

EXECUTIVE SUMMARY: SAFE SPEEDS SF HIGH VISIBILITY ENFORCEMENT CAMPAIGN FINDINGS

In partnership with the State of California through a grant from the California Active Transportation Program, San Francisco implemented a high-visibility enforcement (HVE) campaign focused on driver speeds from October 2016 - September 2017. This speed management campaign showcases a good example of the partnership between local law enforcement, public health and transportation agencies in focusing on high visibility traffic enforcement. The evaluation of this project, conducted by San Francisco's Department of Public Health (SFDPH) and researchers at the University of North Carolina's Highway Safety Research Center, found that **reductions in driver speeds during HVE enforcement began to diminish one week post-enforcement. There was not a lasting effect of the HVE campaign once it ended. This points to the importance of regular, sustained enforcement to achieve lower vehicle speeds.**

Project Summary and Evaluation Findings:

- In partnership with the State through a grant from the California Active Transportation Program, San Francisco implemented a high-visibility enforcement (HVE) campaign focused on driver speeds from October 2016 - September 2017. Lead agencies were the San Francisco Municipal Transportation Agency (SFMTA) and the San Francisco Police Department (SFPD).
 - o The SFMTA-led campaign focused HVE efforts on speeding on 11 corridors, all of which were on San Francisco's Vision Zero High Injury Network – the 13% of city streets where 75% of severe and fatal crashes are concentrated. The campaign included targeted enforcement by SFPD on the 11 corridors as well as citywide, variable-message signs, and targeted media and local community education activities.
 - o SFDPH led a rigorous evaluation of the HVE enforcement efforts on the 11 corridors and partnered with researchers at the University of North Carolina's Highway Safety Research Center to conduct statistical analysis to assess HVE campaign impacts on driver speeds.
- Over 1800 speeding citations were issued to drivers on HVE corridors for the campaign; another 1400+ were issued citywide.
 - o 85% of SFPD citations issued on HVE corridors were to drivers speeding at least 10 mph over the speed limit.
 - o 33% of speeding citations were to drivers speeding 15 mph over the speed limit or higher.
 - o The 11 HVE corridors were in locations across the city, including lower-density, more residential areas.
- The evaluation of the HVE campaign found reductions in driver speeds during HVE enforcement began to diminish one week post-enforcement. There was not a lasting effect of



the HVE campaign once it ended. This points to the importance of regular, sustained enforcement to achieve lower vehicle speeds.

- The SF speed campaign found a 5% reduction in 85th percentile speeds during enforcement.
 - o In the case where the 85th percentile speed on a street is 35 mph, that reduction contributes to a decrease in speed of 1.75 mph among the faster speeders. This reduction translates to reduced distance needed to stop a motor vehicle, which could prevent a crash entirely, and reduced injury severity when a crash occurs. The estimated impacts of slowing speeds are even greater at some of the higher speeds observed and cited for the campaign.
- There were also modest speed reductions one hour *before* HVE was implemented, when variable-message signage was present starting in March 2017. This points to an opportunity to experiment with the use of enforcement-publicizing signs to expand the time and distance halo effects of enforcement.
- Among drivers cited for speeding, 64% were residents of San Francisco, 68% were male, and over half were between 25 and 44 years old (52%).
- To assess potential racial bias in enforcement, we compared police-reported race of cited drivers to an estimate of the race of all drivers on the corridors based on all vehicle-involved crashes. Percent of citations issued and percent of crashes were relatively similar (difference of 2-3%) for Black (12% vs. 10%), Asian (23% vs. 26%) and Other (14% vs. 12%) races. Whites were more represented in citations compared to crashes (36% vs. 28%), while Hispanics were less represented in citations compared to crashes (15% vs. 24%).
- People walking and biking on the HVE corridors reported walking and biking more frequently one year after the campaign started and reported increased confidence in the enforcement of the speed limit.
- Vision Zero SF's 2019 Action Strategy commits to continued HVE enforcement and safe speeds education to address the dangers of speeding. Automated Speed Enforcement, using technology as a potential force multiplier tool to achieve sustained enforcement over time, is part of Vision Zero SF's Transformative Policy Agenda and requires State legislation to authorize its use.
- Slowing speeds is critical to achieving zero traffic deaths on our streets. Driving just 5 miles per hour over a 25-mph speed limit is nearly twice as likely to result in a fatal crash with someone walking. And for people aged 70 and older - the risk of death is even greater.

SAFE SPEEDS SF HIGH VISIBILITY ENFORCEMENT CAMPAIGN FINDINGS

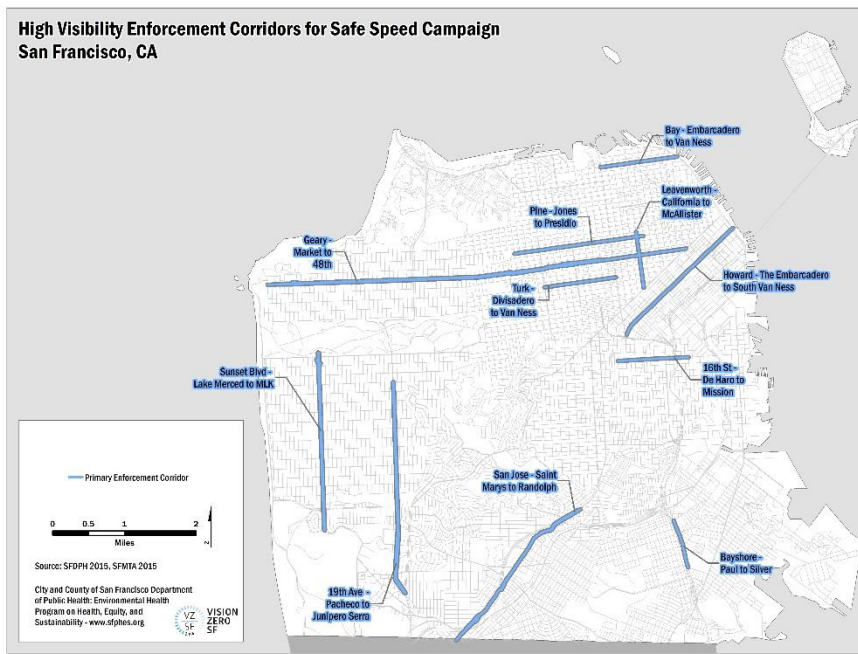
The Vision Zero SF's Safe Speeds SF High Visibility Enforcement (HVE) Campaign was led by the San Francisco Municipal Transportation Agency (SFMTA) in collaboration with the San Francisco Police Department (SFPD) and funded by the California Active Transportation Program. San Francisco Department of Public Health (SFPDH) led the evaluation, and partnered with researchers at the University of North Carolina's Highway Safety Research Center who conducted a statistical analysis to assess HVE campaign impacts on driver speeds.



The Safe Speeds SF HVE campaign targeted SFPD enforcement efforts on speeding on 11 corridors throughout San Francisco from October 2016-September 2017. The HVE events included Variable-Message Signs alerting drivers to enforcement that were displayed the Sunday evening prior starting in

March 2017. There was also targeted media including back-to-school media and radio hits in August/October 2016, bus back/shelter ads and online marketing in July 2017, and paid social media in August/September 2017.

Community groups also conducted local education activities primarily focused in Summer 2017 on the target corridors. The 11 HVE corridors in a range of locations across San Francisco (see



Appendix A) were selected based on the following criteria: a) on the Vision Zero High Injury Network;¹ b) high incidence of serious and/or fatal injuries to people walking and biking; c) high rates of speeding; d) traffic volumes in the medium to high range; e) appropriate for LIDAR enforcement.

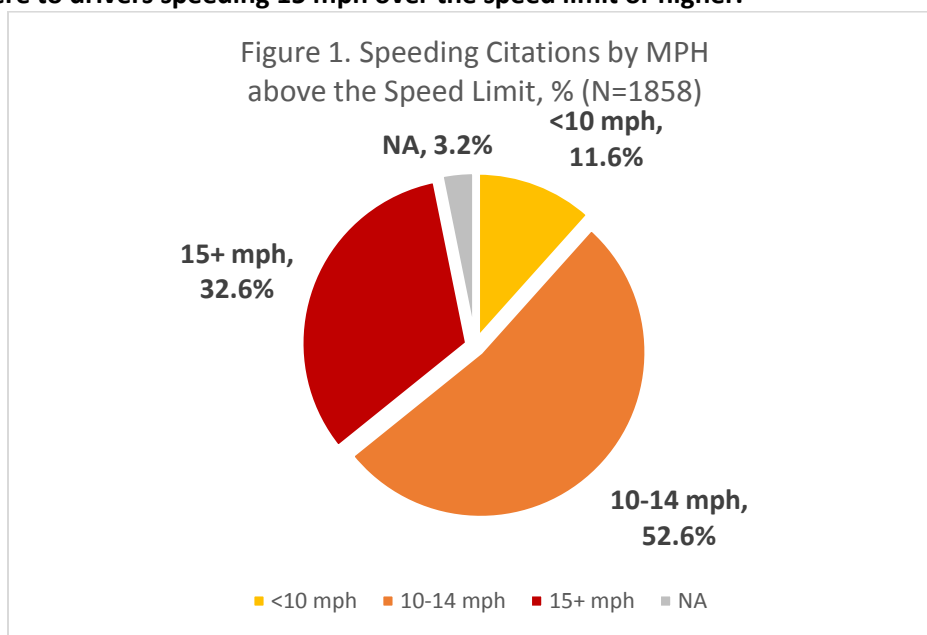
The evaluation focused on the 11 HVE corridors and assessed: a) driver speeds and b) pedestrian and cyclist perceptions. Data was collected from August 2016 through October 2017 on HVE corridors and comparison sites that did not receive targeted enforcement, matched as feasible on characteristics that can impact vehicle speeds and transportation patterns.

¹ Available at: Vision Zero SF. Maps and Data. Vision Zero Maps. <http://visionzerosf.org/maps-data/>

Driver speed data were collected on HVE and comparison sites utilizing LIDAR (light detection and ranging) technology at the five time periods: 1) Pre-Campaign (August/September 2017); 2) HVE Day - One hour prior to the HVE event; 3) HVE Day - During the HVE event; 4) Post-HVE Day - One Week after the HVE event; 5) Post-Campaign (October 2017). Perception surveys were administered to people walking and biking aged 18 and over during August/September 2016 and one year later. Data on citations issued for the campaign were collected by SFPD.

Speed Citations Issued by San Francisco Police Department

Over 1,800 speeding citations were issued by the San Francisco Police Department to drivers on HVE corridors from September 2016 – September 2017.² On average, 154 speeding citations were issued each month of the HVE campaign – at a rate of 9 speeding citations for every hour of HVE traffic operations at a given location. As depicted in Figure 1, **85% of speeding citations on HVE corridors were issued to drivers speeding at least 10 miles over the speed limit. One-third of speeding citations issued on HVE corridors were to drivers speeding 15 mph over the speed limit or higher.**



As depicted in Table 1, **the average and highest recorded citation speeds well exceeded the speed limit.**

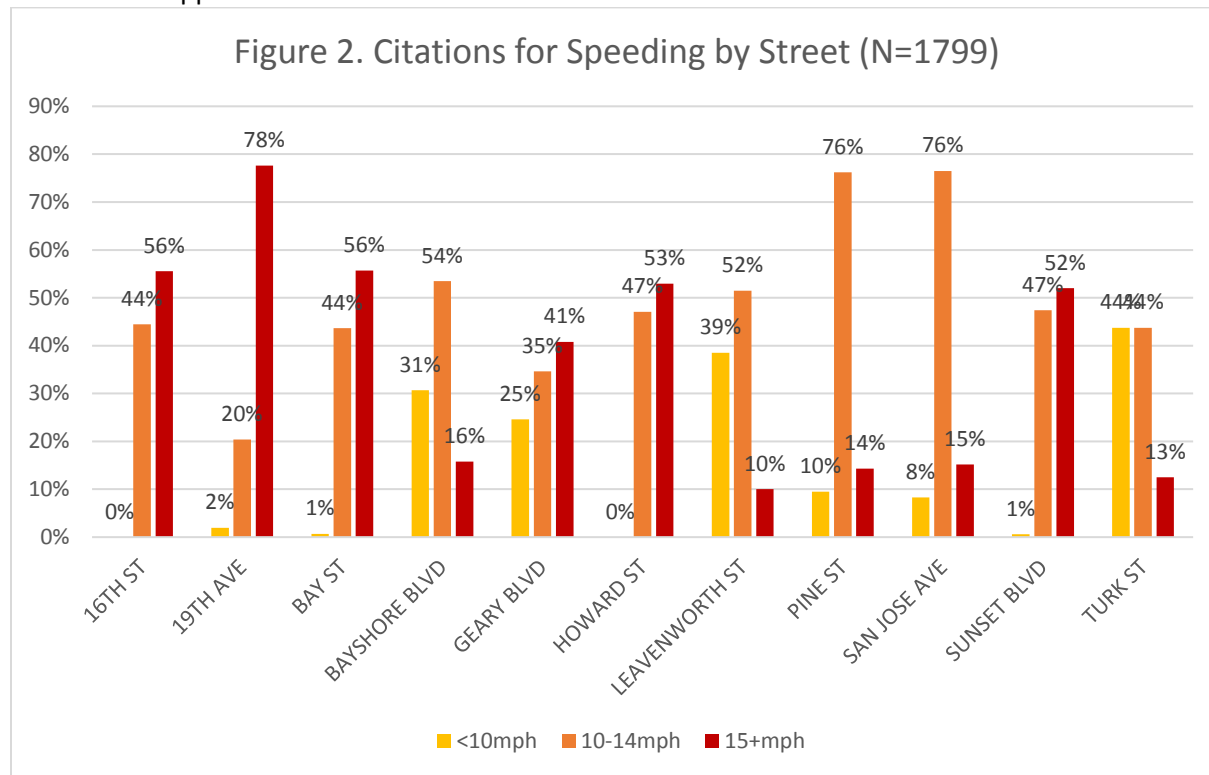
Table 1. Highest and Average Citation Speeds on HVE Corridors by Speed Limit

Speed Limit	Average Citation Speed	Highest Citation Speed
25 MPH	37.6 MPH	55 MPH
30 MPH	44.5 MPH	63 MPH
35 MPH	48.7 MPH	85 MPH

Some streets had notably higher proportions of drivers issued citations for **driver speeding 15 mph or more above the speed limit** when citations were issued for the speed campaign (Figure 2, where speed data available, N=1,799 citations). 19th Avenue had the highest proportion of drivers cited for speeding 15 mph or higher over the speed limit (red in above chart), accounting for 78% of citations issued on the street. **16th Street, 19th Avenue, Bay Street, Howard Street, and Sunset Boulevard** all had **over half of**

² An additional 1,400+ citations were given citywide during the same time period.

their speed citations at speeds of 15 mph or higher above the speed limit. Geary Boulevard had 40% of speed citations in the 15 mph category. Demographic characteristics of drivers cited for speeding are described in Appendix B.



Campaign Impacts on Driver Speeds

There are different approaches to assessing speed impacts/changes over time, and thus four approaches to measuring speed were assessed for the evaluation – the desired direction for all being a *decrease*. Three speed measures are associated with the absolute magnitude of speed: 85th percentile speed; median speed; mean speed. The fourth, percentage of vehicles exceeding mean speed - represents speed variation in traffic flow, a decrease indicating a reduction in proportion of vehicles traveling above the mean speed on the segment. These four variables were analyzed for each intervention period with an advanced modelling approach that allowed for adjustment for factors potentially associated with vehicle speeds, including seasonal effects, peak/off-peak daily commute periods, and weather conditions, to assess the impact of the HVE campaign. Table 2 presents a summary matrix where the effects of the HVE campaign compared to the comparison sites were statistically significant and unlikely to be due to chance. All findings reported in Table 2 were in the desired direction, indicating a decrease in speed.

Table 2. Percent Change in Speed Measure by Evaluation Period, Relative to Pre-Campaign Conditions

Outcome Measure	One hour prior to the HVE event	HVE Day - During the HVE event	One Week after the HVE event
85 th percentile speed	-3.3%	-5.1%	-3.9%
Median speed		-3.4%	
Mean speed	-2.8%	-4.6%	-3.8%
Vehicles exceeding mean speed, %		-5.2%	

One hour prior to HVE: There was a **modest speed reduction in the period one-hour before enforcement events** relative to the pre-campaign data collection period in **85th percentile** and **mean speed** on the HVE corridors. Midway through the campaign, signs indicating the enforcement event were rolled out the Sunday preceding the scheduled enforcement and drivers may have responded to these signs by lowering speeds.

During HVE: The findings indicate that the **HVE speed enforcement was effective** in lowering speeds as measured in **all outcome measures** in Table 2 **while enforcement was being conducted**. Notably, the results show that percent exceeding the mean speed went down during the enforcement when the mean speed also went down.

One week after HVE: There were, on average, **modest detectable effects on 85th percentile speeds** and **mean speeds by one week following** an HVE event.

Post-Campaign (October 2017, Data Not in Table): There was **not a lasting effect of the campaign during the post-campaign period**. While very modest positive effects of the campaign were observed *one week after* the targeted HVEs – the evaluation **did not find a lasting time “halo” effect** with respect to reduced speeding when the citywide targeted enforcement campaign ended and post-campaign data was collected. **This finding points to regular and sustained enforcement as an important tool to address speeding.**

Overall, effects (benefits of HVE slowing vehicle speeds) were **greater during HVE events**, than for before and one week after the intervention. The largest and most significant effects were seen for **85th percentile speeds**; median speeds were least affected. **This is consistent with the campaign having an impact on speeders.**



Perceptions of People Walking and Biking

People walking and biking on the intervention and control corridors were surveyed before the campaign, in August-September 2016, and one year later to assess the influence of the campaign on knowledge and perceptions related to speeding and safety. On the HVE corridors specifically, 407 people completed a pre-campaign survey, and 862 people completed a survey one year later. The average age in these time periods was 42 and 43 years, with age ranges of 18-89 and 17-90 years, respectively. Transportation mode was also similar in the two time periods: walking (91% in both), walking with cane or walker (3%, 2%), wheelchair (2%, 1%), biking (3%, 5%), another non-motorized mode (1% in both).



Compared to before the campaign on HVE corridors, one year later:

- **Respondents surveyed were walking and biking on the corridors more frequently:** More people responded that they walked or biked on the corridor “a few times a week” or “about once a week” post-campaign (16% → 19% and 6% → 9%, respectively), and fewer walked or biked “less than once a week” (15% → 11%).
 - **This increase was most evident on HVE corridors south of 16th Street and on or east of Van Ness Avenue** – with historically generally lower concentrations of people walking and biking.
- **Respondents reported increased confidence in enforcement of safe speeds:** Forty percent more people (22% → 31%) said they thought someone driving over the speed limit would get a ticket after the campaign.

Discussion and Implications

Research published by AAA Foundation³ describes the differences in average crash survival at different vehicle speeds *at the time of crash impact* using data from U.S. jurisdictions. **Driving just 5 miles per hour over a 25 mph speed limit is nearly twice as likely to result in a fatal crash. And for people aged 70 and older - the risk of death is even greater.**

While our study measured vehicle travel speeds and not impact speeds (vehicle speed immediately prior to a crash, the focus of the AAA research), the AAA study illustrates the **potential profound impacts of relatively small changes in vehicle speeds on whether someone walking survives a motor vehicle collision**. International research has also established strong relationships between average operating speed on a roadway, and between individual drivers’ speed, and fatal and injury crash potential.⁴

The SF speed campaign found a 5% reduction in 85th percentile speeds during enforcement. In the case where the 85th percentile speed on a street is 35 mph, that reduction contributes to a decrease in speed of 1.75 mph among the faster speeders. **This reduction translates to reduced distance needed to stop a motor vehicle, which could prevent a crash entirely, and reduced injury severity when a crash occurs. The estimated impacts of slowing speeds are even greater at some of the higher speeds observed and cited for the campaign.**

The study found a modest speed reduction in travel speeds associated with the period one-hour *before* enforcement events started. This finding may relate to the fact that the signs publicizing the event began to be installed along the corridor the Sunday before the enforcement event beginning in March 2017. Therefore, these signs may have influenced driver speeds, even before the police began issuing tickets. This finding points to an **opportunity to experiment with the use of enforcement-publicizing signs, to potentially expand the time and distance halo effects of HVE.**

The campaign also demonstrated reductions in speeds while HVE enforcements were being conducted, which began to diminish by one week post-enforcement. **Despite the high visibility and supporting**

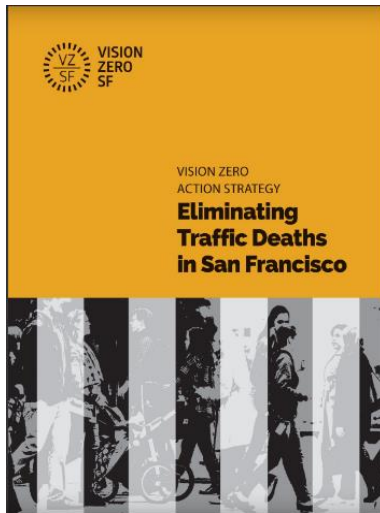
³ Tefft, B.C. (2011). Impact Speed and a Pedestrian’s Risk of Severe Injury or Death. AAA Foundation for Traffic Safety. Available at: <https://aaaafoundation.org/impact-speed-pedestrians-risk-severe-injury-death/#targetText=Results%20show%20that%20the%20average.and%2090%25%20at%2046%20mph>.

Visualization by ProPublica available at: <https://www.propublica.org/article/unsafe-at-many-speeds>
⁴ : Elvik, R., Vadeby, A., Hels, T., & van Schagen, I. (2019). Updated estimates of the relationship between speed and road safety at the aggregate and individual levels. *Accident; Analysis and Prevention*, 123, 114–122.

publicity, the speed lowering impacts seen immediately prior to, during and one-week following the HVE events were not sustained over time, having disappeared within one month of the end of the overall targeted enforcement campaign. This points to the importance of regular, frequent, sustained enforcement over time to achieve lower vehicle speeds.

Vision Zero SF 2019 Action Strategy

San Francisco is implementing a number of engineering, enforcement, education and policy actions as a part of its **Vision Zero 2019 Action Strategy** to slow speeds to save lives and reduce severe injuries.



These actions include:

- **Conduct High Visibility Enforcement** actions along a HIN corridor each quarter to target unsafe driver behaviors related to crashes.
- Continue **safe speeds education campaign** to reach people through communication tools (bus ads/shelter ads, radio, social media) in San Francisco about the dangers of speeding.


Automated Speed Enforcement part of **Vision Zero SF's Transformative Policy Agenda** as it is a potential **force-multiplying tool** to achieve sustained enforcement over time that has been proven to be effective at both slowing speeds and reducing injuries and deaths when implemented in other jurisdictions. Currently, state legislation to authorize the use of automated speed enforcement would be required to use this tool in San Francisco.

For More Information

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APPENDIX A. Safe Speeds SF High Visibility Enforcement Campaign: Corridor Characteristics



High Visibility Enforcement Corridor	Posted Speed Limit	Length	Citations ≥ 10 MPH Above Speed Limit (%)	Land Use	Street Characteristics, Transportation Options	Cross Section +
16 th Street: De Haro to Mission	25 MPH	1 Mile	56%	A mix of residential, mixed use, and production, distribution and repair (PDR).	Travel Lanes: 2 WB; 1 EB Transit: 22, 33, 55 Bicycle Facilities: N/A	 <p data-bbox="1207 802 1625 824"><i>16th Street and Florida Street, August 2017</i></p>

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APPENDIX A. Safe Speeds SF High Visibility Enforcement Campaign: Corridor Characteristics

<p>19th Avenue: Pacheco to Junipero Serra</p>	<p>30 MPH</p>	<p>2.3 Miles</p>	<p>78%</p>	<p>Largely low-density residential neighborhoods. Single and multi-family homes with garages and curb cuts.</p>	<p><i>State Highway</i></p> <p>Travel Lanes: 3 NB; 3 SB; planted median or LRV tracks</p> <p>Transit: 28, 28R, M</p> <p>Bicycle Facilities: N/A</p>	 <p><i>19th Avenue and Denslowe Drive, August 2017</i></p>
<p>Bay Street: The Embarcadero to Van Ness</p>	<p>25 MPH</p>	<p>1 Mile</p>	<p>56%</p>	<p>Primarily composed of multi-family residential buildings to the west, with retail, commercial, and office uses, hotels and other amenities for tourists proliferate to the east.</p>	<p>Travel Lanes: 2 WB; 2 EB</p> <p>Transit: 8, 8BX</p> <p>Bicycle Facilities: N/A</p>	 <p><i>Bay Street and Stockton Street, June 2017</i></p>



APPENDIX A. Safe Speeds SF High Visibility Enforcement Campaign: Corridor Characteristics

<p>Bayshore Boulevard: Silver to Paul</p>	<p>35 MPH</p>	<p>0.7 Miles</p>	<p>16%</p>	<p>Directly fronted by industrial and commercial land uses along most. Large residential neighborhoods are within walking distance.</p>	<p>Roadway adjacent to the freeway</p> <p>Travel Lanes: 1 NB; 1 SB; 1 center turn lane</p> <p>Transit: N/A</p> <p>Bicycle Facilities: Class II bikeway; Class IV bikeway</p>	 <p><i>Bayshore Boulevard and Fitzgerald Avenue, April 2017</i></p>
<p>Geary Street/ Boulevard: Market to 48th Avenue</p>	<p>25 – 35 MPH</p>	<p>6 Miles</p>	<p>41%</p>	<p>To the west a lower density residential neighborhood with ground floor commercial retail. Moving east, residential and commercial density increases, as does the amount of pedestrian foot traffic.</p>	<p>Travel Lanes: 3/4 WB; 3/4 EB west of Gough; 2 WB east of Gough</p> <p>Transit: 38, 38R, 38AX, 38BX</p> <p>Bicycle Facilities: N/A</p>	 <p><i>Geary Boulevard and Divisadero Street, February 2017</i></p>



APPENDIX A. Safe Speeds SF High Visibility Enforcement Campaign: Corridor Characteristics

<p>Howard Street: The Embarcadero to South Van Ness</p>	<p>25 MPH</p>	<p>2 Miles</p>	<p>53%</p>	<p>The corridor connects the bay to downtown commercial, office, and residential areas. Former PDR character is increasingly being converted into higher intensity active uses.</p>	<p>Travel Lanes: 4 WB west of Fremont; 2 WB; 2 EB east of Fremont Transit: N/A Bicycle Facilities: Class II bikeway</p>	 <p><i>Howard Street and 5th Street, September 2017</i></p>
<p>Leavenworth Street: California to McAllister</p>	<p>25 MPH</p>	<p>0.7 Miles</p>	<p>10%</p>	<p>Directly fronted by multi-family residential buildings with and without ground floor retail and lots of pedestrian activity on the sidewalk.</p>	<p>Travel Lanes: 3 NB south of Post; 2 NB north of Post Transit: 27 Bicycle Facilities: N/A</p>	 <p><i>Leavenworth Street and Eddy Street, October 2017</i></p>

APPENDIX A. Safe Speeds SF High Visibility Enforcement Campaign: Corridor Characteristics

<p>Pine Street: Jones to Presidio</p>	<p>30 MPH</p>	<p>1.8 Miles</p>	<p>14%</p>	<p>Primarily residential to the west, with a greater variety of residential, commercial, and institutional uses towards the east.</p>	<p>Travel Lanes: 3 WB</p> <p>Transit: 1BX</p> <p>Bicycle Facilities: N/A</p>	 <p><i>Pine Street and Laguna Street, April 2017</i></p>
<p>San Jose Avenue: Saint Marys to Randolph</p>	<p>35 MPH</p>	<p>1.8 Miles</p>	<p>15%</p>	<p>There are varied land uses along the corridor, primarily residential.</p>	<p>Travel Lanes: 2 NB; 2 SB; LRT tracks; pedestrian foot bridges</p> <p>Transit: J, 28R</p> <p>Bicycle Facilities: Class II bikeway; Class IV bikeway</p>	 <p><i>San Jose Avenue and Cotter Street, December 2017</i></p>

APPENDIX A. Safe Speeds SF High Visibility Enforcement Campaign: Corridor Characteristics

<p>Sunset Boulevard: Lake Merced to MLK</p>	<p>30 MPH</p>	<p>2.4 Miles</p>	<p>52%</p>	<p>Nearby single-family residential housing and neighborhood commercial corridors.</p>	<p>Travel Lanes: 3 NB; 3 SB; planted median</p> <p>Transit: 29</p> <p>Bicycle Facilities: N/A</p> <p>A sidewalk, trail and trees line each side of the boulevard</p>	 <p><i>Sunset Boulevard and Sloat Boulevard, June 2016</i></p>
<p>Turk Street: Divisadero to Van Ness</p>	<p>25 – 30 MPH</p>	<p>1 Mile</p>	<p>13%</p>	<p>A mixed-use corridor that includes large residential, mixed use, and commercial development.</p>	<p>Travel Lanes: 2 WB</p> <p>Transit: 7X</p> <p>Bicycle Facilities: N/A</p>	 <p><i>Turk Street and Webster Street, February 2017</i></p>

+ All screenshots taken between March and October 2017.

APPENDIX B. Safe Speeds SF High Visibility Enforcement Campaign: Demographic Data for Drivers Cited for Speeding

Demographic data related to people cited for speeding on the HVE corridors based on SFPD citations were also analyzed for the study to describe driver characteristics.

City of Residence: Among drivers cited for speeding, 64% were residents of San Francisco.

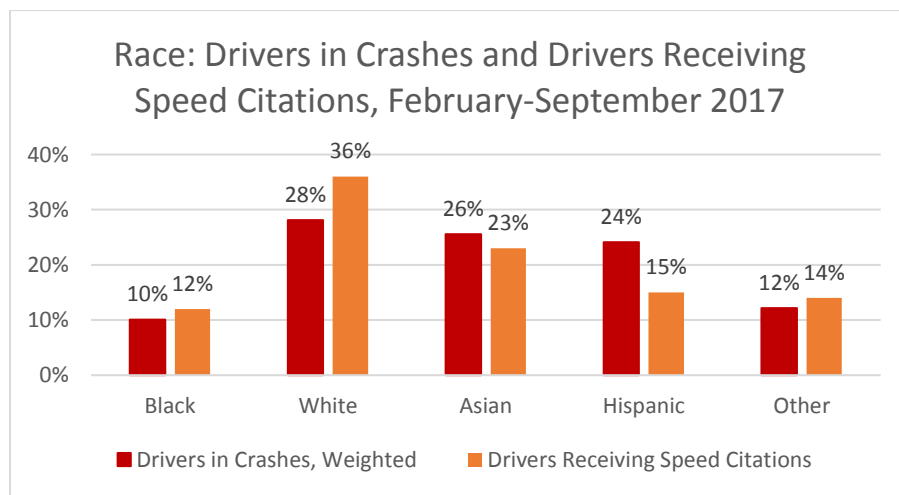
Sex: 68% of drivers cited for speeding were male.

Age: Over half of drivers cited for speeding were between 25 and 44 years old (52%), 28% were aged 45-64 years.

Race: Race data for drivers receiving speed citations was collected based on police report from February-September 2017 in response to community concerns regarding racial bias in policing.

To help assess this concern, for the race analysis we sought to identify a group that would approximate drivers on the enforcement corridors to compare the racial distribution of citations on those same corridors. Data is not available on the race of all drivers. Data based on the census and DMV records only captures the demographics of people who both live *and* drive in a given area – and many of the study corridors carry vehicles travelling across the city with both resident and non-resident drivers. For this analysis, we thus used the imperfect proxy of drivers involved in police-reported vehicle crashes on the corridors as our best estimate of race of all drivers on the corridors. We included all drivers involved in crashes, regardless of fault – as determination of fault is another factor potentially impacted by racial bias.

To estimate driver race on the corridors we selected all vehicle-involved crashes (n=1061) occurring February 2017-September 2017 on the HVE corridors. We weighted the crashes by race on each corridor to be consistent with the proportion of citations issued on each corridor for the HVE campaign to ensure that each corridor's contribution to the overall race estimate for crashes was consistent with the percent of campaign citations issued on that same corridor during February-September 2017. The following chart summarizes our findings.



Percent of citations issued and percent of crashes were relatively similar (a difference of 2-3%) for Black (12% vs. 10%), Asian (23% vs. 26%) and Other (14% vs. 12%) races. Whites were more represented in citations compared to crashes (36% vs. 28%), while Hispanics were less represented in citations compared to crashes (15% vs. 24%).

Limitations of this approach include that drivers involved in crashes may not be representative of all drivers on the road if there are differences in driving patterns associated with race that contribute to crash risk. For both crashes and citations, a limitation is that race is assessed based on police and practices to determine race likely vary across individuals.