-is-the-range-of-bluetooth-and-how-can-it-be-extended.html

NY Times article Mobile data

Source:https://eur02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.nytimes.com%2Finteractive%2F2019%2F12%2F19%2Fopinion%2Flocation-tracking-cell-

wejo data in similar study area

Source: wejo raw data visualised

https://goo.gl/maps/LqWDE1P6ZKb9GCax6

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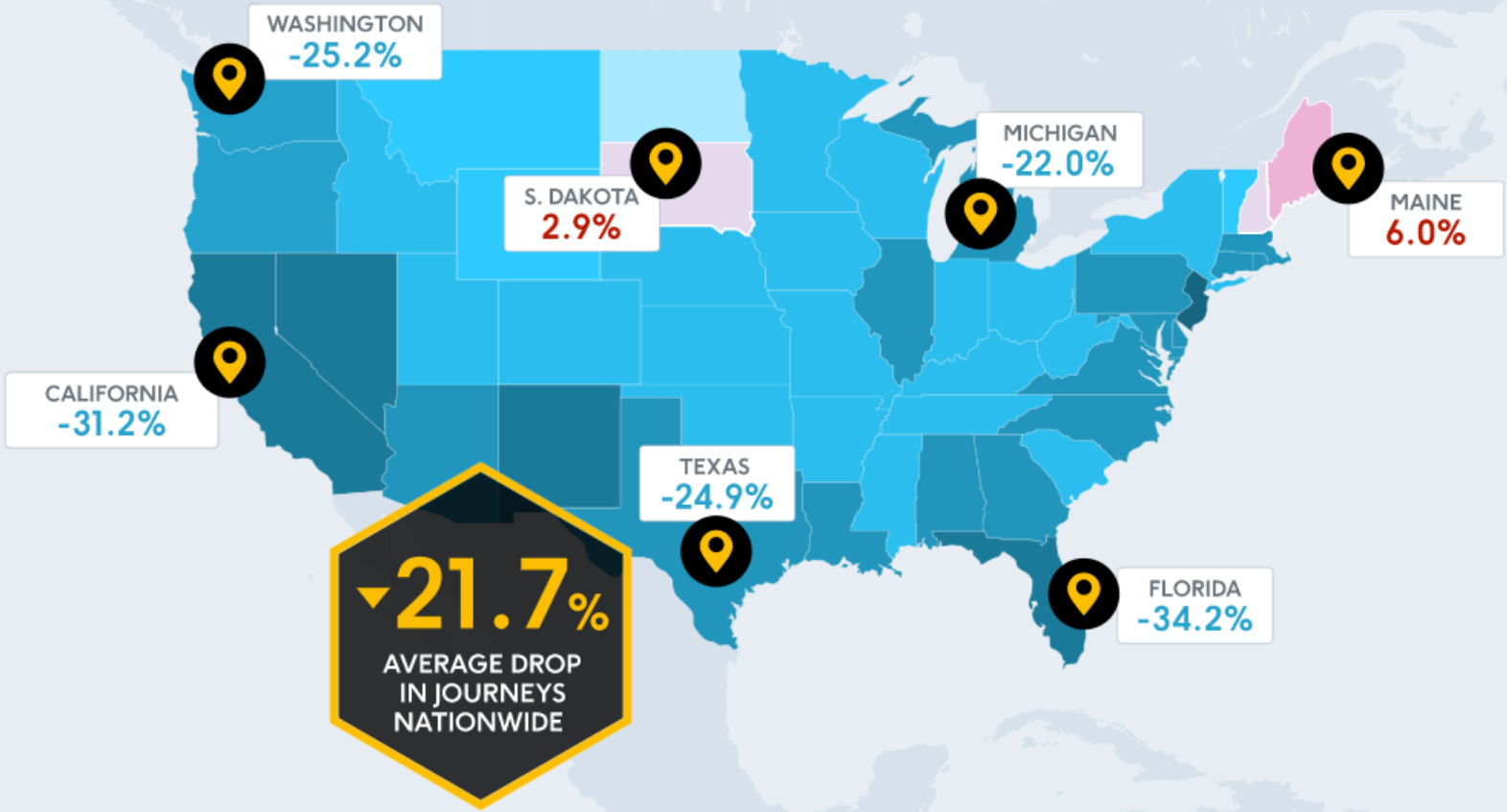
Use cases

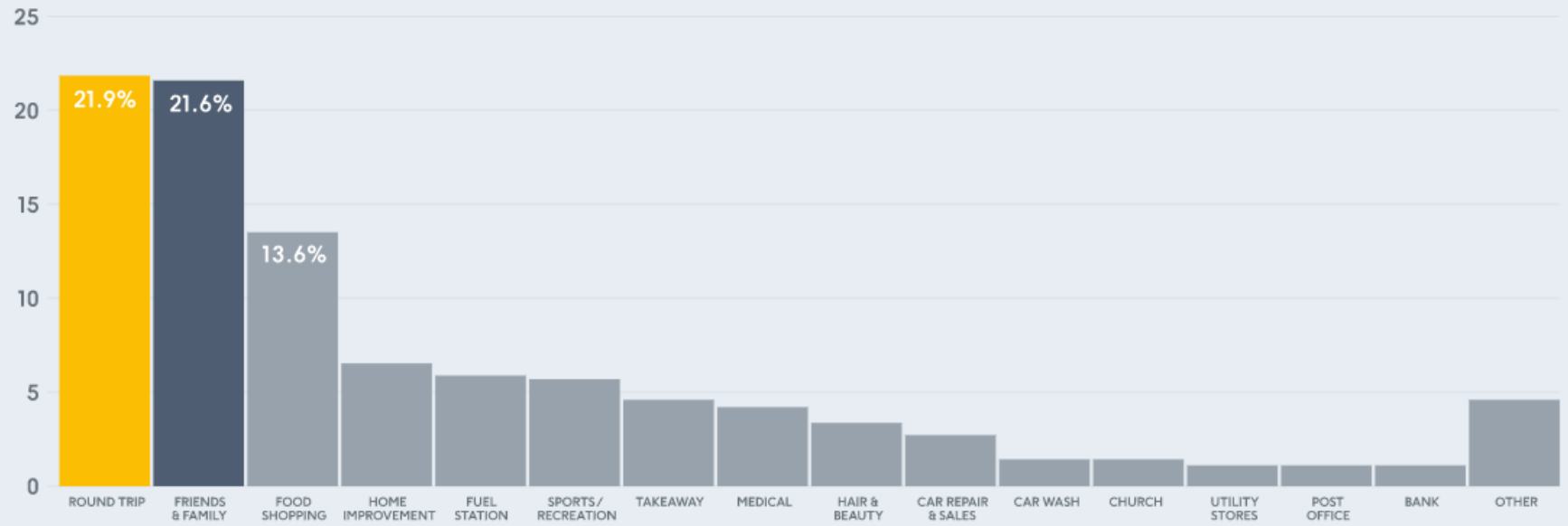
Latest percentage change in journey volumes

As stay-at-home orders came into effect across the US, we have seen the number of trips out reduce drastically (w/c 25 May 2020)



Where did people in Georgia drive to for their first journey in a two-week period?

1st - 2nd May 2020



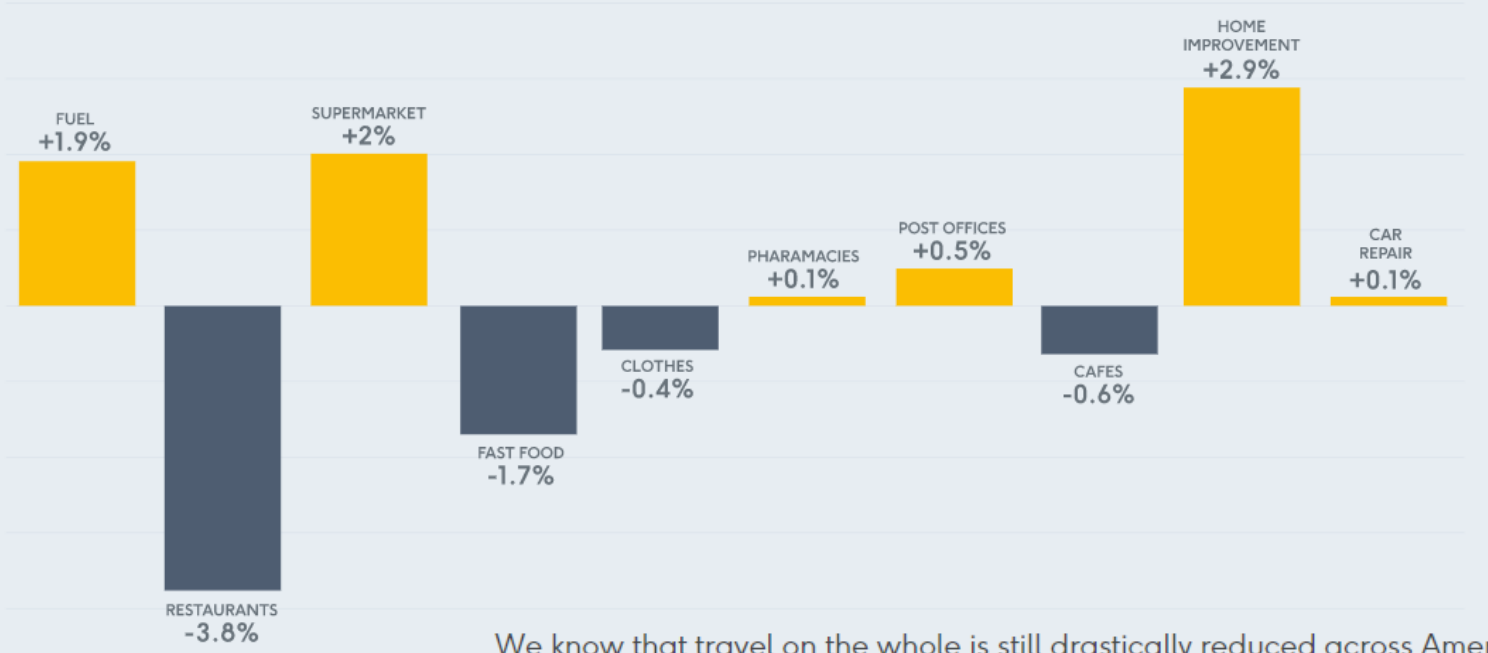
Data science overview

Georgia was the first US state to ease lockdown, with businesses including gyms, hairdressers, tattoo studios and restaurants all now able to reopen their doors to some degree. To provide context to our analysis on travel patterns following the easing of restrictions, we looked back to pre-coronavirus trends.

Our data science team analysed vehicle usage on Fridays for February, March and April. In Georgia in February, vehicles were stationary for around 15.5 hours. Vehicle usage decreased in parallel with the coronavirus pandemic and shelter-in-place orders. On Good Friday (10 April), vehicles were stationary for **20%** longer than in February, marking the peak of the downward trend in vehicle usage.

Difference in share of retail visits vs. pre-COVID-19 average

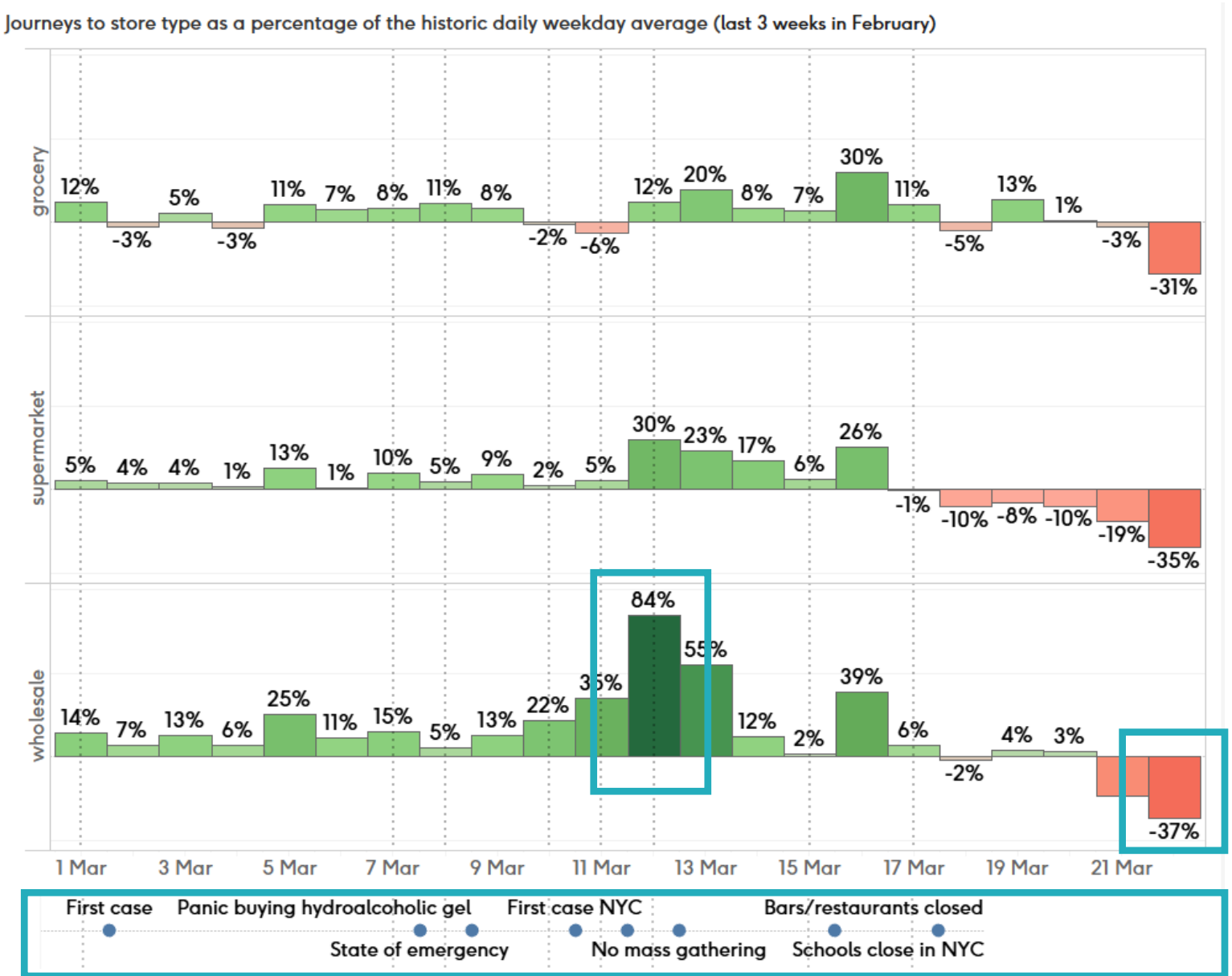
w/c 25th May 2020



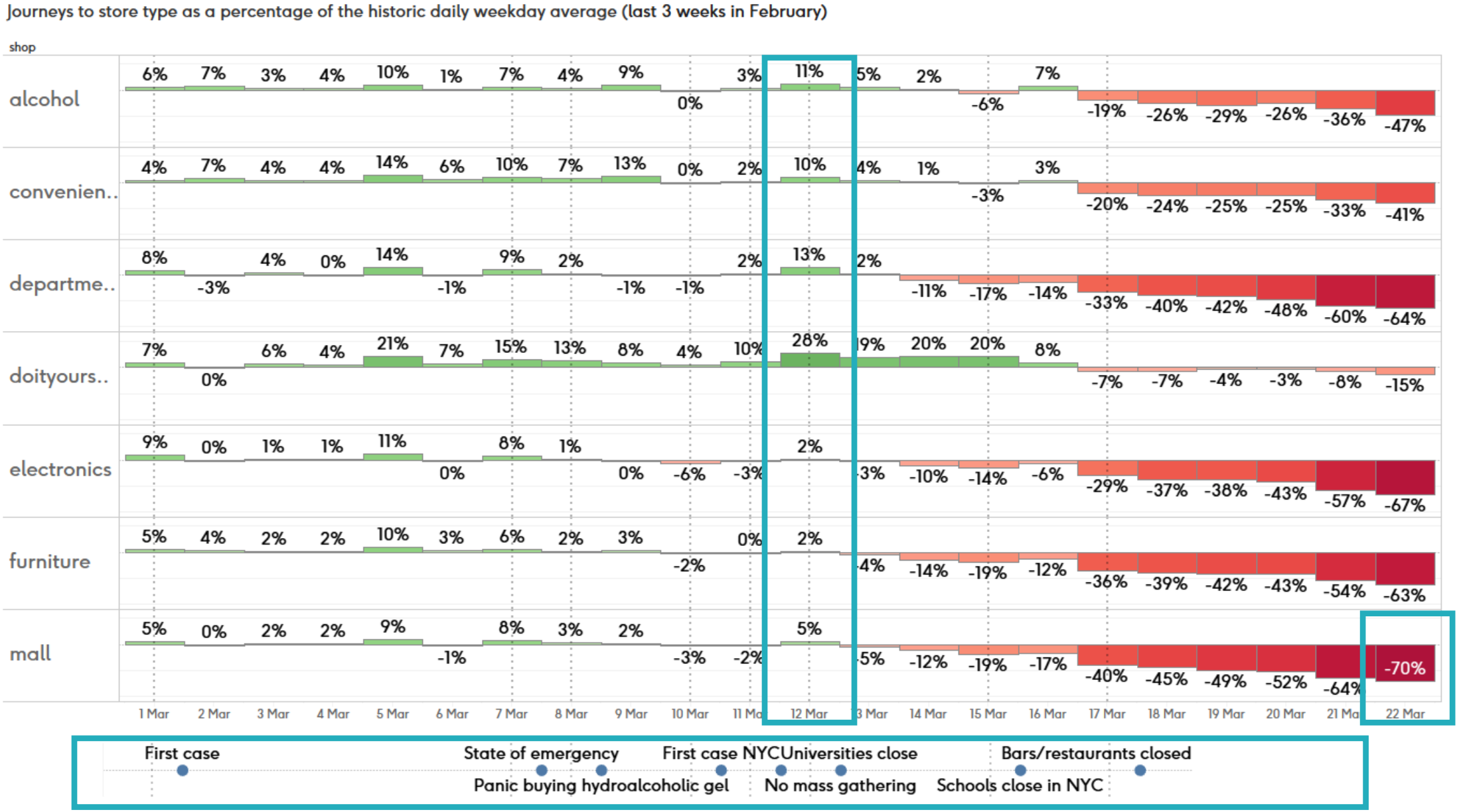
We know that travel on the whole is still drastically reduced across America, but we can also see a shift in behaviour in where they are travelling to. We analysed retail stores in particular to see how drivers' habits have changed since COVID-19.

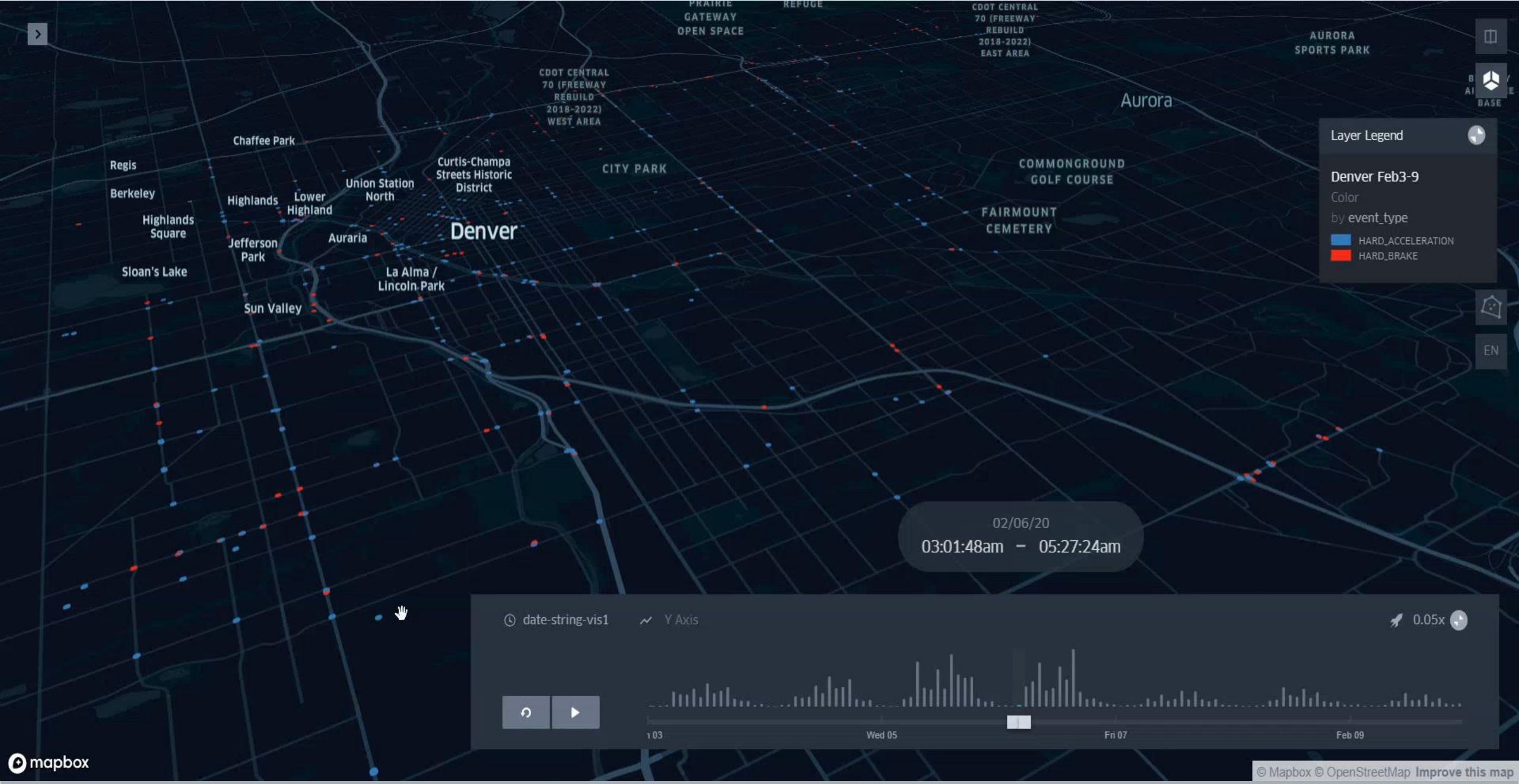
As lockdown restrictions continue to lift, we're seeing a gradual return to pre-COVID 19 patterns of behaviour. Many restaurants across the US are starting to reopen their doors, despite this the percentage share of retail visits to restaurants remains down, at **-3.8%** compared to pre-COVID 19 visits. DIY stores and supermarkets continue to take a higher percentage share of visits to retail stores.

Retail establishments in NY State grocery focus



Retail establishments in NY State split by furniture, electronics & malls





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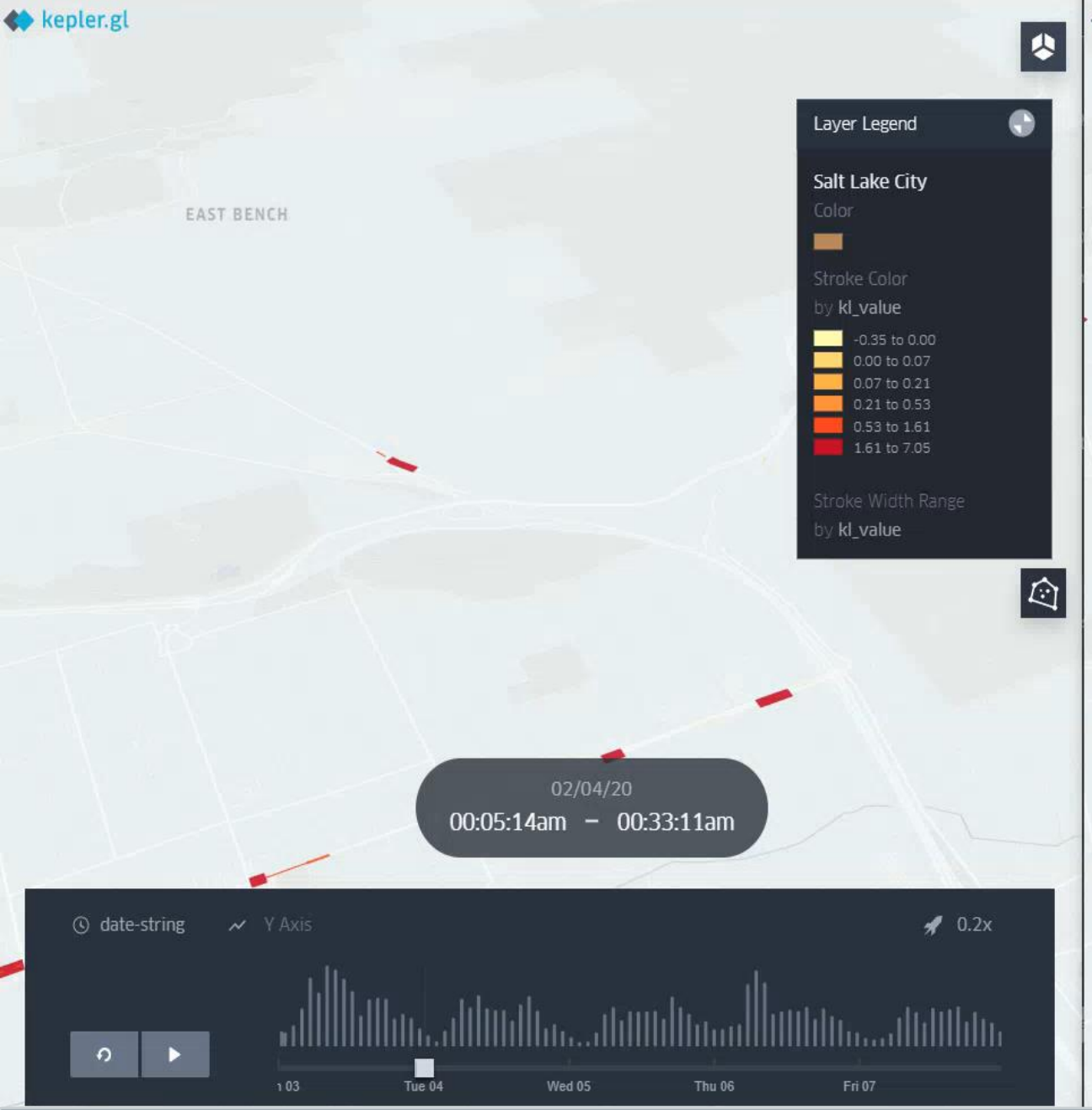
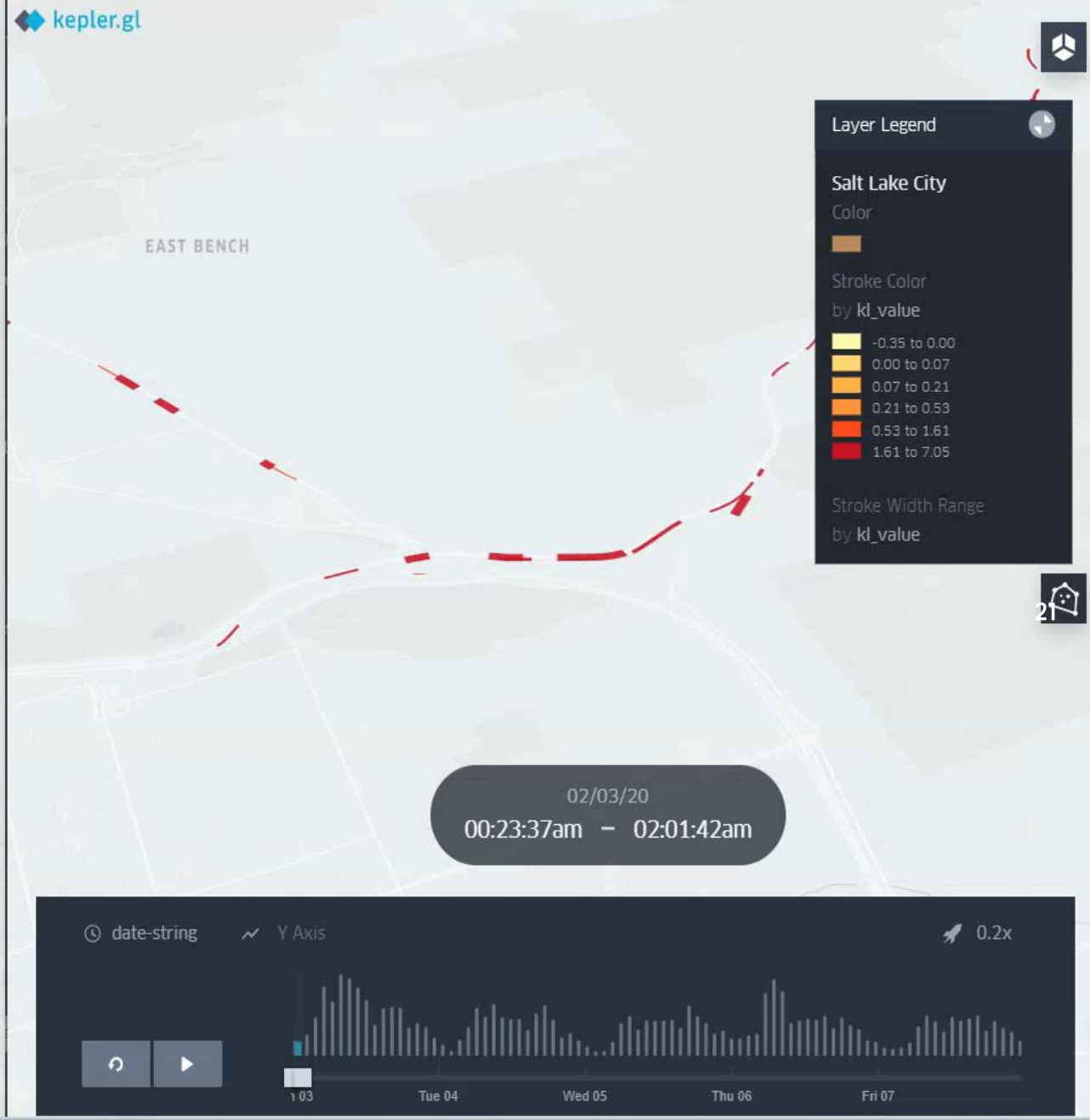
Harsh Braking & Acceleration in Denver

Harsh braking

Harsh Acceleration





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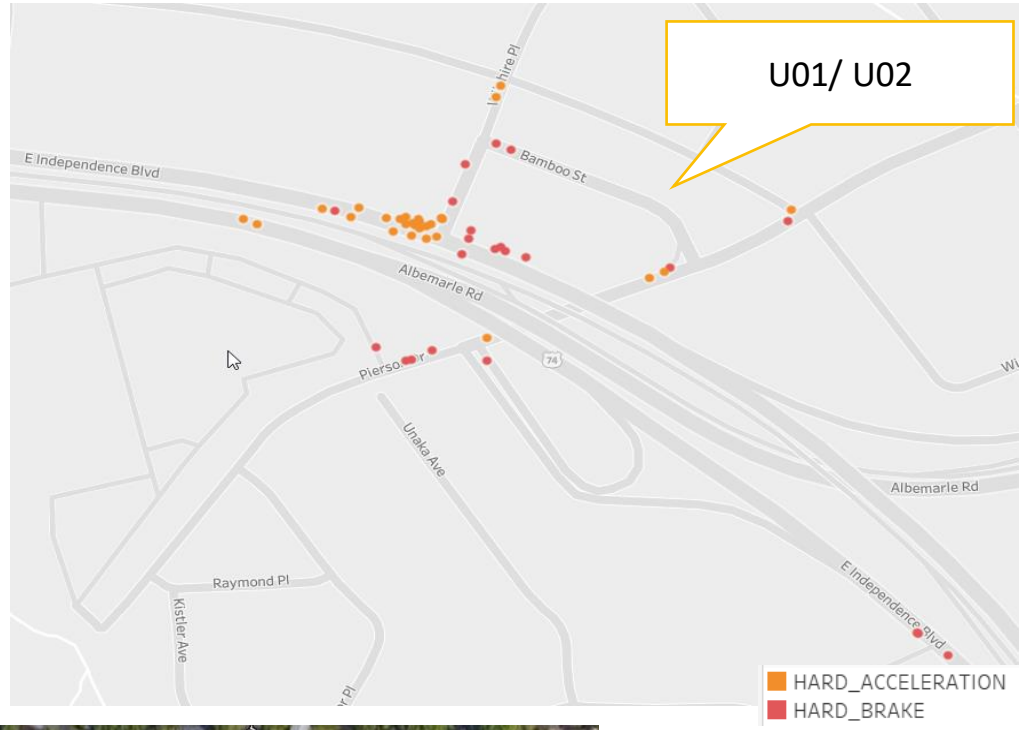
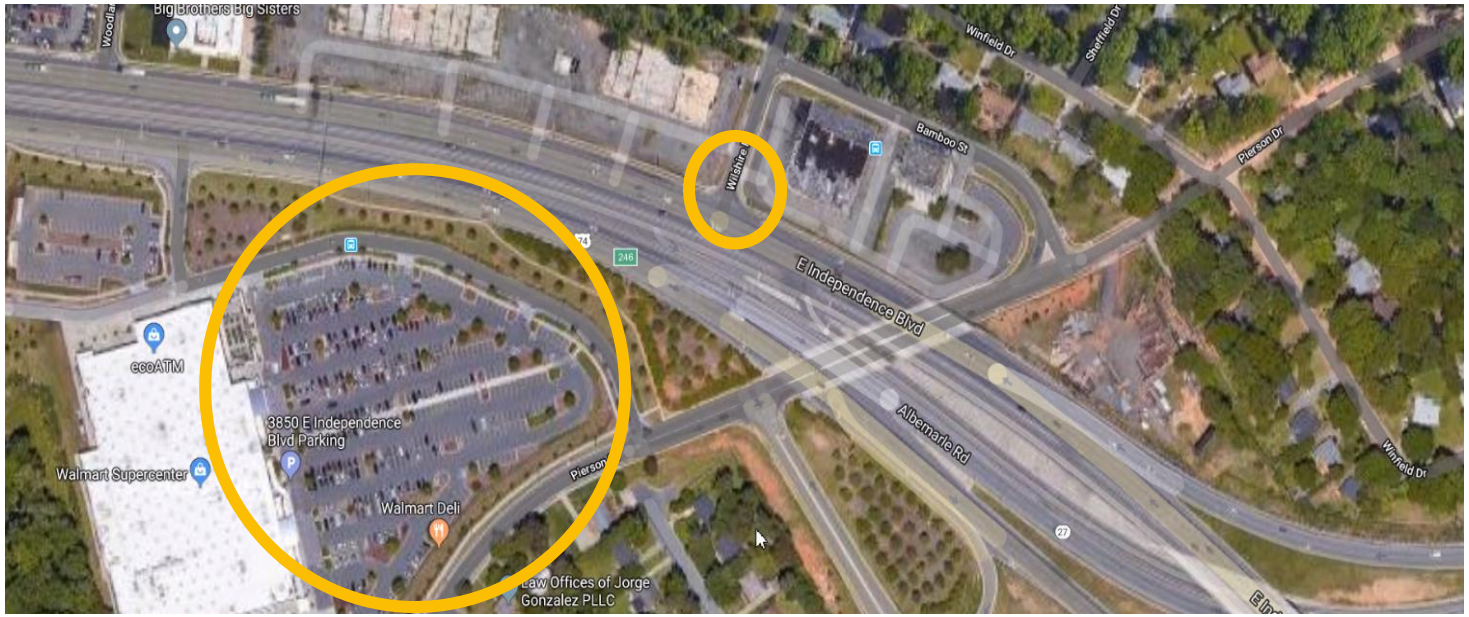
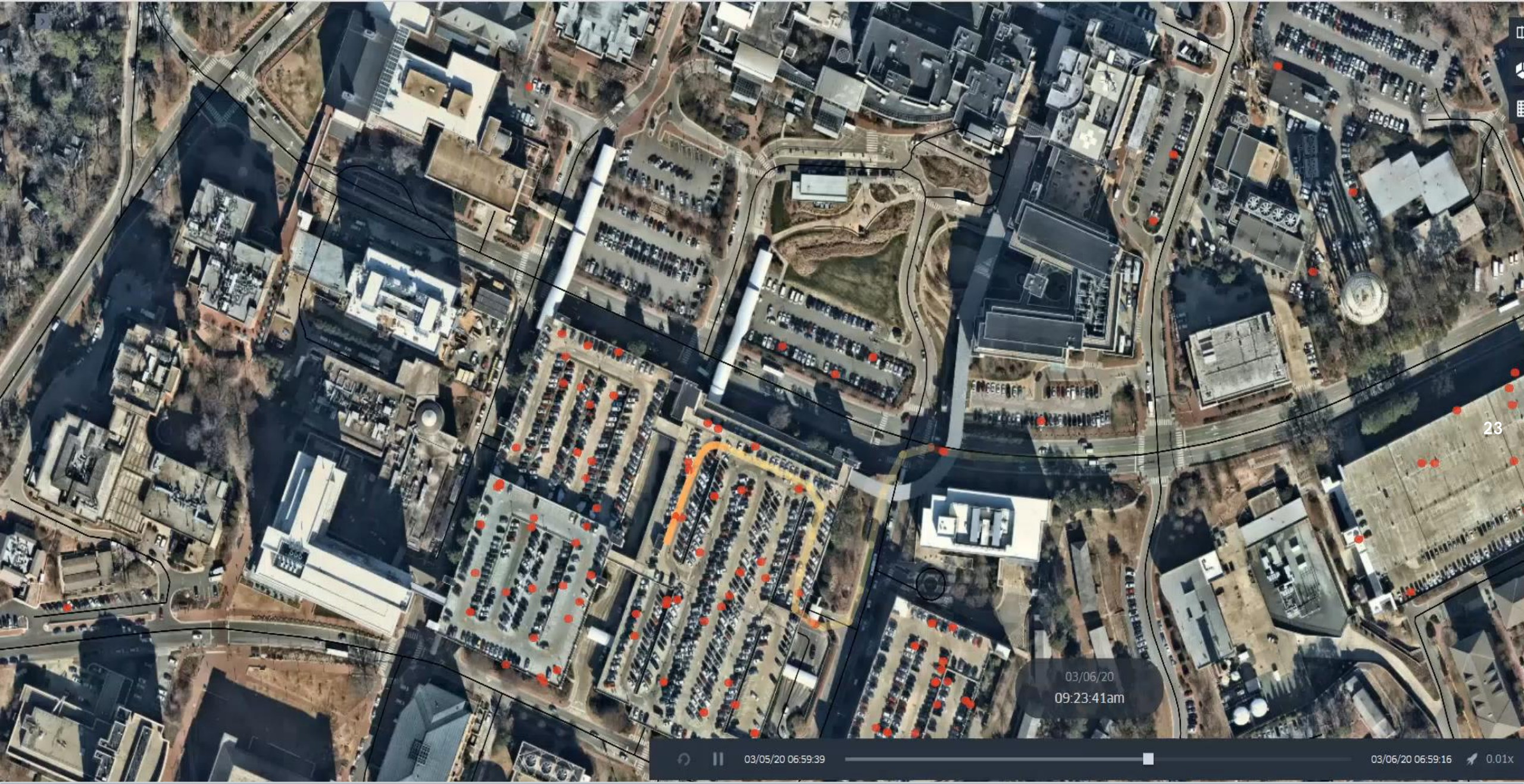
Congestion model Salt lake city

Safety events – toll gantries

- Analysis of harsh braking events leading up to toll gates to understand if signage is adequate
- We found limited harsh braking events in the areas identified suggesting that signage is adequate
- The exception was U01/U02 where we found both harsh braking and acceleration







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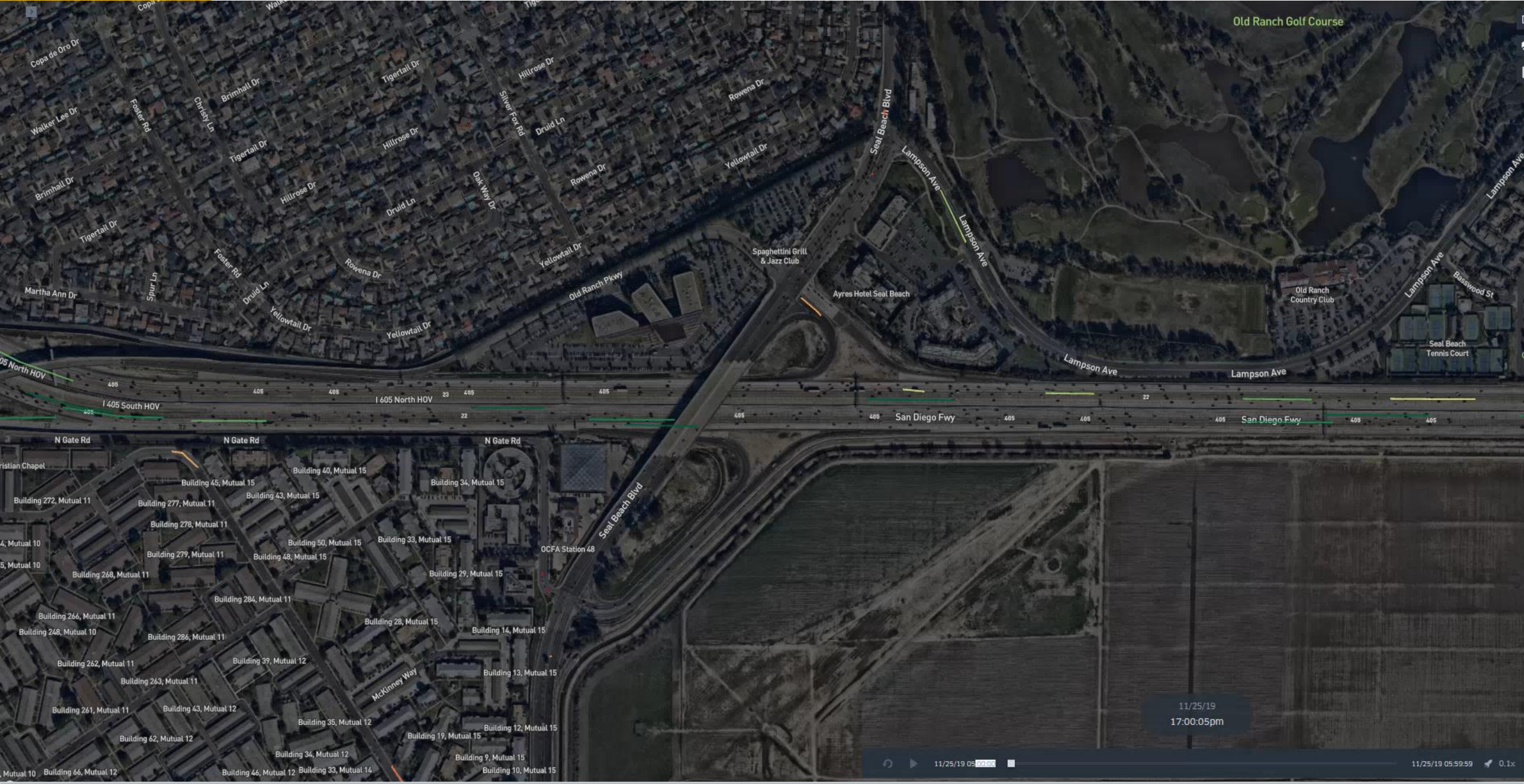
North Carolina Hospital

0 Speed x



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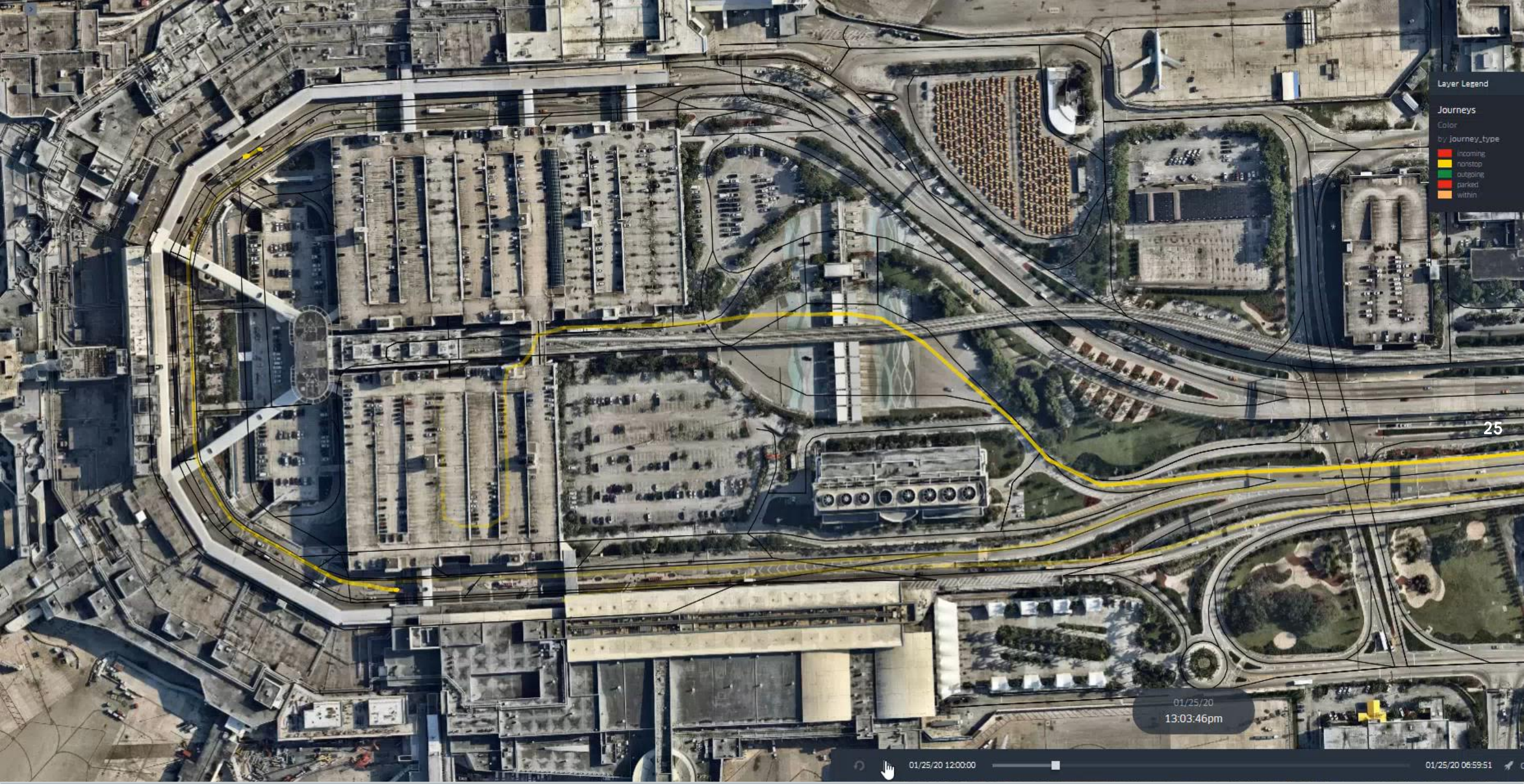
Los Angeles Freeway

0 Speed x



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Miami airport

Other wejo support options

Derived data

Reducing the volume of data consumed providing a CSV file with tangible figures.

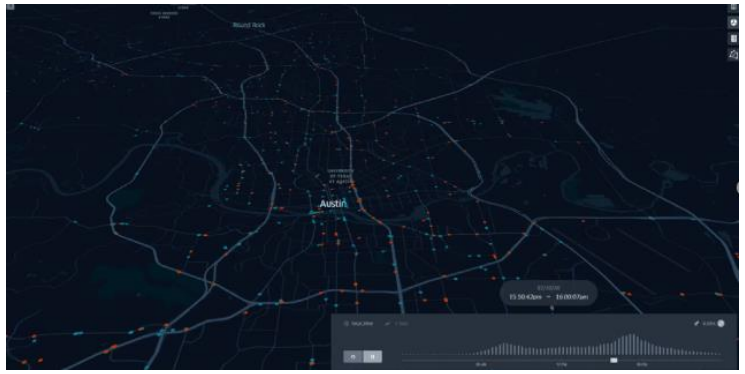
- Filtering of specific attributes
- Aggregated data set reducing data volumes

Date	Hour	Zip Destination	Zip Origin	Direction of Travel	Number of Distinct Journeys	Average Journey Length (miles)	Average Journey Time (mins)
12-10-2020	15	27637	289713	North bound	500	23.1	45

Insight reports

Providing an answer to the question you have in a report from.

- Detailed analysis of the area of study
- Insight provided with commentary around findings
- Production of specific visualisation to bring the data to life



wejo Data insight partner network

A network of wejo partners that can utilise wejo's data to provide interactive dash boards.

- Login to a location that provides geospatial visualisations
- No need to ingest large data volumes and store said data

wejo DATA INSIGHT partner

Our customer feedback

Julian Glaab, CEO, Bliq:

"Bliq's parking assistance services are regularly used by more than 1 million drivers in Europe already, We are confident that working with wejo will help us to expand our reach with AI-powered parking assistance services and power the development of smart cities."

Eimar Boesjes, CEO of Moonshadow Mobile:

"wejo's data is exceptionally precise, being reported at a three-second interval. As a result, there are many use cases that are made possible through wejo's data that wouldn't have been possible using other data sources."

Al McGowan, CEO of TrafficCast:

"We are happy to announce our partnership with wejo and welcome the addition of their unique content to our industry-leading traffic information ecosystem. wejo's data exchange platform is a critical next step in the evolution of the connected vehicle, and TrafficCast clients and end users will benefit from the insights their data provides."

Contact the team

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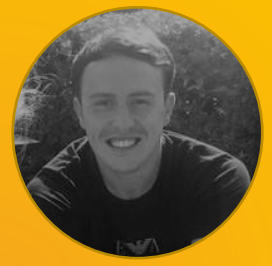

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