Blackshear, Regina

From: Kersh, Kathleen
Sent: Wednesday, July 13, 2022 3:33 PM
To: CCO Clerk
Subject: Public Comment for July 20, 2022 Hearing
Attachments: 7-13-22_Public Comment_COPP_ALPR Request.pdf

Dear Dayton City Commission,

On behalf of the Coalition on Public Protection, please accept the attached public comment. Please do not hesitate to reach out if you have any questions or concerns.

Sincerely,

Kathleen Kersh
Senior Attorney and Project Director

Advocates for Basic Legal Equality, Inc.
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Together, we do the community justice.

PUBLIC COMMENT ON THE DAYTON POLICE DEPARTMENT'S AUTOMATED LICENSE PLATE READER PROPOSAL

The Coalition on Public Protection, which includes representatives from Access Center for Independent Living, Black Lives Matter Dayton, Dayton Unit NAACP, Latinos Unidos, LEAD, Miami Valley Immigration Coalition, ABLE, and other community activists, has reviewed the Dayton Police Department's Automatic License Plate Reader (ALPR) Surveillance Impact Report and Use Policy.

We do not believe the report and policy, as written, serve the purposes mandated in the Surveillance Technology Oversight Ordinance. These reports do not contain enough objective information and accurate, relevant data for the Commission to make an informed decision—as our elected officials—on the technology proposal.

The Coalition previously requested that the Commission send this report and policy back to the Dayton Police Department to make revisions that make the documents more objective and allow the Commission to make an informed decision. This would necessarily require the hearing date to be pushed back. However, in order to comply with the current public comment deadline, we submit a list of our concerns and requests below:

Surveillance Impact Report

1. **Crime statistics.** The explanation of the use of crime statistics, particularly the reliance of comparing 2018 data at the exclusion of data from 2019 that shows ALPRs *do not* result in crime reductions, is insufficient.

2. **Unknown vendor**. There is a huge question regarding data sharing with third party vendors since DPD has not chosen a vendor for the fixed-site ALPRs yet. Further, **all of the community outreach and other information-sharing DPD conducted was with and regarding Flock Safety ALPRs**: their data protections, data-sharing policies, images they capture, etc. If Flock Safety is not going to be the vendor, then the Commission and the community needs to be informed about what capabilities and data-sharing/storage protocols the *actual* vendor possesses before the Commission can make an informed decision.

3. **Adverse Impact of equipment on protected groups.** This is one of the most important sections, yet it reads as an opinion section as to why the police should be trusted. It does not contain data or other objective indicia for why these ALPRs will not have an adverse impact on minority communities.

4. **No independent, objective reports**. We acknowledge there is a blog post by a former police officer and criminal justice professor attached to the current version of the impact report. However, we do not think it qualifies as an "independent evaluation" under Section 34.10(4)(b). There are other independent reports about ALPRs that the police is likely aware of that should have been included. It ultimately benefits the police to

understand the potential risks and costs, as well as the benefits, of ALPRs that are identified by national experts. **We attach to this comment two reports on ALPRs for your consideration.**

Use Policy

1. **Police access to data.** We also noticed that changes to the documents now allow for *every* police officer to access ALPR data, rather than certain command officers, as in previous versions of the policy. This is concerning.

2. **Data retention**. We still question why data needs to be kept for 30 days or longer and whether that is necessary and proportionate to the uses of the ALPR. It seems a period of 24 hours for data not related to a specific criminal incident would be sufficient.

3. **Data sharing with vendors.** There is not enough information about Evidence.com and the data storage and sharing agreement with Axon. A copy of this agreement should be provided.

4. **Removal.** While the impact report mentions a process for installing ALPRs through the Neighborhood Safety Plan, neither the impact report nor the policy mention a process for removal.

5. **Compliance.** Section 34.11(k) of the Surveillance Technology Oversight Ordinance requires a use policy to disclose the mechanisms to ensure that the Use Policy is followed, including "internal personnel assigned to ensure compliance with the Policy, internal recordkeeping of the use of the policy," safeguards to monitor misuse, and legally enforceable sanctions for violation of the policy. The ALPR Use Policy does not contain this information.

6. **No independent auditor**. During the ordinance process, the City committed to the hiring of an independent auditor to monitor DPD's compliance with the ordinance. To date, that auditor has not been hired. Given the repeated compliance concerns with the various drafts of these reports and policies, the Commission should table the proposal until it can be reviewed by an independent auditor. This is the first proposal that is going through the ordinance process, and it is important that we get this right.

7. **No safeguards against data sharing with ICE in policy.** The ALPR use policy does not include the procedure outlined in the impact report that requires recipients of ALPR data to attest they will not share the information with immigration enforcement agencies. This is concerning, since it is the policy that will govern the police department's conduct going forward.

8. **Hearing.** We note the procedure to hold a hearing every time a new neighborhood adopts the ALPR as part of its safety plan was omitted from the most recent policy draft. Why was that? What notice will be provided to the community if a new neighborhood adopts ALPRs?

9. **Transparent use of ALPRs**. Patrol vehicles should have a light or other signal that should be visible to the public when the mobile license plate readers in each patrol vehicle are turned on. If the goal of the ALPRs is to reduce crime through deterrence, it would make sense to let the public know when the ALPRs are actively being used.

10. **Hit list**. The Commission should limit approval of ALPR "hit list" for both mobile and fixed-site ALPRs to a list of certain infractions, such as terrorism hits, stolen vehicles, and amber alerts.

11. **Cost/benefit analysis.** DPD should be required to conduct a cost analysis every year to determine the monetary value of vehicles and other property retrieved through ALPRs compared to the entire cost of ALPRs (including personnel costs and any costs relating to data storage).

We thank you for the opportunity to provide comments on the ALPR proposal. As our elected representatives, we hope you will take our concerns and demands very seriously.

Sincerely,

The Coalition on Public Protection

With representatives from: Black Lives Matter Dayton, Dayton Unit NAACP, Latinos Unidos, Leadership for Equality and Action of Dayton, Miami Valley Immigration Coalition, Access Center for Independent Living, Advocates for Basic Legal Equality

Attachments:

Vasudha Talla, *"Documents Reveal ICE Using Driver Location Data From Local Police for Deportations,"* ACLU.org (Mar. 13, 2019), available at: https://www.aclu.org/blog/immigrants-rights/ice-and-border-patrol-abuses/documents-reveal-ice-using-driver-location-data

Jonathan Hofer, *Automated License Plate Readers: A Study in Failure*, Independent Institute (Nov. 30, 2021), available at: https://www.independent.org/publications/article.asp?id=13893

ACLU

SPEAK FREELY

Documents Reveal ICE Using Driver Location Data From Local Police for Deportations

By Vasudha Talla, Staff Attorney, ACLU of Northern California

MARCH 13, 2019 | 11:00 AM

TAGS: ICE and Border Patrol Abuses, Immigrants' Rights, Automatic License Plate Readers, Location Tracking, Privacy & Technology

U.S. Immigration and Customs Enforcement is using mass location surveillance to target immigrants. And local governments like Merced and Union City, California, are helping – feeding their residents' personal information to ICE, even when it violates local privacy laws or sanctuary policies. Today, the ACLU is urging an immediate end to this information sharing.

Records obtained by the ACLU of Northern California in a Freedom of Information Act lawsuit detail ICE's sweeping use of a vast automated license plate reader (ALPR) database run by a company called Vigilant Solutions. Over 9,000 ICE officers have gained access to the Vigilant system under a $6.1 million contract that the public first learned of last year. ICE has access to over 5 billion data points of location information collected by private businesses, like insurance companies and parking lots, and can gain access to an additional 1.5 billion records collected by law enforcement agencies.

Over 80 local law enforcement agencies, from over a dozen states, have agreed to share license plate location information with ICE. Emails show local police handing driver information over to ICE informally, violating local law and ICE policies.

The ACLU's grave concerns about the civil liberties risks of license plate readers take on greater urgency as this surveillance information fuels ICE's deportation machine. Many communities have license plate readers: high-speed cameras mounted on police cars, road signs, or bridges that can photograph every passing license plate. Together with time, date, and location coordinates, the information is stored for years, generating a literal and intimate roadmap of people's private lives. Vigilant also sells ALPR systems to local police and hosts location information collected by law enforcement and private companies in a massive database called LEARN.

We already knew that ICE engages in egregious conduct: from arresting a father dropping off his daughter at school to detaining a woman in court seeking a protective order against an abuser. But adding license plate surveillance with its attendant misuse – police spying on Muslim Americans or unlawfully detaining a black woman at gunpoint – magnifies ICE's threats to community safety. And now we know which local police departments are helping ICE terrorize immigrant communities by sharing license plate information.

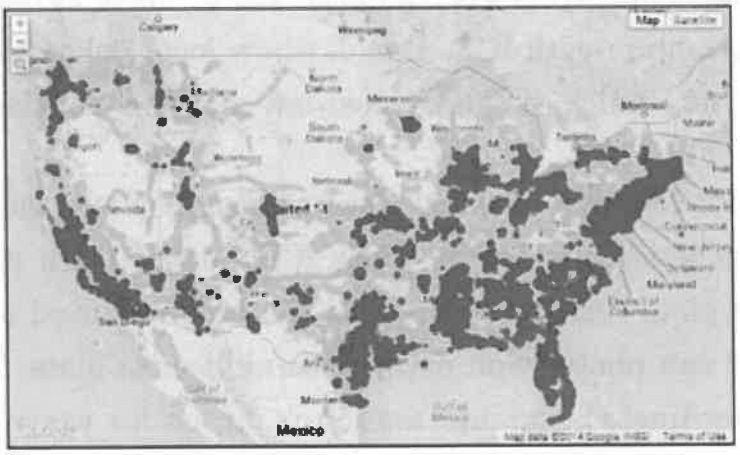
A Nationwide Mass-Surveillance Dragnet

Contract documents show that ICE has long desired the ability to locate people with laser-like precision. After prior attempts were scuttled because of privacy concerns, ICE rushed to finalize a 2017 contract with Thomson Reuters for access to the Vigilant database.

The $6.1 million contract gives ICE access to the Vigilant database through September 2020. Not only does Vigilant's existing database contain over 5 billion license plate scans nationwide, but the database would continue adding, from commercial sources, "an average of 150-200 million unique" license plate scans *each month*.

Vigilant draws its license plate information from the "most populous 50 metropolitan areas" in the country, corresponding to almost 60 percent of the U.S. population.

The map below shows the density and coverage of Vigilant's commercial LPR data. Red areas have higher concentrations followed by yellow and green.



A list of the most populous 50 metropolitan areas in the US with commercial LPR data is provided below and exceeds the minimum requirement by DHS. Additional locations can be provided upon request.

Number	Metro Area
1	NewYork-NorthernNewJersey-LongIsland,NY-NJ-PA
2	LosAngeles-LongBeach-SantaAna,CA
3	Dallas-FortWorth-Arlington,TX
4	Chicago-Joliet-Naperville,IL-IN-WI
5	Houston-SugarLand-Baytown,TX
6	Washington-Arlington-Alexandria,DC-VA-MD-WV
7	Phoenix-Mesa-Glendale,AZ
8	Miami-FortLauderdale-PompanoBeach,FL
9	Riverside-SanBernardino-Ontario,CA
10	SanAntonio-NewBraunfels,TX
11	Baltimore-Towson,MD
12	SanDiego-Carlsbad-SanMarcos,CA
13	Atlanta-SandySprings-Marietta,GA
14	KansasCity,MO-KS
15	VirginiaBeach-Norfolk-NewportNews,VA-NC
16	SanFrancisco-Oakland-Fremont,CA
17	Austin-RoundRock-SanMarcos,TX
18	St.Louis,MO-IL
19	Cleveland-Elyria-Mentor,OH
20	Richmond,VA

ICE was also told that law enforcement agencies "could provide hundreds of millions more LPR scans available for ICE to search" and that its database held "500 million" license plate locations collected by law enforcement.

License plate information collected and shared by police and sheriffs are key to the surveillance dragnet. Vigilant encourages law enforcement to share location information collected locally with hundreds of other agencies nationwide, making it "as easy as adding a friend on your favorite social media platform."

In training materials, ICE was given the tools to make friends with local police: an interactive map of the United States displaying the agencies using Vigilant software, together with "a step-by-step guide (with pictures!)" containing instructions on requesting access from local agencies to their residents' location information.

National LPR Data Sharing Map: The map (Figure 1 below) represents a list of Law Enforcement Agencies using LPR technologies. When logged into LEARN, click on a representing 'Pin' mark and facilitate LPR data sharing by contacting the Agency Manager.

Figure 1: List of Law Enforcement Agencies Who May Provide Data to LEARN (as of May 2018)

ICE's efforts to exploit locally collected location information are working. An internal report lists the 80 local agencies nationwide that granted ICE ongoing access to license plate locations of their residents, including "sanctuary cities" like Union City, California. We do not know whether police gave notice to their residents before agreeing to share years of intimate details with ICE.

In addition to ongoing access to local information, ICE makes individual requests to friendly police for surveillance. Released emails reveal a years-long relationship between an ICE officer and a detective in a fusion center – an intelligence-sharing agency long-criticized by the ACLU for violating civil liberties – in Orange County, California.

The detective searched the Vigilant database at the request of ICE and shared the results:

From: (b)(6),(b)(7)(C)
Sent: Wednesday, March 7, 2018 10:41 AM
To: (b)(6),(b)(7)(C)
Subject: NVLS

Hi (b)(6),

Will you please run AZ plate (b)(6),(b)(7)(C) I am only able to pull from commercial databases for now.

Thanks!

(b)(6),(b)(7)(C)
Intelligence Research Specialist
Narcotics and Gang Group
Homeland Security Investigations

From: (b)(6),(b)(7)(C)
To:
Subject: Re: NVLS
Date: Wednesday, March 07, 2018 6:04:13 PM
Attachments: (b)(6),(b)(7)(C).pdf

Hi there.. Sorry i didn't reply sooner.. I was sleeping after my graveyard shift when you emailed me..

I attached the LPR report.. 1 LE scan that i could find..

hope you are well..

(b)(6),(b)(7)(C) Detective
Orange County Intelligence Assessment Center (OCIAC)
La Habra Police Department
desk (714) 289-(b)(6)
cell (949) 279-(b)(6)
(b)(6),(b)(7)(C)

These emails and others reveal ICE's methods for circumventing both internal privacy rules and attempts by local law enforcement agencies to lock down their information.

These informal inquiries violate ICE's privacy rules requiring all use of ALPR technology to be documented and justified. And ICE exploits friendly intermediaries like the Orange County detective to obtain information collected by another law enforcement agency that may not want ICE to have access to its information. This contradicts ICE's claim that "there are no circumstances where ICE can gain access through the vendor system if a law enforcement agency has chosen not to share its data."

With more than 9,200 ICE employees with accounts on the Vigilant database – many of whom have deportation as their primary work – privacy safeguards are essential. Yet ICE's so-called Privacy Guidance contains gaping holes that enable ICE to infringe on civil liberties. ICE can sweep up to "five years" of driver information when searching for an immigrant to deport.

Storing that much location information is both a significant invasion of privacy and entirely unnecessary to find someone's current location. The privacy rules also do not prevent ICE from ensnaring other individuals – whom they are not looking for – increasing the chances of baseless stops and false arrests.

ICE's privacy rules fail to adequately protect First Amendment-protected speech and activity. While the guidance requires ICE abide by its Sensitive Location policy – limiting surveillance near schools, hospitals, churches, protests, or weddings – there is no way for ICE to know before searching the Vigilant database whether the search will turn up driver information near those locations.

Resistance Is Local

In California, police sharing resident location information with ICE violates the law.

Senate Bill 34 and the California Values Act (SB 54) – passed to protect privacy and immigrant safety – prohibit local law enforcement agencies from sharing license plate information and personal information for immigration enforcement or with out-of-state or federal agencies. Many localities have gone beyond that to adopt ordinances to provide sanctuary to immigrants.

On Wednesday, the ACLU called on local law enforcement agencies to stop sharing their residents' location information with ICE.

California state lawmakers should now call for the state auditor to review compliance with SB 34 and SB 54.

In addition, communities must regain control over their personal information. Some have already rejected contracts for license plate surveillance — like Alameda and Culver City in California. And all communities should pass ordinances to require transparency, oversight, and approval whenever a police department considers purchasing surveillance technology.

If these ordinances existed, and the right questions were being asked and answered from the start, places like Union City wouldn't be endangering their communities by sharing location information with ICE, which is in direct conflict with their sanctuary policies and the law. Local governments need to take immediate action to limit the exposure of local residents' information to ICE and withhold information from fusion centers that do not do the same.

ICE has long embraced technology to target immigrants. Now it's taking surveillance to an unprecedented level to target vulnerable communities — and sweeping up everyone else in the process. It's time to take back control of our information and make sure our communities aren't collaborating with ICE.

Thanks to the Electronic Frontier Foundation and MuckRock for their work documenting the widespread sharing of license plate information among law enforcement agencies nationwide.

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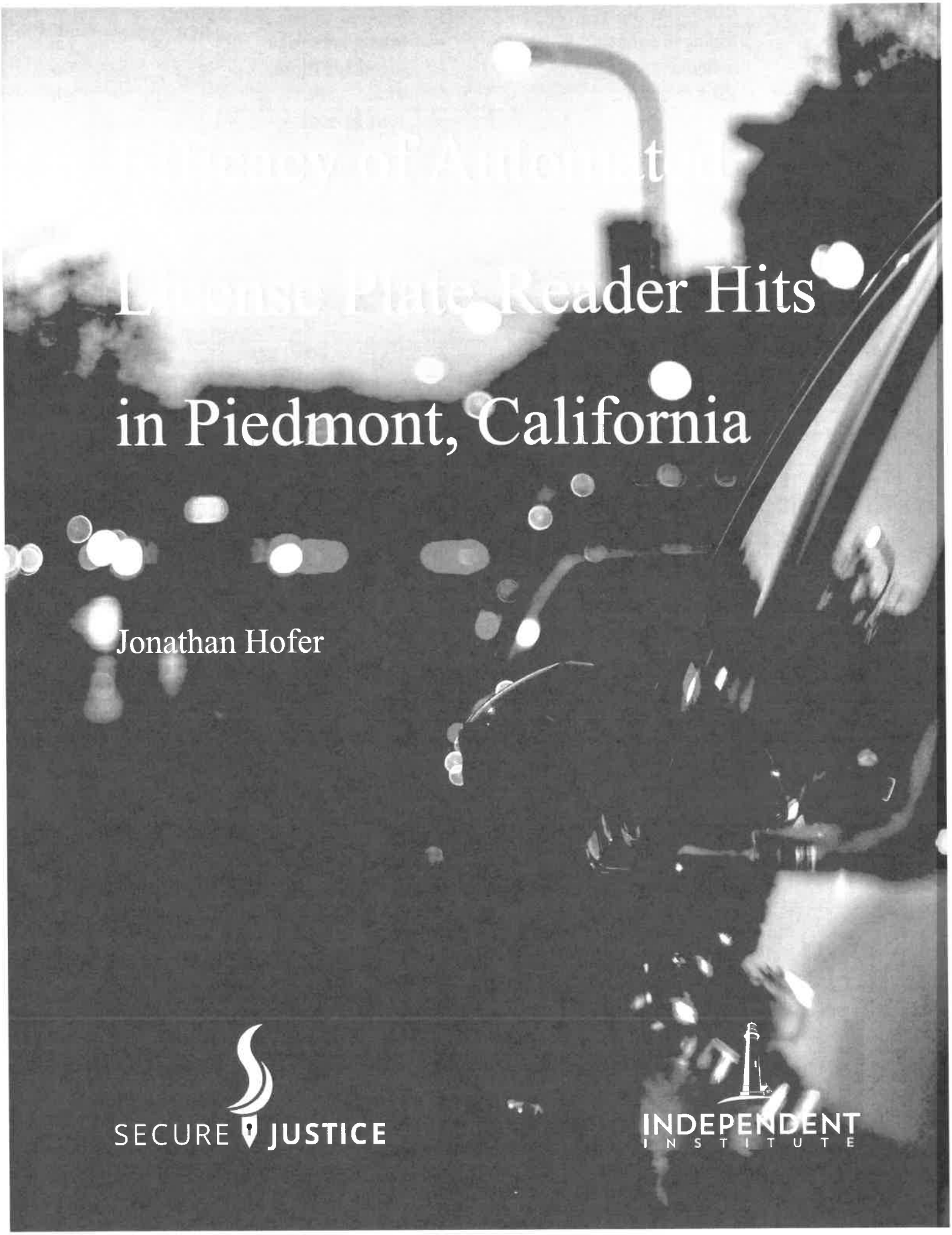

License Plate Reader Hits in Piedmont, California

Jonathan Hofer

SECURE JUSTICE

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Secure Justice is an IRS registered 501(c)(3) non-profit organization advocating against state abuse of power, and for reduction in government and corporate over-reach. We target change in government contracting and corporate complicity with government policies and practices that are inconsistent with democratic values and principles of human rights.

We strive to create municipal civilian oversight frameworks that provide the community with a meaningful voice and a seat at the table when crafting rules for the use of surveillance technologies, and the data collected from such use. Although our primary focus is on entities with police power, the blurring lines between public-private partnerships and corporate complicity in the facilitation of human rights abuses by government actors causes us to also address the private sector's use of surveillance and smart city technologies, data sharing and mining practices.

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November 30, 2021

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Executive Summary

In recent years, American municipalities have readily implemented automated license plate readers (APLRs) for use by law enforcement. ALPRs are cameras that can quickly scan images of car license plates. The primary function of these cameras are for assisting law enforcement to find the location of particular vehicles, chiefly for purposes of recovery of stolen vehicles.

ALPRs have been a growing trend in law enforcement in the United States since the early 2000s. From 2007 and 2012, ALPR use jumped from 19% to 71% nationally, with 85% of enforcement agencies planning to buy or expand their systems according to a Policing Project report (*Second Report of the Axon AI Ethics Board: Automated License Plate Readers 13*). Federal and state funding provided tens of millions of dollars for ALPR purchases (Ibid.).

Despite the surge in their popularity, the efficacy of ALPRs has largely evaded serious inquiry. Practical limitations seem to be the primary cause of this gap in the literature. Anachronistic technology may have lacked some of the communicative abilities with networks that current systems possess, combined with little apparent interest in logging ALPR data. Given the lack of historic data available and few legal requirements to keep records, there has not been adequate studies on the subject of ALPR efficacy. A Police Executive Research Forum (PERF) paper analyzing an auto theft investigation unit in Mesa, Arizona in 2011, showing an uptick in recovered vehicles after ALPRs, but no reduction in motor theft, has been the only literature of note (Wexler). However, the paper lacks long term records and does not look for statistically significant results, perhaps due to this lack of data.

Instead, this project reviewed the investigative leads generated by the ALPRs and the recovery of stolen cars in the City of Piedmont between the years 2013–2019, while comparing occurrences of motor vehicle theft before and after the ALPRs, between 2004–2020. This serves as a case study illuminating on the costs and benefits for cities procuring ALPR systems. This paper can provide guidance for more efficient law enforcement strategies, lower tax burdens, and better property protection strategies.

The following observations resulted from the analyzed data:

- There is an absence of evidence suggesting Piedmont's ALPRs are an effective treatment for deterring vehicle thefts;
- the ratio of Piedmont's ALPR systems license plate hits-to-investigative leads for law enforcement is subjectively low, less than 0.3% of hits equate to leads;
- the positive correlation between license plate hits and investigative leads is weak;
- the positive correlation of plate "hits" and stolen vehicle recoveries is weak, indicating more plate hits does not necessarily entail more vehicle recoveries; and
- the market value of recovered stolen vehicles during the years observed exceeds the city's costs to purchase the cameras, but given the absence of evidence of a casual relationship between ALPRs and recovered vehicles, it is not suggested that the costs to the city have been recuperated.

Background

ALPR systems gather data on passing cars in a manner that greatly exceeds human observation. The stated intention of such a system was that prior to the prevalence of ALPR technology, law enforcement officers would need to confirm plates visually and subsequently compare the license plate number with a database or central dispatch. ALPRs have the potential to mitigate staffing limitations and other associated labor and human capital costs.

The distinguishing feature of ALPR cameras relative to standard consumer cameras or closed circuit television cameras frequently used in private security surveillance is in the ALPR's ability to recognize characters. Conventional digital cameras, that is, those not included within the ALPR definition, capture images as a composite of individual pixels. Whereas, conventional analog cameras used in surveillance similarly capture images in horizontal or vertical lines of pixels, referred to as "tv lines". In addition to incorporating a "snapshot" composite of pixels, typical ALPR systems possess "optical character recognition" or "OCR" software. OCR enables the cameras to translate packets and groupings of pixels into ASCII binary code corresponding to their alphanumeric character (The CCT Advisory Service).

When a car approaches the camera, the ALPR takes a series of pictures of the incoming vehicle. The system at typical vehicle speeds may capture over ten pictures of a particular car, though five pictures is considered to be the minimum amount of captures needed to maintain accuracy (Ibid.). Each individual picture functions as a single bitmap, a mapping of an array of bits which can store the value of colored pixels to make an image file (Ibid.). Though systems vary, even monochromatic cameras are capable of being equipped with OCR software given sufficient resolution. The OCR software is then capable of scanning the whole of the bitmap array and then produces an estimation if the software may replace the grouping of pixels with the ASCII equivalent of the estimated alphanumeric character (Ibid.). When the license plate is translated by the OCR software, the vehicle registration and plate data is placed on a list attached to vehicle information and is digitally retained. Some methods of license plate detection are specifically tailored to particular circumstances, such as known colors (Navas and Mahesh). Others might create unique identifiers for each scanned vehicle (Crump).

ALPR cameras may be subdivided amongst two major groups in terms of their mount. Stationary ALPRs are confined to a particular location and may be fixed to existing municipal infrastructure of sufficient height such as on light poles. Though the specific ratio of installation places, such as pole mounted versus car mounted is presently unknown, a seeming trend is positioning stationary cameras on traffic intersections or over freeway entrances and exits. When a number of stationary ALPR cameras are fixed across a singular road system such as a freeway, data collection can determine the direction and speed of the traveling car (Electronic Frontier Foundation). When data is retained over a period, analysis would be able to determine the frequency of a particular license plate traveling past a given camera network and would likewise be able to determine travel patterns, plausibly allowing for the investigators to deduce a driver's place of living or place of employment (Ibid.).

The second subgroup of camera mount are mobile ALPR systems. These systems are frequently fixed to municipal patrol cars. In some municipalities that use ALPR specifically for parking enforcement, these cameras are frequently dedicated to parking enforcement patrol vehicles, though mobile ALPR cameras used in vehicle recovery or other non-parking enforcement related law enforcement may be attached to general police patrol vehicles (Ibid.). The mobile nature of these ALPR cameras would allow for law enforcement officers to fill gaps within existing stationary ALPR networks, e.g it would allow a police officer to direct their vehicle in a geographic area where there are no stationary ALPRs to act as a stopgap stationary ALPR. It also allows for the ALPR system to gather license plate related data as the vehicle travels throughout the municipality or freeway system (Ibid.). In some instances, mobile ALPRs may be used to direct vehicles to get a secondary reading of a license plate that a previous stationary ALPR flagged as suspect, given that the car direction is known.

When read, license plate data constitutes a bulk collection of data, that is, ALPR systems allow for data to be captured without needing to discriminately investigate individual cars in person. When license plate information is acquired, ALPR systems can coordinate with other databases such as a list of stolen vehicles. When a license plate is flagged, or "hit", that implies that one of the connected databases with the ALPR system has returned a value that is associated with a vehicle in connection with a suspected crime or infraction. When returned, that license plate reading is placed on a secondary "hotlist", which is a preloaded list of license plate data (Ibid.). This data is easier to "fetch", i.e. receive a return value on encoded data. This enables ALPR systems in a general geographic location to better actively search for a particular license plate by notifying an officer in the field about the location of a "hot" car, a car associated with suspected misconduct (Ibid.).

Data ascertained by these systems is used to conduct primarily three generalized forms of investigation: real time, historical and predictive. The capacity to conduct real time investigations stems from the ability of ALPR systems to actively track individual vehicles in the aforementioned manner of determining the direction and speed of the car in between camera positions (Ibid.). Historical investigations augment pre-existing law enforcement investigations by complementing officer's direct investigations. Law enforcement personnel may fill in incomplete information gathered by the APLR system or could retrieve other data associated with a license plate given other information on the vehicle, helping to identify secondary information of those suspected of misconduct (Ibid.). For use in predictive policing, collected data can be farmed for use by law enforcement personal and law enforcement contractors to identify potential crime patterns. If successive "hits" of differing vehicles are congregated or grouped into a particular geographic location or time, the information could be relayed to officers for extra scrutiny.

Other real time enforcement that does not pertain to suspected stolen vehicles, but are included within the ALPR framework, are parking control cameras, whereby the system can control access to a lot or garage; fee collection-cameras can automatically collect a fee for entry into a lot and can database its occupants; toll collection operators of roads or bridges can automatically

bill customers; and traffic control, such as capturing the license plate of cars running a red light (Mesnik).

Method

The City of Piedmont, California is chosen for the years 2004–2020 as a case study because of its high degree of transparency in regards to ALPR reporting. Piedmont is a predominantly residential city located in Alameda County. The Piedmont Police Department is one of the few agencies that self-reported ALPR data from the inception of its program and one of the few agencies in the United States that has been tracking ALPR hits for several years. For each of Piedmont's stat sheets, the number of *plate hits*, *stolen vehicle recoveries*, *recovered vehicle values*, *arrests related to ALPRs*, and *investigative leads related to ALPRs* are reported.

When trying to analyze the efficacy of ALPRs, the downstream effects of the ALPR system are potentially broad. A study of the estimated outcome of ALPR systems within the Phoenix, Arizona metropolitan area, one of the more comprehensive projections of its kind, sought to include monetary benefits associated with improved registration compliance and insurance compliance (Eberline). While downstream effects of this kind are in of themselves important, available data for this case that attributes registration and insurance compliance numbers to ALPR readings are inconclusive. Because assistance with stolen vehicle cases are frequently discussed as the chief rationale for investing in ALPR systems, stolen vehicle recovery and instances of vehicle theft is weighted as the most significant recuperated outcome, with investigative leads and value of the vehicle being the variables of concern (Wexler).

A calculation of the ratio between *Plate Hits* and *Investigative Leads* for years 2013–2019 is given. 2013 was the year in which Piedmont procured the ALPR systems, though they were not in use until November of that year. A calculation of ratios is relevant in terms of preliminary inferences on the practical significance of the relationships between variables. The robustness of ratios is less preferable than statistical testing for determining statistical significance. However, ratios of these variables have previously been used to estimate ALPR efficacy in the past and are included to expand previous literature (*Piedmont License Plate Reader Analysis Shows 99.97% of Data Collected is Useless* 2015).

A linear regression analysis was performed to ascertain the correlation between *Plate Hits* and *Investigative Leads* and *Plate Hits* and *Stolen Vehicles Recoveries*. The year 2020 was not included in these regression analyses because a completed uniform reporting for 2020 is not yet available. Tentative reporting of 2020 values are provided in **Table 7**.

To compare the prevalence of motor theft before and after APLRs, a left-tailed Welch T-Test was used to test the hypothesis that the observed number of motor thefts after ALPRs, was lower at statistical significance than before ALPRs. Data was compiled from police reporting from the years 2004–2020. This is generally the most appropriate statistical test for the nature of this kind of data.

At this time there are not enough samples to have a test with a high degree of power without compromising effect size or significance level α while solely relying on a traditional paired t-test. Testing the left tail increases power, but priori power is still low. Unequal sample sizes could result in a higher chance of a type I error using a paired t-test. A Welch's T-Test generally may be more robust on different n sample sizes between pre and post ALPR groups, therefore was selected as the sample means comparison test.

A Mann-Whitney U Test helps supplement. A Mann-Whitney U Test does not test the same hypothesis as the t-tests, insofar as a traditional t-test examines an equal mean in alternative and unequal groups, whereas the Mann-Whitney U Test provides an informative approximation by randomized observations. That is, the probability of our *Before ALPR Group X* exceeds an observation from the *After ALPR Group Y* (in this case, a reduction in motor theft after ALPRs would be a relevant result) than the probability of an observation from *After ALPR Group Y* exceeding an observation from *Before ALPR* Group *X*, such that:

$$P(X > Y) \neq P(Y > X) \vee P(X > Y) + 0.5 \cdot P(X = Y) \neq 0.5$$

To examine the costs, the City of Piedmont's 2013 purchase order of 39 ALPR cameras for $576,378.80 with the ALPR vender 3M is used ("*Piedmont 3M Invoice #SS24997 Redacted*"). To calculate the average aggregated cost of individual cameras the sales taxes items of $34,210.80, $526.20 and $7894.80 are deducted from the $576,378.80 invoice charge resulting in a non-tax included purchase order of $529,010. When discounting the shipping charge of $2,690, the real purchase order value is $526,320. Divided amongst the 39 cameras, each individual camera's value (from the aggregate) is equivalent to $13,495.38.

This number generally comports with $20,000 per camera average evaluation from the Arizona Department of Transportation projection, as variance in model and purchases may account for the discrepancy (Eberline 41). This is not to suggest that taxes or shipping costs should not be included in determining the cost versus benefits of these systems. Rather the separation is meaningful to maintain a threshold for camera costs, marginal one time shipping events and for money flowing back into the state by virtue of California and county taxes.

The aggregation of camera costs is helpful rather than to tabulate individual camera costs largely in part due to the unapparent difference in efficacy between varying camera models. That is, for the purpose of this estimation, a P392+ camera costing $8,800 and a P392 camera costing $15,200 is assumed to have a comparable capacity for detecting a flagged vehicle. While the variety of models and features suggests that different cameras are more apt for fulfilling certain functions, a reasonable weight on the individual camera variables cannot presently be determined. Moreover, given that the cameras operate within a network and frequently rely on additional cameras to track a particular vehicle, this work assumes these cameras, irrespective of model, are all technically equivalent to each other. See **Supplementary Material B: Excerpted Hardware Listing, Piedmont 2013 3M Invoice-Redacted** for an itemized list of costs.

Efficacy

The following has been reproduced from a compilation of Piedmont Police Department ALPR Stat Sheets presented at city council meetings. Years 2013–2015 were taken from the "Quarter 2–2015" stat sheet. Years 2015–2017 were taken from the "4th Qtr 2017" report. The full data from 2015 was updated in the latter's report. Years 2018–2019 were taken from "Piedmont Police Department 2019 Year End Report." At the time of this report, as aforementioned in the methodology section, completed values for the calendar year 2020 and henceforth were unavailable. A tentative table for 2020 is provided from the May 17, 2021 Piedmont Police Department Quarterly Report in **Table 7** (Lillevand, 2021).

In 2013, in the month of May, an *Investigative Lead* was reported without a *Plate Hit*. Considering the city had not yet implemented their system, this is a peculiarity. The presumption is that this is a data quality issue from the City of Piedmont. However, because the data is unclear on the origin of the information prompting the investigative lead, it is difficult to say with any certainty that this was a typographical mistake. The majority of the following analysis operates as if the data was reported correctly. However, a second regression with a "0" substituting the "1" will be run. Counting the errant (0,1) suggests that the interpretation of the intercept means that a portion of investigations are related to ALPRs, even with no hits. This is a practical implausibility.

Table 1.

2013	Plate Hits	Stolen Vehicle Recoveries	Recovered Vehicle Values	Arrests Related to ALPR's	Investigative Leads Related to ALPR's
May	0	0	0	0	1
June	0	0	0	0	0
July	0	0	0	0	0
August	0	0	0	0	0
September	0	0	0	0	0
October	0	0	0	0	0
November	460	3	13,000.00	1	0
December	532	2	4,501.00	0	0
Totals	992	5	17,501.00	1	1
2014	Plate Hits	Stolen Vehicle Recoveries	Recovered Vehicle	Arrests Related to	Investigative Leads Related

			Values	ALPR's	to ALPR's
January	374	1	6,000.00	2	1
February	276	1	20,000.00	1	0
March	323	2	10,000.00	1	0
April	400	0	0	0	2
May	465	5	14,100.00	3	1
June	391	3	26,000.00	0	2
July	394	1	15,000.00	0	1
August	375	2	1,000.00	1	1
September	500	2	2,000.00	0	2
October	742	0	0	0	0
November	692	3	12,432.00	3	0
December	802	2	5,000.00	5	5
Totals	5734	22	111,532.00	16	15
2015	Plate Hits	Stolen Vehicle Recoveries	Recovered Vehicle Values	Arrests Related to ALPR's	Investigative Leads Related to ALPR's
January	589	1	2,000.00	0	1
February	470	1	4,000.00	0	0
March	537	1	3,500.00	0	0
April	453	1	300	2	1
May	477	5	7,845.00	3	5
June	488	5	43,119.00	1	3
July	499	6	48,001.00	3	5
August	660	3	18,000.00	2	2
September	622	10	35,500.00	6	3
October	624	5	42,500.00	4	2
November	454	1	6,000.00	1	2
December	479	2	15,000.00	0	3

Totals	6352	41	225,765.00	22	27
2016	Plate Hits	Stolen Vehicle Recoveries	Recovered Vehicle Values	Arrests Related to ALPR's	Investigative Leads Related to ALPR's
January	340	2	13,500.00	2	2
February	328	1	1,000.00	1	0
March	455	5	27,500.00	5	3
April	545	8	38,100.00	4	1
May	486	7	51,338.00	3	3
June	508	6	19,000.00	6	4
July	609	4	13,500.00	1	2
August	705	0	0	1	1
September	564	8	77,900.00	5	2
October	491	1	1,500.00	1	2
November	645	3	20,445.00	3	3
December	848	6	15,500.00	5	3
Totals	6524	51	279,283.00	37	26
2017	Plate Hits	Stolen Vehicle Recoveries	Recovered Vehicle Values	Arrests Related to ALPR's	Investigative Leads Related to ALPR's
January	548	5	26,000.00	4	2
February	399	0	0	0	1
March	630	3	27,000.00	0	3
April	699	4	7,000.00	3	1
May	868	5	65,100.00	3	1
June	810	2	17,000.00	2	1
July	787	5	10,938.00	5	1
August	782	2	6,000.00	0	3
September	660	4	20,496.00	4	1
October	666	5	52,000.00	3	3

November	622	2	17,899.00	2	1
December	693	2	5,500.00	2	4
Totals	8164	39	254,933.00	28	22
2018	Plate Hits	Stolen Vehicle Recoveries	Recovered Vehicle Values	Arrests Related to ALPR's	Investigative Leads Related to ALPR's
January	605	5	24,000.00	2	1
February	535	3	43,000.00	2	0
March	724	4	113,000.00	3	0
April	780	1	4,000.00	1	2
May	714	5	17,300.00	4	5
June	unavailable	2	12,000.00	0	0
July	*203	1	500	0	1
August	664	2	10,000.00	2	0
September	705	0	0	0	0
October	809	2	20,000.00	1	1
November	779	2	11,000.00	2	0
December	823	2	3,000.00	0	0
Totals	7341	29	257,800.00	17	10
2019	Plate Hits	Stolen Vehicle Recoveries	Recovered Vehicle Values	Arrests Related to ALPR's	Investigative Leads Related to ALPR's
January	653	2	6,000.00	0	1
February	735	3	30,000.00	1	1
March	710	3	8,600.00	0	2
April	828	2	35,000.00	2	1
May	852	4	61,000.00	2	1
June	640	0	0	0	1
July	757	5	44,500.00	3	1

August	730	4	43,500.00	1	5
September	767	2	26,000.00	1	0
October	682	2	21,000.00	0	2
November	958	4	24,000.00	3	2
December	1062	2	4,500.00	1	1
Totals	9374	33	304,100.00	14	18

Over the seven years examined, the respective totals for plate hits:

$$\sum_{Plate\ Hits} = 44481$$

This results in a sample average of 6354 (rounded) per yearly period:

$$\overline{Plate\ Hits} = 44481/7 = 6354$$

Over the 7 years examined, the total of recovered vehicle values:

$$\sum_{Value\ of\ Recovered\ Vehicles} = \$1{,}450{,}914.00$$

Per the estimated recovered vehicle value, the value of $1,450,914.00 over the years 2013–2019 exceeded the initial purchase cost of the cameras (though this evaluation inference presumes no difference in the utility between the estimated market dollars for recovered vehicles and the utility of police department funds).

Counting each plate hit as an individual trial and each investigative lead as a statistical success, over the seven year period the ratio of *Plate Hits* to *Investigative Leads* is as follows:

$$\sum_{Plate\ Hits} = 44481$$

$$\sum_{Investigative\ Leads} = 119$$

$$\frac{119}{44481} = 0.0026753 \text{ when floating to 7 digits}$$

Assuming equal weights as mentioned previously in the methodology section, the value of returned property per 39 cameras is $37,202.92, exceeding the $13,495.38 aggregated average cost of the cameras.

To help analyze the relationship between an ALPR's hit and an investigative lead induced by said hit, a simple regression analysis of *Investigative Leads* based on *Plate Hits* was calculated,

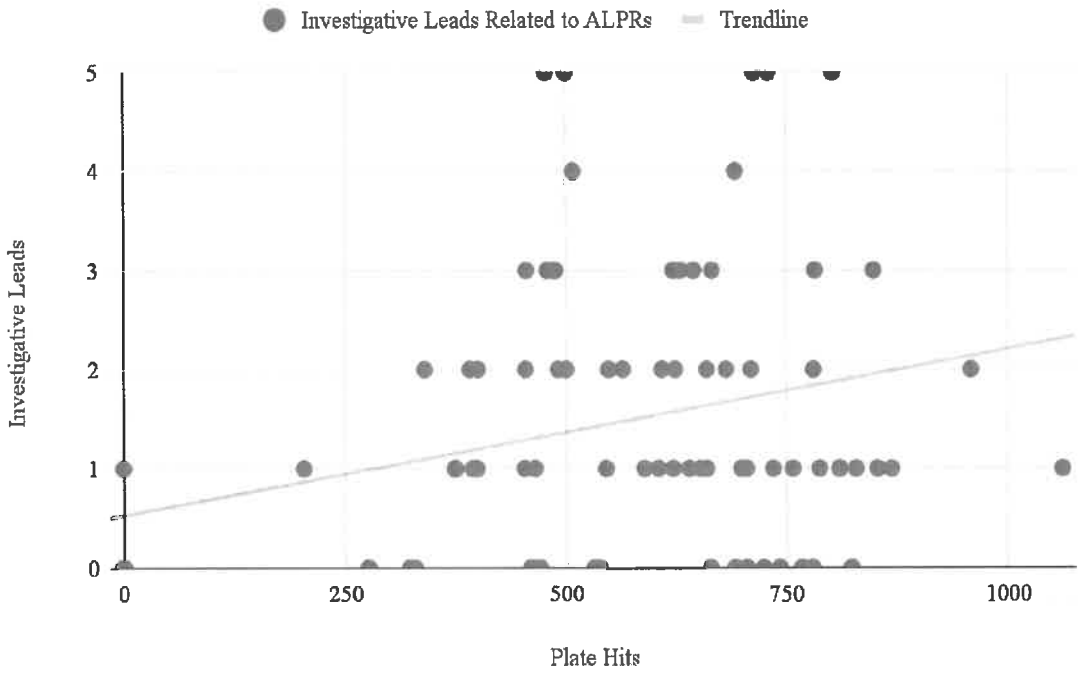
following the general formula of $\widehat{Y} = \beta_0 + \beta_1 (x_{1,2} \ldots)$. For this purpose, *NA* values were coerced to zero. The predicted number equals:

$$\widehat{Y}_{Investigative\ Leads} = 0.0016818\ (Plate\ Hits) + 0.5260684$$

$$R^2 = 0.0973127 \text{ and } R = 0.3119499$$

In the following figure, the values are graphed on a scatter plot with the trendline.

Figure 1.



The absolute value of the statistical measurement of the correlation coefficient R, can fall between [-1,1]. For classifying the degree of correlation, $|R| > 0.7$ will be considered strong. A general threshold of $|R| > 0.7$ is considered to be highly correlated, a $|R|$ value between [0.5, 0.7] is considered moderately correlated, a $|R|$ value between [0.3, 0.5] is considered weakly correlated, and a $|R|$ value below 0.3 is considered very weakly correlated (Mindrila and Balentyne).

The result R = 0.3119499 shows a weak positive correlation between *Plate Hits* and *Investigative Leads*. Based on this data, the number of *Plate Hits* is not a satisfactory predictor of *Investigative Leads*. **Table 2** provides a summary.

Table 2.

Inference	$Y = \alpha + \beta x$
Estimation of Slope	$b = 0.0016818$
Degrees of Freedom	$df = n - 2 = 82$
Standard Error Slope	SEb = 0.0005657
t-Statistic	$t = 2.9731929$
P-Value	$p = 0.0038686$

To account for the potential of the typographical error for May of 2013, the regression was performed again. The predicted $\widehat{Y}$ number of *Investigative Leads* equals:

$$0.0017755\ (\textit{Plate Hits}) + 0.4645903$$

$$R = 0.3275049 \text{ and } R^2 = 0.1072594$$

The result R = 0.3275049 also shows a weak positive correlation between *Plate Hits* and *Investigative Leads*. From the R value, the adjustment made to address the potential May 2013 error had little effect, though the correlation measured by R is improved by a negligible 0.015555.

Another important potential benefit of ALPR cameras could be a reduction in the instances of motor theft and improving stolen vehicle recovery. The following investigates that hypothesis.

To analyze the relationship between ALPRs and stolen vehicle recoveries, a regression analysis of *Stolen Vehicle Recoveries* based on *Plate Hits* was calculated. *NA* values were coerced to zero.

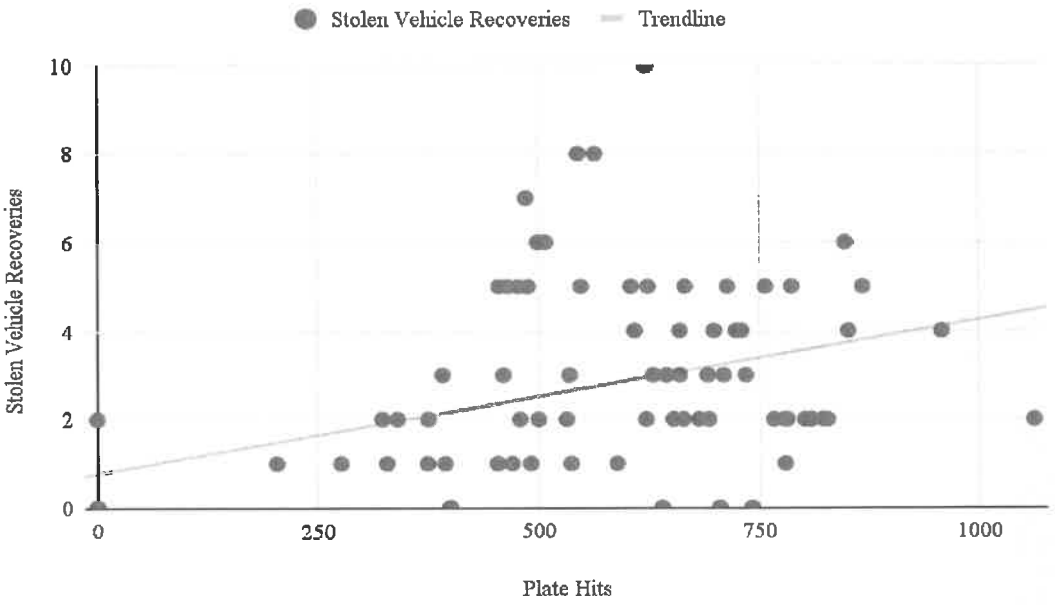
The regression resulted in the following:

$$\widehat{Y}_{\textit{Stolen Vehicle Recoveries}} = 0.0034823\ (\textit{Plate Hits}) + 0.7750678$$

$$R = 0.4152355 \text{ and } R^2 = 0.172405$$

Figure 2 provides a scatterplot of *Stolen Vehicle Recoveries* and *Plate Hits*. **Table 3** is a record of the summary statistics.

Figure 2.



As previously, a $|R| > 0.7$ is considered strong. A general threshold of $|R| > 0.7$ is considered to be highly correlated, a $|R|$ value between [0.5, 0.7] is considered moderately correlated, a $|R|$ value between [0.3, 0.5] is considered weakly correlated, and a $|R|$ value below 0.3 is considered very weakly correlated. R = 0.4152355 shows a weak positive correlation between *Plate Hits* and *Stolen Vehicle Recoveries*. Based on this data, the number of *Plate Hits* is not a satisfactory predictor of *Stolen Vehicle Recoveries*.

Table 3.

Inference	$Y = \alpha + \beta x$
Estimation of Slope	$b = 0.0034823$
Degrees of Freedom	$DF = n - 2 = 82$
Standard Error Slope	SEb = 0.0008425
t-Statistic	$t = 4.1332964$
P-Value	$p = 0.0000858$

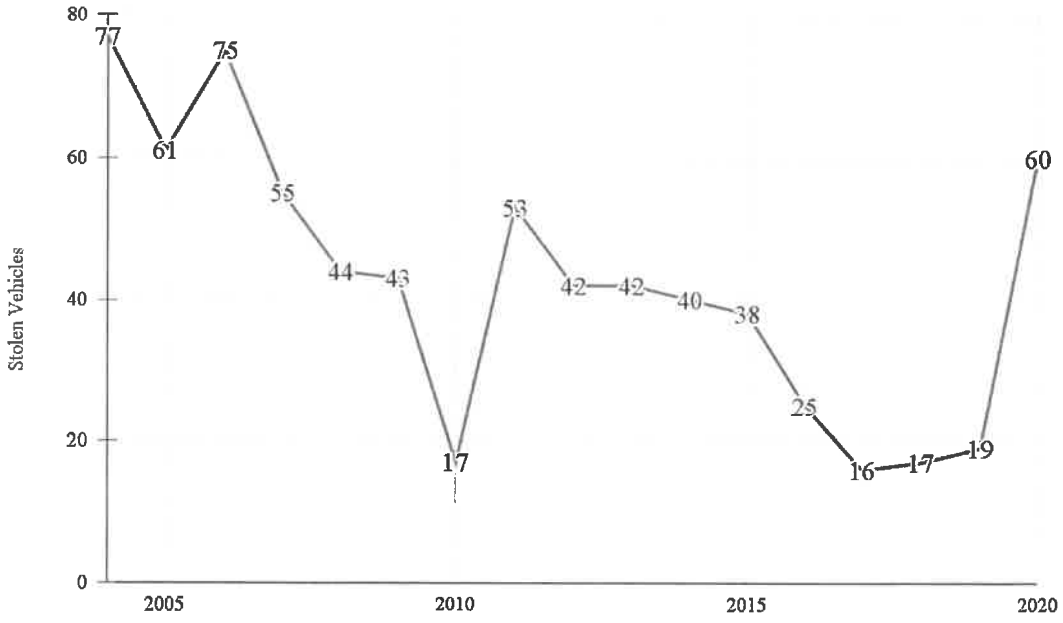
To analyze the effect of ALPR treatment, the motor thefts before Piedmont installed ALPRs versus motor thefts after Piedmont installed ALPRs are compared. Below in **Table 4** is a year by

year count of instances of motor thefts. **Figure 3** provides a line graph. In the 10 years preceding Piedmont's first full year of ALPRs in 2014, 509 vehicles were reported stolen. Between 2014–2020, 215 vehicles were reported stolen. In the *Before ALPR* group, the annual average of stolen vehicles was 50.9. The annual average for the *After ALPR* group is 30.714. It is observed that the *Before ALPR* group has a lower average of motor thefts, by 20.186, than the *After ALPR* group. Further data analysis is necessary to assist in determining the difference between these group means.

Table 4.

Year	'04	'05	'06	'07	'08	'09	'10	'11	'12	'13
Motor Thefts Before ALPRs	77	61	75	55	44	43	17	53	42	42
Year	'14	'15	'16	'17	'18	'19	'20			
Motor Thefts After ALPRs	40	38	25	16	17	19	60			

Figure 3.



To compare the sample means between the "pre" and "post" ALPR group, a Welch T-Test follows. To increase the test power and because less stolen vehicles after the installation of ALPRs would be the relevant result, the calculation is set for a left tail, to better ascertain if the *After* samples were smaller than the *Before* samples. Therefore the alternative hypothesis is H_1:

After < *Before*. For the purpose of this test, the year 2013's results are counted in the *Before ALPR* group, given the late presence of ALPRs in that year, potential lag in results from ALPRs, lag in public perception of the existence of a potential criminal deterrent, and a lack of a clear point of severance to make a *f*(2013) and *f*(2013′). The sample data is below in **Table 5.**

Table 5.

Stolen Vehicles Before ALPRs	Stolen Vehicles After ALPRs
77	40
61	38
75	25
55	16
44	17
43	19
17	60
53	
42	
42	

The results of a two sample t-test (Welch), using T distribution (DF=13.7804) (left-tailed):

Table 6.

	Stolen Vehicles *Before ALPRs*	Stolen Vehicles *After ALPRs*
$\overline{X}$	50.9	30.714286
n	10	7
s	17.647474	16.183472
Skewness	-0.209852	1.031928
Normality	0.5257	0.2216
P-Value	0.985526	

At a confidence level of 95%, the null hypothesis that ALPR cameras are not related to a reduction in instances of stolen vehicles is retained. Since the P-value > α, there is a failure to reject H_0. The average of *Before*'s population is considered to be greater than or equal to the average of the *After*'s population. In other words, the observations sampled support H_0. The P-value equals 0.985526, ($p(x \leq T) = 0.985526$).

This means that if H_0 is rejected, the chance of type I error (rejecting a correct H_0) would be too high: 0.9855 (98.55%). This result is generally considered a high P-value, which is relevant as the larger the p-value the more it supports H_0. The test statistic T = 2.437890, and is in the 95% critical value accepted range: [-1.7633 : ∞]. At 20.19, x_1-x_2, is in the 95% accepted range: [-14.6000 : ∞].

The statistic S' = 8.280. The data does not have any outliers as detected by the Tukey Fence Method, given k=1.5. The assumption of normality was checked based on the Shapiro-Wilk Test, $\alpha = 0.05$. The priori test power is low (0.2507), therefore the test may not reject an incorrect H_0. Based on a two-tailed F test, σ_1 is considered as equal to σ_2 (P-value is 0.863). Sample R code for a demo of this test may be found in **Appendix A**.

Failing to reject the null hypothesis, the difference between the samples after the installation of ALPR cameras and the samples before the ALPRs was not statistically significant.

To supplement the t-test, a left-tailed Mann-Whitney U Test is also used. Unlike the null hypothesis and alternative of the t-test, where the null hypothesis states that there is no relationship between the sample groups, a Mann-Whitney U Test null hypothesis assumes that the distributions of the groups are the same in terms of the probability of observing a value from one group and comparing to the other. Mann-Whitney U test has little power. The total sample size for motor thefts is only slightly above the threshold of 7 samples in which the test would always return P < 0.05. The result statistic is U.

The normal approximation is used. The statistic's distribution is $N(35,10.234^2)$. The data contains ties and identical values, the normal approximation that uses the ties correction is used. A ties correction of 0.0024509803921568627 was used. The P-value = 0.9905, ($p(x \leq Z) = 0.9905$). Since P-value > α, there is failure to reject H_0.

The randomly selected value of *Before ALPRs*' population is assumed to be greater than or equal to the randomly selected value of *After APLRs*' population. The probability of a type I error is high, 0.9905. The test statistic Z equals 2.345, which is in the 95% region of acceptance: [-1.6449, ∞]. U = 58.5, is in the 95% region of acceptance: [18.1659,7 0]. The observed standardized effect size, $Z/\sqrt{(n_1+n_2)}$, is large (0.57). That indicates that the magnitude of the difference between the value from *Before ALPRs* and the value from *After ALPRs* is large. The results of the Mann-Whitney U Test should not be considered a definitive conclusion. The tentative result is that there is a lack of evidence supporting the hypothesis that ALPRs are an effective treatment. As more samples become available, future research can revisit this line of testing, the demo code in R may be found in **Appendix B.**

Discussion

When taking the complement of plate hits to investigative leads ratio, 99.73247% of ALPR hits do not lead to investigative leads. This does not represent the ratio of license plate scans to investigative leads however. When investigating the returned vehicle value, the estimated market value of the cars seems to suggest that over the period of a few years, in this instance, three years, the value of returned property could be comparable to the cost of the hardware surveillance infrastructure investment, not controlling for upkeep and service costs. However, this return on investment may not be generalizable, as the case study subject of Piedmont, a high income area, may have a market value of stolen cars that is not representative of other populations, thereby a larger rate of return than may be expected from other metropolitan areas with a comparable number of cameras. Moreover, given the weak relationship between ALPR cameras and vehicle recoveries, there is a lack of clear evidence suggesting that the cameras have paid for themselves.

Present accounting of ALPR efficacy is limited by a lack of formal reporting standards by municipal police agencies. Calif. Veh. Code § 2413 along with Calif. Civil Code §§ 1798.29, 1798.90.5 which pertains to license plate readers, limits the availability of data which would accompany an internal audit for research purposes. As seen in **Supplementary Material A: Piedmont Stolen Vehicles 2010–2014** and **TABLE 1**, while the chance of a "hit" leading to an investigation may be determined, there is a lack of raw information on the number of total plates scanned by all cameras leading to a "hit". Therefore, it is unclear how many license plates (and therefore cars) are being scanned.

Data on plate scans was effectively unobtainable. A public records act request was sent to the City of Piedmont. The police records specialist replied that there was nothing responsive to the request as the data was only kept for a short number of days and did not relay further data. Policy 438.8 of the Piedmont Police Department Policy Manual states that:

> The policy of the Piedmont Police Department is to utilize ALPR technology to capture and store digital license plate data and images while recognizing the established privacy rights of the public. All data and images gathered by the ALPR are for the official use of this department. Because such data may contain confidential information, it is not open to public review (2017).

Reviewing other municipalities that have ALPR policies in the same region, such as the City of Alameda, similarly shows a propensity for city police departments to disallow review of their license plate data (*Alameda Police Department Policy Manual, Policy 462, Automated License Plate Readers* 2010). While it is ethically upright to purge unnecessarily stored data and give proper consideration to the sensitivity of their records, totals for plate scans would be a valuable inclusion in a police department crime report. Total scan numbers, for example, the number of cars scanned in a given month, are not connected to specific individuals, nor places and do not presently pose a compromise to the public's expectation of privacy.

The most proximate extrapolation was from analyzing an account from Piedmont's Flock Safety's Operating System, which houses the police department's online transparency portal (*Piedmont CA PD Transparency Portal*). The website does not host historic data, but does give a count for the number of vehicles detected in the "last 30 days". The count is not updated daily, but periodically at intervals that are unclear. For a thirty day period, which spanned August of 2021, overlapping with September of 2021, it was reported that 122,050 vehicles were detected by the ALPRs. Because there is no current reporting of August 2021 ALPR statistics listing number of *hits* and *investigative leads*, August of 2019's data was used as a preliminary substitute, as it was the most recent available data for the same month. Reviewing the ratio of the aforementioned variables, compared to number of license plate scans results in the following:

Reported scans for a 30 day period (August–September, 2021) = 122050

Ratio of Plate Hits Per Plate Scans Using August of 2019 numbers: 730/122050 = 0.0059811

Number of Plate Scans Per Investigative Leads Related to ALPRs Using August of 2019 numbers: 119/122050 = 0.0009750

While this data shows that the overwhelming bulk of scans did not translate into *hits* or *investigative leads*, without the proper data, this observation is conjectural.

In 2018, Oakland included in its Surveillance and Community Safety Ordinance comprehensive reporting and audit mandates for surveillance technologies including ALPR systems ("*Oakland City Council / Rules for Surveillance Use / 4.26.2018*"). Since then, the Californian cities of Berkeley, Davis, and San Francisco, have adopted similar policies using the Oakland template. In future calendar years, the audits and reports for these cities will become available, allowing for a greater understanding of ALPR efficacy, though they differ from Piedmont's template of reporting. A type of reporting similar to Piedmont's is preferable. Reporting should encapsulate to the fullest extent that is feasible to include metrics of desired outcomes, such as vehicle thefts, recovered vehicles and so forth.

More data would strengthen the power of the T-Test. As of now, there is a higher than desired outcome of a type I error, that is, a false positive.

The City of Piedmont is exploring an expansion of its ALPR network. If the city procures additional ALPRs, it would be beneficial to continue analyzing the costs and benefits of the efficacy of these camera networks. One specific question would be whether or not more cameras equals more investigative leads as a consequence of more coverage, or would there be diminishing returns? **Supplementary Material C: Excerpts of Quoted Prices from Piedmont Council ALPR Expansion Agenda Meeting 07/01/2019** provides quoted costs and listings of the proposed expansion. When new reporting is released, the efficacy of the plate readers can be compared with these costs. Tentative reporting from the Piedmont police department regarding 2020 shows an uptick in motor thefts, as seen in **Table 4**. Preliminary figures for 2020 can be seen in the following table.

Conclusion

The low ratio of *hits* to *investigative leads* casts doubt on the practical significance of the reliability of ALPRs to translate hits of license plates to investigative leads for law enforcement. The findings also show that the correlation between license *plate hits* and *investigative leads* is statistically weak and the correlation of *plate hits* and *stolen vehicle recoveries* is also statistically weak. The low degree of correlation fails to demonstrate that *plate hits* are a strong predictor of the desired responses. And that, while the average number of stolen vehicles since the installation of ALPRs is observed to be lower than years prior, a sample means comparison test does not suggest statistical significance. Therefore, the data from Piedmont fails to suggest that ALPRs are an effective treatment at deterring vehicle theft. Despite the market value of recovered vehicles exceeding the camera costs, given the lack of evidence supporting a strong relationship between the cameras and recovered vehicles, it cannot be determined that the camera costs were recuperated.

Table 7.

2020	Plate Hits	Stolen Vehicle Recoveries	Recovered Vehicle Values	Arrests Related to ALPR's	Investigative Leads Related to ALPR's
January	938	0	0	0	NA
February	602	1	16,000.00	1	NA
March	710	1	15,000.00	0	NA
April	702	7	61,500.00	5	NA
May	624	3	15,000.00	1	NA
June	721	3	10,000.00	2	NA
July	805	3	6000	1	NA
August	NA	2	3,800.00	2	NA
September	1275	3	9,000.00	2	NA
October	879	5	12,000.00	1	NA
November	1005	3	9,500.00	0	NA
December	820	3	9,500.00	2	NA
Totals	9081	34	167,300.00	17	

Appendix A: Demo R input for Two Sample T-Test

```
> BeforeALPRs1<-c(17,42,42,43,44,53,55,61,75,77)
> AfterALPRs1<-c(16,17,19,25,38,40,60)
> t.test(BeforeALPRs1, AfterALPRs1, alternative = "less", paired = FALSE, var.equal =
FALSE, conf.level = 0.95)
```

Appendix B: Demo R input for Mann-Whitney U Test

```
> BeforeALPRs2<-c(77,61,75,55,44,43,17,53,42,42)
> AfterALPRs2<-c(40,38,25,16,17,19,60)
> wilcox.test(BeforeALPRs, AfterALPRs, alternative = "less", paired = FALSE, exact =
FALSE, correct = TRUE)
```

Supplementary Material A: Piedmont Stolen Vehicles 2010–2014

CASE SEARCH
Print Date/Time: 5/16/2017 4:30:01 PM

Case Number	Reported Date/Time	Occurred Incident Type	Location	Disposition
2010-00008911	12/21/2010 23:10:14	Stolen Vehicle/Recovery	8 PARK AVE, Piedmont	Closed - Other
2010-00008865	12/19/2010 17:40:19	Stolen Vehicle/Recovery	11100 64 TH AVE, Piedmont	Suspended - No Further Leads
2010-00008864	12/19/2010 16:35:41	Stolen Vehicle/Recovery	900 66TH AVE, Piedmont	Suspended - No Further Leads
2010-00008830	12/18/2010 01:39:03	Stolen Vehicle/Recovery	BRUNS CT / LA SALLE AVE, Piedmont	Closed - Other
2010-00008625	12/09/2010 15:10:52	Stolen Vehicle/Recovery	96 OAKMONT AV, PIEDMONT	Suspended - No Further Leads
2010-00008575	12/08/2010 07:39:08	Stolen Vehicle/Recovery	222 WILDWOOD AV, PIEDMONT	Suspended - No Further Leads
2010-00007911	11/05/2010 10:47:27	Stolen Vehicle/Recovery	319 BLAIR AV, PIEDMONT	Suspended - No Further Leads
2010-00007542	10/21/2010 13:01:43	Stolen Vehicle/Recovery	476 FLORENCE AVE, Piedmont	Closed - Other
2010-00006906	09/24/2010 18:37:00	Stolen Vehicle/Recovery	2083 OAKLAND AV, PIEDMONT	Suspended - No Further Leads
2010-00006740	09/17/2010 23:36:44	Stolen Vehicle/Recovery	116 HAGAR AV, PIEDMONT	Suspended - No Further Leads
2010-00006246	09/01/2010 12:51:12	Stolen Vehicle/Recovery	32 SHERIDAN RD, Piedmont	Suspended - No Further Leads
2010-00005747	08/13/2010 15:56:09	Stolen Vehicle/Recovery	245 JOHN ST, Piedmont	Closed - Other
2010-00005744	08/13/2010 15:26:29	Stolen Vehicle/Recovery	281 41 ST ST, Piedmont	Closed - Other
2010-00005740	08/13/2010 13:08:47	Stolen Vehicle/Recovery	585 BEACON ST, Piedmont	Closed - Other
2010-00005511	08/05/2010 08:48:03	Stolen Vehicle/Recovery	303 OLIVE AV, PIEDMONT	Closed - Other
2010-00005314	07/29/2010 09:52:55	Stolen Vehicle/Recovery	24 OLIVE AV, PIEDMONT	Suspended - No Further Leads
2010-00000096	01/04/2010 21:05:12	Stolen Vehicle/Recovery	1078 ANNERLEY RD, PIEDMONT	Suspended - No Further Leads

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Case Number	Reported Date/Time	Occurred Incident Type	Location	Disposition
2011-00009192	12/28/2011 08:33:58	Stolen Vehicle/Recovery	25 SELBORNE DR, PIEDMONT	Suspended - No Further Leads
2011-00008804	12/12/2011 11:45:53	Stolen Vehicle/Recovery	204 RAMONA AV, PIEDMONT	Suspended - No Further Leads
2011-00008771	12/10/2011 19:37:12	Stolen Vehicle/Recovery	3702 GRAND AVE, Piedmont	Suspended - No Further Leads
2011-00008719	12/08/2011 13:16:42	Stolen Vehicle/Recovery	374 PARK BLVD WAY	Suspended - No Further Leads
2011-00008677	12/07/2011 08:57:36	Stolen Vehicle/Recovery	4200 PARK BLVD, Piedmont	Suspended - No Further Leads
2011-00008604	12/03/2011 20:44:47	Stolen Vehicle/Recovery	250 SANTA ROSA AVE, Piedmont	Closed - Other
2011-00008504	11/29/2011 20:52:47	Stolen Vehicle/Recovery	610 MORAGA AV, PIEDMONT	Suspended - No Further Leads
2011-00008455	11/27/2011 04:58:43	Stolen Vehicle/Recovery	901 KINGSTON AV, PIEDMONT	Suspended - No Further Leads
2011-00008381	11/23/2011 10:20:02	Stolen Vehicle/Recovery	OAKLAND AV / HARDWICK AV, PIEDMONT	Closed - Other
2011-00007853	10/30/2011 03:32:07	Stolen Vehicle/Recovery	3514 KEMPTON WY, OAKLAND	Closed - Other
2011-00007826	10/28/2011 16:30:38	Stolen Vehicle/Recovery	105 SHERIDAN AV, PIEDMONT	Suspended - No Further Leads
2011-00007819	10/28/2011 11:43:24	Stolen Vehicle/Recovery	92 SEA VIEW AV, PIEDMONT	Closed - Other
2011-00007495	10/15/2011 09:25:06	Stolen Vehicle/Recovery	758 WALKER AVE, Piedmont	Closed - Other
2011-00006793	09/15/2011 10:58:45	Stolen Vehicle/Recovery	3766 PARK BOULEVARD WAY, Piedmont	Closed - Other
2011-00006706	09/11/2011 19:44:17	Stolen Vehicle/Recovery	237 GREENBANK AV, PIEDMONT	Closed - Other
2011-00006542	09/03/2011 22:35:00	Stolen Vehicle/Recovery	1165 HARVARD RD, PIEDMONT	T4 VICTIM UNAVAIL./DECLINES
2011-00006525	09/03/2011 11:26:48	Stolen Vehicle/Recovery	REQUA RD / WILDWOOD AV, PIEDMONT	Closed - Other
2011-00006520	09/03/2011 01:13:15	Stolen Vehicle/Recovery	76 OAKMONT AV, PIEDMONT	Closed - Other
2011-00006318	08/26/2011 09:31:23	Stolen Vehicle/Recovery	18 LAKE AV, PIEDMONT	Closed - Other
2011-00006162	08/20/2011 15:11:21	Stolen Vehicle/Recovery	FLORADA AV / LA SALLE AV, PIEDMONT	Closed - Other
2011-00006123	08/19/2011 00:00:28	Stolen Vehicle/Recovery	140 OLIVE AV, PIEDMONT	Suspended - No Further Leads
2011-00006043	08/15/2011 20:05:11	Stolen Vehicle/Recovery	160 OLIVE AV, PIEDMONT	Closed - Other
2011-00005755	08/04/2011 17:11:40	Stolen Vehicle/Recovery	1134 WARFIELD AV, PIEDMONT	Closed - Other
2011-00005754	08/04/2011 16:45:14	Stolen Vehicle/Recovery	1136 WARFIELD AV, PIEDMONT	Closed - Other
2011-00005574	07/29/2011 16:59:13	Stolen Vehicle/Recovery	612 MAGNOLIA AV, PIEDMONT	Closed - Other
2011-00005288	07/18/2011 20:03:37	Stolen Vehicle/Recovery	645 FAIRMOUNT AVE, Piedmont	Closed - Other
2011-00005180	07/14/2011 00:00:31	Stolen Vehicle/Recovery	700 WESLEY WAY, Piedmont	Closed - Other
2011-00004954	07/05/2011 13:33:35	Stolen Vehicle/Recovery	3746 PARK BOULEVARD WAY, Piedmont	Suspended - No Further Leads
2011-00004728	06/30/2011 00:54:00	Stolen Vehicle/Recovery	3250 LAKESHORE AV, OAKLAND	Closed - Other
2011-00004557	06/23/2011 15:04:30	Stolen Vehicle/Recovery	BAYO VISTA AVE / OAKLAND AVE, Piedmont	Suspended - No Further Leads
2011-00004310	06/15/2011 09:16:00	Stolen Vehicle/Recovery	129 REQUA RD, PIEDMONT	Closed - Forward to Outs. Agency
2011-00004267	06/14/2011 01:02:57	Stolen Vehicle/Recovery	564 OAKLAND AVE, Piedmont	Suspended - No Further Leads
2011-00004053	06/06/2011 02:20:40	Stolen Vehicle/Recovery	671 VERNON ST, Piedmont	Suspended - No Further Leads
2011-00003705	05/24/2011 14:57:30	Stolen Vehicle/Recovery	156 WILDWOOD AV, PIEDMONT	Suspended - No Further Leads
2011-00003494	05/18/2011 10:00:32	Stolen Vehicle/Recovery	115 FAIRVIEW AV, PIEDMONT	Suspended - No Further Leads
2011-00003353	05/12/2011 13:28:32	Stolen Vehicle/Recovery	968 GROSVENOR PL, Piedmont	Closed - Other
2011-00003229	05/07/2011 09:05:01	Stolen Vehicle/Recovery	1063 RANLEIGH WY, PIEDMONT	Suspended - No Further Leads
2011-00003148	05/04/2011 12:34:17	Stolen Vehicle/Recovery	104 MONTICELLO AV, PIEDMONT	Closed - Other
2011-00002829	04/19/2011 20:17:23	Stolen Vehicle/Recovery	625 EL DORADO AVE, Piedmont	Suspended - No Further Leads
2011-00002735	04/16/2011 20:39:13	Stolen Vehicle/Recovery	406 SUNNYSLOPE AVE, Piedmont	Suspended - No Further Leads
2011-00002543	04/08/2011 14:21:00	Stolen Vehicle/Recovery	32 CROCKER AV, PIEDMONT	Suspended - No Further Leads
2011-00002415	04/04/2011 10:54:35	Stolen Vehicle/Recovery	MONTE VISTA AVE / KINGSTON AVE, Piedmont	Suspended - No Further Leads
2011-00002251	03/29/2011 20:50:09	Stolen Vehicle/Recovery	27 CRAIG AV, PIEDMONT	Suspended - No Further Leads
2011-00002190	03/28/2011 11:02:51	Stolen Vehicle/Recovery	99 CREST RD, PIEDMONT	Suspended - No Further Leads
2011-00002048	03/23/2011 07:14:53	Stolen Vehicle/Recovery	1130 WINSOR AV, PIEDMONT	Suspended - No Further Leads
2011-00001822	03/14/2011 20:29:07	Stolen Vehicle/Recovery	49 YOSEMITE AVE, Piedmont	Suspended - No Further Leads
2011-00001607	03/06/2011 10:40:50	Stolen Vehicle/Recovery	106 OLIVE AV, PIEDMONT	Suspended - No Further Leads
2011-00001321	02/22/2011 08:39:35	Stolen Vehicle/Recovery	302 OAKLAND AVE, Piedmont	Suspended - No Further Leads
2011-00001089	02/13/2011 05:09:36	Stolen Vehicle/Recovery	612 MARIPOSA AVE, Piedmont	Closed - Other
2011-00000681	01/28/2011 12:07:19	Stolen Vehicle/Recovery	12 HIGHLAND AV, PIEDMONT	Closed - Other
2011-00000591	01/24/2011 23:41:41	Stolen Vehicle/Recovery	3746 PARK BLVD, Piedmont	Closed - Other
2011-00000580	01/24/2011 15:08:22	Stolen Vehicle/Recovery	N HWY 580 / W GRAND AVENUE, Piedmont	Closed - Case Charged
2011-00000271	01/12/2011 22:32:52	Stolen Vehicle/Recovery	762 TRESTLE GLEN RD, Piedmont	Closed - Other

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Case Number	Reported Date/Time	Occurred Incident Type	Location	Disposition
2012-00008519	12/31/2012 05:59:42	Stolen Vehicle/Recovery	GREENBANK AV / KINGSTON AV, PIEDMONT	Suspended - No Further Leads
2012-00008035	12/11/2012 12:05:06	Stolen Vehicle/Recovery	300 OLIVE AV, PIEDMONT	Suspended - No Further Leads
2012-00007908	12/04/2012 09:51:34	Stolen Vehicle/Recovery	515 MORAGA AV, PIEDMONT	
2012-00007758	11/28/2012 10:23:54	Stolen Vehicle/Recovery	118 WILDWOOD AV, PIEDMONT	Suspended - No Further Leads
2012-00007473	11/14/2012 11:34:24	Stolen Vehicle/Recovery	920 KINGSTON AV, PIEDMONT	Suspended - No Further Leads
2012-00007261	11/04/2012 23:01:25	Stolen Vehicle/Recovery	700 JEAN ST, OAKLAND	Suspended - No Further Leads
2012-00007243	11/04/2012 07:52:37	Stolen Vehicle/Recovery	401 MONTE VISTA AVE, Piedmont	Suspended - No Further Leads
2012-00007098	10/29/2012 12:41:44	Stolen Vehicle/Recovery	226 SUNNYSIDE AV, PIEDMONT	Suspended - No Further Leads
2012-00007087	10/28/2012 22:20:53	Stolen Vehicle/Recovery	444 SUNNYSLOPE AVE, Piedmont	Suspended - No Further Leads
2012-00007080	10/28/2012 08:34:33	Stolen Vehicle/Recovery	344 MONTE VISTA AVE, Piedmont	Suspended - No Further Leads
2012-00006939	10/22/2012 08:13:24	Stolen Vehicle/Recovery	400 MONTE VISTA AVE, Piedmont	Suspended - No Further Leads
2012-00006777	10/15/2012 01:46:01	Stolen Vehicle/Recovery	5201 PARK BLVD, Piedmont	Suspended - No Further Leads
2012-00006775	10/14/2012 23:53:02	Stolen Vehicle/Recovery	601 VERNON ST, Piedmont	Suspended - No Further Leads
2012-00006659	10/09/2012 14:40:38	Stolen Vehicle/Recovery	535 HAMPTON AVE, Piedmont	Suspended - No Further Leads
2012-00006635	10/08/2012 11:23:14	Stolen Vehicle/Recovery	85 LA SALLE AV, PIEDMONT	Closed - Forward to Outs. Agency
2012-00006392	09/27/2012 22:42:14	Stolen Vehicle/Recovery	312 BLAIR AV, PIEDMONT	Closed - Forward to Outs. Agency
2012-00005500	08/19/2012 23:26:31	Stolen Vehicle/Recovery	64 SANTA CLARA AV, OAKLAND	Suspended - No Further Leads
2012-00004758	07/20/2012 08:57:52	Stolen Vehicle/Recovery	LA SALLE AVE / INDIAN RD, Piedmont	Suspended - No Further Leads
2012-00004651	07/15/2012 04:03:52	Stolen Vehicle/Recovery	1871 PARK BLVD, Piedmont	Closed - Arrest
2012-00004486	07/08/2012 12:17:30	Stolen Vehicle/Recovery	103 OAKMONT AV, PIEDMONT	Suspended - No Further Leads
2012-00004430	07/05/2012 12:00:31	Stolen Vehicle/Recovery	300 WILDWOOD AV, PIEDMONT	Suspended - No Further Leads
2012-00003804	06/09/2012 21:00:56	Stolen Vehicle/Recovery	3516 KEMPTON WY, OAKLAND	Closed - Other
2012-00003258	05/22/2012 11:34:07	Stolen Vehicle/Recovery	S HIGHLAND AVE / EAS MAGNOLIA AVE, Piedmont	Suspended - No Further Leads
2012-00003160	05/19/2012 20:04:34	Stolen Vehicle/Recovery	605 VERNON ST, Piedmont	Closed - Other
2012-00002991	05/13/2012 05:18:45	Stolen Vehicle/Recovery	211 SANDRINGHAM RD, PIEDMONT	Closed - Other
2012-00002980	05/12/2012 15:43:00	Stolen Vehicle/Recovery	400 MONTE VISTA AVE, Piedmont	Suspended - No Further Leads
2012-00002270	04/13/2012 20:01:41	Stolen Vehicle/Recovery	58 FAIRVIEW AV, PIEDMONT	Suspended - No Further Leads
2012-00002236	04/12/2012 03:18:00	Stolen Vehicle/Recovery	48 FAIRVIEW AV, PIEDMONT	Suspended - No Further Leads
2012-00002217	04/11/2012 09:18:59	Stolen Vehicle/Recovery	OAKLAND AVE / MOSS AVE, Piedmont	Closed - Other
2012-00002185	04/09/2012 19:44:31	Stolen Vehicle/Recovery	243 JOHN ST, OAKLAND	Closed - Other
2012-00002125	04/07/2012 21:07:00	Stolen Vehicle/Recovery	66 MACARTHUR BL, OAKLAND	Suspended - No Further Leads
2012-00002105	04/07/2012 00:15:37	Stolen Vehicle/Recovery	KINGSTON AV / GREENBANK AV, PIEDMONT	Suspended - No Further Leads
2012-00002084	04/06/2012 07:51:52	Stolen Vehicle/Recovery	774 KINGSTON AV, PIEDMONT	Closed - Other
2012-00001605	03/11/2012 15:30:03	Stolen Vehicle/Recovery	515 FAIRMOUNT AVE, Piedmont	Closed - Other
2012-00001484	03/06/2012 13:41:34	Stolen Vehicle/Recovery	55 SANTA CLARA AVE, Piedmont	Suspended - No Further Leads
2012-00001266	02/27/2012 07:58:22	Stolen Vehicle/Recovery	217 SANTA CLARA AVE, Piedmont	Closed - Other
2012-00000733	02/01/2012 10:25:00	Stolen Vehicle/Recovery	MOUNTAIN BLVD / COLTON BLVD, Piedmont	Probation
2012-00000718	01/31/2012 12:25:21	Stolen Vehicle/Recovery	99 SEA VIEW AV, PIEDMONT	Suspended - No Further Leads
2012-00000526	01/23/2012 22:18:57	Stolen Vehicle/Recovery	200 HIGHLAND AV, PIEDMONT	Suspended - No Further Leads
2012-00000348	01/16/2012 07:35:31	Stolen Vehicle/Recovery	500 VERNON ST, Piedmont	Suspended - No Further Leads
2012-00000331	01/15/2012 08:54:05	Stolen Vehicle/Recovery	687 VERNON ST, Piedmont	Suspended - No Further Leads
2012-00000152	01/08/2012 00:37:24	Stolen Vehicle/Recovery	4368 MONTGOMERY ST, Piedmont	Suspended - No Further Leads

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Case Number	Reported Date/Time	Occurred Incident Type	Location	Disposition
2013-00010677	12/23/2013 15:45:45	Stolen Vehicle/Recovery	721 TRESTLE GLEN RD, Piedmont	Closed - Forward to Outs. Agency
2013-00010220	12/09/2013 19:43:42	Stolen Vehicle/Recovery	OAKLAND AV / OLIVE AV, PIEDMONT	Suspended - No Further Leads
2013-00010173	12/07/2013 09:41:34	Stolen Vehicle/Recovery	SANDRINGHAM AV / ESTATES DR, PIEDMONT	Closed - Forward to Outs. Agency
2013-00009934	11/27/2013 14:51:00	Stolen Vehicle/Recovery	101 WILDWOOD AV, PIEDMONT	Closed - Other
2013-00009930	11/27/2013 12:45:54	Stolen Vehicle/Recovery	KINGSTON AVE / MONTE VISTA, Piedmont	Closed - Other
2013-00009740	11/22/2013 08:27:08	Stolen Vehicle/Recovery	4499 PIEDMONT AVE, Piedmont	Closed - Case Charged
2013-00009698	11/21/2013 13:10:45	Stolen Vehicle/Recovery	E GRAND AVE / W MACARTHUR BLVD, Piedmont	Closed - Forward to Outs. Agency
2013-00009641	11/20/2013 04:58:45	Stolen Vehicle/Recovery	140 MAXWELTON RD, PIEDMONT	Suspended - No Further Leads
2013-00009568	11/18/2013 07:04:57	Stolen Vehicle/Recovery	36 WILDWOOD AV, PIEDMONT	Suspended - No Further Leads
2013-00009559	11/17/2013 14:49:11	Stolen Vehicle/Recovery	EAS MAGNOLIA AVE / N EL CERRITO AVE, Piedmont	Closed - Other
2013-00009468	11/15/2013 01:52:00	Stolen Vehicle/Recovery	3533 KEMPTON WAY, Piedmont	Closed - Forward to Outs. Agency
2013-00009296	11/07/2013 17:03:45	Stolen Vehicle/Recovery	221 CARMEL AV, PIEDMONT	Suspended - No Further Leads
2013-00009277	11/07/2013 05:44:57	Stolen Vehicle/Recovery	900 EAS MORAGA AVENUE, Piedmont	Suspended - No Further Leads
2013-00007866	09/22/2013 17:22:04	Stolen Vehicle/Recovery	65 WYNGAARD AV, PIEDMONT	Closed - Forward to Outs. Agency
2013-00007640	09/15/2013 15:52:26	Stolen Vehicle/Recovery	7 OLIVE AV, PIEDMONT	Suspended - No Further Leads
2013-00006850	08/22/2013 05:17:00	Stolen Vehicle/Recovery	18 CALVERT CT, PIEDMONT	Suspended - No Further Leads
2013-00006782	08/20/2013 08:08:16	Stolen Vehicle/Recovery	24 GREENBANK AV, PIEDMONT	Suspended - No Further Leads
2013-00005956	07/22/2013 11:11:17	Stolen Vehicle/Recovery	303 OLIVE AV, PIEDMONT	Closed - Property Only
2013-00005873	07/18/2013 18:13:13	Stolen Vehicle/Recovery	147 GREENBANK AV, PIEDMONT	Suspended - No Further Leads
2013-00005651	07/11/2013 19:40:35	Stolen Vehicle/Recovery	584 VERNON ST, Piedmont	Suspended - No Further Leads
2013-00005519	07/07/2013 10:50:15	Stolen Vehicle/Recovery	86 CAMBRIDGE WY, PIEDMONT	Suspended - No Further Leads
2013-00005174	06/25/2013 09:51:23	Stolen Vehicle/Recovery	663 MANDANA AVE, Piedmont	Closed - Traffic
2013-00004914	06/16/2013 09:17:51	Stolen Vehicle/Recovery	309 MACARTHUR BLVD, Piedmont	Closed - Forward to Outs. Agency
2013-00004842	06/13/2013 17:11:35	Stolen Vehicle/Recovery	11 FAIRVIEW AV, PIEDMONT	Suspended - No Further Leads
2013-00004486	06/01/2013 10:11:43	Stolen Vehicle/Recovery	3856 HOWE ST, Piedmont	Suspended - No Further Leads
2013-00004365	05/28/2013 07:20:31	Stolen Vehicle/Recovery	777 OAKLAND AV, PIEDMONT	Suspended - No Further Leads
2013-00004283	05/24/2013 22:04:27	Stolen Vehicle/Recovery	28 OLIVE AV, PIEDMONT	Suspended - No Further Leads
2013-00004167	05/20/2013 23:53:54	Stolen Vehicle/Recovery	MOSS AVE / OAKLAND AVE, Piedmont	Suspended - No Further Leads
2013-00003964	05/14/2013 02:26:18	Stolen Vehicle/Recovery	1107 ROSE AVE, Piedmont	Suspended - No Further Leads
2013-00003858	05/08/2013 23:39:46	Stolen Vehicle/Recovery	1037 ASHMOUNT AVE, Piedmont	Closed - Arrest
2013-00003670	05/01/2013 20:47:42	Stolen Vehicle/Recovery	474 FAIRBANKS AVE, Piedmont	Closed - Traffic
2013-00003362	04/21/2013 05:40:30	Stolen Vehicle/Recovery	5201 PARK BLVD, Piedmont	Closed - Forward to Outs. Agency
2013-00003172	04/14/2013 11:45:27	Stolen Vehicle/Recovery	124 OLIVE AV, PIEDMONT	Suspended - No Further Leads
2013-00003112	04/12/2013 12:40:44	Stolen Vehicle/Recovery	946 KINGSTON AV, PIEDMONT	Suspended - No Further Leads
2013-00002725	03/30/2013 23:28:02	Stolen Vehicle/Recovery	62 SANTA CLARA AV, OAKLAND	Suspended - No Further Leads
2013-00002481	03/23/2013 01:42:12	Stolen Vehicle/Recovery	515 OAKLAND AVE, Piedmont	Suspended - No Further Leads
2013-00002331	03/18/2013 00:05:32	Stolen Vehicle/Recovery	1021 ROSE AVE, Piedmont	Suspended - No Further Leads
2013-00002267	03/16/2013 04:24:20	Stolen Vehicle/Recovery	525 MONTE VISTA AVE, Piedmont	Suspended - No Further Leads
2013-00001620	02/24/2013 02:24:33	Stolen Vehicle/Recovery	230 W MACARTHUR BLVD, Piedmont	Closed - Traffic
2013-00001458	02/19/2013 08:49:09	Stolen Vehicle/Recovery	973 KINGSTON AV, PIEDMONT	Suspended - No Further Leads
2013-00000379	01/16/2013 07:52:00	Stolen Vehicle/Recovery	319 MORAGA AV, PIEDMONT	Suspended - No Further Leads
2013-00000349	01/14/2013 22:48.20	Stolen Vehicle/Recovery	206 PACIFIC AV, PIEDMONT	Suspended - No Further Leads

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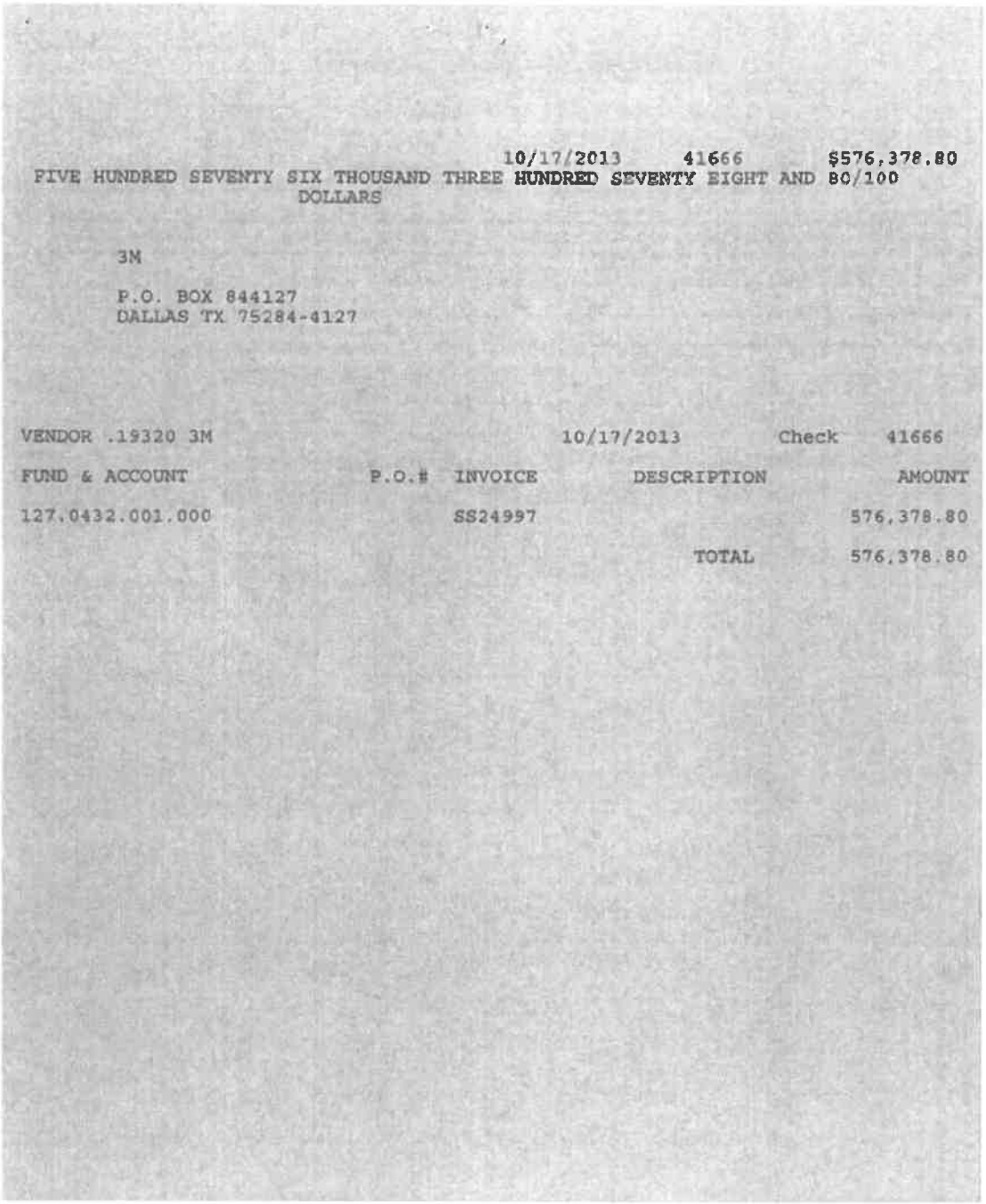
Case Number	Reported Date/Time	Occurred Incident Type	Location	Disposition
2014-00009971	12/21/2014 18:24:00	Stolen Vehicle/Recovery	93 CAMBRIAN AV, PIEDMONT	Suspended - No Further Leads
2014-00009676	12/11/2014 09:16:44	Stolen Vehicle/Recovery	204 ST JAMES DR, PIEDMONT	Closed - Case Charged
2014-00009374	11/30/2014 23:11:00	Stolen Vehicle/Recovery	424 MONTE VISTA AVE, Piedmont	Suspended - No Further Leads
2014-00009151	11/21/2014 14:26:00	Stolen Vehicle/Recovery	4416 PIEDMONT AVE, Piedmont	U3 DEFFERED FOR REV. OF PROB.
2014-00009085	11/19/2014 08:04:00	Stolen Vehicle/Recovery	MONTE VISTA AVE / VERNON ST, Piedmont	Closed - Case Charged
2014-00008908	11/13/2014 06:56:54	Stolen Vehicle/Recovery	1166 WINSOR AV, PIEDMONT	Suspended - No Further Leads
2014-00008613	11/02/2014 07:50:00	Stolen Vehicle/Recovery	3500 GRAND AVE, Piedmont	U3 DEFFERED FOR REV. OF PROB.
2014-00007742	09/29/2014 03:52:44	Stolen Vehicle/Recovery	1728 PLEASANT VALLEY AVE, Piedmont	Suspended - No Further Leads
2014-00007112	09/06/2014 14:58:45	Stolen Vehicle/Recovery	3727 GRAND AVE, Piedmont	Suspended - No Further Leads
2014-00006857	08/28/2014 00:24:56	Stolen Vehicle/Recovery	OAKLAND AV / HILLSIDE AV, PIEDMONT	Closed - Forward to Outs. Agency
2014-00006376	08/10/2014 09:21:18	Stolen Vehicle/Recovery	97 OAKMONT RD, Piedmont	Suspended - No Further Leads
2014-00005493	07/10/2014 12:55:37	Stolen Vehicle/Recovery	5728 MORAGA AVE, Piedmont	Closed - Unfounded
2014-00004963	06/22/2014 09:29:59	Stolen Vehicle/Recovery	8 CAMBRIDGE WY, PIEDMONT	Suspended - No Further Leads
2014-00004895	06/19/2014 12:32:00	Stolen Vehicle/Recovery	4145 SHAFTER AVE, Piedmont	Closed - Forward to Outs. Agency
2014-00004812	06/16/2014 07:27:23	Stolen Vehicle/Recovery	136 OLIVE AV, PIEDMONT	Suspended - No Further Leads
2014-00004349	05/30/2014 07:55:00	Stolen Vehicle/Recovery	GLEN AVE / PIEDMONT AVE, Piedmont	T1 LACK OF CORPUS
2014-00004315	05/28/2014 14:12:00	Stolen Vehicle/Recovery	MORAGA AVE / LA SALLE AVE, Piedmont	Closed - Unfounded
2014-00004270	05/26/2014 16:01:54	Stolen Vehicle/Recovery	JEAN ST / GRAND AVE, Piedmont	Closed - Arrest
2014-00003949	05/15/2014 21:25:05	Stolen Vehicle/Recovery	1685 GRAND AV, PIEDMONT	U3 DEFFERED FOR REV. OF PROB.
2014-00003883	05/13/2014 12:05:28	Stolen Vehicle/Recovery	37 GREENBANK AV, PIEDMONT	Closed - Forward to Outs. Agency
2014-00003814	05/10/2014 10:21:08	Stolen Vehicle/Recovery	6025 ESTATES DR, Piedmont	Closed - Forward to Outs. Agency
2014-00003664	05/05/2014 21:05:00	Stolen Vehicle/Recovery	244 ST JAMES DR, PIEDMONT	T4 VICTIM UNAVAIL./DECLINES
2014-00003252	04/22/2014 15:27:04	Stolen Vehicle/Recovery	4 SIERRA AV, PIEDMONT	Closed - Unfounded
2014-00003208	04/20/2014 16:09:00	Stolen Vehicle/Recovery	3205 GRAND AVE, Piedmont	Closed - Case Charged
2014-00002915	04/09/2014 01:43:53	Stolen Vehicle/Recovery	70 ST JAMES PL, PIEDMONT	Closed - Traffic
2014-00002914	04/09/2014 01:36:45	Stolen Vehicle/Recovery	110 ST JAMES DR, PIEDMONT	Closed - Other
2014-00002457	03/24/2014 15:34:35	Stolen Vehicle/Recovery	161 SCENIC AV, PIEDMONT	Closed - Forward to Outs. Agency
2014-00002084	03/11/2014 17:12:39	Stolen Vehicle/Recovery	1811 TRESTLE GLEN RD, PIEDMONT	Closed - Forward to Outs. Agency
2014-00002068	03/11/2014 09:32:50	Stolen Vehicle/Recovery	245 SANDRINGHAM AV, PIEDMONT	Closed - Forward to Outs. Agency
2014-00002027	03/10/2014 08:52:37	Stolen Vehicle/Recovery	1159 HARVARD RD, PIEDMONT	Closed - Forward to Outs. Agency
2014-00002017	03/09/2014 16:15:10	Stolen Vehicle/Recovery	GRAND AV / RONADA AV, PIEDMONT	Closed - Arrest
2014-00001771	02/28/2014 13:49:00	Stolen Vehicle/Recovery	KINGSTON AV / ROSE AV, PIEDMONT	Closed - Other
2014-00000712	01/22/2014 11:36:59	Stolen Vehicle/Recovery	35 GREENBANK AV, PIEDMONT	Closed - Forward to Outs. Agency
2014-00000085	01/03/2014 15:11:25	Stolen Vehicle/Recovery	4001 GRAND AV, OAKLAND	Closed - Arrest

Total Rows: 34

Supplementary Material B: Excerpted Hardware Listing and Invoice Redacted, Piedmont 2013 3M



10/17/2013 41666 $576,378.80

FIVE HUNDRED SEVENTY SIX THOUSAND THREE HUNDRED SEVENTY EIGHT AND 80/100 DOLLARS

3M

P.O. BOX 844127
DALLAS TX 75284-4127

VENDOR .19320 3M 10/17/2013 Check 41666

FUND & ACCOUNT	P.O.#	INVOICE	DESCRIPTION	AMOUNT
127.0432.001.000		SS24997		576,378.80
			TOTAL	576,378.80

REGULAR PAYMENT DEMAND

DATE: 10/08/13

VENDOR NAME: 3M INVOICE DATE: 09/30/13

AMOUNT	FUND	DEPT.	ACCOUNT	INVOICE NUMBER	VENDOR NUMBER
576,378.80	127	0432	001 - 0000	5524997	None
			-		
			-		
			-		
			-		
			-		
			-		
			-		
			-		

PAID OCT 17 2013 By

576,378.80 TOTAL AMOUNT

DEPARTMENT APPROVAL:

FINANCE APPROVAL

3M Invoice

PAGE 5 OF 6

PURCHASE ORDER..SALES AGREEMENT

CHARGE TO ACCOUNT NO... PEI3213

INVOICE NO..... 8824997
TYPE..... ORIGINAL
DATE..... 09/30/2013

SHIP TO: RAYS ELECTRIC OAKLAND CA 94621-2115

QUANTITY	UNIT	DESCRIPTION	UNIT PRICE	TOTAL AMOUNT
		NTENNA #TL-ANT2409A		
2	EACH	05111576537 P392+ 850NM 50/25 4GB W/HOOD	8800.00	17,600.00
1	EACH	05111576537 P392+ 850NM 50/25 4GB W/HOOD	8800.00	8,800.00
2	EACH	05111576523 P382 850NM 75/35 4GB W/HOOD	15200.00	30,400.00
2	EACH	05111575688 P392+ Cam 850nm N 35/16mm Len 4GB Single	8800.00	17,600.00
1	EACH	05111576537 P392+ 850NM 50/25 4GB W/HOOD	8800.00	8,800.00
2	EACH	05111576523 P382 850NM 75/35 4GB W/HOOD	15200.00	30,400.00
1	EACH	05111576521 P382 850NM 50/25 4GB W/HOOD	15200.00	15,200.00
2	EACH	05111576523 P382 850NM 75/35 4GB W/HOOD	15200.00	30,400.00
1	EACH	05111576537 P392+ 850NM 50/25 4GB W/HOOD	8800.00	8,800.00
1	EACH	05111576521 P382 850NM 50/25 4GB W/HOOD	15200.00	15,200.00
1	EACH	05111576521 P382 850NM 50/25 4GB W/HOOD	15200.00	15,200.00
1	EACH	05111576523 P382 850NM 75/35 4GB W/HOOD	15200.00	15,200.00
1	EACH	05111576521 P382 850NM 50/25 4GB W/HOOD	15200.00	30,400.00
1	EACH	05111576523 P382 850NM 75/35 4GB W/HOOD	15200.00	15,200.00
3	EACH	05111576537 P392+ 850NM 50/25 4GB W/HOOD	8800.00	26,400.00
1	EACH	05111576523 P382 850NM 75/35 4GB W/HOOD	15200.00	15,200.00
1	EACH	05111576537 P392+ 850NM 50/25 4GB W/HOOD	8800.00	8,800.00
2	EACH	05111576537 P392+ 850NM 50/25 4GB W/HOOD	8800.00	17,600.00
1	EACH	05111576521 P382 850NM 50/25 4GB W/HOOD	15200.00	15,200.00
1	EACH	05111576537 P392+ 850NM 50/25 4GB W/HOOD	8800.00	8,800.00
2	EACH	05111576523 P382 850NM 75/35 4GB W/HOOD	15200.00	30,400.00
2	EACH	05111575688 P392+ Cam 850nm N 35/16mm Len 4GB Single	8800.00	17,600.00
1	EACH	05111576537 P392+ 850NM 50/25 4GB W/HOOD	8800.00	8,800.00
1	EACH	05111576521 P382 850NM 50/25 4GB W/HOOD	15200.00	15,200.00
1	EACH	05111575688 P392+ Cam 850nm N 35/16mm Len 4GB Single	8800.00	8,800.00
1	EACH	05111575688 P392+ Cam 850nm N 35/16mm Len 4GB Single	8800.00	8,800.00
1	EACH	05111576537 P392+ 850NM 50/25 4GB W/HOOD	8800.00	8,800.00
1	EACH	05111576523 P382 850NM 75/35 4GB W/HOOD	15200.00	15,200.00
F		TRANSPORTATION CHARGES	*	2,690.00

3M Invoice

PAGE 6 OF 6

PURCHASE ORDER..SALES AGREEMENT

CHARGE TO ACCOUNT NO... PEI3213

INVOICE NO..... 9824997
TYPE..... ORIGINAL
DATE..... 09/30/2013

SHIP TO: RAYS ELECTRIC OAKLAND CA 94621-2115

QUANTITY	UNIT	DESCRIPTION		UNIT PRICE	TOTAL AMOUNT
		6.500% CALIFORNIA STATE SALES TAX	ET		34,210.80
		1.000% ALAMEDA COUNTY TAX	ET		5,263.20
		1.500% ALAMEDA COUNTY TRANSIT TAX	ETET		7,894.80
***		SHPD 09/30 FROM-3M KNOXVILLE VIA-CHWY	B/L-2K 000221		
***			2,089-LBS	128-PCS	
***					

TOTAL MUST BE RECEIVED BY: 10/30/2013 | INVOICE TOTAL 576,378.80

Please see reverse side for terms and conditions of sale and address change form.

PAID
OCT 17 2013
By_____

Supplementary Material C: Excerpts of Quoted Prices from Piedmont Council ALPR Expansion Agenda Meeting 07/01/2019

City of Piedmont
COUNCIL AGENDA REPORT

DATE: July 1, 2019

TO: Mayor and Council

FROM: Paul Benoit, City Administrator

SUBJECT: Automated License Plate Recognition (ALPR) Program: Consideration of Program Expansion and a Proposal to Replace Failing Cameras at an Existing Intersection

RECOMMENDATION

Approve the expansion of the ALPR camera system to include five new intersections and the replacement of five failing cameras at the intersection of Grand Avenue and Wildwood Avenue.

EXECUTIVE SUMMARY

In 2013, the City Council authorized execution of the City's Automated License Plate Recognition (ALPR) program that consisted of 39 cameras at 15 intersections throughout the City. At the time, the project was scaled down from 24 identified locations to 15 intersections due to cost considerations and with the idea the City could revisit the program at a future time to add fixed sites. The project presented for consideration this evening proposes five new locations - Blair Avenue at Calvert Court, La Salle Avenue at Indian Avenue, Trestle Glen Avenue at Park Avenue and Trestle Glen Avenue at Valant Place, and Harvard Avenue at Ranleigh Way. In addition to consideration of this proposal, staff also recommends replacement of the ALPR cameras located at the Grand Avenue/Wildwood Avenue site.

The estimated cost of the camera replacement and expansion proposal is $113,358.31 (see Fiscal Considerations on page 3). The Department is not asking for an appropriation of any additional funds as the costs can be covered out of existing COPS funding, equipment replacement funds and a generous donation of $20,000 from the Helen C. Connell Trust. The cameras have proved to be a valuable resource for both patrol officers and investigators and ultimately have led to the identification, arrest and successful prosecution of numerous suspects.

BACKGROUND

In 2013, the City Council directed the police department to explore the use of ALPR cameras as a force multiplier. As part of the exploration, the Department considered each of the 24 ingress/egress points existing between the cities of Piedmont and Oakland. Due to budgetary limitations, the project scope was scaled back to cover only major ingress/egress points in areas of the City that experience high levels of certain crimes. Input was sought from community stakeholders and city staff regarding the optimal location of the ALPR cameras. Ultimately, 39

ALPR cameras were installed at 15 of the 24 intersections which border Oakland, leaving the remaining 9 sites to be considered in the future.

Over the last five years, the cost of repair and maintenance of our existing ALPR camera system, as detailed in the following table, has been well under the annual budgeted amount of $52,000.

FY 2014-15	$1,710
FY 2015-16	$9,134
FY 2016-17	$28,312
FY 2017-18	$30,228
FY 2018-19	$18,695

By providing for regular preventative maintenance such as firmware updates and conducting hardware checks, the Department has successfully extended the operational life of the system. However, as our system ages we will need to replace cameras, as needed, due to end-of-life technology. Additionally, maintenance and repair costs are likely to increase. Currently, the City budgets $60,000 a year in the Equipment Replacement Fund for the replacement of ALPR equipment. Hardware costs associated with the cameras have decreased over time. When calculating the current costs of ALPR cameras, staff estimates a 7 year operational life span, at which time we would assume the need to replace the existing 39 camera system. The Department employs a conservative approach to the replacement of the existing equipment by closely monitoring the operational functionality of the cameras and seeking to replace equipment only when necessary as opposed to simply adhering to a set schedule of anticipated length of service life. While equipment costs may decrease over time, we would estimate a full replacement of the existing 39 camera system would cost somewhere between $500,000 and$600,000. The original cost of the City's existing ALPR system was $673,273.92.

RECOMMENDATION for PROGRAM EXPANSION

The ALPR cameras have proved to be an invaluable investigative tool as well as a tool to affect crime, or the potential of crime, in real time using the alerting capabilities of the system. Since 2013, officers have arrested 124 individuals directly associated with hits, or alerts, from the ALPR cameras. The cameras have also provided investigative leads in over 100 criminal investigations, most notably in several high-profile, dangerous, home-invasion robbery investigations which ultimately lead to the identification, arrest and prosecution of associated suspects. The past six years have provided our Department the opportunity to understand where additional ALPR cameras would be most beneficial. The recommendation of additional locations is based on staff's knowledge and experience of intersections which serve as significant ingress and egress locations to the City and which, in some cases, are known to be used by individuals who have engaged in crime. A review of reported crime locations also provides a basis for the recommended new sites. The proposed expansion of the ALPR program includes the following five new intersections.

- Blair Avenue at Calvert Court
- La Salle Avenue at Indian Avenue
- Trestle Glen at Valant Place and West of Park Boulevard
- Harvard Avenue at Ranleigh Way

The Piedmont Police Department continues to be sensitive to the privacy concerns associated with the use of ALPR technology. The Department currently complies with all laws and policies governing how the data is used as well as how it is stored and retained. Piedmont Police Policy Section 438 provides strict guidelines for police personnel to follow when using the camera system and the data which it contains. The policy (Attachment #7) can be found on the City's website and by clicking here. The Department will continue to use the Northern California Regional Intelligence Center (NCRIC) for data storage as it provides rigorous security procedures, creates detailed audited trails of all access, performs regular purge of server content, allows for regional access to the data by our law enforcement partners, and provides data storage at no cost.

EQUIPMENT REPLACEMENT

The intersection of Grand Ave and Wildwood Ave is the first ALPR site in need of equipment replacement due to an increase in camera malfunctions. The six cameras deployed at this intersection have been in service for six years and are at the end of their serviceable life. Due to the lane re-configuration at the intersection resulting from the City's adopted Pedestrian and Bicycle Master Plan the intersection has been reduced from four to two lanes. As a result, the number of cameras required to cover the intersection adequately can be reduced from six to four. Attachment #5 is a quote in the amount of $27,479.38 provided by PIPS Technology for the four required P492 cameras, two universal fixed brackets, and a 48 V termination box. There will also be associated installation costs in the amount of $11,207 that are reflected in the quote from our current maintenance contractor, Odin Systems Inc. (see Attachment). The total cost for installing 4 new cameras at the intersection of Grand Ave and Wildwood Ave is $38,686.38.

FISCAL CONSIDERATIONS

The Equipment Replacement Fund will cover the cost of the proposed replacement cameras at the intersection of Grand Avenue and Wildwood Avenue. The COPS fund, as well as a generous private contribution of $20,000 received from the Helen C. Connell Trust in May 2019, will be used to fund the installation of cameras at the five new locations. The private contribution was made specifically to support the City's ALPR program.

	Equipment Replacement	COPS Fund	Private Contribution	Total
Available Funding	$ 410,000	$ 485,800	$ 20,000	$ 915,800
Grand & Wildwood	$ 38,686			$ 38,686
Expansion Sites		$ 54,672	$ 20,000	$ 74,672
Total Cost	$ 38,686	$ 54,672	$ 20,000	$ 113,358
Remaining Balance	$ 371,314	$ 431,128	$ -	$ 802,442

Earlier this year, the Police Department obtained nine ALPR cameras, of the same type and model as used in Piedmont, from the San Pablo Police Department at a significantly reduced cost

of $8,500. These cameras have been thoroughly vetted by the current vendor, PIPS Technology, and updated with the latest firmware at a cost of $1,440, for a total procurement cost of $9,940 paid for by funds of the private contribution. Five of these cameras will be utilized in the proposed new locations. The remaining four cameras will be used for equipment replacement purposes. For comparison, the purchase price of a single new camera is in the range of $8,000 - $10,000.

Purchase of the ALPR cameras falls within Section 2.154(c) sole source exception of the purchasing rules. The Back Office System Software (BOSS) is proprietary, thus only agencies utilizing PIPS technology may use the software to access the data. The ability to utilize the NCRIC for data storage eliminates the need to purchase server hardware or software license, IT management, maintenance, upgrades and backups. The NCRIC vetted several companies through a competitive bidding process, and selected PIPS to enter into a contract with.

The Department has used Odin Systems for several years after procuring their maintenance services to fix several connectivity issues associated to the installation work of a prior vendor. As a result, Odin has an intimate knowledge of the City's existing system and have been extremely responsive when maintenance issues arise. Odin's pricing is competitive and it is unlikely bidding would result in a lower price given the value they bring to the critical maintenance of the system. Finally, Odin Systems also provides similar services to other cities in the region and maintain a reputable reputation for their work product and costs. The proposed work would be exempt from bidding pursuant to 2.154(d), as installing the cameras involves specialized technology services work, including specialized software configuration and wireless connectivity work which makes this unlike a public works project.

Should the City Council approve the recommendation for deploying ALPRs to the proposed five new intersections, staff projects that the annual budgeted amount of $52,000 for ALPR maintenance will continue to be sufficient. The Chief of Police has consulted with the Finance Director relative to this proposal as well as the implications to the Equipment Replacement Fund by adding cameras. Based on the funding level of the Equipment Replacement Fund the Finance Director did not recommend any increase to the fund at this time.

The attached agreements have been approved as to form and legality by the City Attorney.

ATTACHMENTS

#1 PIPS Quote for Trestle Glen
#2 PIPS Quote Ranleigh & Harvard
#3 PIPS Quote Indian & LaSalle
#4 PIPS Quote Blair & Calvert
#5 PIPS Quote Grand & Wildwood
#6 Odin Systems Install Quotes and Services Agreement
#7 Piedmont Police Department Policy Section 438

By: Jeremy Bowers, Chief of Police

PIPS TECHNOLOGY
A NEOLOGY BUSINESS

Company Address 15320 Evening Creek Drive N.
Suite 460
San Diego, CA 92128
US

Quote Number	00001545	**Created Date**	6/5/2019
Quote Name	Fixed Cameras - Trestle Glen West of Park CITY OF PIEDMONT POLICE DEPT	**Expiration Date**	7/31/2019
Prepared By	Louis Wershaw	**Contact Name**	Lisa Douglas
Phone	(562) 843-1066	Phone	(510) 420-3014
Email	lwershaw@neology.net	Email	ldouglas@piedmont.ca.gov
Bill To Name	CITY OF PIEDMONT POLICE DEPT	**Ship To Name**	CITY OF PIEDMONT POLICE DEPT
Bill To	403 HIGHLAND AVE PIEDMONT, California 94611-4025	**Ship To**	403 HIGHLAND AVE PIEDMONT, California 94611-4025

Quantity	Product Code	Product	List Price (MSRP)	Discount	Sales Price	Subtotal
0.50	75-0302-5309-2	FIXED SYSTEM COMMISSIONING BILLING ONLY	USD 1,300.00	0.00%	USD 1,300.00	USD 650.00
1.00	75-0302-5323-3	P492 810NM 50/25 8GB W/HOOD	USD 6,666.00	0.00%	USD 6,666.00	USD 6,666.00
0.50	75-0302-3692-3	Travel Fee- Zone One Billing Only	USD 1,200.00	0.00%	USD 1,200.00	USD 600.00

Subtotal	USD 7,916.00
Shipping and Handling	USD 95.00
Tax	USD 616.61
Grand Total	USD 8,627.61

Notes

- Installation not included
- Customer to provide bucket truck and traffic control for commissioning
- Customer to provide all network communication

Acknowledgement

Warranty: Two year return-to- depot included with purchase

Headquartered in San Diego, CA with a customer contact Center in Austin, TX
Providing products and services designed specifically for Law Enforcement, Security, Parking, Tolling, and Intelligent Transportation markets PIPS Technology designs, manufactures, installs and supports every aspect of our ALPR products including cameras, processors, software and OCR engines.

Payment Term: Net 30 days are subject to Neology statement of Terms, Conditions, and Warranties of Sales
Warranty: One year return-to- depot included with purchase

Questions/ Concerns? Contact Technical Services (833) PIPS-LPR or (833) 747-7577

A Neology Business USA: 12760 Danielson Ct. Suite A, Poway, CA 92064 P. (858) 391-0260

PIPS TECHNOLOGY
A NEOLOGY BUSINESS

Company Address 15320 Evening Creek Drive N.
Suite 460
San Diego, CA 92128
US

Quote Number	00001546	Created Date	6/5/2019
Quote Name	Commissioning - Trestle Glen Opposite Valant - CITY OF PIEDMONT POLICE DEPT	Expiration Date	7/31/2019
Prepared By	Louis Wershaw	Contact Name	Lisa Douglas
Phone	(562) 843-1066	Phone	(510) 420-3014
Email	lwershaw@neology.net	Email	ldouglas@piedmont.ca.gov
Bill To Name	CITY OF PIEDMONT POLICE DEPT	Ship To Name	CITY OF PIEDMONT POLICE DEPT
Bill To	403 HIGHLAND AVE PIEDMONT, California 94611-4025	Ship To	403 HIGHLAND AVE PIEDMONT, California 94611-4025

Quantity	Product Code	Product	List Price (MSRP)	Discount	Sales Price	Subtotal
0.50	75-0302-5309-2	FIXED SYSTEM COMMISSIONING BILLING ONLY	USD 1,300.00	0.00%	USD 1,300.00	USD 650.00
0.50	75-0302-3692-3	Travel Fee- Zone One Billing Only	USD 1,200.00	0.00%	USD 1,200.00	USD 600.00

Subtotal	USD 1,250.00
Tax	USD 0.00
Grand Total	USD 1,250.00

Notes

- Installation not included
- Customer to provide bucket truck and traffic control for commissioning
- Customer to provide all network communication

Acknowledgement

Warranty: Two year return-to- depot included with purchase

Headquartered in San Diego, CA with a customer contact Center in Austin, TX
Providing products and services designed specifically for Law Enforcement, Security, Parking, Tolling, and Intelligent Transportation markets.
PIPS Technology designs, manufactures, installs and supports every aspect of our ALPR products including cameras, processors, software and OCR engines.

Payment Term: Net 30 days are subject to Neology statement of Terms, Conditions, and Warranties of Sales
Warranty: One year return-to- depot included with purchase

Conditions of This Sale:

Questions/ Concerns? Contact Technical Services (833) PIPS-LPR or (833) 747-7577

A Neology Business USA: 12760 Danielson Ct. Suite A, Poway, CA 92064 **P.** (858) 391-0260

PIPS TECHNOLOGY
A NEOLOGY Business

Company Address 15320 Evening Creek Drive N.
Suite 460
San Diego, CA 92128
US

Quote Number	00001761	Created Date	6/5/2019
Quote Name	Parts & Service - Harvard Rd & Ranleigh Way NE Harvard - CITY OF PIEDMONT POLICE DEPT	Expiration Date	9/4/2019
Prepared By	Louis Weishaw	Contact Name	Lisa Douglas
Phone	(562) 843-1068	Phone	(510) 420-3014
Email	lweishaw@neology.net	Email	ldouglas@piedmont.ca.gov
Bill To Name	CITY OF PIEDMONT POLICE DEPT	Ship To Name	CITY OF PIEDMONT POLICE DEPT
Bill To	403 HIGHLAND AVE PIEDMONT, California 94611-4025	Ship To	403 HIGHLAND AVE PIEDMONT, California 94611-4025

Quantity	Product Code	Product	List Price (MSRP)	Discount	Sales Price	Subtotal
0.50	75-0302-5309-2	FIXED SYSTEM COMMISSIONING BILLING ONLY	USD 1,300.00	0.00%	USD 1,300.00	USD 650.00
1.00	75-0302-5441-3	TBOX 1-15V 1 P392+	USD 1,300.00	0.00%	USD 1,300.00	USD 1,300.00
0.50	75-0302-3692-3	Travel Fee- Zone One Billing Only	USD 1,200.00	0.00%	USD 1,200.00	USD 600.00
1.00	75-0302-2230-3	UNIVERSAL FIXED BRKTS (P392+/P492)	USD 850.00	0.00%	USD 850.00	USD 850.00

Subtotal	USD 3,400.00
Shipping and Handling	USD 35.00
Tax	USD 198.88
Grand Total	USD 3,633.88

Notes

- Installation not included
- Customer to provide bucket truck and traffic control for commissioning
- Customer to provide all network communication
- 1 P392 (Existing), 1 Universal Bracket (New), 1 15V Term Board (Existing), 1 1 Cam T Box (New) Customer supply Modem and external Antenna. Any additional Mounts.

Acknowledgement

Warranty: Two year return-to- depot included with purchase

Headquartered in San Diego, CA with a customer contact Center in Austin, TX
Providing products and services designed specifically for Law EnforcemenL Security, Parking, Tolling, and Intelligent Transportation markets.

Questions/ Concerns? Contact Technical Services (833) PIPS-LPR or (833) 747-7577

A Neology Business USA: 12760 Danielson Ct. Suite A, Poway, CA 92064 P. (858) 391-0260

PIPS TECHNOLOGY
A NEOLOGY business

Company Address 15320 Evening Creek Drive N.
Suite 460
San Diego, CA 92128
US

Quote Number	00001760	Created Date	6/5/2019
Quote Name	Parts & Services - Harvard Rd & Ranleigh Way N Ranleigh - CITY OF PIEDMONT POLICE DEPT	Expiration Date	9/4/2019
Prepared By	Louis Wershaw	Contact Name	Lisa Douglas
Phone	(562) 843-1066	Phone	(510) 420-3014
Email	lwershaw@neology.net	Email	ldouglas@piedmont.ca.gov
Bill To Name	CITY OF PIEDMONT POLICE DEPT	Ship To Name	CITY OF PIEDMONT POLICE DEPT
Bill To	403 HIGHLAND AVE PIEDMONT, California 94611-4025	Ship To	403 HIGHLAND AVE PIEDMONT, California 94611-4025

Quantity	Product Code	Product	List Price (MSRP)	Discount	Sales Price	Subtotal
0.50	75-0302-5309-2	FIXED SYSTEM COMMISSIONING BILLING ONLY	USD 1,300.00	0.00%	USD 1,300.00	USD 650.00
0.50	75-0302-3692-3	Travel Fee- Zone One Billing Only	USD 1,200.00	0.00%	USD 1,200.00	USD 600.00
1.00	75-0302-2230-3	UNIVERSAL FIXED BRKTS (P392+/P492)	USD 850.00	0.00%	USD 850.00	USD 850.00

Subtotal	USD 2,100.00
Shipping and Handling	USD 20.00
Tax	USD 78.63
Grand Total	USD 2,198.63

Notes

- Installation not included
- Customer to provide bucket truck and traffic control for commissioning
- Customer to provide all network communication
- Customer to provide P392 (Existing), 1 Universal Bracket (New). 1 15V Term Board (Existing), 1 2 Cam T Box (Existing)

Customer supply Modem and external Antenna. Any additional Mounts.

Acknowledgement

Warranty: Two year return-to- depot included with purchase

Questions/ Concerns? Contact Technical Services (833) PIPS-LPR or (833) 747-7577

A Neology Business USA: 12760 Danielson Ct. Suite A, Poway, CA 92064 P. (858) 391-0260

PIPS TECHNOLOGY
A NEOLOGY business

Company Address 15320 Evening Creek Drive N.
Suite 460
San Diego, CA 92128
US

Quote Number	00001760	**Created Date**	6/5/2019
Quote Name	Parts & Services - Harvard Rd & Ranleigh Way N Ranleigh - CITY OF PIEDMONT POLICE DEPT	**Expiration Date**	9/4/2019
Prepared By	Louis Wershaw	**Contact Name**	Lisa Douglas
Phone	(562) 843-1066	**Phone**	(510) 420-3014
Email	lwershaw@neology.net	**Email**	ldouglas@piedmont.ca.gov
Bill To Name	CITY OF PIEDMONT POLICE DEPT	**Ship To Name**	CITY OF PIEDMONT POLICE DEPT
Bill To	403 HIGHLAND AVE PIEDMONT, California 94611-4025	**Ship To**	403 HIGHLAND AVE PIEDMONT, California 94611-4025

Quantity	Product Code	Product	List Price (MSRP)	Discount	Sales Price	Subtotal
0.50	75-0302-5309-2	FIXED SYSTEM COMMISSIONING BILLING ONLY	USD 1,300.00	0.00%	USD 1,300.00	USD 650.00
0.50	75-0302-3692-3	Travel Fee- Zone One Billing Only	USD 1,200.00	0.00%	USD 1,200.00	USD 600.00
1.00	75-0302-2230-3	UNIVERSAL FIXED BRKTS (P392+/P492)	USD 850.00	0.00%	USD 850.00	USD 850.00

Subtotal	USD 2,100.00
Shipping and Handling	USD 20.00
Tax	USD 78.63
Grand Total	USD 2,198.63

Notes

- Installation not included
- Customer to provide bucket truck and traffic control for commissioning
- Customer to provide all network communication
- Customer to provide P392 (Existing) 1 Universal Bracket (New), 1 15V Term Board (Existing) 1 2 Cam T Box (Existing) Customer supply Modem and external Antenna. Any additional Mounts

Acknowledgement

Warranty: Two year return-to- depot included with purchase

Questions/ Concerns? Contact Technical Services (833) PIPS-LPR or (833) 747-7577

PIPS TECHNOLOGY
A NEOLOGY business

Company Address 15320 Evening Creek Drive N.
Suite 460
San Diego, CA 92128
US

Quote Number	00001548	Created Date	6/5/2019
Quote Name	Commissioning - Indian & La Salle - CITY OF PIEDMONT POLICE DEPT	Expiration Date	/31/2019
Prepared By	Louis Wershaw	Contact Name	Lisa Douglas
Phone	(562) 843-1066	Phone	(510) 420-3014
Email	lwershaw@neology.net	Email	ldouglas@piedmont.ca.gov
Bill To Name	CITY OF PIEDMONT POLICE DEPT	Ship To Name	CITY OF PIEDMONT POLICE DEPT
Bill To	403 HIGHLAND AVE PIEDMONT, California 94611-4025	Ship To	403 HIGHLAND AVE PIEDMONT, California 94611-4025

Quantity	Product Code	Product	List Price (MSRP)	Discount	Sales Price	Subtotal
0.50	75-0302-5309-2	FIXED SYSTEM COMMISSIONING BILLING ONLY	USD 1,300.00	0.00%	USD 1,300.00	USD 650.00
0.50	75-0302-3692-3	Travel Fee- Zone One Billing Only	USD 1,200.00	0.00%	USD 1,200.00	USD 600.00

Subtotal	USD 1,250.00
Tax	USD 0.00
Grand Total	USD 1,250.00

Notes

- Installation not included
- Customer to provide bucket truck and traffic control for commissioning
- Customer to provide all network communication

Acknowledgement

Warranty: Two year return-to- depot included with purchase

Headquartered in San Diego, CA with a customer contact Center in Austin, TX
Providing products and services designed specifically for Law Enforcement, Security, Parking, Tolling, and Intelligent Transportation markets
PIPS Technology designs, manufactures, installs and supports every aspect of our ALPR products including cameras, processors, software and OCR engines.

Payment Term: Net 30 days are subject to Neology statement of Terms, Conditions, and Warranties of Sales
Warranty: One year return-to- depot included with purchase

Conditions of This Sale:

Questions/ Concerns? Contact Technical Services (833) PIPS-LPR or (833) 747-7577

A Neology Business USA: 12760 Danielson Ct. Suite A, Poway, CA 92064 P. (858) 391-0260

PIPS TECHNOLOGY
A NEOLOGY Business

Company Address 15320 Evening Creek Drive N.
Suite 460
San Diego, CA 92128
US

Quote Number	00001547	Created Date	6/5/2019
Quote Name	Fixed Cameras - Blair & Calvert - CITY OF PIEDMONT POLICE DEPT	Expiration Date	7/31/2019
Prepared By	Louis Wersnow	Contact Name	Lisa Douglas
Phone	(562) 843-1066	Phone	(510) 420-3014
Email	lwersnow@neology.net	Email	ldouglas@piedmont.ca.gov
Bill To Name	CITY OF PIEDMONT POLICE DEPT	Ship To Name	CITY OF PIEDMONT POLICE DEPT
Bill To	403 HIGHLAND AVE PIEDMONT, California 94611-4025	Ship To	403 HIGHLAND AVE PIEDMONT, California 94611-4025

Quantity	Product Code	Product	List Price (MSRP)	Discount	Sales Price	Subtotal
0.50	75-0302-5309-2	FIXED SYSTEM COMMISSIONING BILLING ONLY	USD 1,300.00	0.00%	USD 1,300.00	USD 650.00
3.00	75-0302-5323-3	P492 810NM 50/25 8GB W/HOOD	USD 6,666.00	0.00%	USD 6,666.00	USD 19,998.00
0.50	75-0302-3692-3	Travel Fee- Zone One Billing Only	USD 1,200.00	0.00%	USD 1,200.00	USD 600.00

Subtotal	USD 21,248.00
Shipping and Handling	USD 285.00
Tax	USD 1,949.81
Grand Total	USD 23,482.81

Notes

- Customer to provide mounting hardware and termination box.

Acknowledgement

Warranty: Two year return-to- depot included with purchase

Headquartered in San Diego, CA with a customer contact Center in Austin, TX
Providing products and services designed specifically for Law Enforcement, Security, Parking, Tolling, and Intelligent Transportation markets.
PIPS Technology designs, manufactures, installs and supports every aspect of our ALPR products including cameras, processors, software and OCR engines.

Payment Term: Net 30 days are subject to Neology statement of Terms, Conditions, and Warranties of Sales
Warranty: One year return-to- depot included with purchase

Questions/ Concerns? Contact Technical Services (833) PIPS-LPR or (833) 747-7577

A Neology Business USA: 12760 Danielson Ct. Suite A, Poway, CA 92064 P. (858) 391-0260

PIPS TECHNOLOGY
A NEOLOGY business.

Company Address 15320 Evening Creek Drive N,
Suite 460
San Diego, CA 92128
US

Quote Number	00001380	Created Date	6/6/2019
Quote Name	P492 - Grand & Wildwood	Expiration Date	7/31/2019
Prepared By	Louis Wershaw	Contact Name	Lisa Douglas
Phone	(562) 843-1066	Phone	(510) 420-3014
Email	lwershaw@neology.net	Email	ldouglas@piedmont.ca.gov
Bill To Name	CITY OF PIEDMONT POLICE DEPT	Ship To Name	CITY OF PIEDMONT POLICE DEPT
Bill To	403 HIGHLAND AVE PIEDMONT, California 94611-4025	Ship To	403 HIGHLAND AVE PIEDMONT, California 94611-4025

Quantity	Product Code	Product	List Price (MSRP)	Discount	Sales Price	Subtotal
4.00	75-0302-5323-3	P492 810NM 50/25 8GB W/HOOD	USD 5,250.00	0.00%	USD 5,250.00	USD 21,000.00
1.00	75-0302-5442-1	TBOX 2-48V 2 P492	USD 2,050.00	0.00%	USD 2,050.00	USD 2,050.00
2.00	75-0302-2230-3	UNIVERSAL FIXED BRKTS (P392+/P492)	USD 850.00	0.00%	USD 850.00	USD 1,700.00

Subtotal	USD 24,750.00
Shipping and Handling	USD 440.00
Tax	USD 2,289.38
Grand Total	USD 27,479.38

Notes

- Installation not included
- Customer to provide bucket truck and traffic control for commissioning
- Customer to provide all network communication
- Replacement camera discounted pricing. 2 P492 for Wildwood North and South. Install new 2 cam T box. Take old T box from Wildwood and use on Grand North Bound. Use existing T box on Grand South Bound.

Acknowledgement

Warranty: Two year return-to- depot included with purchase

Headquartered in San Diego, CA with a customer contact Center in Austin, TX
Providing products and services designed specifically for Law Enforcement, Security, Parking, Tolling, and Intelligent Transportation markets.
PIPS Technology designs, manufactures, installs and supports every aspect of our ALPR products including cameras, processors, software and OCR engines.

Questions/ Concerns? Contact Technical Services (833) PIPS-LPR or (833) 747-7577

A Neology Business USA: 12760 Danielson Ct. Suite A, Poway, CA 92064 P. (858) 391-0260

ODIN SYSTEMS INC.

6/10/2019

Lisa Douglas
Support Services Commander
Piedmont Police Department
403 Highland Ave. Piedmont , CA 94611
Office/510-420-3014 Cell/510-775-3465
ldouglas@piedmont.ca.gov

Job Name: Piedmont PD ALPR Installation

Dear Lisa,
We are pleased to submit you with a proposal to install and deconstruct 4 cameras at Grand and Wildwood ALPR cameras at

Labor:$8,750.00
Travel/ Per Diem:$600.00
Commission:$1,800.00
Total cost: $11,207.00 (includes tax)

Exclusion and clarification sheet is attached for your review and is included to be part of this proposal. Please note that our bid is firm for 30 days. Any additional requirements not shown, or not designated will be considered a change to the quotation and may require a price modification. We thank you for this opportunity to submit our proposal for this project. Please do not hesitate to call should you have any questions.

Sincerely,

CEO
Odin Systems, Inc.
dustin@odinsystems.com

ODIN SYSTEMS INC.

Job Name: Piedmont PD ALPR Installation

Inclusions/ Clarifications:

- **Price based on the budgetary scope of work verbally requested by the client/ Piedmont PD outlined in emails starting 4/16/2019**
- **Pricing based on normal working hours.**
- **Pricing does include prevailing wage, travel and per-diem.**

1. **Description:**
   a. **Provide 2 days labor, 1 overnight stays, materials, bucket truck, and equipment to install (4) ALPR cameras at sites listed below. Piedmont PD is providing cameras, mounting hardware and communication boxes.**
      i. **All pre-configuration and testing have been done by the PD, Odin Systems is not responsible for the integrity of the cameras.**
2. **Locations:**
   a. **Grand and Wild Wood.**
      i. **Install (4) ALPR cameras and Termination Boxes.**
      ii. **Remove old cameras and technology.**
      iii. **Align and commission cameras**

Exclusions:

1. Approvals from City Agencies.
2. Unforeseen conditions.
3. Working not specifically referenced above.
4. City permit fees or inspections
5. Encroachment permit fees
6. Constant 120vac at each site for camera power
7. Overtime.
8. Horizontal mast unless requested by the City for us to contract out.

All work to be specified. All work to be completed in a workman like manner according to standard practices. Any alteration or deviation from the above specifications involving extra cost will be executed upon written orders.

6642 MERCHANDISE WAY STE 200 DIAMOND SPRINGS, CA 95619 | PHONE (619) 850-8901|
DUSTIN@ODINSYSTEMS.COM

ODIN SYSTEMS INC.

6/10/2019

Lisa Douglas
Support Services Commander
Piedmont Police Department
403 Highland Ave. Piedmont , CA 94611
Office/510-420-3014 Cell/510-775-3465
ldouglas@piedmont.ca.gov

Job Name: Piedmont PD ALPR Installation

Dear Lisa,
We are pleased to submit you with a proposal to install ALPR cameras at (5) sites designated by Piedmont PD.

Labor:$15,400.00
Travel/ Per Diem:$2,400.00
Harware:$4,020.00
Commission:$1800.00
Total cost: $24,229.00 (includes tax)

Exclusion and clarification sheet is attached for your review and is included to be part of this proposal. Please note that our bid is firm for 30 days. Any additional requirements not shown, or not designated will be considered a change to the quotation and may require a price modification. We thank you for this opportunity to submit our proposal for this project. Please do not hesitate to call should you have any questions.

Sincerely,

CEO
Odin Systems, Inc.
dustin@odinsystems.com

Declaration of Conflicting Interests

Jonathan Hofer declares that he was a plaintiff in a 2018 lawsuit, now resolved, in which an ALPR vendor was a defendant and that he owns stock in a separate company that assists law enforcement agencies with ALPR related services.

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