CA Social Distancing Data Brief

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Prepared for the State of California by Google/Slalom team
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Executive Summary

- *We sought to address the question:* ***Have CA citizens responded to the March 16/19 Shelter in Place (SIP) policies and what is the impact?***
- Our team has analyzed data from roadway traffic sensors, navigation app interactions, and roadway pollutant sensors, and all of these sources corroborate a reduction in public traffic, consistent with SIP policies. We also utilized satellite imagery and anonymized cellular phone tower data (that was provided by Orbital Insights, not Google) to identify any areas where crowd size appears to have increased or maintained pre-SIP numbers.
- We're seeing a **32.3% reduction in vehicle traffic** throughout the Bay Area following the March 16 SIP directive, as well as a **28-38% reduction in CHP traffic incidents**.
- The reduction in traffic is also corroborated by **Waze App** reported alerts being reduced by **more than 90%** across 4 counties.
- We recommend **monitoring these changes** over the coming weeks to capture any increase in social activity as CA citizens resume normal activities. These datasets are currently ingested and ready to monitor.

Overall vehicle traffic is reduced following SIP

Data from Waze traffic incidents, CalTrans highway sensors, and roadway pollution sensors all point to a reduction in roadway traffic. We estimate:

- **32.3% reduction in roadway traffic** throughout District 4 (Bay Area counties), based on CalTrans highway sensors.
- **56% reduction in NO_2** (a proxy for automobile traffic) near roadways, based on Aclima/CARB/AQMIS air quality data.
- We also see these trends coupled with a **90-94% reduction in "traffic jam" alerts** reported through the Waze app.

Note that the trends shown below generally drop concurrent with the March 16 SIP directive for the Bay Area counties, and continues for most areas during the March 19 statewide SIP order. This reduction continues through today, but we expect to see an increase over the next 2 weeks. An increase in traffic above this level will be an indication that CA residents have resumed some daily activities, against the guidance of the SIP policy. These data sources are currently available for further analysis and monitoring in the California CDT Google Cloud Platform.

Total Vehicle Flow Declined Following SIP Orders

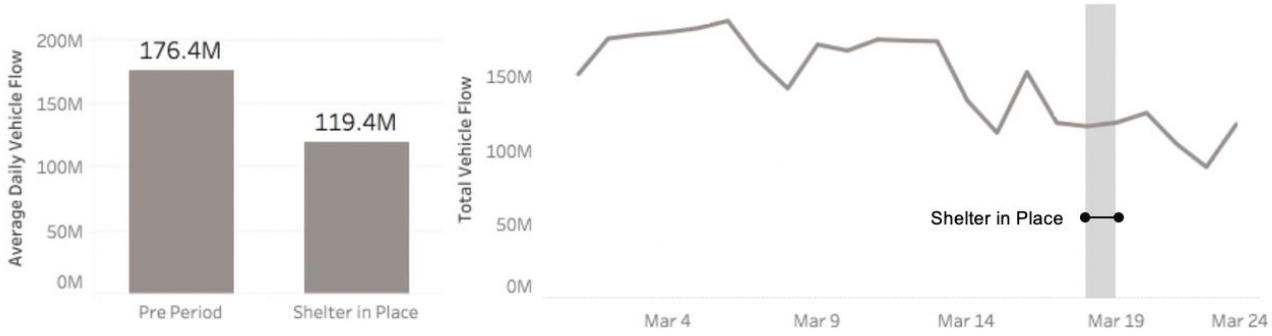
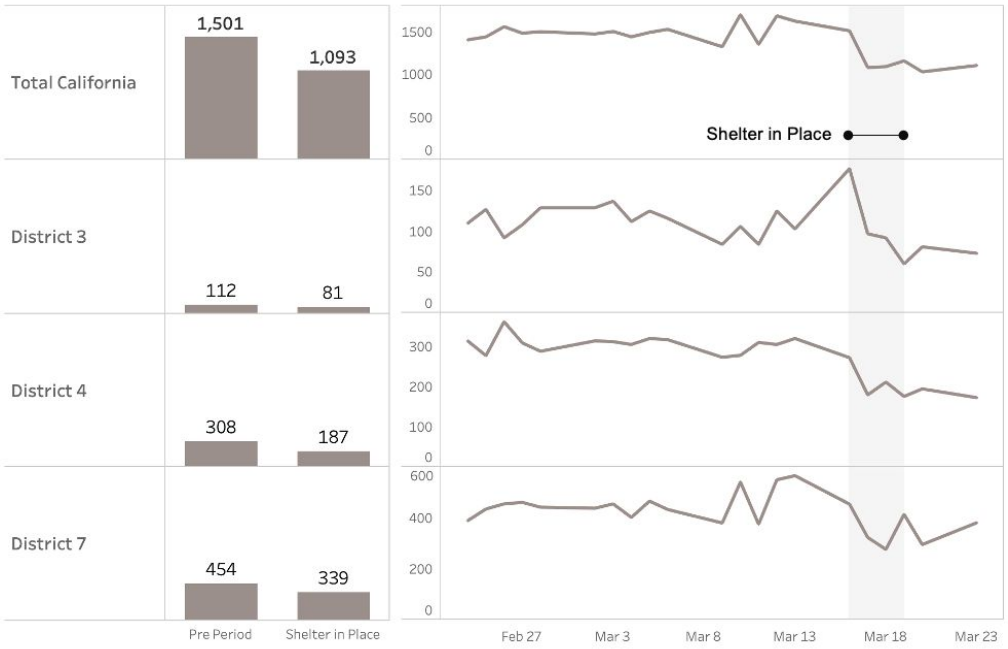


Figure 1: Traffic flow was reduced by **32.3%** throughout Bay Area Counties following the March 16 SIP order. CalTrans highway sensors are collected in 5-minute batches, and here are summed across highways in District 4.

Source : Traffic flow from Station 5-Min (PeMS) dataset for District 4. (link)

CHP Traffic Incidents Declined Following SIP Orders



Area of interest	Change after 3/16/2020
All of CA	⇩ 27.2%
District 3* (Sacramento and surrounding area)	⇩ 27.6%
District 4 (Bay Area)	⇩ 39.3%
District 7* (LA and surrounding area)	⇩ 25.3%

**SIP orders for Districts 7 and 3 occurred on 3/19/2020, but we see a reduction in these areas beginning after the SF SIP order, which occurred on 3/16/2020.*

Figure 2: Average traffic incidents per day Pre-SIP and Post-SIP, followed by the number of incidents over time. Traffic Incidents were reduced by ~28% for all of California following the March 16th SIP order. When looking at the major Metropolitan districts of CA, District 4 (Bay Area) had the highest reduction in daily traffic incidents (38%), followed by District 7 - LA (29%) and District 3 (27%).
Source : Traffic Incidents from CHP Incident Day (PeMS) dataset for all District. (link)

Waze “Traffic Jam Alerts” declined as CA Highways fall below capacity

Waze Alerts – Area of interest	Change after 3/16/2020
Los Angeles County	⇩ 90.85%
Alameda County	⇩ 91.86%
San Francisco	⇩ 93.97%
Sacramento County	⇩ 90.96%

Figure 3: In the Waze traffic alert graphics above, CA major metro areas all see a major drop-off (90-94%) in **traffic jam alerts** reported on the Waze app. Note that the first several days of the Bay Area SIP order were accompanied by a gradual reduction in traffic incidents.

Bay Area NO_2 Levels Decreased with Traffic

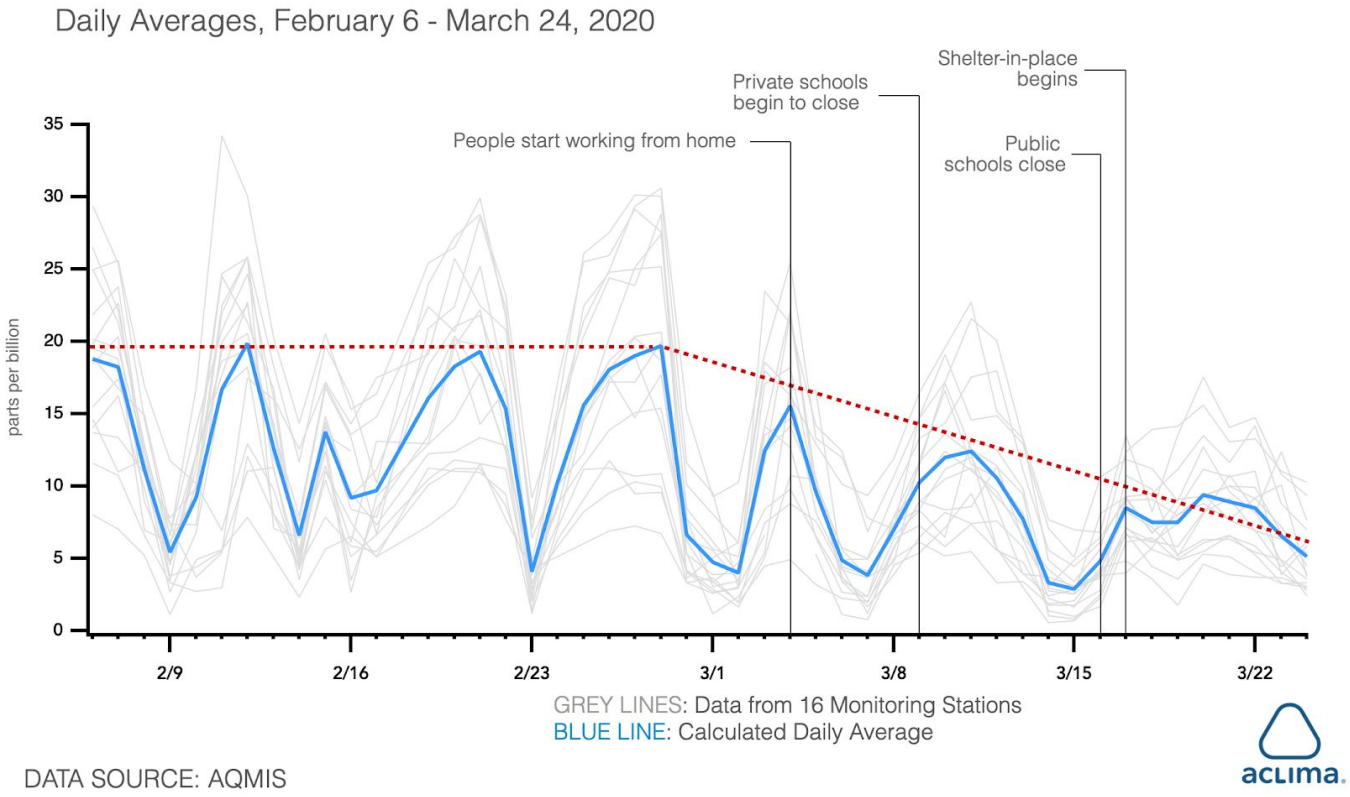


Figure 4: NO_2 (automobile pollutant) steadily declined near roadways starting in early March, when people started working from home. The average of all roadway measurements shows a 56% reduction in daily peak levels between March 4 and March 19.
Source: Aclima, CARB/AQMIS

Orbital Insight Data Indicates Declining Foot Traffic in SF

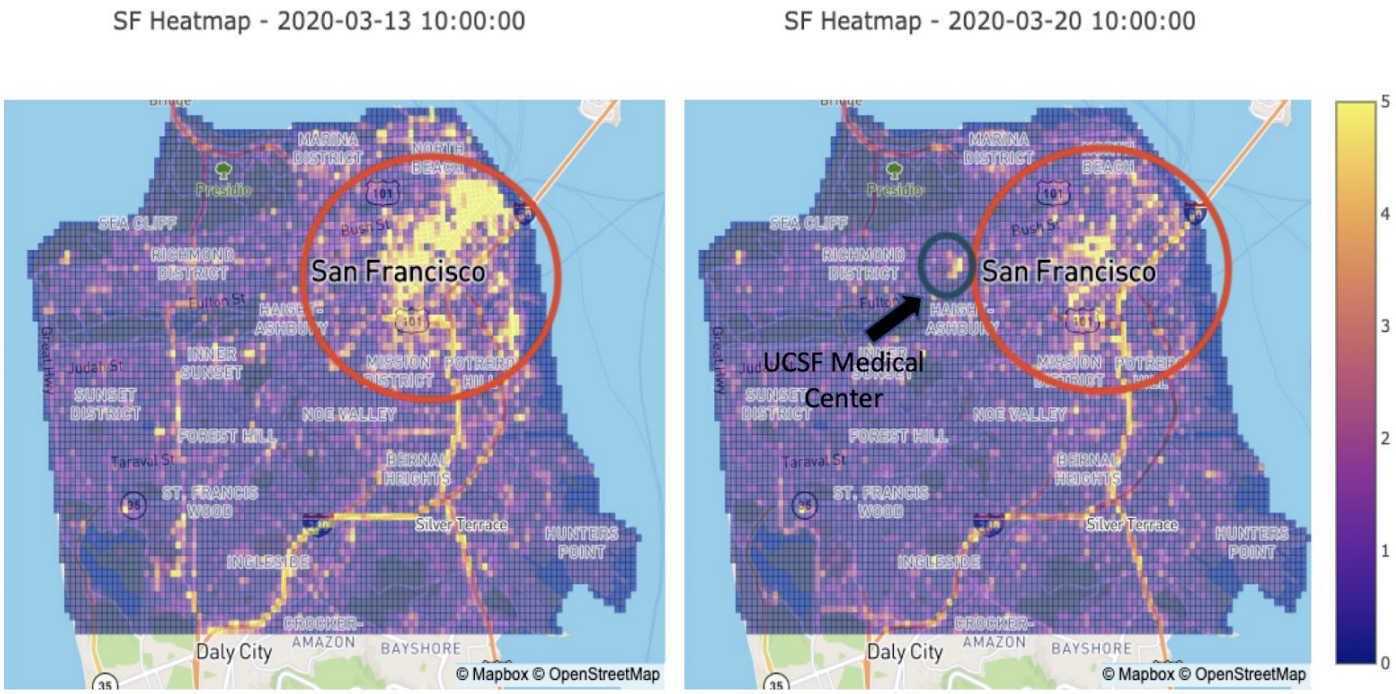


Figure 5: The density maps above show the anonymized cell phone counts (data sourced by Orbital Insights and not provided by Google) as pings to a cell phone tower (a proxy for local population) in San Francisco, at 10 AM on Friday 3/13/20 (left) and 10 AM on Friday 3/20/20 (right). The reduction in foot traffic is especially striking in the Financial District, North Beach, and Mission Bay neighborhoods, as well as on the highways. Considering the SIP order went into effect on the 16th, we do see an indication of adherence to the directive a week hence. The smaller, dark-green circle designates a clear up-tick in foot traffic around UCSF.

References

CA District Map