

**CITY AND COUNTY OF SAN FRANCISCO
BOARD OF SUPERVISORS**

BUDGET AND LEGISLATIVE ANALYST

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Policy Analysis Report

To: President Norman Yee
From: Budget and Legislative Analyst's Office
Re: Vehicle Telematics Update
Date: August 19, 2020



SUMMARY OF REQUESTED ACTION

Your office requested that the Budget and Legislative Analyst provide an update on the status of telematic technologies installed in City vehicles since our previous report on the subject issued in 2015. Topics of interest included a review of safety, vehicle utilization, and additional uses of the technology to meet various goals and ordinances passed by the Board of Supervisors. The request also included related considerations to the City's rental fleet and take-home vehicle programs.

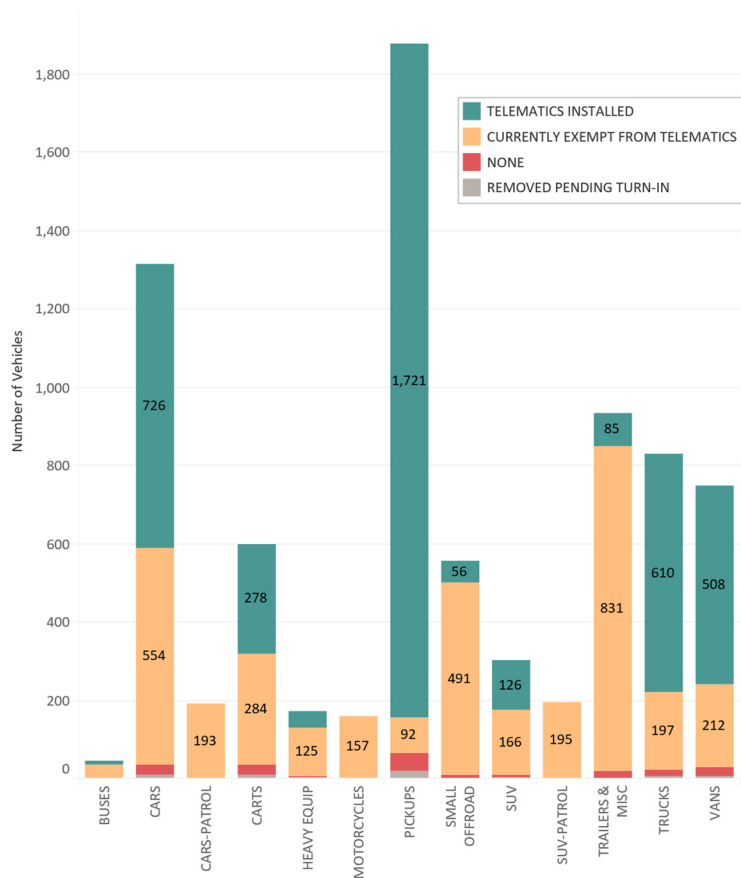
For further information about this report, contact Fred Brousseau, Director of Policy Analysis at the Budget and Legislative Analyst's Office.

Executive Summary

- Vehicle telematics, sometimes known as black boxes or global positioning system (GPS) tracking, allow for tracking vehicles individually and collecting and reporting data on their location, history, speed, mechanical diagnostics, safety, and other information.
- As of August 2019, the City's vehicle telematic system was installed on 4,163 vehicle assets, or 52 percent of the 7,930 vehicles managed by the City Administrator's Central Shops Division. At least 1,000 more vehicles were expected to have telematics installed by June 2020, when most public safety vehicles were required to begin participation in the program pursuant to San Francisco Administrative Code SEC. 4.10-2.: Telematic Vehicle Tracking Systems.

Project staff: Julian Metcalf and Fred Brousseau

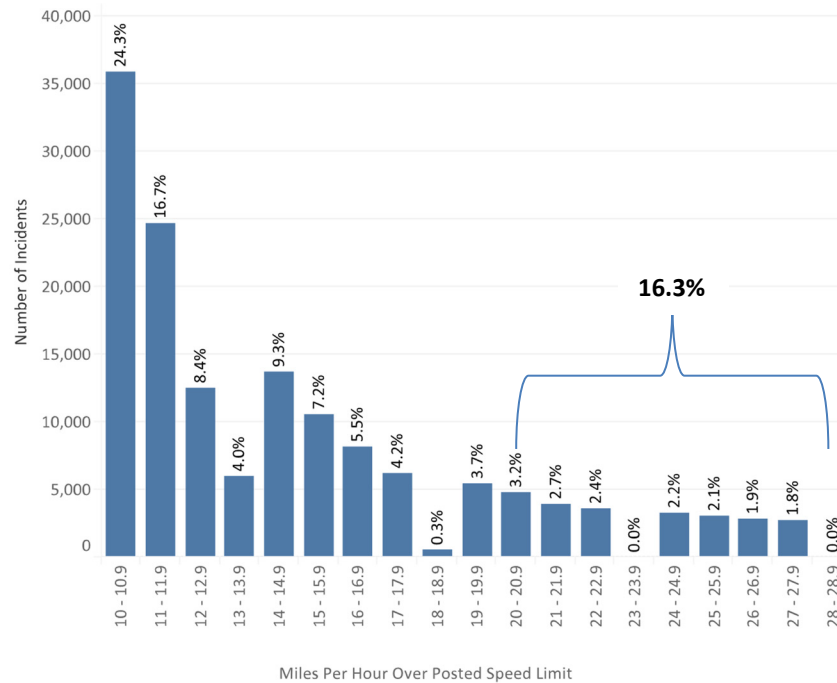
Exhibit A: Telematics Installed Citywide by Type of Vehicle, August 2019



- Unfortunately, simply having vehicle telematic technology installed does not mean the City is benefitting from it. Use of the system varies by department and is only minimally used by some. The City Administrator’s Central Shops Division provides departments with monthly standardized reports and provides a limited annual summary to the Board of Supervisors of selected data collected by the vehicle telematic system. The metrics that Central Shops tracks are minimal and utilize only a small portion of the telematics system’s capabilities. Further, neither Central Shops nor any department serves as a central authority in the City to ensure that problems identified through vehicle telematic equipment are resolved.
- Based on our analysis of existing telematics data, we observed that 2,619 individual vehicles had at least one speeding incident of more than 10 miles per hour over the posted speed limit during the 13 months between September 2018 and September 2019. Further, 768 individual vehicles reported 50 or more incidents each in the same period.

- There were 148,034 speeding incidents reported for City vehicles with telematics equipment installed between September 2018 and September 2019. Alarmingly, we found that 16.3 percent of all speeding incidents were between 20 to 28.9 miles per hour over the posted speed limit – a rate of excessive speeding that can increase fatalities to pedestrians if struck in residential and commercial areas, or contribute to increased odds of an accident when driving on freeways. Our analysis of the telematics speeding data used conservative assumptions to reduce the chance of false-positives and possible GPS-based data errors as explained in the report.

Exhibit B: Frequency of Speeding by Amount Over Posted Speed Limit, September 2018 to September 2019



- Our analysis of the City’s passenger vehicle rental program with Enterprise Rent-a-Car, intended to support departments’ vehicle needs for short-term projects and temporary use, found that use of vehicles through this program is not monitored or reviewed centrally, including compliance with the contract rate schedule. We found 55 instances where cars were rented for more than a year, which effectively subverts the Board of Supervisors’ budget approval of departments’ vehicle purchases. Further, we found that 18.6 percent of City department vehicle rental days were for vehicles classified by Enterprise Rent-a-Car as luxury, premium or elite. While these types of vehicles may have been justified in some circumstances, no one outside of each department is reviewing or monitoring such uses to determine if they are appropriate. The telematics system and an increased involvement by the City Administrator’s Central Shops division could help monitor vehicle rentals and ensure they are being rented and used appropriately. Exhibit

C presents the distribution of types of vehicles rented by City departments through the Enterprise Rent-a-Car contract for the two years between September 2017 and September 2019.

**Exhibit C: Distribution of Vehicle Types Rented
by City Departments,
September 2017 – September 2019**

	Regular	Luxury, Premium, Elite	Total
Number			
Rental Days	64,627	14,727	79,354
% Total	81.4%	18.6%	100.0%

- More could be done to curb dangerous driving behavior, reduce vehicle emissions and lower spending and potential waste related to vehicle use. Combined, we estimate that these factors cost the City \$10.5 million annually. These costs could be reduced if Central Shops reported and followed up on more detailed and effective metrics from the telematics system. This should include incidents of speeding above the posted speed limit, aggressive driving behavior, inappropriate use of vehicles such as unauthorized take-home use, and underutilized vehicles, to name a few. If these more robust measures were reported to departments and to the Board of Supervisors, departments would be better equipped to be accountable for addressing and correcting negative behaviors stemming from City staff vehicle use.
- To achieve this, we recommend that the Board of Supervisors consider requesting a minimum set of specific and detailed measures for Central Shops to track and report. Further, Central Shops could use its expertise to assist departments when investigating possible negative behaviors identified through the telematics system. The frequency and outcomes of investigations, including resulting improvements, should also be annually reported to the Board of Supervisors to determine if these efforts are having the desired impact. Central Shops could assume these duties with the addition of two staff positions costing an estimated \$340,348 in annual salary and benefits. We expect that if our recommendations are implemented in full, that the cost of these added positions would pay for themselves by reducing annual savings related to vehicles use and liability claims across the City.

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Current Installation of Telematic Systems Citywide

The City has used vehicle telematic systems for over a decade, but the current Citywide system was adopted in 2014. Vehicle telematics, sometimes known as black boxes or global positioning system (GPS) tracking, allow for tracking vehicles individually and collecting and reporting data on their location, history, speed, mechanical diagnostics, safety, and other information. This information can also be aggregated and reviewed to determine trends by department, vehicle, time of year, time of day, and other variables. So far, the City’s use of this information has been varied across the City and often minimal, if used at all. The City is missing the opportunity to manage the City fleet more effectively, curb dangerous driving behavior such as excessive speeding, and make better use of the telematics system it pays to operate. The need to better use the system will become even more urgent when in June 2020, most law enforcement vehicles will be added to the telematics

system. If the system is not more effectively used, this expansion will have little to no benefit.¹

The telematics system is centrally managed by Central Shops, a division within the City Administrator's Office. While Central Shops does some reporting from the telematics system, it does not have a defined oversight, monitoring, or enforcement role. Neither Central Shops nor individual departments are accountable for achieving results from use of the telematics equipment. Instead, departments are thought to use the system to monitor and self-regulate their activities. As we report below, both centralized and departmental monitoring occurs but is varied and mostly minimal. The current role of Central Shops is ambiguous, and it is not clearly defined if they should be taking a more active role monitoring departments' behavior and vehicle use. This ambiguity is important to consider when assessing the use of the telematics program and our recommended changes to its use. As it stands, departments are expected to monitor themselves, but we found that this is not working in most cases. If clear oversight and monitoring responsibilities aren't assigned centrally and authority for program results is not delegated to any City entity, then the use of the telematics system will continue to have minimal benefits for the City overall.

¹ In June 2019, the Board voted to expand the installation and use of telematics with the City's law enforcement agencies, with the option for those agencies to obtain a waiver from the City Administrator. The Police Department, the Sheriff's Department, the Adult Probation Department, and the Juvenile Probation Department for law enforcement purposes, and the eight vehicles used by the District Attorney's Office or the City Attorney's Office for investigations were required to have these systems installed and in use by June 30, 2020. In addition, the Fire Department and Public Defender's Office were voluntarily implementing telematics in the same time frame, though this is unrelated to the ordinance.

As of August 2019, the system was installed on 4,163 City vehicle assets, or 52 percent of the 7,930 vehicles managed by Central Shops.^{2,3,4} However, as mentioned above, the number of vehicles without telematics installed was expected to decrease by June 30, 2020 when law enforcement agencies were required by ordinance to install telematics in their vehicles unless waivers were granted for specific cases. While the exact number is unknown at this time, at least 1,000 law-enforcement vehicles were expected to have telematics installed. Central Shops reports that the law enforcement vehicles will have special protection of their data and reporting to ensure that sensitive location information is safeguarded. Even with these protections, inclusion of these vehicles represents a significant increase in the Citywide use of vehicle telematic technology.

Figure 1 below shows the composition of the Citywide fleet with their status of telematic systems installed or not as of August 2019.

Simply having the technology installed does not mean the City will benefit from it. What matters most is how the information the system generates is reported, understood and ultimately used operationally to improve and manage the fleet. If used properly, telematics can help the City reduce its emissions, protect human lives, and save money such as some of the \$7.2 million spent in fiscal year 2017-18 on vehicle related claims. Unfortunately, we found that in most cases the information available from the existing telematics system is underutilized. Further, practices across the City departments vary, leading to inconsistent and selective use of the system's information. We propose simple steps to improve the use of the existing technology through the development of standardized reporting,

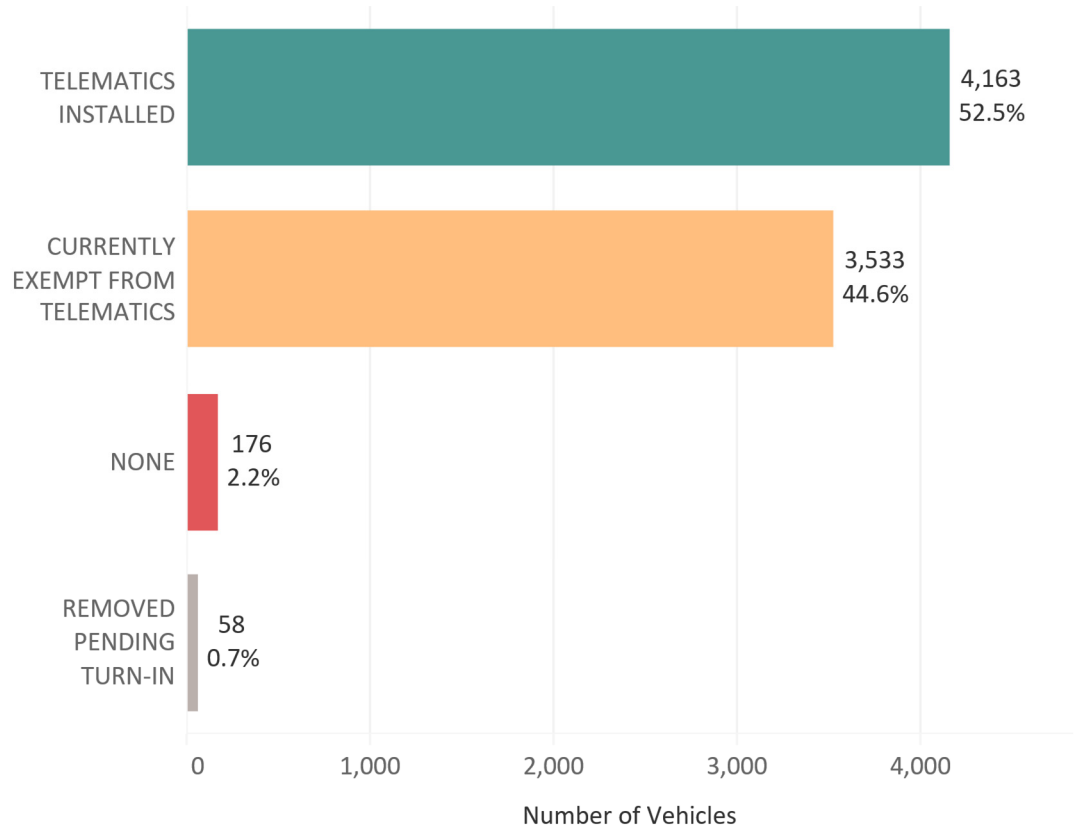
² We included all vehicles managed by Central Shops in this count. This includes vehicles that are serviced by enterprise departments for regular maintenance such as SFO and the PUC. These enterprise departments have their own shops where they perform basic vehicle services and stock their own telematics units for installation.

³ In addition to the 7,930 vehicles managed by Central Shops, the SFMTA manages another 1,502 vehicles in what is known as their revenue fleet or the trains and buses operated by MUNI. As of September 2019, all these vehicles were equipped with a new radio system that includes computer automated dispatch and automatic vehicle location, commonly called CAD/AVL. In addition, all the SFMTA revenue fleet vehicles, except for historic street cars and cable cars, are equipped with some form of onboard vehicle information systems that can provide digital diagnostics. The revenue fleet is excluded from the analysis of this report since they are uniquely managed and operated compared to other City vehicles. The SFMTA vehicles that are discussed in this report include their non-revenue fleet, such as vehicles used for maintenance or parking enforcement. These non-revenue vehicles use the standard Citywide telematics system discussed herein.

⁴ Central Shops estimates that ten percent of all installed telematics devices aren't reporting properly and that it can be challenging to departments to bring the non-reporting units in for inspection or repair.

monitoring and investigation support, and accountability that should be centrally managed by the Central Shops Division of the City Administrator’s Office.

Figure 1: Telematics Installed Citywide as of August 2019



Source: Budget and Legislative Analyst’s Office analysis of Central Shops vehicle asset records as of August 2019

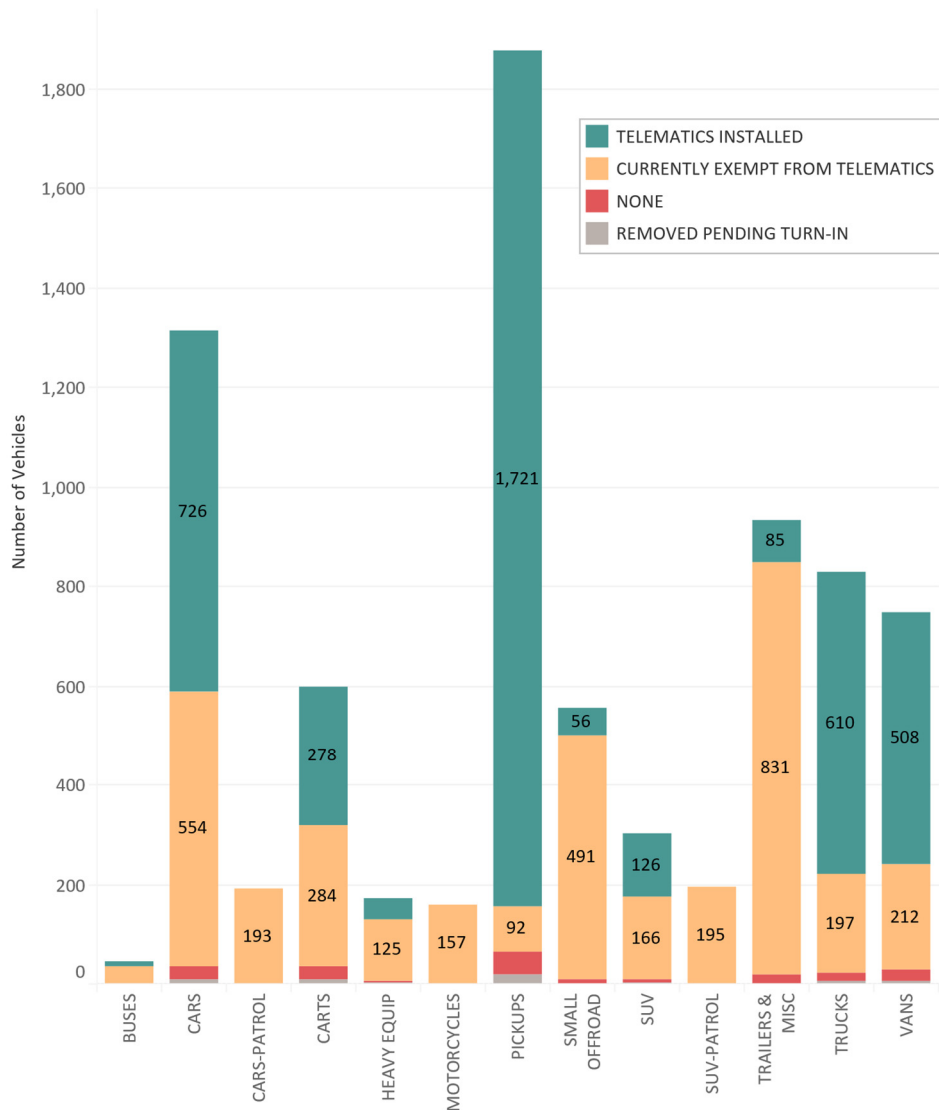
Figure 2 below shows the current installations and exemptions by department.⁵ As can be seen, most vehicle telematics equipment is installed in cars, pickups, truck, and vans. Besides law enforcement vehicles, telematic equipment is for the most part not installed in small off-road vehicles, trailers, and miscellaneous other vehicles.

The installation of telematics in the City’s law-enforcement departments’ vehicles planned for June 2020 will significantly increase the use of the technology Citywide. The rest of the exemptions from use in accordance with the Administrative Code requirements are generally related to trailers and equipment, such as rideable

⁵ San Francisco Administrative Code SEC. 4.10-2. Telematic Vehicle Tracking Systems

mowers. Departments report that using the current telematics solution for these types of assets doesn't work well for all circumstances.

Figure 2: Telematics Installed Citywide by Type of Vehicle



Source: Budget and Legislative Analyst's Office Analysis of Central Shops vehicle asset records as of August 2019

Central Shops reports that they plan to replace the current telematic system eventually. They hope that a new system will be easier to use and technically superior so that it reduces the chance of erroneous results being reporting. If possible, such a system could save time for the analysts who review the system's data by reducing the need to clean and verify some data and information. There is no set timeline for updating the system, but the Office has begun researching what

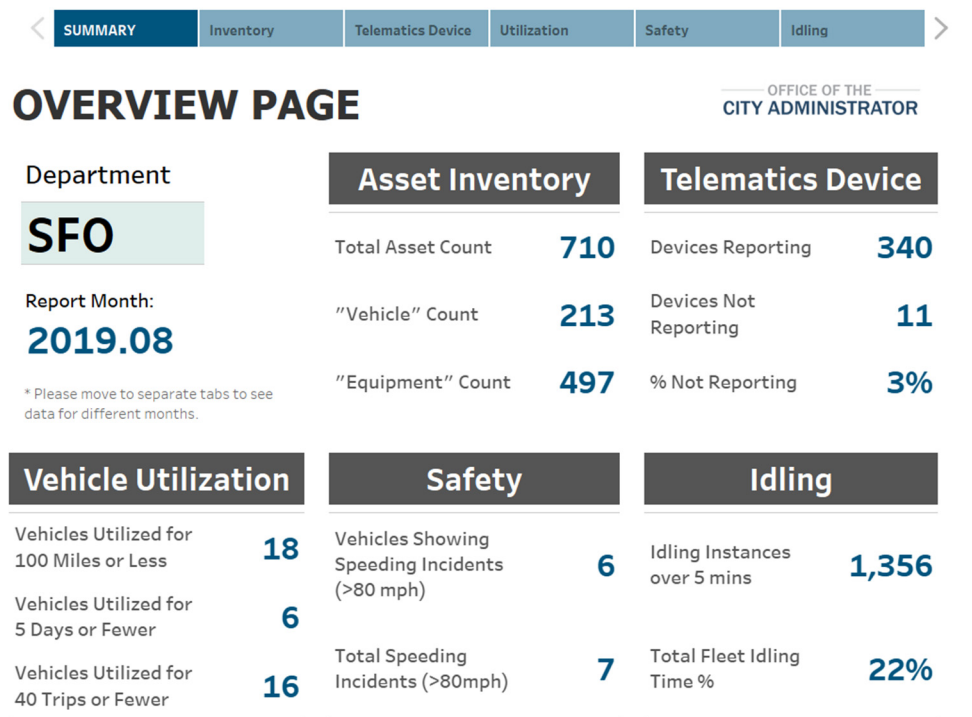
it might include in the system's specifications and requirements. In September 2019, Central Shops issued a request for information to seek information from vendors regarding their offerings. They received responses from several vendors but, as of the writing of this report, had not finalized the requirements and specifications they will use in an eventual request for proposal, when vendors would bid on the actual contract.

Centralized Use of the Telematics System Is Limited

Central Shops administers the telematics system for the Citywide fleet through a web portal for all public safety vehicles.⁶ All departments have full access to the portal where they can run their own custom reports and set various alerts for their own vehicles. However, most department representatives we spoke with said they rely on optional monthly reports sent by Central Shops, who report that the monthly reports they send are meant to supplement the department's own reports and track how measures change over time. Central Shops would not provide the Budget and Legislative Analyst's Office with access to the monthly reports they send departments. However, various departments shared their reports and some high-level metrics are available from the mandated annual report to the Board of Supervisors on the vehicle telematics program submitted in November 2018. Figure 3 below is a screenshot of an example of the monthly reports that most departments receive.

⁶ Once implemented, public safety departments will have individual access to their own telematics data. Central Shops and the City Administrator's Office overall will not have access to the information on public safety vehicles for security purposes.

Figure 3: Example of Monthly Report Sent to Departments



Source: San Francisco International Airport, telematics report produced and by Central Shops for all departments, August 2019

Some of the shortcomings discussed below stem from the ambiguous role that Central Shops plays in the City. This is a common problem for any internal service function where there is a tension between being a service provider who responds to the needs of departments and being a gatekeeper who can independently monitor and enforce regulations. In the case of Central Shops, they report that they mainly act as a service provider, with much of enforcement decentralized and delegated to each department. This pattern is true of the telematics system in particular: Central Shops provides some standardized reports to departments but does not routinely review or act on the information in the reports beyond occasionally bringing any outlier information to the department's attention. In addition, other City vehicle programs that could be monitored by Central Shops, such as take-home vehicle use and vehicle rentals, are not monitored or reviewed on a Citywide basis by Central Shops or anyone else.

Without a better-defined role for Central Shops, the City's vehicle fleet is lacking management oversight and accountability. Telematics is a tool that can simplify oversight and accountability but Central Shops and most departments only minimally use telematics for this or any purpose. We recommend that any use of

the telematics system be accompanied by clear oversight and monitoring responsibilities assigned to Central Shops.

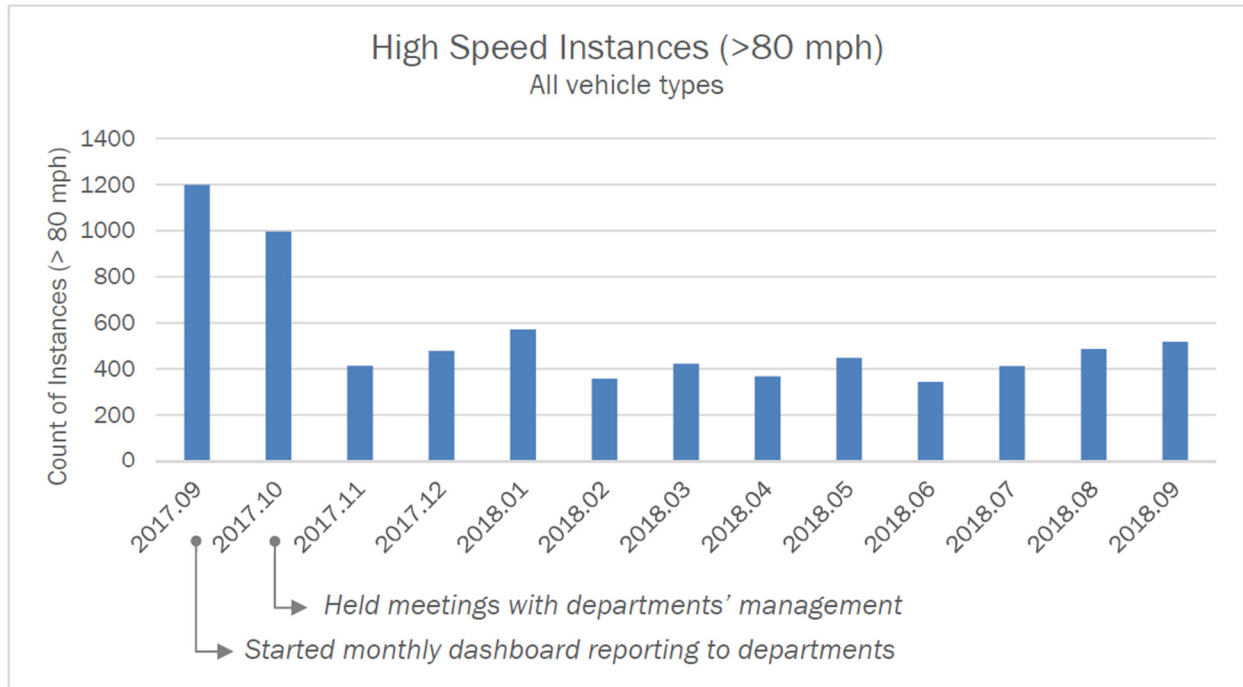
Limited Measures Reported

In addition to basic inventory metrics such as vehicle counts and statistics on whether telematics units are functioning or not, Central Shops' monthly reports sent to all departments using vehicles with telematic equipment provide data in three areas: 1) utilization, 2) safety, and 3) engine idling. Utilization data seeks to identify vehicles that may be superfluous due to infrequent use. The one safety measure reported is vehicles speeding over 80 miles per hour. The idling metrics are: total idling time, and a count of instances of idling time.

Figure 4 below shows Citywide high-speed instances and Figure 5 shows idling instances, both for the 13 month period between September 2017 and September 2018, as reported by the City Administrator to the Board of Supervisors in their most recent vehicle telematics program annual report issued in November 2018. These annual reports to the Board of Supervisors, mandated by ordinance adopted June 14, 2016, contain less information than the monthly reports provided to departments.

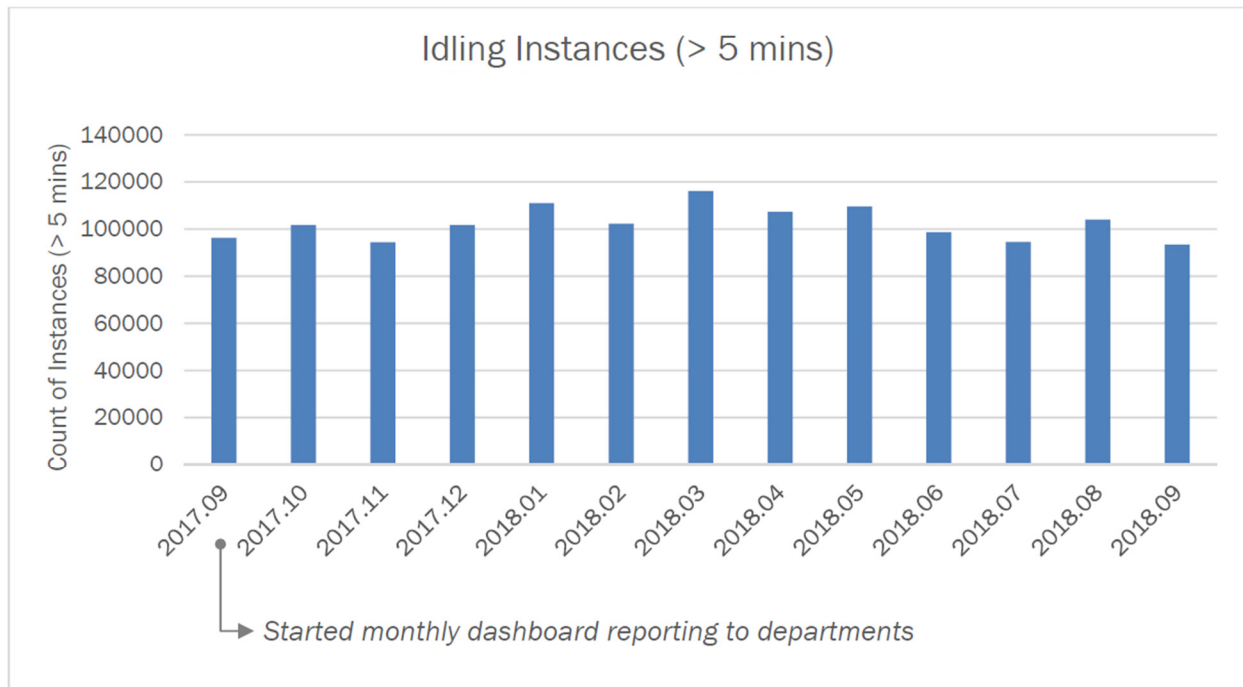
As can be seen in Figures 4 and 5, there was little month to month change in reported speeding and idling incidents over the reported thirteen-month period between from November 2017 onward. This could be interpreted to mean that the information reported is not having an impact or changing behavior beyond the initial improvement. In the September 2017 to September 2018 period reported by Central Shops to the Board of Supervisors, shown in Figures 4 and 5 below, there were approximately 6,875 incidents where vehicles were recorded speeding over 80 miles per hour, and approximately 1,320,000 instances where vehicles idled for more than five minutes.

Figure 4: Excerpt from Annual Telematics Report – High Speed Instances



Source: Annual Telematics Report, City Administrator's Office, November 9, 2018

Figure 5: Excerpt from Annual Telematics Report – Idling Instances



Critical Areas Not Currently Monitored or Reported Fully

Speeding

The current system can monitor incidents of speeding when the vehicle exceeds the posted speed limit by a set threshold. This is important since most streets in San Francisco have a maximum speed limit of 25-35 miles per hour – far below the 80 miles per hour currently monitored by Central Shops. However, measuring speeding against posted speed limits can result in misreports due to errors with the GPS unit. For example, a vehicle may be traveling on a freeway at the speed limit of 65 miles per hour, but the system may show the vehicle as traveling on an adjacent surface street with a maximum speed limit of 25 miles per hour. The resulting error could be caused by the imprecision of all GPS units in real-world environments. The error would indicate the vehicle was traveling 40 miles above the speed limit.

Despite the potential for the system to at times confuse a vehicle's location, there is an easy solution. Within Central Shops' existing data analytics tools, such as Tableau, which it uses to produce the monthly reports, Central Shops could design a report that excludes these problematic areas where errors are known to occur. For example, a buffer could be set for roads within the City where freeways exist near other roads with lower speed limits. Speeding that occurs within the buffer would be excluded from automatic reporting. No filter would be necessary for the rest of the City, most of which is on a grid with no adjacent or overlapping freeways. Staff within Central Shops agreed that this would be a reasonable solution to the problem but has not configured a process to do so.

Our analysis of speeding data

Central Shops provided us with anonymized data on vehicles exceeding speed limits by more than 10 miles per hour above the posted speed limit recorded between September 2018 and September 2019. For our analysis of this data we developed a system to flag and filter out potential erroneous results. As noted previously, GPS units can misreport exact location data for two primary reasons. First, GPS units are not always precise due to signal issues and can range in accuracy by several yards at times. Second, in areas with dense tall buildings, precision is eroded by an effect called "urban canyoning." As such, we would expect some frontage roads to be confused with freeways and some speeds around skyscrapers to be erroneous if the reporting between two points is miscalculated. These are common problems and the City's existing telematics vendor recommends "setting speeding report thresholds, such as only reporting over a specific percentage of the speed limit, or

for a given duration, managers can focus on just those incidents that merit their attention.”⁷

To limit possible misrepresentations of speeding in our analysis, we filtered the speed data in several ways, as detailed in Appendix B, to account for possible GPS errors. These filters are intended to focus on material violations but exclude possible erroneous results that would otherwise show false positives. The filters likely exclude some cases of real speeding incidents that aren’t GPS errors. However, we would expect that drivers who exhibit repeat behavior, and arguably are of the greatest concern, will present several other incidents that aren’t filtered out.

During this period, our analysis shows that 2,619 individual vehicles out of the total fleet of 4,163⁸ had at least one speeding incident. Of that, 768 individual vehicles, or 18.4 percent of the total fleet with telematics installed, reported 50 or more incidents each over the 13-month period. Central Shops could easily monitor and report when individual vehicles and their drivers show repeat and ongoing speeding behavior. As noted above, some incidents may be associated with data error in the telematics system, but when persistent repeat incidents are reported, it is likely due to driver behavior and warrants investigation. If the investigation determines that the incidents are in fact due to error, Central Shops should fix the vehicle’s equipment to ensure it is reporting accurately or further adjust its filters to minimize erroneous reporting.

Figure 6 below shows the top 20 individual vehicles that reported the most speeding incidents during the 13-month period, with our filters on streets adjacent to highways and other outliers that were filtered to reduce false positives, as detailed in Appendix B, applied to reduce the number of likely errors. As can be seen, the range of average incidents per month where these vehicles were recorded speeding more than 10 miles over the posted speed limit ranged from 4 to 41 times per vehicle per month. The number of incidents per individual month ranged from a low of one to a high of 75. This is not to say the same driver was responsible for all speeding incidents in a month or for a particular vehicle, but the high frequency of incidents certainly suggests the same drivers are repeatedly engaging in risky driving patterns as it would otherwise be an unusual coincidence

⁷ Verizon Connect, Brad Penneau, [“How Does GPS Tracking Report on Speeding?”](#), accessed January 15, 2020

⁸ 4,163 total vehicles with telematics installed.

**Figure 6: Number of Speeding Incidents for Top 20 Vehicles Recorded as Speeding 10 MPH or more over Speed Limit
September 2018 to September 2019**

Vehicle ID	Dept.	2018	2018	2018	2018	2019	2019	2019	2019	2019	2019	2019	2019	2019	Avg. Per Mo.	Total
		Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep		
14082414	SFO	33	35	33	21	15	21	43	55	64	75	56	46	39	41	536
64081559	PUC	19	17	28	25	4	6	45	60	46	51	31	41	19	30	392
15322402	SFO	18	18	18	16	24	19	19	21	38	48	30	29	24	25	322
47612303	SFO	37	32	33	35	56	25	51	4	2	3	3	3		24	284
32861612	PUC	20	17	19	24	21	12	25	32	18	9	20	28	15	20	260
62457128	PUC	6	14	4	12	19	15	28	29	28	22	13	24	33	19	247
97305414	MTA	27	14	12	14	24	22	15	18	17	4	19	18	22	17	226
48510928	PUC	5	10	16	28	20	2	20	23	10	16	27	20	20	17	217
42691536	HSA	10	14	15	10	16	17	14	19	17	24	13	29	10	16	208
18696186	MTA	4	3	1	3	2	5	6	22	26	20	22	25	27	13	166
94063887	HSA	13	9	17	7	7	12	19	19	20	23	3	3	11	13	163
31086203	PUC	6	8	10	7	10	3	5	16	16	17	20	18	13	11	149
71804752	PUC	18	23	11	2	5	6	4	5	23	10	19	8		11	134
69517795	PORT	5	7	8	4	3	6	9	7	18	13	11	5	18	9	114
59884348	HSA	1	8	9	13	8	6	1	17	4	1	14	8	8	8	98
14818455	HSA	7	9	4	7	18	12	5	10	4		4		1	7	81
81864513	PUC	3	4	2		2	2	5	6	17	6	6	13	7	6	73
53965165	PUC	1	3	4	1	5	4		5	6		1	2	7	4	39

Source: Budget and Legislative Analyst’s Office analysis of speeding data provided by Central Shops. September 2018 to September 2019. Filters as described in Appendix A to reduce false positives.

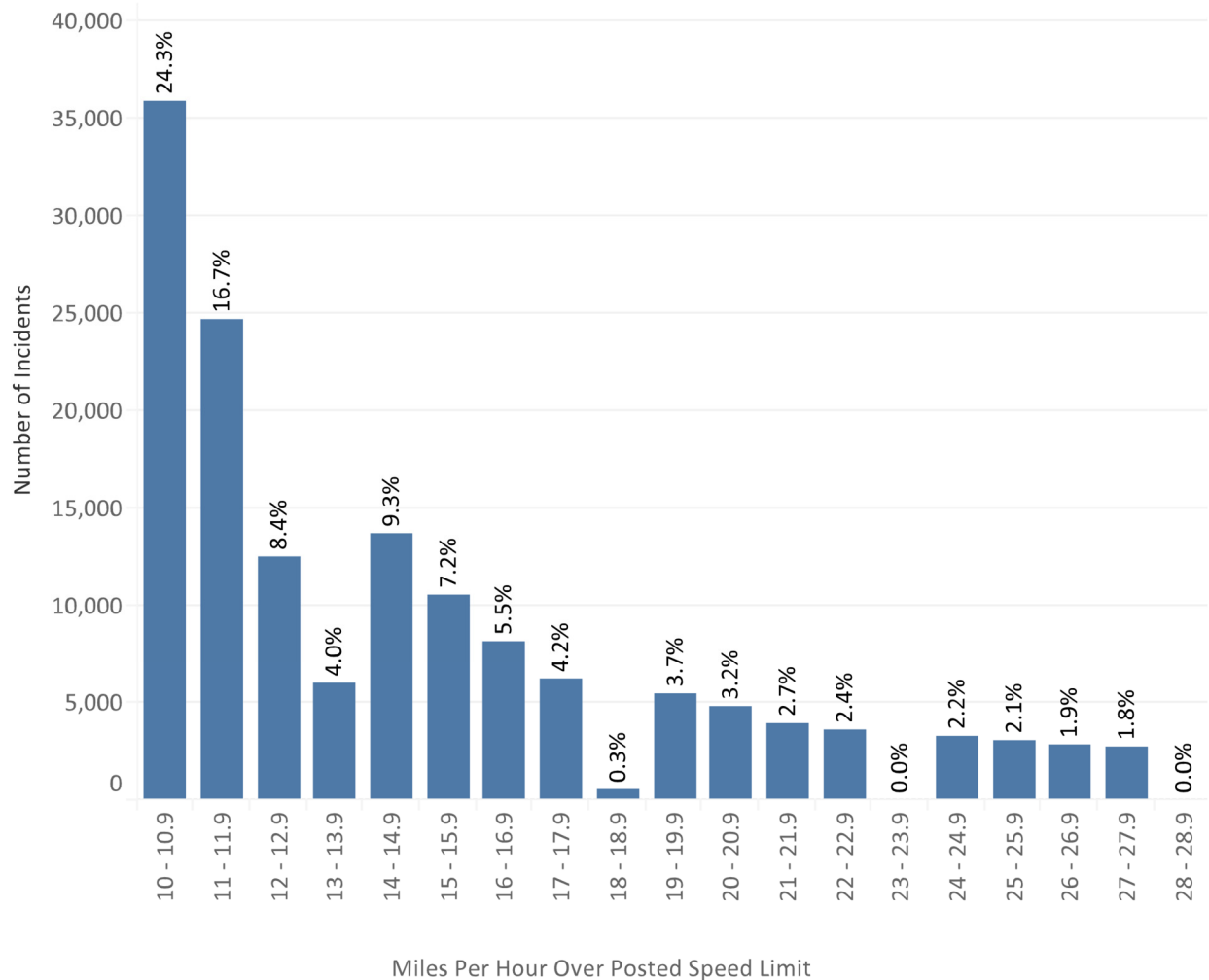
Nearly a quarter of speeding incidents, or 24.3 percent, were for vehicles driving between 10 and 10.9 miles per hour over the posted speed limit, as shown in Figure 7. Even at these speeds the risks are high. This is especially true for pedestrians who could be struck by a speeding vehicle. For example, if someone were speeding in a residential area with a posted speed limit of 25 miles per hour but going 10 miles above that, their speed would be 35 miles per hour. According to a study conducted by the AAA Foundation for Traffic Safety⁹, if a pedestrian were struck by a vehicle traveling at 25 miles per hour, their chances of sustaining a serious injury or dying would be 15.5 percent. But at 35 miles per hour, it jumps to a 35.4 percent chance of death. More alarmingly, 16.3 percent of incidents were between 20 to 28.9 miles

⁹ AAA Foundation for Traffic Safety, “[Impact Speed and a Pedestrian’s Risk of Severe Injury or Death](#)”, September 2011

per hour over the posted speed limit. At these speeds risks to pedestrians increase considerably in residential and commercial areas. These excessive speeding violations also increase risks on freeways where pedestrians aren't present. The National Highway Traffic Safety Administration states, "speeding reduces a driver's ability to steer safely around curves or objects in the roadway, extends the distance necessary to stop a vehicle, and increases the distance a vehicle travels while the driver reacts to a dangerous situation."¹⁰ Figure 7 below shows the distribution of speeding incidents that were recorded and by how much over the posted speed limit they were.

¹⁰ National Highway Traffic Safety Administration's National Center for Statistics and Analysis, U.S. Department of Transportation, "[Traffic Safety Facts, 2007 Data](#)", 2008

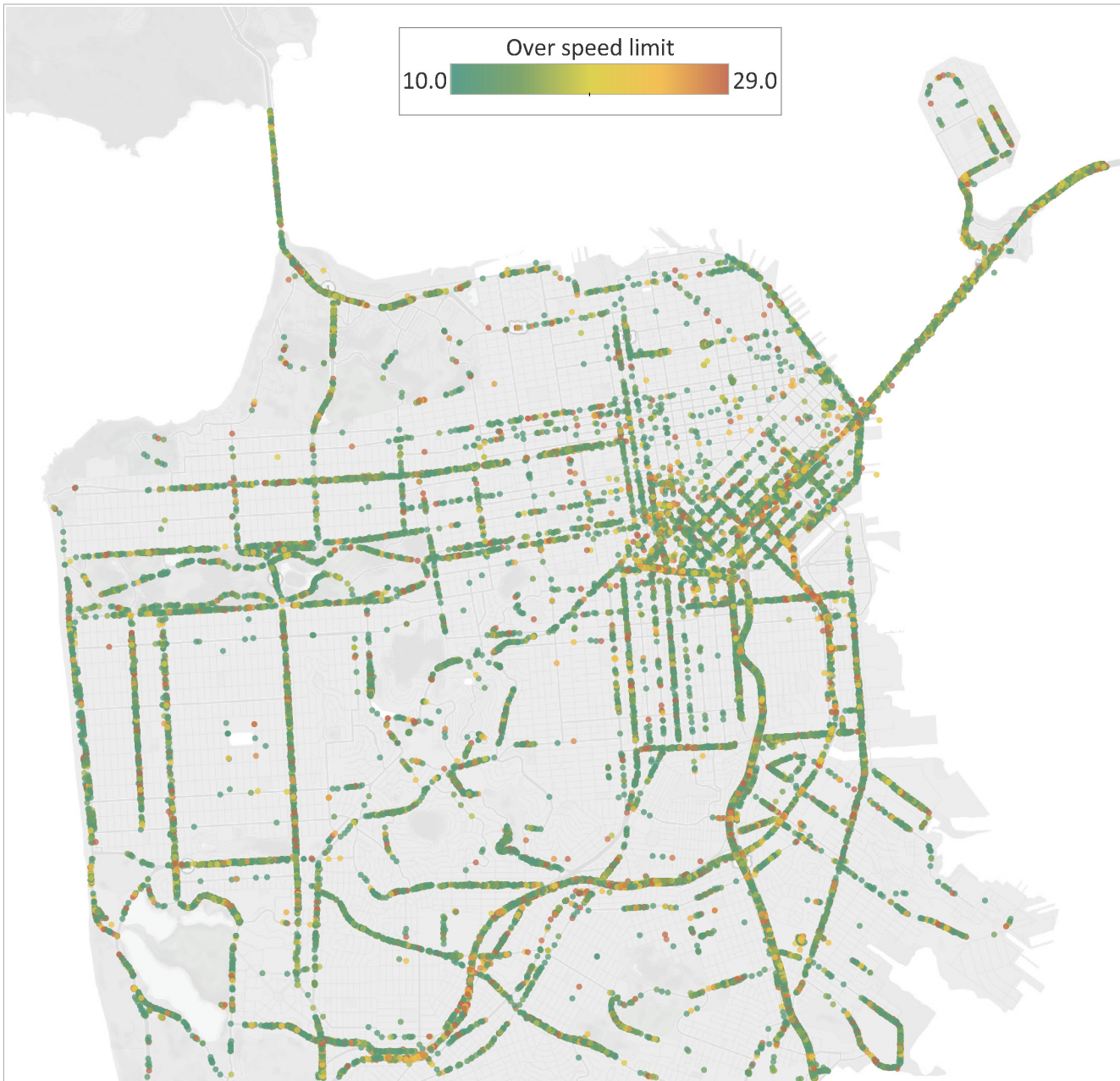
Figure 7: Frequency of Speeding by Amount Over Posted Speed Limit
September 2018 to September 2019



Source: Budget and Legislative Analyst’s Office analysis of speeding data provided by Central Shops. September 2018 to September 2019. Filters as described in Appendix A to reduce false positives.

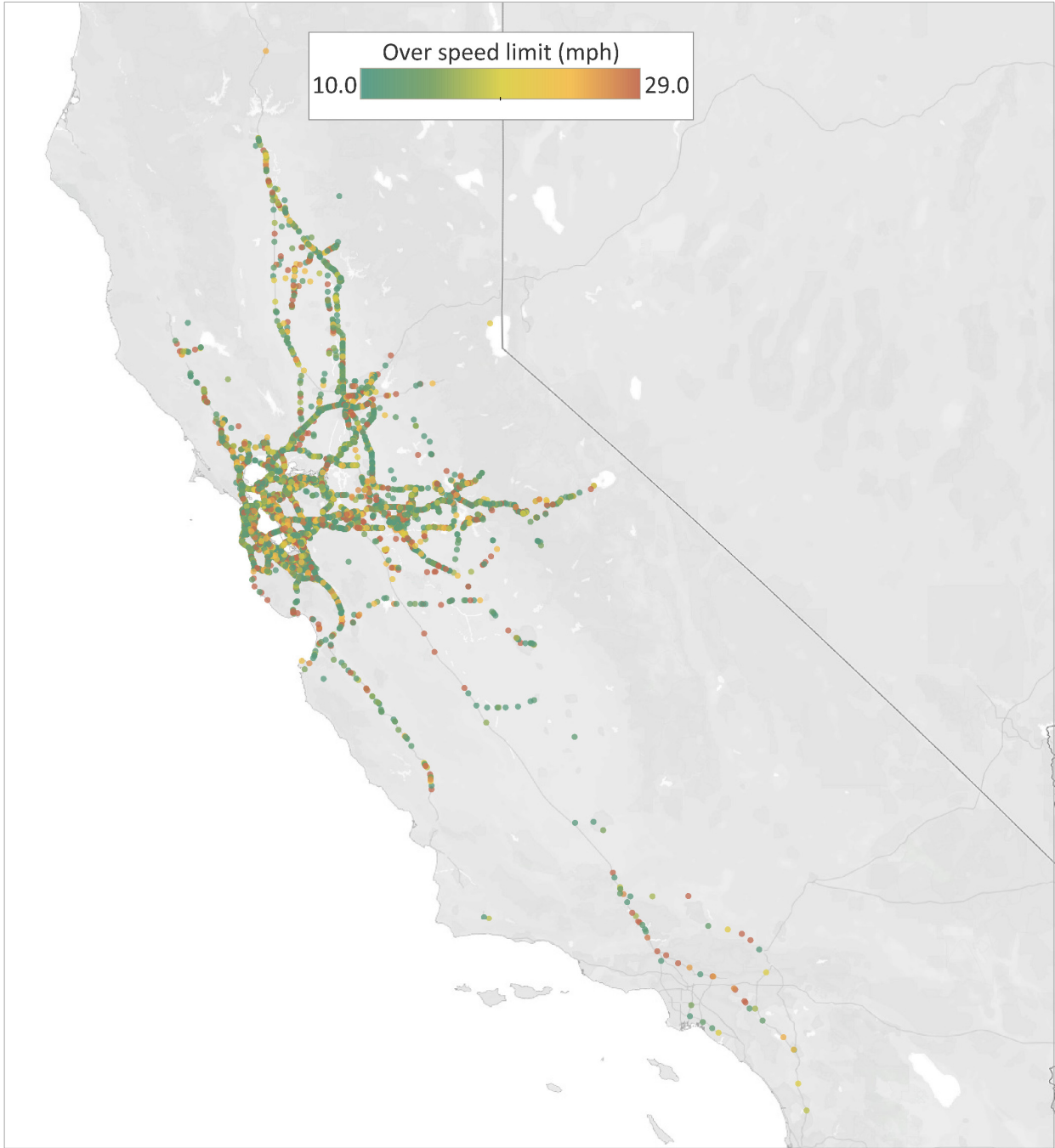
Of the 148,034 reported speeding incidents from the 13-month period, 70,902 occurred within the boundaries of San Francisco, or 47.9 percent of all incidents. The remainder of the incidents occurred outside the boundaries of San Francisco. Most of the others were within the Bay Area, Sacramento, or along the corridor to and from Hetch Hetchy Reservoir. Figure 8 below shows a map of where speeding incidents occurred within San Francisco, and the subsequent Figure 9 shows incidents statewide.

Figure 8: Speeding Incidents within San Francisco
September 2018 to September 2019



Source: Budget and Legislative Analyst's Office analysis of speeding data provided by Central Shops. September 2018 to September 2019. Filters as described in Appendix A to reduce false positives.

Figure 9: Speeding Incidents Statewide
September 2018 to September 2019



Source: Budget and Legislative Analyst's Office analysis of speeding data provided by Central Shops. September 2018 to September 2019. Filters as described in Appendix A to reduce false positives.

Aggressive Driving Behavior

The telematic system in most of the City's vehicles can report incidents of aggressive driving behavior such as hard braking or hard acceleration. The system receives this information directly from the car itself and from the telematic unit's accelerometer, which is similar to the technology in most smart phones that can identify movement. Aggressive driving is linked to unsafe driving practices, especially when it occurs regularly. Central Shops contends that hard braking or acceleration may be needed on occasion for defensive driving practices. While occasional incidents may be necessary, a report could be prepared on the telematics system that excludes occasional incidents and instead reports on systematic patterns. Such reports are a standard feature available within the City's current telematics system in place since 2014.

As we noted in our 2015 report on vehicle telematics¹¹ other jurisdictions have found it possible to measure such patterns. For example, in 2015 the Los Angeles Police Department began monitoring aggressive driving behaviors in patrol cars.¹² At the federal level, the National Renewable Energy Laboratory of the U.S. Department of Energy developed a framework for the Marine Corps to use in managing its fleet.¹³ Among the many metrics it recommends is a similar measure of monitoring the frequency of aggressive driving behavior and generally excluding occasional incidents that may be necessary for occasional defensive driving. Their report found that at the federal level, using monitoring to reduce these behaviors and speeding resulted in estimated average savings of \$553 per-vehicle per-year. In San Francisco, the cost of vehicle claims averaged \$935.48 per vehicle in fiscal year 2017-18.¹⁴ Reducing some of those costs, not to mention the risk to human life and of injury, would easily justify any additional City staff time spent monitoring aggressive driving behavior. In addition, reducing harsh acceleration will improve fuel efficiency which would save additional annual costs.

Beyond saving the City money, better monitoring of speeding and aggressive driving behaviors closely aligns with the City's Vision Zero goals. Vision Zero was adopted in 2014 to eliminate traffic fatalities and reduce severe injuries, with the goal of

¹¹ Budget and Legislative Analyst, City and County of San Francisco, "Vehicle Telematics for City Vehicles", Policy Analysis Report to Supervisor Norman Yee. February 23, 2015.

¹² 89.3KPCC, "[LAPD to track how safely officers are driving patrol cars LAPD Begins Tracking Officer Driving](#)" December 22, 2014, accessed January 27, 2015

¹³ NREL is a national laboratory of the U.S. Department of Energy, "[Telematics Framework for Federal Agencies: Lessons from the Marine Corps Fleet](#)", October 2017, access October 22, 2019

¹⁴ Calculated by dividing the fiscal year 2017-18 total cost of vehicle related claims issued that year, \$7,243,443.22, by the number of vehicles reported in the fleet at that time, 7,743.

eliminating all traffic fatalities by 2024. The current telematics system can better support this goal with the addition of two reports to monitor and reduce speeding and aggressive driving behavior.

Underutilized Vehicles

Currently, Central Shops uses the telematics system to report on the use, frequency, and characteristics of vehicles. In their monthly reports to departments they classify vehicles according to their utilization rates of days used, trips taken, and mileage. Central Shops said that “33 vehicles have been identified as underutilized using telematics data and confirmed to have been taken out of the fleet during this process.” Aside from the value of the vehicle and fuel savings, these reductions saved an average in annual maintenance costs of roughly \$2,750 per turned-in vehicle,¹⁵ which results in estimated maintenance cost savings of \$90,750 per year.

In its monthly reports to departments, Central Shops categorizes underutilized vehicles as those that meet one of the following criteria for three consecutive months: (1) driven 100 miles or less in a month, (2) utilized five or fewer days in a month, or (3) 40 or fewer trips per month. Central Shops noted that these metrics don’t always mean that a vehicle is underutilized since its telematics unit might not be functioning properly or the vehicle may have been serviced during that month and therefore not driven. However, as we demonstrate below in our own analysis, it is possible to account for these factors already included in the monthly reports and add known data on vehicles being serviced during that period. This combination would produce a more accurate analysis that isolates vehicles that are truly underutilized and could be candidates for retirement from the fleet.

Central Shops provided us with basic data on utilization, plus records indicating if a vehicle’s telematics unit was fully functioning during a given month, records showing if the vehicle was being serviced during any given month, and records for when vehicles were turned in and removed from the fleet. We analyzed this data for the entire fleet by filtering out those with reportedly broken telematics units, those being serviced, and vehicles that were retired in each month. We found that from November 2018 to September 2019, there were 365 unduplicated vehicles Citywide that met at least one of Central Shop’s underutilization criteria for at least three months and were not explained due to a broken telematics unit or being serviced. Figure 10 below shows the results of our analysis.

¹⁵ Amounted reported by Central Shops in August 2019

**Figure 10: Underutilized Vehicles for Three Consecutive Months with
Functioning Telematics Systems and not being Serviced**
November 2018 to September 2019

Reported Three Consecutive Months of:	Unduplicated Vehicle Count
Driven 100 Miles or Less in a Month	49
Utilized Five or Fewer Days in a Month	49
40 Or Fewer Trips Per Month	354
Total Unduplicated Vehicle Count ¹	365

Source: Budget and Legislative Analyst’s Office analysis of speeding data provided by Central Shops. November 2018 to September 2019.

¹ This totals the unduplicated vehicle count for all three measures. If a vehicle meets more than one criterion it will only be counted once in the total, meaning the rows above the unduplicated total line will not add up to equal the total.

Based on our analysis, over the course of the 13-month period, 365 vehicles, or 4.6 percent of the Citywide vehicle fleet vehicles, were underutilized for at least three consecutive months.¹⁶ Many of these vehicles could be candidates for removal or repurposed. If the full 4.6 percent of underutilized vehicles were removed entirely, their reduction would save an estimated \$1,003,750 in estimated annual maintenance costs.¹⁷ If the vehicles were repurposed, they would offset the cost of new purchases and similar additional annual maintenance costs.

¹⁶ Based on 7,930 vehicles as of August 2019 x 4.6 percent = 365 vehicles x \$2,750 in annual maintenance costs per vehicle = \$1,003,750.

¹⁷ Based on the utilization data Central Shops provided, only 21 of the identified underutilized vehicles contained information on the make, model, and year of the vehicle. This group was varied but mostly included vehicles that were at least 15 years old, except for one 2016 model car. With so much information missing from the data Central Shops provided, we determined that we couldn’t reliably estimate the possible resale value of the vehicles. Instead, we estimated savings based solely on their saved maintenance costs. For maintenance costs savings, we assumed the \$2,750 annual savings that Central Shops estimated in August 2019.

Emissions and Maintenance

While Central Shops currently reports to departments monthly on vehicle idling behavior, where an engine is running but the vehicle is stationary for extended periods, there are many other emissions related metrics it does not report or consider. For example, the telematics system is connected to many vehicle diagnostic systems, meaning it can read and monitor vehicle efficiency and emissions information from its various sensors. While there are few vehicles in the City fleet such as heavy equipment that can't report this information over the telematics system, most of the fleet can. However, Central Shops does not monitor or report any of these metrics. Adding them to its reporting could help identify poorly performing vehicles early and reduce the emissions of all fossil fuel vehicles in the fleet.

Take-Home Vehicle and Misuse

In March of 2019, our office issued a report on the practice of take-home vehicles among City departments.¹⁸ The report found that “departments are assigned 247 take-home vehicles, or 118 percent more than the 113 take-home vehicles allocated in the Administrative Code.” The report estimated that the excess 134 unauthorized take-home vehicles cost the City a total of \$1,580,553 per year in acquisition and maintenance costs. Our report recommended that the Administrative Code be updated to clarify some existing ambiguity and improve compliance. Regardless of these recommended changes, Central Shops has had the ability to develop a report to monitor authorized and unauthorized take-home activity for several years but reports it has not been directed to do so. In addition, it could monitor other unauthorized uses such as use of vehicles for personal travel when vehicles are driven to unexpected locations.

Central Shops states that monitoring authorized and unauthorized take-home vehicles and other vehicle use behavior is not feasible since they do not know the location of all City-owned or leased real estate.¹⁹ These locations are important to know for such a report so it could identify if vehicles are parked at their appropriate locations when not in use for City business, such as City facilities, employee residences for authorized take-home vehicles, or other authorized non-City

¹⁸ City and County Of San Francisco Board Of Supervisors Budget and Legislative Analyst, “[City Departments’ Assignment of Take-Home Vehicles](#)” Policy Analysis Report to Supervisor Sandra Fewer, March 25, 2019

¹⁹ Central Shops noted that they did not know that this information was available from the Real Estate Division until we discussed the feasibility of such analysis with them for this report.

locations. Vehicles parked in unauthorized locations would be readily identified if such a report were produced.

To produce such a report to identify if City vehicles are being driven to unauthorized locations, Central Shops could use information available from the Real Estate Division, also a division of the City Administrator. The Real Estate Division has maintained a [public database of all City owned and leased](#) facilities since 2016, and most recently updated as of September 2019. The Real Estate Division confirmed that this list is relatively comprehensive and includes most City property locations. They cautioned it could be missing a few leased facilities. However, most of the work creating a list of locations is complete and adding any final missing locations would be relatively easy to do. Once updated, this list could be used by Central Shops to identify vehicles that are not parked overnight as expected at City facilities or authorized home addresses, or are being driven to unauthorized locations for personal travel.

Monitoring take-home vehicle practices will inherently pick up a few false positives. For example, the Human Services Agency frequently will use a vehicle from its pool to transport foster children to different counties where the vehicle may be parked overnight. However, such infrequent occurrences could be filtered out and reporting could instead focus on frequent use.

A report could be developed that monitors activity to identify personal use of the vehicles not fitting with their intended business purpose. Any monitoring of take-home vehicles could easily pay for itself if only a handful of vehicles that are out of compliance with the Administrative Code are then removed from the fleet or repurposed.

Rental Vehicle Use

The City maintains a contract with Enterprise Rent-A-Car intended to support departments' vehicle needs for short-term projects and temporary use. The contract, established through a competitive bidding process, has been in place since 2016. According to records provided by the Office of Contract Administration, the City spent \$1,254,174 on the contract in fiscal year 2018-19. These records suggest the City paid between \$21 and \$183.60 per day per vehicle depending on the rental duration and the vehicle type. Some of the more expensive vehicles are large cargo and passenger vans, while others appear to be luxury-oriented rentals that incur a higher daily rate.

The program is currently decentralized and not monitored by any central agency. This approach to oversight and accountability for the rental program poses risks to the City if an individual department does not adhere to the City's vehicle use guidelines or the rates and other terms and conditions in the Enterprise contract. Telematics could be a tool used to better monitor the use of rental vehicles.

Currently, the Office of Contract Administration within the City Administrator's Office is responsible for the contract with Enterprise but reports only reviewing it periodically to ensure the amount budgeted for the contract and its duration are sufficient. Verification that the rates established in the contract are being charged for each rental is not conducted by the Office of Contract Administration.

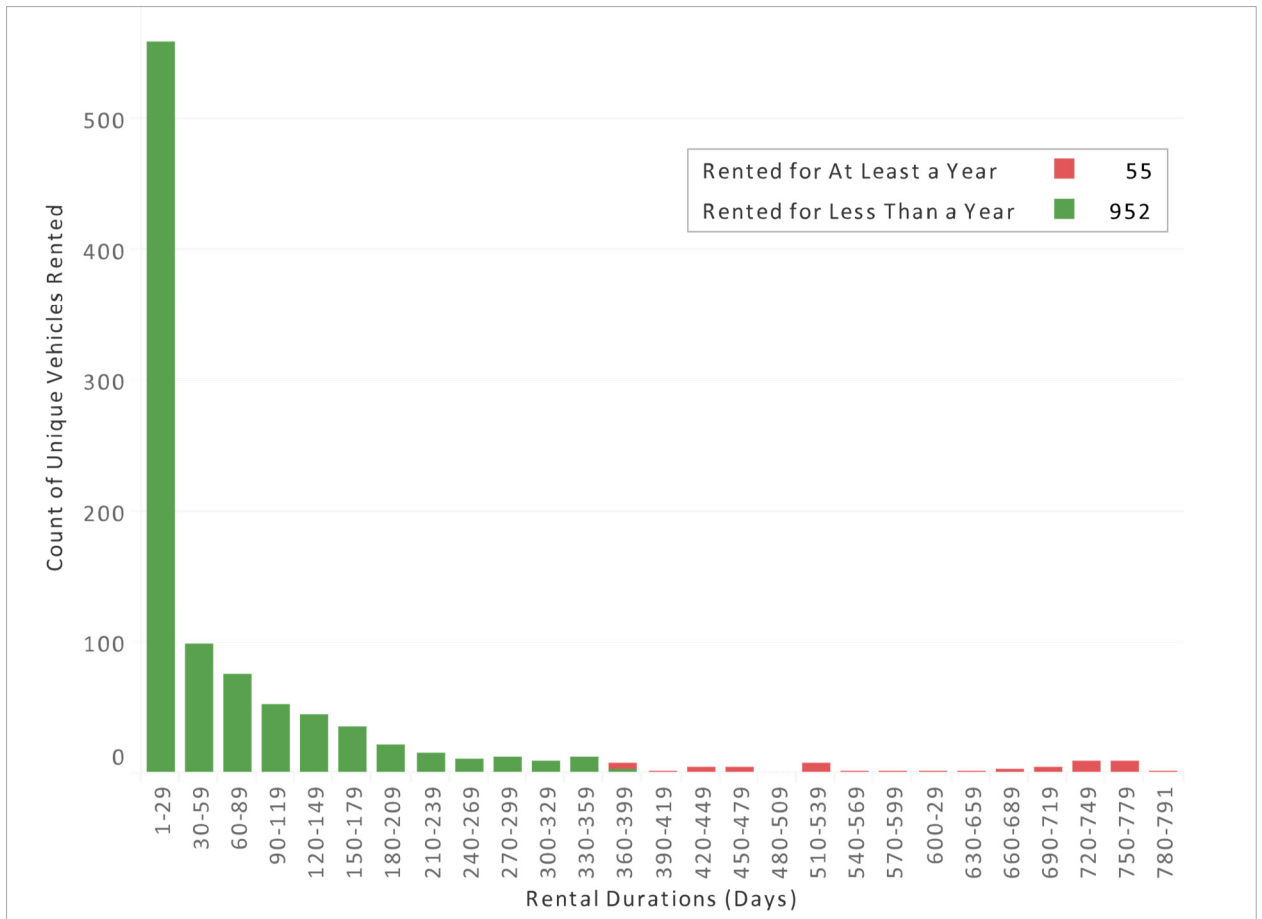
The Office of Contract Administration reports that each department is individually responsible for day-to-day management of the contract and monitoring their own utilization of it. Central Shops inspects rental vehicles when they are received, places a temporary decal with the City logo and asset number on them, and installs a telematics unit in each vehicle, except for enterprise departments which perform these functions with their own staffs.

Departments engage with the vendor directly and rent vehicles as needed and in what should be pursuant to the terms of the Citywide contract, paying for such use out of their operating budgets. Neither the Office of Contract Administration nor Central Shops reviews or approves individual department rentals. They also don't monitor or report on the City's utilization of the contract to the Board of Supervisors or any other oversight body. Further still, the contract with Enterprise requires the vendor to prepare an annual vehicle usage report, but the Office of Contract Administration was unable to confirm if they have ever received the required annual reports and if the vendor has been compliant with their contract in this regard. If they have received these reports, they could not be made available for our review.

For this report, our office requested that Central Shops and the Office of Contract Administration request rental vehicle usage information from the vendor. Several months after our requests for this information, which should have been provided in the annual reports to the City required in its contract with Enterprise, we received data on Citywide vehicle rentals from September 2017 to September 2019 only. In this period, the City spent \$2.6 million on rental vehicles, rented 1,015 individual vehicles for 79,354 vehicle rental days, and drove them a total of two million miles. The majority of rentals were short-term. In particular, the Department of Elections rented 494 of the vehicles, most of which were for only a couple days during election periods. On average, vehicles were rented for 78 days (79,354 vehicle

rental days divided by 1,015 vehicles). However, 55 cars were rented by various departments for more than a year, suggesting that to a small extent the rental program is used to supplement long-term vehicle usage. Figure 11 below shows a distribution of the rental durations.

Figure 11: Distribution of Vehicle Rental Durations
 September 2017 to September 2019



Source: Budget and Legislative Analyst’s Office analysis of rental data provided by Enterprise Rent-A-Car. September 2017 to September 2019. Note, this figure excludes eight instances of the same vehicle that were rented for multiple short durations.

In the data we received, each vehicle was classified using a system adopted by the vehicle rental industry overall and by Enterprise Rent-A-Car. We grouped those classified as mini, economy, compact, intermediate, standard, and full-size all as Regular. We grouped those classified as luxury, premium, and elite all as Luxury,

Premium, or Elite.²⁰ Based on our analysis of rentals from September 2017 to August 2019, nearly 18.6 percent of the City’s rentals were grouped as Luxury, Premium, or Elite. An example of this type of rental was an Infiniti QX70, classified as a premium elite SUV that was rented for 204 days by the Police Department for a total of \$16,623, or \$81 per day. This vehicle model or type did not appear as an option in the price list of the City’s contract with Enterprise.

Figure 12 below shows a breakdown of the vehicle rentals by department, the total individual vehicles rented, the total rental days, the total miles driven, and the total charges incurred between September 2017 and September 2019. The Police Department incurred the most charges accounting for 47.5 percent of costs during this period. They also accounted for the department with the highest total rental days and total miles driven. The Elections Department rented the highest number of individual vehicles but did so mostly near elections and for short durations.

Figure 12: Summary of Vehicle Rentals by Department
September 2017 to September 2019































Department Name	Individual Vehicles Rented	Total Rental Days	Total Miles Driven	Total Charges
Airport Commission	2	1,315	13,025	\$35,949
Elections Dept.	494	3,627	139,434	\$392,207
General Hospital	5	1,594	30,483	\$57,252
Municipal Transportation Agency	5	627	11,608	\$21,477
No Department Listed	5	2,080	39,218	\$62,794
Police Dept.	398	42,497	1,222,120	\$1,216,645
Public Health Dept.	2	290	2,510	\$7,873
Public Utilities Commission	77	23,429	500,984	\$663,860
Recreation & Park Dept.	5	672	10,237	\$20,403
Sheriff Dept.	16	3,167	41,240	\$82,888
Successor Agency to Redevelopment Agency	6	56	5,290	\$2,497
Grand Total	1,015	79,354	2,016,149	\$2,563,845

Source: Budget and Legislative Analyst’s Office analysis of rental data provided by Enterprise Rent-A-Car. September 2017 to September 2019

²⁰ While this grouping of Regular and Luxury, Premium, or Elite can be subjective, the classifications are based on Enterprise’s classification of the vehicles using the Standard Interline Passenger Procedure and the Association of Car Rental Industry Systems Standards.

Figure 13 below shows a breakdown of the vehicles rented by type and group. As can be seen, 14,727 vehicle rental days, or 18.6 percent of the 79,354 total vehicle rental days paid for by the City between September 2017 and September 2019, were for luxury, premium, or elite vehicles.

Figure 13: Number of Rental Days by Vehicle Type and Group
 September 2017 to September 2019

Type of Vehicle	Regular	Luxury, Premium or Elite	Grand Total
2 or 4 Door Sedan	 37,601	 555	 38,156
Commercial Van/Truck		 1,114	 1,114
Crossover		 1,227	 1,227
Open Air All Terrain	 120		 120
Passenger Van	 6,368	 7	 6,375
Pickup Extended Cab		 30	 30
Pickup Regular Cab	 1,931	 8,990	 10,921
Special	 2	 1,994	 1,996
Special Offer Car		 6	 6
Sport	 306		 306
SUV & Recreational	 18,299	 804	 19,103
Grand Total	 64,627	 14,727	 79,354

Source: Budget and Legislative Analyst's Office analysis of rental data provided by Central Shops. September 2017 to September 2019. Type of vehicles were assessed using car classification system from the Standard Interline Passenger Procedure and the Association of Car Rental Industry Systems Standards

Figure 14 below shows a breakdown by departments' use of rental vehicles that were classified as luxury, premium or elite between September 2017 and September 2019. The Public Utilities Commission incurred the most charges in this period for luxury, premium, or elite vehicles, accounting for 58.0 percent of total costs in these categories.

Figure 14: Summary of Vehicles Classified as Luxury, Premium or Elite, by Department

September 2017 to September 2019

Department Name	Individual Vehicles Rented	Total Rental Days	Total Miles Driven	Total Charges
Elections Dept.	6	50	876	\$5,201
Municipal Transportation Agency	4	506	8,587	\$18,285
No Department Listed	1	696	14,005	\$21,491
Police Dept.	52	4,918	95,469	\$160,008
Public Utilities Commission	30	8,534	201,665	\$284,011
Sheriff Dept.	1	5	268	\$568
Successor Agency to Redevelopment Agency	2	18	786	\$713
Grand Total	96	14,727	321,656	\$490,276

Source: Budget and Legislative Analyst's Office analysis of rental data provided by Enterprise Rent-A-Car. September 2017 to September 2019

What's not clear from the data we received is if any given rental is justified and being used appropriately. Some of the apparent luxury vehicles may have been the only option available with an important feature that was needed by the renting department. However, no one besides the department renting the vehicles reviews, approves or monitors the rentals for compliance with the City's vehicle use policy. Further, there are no specific City guidelines regarding the use of luxury or high-end rental vehicles.

The lack of any central monitoring of the rental fleet on a Citywide basis is a risk that could be reduced through use of the telematics system. For example, an automated report could be developed that monitors the activity of the rental fleet. If departments were required to note the purpose of their rentals and the business purpose for any premium or luxury vehicle rentals, and Central Shops were to conduct occasional reviews of the report, it could help identify any inappropriate use of the rental vehicle. Further, it could be used to identify long-term needs where it may be more cost effective to purchase a vehicle or develop a pool of vehicles for shared temporary use within or among departments.

Beyond the telematics system, Central Shops could be required to play an active role in reviewing and approving rental vehicle use. This will help the City reach its Zero Emission Vehicle (ZEV) Ordinance mandate, which requires that all passenger

vehicles be zero emission by December 31, 2022. If the rental program continues to operate without oversight it risks becoming a loophole to the ZEV requirements since departments are permitted to rent vehicles of their choosing. In the case of the 55 instances where cars were rented for more than a year it effectively subverted the Board of Supervisors' budget approval of departments' vehicle purchases in the capital budget process. Finally, without oversight there is a risk that departments may be renting vehicles with inappropriate luxury features and trims.

Departments' Use of the Telematics System Is Varied and Limited

Departments' use of the telematics system is varied. Some do very little with the system and others are focused on one or two important metrics. No single department seems to fully utilize the telematics system for all its intended and possible purposes. Given the varied use by departments it leaves an opportunity for a better-defined role for Central Shops to improve the City's vehicle fleet's oversight and accountability. We recommend that any increased use of the telematics system be accompanied by clear oversight, monitoring, and detailed reporting responsibilities assigned to Central Shops.

To get a sense of how departments are using telematics, we surveyed six City departments including the Human Services Agency, the Department of Public Health, the San Francisco Metropolitan Transportation Agency, San Francisco Recreation and Parks, Public Utilities Commission, and the San Francisco Airport. All six surveyed departments report tracking three metrics on a monthly basis: vehicle utilization, speeding over 80 miles per hour, and idling for the following purposes:

1. To ensure that under-utilized cars are reassigned or removed from the fleet
2. To reduce instances of speeding over 80 miles per hour
3. To reduce idling time

These metrics are sent to employees responsible for departments' fleets in the monthly reports from Central Shops that was discussed in the prior section. Departments also have access to the telematics system's web portal where they can review other metrics and create custom reports and alerts for the vehicles for which they are responsible. Only some departments report using these additional tools on the web portal. Instead of requiring each department to individually develop the additional metrics proposed in the prior section, it would be more efficient for Central Shops to develop more detailed and effective shared reports and tools that all departments can use.

Departments Use Is Mainly Coaching and Investigation

Departmental fleet managers reported using the information sent to them from Central Shops primarily as a coaching and investigative tool, rather than as a tool to assess overall performance of the department's vehicle use. In instances where fleet managers saw problematic behavior, at least one reported going to a division manager where the driver worked to discuss the incident or behavior, figuring out the circumstances behind the problem, and following up to try and correct individual behavior as needed. Fleet managers reported, for example, that if one of them saw an instance where a car idled for several hours, they would talk to the manager of the division that used the vehicle. The division manager would then find the driver responsible for idling, inquire about the reason for idling, and report this information back to the fleet manager. Through this process, they might learn, for example, that someone left a hybrid car on for several hours accidentally because the car idles quietly, and the driver did not realize the car was on.

Beyond these uses, most departments reported using telematics as an investigative tool if they receive a complaint about a specific vehicle and to count their asset inventory.

A clear takeaway from our discussion with departments was that it takes time and manual review to act on information from the telematics system. For example, a potential problem with an individual driver may be identified in the system, but to address the issue the departmental fleet manager generally needs to know more such as the driver's job duties, assignments, or prior personnel issues. To accomplish this, the fleet manager must work with the individual's supervisor to investigate. If the potential problem proves true, then correcting it requires coaching, training, or even disciplining the employee. These activities can't be done with the telematics system alone. The system can only identify a problem and potentially document it. To assist with such time intensive investigations, additional staff from Central Shops could support departments' investigations and help reduce the time burden on individual department fleet managers.

Additional uses by individual departments are described below.

Airport

Staff at the Airport report using telematics data to ensure that the vehicle being used matches specific job requirements. For example, if a person's job does not require carrying tools, they should not be using a truck. The process for matching vehicles and users is supported by telematics but is overall a manual process that requires understanding peoples' jobs.

The Airport reported keeping an incident log that allows for easy review of all reported incidents and tracks peoples' behavior over time. Through keeping an incident log, Airport staff reported they were able to find one employee with many instances of speeding and revoke a take-home vehicle that was previously assigned to the employee.

Human Services Agency

While many departments' fleets are divided by division, HSA manages the entire fleet as a pool. When someone needs a vehicle, they simply call the fleet office and the fleet office assigns a car. Beyond tracking vehicle utilization, idling, and speeding, HSA also reviews the hours vehicles are being used from 6:00 p.m. to 5:00 a.m. or weekend use as a proxy for inappropriate use. If they see potentially inappropriate use, they follow up with the supervisor of the person with the infraction to assess the situation.

Public Utilities Commission

The Public Utilities Commission staff report that they primarily focus on utilization, idling, and speeding, per the recommendation of a 2018 Controller's Office audit of fleet management. The department also reported using telematics to track vehicle mileage and battery health. They have set up over 800 geofences since 2010 to track appropriate vehicle use and monitor time spent in certain areas, and to dispatch vehicles to assignments. Geofences serve as automatic alerts when vehicle cross a geographic area, such as an area where a vehicle wouldn't be expected to drive.

San Francisco Municipal Transportation Agency

The San Francisco Municipal Transportation Agency (SFMTA) reports the standard uses of telematics including assessing vehicle utilization, idling, and speeding incidents. SFMTA staff review these numbers in more detail, examining the performance of individual divisions, and track performance over time. SFMTA staff produce a quarterly report that summarizes their findings and includes action items. Staff at SFMTA report that they believe the department should be moving toward a pool structure, managing the fleet more holistically. However, because of parking limitations at MTA facilities, this effort has not been initiated.

San Francisco Recreation and Parks

Beyond the standard metrics, San Francisco Recreation and Parks has used telematics to recover stolen vehicles: they report having recovered five vehicles in approximately a year and a half. The Department also uses telematics as a proxy to assess whether work was actually done: for example, if the Department receives a complaint that a facility is dirty soon after someone was supposed to have cleaned it, Department staff will check the amount of time a vehicle was parked at the cleaning location. If the vehicle was there for just a few minutes, it suggests cleaning may not have been done properly.

Department of Public Health

The Department of Public Health does not have one central fleet manager and instead divides fleet management among several different staff members including the Facilities Manager at Zuckerberg General Hospital, and the Department of Public Health's Facilities and Environmental Services Manager. Because each individual has relatively fewer vehicles, as a whole the Department reports that telematics is used infrequently.

Role of Central Shops?

Part of the reason Central Shops has not taken more initiative to better utilize telematics, oversee take-home vehicles, or manage the rental fleet contract may be because its current role is ambiguous. In relation to our March 2019 report on Take-Home Vehicles, the City Administrator, who oversees Central Shops, stated that their office serves in an information and coordination role rather than an approval and enforcement role. We conclude that this approach has proved ineffective regarding take-home vehicles, rental vehicles, or monitoring of vehicles overall with the telematics system. In general, departments do not self-police their behavior comprehensively as is evident by the responses from departments we surveyed, the high rates of excessive speeding observed in our analysis, and the occasional practice of departments renting cars classified as luxury, premium and elite vehicles.

We believe these behaviors can be curbed without Central Shops and the City Administrator adopting a full-enforcement model. Instead, Central Shops could utilize the telematics system to better monitor, report, and support departments in investigating and correcting these behaviors. Then, if Central Shops were required to provide the Board of Supervisors with more detailed annual reporting, including a requirement to show areas of improvement, departments would be encouraged

to correct problematic staff vehicle use patterns using their existing disciplinary options for staff.

If Central Shops were to support departments in conducting investigations of patterns identified by the telematics system, they could also report to the Board of Supervisors a summary of the outcomes of such investigations. Reporting outcome results and rates would create an incentive for departments to more closely manage driver behavior and enforce existing City rules regarding vehicle use.

Within the City Administrative Code, some enforcement mechanisms already exist that could be acted upon by departments. For example, the Code describes the following penalty: “Any employee violating the provisions of this Section [4.11] shall pay to the City and County an amount equal to three times the City and County's mileage reimbursement rate times the number of miles driven in violation thereof.”²¹ Further, any confirmed driver behavior that compromises safety, such as excessive speeding and aggressive driver behavior, should be reported to the Department of Human Resources. According to the Administrative Code, the Department of Human Resources is responsible for the coordination of safety programs and the administration of employee discipline.²²

Currently, the telematics system is run by the Central Shops Business Manager of Fleet Management. The Business Manager estimates that ten percent of his unit's time is spent managing the telematics program. In addition, he estimates that an Administrative Analyst on his staff spends 30 percent of his/her time data processing, auditing, and troubleshooting the telematics system. If the role of Central Shops were expanded to better manage and monitor the telematics system, oversee the rental program, and monitor take home-vehicles, additional staff would be required. Based on our assumption of the potential workload, we propose adding another full-time Administrative Analyst and a Principal Administrative Analyst to support these programs. Both positions combined, would cost a total of \$340,348 of salary and benefits based on the fiscal year 2019-20 budgeted rates.

The added positions would be dedicated to monitoring and reporting on the telematics system and collaborating with departments to investigate possible problems and unsafe behaviors identified in the system. The positions could be further responsible for reviewing all requests for rental vehicles from various

²¹ San Francisco Administrative Code Section 4.11 Use of City-Owned Vehicles

²² San Francisco Charter Section SEC. 10.102. Department of Human Resources.

departments and maintaining an official list of approved take-home vehicles assigned throughout the City.

The cost of the proposed additional staff within the Central Shops Fleet Management team would be covered by overall savings gained by better utilizing information generated by the telematics system. Depending on how effective the program is at curbing dangerous behavior and reducing waste, it could save a portion of the \$10.5 million currently estimated to be spent a year on claims, rentals, maintenance of unauthorized vehicles and underutilized vehicles.²³ Further, any overall reduction of vehicle emissions would support the City's environmental goals.

Role of City Administrator

The City's Charter does not clarify the issue of the City Administrator's responsibility as an information and coordination role rather than an approval and enforcement role. Instead, the Charter only states that the City Administrator will be responsible for "administrative services within the executive branch, as assigned by the Mayor or by ordinance."²⁴ However, the Administrative Code places responsibility on the City Administrator over general-purpose vehicles owned by the City. The City's Administrative Code addresses the City's Administrator's responsibility for all "all general purpose vehicles owned, leased or rented by the City" as follows:

"(b) The City Administrator shall have primary authority over vehicles now or hereafter placed under his or her jurisdiction, but may assign these vehicles for use by City officers and departments. The City Administrator may adopt rules and regulations necessary to implement this vehicle fleet management program[...]"²⁵

This seems to clearly place the City Administrator in a role responsible for the City's general-purpose vehicles since the position has authority to adopt rules and regulations about vehicle use. Such language suggests the City Administrator is authorized to do more than just provide information and coordination as claimed by the City Administrator.

²³ This figure is based on:

- \$7.2 million spent in fiscal year 2017-18 on vehicle related claims
- \$1.3 million spent on rental vehicles fiscal year 2018-19
- Estimated \$495,000 spent on maintaining potentially under-utilized vehicles
- Estimated \$1,580,553 FY 2017-18 cost of Take-Home Vehicles

²⁴ San Francisco Charter Section 3.104

²⁵ San Francisco Administrative Code Section 4.10-1 City-Owned and Leased Vehicles; Fleet Management Program.

When it comes to telematics though, the Administrative Code contains the requirements for the City Administrator to monitor the system, but distribution of authority between the City Administrator and departments is not clear. The telematics section of the Administrative Code states:

“ (b) The City Administrator and each department head or other City official shall monitor the use of the motor vehicles over which he or she has jurisdiction using the systems, and shall use that information to monitor and analyze subjects such as vehicle cost efficiency, use optimization, and post-incident investigation, and to promote other potential benefits such as increased efficiency, productivity, and improved route management planning.”²⁶

As this report found, review and monitoring activities are often occurring within departments and by the City Administrator at a high-level, but not always in a manner that appears to improve driver behavior or results in a more cost-effective vehicle inventory. Yet presumably, the City Administrator’s responsibility as the “primary authority over vehicles” supersedes any ambiguity in the portion of the Code relating to telematics.

Our recommendations for specific monitoring and reporting requirements for the City Administrator are well within the existing authority for the Board of Supervisors to assign by ordinance. The Charter leaves it open to the Mayor or the Board to assign and define the position’s responsibility.

Further, should the Board of Supervisors wish to assign the City Administrator a more robust enforcement role in regard to vehicle use, this fits within the Charter and already conforms to the City Administrator’s existing authorization to “adopt rules and regulations necessary to implement this vehicle fleet management program.” If desired, the Board could clarify through an ordinance modifying the Administrative Code a set of specific enforcement requirements for the City Administrator to conduct using information from the telematics system. Another option for enhancing the vehicle use enforcement role would be to assign it to the Mayor’s Office, which serves as the overarching executive office for all City departments and therefore would not be subject to any confusion about level of authority.

²⁶ San Francisco Administrative Code Section 4.10-2 TELEMATIC VEHICLE TRACKING SYSTEMS.

Conclusion

The City is missing the opportunity to manage the City fleet more effectively, curb dangerous driving behavior such as excessive speeding, reduce accidents and claims, reduce vehicle emissions, and prevent wasteful spending on underutilized vehicles. Combined, we estimate that these factors cost the City \$10.5 million annually. The telematics system that the City has used for several years can help reduce this figure, but it is not managed centrally, and departments use it in varied and often incomplete ways. With the addition of public safety vehicles expected to be added to the telematics system by June 2020, it adds urgency to the need to better utilize the telematics system, so the efforts of installing and maintaining the telematics system are not wasted.

In our analysis of data from the City's telematics system, we saw excessive, recurring, and dangerous rates of speeding in City vehicles. This behavior risks human lives and costs the City money to pay for any resulting liability or repairs. Further, programs such as the City's take-home vehicles and vehicle rentals are not monitored or reported on. Better use of the telematics system could help with all the issues we have identified.

While the City Administrator's Office and its Central Shops Division report their role to be service and information providers and not enforcers of City policy, adding increased monitoring, reporting, and investigation support to departments will not disrupt their current role. Instead, they could better support departments and help encourage change Citywide with our recommended improvements to their reporting from the telematics system. Alternatively, a formalized vehicle use enforcement role could be assigned to the Mayor's Office, where Citywide authority over departments is already in place. Either of these approaches would reduce the risk to lives, save the City money, and help reduce vehicle emissions overall.

Policy Options

1. The Board of Supervisors could amend and update Administrative Code Section 4.10-2 to include more detailed annual reporting requirements for the City Administrator's Office and require the City Administrator's Office to perform ongoing monitoring and oversight of Citywide vehicle use patterns using the telematics system.
2. The Board of Supervisors could request the City Administrator's Office or the Mayor's Office to collaborate with departments to investigate vehicle use patterns, trends and specific incidents identified by the telematics system and to assume responsibility for enforcing policies and procedures to improve driver behavior and vehicle fleet cost-effectiveness.
3. The Board of Supervisors could request more robust annual reporting from the City Administrator's Office to include at minimum the following Citywide metrics and trends for the current and past reporting periods, aggregated by department and month and filtered to reduce the number of false positives within the results and excluding any law enforcement departments:
 - a. Speeding and Aggressive Driving Behavior
 - i. Incidents when vehicles exceed over 80 miles per hour.
 - ii. Incidents when vehicles exceed over 10 miles per hour over the posted speed limit.
 - iii. Incidents of aggressive acceleration.
 - iv. Incidents of aggressive braking.
 - b. Underutilization - *excluding all vehicles each month that were serviced or those with broken telematics units at the time.*
 - i. Number of vehicles that have been driven 100 miles or less in a month.
 - ii. Number of vehicles utilized five or fewer days in a month.
 - iii. Number of vehicles that made 40 or fewer trips.
 - c. Emissions and Maintenance
 - i. Number of idling incidents over 5 minutes per month.
 - ii. Average length of idling incidents that exceed 5 minutes.
 - iii. Number of vehicles with engine codes that indicate poor and non-compliant emission levels.
 - d. Rental Fleet
 - i. Number of vehicles rented and listed by category of rental purpose, category of vehicles, and vehicles classified as luxury, premium and elite.
 - ii. Average length of continuous use of rental vehicles.
 - iii. Number of rental vehicles that have been continuously rented for a year or more.

- e. Take Home-Vehicles
 - i. Number of official take-home vehicles approved for use under the Administrative Code.
 - ii. Number of vehicles flagged within the telematics system as exhibiting potential unofficial take-home use.
 - iii. Number of potential incidents of vehicles being used for personal use.
 - f. Monitoring and Investigations
 - i. Number of each type of investigation initiated by the City Administrator's Central Shops Division in collaboration with departments and listed by type of issue investigated.
 - ii. Number of investigation outcomes listed by category of outcome, such as issue identified as false, training provided, or disciplinary action.
 - iii. Changes in incidents over time to show the impact of investigations and their follow up.
4. The Board of Supervisors could request the City Administrator's Office to monitor and report on the City's passenger vehicle rental program within its Central Shops Division, including reviewing all rental requests from all departments to document and report annually to the Board on annual rental usage, and to report quarterly to all departments on their rental usage and compliance with the contract.
5. Based on the recommendations we made in our March 2019 report, "[City Departments' Assignment of Take-Home Vehicles](#)," the Board of Supervisors could request the assignment of take-home vehicles be reviewed by the Mayor's Office of Policy & Finance and the Budget & Legislative Analyst's Office during the annual budget review. Any approval of requests for new or replacement vehicles by City departments should be contingent on detailed justification for take-home vehicles assigned on a permanent basis to meet the City's public safety and emergency response requirements, and on a temporary basis from a department vehicle pool to meet the department's operational requirements.
6. The Board of Supervisors could request the City Administrator's Office to monitor the City's take home-vehicle program, record the status of those vehicles within the City's vehicle asset systems, monitor approved take-home vehicles using the City's telematics system for compliance with the City laws and codes, and monitor all other vehicles within the City's telematics system for instances of unapproved take home vehicle use.
7. The Board of Supervisors could adopt a supplemental budget appropriation to add additional staff to the City Administrator's Central Shops Division to perform more comprehensive monitoring and reporting of the telematics system, and to collaborate

with departments when investigating identified unsafe behaviors, unapproved take home-vehicle activity and other vehicle use patterns.

8. The Board of Supervisors could request the City Administrator's Office to develop reports, templates and tools necessary for public safety departments to independently monitor and annually report to the Board the same aggregated metrics the City Administrator's Office could report Citywide, including telematics, rental vehicle use, and take-home vehicle use.

Appendix A: Overview of Existing Policies

City's History with Telematics

Prior to 2014, various individual departments had implemented vehicle telematics systems through individual contracts with different contractors and a variety of systems. In September 2014, the Fleet Management/Central Shops Department consolidated the various contracts into one contract with USA Fleet Solutions²⁷ serving all City departments using the same technology and providing the same service level. This standardized system and contract offers installation, support, and training for these systems across all departments.

2015 Report

In February 2015, we released a [report](#) at the request of Supervisor Yee reviewing the implementation of telematics at that time, including cost estimates to install and maintain it on additional City vehicles. At the time of the report, telematics had been installed on 3,108 vehicles. The report concluded that the City could save money and increase vehicle-related safety by installing it on the remainder of the fleet.

2016 Telematics Legislation

In June of 2016, the Board of Supervisors amended San Francisco's Administrative Code²⁸ to require the installation and use of telematics vehicle tracking systems in all motor vehicles owned or leased by the City. Law enforcement vehicles are exempt from the legislation, including vehicles owned by the Police Department, the Sheriff's Department, the Adult Probation and Juvenile Probation Departments (if used for law enforcement purposes), and the District Attorney's and City Attorney's offices (if used for investigative purposes). In addition, the Administrative Code requirements may not apply to the Public Utilities Commission, Airport, Port, or Municipal Transportation Authority if the requirements conflict with State or federal laws or interfere with functions placed under the jurisdiction of these departments.

The legislation also requires that department heads submit an annual report on telematic system data collected for their department vehicles to the City Administrator at the end of the fiscal year. The City Administrator must then submit an annual report on Citywide vehicle use to the Mayor and Board of Supervisors by October 1 of each year. If department heads believe that reporting will be too

²⁷ USA Fleet Solutions is a reseller of the Networkfleet service, which is owned by Verizon.

²⁸ Ordinance 101-16, Section 4.10-2- Telematic vehicle tracking system

arduous, they may submit a written application requesting a waiver to the requirements of Section 4.10-2, and the City Administrator may offer a waiver if they determine that the requirements would interfere with a department's ability to complete its official functions. The City Administrator must complete a process notifying the Board of Supervisors of the waiver, and the Board has the opportunity to reject or affirm the waiver.

According to Administrative Code Section 4.10-2, data collected from telematics is meant to improve unsafe driving, make vehicle use more efficient, improve maintenance of vehicles, and help with route management planning. In addition, telematics are meant to support Vision Zero and the Healthy Air and Clean Transportation Ordinance (HACTO)

2019 Expansion to Law Enforcement

In June 2019, the Board of Supervisors voted to expand the installation and use of telematics with the City's law enforcement agencies, with the option that these agencies can be granted a waiver from the City Administrator exempting them from the reporting requirements. Vehicles possessed by the Police Department, the Sheriff's Department, the Adult Probation Department, and the Juvenile Probation Department for law enforcement, and the eight vehicles used by the District Attorney's Office or the City Attorney's Office for investigations were required to have telematic systems installed and in use by June 30, 2020.

Related Policies

Healthy Air and Clean Transportation Ordinance (HACTO). In 2010 the Board of Supervisors adopted legislation requiring each department to remove from service five percent of their total number of non-safety, passenger and light duty vehicles annually over a five-year period. In 2015 the ordinance was amended to: (1) transfer the fleet management and vehicle selection elements of HACTO, therein referred to as the Healthy Air and Clean Transportation Program from the Department of the Environment to the City Administrator; (2) replace the mandatory fleet reduction requirements with new policies to optimize the size and use of the City's vehicle fleet; and (3) authorize master contracts for City use of car-sharing services.

Vision Zero. The City adopted Vision Zero as a policy in 2014 to eliminate traffic fatalities and reduce severe injuries, with the goal of eliminating all traffic fatalities by 2024. The Vision Zero program uses data to drive decision making; strategies used to decrease fatalities in San Francisco include improving street infrastructure, enforcing traffic laws, running public education campaigns, and adopting policy

changes that support safer streets. Vision Zero operates with the assumption that traffic deaths are preventable, and historically the City has found that the majority of severe traffic injuries and fatalities occur on a very small percentage of San Francisco's streets. Given the underlying principles of the policy, collecting relevant data is an important piece of developing and implementing Vision Zero strategies. In addition, the City identifies reducing vehicle miles traveled as a complementary goal to Vision Zero's overall goal.

Zero Emission Vehicle (ZEV) Ordinance. In May 2017, the City adopted an ordinance requiring that all new light-duty passenger vehicles procured for the City Fleet be Zero Emission Vehicles (ZEVs) and requiring all passenger vehicles be zero emission vehicles by December 31, 2022. Under the legislation, departments had the option of obtaining a waiver or exemption from this requirement. The ordinance also directed the City to minimize the light-duty fleet by analyzing the fleet and eliminating unnecessary vehicles.

Take Home Vehicles. The use of City vehicles for travel to and from a place of residence ("take-home vehicles") is governed by the San Francisco Administrative Code, Sec. 4.11. Vehicles owned, leased, or rented by the City are subject to this Code section.

According to the Administrative Code, no officer, employee, or authorized volunteer of the City may use a vehicle without consent of the head of the department. The head of the department may not assign any vehicle to an individual unless a written request justifying the need for personal assignment is made and approved by the Director of Administrative Services. These assigned vehicles must be used for municipal business.

There are five conditions in which a City vehicle may be used for transportation to and from an employee's place of residence:

1. The employee resides in the City and works outside of the City, or resides and works outside the City, and is on call for work after hours. The work must have required the use of a City vehicle after hours on at least five occasions in the preceding 12-month period.
2. The employee resides in the City and works outside of the City, or resides and works outside of the City, and must leave his or her residence prior to 8:00 a.m. on City business away from his or her normal place of work.
3. The employee resides in the City and works outside of the City, or resides and works outside of the City, and would return to his or her normal place of work from an appointment on City business after 6:00 p.m. or on a weekend.

4. The employee is a forensic pathologist employed by the Office of the Medical Examiner and has prior written permission of the Medical Examiner to use a City vehicle and is on call before or after normal work hours in order to respond to and investigate death scenes. The Medical Examiner is allowed only two exempted vehicles.
5. The employee is a resident of the City and is driving the vehicle to and from the employee's place of residence solely for the purpose of garaging the vehicle at his or her place of residence during non-work hours, with the approval by resolution of the Board of Supervisors, upon the recommendation of the Director of Administrative Services.

Appendix B: Filters Applied to Speeding Data

The data provided by Central Shops for the 13-month period showed 362,922 speeding incidents that were ten miles or more per hour over the posted speed limit. Note that each incident is the start and stop of when speeding occurs, so a single vehicle trip may include several incidents. After we conducted the filtering to reduce false positives from erroneous GPS results there were 148,034 incidents, or 40.8 percent of the original data provided. Similarly, the data initially showed 3,778 unique vehicles that had recorded at least one speeding incident. After our filtering, 2,619 unique vehicles remained, or 69.0 percent. Note that since the data we received was anonymized there could have been different or multiple drivers per unique vehicle that accounted for the speeding incidents. This would be especially true among shared and pool vehicles. Departments maintain a log of who uses such vehicles and are able to reference the time of speeding incidents with the driver at that time.

Our filtering methods included the following in order to reduce the number of possible erroneous results from suspected GPS and data errors and focus our analysis on more material and significant incidents.

1. We included only speeding incidents with reported violation distances of more than 0.25 of a mile or 1,320 feet to account for only longer periods of speeding. This exclusion is not to dismiss the dangers of even short speeding incidents, but we believe such instances would be better captured with our recommended monitoring of aggressive driving behaviors discussed in the report such as rapid acceleration and harsh braking. Note that the maximum speed attained is the number reported for each segment when a violation occurred. For example, a speeding incident over a mile may have generally been 12 miles per hour over the posted speed limit, but for a short period within the incident they reached 20 miles per hour. In this example, 20 miles per over the posted speed limit is the number reported in the system.
2. We excluded speeding incidents that were reported occurring for more than a sustained 50 miles. Although possible on long drives outside of the City, these longer reported durations could be the result of errors. For example, some outlier data shows speeding incidents occurring across several hundred miles. These are seemingly improbable and likely errors related to false coordinates captured from the GPS unit.
3. In San Francisco, the downtown portion of Market Street has a 10 mile per hour speed limit that applies “if [a] bus or streetcar is stopped at safety zone.” While buses and streetcars are often present on Market Street, there may be

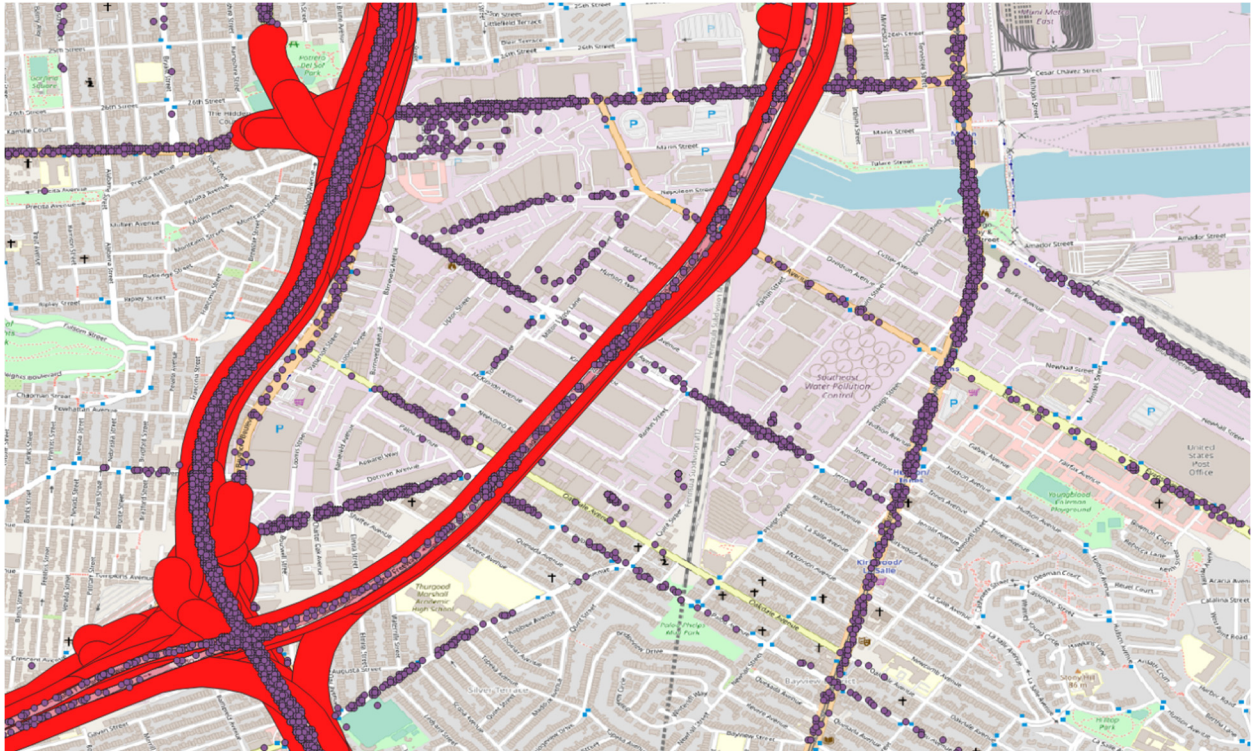
occasions when they are not. In these instances, the speed limit is 25 miles per hour. To avoid reporting possible false positives, we excluded speeding incidents in this variable zone. As with other exclusions, we believe repeat offenders will be identified in other instances and any subsequent review by management of an employee's driving should not exclude such zones when reviewed in-depth.

4. We included only vehicles reporting speeding that are connected to the telematics system using their OBD II port. This port allows the vehicle to directly report its speedometer reading to the system. Other interfaces rely on the GPS unit exclusively to estimate speed. However, Central Shops reports that this can cause an "urban canyon" effect where GPS units show sporadic readings when driving between tall buildings. Most modern passenger vehicles, vans, and pickup trucks have a standard OBD II port, meaning the majority of vehicles in the fleet can report data to the telematics system using it.
5. We excluded speeding incidents that are more than 30 miles above the posted speed limit. After analyzing the location of such reported incidents, they appear in proximity to freeways and were likely caused by GPS confusion between a surface street and freeway. Extremely high-speed incidents above 80 miles per hour that would be excluded in this analysis will be captured in the existing speeding report that Central Shops already conducts and reports on.
6. We excluded incidents that are recorded as beginning within 150 feet of either side of a freeway or highway within San Francisco. After we reviewed the data in San Francisco we saw a large volume of incidents that appeared to have some GPS error along the corridors of the City's freeways, especially where freeways are elevated, around interchanges, and ramps. Many of these are likely due to a vehicle traveling on the freeway at a normal speed, but the GPS unit recording it as slightly adjacent due to poor GPS accuracy. These adjacent coordinates would then map to the closest street address, which may not be the freeway and then the telematics system automatically compares the speed to the posted speed limit for on the erroneous street. To resolve this issue and reduce false positives, we kept all incidents that are within the boundaries of the freeway²⁹, but excluded those with a 150-foot buffer around both sides. We also excluded incidents on and around on- and off-ramps given a similar propensity for GPS errors and variable speeds in these transitional zones. Figure 11 below illustrates how this filtering method was applied. The red colored

²⁹ We estimated freeways in San Francisco with four lanes in each direction with 12-foot lanes.

areas are the portions where incidents were excluded in our analysis due to a higher chance of GPS-errors occurring.

Figure 15: Screenshot of Areas Excluded from Speeding Analysis



Source: Budget and Legislative Analyst's Office

After the above filters are applied to the speeding data, what remains are incidents with a higher degree of confidence that they represent true speeding incidents that occurred. Our filters likely exclude some number of true incidents of speeding, but also reduce the number of potential erroneous or false-positive results. Even with these exclusions we believe that repeated dangerous driving behavior has been identified. For example, someone who speeds on a portion of Market Street, which was excluded, would be equally likely to speed on another nearby street and be represented in our resulting analysis.

Appendix C: Digital Appendix

The website for the Budget and Analyst of the Board of Supervisors hosts PDF copies of this and all prior audit reports. In addition, this report has a Digital Appendix hosted on the web page. The digital appendix provides interactive visualizations and downloadable data for select datasets and topics from the report. This digital appendix includes the following topics:

1. Overview of City Fleet
2. Analysis of Speeding Records
3. Analysis of Rental Records

[You can find the Digital Appendix here.](#)

The full URL is as follows, <https://sfbos.org/budget-legislative-analyst-reports>

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**CITY AND COUNTY OF SAN FRANCISCO
BOARD OF SUPERVISORS
BUDGET AND LEGISLATIVE ANALYST**

Policy Analysis: Vehicle Telematics Update

Fleet Summary | Speeding Incidents | Vehicle Rental Program

The City maintains a contract with Enterprise Rentals for passenger cars, trucks and vans. Departments are given discretion to use the contract with no monitoring or oversight from the City's Office of Contract Administration or its Central Shops Division, which oversees the City's fleet of vehicles. Use of rental Vehicles has varied by department.

Central Shops provided rental data for rentals that occurred between September 2..

Use the filter menus to change the view of the table and chart below. -->

Department Name	Type of Vehicle
(All)	(All)

Amount spent on rental vehicles in fiscal year 2018-19: **\$1,254,174**

Total amount spent on rental vehicles September 2017 to September 2019: **\$2,563,845**

Department Summary

Department Name	Individual Vehicles Rented	Total Rental Days	Total Miles Driven	Total Charges
Airport Commission	2	1,315	13,025	\$35,949
Elections Dept.	494	3,627	139,434	\$392,207
General Hospital	5	1,594	30,483	\$57,252
Municipal Transportation Agency	5	627	11,608	\$21,477
No Department Listed	5	2,080	39,218	\$62,794

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