

Replica: Insights for Transportation Planning

Data that Drives the Built Environment





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Data that Drives the Built Environment



[illegible]

- **Emerging market for big data for transportation:**
 - Big data is still young and an evolving market:
 - Its important to take into consideration sources, processing methods, sample size, etc.
- **SACOG is active in big data**
 - Using available big data on travel speeds and reliability
 - Big Data Pilot project 2019
 - Currently have a big data platform contracted with Replica.
- **Opportunities to connect big data to SACSIM**
 - Will continue to add big data sources
 - Partnered with Caltrans and ARB to on-board big data for a 12+ month pilot

Household Travel Survey vs Big Data

	Household Travel Survey	Big Data
Sample Size	Small (<0.5%)	Large (>5%)
Total Cost	High	High
Unit Cost	High	Low
Timeliness	Low	High
Privacy Concerns	High	Low to Medium
Data Quality	High	Medium to High
Seasonal Variation	No	Yes

Big Data vs SACSIM

- Replica for near term trend tracking and existing condition analysis
- Travel model mostly for demand forecast and policy evaluation

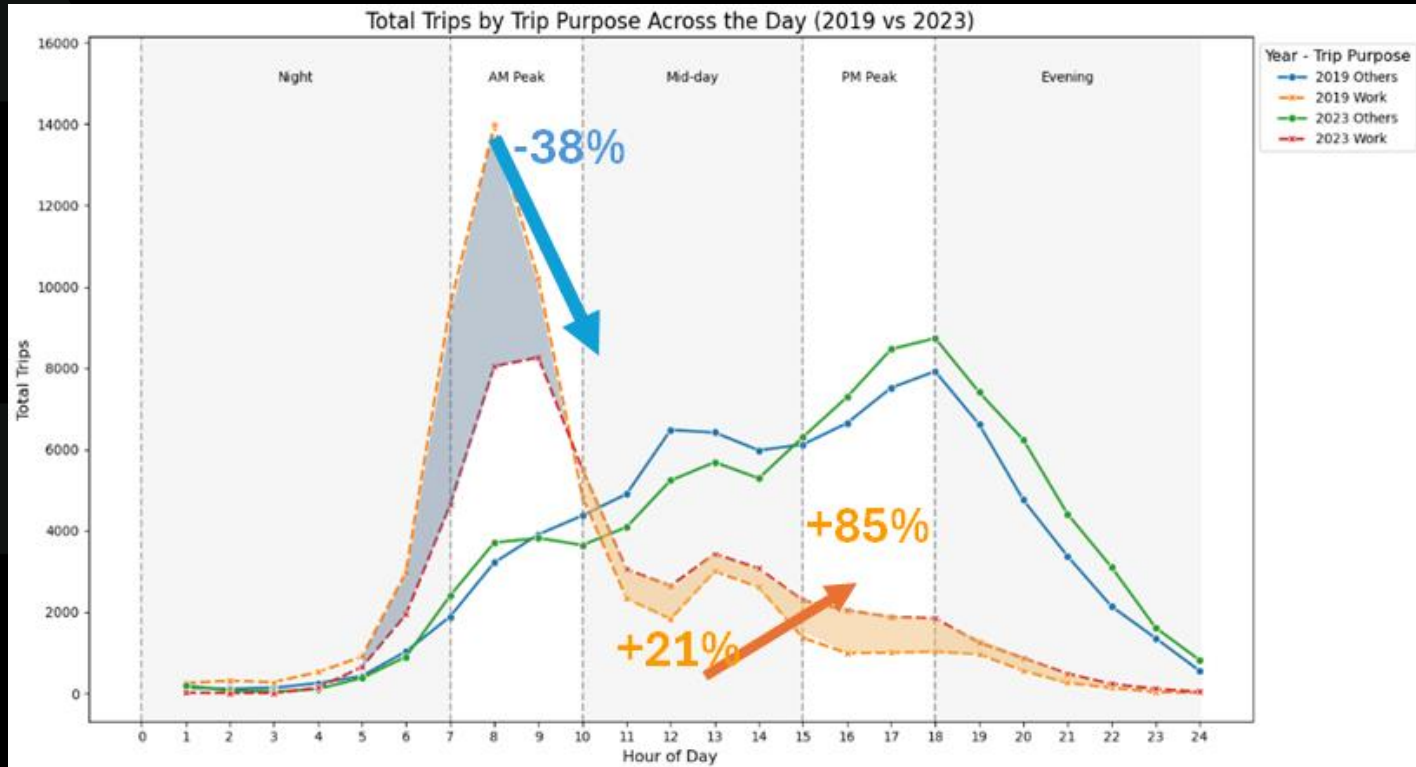
How to Access?

- Full Platform Support
 - SACOG Jurisdiction Members
- Download Data Requests
 - Research & Development
 - Consultant for Project Analysis

<https://www.sacog.org/planning/data-resource-center/data-requests>

Contact : Shengyi Gao at Sgoa@sacog.org

Last Week Use Case



Replica Platform Team



Agenda

1. Introduction-Kyle Shipley
2. Replica's Data Sources-Erin Johnston
3. General Overview of Replica Capabilities-Erin & Warren
4. Examples of Replica Projects for SACOG
5. Conclusion

Introduction

REPLICA X SACOG PARTNERSHIP

- SACOG conducted a big data program collaboration with Caltrans/CARB
- Replica was selected with a 5 year contract
- Project Manager Shengyi Gao (SACOG) and Replica liaison Erin Johnston

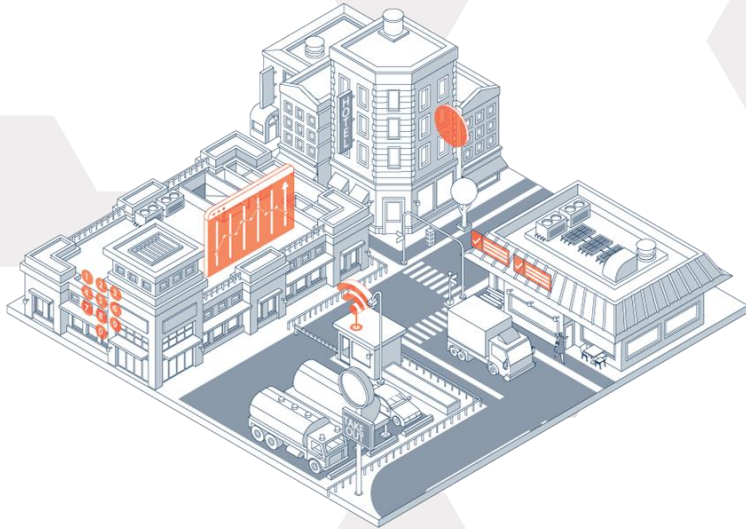


REPLICA

REPLICA MISSION

Organize the world's information about the **Built Environment** to make it **accessible, valuable, and actionable.**

ABOUT REPLICA



- Born out of Google, Sidewalk Labs, about 10+ years of research with State of CA and AT&T
- Deep expertise in local and regional government
- Built by and for transportation and urban planners

Introduction

OUR CUSTOMERS

DOTs, transit agencies, local municipalities, next generation mobility companies, and the nation's premier professional service firms rely on Replica to provide trusted data.



Replica Datasets & Metrics

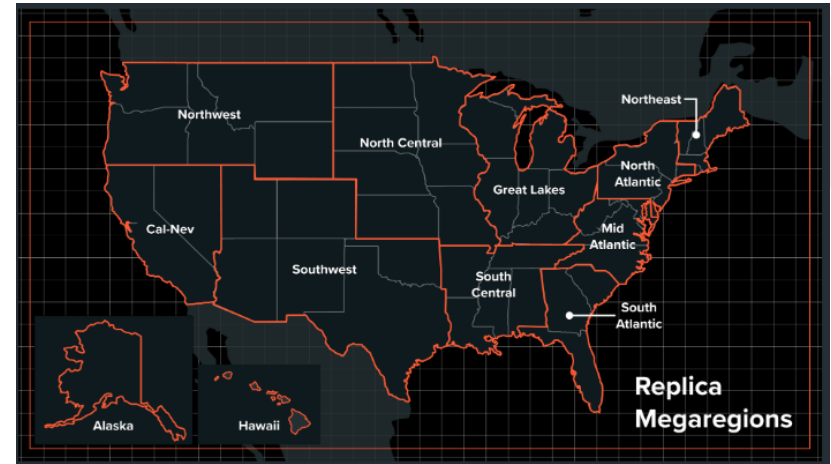
REPLICA'S DATA IS AVAILABLE **NATIONWIDE**, UPDATED AT A **REGULAR CADENCE**, AND DELIVERED WITH **QUALITY REPORTS** SO YOU KNOW EXACTLY WHAT YOU'RE GETTING.

- Disaggregate trip tables with all modes, purposes, and routes
- Annual Average Daily Traffic (AADT)
- Turning-movement counts
- Origin-Destination flows
- Vehicle miles traveled
- Network speeds and volumes
- Disaggregate population tables, including demographic and socio-economic information
- Consumer spending + O-D flows
- Parcel-level land use
- Transit trip and ridership data
- Work-from home %

Replica's Seasonal Mobility Model (Places)

VISUALIZE & QUERY THE DATA BASED ON:

- Trip characteristics (origins, destinations, primary mode, trip purpose, distance, duration, etc.)
- Demographic characteristics (HH income, race & ethnicity, age, sec, private auto availability, etc.)
- Geographies (block group, tract, TAZ, zip code, school district, city, county, state, or custom geography)
- Time frame (Places data modeled in seasons for typical weekday and weekend day; bi-yearly updates for Spring & Fall)



Megaregion Boundaries

Data Inputs & Pipeline

HOW IT WORKS



Census



Consumer
Marketing



Geography and
Land Use



Mobile
Location



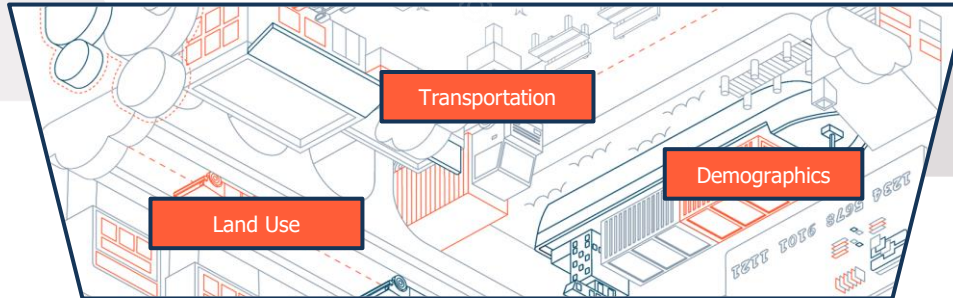
Credit
Transaction

Factoring

Scaling

Normalizing

Modeling



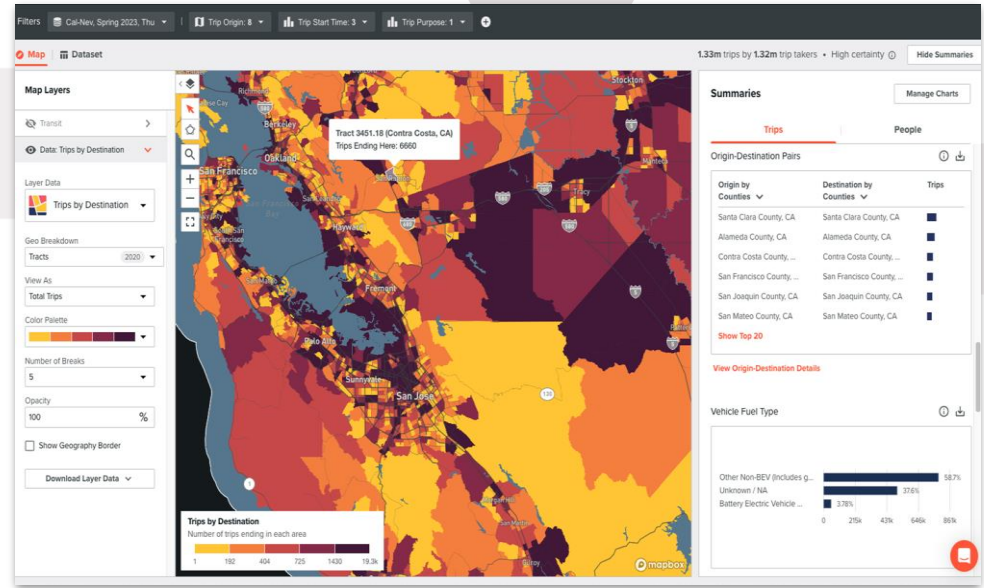
- Leverage a diverse set of third-party source data to create our models
- Generate our data by running large-scale simulations
- Granular data outputs spanning mobility, demographics, economic activity, and land use
- **Direct** link between travelers and their trips

From Data to Insights

DATA IS ONLY AS POWERFUL AS THE METRICS YOU DERIVE FROM IT

Our customers rely on Replica data to support use cases spanning operational, planning, and modeling purposes.

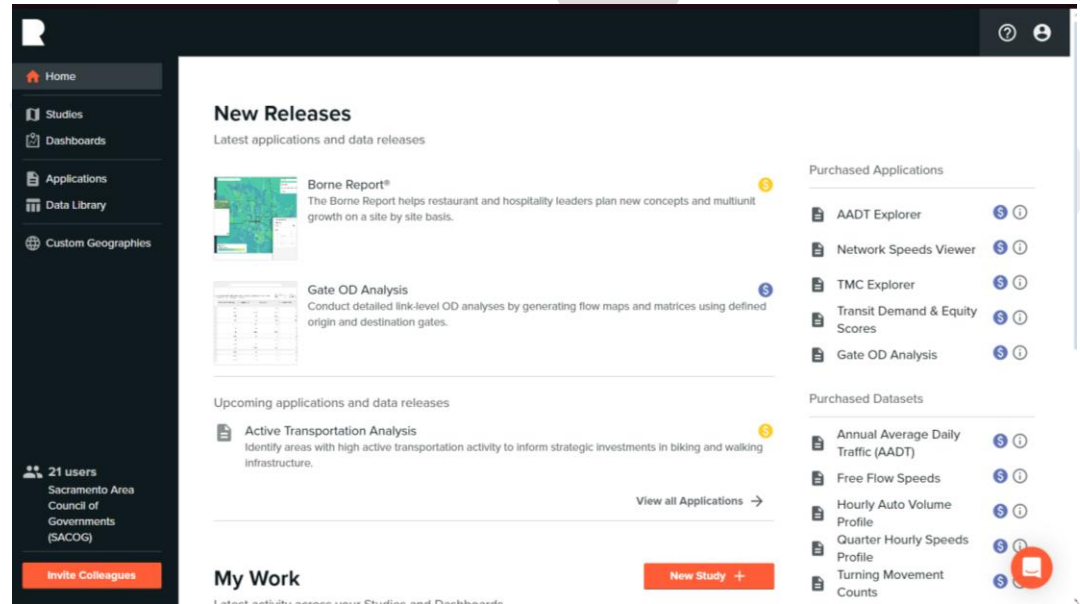
- Origin-Destination Studies
- Corridor Studies
- Transit Planning
- Travel Demand Model Updates
- Project Prioritization / Monitoring
- Safety Action Plans
- Active Transportation Studies
- Traffic Operations
- Freight Studies
- VMT & Emissions



Replica Capabilities

Platform Tools In 3 'MODES'

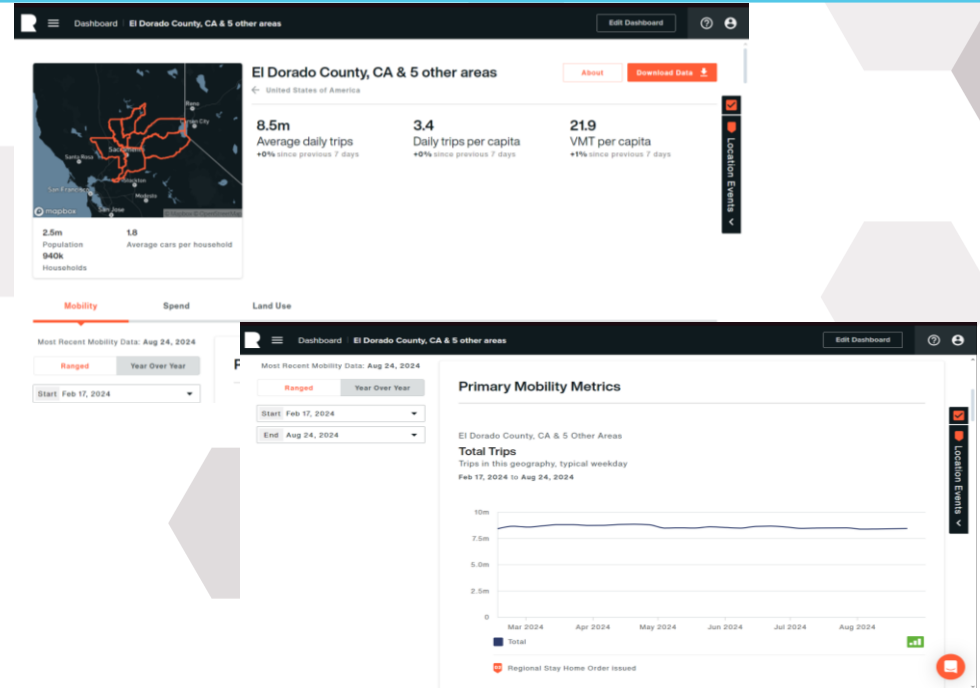
- **Dashboard**-Quick and responsive for general information
- **Applications**-Specialized and ready to go tool sets for specific analysis
- **Studies**-Deep dive data analysis



Replica Capabilities

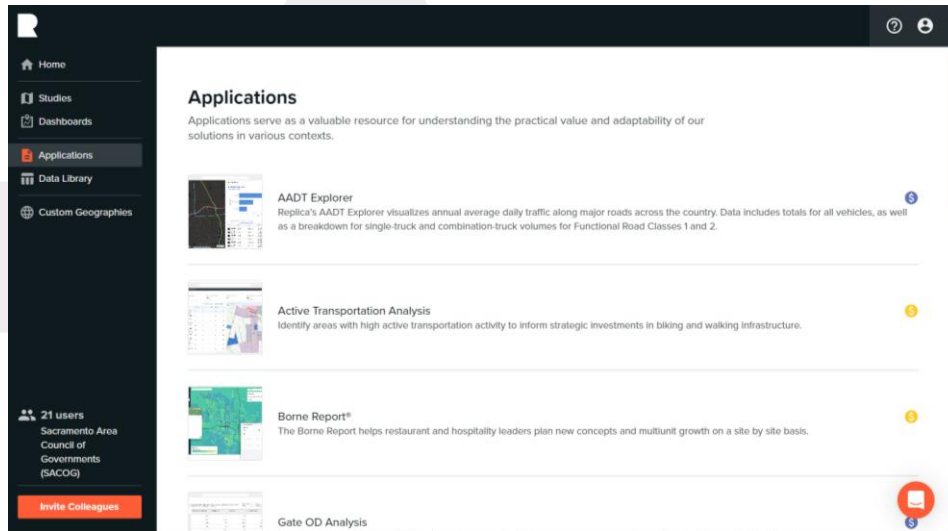
Dashboard

- **Dashboard** is an easy and quick interface to get general information for travel, spending, and land uses.
- Can filter by some metrics
- Ability to download charts



Replica Capabilities

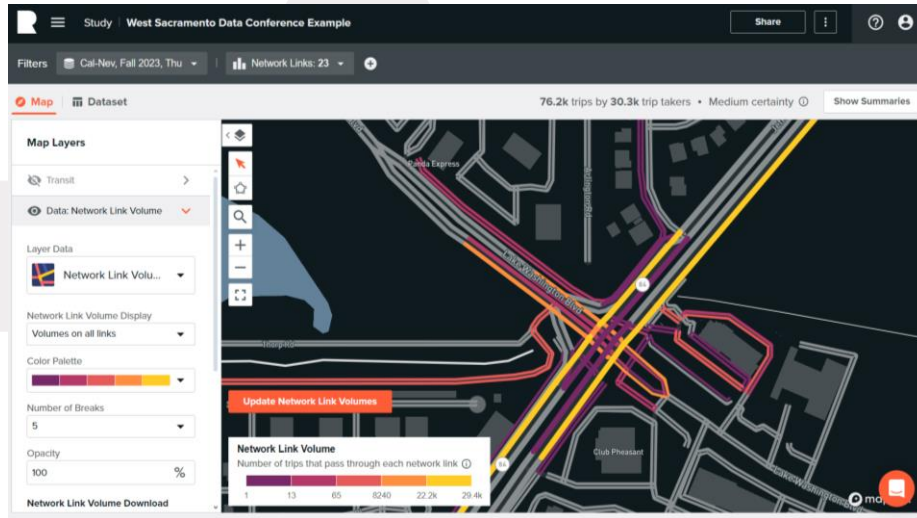
Applications



- **Applications** are specialized tool sets for specific analysis
- SACOG has access to:
 - AADT
 - Gate OD
 - Network Link Volumes
 - Network Speeds Viewer
 - Network VMT Calculator
 - Turning Movement Count Explorer
 - Transit Demand & Equity Scores

Replica Capabilities

Studies



- **Studies** is the deep dive analysis tool set.
- Contains 'raw' data by geographic boundary or network
- Provides travel and demographic metrics datasets
 - Connected by 'activity id'

Study | West Sacramento Data Conference Example

Filters: Cal-Nev, Fall 2023, Thu | Network Links: 23

Map | **Dataset** 76.2k trips by 30.3k trip takers • Medium certainty

Trips | People

The trip table represents the traveling population for your selected geo. The rows below are a preview of the data that meets the applied set of filters including origin, destination, mode, and distance. [Learn More](#)

Showing first 100 of all 76,180 rows

Activity ID	Trip Origin Block Group	Trip Origin Tract	Trip Origin County	Trip Origin State	Trip Destination Block Group	Trip Destination Tract
17701434521582139992	1 (Tract 101.02, Yolo, CA)	101.02 (Yolo, CA)	Yolo County, CA	California	1 (Tract 103.15, Yolo, CA)	103.15 (Yolo, CA)
17507860200719624527	1 (Tract 101.02, Yolo, CA)	101.02 (Yolo, CA)	Yolo County, CA	California	1 (Tract 103.15, Yolo, CA)	103.15 (Yolo, CA)
1551833308115550515	1 (Tract 101.02, Yolo, CA)	101.02 (Yolo, CA)	Yolo County, CA	California	1 (Tract 103.15, Yolo, CA)	103.15 (Yolo, CA)
1322005204820948040	1 (Tract 101.02, Yolo, CA)	101.02 (Yolo, CA)	Yolo County, CA	California	2 (Tract 103.10, Yolo, CA)	103.10 (Yolo, CA)
8173911582965473196	1 (Tract 101.04, Yolo, CA)	101.04 (Yolo, CA)	Yolo County, CA	California	1 (Tract 103.10, Yolo, CA)	103.10 (Yolo, CA)
9565309149120563308	1 (Tract 101.05, Yolo, CA)	101.05 (Yolo, CA)	Yolo County, CA	California	4 (Tract 103.10, Yolo, CA)	103.10 (Yolo, CA)
9914337085657002068	1 (Tract 102.01, Yolo, CA)	102.01 (Yolo, CA)	Yolo County, CA	California	2 (Tract 104.02, Yolo, CA)	104.02 (Yolo, CA)
3737698488377477539	1 (Tract 102.01, Yolo, CA)	102.01 (Yolo, CA)	Yolo County, CA	California	1 (Tract 103.10, Yolo, CA)	103.10 (Yolo, CA)

Trips table

Some examples of Trip metrics

- Primary Mode
 - Auto passenger
 - Public Transit
 - Walking
 - Biking
 - Commerical (Freight)
 - Taxi/Transportation
- Trip Purpose
 - Work
 - Eat
 - Social
 - Shop
 - Etc...
- Vehicle Type
 - Passenger Car
 - Medium Commerical
 - Heavy Commerical

Some examples of Demographic metrics

- Race and Ethnicity
 - American Indian and Alaska Native Non-Hispanic/Latino
 - Asian
 - Black Non-Hispanic/Latino
 - Etc...
- Work From Home
 - Remote
 - In-person
 - Employed_not_working
 - Unemployed/Not in the labor force
- Education
 - No_school: No schooling
 - Under_3
 - High_school
 - Some_college
 - Bachelors_degree
 - Etc...

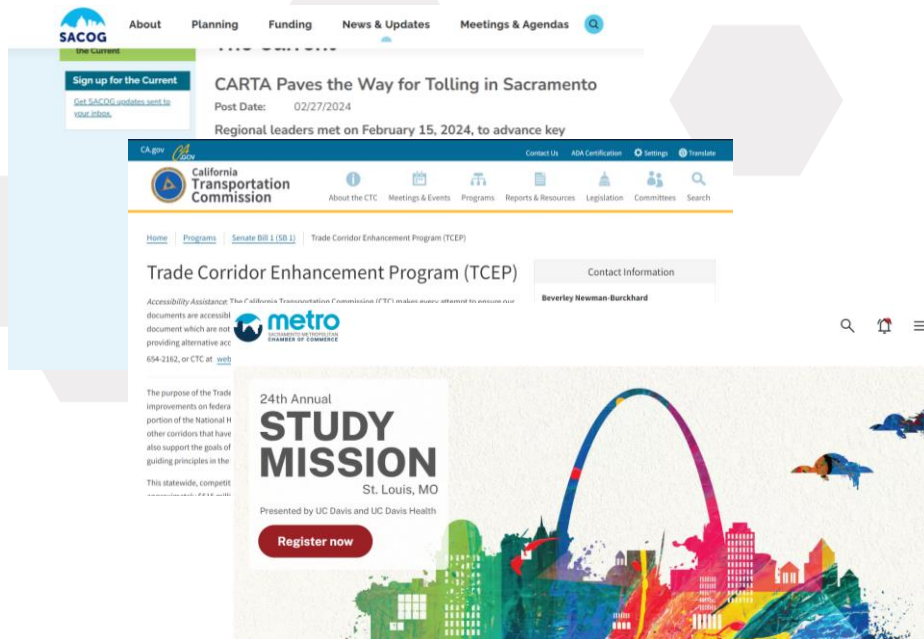
The screenshot shows a web application interface for the "West Sacramento Data Conference Example". At the top, there's a navigation bar with a "Study" tab and a "Share" button. Below this, a "Filters" section shows "Cal-Nev, Fall 2023, Thu" and "Network Links: 23". The main content area has a "Map" and "Dataset" tab, with "Dataset" selected. It displays "76.2k trips by 30.3k trip takers" with "Medium certainty". The "Trips" and "People" tabs are visible, with "People" selected. A description states: "The people table represents the population of your study that meets the applied filters. When no filters are applied, the table reflects all people who live or travel in your selected geography, and excludes 'pass-through' travelers. When trip filters are applied the table represents only the traveling population. Below is a preview of the data that meets the applied set of filters. [Learn More](#)". There are "Manage Attributes" and "Download" buttons. Below this, it says "Showing first 100 of all 30,348 rows". The table has columns: Person ID, Household ID, Age, Sex, Race and Ethnicity, Language, Employment Status, Industry, and Work From Home. The first 10 rows of data are shown.

Person ID	Household ID	Age	Sex	Race and Ethnicity	Language	Employment Status	Industry	Work From Home
10252209433478291110	5398252694505737452	26	male	white_not_hispanic_or_la...	english	employed	naics92	in_person
2890996730322428878	10744215422649532859	48	female	white_not_hispanic_or_la...	english	employed	naics54	remote
9231395086890081300	1394038955489706282	54	male	white_not_hispanic_or_la...	english	employed	naics54	in_person
9346992196461079670	839237374623976533	30	male	white_not_hispanic_or_la...	indo_european	employed	naics62	in_person
17525588044852804206	4141904889714517911	45	female	hispanic_or_latino_origin	spanish	not_in_labor_force	not_working	unemployed
9620191676387485910	16809993474774633568	60	male	white_not_hispanic_or_la...	indo_european	employed	naics22	in_person
16542332445434642122	9593922828700979478	43	female	white_not_hispanic_or_la...	english	employed	naics624221	employed

Demographics table

SACOG Replica Projects

Replica in Action

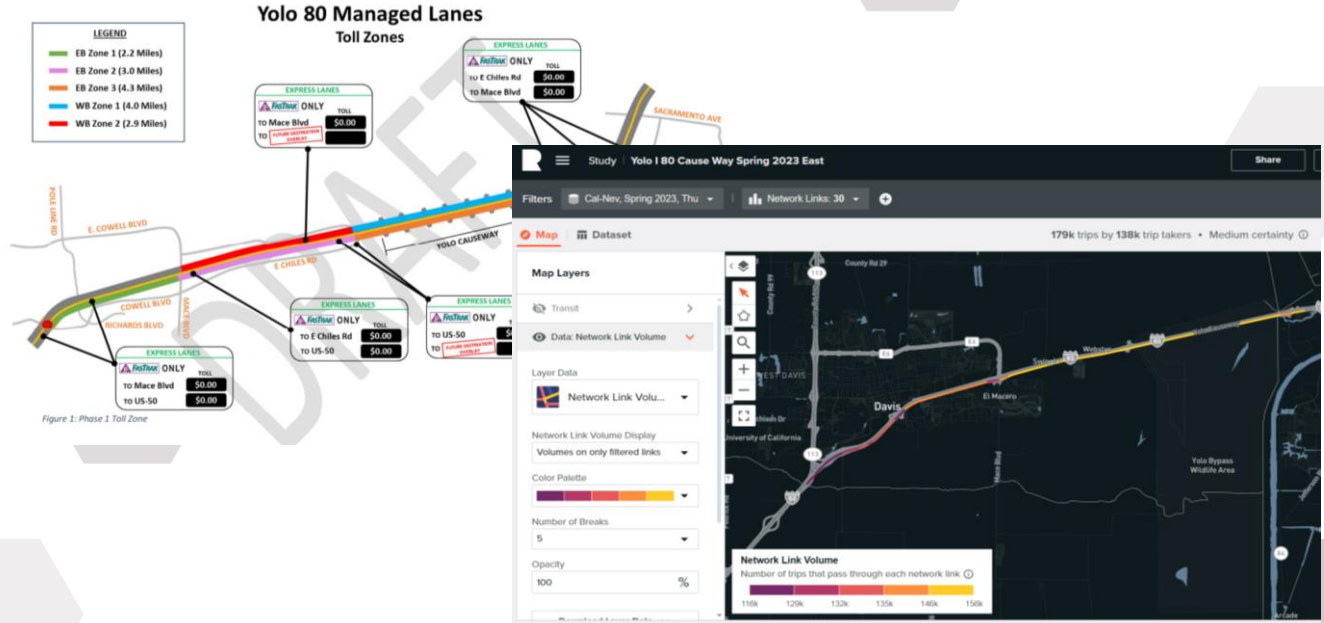


- Initial Yolo Cause Way Toll Way Data Analysis
- Commercial Truck Volumes for Trade Corridor Enhancement Program (TCEP)
- Sacramento Metro Chamber Study Tour

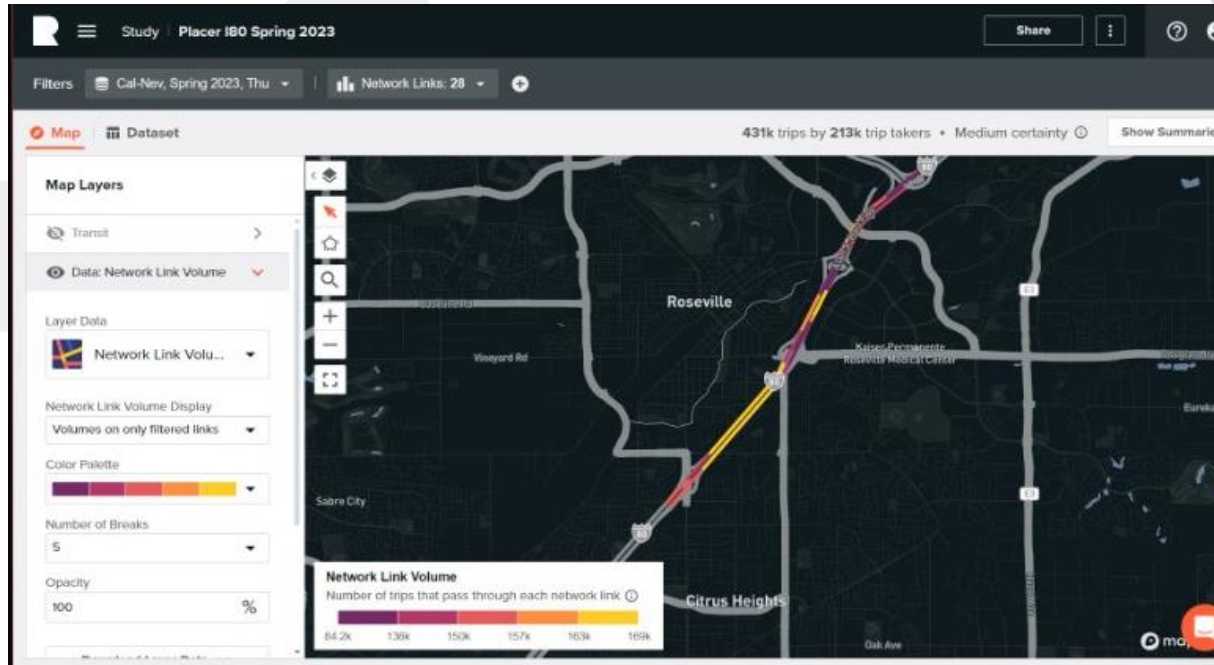
SACOG Replica Projects

Yolo Causeway and CARTA

- Collected traffic volumes on HWY 50 with focus on Yolo Causeway for O/D analysis
- Data was used to determine tolling policies implement by Capital Area Regional Tolling Authority (CARTA)



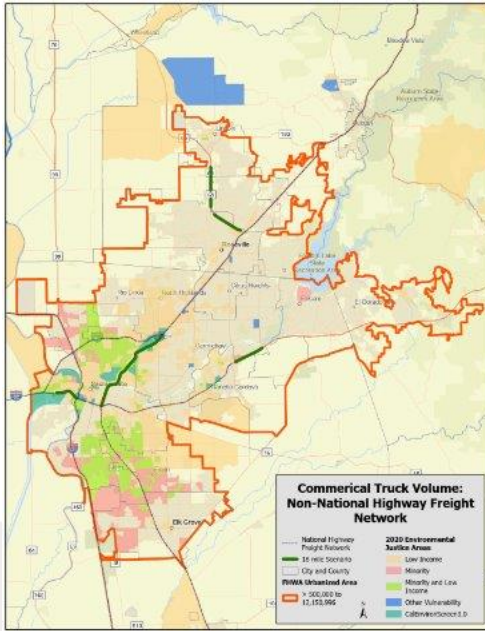
Commercial Truck Volumes for TCEP Study



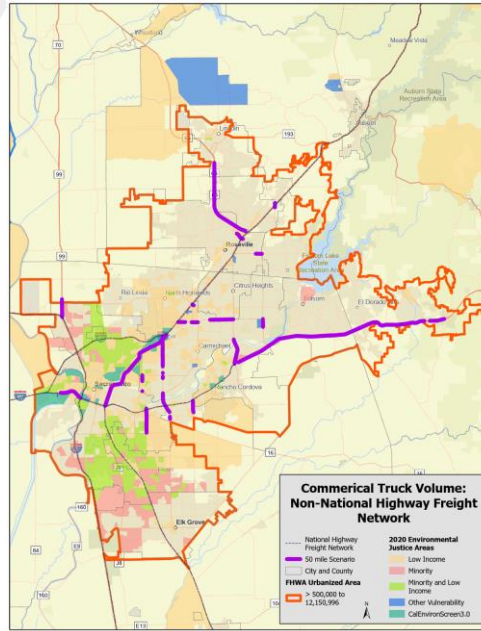
- Trade Corridor Enhancement Program (TCEP) provides funding National Highway Freight Network
- Replica provided commercial truck volumes over a 3 year period

Commercial Truck Volumes for TCEP Study

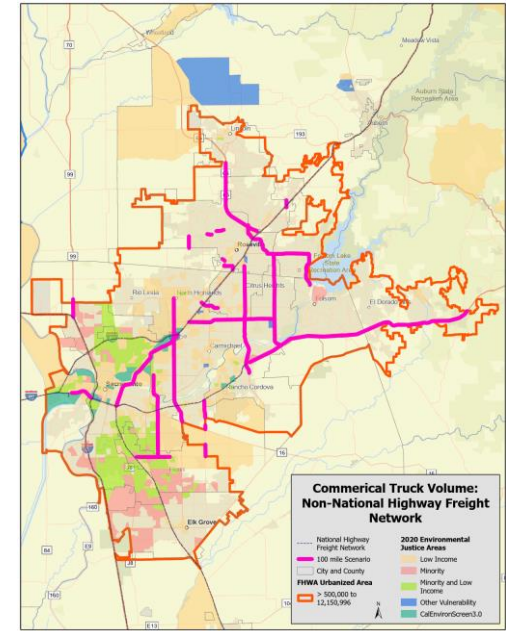




18 miles



50 miles

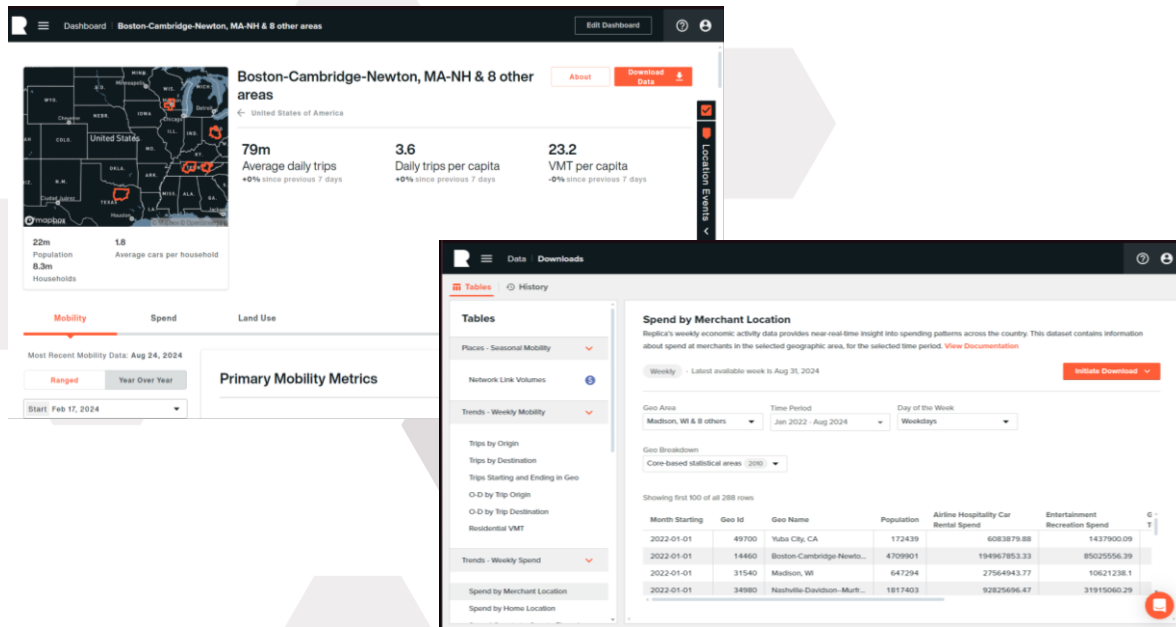


100 miles

- TCEP provides funding National Highway Freight Network
- Replica provided commercial truck volumes over a 3-year period. Network (roads) that are 28 percent by Commerical truck volume

SACOG Replica Projects

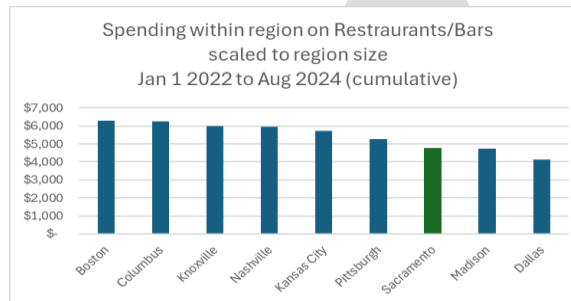
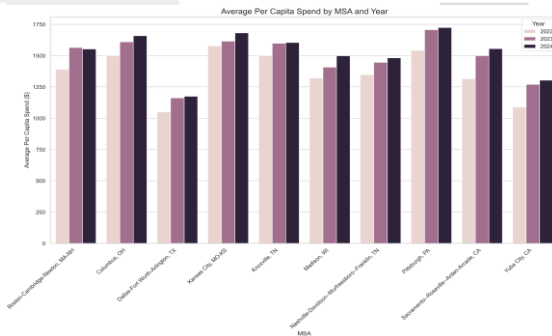
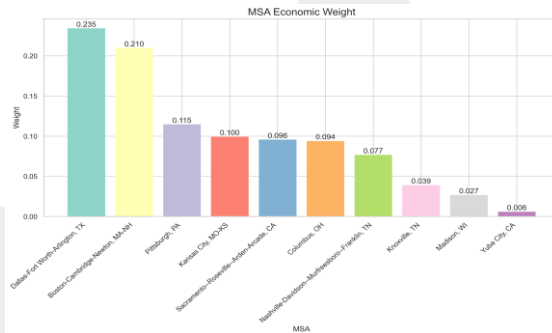
Sacramento Metro Chamber Study Tour



- Sacramento Metro Chamber has peer to peer region study mission
- Request 'Tourism' data request by MSA geography
 - Boston, MA
 - Pittsburg, PN
 - Columbus, OH
 - Nashville, TN
 - Knoxville, TN
 - Dallas, TX
 - Kansas, MO
 - Madison, WI
 - Sacramento, CA

SACOG Replica Projects

Sacramento Metro Chamber Study Tour



Future and Conclusion

- Dashboard and data download of travel metrics by every jurisdiction
- Prebuilt datasets for grant application: VMT, modes, volumes, O/D gate analysis, etc...

**Request for projects specific
to your needs!**

Thank you!

Data Request and Portal:

<https://www.sacog.org/planning/data-resource-center/data-requests>

