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State of Knowledge and Practice for Using Automated License Plate Readers for Traffic Safety Purposes

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16. Abstract: The study gathered information on and provided insight into law enforcement agency implementation and use of automatic license plate readers (ALPRs) for traffic safety purposes, with specific emphasis on its use for detecting drivers with revoked, suspended, or restricted licenses. Texas A&M Transportation Institute researchers employed two research methods—a literature review and case studies. Six case studies were conducted, representing city, county, and State law enforcement agencies (LEAs); large and small agencies; and a mix of geographic locations. The evidence gleaned from the case studies provides additional indicators to support the effectiveness of ALPR for traffic safety purposes—when viewed in terms of efficiency and productivity gains as well as improvements in traffic safety by culling vehicles that are more prone to crash risk. Effectiveness as a traffic safety countermeasure was often viewed as a secondary outcome—as a by-product of looking for stolen vehicles or other criminal activity.		
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Objectives

The National Highway Traffic Safety Administration, in conjunction with the Governors Highway Safety Association (GHSA), identified a need to discover and report on the state of knowledge and practice regarding the use of automated license plate readers (ALPRs) for traffic safety purposes. This research topic aligns with NHTSA's mission, which is to save lives, prevent injuries, and reduce economic costs due to road traffic crashes, through education, research, safety standards, and enforcement activity. The study was conducted under the *National Cooperative Research and Evaluation Program* (*NCREP*), which is administered by NHTSA and jointly managed by NHTSA and GHSA.

This study's objectives were to gather information on and provide insight into law enforcement agency (LEA) implementation and use of ALPRs for traffic safety purposes, with specific emphasis on its use for detecting drivers with revoked, suspended, or restricted licenses. Like all data capture technology, ALPR has the potential to decrease cost and improve capabilities in enforcement of traffic safety laws and, in turn, provide tremendous opportunities for creating safer and more efficient transportation systems. The current study examined a full range of issues, including the extent of ALPR use for traffic purposes, technical and operational challenges, and legal and privacy issues. The information gathered not only informed implementation issues, but also assessed current and likely effectiveness as a State highway safety countermeasure.

Methods

Texas A&M Transportation Institute researchers employed two research methods—a literature review and case studies. The literature review documented current use of ALPR for traffic safety purposes as a foundation for subsequent case studies. The literature review used identified LEAs using ALPRs to detect drivers with revoked, suspended, or restricted licenses. This list of LEAs formed the universe of agencies using ALPR for selecting LEAs as case study sites; this universe was later expanded during the course of LEA recruitment for case study sites.

The unit of analysis for the case studies was an LEA. The original intent was to conduct 9 to 12 case studies. Because of challenges in finding and recruiting LEAs, the research team completed 6 case studies. These LEAs represented a mix of city, county, and State agencies; both large and small departments; and a variety of geographic locations. At each site, interviews were conducted with users, managers, and administrators. Information at 5 of the case study sites was gathered through in-person visits, and information at one site was gathered through telephone interviews. In total, 23 individuals were interviewed. These interviews provided a knowledge base about this particular use of ALPR systems by providing rich, contextual information from those most knowledgeable about the weaknesses and strengths, or incentives and barriers, to this technology's effective implementation and use for traffic safety purposes.

Key Findings

How Are ALPRs Being Used for Traffic Safety Purposes?

The LEAs in this study used 1 to 36 ALPRs in their agencies. All case study LEAs deploy on board units; 2 use units at fixed locations and 1 LEA deploys ALPRs on portable trailers. Funding for the units was primarily through LEA departmental budgets. Two cases had federal grants.

LEAs use ALPR technology for multiple purposes, from finding stolen vehicles to addressing Amber Alerts. By far, the most common use was related to some sort of criminal activity. Traffic safety was an important but often secondary use of the technology. A predominant perception was that there was not a huge difference between using ALPR for traffic safety purposes and using it for other purposes, such as investigating other illegal activities. As an enforcement officer stated, "ALPR use is all for traffic safety. Safety is always there, even if it's a criminal act." The goal was to get unsafe individuals off the road. This may have led some interviewees to overstate the percent of ALPR use that is for traffic safety purposes, which ranged from 80 to 100 percent.

What Was Discovered About LEAs Use of Hot Lists and Associated Privacy and Legal issues?

If an LEA was interested in deploying ALPR for the purpose of identifying revoked, suspended, or restricted drivers, it was constrained by whether hot lists were available for this purpose in the State. A hot list is a database of vehicles of interest, against which license plates captured via ALPR can be compared. Not all States have hot lists that provide revoked, suspended, or restricted licenses. In addition, to be effective in identifying vehicles of interest, hot lists need to be frequently updated. In a few of the case study LEAs, the lack of frequency of list updates was a technical challenge.

ALPR technology has the potential to capture and store data that is personally identifiable information (PII). PII can single out people and may be used to track a person's movement. LEA staff, especially administrators and managers who were interviewed, were extremely cognizant of the sensitivity of the data and of community and advocacy group concerns with regard to protection of PII. Many administrators and managers indicated that they had policies in place to ensure that privacy protection is not abused. In addition, most traffic safety uses of ALPR data involve law enforcement officers receiving and acting on real-time information about license plates that have been placed on hot lists, rather than on the analysis of stored data, which can facilitate detailed examination of vehicle movements in time and space. So, there were fewer associated privacy issues and legal challenges than for other ALPR uses.

What Are the Challenges to ALPR Use for Traffic Safety Purposes?

Three types of challenges were explored: technical, operational, and institutional. Of the challenges that surfaced, none were unique to traffic safety uses. Technical challenges included accuracy and reliability issues with both equipment and databases. Interviewees indicated that officers have struggled with the accuracy of the units, experiencing numerous misreads. However, accuracy issues generally pertained to older units, while accuracy of new equipment was reported to have improved dramatically. Weather can also adversely affect the accuracy of ALPR reads. Maintenance of equipment is a challenge for many LEAs, leading to equipment reliability problems. Some agencies handled maintenance in-house; others relied on external contractors. In either case, when the equipment breaks, it can take months before repair. Databases may not be up to date, resulting in false positive hits. Such results may cause officers to question the effectiveness of ALPRs.

Operational challenges included officer distraction and ensuring agency policies were followed. ALPRs can read thousands of plates per day; some units get hits as often as once a minute. Such high volumes of alerts can affect patrol officers' safety when the vehicle is in motion, so users often turn the ALPRs off. Most agencies have established departmental ALPR policies, but ensuring that users follow that protocol when on the job is an operational challenge. Often the ALPR protocols are time-consuming, and so officers may not always follow the protocols, as required, which can also reduce the perceived effectiveness of the ALPRs. Most use of ALPRs is reactive—reacting to an alert. However, many interviewees mentioned that they would like to be able to conduct predictive analytics, such as

identifying traffic safety hot spots, but funding and skill sets are barriers to implementing more predictive uses.

Institutional challenges related to lack of funding. Almost all case study sites were interested in expanding their ALPR programs by purchasing more units but lacked necessary financial resources. Also, lack of funding often led to equipment reliability issues because funding maintenance of the equipment was a challenge. In addition to growing ALPR programs through the purchase of new units, LEAs reported finding it difficult to locate the personnel to sustain the program. The larger the program, the more officers are required that are qualified users, trainers, or maintainers of ALPR systems.

What Are the Findings About ALPR Acceptance in LEAs and in the Community?

In all of the case study LEAs, acceptance was described as high. The main reason for this is the widespread perception that ALPRs are an effective policing tool that helps officers identify and stop vehicles, and when that happens, traffic safety can be improved. At the same time, it was acknowledged across the LEAs that some officers are more interested in using the tool than others. Interviewees were less familiar with levels of community acceptance. In fact, in several of the case study sites, interviewees indicated that people in the community generally did not know about their ALPR use. Interviewees indicated that keeping the use of technology below the radar lessens the likelihood that privacy concerns will be raised.

What Are the Findings About ALPR Effectiveness in Detecting Drivers Who Have Revoked, Suspended, or Restricted Licenses?

ALPR effectiveness was discussed in terms of efficiency, productivity, and efficacy. ALPRs are highly efficient, able to process plate reads rapidly. The equipment enhances productivity; several interviewees pointed to ALPRs as being a "force multiplier." In all case study LEAs, ALPR acceptance was high. There was a widespread perception that ALPRs are a successful policing tool; however, this was not necessarily linked to benefits for traffic safety. Many interviewees indicated that they do not necessarily see ALPR as a tool for traffic safety; rather, it is a tool that helps stop vehicles, and when that happens, traffic safety can be improved. ALPRs enable traffic stops of vehicles on hot lists, which in turn identify vehicles that are more prone to crash risk. According to one agency's analysis, drivers with revoked, suspended, or restricted licenses are 2.2 times more likely to be involved in serious or fatal crashes than other drivers in the State.

Recommendations

ALPRs can be highly effective in identifying habitual traffic offenders and getting them off the road. Recommendations from managers and administrators for enhancing the effectiveness of the ALPR technology as gleaned from the study findings were to specifically articulate strategic goals and tactical objectives for ALPR technology and to develop and strictly enforce aligned policies on data quality, system security, compliance with applicable laws and regulations, and the privacy of information gathered. Recommendations from users included:

- thorough and ongoing training in system use,
- a focus on hardware maintenance and frequent updates to hot lists,
- linking the ALPR system to the State's crime information computer, and
- having close coordination with the external steward of the hot lists.

The study authors also recommended that there would be utility in conducting a national survey to quantify current incidence of ALPR systems in LEAs and the purposes to which these systems are used. Even with the anecdotal indicators of success for traffic safety applications reported here, further

quantitative evaluation at the local and aggregate levels would be of value. However, obtaining a robust sample of LEAs to participate in the survey would require significant effort. The challenges in LEA recruitment described in this report would need to be addressed in sampling and response generating strategies.

1. INTRODUCTION

Study Background

The study was conducted under the *National Cooperative Research and Evaluation Program*, a new, cooperative research program mandated under MAP-21, the Moving Ahead for Progress in the 21st Century Act of 2012 (P.L. 112-141). NCREP is administered by NHTSA and jointly managed by NHTSA and GHSA. As such, NHTSA and GHSA identified a need to conduct a study on the state of knowledge and practice regarding the use of ALPRs for traffic safety purposes, with emphasis on its use for detecting drivers with revoked, suspended, or restricted licenses.

Traffic safety refers to the methods and measures used to prevent road users from being killed or seriously injured. ALPR systems can capture the image of a passing vehicle, compare its plate against official hot lists, and show an array of infractions in which it may be involved or reasons why it may be of interest to authorities. ALPR systems are able to capture up to 1,800 plates per minute from vehicles traveling up to 120 to 160 miles per hour (Roberts & Casanova, 2012). After an alert is issued, the officer can then investigate the license plate of interest and decide whether to take further action. Traffic-safety-related uses of ALPR have included detecting drivers with revoked, suspended, or restricted licenses; enforcing speed limits; detecting vehicles that illegally pass stopped school buses; and identifying vehicles that have been involved in a high number of crashes or in hit-and-run crashes (Watson & Walsh, 2008).

License sanctions are widely used to address traffic risks posed by problem drivers. Research indicates that many of these drivers continue to drive (McCartt, Geary, & Berning, 2003). Drivers with driver license sanctions are also overrepresented in crashes (Neuman, Pfefer, Slack, & Waller, 2003). However, license actions are difficult to enforce due to the essentially invisible nature of the offense (Voas, McKnight, Falk, & Fell, 2008). The difficulty in detecting drivers who have revoked, suspended, or restricted licenses weakens the deterrent value of the laws. The traffic safety risk posed by drivers with license sanctions is sometimes addressed by the use of a striped zebra sticker placed over the annual sticker on the vehicle license plate (e.g., Oregon and Washington State) and also learner plate/decal laws (e.g., New Jersey State Law 2314) (Voas, McKnight, Falk, & Fell, 2008; Neuman, Pfefer, Slack, & Waller, 2003). However, these approaches may be easily evaded through transfers of ownership and may affect family members of offenders. ALPRs could be used in conjunction with a hot list of drivers with revoked, suspended, or restricted licenses to mitigate some of the concerns associated with zebra plates and decals. Traffic safety uses of ALPR are less prevalent than other uses, so there are fewer details and analyses focusing on practices, effectiveness, policies, or issues relating to ALPR to evaluate its potential effectiveness as a countermeasure.

Study Purpose

This study documented the extent of ALPR use for traffic safety purposes, identified the challenges in ALPR use for this purpose, and provided preliminary evidence about ALPR effectiveness in detecting drivers who have revoked, suspended, or restricted licenses. This study produced a qualitative knowledge base about the weaknesses and strengths, or barriers and incentives, to ALPR use as a traffic safety countermeasure.

ALPR Use: Background Research

Texas A&M Transportation Institute researchers conducted a literature review to understand current ALPR use, frame its operating environment, and guide interviews with law enforcement participants. There is little existing literature about law enforcement's use of ALPR specific to traffic safety purposes. This seems to reflect the lower prevalence of traffic safety as a primary objective for ALPR use. LEAs more frequently use ALPR to combat criminal activity (ranging from stolen vehicles to terrorist and gang activity) or to improve collection of fines and fees for parking violations and similar minor infractions. For example, a

2009 survey of 444 randomly sampled U.S. local, State, and tribal LEAs found 70 agencies were using ALPRs at that time. A follow-up survey distributed to these 70 agencies asked questions that were more detailed about their ALPR use. The most frequently cited use was recovery of stolen vehicles (63% of the responding agencies stated this as their primary ALPR use, and 83% included it as one of their current uses) (Roberts & Casanova, 2012). Traffic safety appears more frequently as a secondary objective. Of the 40 agencies that responded to the second survey, 20 agencies (50%) indicated traffic enforcement as one of their current ALPR uses; 11 (28%) indicated that traffic enforcement was their primary reason for using ALPR.

An agency's priorities for ALPR use (e.g., traffic safety or stolen car recovery) generally determine which hot lists (databases of vehicles of interest)—and therefore which alerts—are activated for an ALPR-equipped patrol vehicle or monitoring station (Gierlack, Williams, LaTourrette, Anderson, Mayer, & Zmud, 2014; Roberts & Casanova, 2012). LEAs have the ultimate responsibility for determining which hot lists will be uploaded to their agencies' ALPR systems (Tracy, Cotter, & Nagel, 2009). Because most traffic safety uses of ALPR data involve reactive use of data (meaning that law enforcement officers receive and act on information about license plates that have been placed on hot lists) rather than analysis of stored data, there are likely fewer associated privacy issues and legal challenges than for other ALPR uses. However, various agencies that have access to the same vehicle and/or driver data may have very different policies about retention, access, and use of those data (Perera, 2013; ACLU, 2013).

The ALPR systems' costs vary depending on vendors and configurations. The typical components of an ALPR system are cameras, user interfaces, and software. Camera hardware is a significant component. Since the initial image capture forms a critically important part of the ALPR system and often determines the overall performance, ALPR systems typically use still or video cameras specialized for the task. As vehicles pass through the field of view of the ALPR camera, a picture is taken of the license plate and vehicle, and the captured camera images are displayed on a user interface. The user interface allows an officer to see the captured license plate number to ensure the accuracy of the read, and to see the larger, contextual image to help the officer identify which specific vehicle has the plate of interest. In addition, the user interface also typically enables the officer to manually enter plates on vehicles of interest, manage hot list information, deal with alert queues, and run reports. Software performs a series of algorithms on the image to isolate the plate and render the alphanumeric characters into an electronically readable format. The sophistication and complexity of each of these algorithms determine the accuracy of the system. Cost elements typically include equipment purchase (e.g., cameras and user interfaces), software, deployment, and training costs. Subsequent maintenance costs can include vendor support contracts for hardware and software, as well as database maintenance and wireless communication costs.

Systems can be deployed on vehicles or portable trailers, or attached at fixed sites. Costs reported in the literature range from $10,000 to $25,000 per camera for mobile ALPR systems (Gierlack, Williams, LaTourrette, Anderson, Mayer, & Zmud, 2014; Hsu, 2014; Roberts & Casanova, 2012; Police Executive Research Forum, 2012; Lum, Merola, Willis, & Cave, 2010; Weise & Toppo, 2013). Mobile ALPR systems, which do not require extensive infrastructure to support, cost much less than fixed-site ALPRs. Fixed ALPR camera installations can cost considerably more due to the infrastructure needed for power, communications, and mounting and because it is often necessary to work with other departments or utilities to place the cameras. Some fixed sites, such as bridge mountings, can cost up to $100,000 (Gierlack, Williams, LaTourrette, Anderson, Mayer, & Zmud, 2014). Though more expensive, fixed sites can scour geography of great interest to police or scan choke points like bridges or major intersections where parking a police cruiser could be difficult due to space or traffic concerns.

ALPR system effectiveness is most frequently described in the literature in terms of the number of plates that can be read per unit of time, with additional criteria including the relative vehicle speed at which an ALPR camera can accurately read a plate, the accuracy of the system's optical character recognition, the

width of the read zone, and similar system specifications (Noble, 2008; Traffic Technology International, 2010; Tracy, Cotter, & Nagel., 2009; Han, 2010). In some police jurisdictions, officers are not required to report whether a given traffic stop was due to an ALPR hit or some other reason; this adds to the challenge of quantifying the benefits of ALPR technology (Dobbs, 2014).

The literature provides a strong overall background about the uses of ALPR data by law enforcement. Its relative lack of detail about how ALPRs are being used for traffic safety purposes underscores the importance of this study.

Report Structure

This report is structured as follows.

- Chapter 2 describes the case study methodology used to gather the information presented in this report.

- Chapter 3 presents case study findings about ALPR use for traffic safety purposes.

- Chapter 4 explores key issues surrounding hot lists and data sharing.

- Chapter 5 presents findings about legal and privacy issues.

- Chapter 6 analyzes case study information to discuss challenges: technical, operational, and institutional.

- Chapter 7 summarizes findings on ALPR acceptance and effectiveness for traffic safety uses.

- Chapter 8 offers lessons learned about the technology's use for traffic safety purposes and observations about further study of this topic.

- Appendix A presents the results of a literature review conducted to gather published information regarding the project's key research questions prior to designing the case study data collection material.

- Appendix B summarizes information gathered at each case study site.

- Appendices C through I provide the protocols used for the case study interviews and other material used for contacting and recruiting case study sites.

2. METHODOLOGY

Overview

Study methods included a literature review and case study interviews. Data collection methods were reviewed and approved by the Office of Management and Budget (OMB) as well as by the Texas A&M University Institutional Review Board (IRB). The research team completed the necessary Information Collection Request (ICR) for OMB, which consists of a set of documents that describe what information is needed, why it is needed, how it will be collected, and how much collecting the information will cost the respondents and the government. This package included the supporting statements (part A and part B) and all supporting documents. Once the ICR was submitted, the OMB approval process took approximately one year.

Researchers recruited and conducted case study interviews with 6 LEA sites from January 2 to June 8, 2018. The study initially targeted 9 to 12 LEA case study sites, with at least 6 of the site visits conducted in person. Given the qualitative nature of this research, conducting interviews with personnel at the case study sites was vital (versus a self-completion survey) so that the interviewer could probe for detail-rich information and ask follow-up questions, as needed. The study team completed 5 case studies through on-site visits and 1 via telephone. Table 1 describes case study sites, including LEA type; description of the LEA jurisdiction; number of LEA personnel; whether the case study was conducted on site or by telephone; and the dates case studies were conducted. The information about each LEA is presented in a manner that does not reveal the identity of the agency.

Table 1. Description of Case Study Sites

Case Study Site	LEA Type	LEA Jurisdiction Description	Number of LEA Personnel	On-Site or Telephone Case Study	Date Case Study Conducted
Case Study Site 1	City Police Department	Fast-growing, large city in western region of U.S. with approximately 360,000 people.	Approximately 700 police officers	On-site	June 8, 2018
Case Study Site 2	County Police Department	County in southeastern U.S., 437 square miles, and population of almost 900,000 (this PD is not the only LEA in the county).	783 police officers	On-site	June 5, 2018
Case Study Site 3	City Police Department	Small city in northeast U.S. with approximately 150,000 people.	420 police officers	Telephone	June 6, 2018, June 14, 2018
Case Study Site 4	County Police Department	County in mid-Atlantic U.S. with population of almost 1 million (this PD is not the only LEA in the county).	1,300 police officers	On-site	March 12-13, 2018
Case Study Site 5	City Police Department	Small suburban town in mid-Atlantic U.S. with population of	30 police officers	On-site	April 10, 2018

Case Study Site	LEA Type	LEA Jurisdiction Description	Number of LEA Personnel	On-Site or Telephone Case Study	Date Case Study Conducted
		approximately 23,000 people.			
Case Study Site 6	State Patrol	State in Midwest	State troopers	On-site	March 20, 2018

Study Population

The unit of analysis was an LEA. Through the literature review, the research team identified LEAs as agencies that use ALPRs for traffic safety. The NHTSA research office, NHTSA regional offices, and International Association of Chiefs of Police (IACP) identified additional sites. The research team developed a framework that could be used to characterize 15 LEAs by geography, size, and ALPR regulatory requirements. Following NHTSA guidance, the list was prioritized according to the following criteria: State highway patrol and large-city LEAs; those identified by IACP, NHTSA regional offices, or the NHTSA sponsor; and diverse locations. As researchers progressed through the recruiting phase of the study, many LEAs were deemed not eligible for case studies (more detail is given later in this report). Due to the unsuccessful recruitment of some LEAs and the lack of a response from other agencies, researchers expanded the recruiting effort to complete the requisite amount of case studies. Researchers identified additional LEAs through conversations with ALPR manufacturers, LEA contacts, State ALPR coordinators, as well as broad internet research. This process resulted in the number of potential LEAs increasing from 15 to 77 agencies. Researchers focused solely on recruiting the initial 15 LEAs for 3 weeks. After 3 weeks, an additional 16 LEAs were identified and added to the list of agencies that were actively recruited. Finally, 12 weeks after recruitment began, researchers identified and began recruiting the remaining 46 LEAs. In total, researchers spent 20 weeks recruiting LEAs to participate in the study.

LEA Recruitment Protocol

LEAs identified as potential case study sites were mailed formal letters addressed to the head administrators of the agencies (e.g., chief, sheriff, commander, or director). The letter provided an overview of the study including research sponsor, an explanation of the goals of the study, and a formal request that the LEA participate in the study. The letter outlined that TTI was interested in conducting interviews with an administrator, a manager, and two users (definitions of each provided below) who were familiar with the agency's use of ALPR for traffic safety. The formal recruitment letter is Appendix C. Researchers sent the LEA administrators follow-up e-mails approximately one week after the letters were mailed. The e-mails reiterated the information provided in the formal letters. A copy of the follow-up e-mail is in Appendix D. Finally, the recruitment team placed calls to the LEA administrators. Researchers developed scripts to ensure consistency among follow-up calls. Telephone scripts are in Appendix E.

Upon speaking directly to the LEA administrator, or being directed to a person in the agency knowledgeable about the agency's ALPR use, the recruiter restated the purpose of the study and asked if the LEA deployed its ALPRs for traffic safety, specifically probing whether the agency used ALPRs to detect drivers with revoked, suspended, or restricted licenses. If the agency indicated that it did not use ALPR for traffic safety, recruiters terminated recruitment and recorded that the LEA was not eligible to serve as a case study. If the LEA indicated that ALPR is used for traffic safety, the recruiter requested that the agency participate in the

study. The majority of LEAs requested additional information, including the interview questions, before providing answers about whether they would participate.

LEA Recruitment Challenges

Recruiting LEAs to participate in the study presented numerous challenges for researchers. The following is a summary of each of the specific challenges that arose.

- **Fewer LEAs use ALPR for traffic safety than anticipated.** Of the 15 LEAs identified at the outset of the study, 6 indicated they do not use ALPR for traffic safety. As recruiters expanded recruitment efforts to additional LEAs, the number of agencies indicating they did not use ALPR for traffic safety grew. In total, 18 LEAs indicated they did not use ALPR for traffic safety. This number is based on the LEAs recruiters were able to directly confirm by talking to someone knowledgeable with the agency's ALPR program. In many cases, even if the LEA was interested in deploying ALPR to identify revoked, suspended, or restricted drivers, they were constrained by whether a State agency (e.g., the department of motor vehicles or department of public safety) developed and distributed hot lists for this purpose. Researchers learned that only some States provide hot lists that include people with revoked, suspended, or restricted licenses. In other cases, researchers found that, of the LEAs that researchers spoke to directly, many that received ALPRs through grants could not afford to continue to use and maintain the devices once the grant ended. These LEAs indicated that the devices were no longer operating and were sitting in storage.

- **The use of ALPR systems is an extremely divisive topic that has faced public scrutiny, leading LEAs to shy away from participating in the study.** Many LEAs recruiters we spoke to indicated they were not willing to participate in the study because ALPR use by police agencies has received extremely negative attention. LEAs pointed to recent American Civil Liberties Union (ACLU) reports that had negatively portrayed use of ALPR by police agencies. Many LEAs researchers we spoke to refused to participate outright because they were not willing or interested in potentially drawing any attention, negative or otherwise, to their ALPR programs. In these cases, recruiters emphasized that the study focuses solely on traffic safety, and all findings are completely anonymous. When faced with this challenge, the research team developed a system that further increased anonymity of the agencies that participated, but in every case, LEAs indicated they saw little to gain versus potential risk and were not interested in participating. In total, 10 LEAs directly confirmed they were not interested in participating due to these concerns.

- **LEAs indicated the potential for study data to be requested through the Freedom of Information Act was a deterrent to participating.** LEAs, especially those in California and Florida, indicated they were unwilling to participate based on the potential for the study to trigger Freedom of Information Act (FOIA) requests of their departments. These agencies indicated they are in States where LEAs field numerous FOIA requests, and the requests incur significant amounts of administrative staff time to complete. Some LEAs indicated they were particularly concerned with FOIA requests based on the sensitive nature of ALPR use, but some LEAs indicated as a policy they do not participate in research requests due to the administrative strain it places on them.

- **Many LEAs researchers attempted to recruit were nonresponsive even after numerous requests for participation.** Recruiters discovered that identifying the person in an LEA who had firsthand knowledge of the agency's ALPR program was extremely challenging, and recruiters often had to make repeated calls to the administrator's office to identify the appropriate person to speak with. Once recruiters identified a contact in the LEA, it was often difficult to talk directly with these people. In many cases, e-mails and voicemails were not returned. In other cases, recruiters directly contacted these people and had productive conversations about the LEA's ALPR program, and then

the contacts expressed interest in participating and indicated that they would need permission from their commands. Often, recruiters never heard back from these people, and numerous e-mails and voicemails were unanswered. There was no response to the recruitment for 43 LEAs. This outcome ranged from never hearing back from an LEA after sending the formal letter to having numerous conversations with the LEA but never receiving a final answer about whether the LEA would participate. Depending on the nature of the communication between the recruiter and LEA, the number of follow-up calls and e-mails ranged from 5 to 10.

Table 2 shows the results of the recruitment effort for 77 LEAs.

Table 2. Results of LEA Recruitment Effort

Recruitment Outcome	Recruited	Refused to Participate	Not Eligible	No Response	Total
Number of LEAs	6	10	18	43	77
Percentage of LEAs	8%	13%	23%	56%	100%

Interview Protocol

The study objective was to conduct qualitative research on the feasibility of using ALPRs as countermeasures to improve traffic safety, with emphasis on ALPR use for detecting drivers with revoked, suspended, or restricted licenses. The unit of analysis was an LEA site. To ensure that case studies documented a diverse range of perspectives on the use of ALPRs, researchers interviewed different populations with experience with ALPR use. Interviews included up to four people at each site: two users, one manager, and one administrator.

- **Users** are defined as law enforcement personnel who primarily use the ALPR technology for traffic purposes. Others who are considered users are non-certified personnel who work as extensions of the LEA acting in the capacity of traffic enforcement.

- **Managers** are defined as law enforcement personnel who hold a mid-level supervisory roles in managing field personnel users. Managers do not include chiefs of police but do include sergeants, lieutenants, and captains.

- **Administrators** are defined as heads of LEAs and include majors, assistant chiefs, and chiefs of police. Administrators have significant roles in the decision-making process of how, when, where, and why ALPR technology is deployed and used.

Discussion guides were developed for each of the three populations interviewed at case study sites. While there were many overlapping questions among the three discussion guides, each guide was tailored to include questions specific to each population's experience. For example, users were the only population asked how much training they received on the overall use of ALPRs; managers were the only population asked if they were responsible for developing or maintaining databases or hot lists for the agency; and administrators were the only population asked about the agency's community support regarding the use of ALPR. The discussion guide for the administrator, manager, and user are shown in Appendix F, G, and H respectively.

Table 3 displays the total number of interviews conducted.

Table 3. Numbers of Interviews Completed

Personnel Type	LEA 1 City PD	LEA 2 County PD	LEA 3 City PD	LEA 4 County PD	LEA 5 City PD	LEA 6 State Patrol	Total
User	3	2	1	2	2	2	12
Manager	1	1	1	2	2	1	8
Administrator	0	1	0	1	0	1	3
Total	4	4	2	5	4	4	23

Before the research team began recruiting LEAs to conduct case studies, TTI conducted a pilot test that replicated the process of recruiting and conducting interviews with LEAs. Two LEAs were recruited and researchers conducted on-site interviews with users, managers, and administrators. The pilot study gave researchers the opportunity to test the recruitment material and discussion guides prior to finalization and submission to OMB for an approved clearance for the information collection. The interview guide covers the following topics per LEA ALPR use.

- Extent of ALPR use for traffic safety purposes (overall and relative to other purposes)

- ALPR databases and hot lists (development, implementation, maintenance, and sharing)

- Effectiveness and value of ALPRs

- Challenges and problems

- Legal issues (and how they have been addressed)

- Law enforcement and community acceptance

- Privacy concerns

Upon recruitment of the LEA, two-person interview teams were assigned to each case study site, a primary interviewer and a note taker. The primary interviewer led the discussion with interviewees, though in many of these cases the note taker asked follow-up questions as well as probing and clarifying questions as needed. At the start of each interview, the primary interviewer provided an overview of the study because the interviewee might not have heard about the study from the primary contact at the LEA who coordinated interview availability. Before the interview started, the primary interviewer reviewed the Texas A&M University Human Subjects Protection Program Information Sheet (Appendix I) with the interviewee to confirm that the interviewee understood the interview protocol, did not have any questions about his or her rights as a human subject, and verbally agreed to participate in the study.

Every question in the interview script was asked of the appropriate respondent. If an interviewee inadvertently answered the question before it was asked, interviewers asked the question again and prompted the interviewee to expand on the previous answer. Once interviews were completed, the interview teams filled out interview summary forms for each interview.

- What were the main issues or themes that struck you in this interview?

- Did anything else strike you as salient, interesting, illuminating, or important in this interview (e.g., observations about the interviewee, special phrases used, or body language)?

- What new (or remaining) questions do you have after this interview?

- Do you have any reflections on the credibility and reliability of the information collected?

This summary form captured the interview team's reactions to interviewees shortly after the interview was complete, in order to document any thoughts, observations, or reflections that were not captured during the formal note-taking process. The interview summary forms were used in conjunction with the formal notes from interviews to complete the case study summaries shown in Appendix A.

Additional Data Items

Additional data items were sought from the sites, in addition to the interview questions. These data items were either quantitative or included other information the interviewees may not have had readily available in memory. Table 4 presents the success of the research team in gathering these other data items. Cells in red designate that item was not collected, and cells in green designate that item was collected.

Table 4. Success in Gathering Other Data Items

Data Item	LEA 1 City PD	LEA 2 County PD	LEA 3 City PD	LEA 4 County PD	LEA 5 City PD	LEA 6 State Patrol
Percent of ALPR for traffic safety purposes	NO	NO	NO	NO	NO	NO
Cost information	YES	YES	NO	YES	YES	YES
Number/nature of community complaints	YES	YES	NO	YES	YES	YES
Written policies	YES	YES	NO	YES	YES	YES

Case study 3 did not respond to multiple requests for other data items. Generally, the primary contact sent responses to these items after the interviews. The information collected was used to inform the case study summaries and the findings of this report.

Limitations of the Research

The following is a summary of the limitations of the research TTI conducted.

- **Recruitment challenges resulted in only 6 case study interviews.** This chapter provides a detailed overview of the recruitment challenges that yielded a smaller sample size than was sought. Recruiting eligible LEAs for research proved to be extremely challenging. Non-response was a significant issue, and the controversial nature of the subject matter compounded this challenge.

- **Challenges prompted researchers to modify the recruitment protocol.** As the challenges to recruiting LEAs became obvious, the research team modified the recruitment protocol so that first contact was made by telephone to more quickly assess if an LEA used ALPR for traffic safety purposes and, if so, would be willing to participate. This contact was then followed by sending the formal letter.

- **The research excluded LEAs that did not use ALPR for traffic safety.** The LEAs that participated in the study were extremely helpful in providing the research team with the benefits and challenges of using ALPR for traffic safety. However, during recruitment, researchers did not systematically collect information from LEAs that that did not use ALPRs for traffic safety or did not support the use of ALPR technology for any police enforcement activities. This information could have provided a more comprehensive view of LEAs' attitudes and opinions toward ALPR use. However, this information would have been extremely challenging to collect in a comprehensive manner, as during recruitment, many of the LEAs contacted were not interested in providing any details of their ALPR programs and simply refused to participate.

- **Researchers acknowledge that a positive bias likely exists in the research findings.** By virtue of the fact that researchers only spoke to LEAs that use ALPR for traffic safety, there is likely a positive bias

in the research findings. Due to the fact that the case study LEAs have implemented ALPR programs and continue to use them, they are more likely to have positive attitudes towards the tools. If an LEA had negative experiences with ALPRs, they would have likely stopped using them. Researchers also noted that the interviewees that participated in the interviews exhibited positive bias in their opinions and attitudes toward ALPRs. Interviewees were all extremely positive about their ALPR use. In some cases, interviewees disclosed that they wanted more resources allocated to this technology so their agencies could purchase more units. Researchers noted that this could have motivated interviewees to provide only positive feedback regarding ALPRs, in hopes that this input would shine the most positive light on their use of the technology.

3. ALPR USE

Why ALPR?

ALPR systems typically pair infrared and visible-light cameras to scan surrounding area for license plates. The infrared camera, with optical character recognition software, can identify license plates and read plate characters. The vehicle and plate both get photographed by the visible-light camera and the images are stored, along with relevant metadata (i.e., geo-location and temporal information, as well as data about the ALPR unit). License plate information can then be compared to a database or hot list of plates connected with suspended registrations, license revocations, criminal activity or other matters, such as silver alerts, to determine if the scanned license plate is of interest to law enforcement. If a match is detected, the system alerts the officer and can in some cases display photographs so a user can quickly identify the suspect vehicle.

ALPR systems may consist of fixed, portable, and mobile cameras coupled with searchable databases.

- **Fixed cameras** scour a specific geographic area and transmit data back to administrators to analyze. These cameras can go in high-crime or high-traffic areas or on main thoroughfares to act as both added eyes for police and a potential deterrent to criminal activity.

- **Portable systems** are often housed in inconspicuous trailers, which stay at a location for a time and can then be relocated.

- **Mobile cameras**, affixed to police cruisers or handheld, can help authorities patrol operational areas or target operations in high-crime areas.

Databases with downloaded plate information can be searched with even partial license numbers; investigators can access time and geospatial information. Because of these functionalities, ALPR systems are widely acknowledged investigative tools for a variety of crimes.

Purposes and Traffic Safety Uses

ALPR technology is used for multiple purposes. The most common uses cited by case study interviewees were reactive: stolen vehicles, vehicles involved in hit-and-run accidents, vehicles known to be involved in specific crimes, Amber Alerts, Megan's Law, Silver Alerts, be-on-the-look-out (BOLO) alerts, and wanted felons. Several interviewees identified more predictive uses. One manager in a large LEA described how ALPRs are:

> "used to identify hot spots within the precincts. Traffic stops and hours used are captured and are used administratively to develop operational plans and daily patrol deployment directives within individual precincts."

But by far, the most frequent use was related to some sort of criminal activity. A manager described that the primary goal for originally obtaining the ALPRs in his highway patrol was to reduce auto theft, but the LEA quickly found that the use of ALPRs for one specific purpose limited the effectiveness of the units. As a result, the agency discovered additional uses, and traffic safety improvement was one.

Traffic safety was found to be a prevalent but oftentimes secondary use of the technology. Traffic safety uses include traffic enforcement (which includes expired vehicle registrations, no insurance, and revoked or suspended licenses) and revocation of vehicle registration. The fact that the use may be secondary did not take away from its perceived utility for this purpose. ALPR alerts were believed to enable officers to make meaningful traffic stops, which in turn enabled more meaningful enforcement activities. As one officer said,

> *"I am motivated to use ALPR because I like doing traffic stops and enforcing traffic laws. ALPR does a significant job for me with running thousands of plates a day. There is no way I can run 2,000 to 3,000 tags per day. ALPR allows me to be able to do so much more, which motivates me to do my job."*

A former patrol officer in another LEA estimated, "About 40 percent of my use was for traffic safety." He did this because "Traffic safety is huge. There have been 13 fatalities so far this year. Getting violators off the road is significant."

A predominant perception was that there was not a huge difference between using ALPR for traffic safety purposes and using it for other purposes. As an enforcement officer in one LEA said, "ALPR use is all for traffic safety. Safety is always there, even if it's a criminal act; safety is part of all investigations." His captain agreed, saying "95 percent of the ALPR is for traffic safety." This view may have led interviewees to overestimate the percent of all ALPR use that was for traffic purposes. A highway patrol interviewee indicated that 90 percent of the stops the highway patrol makes while using ALPR were related to traffic safety; this may be true for the highway patrol because traffic safety is inherent in its mission. But other case study sites (i.e., county and city PDs) also cited uses for traffic safety of 80 to 100 percent, which may be overestimated.

Not all States have hot lists that provide revoked, suspended, or restricted licenses. Two of the case study sites were located in States without such databases. Both States did provide hot lists for suspended registrations. For one PD in such a State, use of ALPR for traffic safety purposes was a by-product of the three primary uses of ALPR: stolen vehicles, revoked registrations, and BOLOs. Interviewees in this LEA indicated that a frequent traffic safety application was finding people with suspended licenses by pulling over vehicles for revoked registrations. A patrol officer estimated that about one-third of the ALPR hits for revoked registrations also found suspended licenses. However, this same officer noted that a "revoked registration is a lower priority. So if a patrol car gets a hit for a revoked registration, it does not always result in stopping that vehicle." The officers in the other State indicated that officers identify and pull over vehicles with suspended plates as opportunities to investigate illegal activity, such as driving under the influence (DUI), drugs, etc. One officer highlighted this approach by explaining, "It's a tool that allows us to stop more vehicles."

Table 5 summarizes the various purposes case study LEAs routinely applied ALPR technology. Cells in red indicate that the LEA does not routinely apply ALPR technology for the field application, and cells in green indicated that the LEA does apply ALPR technology for the application.

Table 5. ALPR Applications in the Field

Applications in the Field	LEA 1 City PD	LEA 2 County PD	LEA 3 City PD	LEA 4 County PD	LEA 5[1] City PD	LEA 6[2] State Patrol
Probable cause for stop	NO	NO	NO	NO	YES	NO
Stolen vehicle	YES	NO	YES	YES	NO	YES
Vehicle registration violations	NO	YES	YES	NO	YES	YES
Driver license violations	YES	YES	YES[3]	YES	NO	YES
Insurance violations	YES	YES	NO	YES	NO	YES
Hit-and-run investigations	NO	NO	NO	NO	NO	NO
Criminal investigations	YES	YES	YES	YES	YES	YES

[1] The majority of actions reported following a hit are not traffic-safety-related.
[2] The primary focus reported is traffic safety (90% of contacts).
[3] Traffic safety use is identifying drivers with suspended licenses by stopping revoked vehicle registrations.

Numbers, Types, and Funding Sources of ALPR Units

Among the case study sites, the duration of use ranged from 6 to 10 years. The number of units currently deployed is between 1 and 36. These units are fixed, portable, and mobile. However, all LEAs had mobile units. LEAs generally started with 1 to 4 units and gradually added more units as resources became available. For instance, one city PD started with 2 units that were taken out of storage in 2012 due to the interest of the lieutenant in charge of the electronic support section, and the PD has gradually been able to increase the number to 36 units—12 on vehicles and the rest in fixed locations. Funds for purchasing the equipment and its subsequent maintenance have been obtained through requests in the city budget. City council support is strong for use of the ALPR because perceptions of its effectiveness are prevalent among city council members. A county PD had 4 ALPR units in 2011, and an additional 3 were purchased in 2012; all are mobile units. At the other end of the range, another city PD has 1 ALPR unit it bought in 2012 that is mounted on one vehicle. No other units have been acquired, but this vehicle is always in use. Departmental policy requires that this vehicle be assigned to a patrol officer for all three shifts, every day. Predominantly, case study LEAs used local sources (departmental budgets) to procure the ALPR systems. Only two of the LEAs used Homeland Security grants and, interestingly, these were the State highway patrol and small city PD.

Table 6 presents information on the numbers and types of ALPR units, as well as funding sources.

Table 6. Number, Types, and Funding Sources of ALPR Units

ALPR Units	LEA 1 City PD	LEA 2 County PD	LEA 3 City PD	LEA 4 County PD	LEA 5 City PD	LEA 6 State Patrol
Number of units	36	7	7	32	1	16
Fixed, portable, or mobile	Fixed, mobile	Mobile	Mobile	Fixed, portable, mobile	Mobile	Mobile
Funding source	Local	Local	Local	Local	Grant	Grant

Training

While all case study sites required training before use of ALPR in the field, interviewees indicated that formal training was limited. For one large city PD, training lasted about 1 hour and covered fundamental instructions, such as how to turn the ALPR on and off and how to respond to hits. For a small city PD, training was 2 hours. A county PD provided 4 hours of in-class training. Continuous ongoing training did not exist. Interviewees in many of the case study LEAs indicated that on-the-job training was how they really learned to use the ALPR systems and that this was common in their line of work.

Policies for Use

Five of the 6 case study sites indicated that the agency has specific policies governing ALPR use. In 2 of these cases, State law guides the contents of the policies. Policies cover requirements for training, updates to the hot lists, processes for taking action after a hit, data access and sharing guidelines, and data storage and data retention practices. Of the 5 case study sites that have ALPR policies, all include a time limit that ALPR data is retained for (this is covered in more detail in Chapter 4 under *Data Retention Policies*) and specify that collected ALPR data can be shared with other law enforcement agencies for law enforcement purposes (this is covered in more detail in Chapter 5 under *Data Sharing Policies*). However, beyond these two items, the extensiveness of ALPR policies for case study sites vary, as 3 of the 5 case study sites' ALPR policies do not expand far beyond the previous two items. The remaining 2 case study site's ALPR policies are far more extensive and provide details regarding the required procedures that users must follow when using ALPRs, including training requirements, requirements for maintaining hotlists, and procedural requirements during a vehicle stop that was a result of an ALPR hit

(e.g., users must visually confirm the plates against the captured image to verify its validity and enter the outcome of the stop in the hot list). It is noteworthy that the 2 case study sites with more extensive ALPR policies are also the 2 case study sites with the largest ALPR programs. Interviewees indicated that it is important to have thorough policies in place to ensure that the ALPRs are used appropriately. A lieutenant in one of the agencies with a more extensive policy emphasized the importance of his agency's extensive policy, stating that his department is very focused on "ensuring that the use of the system is not abused." This PD runs the largest ALPR program in its State, and he felt that the PD has a successful program "because we have put parameters on it."

4. ALPR DATABASES, HOT LISTS, AND DATA RETENTION

Databases and Hot Lists

Databases and hot lists were referred to synonymously by law enforcement officers who were interviewed as part of this project. Most databases were managed at either the State or local level, but one LEA reported the use of a regional database used for homeland security efforts. All LEAs indicated that they use the National Crime Information Center (NCIC) and their State equivalent databases. These databases are a repository for crimes, some of which are traffic-safety-related (DUI, vehicular assault, etc.). The local or agency-based databases focus on jurisdiction issues including hit-and-runs and other alerts that are time-sensitive. Specialized lists such as Amber Alerts, Megan's Law, and Silver Alerts are handled at multiple levels.

Vehicle registrations and driver license databases are administered at the State level. These lists were cited as critical to ensuring that ALPRs directly affect traffic safety. Some LEAs had access to both lists, and those that did not reported that having access would allow officers to be significantly more effective. The registration lists allow officers to identify vehicles that have revoked status. Based on the responses, officers use the hits from the vehicle registration database to make stops that result in opportunities to look beyond the stop and frequently result in auxiliary citations and arrests. Similarly, the driver license database provides tools that can be useful in getting violators off the road.

One challenge associated with the databases, especially vehicle and driver license as noted by several interviewees, was the frequency of updates issued by the administrators, such as vehicle registration status. When officers do not trust the accuracy of a database, it can interfere with an officer's motivation to use ALPRs. Table 7 summarizes the data details across the case study LEAs. The cells in red indicated that the LEA databases does not include the information, and cells in green indicate that the LEA databases do include the information.

Table 7. Summary of LEA ALPR Database Details

Database Details	LEA 1 City PD	LEA 2 County PD	LEA 3 City PD	LEA 4 County PD	LEA 5 City PD	LEA 6 State Patrol
NCIC	YES	YES	YES	YES	YES	YES
State-level crime database	YES	YES	YES	YES	YES	YES
Regional database	YES	NO	YES	YES	YES	YES
Local database and/or BOLOs	YES	YES	YES	YES	YES	YES
Megan's Law	NO	NO	NO	NO	YES	NO
Amber and/or Silver Alerts	NO	NO	NO	NO	YES	YES
Vehicle registration	NO	YES	YES	NO	YES	YES
Driver license	NO	YES	NO	YES	NO	YES

Data Retention Policies

Almost all case study agencies' ALPR policies state that data collected by ALPR is to be retained for no more than 1 year and destroyed no more than 12 months after collection. The exception is when ALPR data is deemed evidence in a criminal investigation. One interviewee from a case study site reported that this State allows ALPR data retention for a maximum of 90 days. However, this interviewee indicated that the agency's internal policy dictates that it retain the data for only 48 hours. Conversely,

an interviewee from another case study site indicated that State policy allows them to retain ALPR data for 30 months.

Notably, an interviewee from one agency indicated that State legislation provides that ALPR data can be retained for 3 years, but the data can only be accessed if it is in connection with a felony. Due to concerns with privacy and the complicated nature of determining whether a crime is a felony (this can change through the course of an investigation), the department decided to forego retaining data for any longer than 1 year. The interviewee reported that this has worked well because the LEA has never had a case where officers wished they had more data.

Each of the 6 LEAs provided common information related to ALPR retention and update policy. Table 8 summarizes this information.

Table 8. Summary of LEA ALPR Retention and Update Policies

Update and Retention Details	LEA 1 City PD	LEA 2 County PD	LEA 3 City PD	LEA 4 County PD	LEA 5 City PD	LEA 6 State Patrol
Database update frequency	2–4 hours	1 time per day[1]	Varies[2]	2 times per day	2 times per day	2–3 times per day
Scan retention period	1 year	2 years	1 year[3]	1 year	30 days	48 hours
Scan retention location	Agency and State	County	Agency	Agency	Agency	State

[1] ALPRs are updated daily, but the registration database is only updated twice per month.
[2] NCIC data is uploaded daily, and the revoked registration list is updated weekly.
[3] Those interviewed were unsure of the retention policy or the location. One respondent estimated the data is retained for a year

5. LEGAL AND PRIVACY ISSUES

Legal Issues

TTI's literature review found that the primary legal issue surrounding law enforcement's use of ALPR is whether its use violates the public's Fourth Amendment right to privacy and whether the ALPR hit warrants sufficient probable cause to stop or detain a vehicle. The literature review found that because ALPR cameras are employed on public roadways, the Supreme Court's interpretation of the Fourth Amendment maintains that there is no expectation of privacy about the location of any particular vehicle on those roadways. Researchers specifically probed interviewees from case study sites to determine whether they had experienced legal issues about their use of ALPR to stop or detain a vehicle based on an ALPR hit, and whether this had led to challenges of violations that stemmed from an ALPR hit and subsequent stop.

Some interviewees indicated that they have been subpoenaed to appear in court about a violation for a stop that was initiated by an ALPR hit. However, interviewees indicated that these instances do not typically result in the court overturning a violation based on the LEA's use of ALPR to initiate the traffic stop. Numerous interviewees explained that their understanding of the law is that the "public has no expectation of privacy for license plates when operating a vehicle on a public road." For example, as described by the Ninth Circuit, this aligns closely with an established legal precedent, which states that

> *"a person does not have a reasonable expectation of privacy for a publically displayed license plate tag and, as a result, public ALPR surveillance is not an invasion of privacy" (Green v. San Francisco City and County. 751 F.3d 1039 [2014]).*

The research team reviewed a range of civil and criminal cases to further understand legal issues about law enforcement's use of ALPR and to document the outcome of these cases. One such case was a civil case where an LEA was sued for damages relating to a false positive ALPR hit. In this case, the arresting officers failed to verify the accuracy of the ALPR read prior to stopping the vehicle (violating the LEA's ALPR policy). Three of the 6 case study sites have policies that require users to confirm through their local database that a hit is still active and for a valid violation, and to visually confirm that the driver is the person the violation is for (this is applicable to identifying drivers with revoked, suspended, or restricted licenses). Interviewees from these case study sites indicated this policy is in place to avoid the legal issues arising from a stop from a false positive and that these policies reduce the number of violations that are challenged.

One officer indicated the challenges to violations from ALPR stops are often instigated by an inexperienced lawyer who is not well versed in the legality of ALPR use by LEAs. This officer indicated that an informational brochure would be useful to limit these challenges.

Privacy Issues

ALPR technology raises concerns about whether stored data is personally identifiable information. It is an especially sensitive category of individuals' information that can help distinguish or single out people and may be used to track someone's movement. Interviewees, especially administrators and managers, were extremely cognizant of the sensitivity surrounding the privacy concerns of residents and advocacy groups with regard to the use of ALPR. Many administrators and managers indicated they had policies in place meant to protect the public's privacy and they were committed to following these policies. One interviewee reported viewing his organization as the "guardians of ALPR data." The policies are also meant to ensure the tool is not abused, which could lead to the agency losing access to its ALPR program.

The literature review also identified a range of privacy issues associated with law enforcement's use of ALPR. The most frequently cited issues include the length of time that LEAs retain license plate data collected by ALPR readers, who in the agency has access to the data, who the LEAs share data with, and the circumstances under which the data can be accessed. Researchers probed case study sites about these topics, and specific findings for each can be found in the following subsections. In general, interviewees at case study sites, most often the administrator or manager of the ALPR program, indicated their LEAs have developed ALPR policies that protect the privacy of the data collected through their ALPR programs though the extensiveness of the policies differed. For example, the administrator at one of the case study sites explained that when the agency started its ALPR program, there was significant negative public sentiment about privacy concerns over law enforcement's use of ALPRs. These concerns prompted the State legislature to hold hearings about law enforcement's ALPR use and privacy concerns. The outcome of the hearings was development of a statewide policy having clear guidelines on data protection, data access, data collection, and data retention. Interviewees from this case study site indicated the existence of a policy that protects the privacy of the State's residents has resulted in the agency receiving no privacy complaints about their agency's use of ALPR.

Some interviewees did indicate that ALPR watch groups, such as the ACLU, have specifically questioned the use of ALPR in their communities. The literature review identified that ALPR watch groups' (specifically ACLU) concerns stem from the potential that law enforcement could use ALPR data to abusively track people for illegitimate purposes and target communities based on race, religion, or ethnicity. Interviewees from the case study sites that indicated they have fielded questions from these groups have reported that this interest has not interfered with their use of ALPR in the field.

Data Storage and Access

Agencies with larger ALPR programs each store their ALPR data onsite in a central database. These agencies have policies that are more sophisticated about how data is stored, accessed, and shared. In most cases, the agency's ALPR policy identifies which personnel have access to the ALPR data. In some cases, the ALPR policy states that only administrative staff can access data, and other personnel (detectives, officers, etc.) can request ALPR data if they are for official law enforcement purposes. Other LEAs restrict ALPR data access to personnel who have completed the requisite training. An administrator at one case study site indicated the LEA has gone to great lengths to limit its users from having access to ALPR data. This agency's ALPR system only allows users to view data about the vehicle that has triggered an alert during patrol. Conversely, other agencies had no restrictions on who in the department could access the ALPR data. At one case study site, any officer who knew how to access the data was able to view it. Other interviewees reported that if officers are assigned to a vehicle with an ALPR, they have access to all stored data.

In contrast to an LEA that stores ALPR data onsite in a central database, some of the smaller agencies with less expansive ALPR programs rely on agreements with other agencies, ALPR license holders, or State ALPR coordinators to store ALPR data. The case study sites that do not store their own ALPR data do not have internal policies about who has access to the ALPR data the agency collects because the data storage and access are the responsibility of the agencies that store the data.

Data-Sharing Policies

Interviewees from four case study sites indicated their ALPR policies allow for data sharing with other LEAs for official law enforcement purposes (e.g., criminal investigation, prosecution, or investigative support). Some interviewees indicated they have no interagency agreements, but rather they share data

if asked by other agencies. Some of the agencies with more expansive ALPR programs share with State-run databases that LEAs throughout the State can access.

While most of the data-sharing policies are written to broadly allow ALPR data sharing for law enforcement purposes, one agency's policy specifically States that it can share stored ALPR data with "other law enforcement agencies for official law enforcement purposes *if those agencies have similar [to the case study agency] use restriction policies or procedures* in effect."

No interviewees from case study sites indicated they share data with non-law enforcement entities. One interviewee reported that the LEA frequently receives requests from lawyers for ALPR data, and these requests are flatly denied. No case study sites allow civilian review of any stored ALPR data.

6. CHALLENGES IN USE OF ALPR

This chapter discusses the findings of the case studies about the technical, operational, and institutional challenges that interviewees at LEAs reported in their use of ALPR.

Technical Challenges

ALPRs Can Be Inaccurate and Unreliable

A 2009 George Mason University survey of LEAs about ALPR use found that technical problems, including misreads of plates that lead to false positives, were a significant concern when using ALPR (Lum, Merola, Willis, & Cave, 2010). This finding was confirmed during case study site interviews. Interviewees from 3 of 6 case study sites indicated that their agencies have experienced technical challenges with the accuracy and reliability of the ALPR units. Numerous interviewees from case study sites indicated their officers had struggled with the accuracy of the units and that they had experienced numerous misreads from the ALPRs, especially older units. One user detailed the technical challenges that his agency experiences:

> *"The biggest challenge we have is keeping the units operational and out in the field. Unfortunately, we have older ALPR units, and the software is outdated. We get random license plate reads that are not always correct. Sometimes these readings are alerted on, and we have to turn around and chase a vehicle that may not be an actual violator, suspension, or stolen/wanted."*

Some LEAs have developed policies that require the officer to visually confirm the hit on the ALPR computer matches the vehicle in question. However, some officers indicated they had personally stopped vehicles based on ALPR misreads. In many cases, interviewees indicated the challenges with accuracy were a result of using older units, and interviewees that had experience with newer units indicated the accuracy of the newer units is dramatically better. In fact, interviewees from only 1 of the 6 case study sites indicated continued accuracy challenges with ALPR systems.

In addition to the issue with the accuracy of the ALPRs, many case study interviewees indicated the units can be unreliable—finicky or tending to break down frequently. One officer explained the units seemed to decline in durability as soon as the warranty on the ALPRs ended. Notably, another detective expressed that while his agency experienced issues with units breaking down, they were no less durable than other police equipment the agency deploys. In some cases, interviewees indicated some of the durability issues with the units were minor, such as a cord inadvertently getting disconnected, causing the system to shut down.

The maintenance of the ALPRs was a challenge for many of the LEAs. Maintenance is handled differently from one agency to another. Some agencies handle maintenance in-house, while others rely on contractors to maintain and repair the ALPRs. For agencies that handle maintenance in-house, interviewees indicated they did not believe the in-house maintenance staff had the requisite expertise to properly fix and maintain the units. In fact, one officer indicated he had resorted to conducting maintenance himself when off duty because he felt his maintenance work would be more reliable than that of the staff responsible for doing this work. For agencies that rely on external contractors to fix and maintain their ALPRs, interviewees indicated cost was a challenge, especially for smaller agencies. In addition, the contractors are not always available to fix units immediately, so if an agency has a small number of ALPRs and one breaks, the unit could be down for months before being repaired. One interviewee who was the ALPR coordinator for the case study site indicated the contractor the LEA

relied on to maintain and fix its ALPRs went out of business, and the LEA had a difficult time procuring a new service contract with a new contractor.

Researchers noted that when speaking with interviewees of agencies that have experienced technical difficulties with their ALPR units, all interviewees were aware of these challenges. Users (often officers or detectives) had the most intimate knowledge of these technical issues and often provided the most specific examples. However, administrators and managers indicated they were very aware of the technical issues related to the accuracy and reliability of the ALPR units.

Interviewees from larger LEAs with larger ALPR programs indicated fewer challenges with accuracy and reliability. Researchers believe this is a result of the resources needed to maintain older units and purchase newer units. The only LEA that still experienced accuracy issues with its ALPRs was the second smallest LEA and ALPR program. Interviewees from the smallest LEA with the smallest ALPR program indicated they used to have significant issues with accuracy and reliability, but improved software has improved the accuracy and reliability of their unit.

Weather Can Adversely Affect the Accuracy of ALPRs

Interviewees from 5 of the 6 case study sites indicated weather affects the accuracy of the ALPRs. Interviewees from more than one case study site indicated snow and salt get stuck to the licenses plates and make it hard for the units to accurately read plates. Interviewees indicated this can lead to misreads, and often the ALPRs get less use in winter because they are less reliable. One interviewee also indicated the cameras do not work as well when it is wet and rainy because the water sprays from the road onto the unit and reduces the accuracy of the units.

Hot Lists and Databases May Not Be Accurate or Up to Date

The accuracy of hot lists and databases was mentioned as a technical challenge by 4 of 6 case study sites. Interviewees at several LEA indicated there are situations in which cars are stuck on the hot lists, even though there is no violation with the vehicles. This was more common with stolen vehicles that had been recovered, but the accuracy of hot lists was reported to affect the effectiveness of ALPRs for all uses, including traffic safety. Officers from 2 case study sites indicated when they first used the ALPRs, inaccurate hits were so common many officers stopped trusting the units. One of the officers from a case study site indicated the hot lists his agency uses are still inaccurate. However, interviewees from the remaining three agencies that experienced these problems reported the lists have become increasingly accurate. In one case, officers indicated the hot lists the agency used had significant accuracy issues in the beginning but currently have no inaccuracies whatsoever. These interviewees indicated the State coordinator switched to a new ALPR company and since the new company took over the development, maintenance, and distribution of the hot lists, accuracy has improved.

Another issue personnel at several LEAs reported was the regularity with which the hot lists were updated on the ALPR units. One officer reported when the agency first launched its ALPR program, personnel had to physically download the hot lists and upload them to the ALPRs. This led to the hot lists being updated once a day at most and in some cases less frequently. An officer from another case study site indicated the ALPRs receive updates from the State database only two times per month. The infrequency of the updates pushed to this agency's ALPRs creates information gaps where old data is still in the system and new data is absent. The interviewee indicated this creates scenarios where the patrol officers spend inordinate amounts of time trying to confirm violations that no longer exist. The interviewee explained this takes officers away from patrol activities.

One additional technical challenge many interviewees reported was that ALPRs could not differentiate which State a license plate is from, so it is common for a false positive hit to occur on license plates from

wrong States. One manager indicated alerts for the NCIC hot list are not turned on because officers get overwhelmed with false positive hits on license plates from all over the country.

Lack of Coordination Exists Between LEAs and ALPR Coordinators

LEAs do not maintain or control the development of ALPR hot lists or databases. Rather, they rely on other State agencies (ALPR coordinators) to maintain, develop, and update hot lists and databases. Interviewees from 5 of the 6 case study sites indicated their agencies have the ability to add vehicles to hot lists, but the primary responsibility for developing and maintaining these databases falls on agencies outside the case study LEAs. Many interviewees, including users, managers, and administrators, reported a lack of communication and coordination between their agencies and the ALPR coordination agencies. A detective (user) at one case study site expressed frustration with the fact that ALPR users did not even have a direct contact to speak with about the hot lists because they struggle with the accuracy of their databases. In this case, the individual indicated that all officers had was a form and a fax number, and there was no way of knowing if the ALPR coordinator received or completed the LEA's request to remove or add a license plate from/to the databases or hot lists. An interviewee from another case study site reported the LEA depends on the ALPR coordinator to enter and remove its ALPR data into the system database. In this case, the entry of this data is at the discretion of the ALPR coordinator, so the interviewee reported the ALPR data is not always entered as quickly as the officers need it to be to do their job, or removed once an issue related to the ALPR data has been resolved. The user explained that

> *"the limited updates we get from the State are a big problem. Data is not uploaded, and old data often interferes with at-present enforcement activity. For instance, a stolen car may still be in the system after it has been recovered and returned to the owner because of the gap in updates. As a result, we may come across a stolen car or a suspended registration, and it shows hot when in fact it may not be. In dealing with those cases, we will spend a large amount of time trying to confirm a violation where one no longer exists, which takes us away from patrol activities."*

Operational Challenges

A High Volume of ALPR Hits Can Be Distracting

Administrators, managers, and users of case study sites reported the most common operational challenge was the high volume of hits that occur while patrol officers are using the units. In some LEAs, ALPR units get hits as often as once a minute. To patrol officers, the alerts can be distracting. One user reported the high volume of alerts adversely affected his own safety when the patrol vehicle is in motion. Some managers and administrators indicated they have heard that users turn the ALPRs off during patrol due to frustration over the high volume of alerts. In fact, a lieutenant at one LEA stated that the ALPRs are

> *"too efficient, and for some of [the users] who are not as interested in using the information, they get tired of the continual beeping when it makes a read, so they turn it off."*

For the LEAs that indicated ALPRs have many false positives, users were more likely to turn the ALPRs off since the high volume of inaccurate hits is distracting.

One of the case study sites developed a system to manage the high volume of alerts. The LEA categorized the alerts into high, medium, and low priority and explained that the ALPR screen in the vehicle color-coded each alert differently as well. High alerts are felony warrants and stolen vehicles,

and low alerts are driver license revocations. Users can choose to receive all alerts or to turn off all but the high-priority alerts. Users at this case study site indicated this allows the officers to adapt their ALPR use to their primary assignments. For example, if officers are responding to emergency calls, they can turn the low- and medium-priority alerts off. However, if there is not much activity or if the officers' assignment is to patrol for traffic safety, the officers can turn all alerts on.

Ensuring Department ALPR Policy Is Followed

Administrators and managers from LEAs with ALPR policies covering protocols for making traffic stops indicated that ensuring users follow that protocol when they are on the job is an operational challenge. One example in several LEAs was a policy to ensure that a hit for a vehicle registered to a person with a revoked, suspended, or restricted license actually pertains to the person operating the vehicle. This policy requires a user to manually run the license plate through the agency's internal database to ensure that the reason for the hit is still valid, and then to visually confirm the individual driving the vehicle is the person whose license is suspended. Users reported this process is time consuming and can take 5 or more minutes to confirm through the agency's internal database that the hit is still valid. Then the officer has to safely maneuver the patrol vehicle to visually confirm the person is the one the alert identified. Many users indicated they thought the process of confirming the ALPR hit with the LEA's database should be automated.

Lack of Analytical Tools Reduces Effectiveness of ALPR Use

Most LEA staff interviewed reported they do not conduct any advanced or predictive analytics using the ALPR data collected for traffic safety. For example, collected ALPR data could be used to identify locations where traffic safety is of greater concern if it is an area where more plates of drivers with revoked, suspended, or restricted licenses are scanned. Another example is using collected ALPR data to identify areas where a greater number of plates of drivers with numerous DUIs or speeding violations are scanned. Using ALPR data in this manner could let LEAs predict where these trouble areas are and increase enforcement. Some managers and administrators acknowledged this is a missed opportunity. A captain at one LEA explained, "The largest challenge is that we don't have a readily available analytical tool that allows us to mine and use the data in a proactive fashion." For the 3 LEAs interested in this approach, the inability to conduct these types of analyses was primarily due to the lack of skilled personnel to perform these analytics. One manager also discussed the need for an off-the-shelf computer program existing personnel could use to analyze collected ALPR data and predict potential hot spots for criminal activity and traffic safety issues. The manager acknowledged that funding for this approach was a barrier.

Not All States Provide Hot Lists for Revoked, Suspended, or Restricted Drivers

LEAs rely on State laws, and more specifically the State ALPR coordinator, to develop hot lists for drivers with revoked, suspended, or restricted licenses. In many cases, States do not develop or distribute this information to LEAs. Interviewees at LEAs in States where these hot lists are not distributed indicated this was an operational challenge: "The [ALPR] is a very effective tool but would be more effective for traffic safety if we were able to get alerts on more than suspended or revoked registrations." These interviewees indicated they recognized how effective the ALPRs could be for traffic safety but their only option to get these drivers off the road was when their plates led to hits for different reasons.

Institutional Challenges

All case study sites indicated their ALPR programs received support from their agency leadership. However, users, managers, and especially administrators indicated funding is an institutional challenge. During interviews, the following themes regarding the lack of funding emerged.

Lack of Resources to Expand ALPR Programs

Interviewees reported that each ALPR cost approximately $15,000 to $20,000 per unit. This number did not incorporate costs associated with mounting the units or maintenance. Almost all case study sites were interested in expanding their ALPR programs by purchasing more units. One administrator at a case study site indicated he had allocated money to purchase an additional unit in each of the last two budget proposals, but both units were removed from the final budgets. One case study site was successful in getting the city council to approve the purchase of additional units, but this was not the norm based on case study interviews. As discussed previously, agencies also struggle with funding the maintenance and upkeep of the ALPR units. Some agencies contacted to participate in the study indicated they no longer used the units because they could not afford maintenance and upkeep of the devices once they were out of warranty.

As ALPR Programs Grow, the Need for Additional Manpower to Maintain the Programs Grows

For the LEAs that have been more successful in growing their ALPR programs by purchasing additional units, finding personnel to sustain the programs was reported as an institutional challenge. Sustainability includes officers who are qualified to use the ALPRs on patrol, perform in-house maintenance, maintain in-house data storage, and provide introductory and ongoing training for users. A manager at one case study site indicated that when his agency decides to conduct an operation focusing on revoked, suspended, or restricted licenses, it is extremely labor intensive because a significant number of drivers in that community operate motor vehicles illegally. This agency can only occasionally focus on this aspect of its ALPR use because the effort uses too many labor resources.

7. ALPR ACCEPTANCE AND EFFECTIVENESS

ALPR Acceptance

In LEAs

LEAs in general see ALPR as a useful tool and a force multiplier, enabling a single officer in an ALPR-equipped patrol vehicle to identify far more vehicles connected with crimes, traffic violations, and alerts than would be possible otherwise. Additionally, using an ALPR system to scan for vehicles of interest can reduce the potential for racial or other biases in patrol officers' decisions on which vehicles to pull over since the system scans for license plate numbers rather than basing decisions on the look or description of the vehicle drivers (Gierlack, Williams, LaTourrette, Anderson, Mayer, & Zmud, 2014; Roberts & Casanova, 2012; Police Executive Research Forum, 2012). Some agencies have found stored ALPR data useful for investigations and/or data-driven policing (Ozer, 2016; Police Executive Research Forum, 2012).

In all case study interviews, acceptance of the ALPR was high. The main reason for this is the widespread perception that ALPRs are effective policing tools; however, this was not necessarily linked to benefits for traffic safety. Many interviewees indicated they do not necessarily see ALPR as a tool for traffic safety; but rather the ALPR was viewed as a tool that helps identify vehicles for traffic stops, and when that happens, traffic safety can be improved. A slightly different take on this sentiment was found at the State patrol, where traffic safety is viewed as the main purpose of the agency: "Since my primary job is to keep roadways safe, the use of ALPR fits the agency's mission."

It was acknowledged across the LEAs that some officers are more interested in using the tool than others. A captain at one LEA explained that personnel at his PD feel extremely positive about the use of ALPR: "[They] think [ALPRs] are phenomenal. Once officers learn what they are and how they use them, they love them." Acceptance is often based on the precedent set by command. A manager mentioned,

> "ALPRs are being pushed more by the command staff, so I think they understand the value of the units. We went from high [in agency] user approval of about 80 percent; then the ALPRs went to the closet, and user approval went to 10 percent. With the resurgence for use by the new command staff, ALPRs have been widely accepted, and user approval is back up to 80 percent."

Community Acceptance

At several case study sites, interviewees indicated people in the community generally do not know about their ALPR use. An officer at one site who is now in public affairs said, "It's a thing that we try to keep a little bit low key. If I've arrested somebody, I close my laptop. They don't need to see the technology we are using." The ACLU was often linked to community concerns, but always with the qualifier that community concerns may be a problem elsewhere though not in the interviewee's community: "ALPR watch groups have questioned the use of ALPR for our community. However, it has not interfered with our use of ALPR in the field." On the other hand, an officer at another LEA said he has actually shown the unit to people that he has stopped, and they have always been impressed, and feedback has been positive. Likewise, another officer at the same LEA said, "People want their PD to have the latest technology." An officer at a third LEA expressed a similar view: "The public is supportive and thinks the technology is cool."

A captain at another LEA shed light on the disparate views, saying that there is a vocal minority in the community that does not like the units because they worry about privacy. Except for that small portion, the public seemed supportive. His assistant chief added,

> *"That is part of our job, to inform the community. People generally want to be safe. However, [the ALPRs are] just an automated thing compared to a cop simply writing down license plates. It's just faster."*

ALPR Effectiveness

In recent years, many LEAs have employed ALPR technology to accomplish a variety of purposes including traffic enforcement, identification of revoked and suspended driver licenses, monitoring of temporal and spatial events, access control, criminal enforcement, and recovery of missing or endangered persons. ELSAG, an ALPR vendor, has reported that as much as 70 percent of all committed crime involves the use of a motor vehicle (Slahor, 2016). In light of this finding, targeting license plates provides law enforcement with a substantial opportunity to regulate enforcement and control for future crimes and infractions.

Although ALPR system use, as a tool for law enforcement, has been rapidly spreading in the United States, not much is known about the actual effectiveness in relation to traffic safety. Currently, little has been done to measure what ALPR success looks like. Much of the perceived effectiveness of ALPR systems has come from limited interpretations that revolve around reductions in crimes and crashes. According to a supervisor, "Success for us is measured on the overall affect our officers have in reducing traffic crashes and improving safety, which may or may not be linked to the use of the ALPR systems." Findings suggest that the use of ALPR technology accounts for significant increases in law enforcement production (i.e., a force multiplier). This includes increases in follow-up arrests and other enforcement contacts when compared to traditional police methodologies, use of fewer resources to increase enforcement contacts and arrests, and substantially improved savings related to agency costs and resource allocation (Ozer, 2016).

This study explored the perceived effectiveness and value of ALPRs as a traffic safety countermeasure. Table 9 presents operational definitions of the measures the research team used to perform this research.

Table 9. Operational Definitions of Measures

Measure	Definitions
Efficiency	• Performing or functioning in the best possible manner with the least waste of resources • Ensuring processes are error free or optimizing **how** work is completed
Productivity	• A combination of effectiveness and efficiency • Maximizing output while minimizing input
Effectiveness	• Adequate to accomplish a purpose • Producing the desired or intended outcome • Ensuring core work is completed or optimizing **what** work is completed

Efficiency

The overall, anecdotal perception from those people interviewed as part of this project was that ALPRs provide significant gains in efficiency. When evaluating the impact of equipment based on anecdotal evidence, it is important to consider how the equipment was acquired. In the case of the ALPRs in the selected LEAs, the majority, 82 of the 99 units across all 6 agencies, were purchased using local funding.

In order to sustain ALPR programs in an agency with local funding, there needs to be a demonstrated return on investment internally and externally. One of these agencies uses ALPRs to focus on clearing hit-and-run and stolen vehicle cases since that are priorities in that community. The equipment lets the agency efficiently clear these cases by increasing the rate of license plate reads, and subsequently the likelihood of finding the vehicles. The investigator in question said, "We have approximately 3,000 hit-and-run cases per year, with some being associated with fatalities. About one-third are investigated, and of these, 90 percent are closed by using ALPR." Similarly, a patrol officer in another LEA mentioned,

> *"The ALPRs are very effective because of their ease of use and speed. Before ALPR, we would have to physically run license plates, and we might run 100 plates per week for all our shifts. With ALPR, we automatically get thousands of reads per day."*

An administrator in a large PD stated,

> *"While the ALPR units are expensive, when you look at the cost per stop, they are very cost effective and valuable. They are very effective at locating unlicensed drivers and greatly enhance our officers' efficiency."*

Since ALPRs can process plate reads rapidly, even limited use can have a significant impact related to return on investment.

Productivity

More than one interviewee pointed to ALPR as being a force multiplier. An officer mentioned, "The ALPR is like a second set of eyes. Being able to access multiple violators and getting to choose to go after the one with the highest priority violation is a big benefit. The ALPR unit is like having a co-pilot, which adds officer safety benefits since you are not distracted running LPs [license plates]."

One of the observations made during the case study interviews was the impact that frequent database updates had on the productivity of officers in the field. The LEAs that updated their databases at least once a day reported better performance since they trusted the information was current and, therefore, more accurate. The trust the officers had in the accuracy of the database was directly related to their willingness to stop vehicles. This was related to resource challenges: "Budget funding has a direct effect on equipment and software updates; therefore, the performance of the ALPR can be adversely affected."

Overall, officers believed that ALPRs can be an effective resource in identifying hit-and-runs, unlicensed and suspended drivers, and registration violations that affect traffic safety. Additionally, the technology can be used to address criminal activity. Individual agencies or statewide agencies would need to seek out ways to identify and analyze quantifiable data in order to establish a robust understanding of ALPR return on investment.

Effectiveness

Agencies have employed ALPRs to address traffic safety with varying degrees of effectiveness. For example, a patrol officer said, "Very effective tool for traffic safety, but having the resources to target that purpose is tough due to frequent calls for service, which compete with traffic safety priorities." Other officers mentioned that effectiveness as a traffic safety countermeasure was a secondary outcome: "Primary use is for the location of stolen vehicles, and traffic safety implications are just a by-product of that function." Another officer said, "I think that success for ALPR use is secondary and comes by way of the deterrent effect the unit provides when officers are stationary and performing traffic enforcement." One of the inferences drawn from the interviews was that agencies have priorities that can conflict with each other. Agencies and their communities believe that traffic safety is a major

concern, but calls for services and criminal activity can demand resources originally designated to operate ALPRs.

To be considered effective for addressing traffic safety, ALPRs must be used to reduce crashes, with emphasis on those causing fatalities and injuries. The LEAs interviewed used databases with either vehicle registration or driver license information. The interviewees indicated that stopping vehicles on these lists addressed traffic safety by removing those with invalid registrations and licenses. The associated drivers are thought to be disproportionately involved in crashes. As one administrator noted, "ALPR is highly effective in identifying habitual traffic offenders and getting them off the road." And, even if the drivers are not stopped, there is the perception that the ALPR units are effective. As one officer mentioned, "I do believe there is a significant deterrent effect that the ALPRs have when units are stationary and running plates. The presence causes motorists to slow down, which improves traffic safety to some degree even if metrics are not available." However, only a couple of the case study LEAs could present quantitative evaluations to better illustrate the relationship between the efficiency of running plates automatically and the reduction of crashes. As one manager mentioned,

> *"I think success is measured by the reduction in crashes and injuries. Unfortunately, it is part of a bigger picture with other variables we cannot control, so in our case, the measurements are not really tracked."*

On the other hand, one case study site had recently conducted an effectiveness analysis as part of its ALPR grant requirements. The results of that analysis indicated that revoked, suspended, or restricted drivers were 2.2 times more likely to be involved in serious or fatal crashes than other drivers in the State. The preliminary finding suggested that using ALPR for identifying drivers with revoked, suspended, or restricted licenses could affect traffic safety positively by targeting violator vehicles that are more prone to crash risk.

8. CONCLUSIONS

Prior research had found that that regular use of ALPR technology was a cost-effective tool with return on initial investment in one week for property crimes and one month for violent crimes (Ozer, 2016). The evidence gleaned from the case studies provides additional indicators to support the effectiveness of ALPR for traffic safety purposes—when viewed in terms of efficiency and productivity gains as well as improvements in traffic safety by culling vehicles more prone to crash risk. Effectiveness as a traffic safety countermeasure was often viewed as a secondary outcome—as a by-product of looking for stolen vehicles or other criminal activity.

This research, however, did identify challenges in applying ALPR technology, and none were unique to traffic safety uses. Technical challenges included accuracy and reliability issues with both equipment and databases. Hot lists may not be up to date, resulting in false positive hits. Also, there is variation in the quality of the ALPR technology that is sold to LEAs. LEAs should do the necessary product research prior to purchasing. Operational challenges included officer distraction and ensuring agency policies were followed. Most use of ALPRs is reactive—reacting to an alert. However, the capability to do predictive analytics could increase ALPR effectiveness, but funding and skill sets are barriers to implementing more predictive uses.

Institutional challenges identified were related to lack of funding. Almost all case study sites were interested in expanding their ALPR programs by purchasing more units but lacked the necessary financial resources. Also, lack of funding often led to equipment reliability issues because funding maintenance of the equipment was a challenge. Regardless of funding challenges, administrator support can affect the extent to which ALPR technology is applied in the field, and in all of the case study sites, administrator support was strong. However, not all officers are inclined to use ALPR technology and training is often on-the-job. Therefore, the equipment should be assigned to staff who are motivated to train themselves on proper functionality and that use the ALPR technology often.

There were no real distinctions in the perceptions toward ALPR among users, managers, and administrators among the case study sites. Users were very passionate about using ALPRs for traffic safety. They believed the units make them more efficient in their job and allow them to have a greater impact on traffic safety. Managers and administrators clearly supported the use of ALPRs. It should be noted that researchers in this study only spoke to LEAs that currently use ALPRs. If an LEA had negative experiences with ALPRs, they would have stopped using them. Thus, there is likely a positive bias in the research findings due to the fact that current use is associated with positive attitudes toward the technology.

Recommendations for Enhancing ALPR Effectiveness

ALPRs can be highly effective in identifying habitual traffic offenders and getting them off the road. Recommendations from interviewees for enhancing their effectiveness are as follows.

- Users:
  - Thorough and ongoing training ensures that the technology performs effectively.
  - Users should be well versed in operational policies.
  - Maintaining hardware and software updates improves the effectiveness of the ALPR units' operability and diminishes false positive alerts.

- Linking the ALPR system to the State's crime information computer and having closer coordination between the LEA and the stewards of the hot lists could improve user ability to react appropriately to alerts.

- Managers:

  - The core business values that ALPR promises can only be achieved through proper planning, implementation, training, deployment, use, and management of the technology.

  - Policies should be developed and strictly enforced to ensure data quality, system security, compliance with applicable laws and regulations, and the privacy of information gathered.

  - Managing the volume of alerts is important to officers' perceptions of ALPR effectiveness and utility.

- Administrators:

  - Agencies should articulate their strategic goals and tactical objectives for the ALPR technology.

  - Strategies should be aligned with the broader strategic plans of the agency.

  - Robust auditing requirements should be built into the agency's policies.

  - Proper use of the ALPR unit and data and retention systems should be enforced.

  - The agency should reassure the public that their privacy interests are recognized and respected.

Recommendations for Further Study

There would be utility in conducting a national survey to quantify current incidence of ALPR systems in LEAs and the purposes to which these systems are used. Even with the anecdotal indicators of success for traffic safety applications reported here, further quantitative evaluation at the local and aggregate levels would be of value. This type of evaluation would inform internal and external stakeholders and support the use of ALPRs in traffic safety. Such a survey would target a national sample of LEAs—using or not using ALPR—to determine the incidence of use. For those not using ALPR, the questionnaire would be short and place limited burden on responding agencies. For those using ALPR, questions could target purpose, numbers and types of units, and challenges. For those using ALPR for traffic safety, perceptions of effectiveness could be targeted. Overall, the findings of this study provide a firm foundation for the topics to be explored in a future quantitative research activity. However, obtaining a robust sample of LEAs to participate in the survey would require significant effort. The challenges in LEA recruitment that are described in this report should be addressed in sampling and response generating strategies.

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APPENDIX A—LITERATURE REVIEW

As an early task in this study, a literature search was conducted to gather published information regarding the project's key research questions:

- How are ALPRs being used in the U.S. for traffic safety purposes?
- What are the challenges (e.g., legal issues, privacy concerns, community acceptance) to ALPR use for traffic safety purposes and to what extent are they unique to this use?
- What are the findings regarding ALPR effectiveness in detecting drivers who have suspended, revoked, or restricted licenses?

Additional topics covered in the literature search and review included the development and implementation of ALPR databases, the costs associated with ALPR systems, and laws and policies that have been developed at the local and State levels regarding ALPR data collection, use, retention, and sharing.

Literature Search Methods and Sources

The research team developed a list of search terms to guide the literature search. The search terms included various words and phrases that have been used to describe technologies that read/recognize vehicle license plates, as well as modifying terms to help narrow the ALPR search results according to the objectives of this study, such as "law enforcement," "police," "traffic safety," and others.

The literature search was conducted via commercial databases and resources available through the Texas A&M University Libraries and other Internet resources. The resources described below yielded reports, articles, and other documents relevant to the study.

TRID: Transportation Research International Documentation (TRID) is an integrated database that combines the records from the Transportation Research Board's (TRB's) Transportation Research Information Services (TRIS) Database and the Organization for Economic Cooperation and Development (OECD) Joint Transport Research Centre's International Transport Research Documentation (ITRD) Database. TRID provides access to more than one million records of transportation research worldwide. TRB's Research in Progress database is also searchable through TRID.

EBSCO Databases: Searches were conducted on the following databases hosted by EBSCO Information Services.

- **Academic Search Complete**: Academic Search Complete is a full-text, scholarly database of more than 8,500 journals (7,300 peer-reviewed) in almost every academic discipline.

- **Applied Science & Technology Source**: Applied Science & Technology Source covers the research and development spectrum of the applied sciences and computing disciplines. Providing content from leading trade and industrial journals, professional and technical society journals, specialized subject periodicals, buyers' guides, directories, conference proceedings and more, Applied Science & Technology Source focuses on traditional engineering challenges and research, as well as research concerning the business and social implications of new technology.

- **NTIS**: The National Technical Information Service Database is the preeminent resource for accessing the latest U.S. government-sponsored research and worldwide scientific, technical, engineering, and business-related information. It also includes information available from international government departments and other international organizations, including those from Canada, Japan, the former Soviet Union, and Western and Eastern European countries.

LEXIS-NEXIS Academic: LEXIS-NEXIS Academic provides full text documents from over 5,900 news, business, legal, medical, and reference publications.

WestlawNext: WestlawNext provides access to a comprehensive collection of news and business information and law-related resources.

Proquest's Technology Research Database: Technology Research Database provides a single mega-file of all the unique records available through its three components: the Materials Research Database with METADEX, High Technology Research Database with Aerospace, and the Engineering Research Database. Subjects covered include materials science, engineered materials, mechanical engineering, civil engineering, environmental engineering, earthquake engineering, new technologies in engineering, aerospace, computer and information systems, telecommunications, electronics, and physics. Sources covered include over 4,000 periodicals, conference proceedings, technical reports, trade literature, patents, books, and press releases.

Web of Science: Web of Science provides multidisciplinary coverage of thousands of scholarly journals in the sciences, social sciences, and arts and humanities, as well as international proceedings.

Online Computer Library Center (OCLC) WorldCat: OCLC WorldCat database is the OCLC online catalog. It contains millions of bibliographic records of books and other materials in libraries worldwide.

Google Scholar and Institute of Electrical and Electronics Engineers (IEEE) Xplore: Google Scholar searches across a variety of academic disciplines for sources including scholarly journals, academic theses, books, and court opinions. IEEE Xplore provides full text documents from IEEE journals, transactions, magazines, letters, conference proceedings, standards, and IET (Institution of Engineering and Technology, formerly IEE) publications.

Google: Searches were conducted using Google's search engine to uncover potential resources that are not indexed in key transportation and engineering databases.
Searches were also conducted via ScienceDirect, the Scopus abstract and citation database, and the library catalogs of the Texas A&M Transportation Institute and of the Center for Transportation Research at the University of Texas; and therefore, these searches did not yield any documents relevant to the current research study.

Following the initial search, using the TRID database, search results were reviewed for their relevance and applicability to the study. This initial review of results found that the search word "automatic vehicle identification" primarily identified literature that did not pertain to automated license plate readers; this search term was eliminated for the remaining searches.

Search results from each of the resources were similarly reviewed for relevance to the current study; an initial screening based on document abstracts (where applicable) or partial readings narrowed the list of documents selected for more thorough review. The narrowed pool of documents were then read and reviewed. The documents that addressed one or more of the study research questions were included in the annotated bibliography of this literature review and contributed to the synthesis of findings presented below. Documents that did not address the research questions were discarded.

Synthesis of Findings

ALPR use has expanded rapidly during the past decade. A 2007 survey of U.S. police jurisdictions found 19 percent of jurisdictions using ALPR systems; and by 2012 that had increased to 71 percent of jurisdictions, with still more indicating that they planned to acquire ALPR systems or expand ALPR use in the near future (Hsu, 2014).

Extent of ALPR Use for Traffic Safety Purposes

ALPR uses for traffic safety can include identifying drivers with revoked or suspended licenses and/or drivers who are on law enforcement hotlists for other driving-related offenses (Watson & Walsh, 2008; Hockley, 2013; Milwaukee Police Department, 2013; Delaney, 2012; City of Evanston, 2012; Hsu, 2014; Macarilla, 2010). Other safety-related uses of ALPR in the United States and elsewhere have included identification of vehicles that illegally pass stopped school buses, speed enforcement, and identification of vehicles that have been involved in a high number of crashes (Manson, 2008; Watson & Walsh, 2008). In most cases, even among law enforcement agencies that use ALPR for traffic safety purposes, this use is not the primary purpose. The most frequently reported use of ALPR among law enforcement agencies is crime prevention and detection (Vermont DPS, 2014; Farrell, 2014; Gierlack, 2014; Basich, 2012; Wolfe, 2011). A cost-benefit analysis conducted for the Arizona Department of Transportation included the potential use of ALPR units to monitor traffic flow along selected major roadways in the Phoenix area, though most of the analysis concentrated on the financial and other benefits of other ALPR uses over traffic safety uses (e.g., identifying unregistered vehicles, vehicles without insurance, and collecting tolls) (Eberline, 2008). By contrast, police in Athens, Georgia, prioritize ALPR "hits" identifying unlicensed drivers over those identifying unregistered vehicles because they view unlicensed drivers as a greater threat to traffic safety (Hockley, 2013).

A survey of 444 randomly sampled U.S. local, State, and tribal law enforcement agencies in 2009 found 70 agencies were using ALPR at that time. A follow-up survey distributed to these 70 agencies asked more detailed questions about their ALPR use. Of the 40 agencies that responded to the second survey, 20 (50%) indicated vehicle and traffic enforcement as one of their current ALPR uses;[1] 11 (28%) indicated that vehicle and traffic enforcement was their primary reason for using ALPR. The most frequently cited use of ALPR by law enforcement was recovery of stolen vehicles (63% of the responding agencies stating this as their primary ALPR use, 83% including it as one of their current uses) (Roberts & Casanova, 2012). Forty out of 134 agencies (30%) responding to a survey conducted by George Mason University in 2009 reported using ALPR to identify vehicles associated with motor vehicle violations (Lum Merola, Willis, & Cave, 2010).

U.S. law enforcement agencies that were specifically mentioned in the reviewed literature as using ALPR for traffic safety purposes included the following.

- City of Milwaukee, Police Department (Milwaukee Police Department, 2013)
- Minnesota State Patrol (Minnesota State Patrol, 2015)
- City of Evanston, Illinois (Evanston, 2012)
- City of Sarasota, Florida (Delaney, 2012)
- Ohio State Patrol (American Civil Liberties Union, 2013)
- Springfield, Longmeadow, Amherst, Pittsfield, Massachusetts (Schoenberg, 2015)
- Napa County Sheriff/City of American Canyon, California (Napa County, 2015)
- Marple PD, Pennsylvania (Krowchenko, 2013)
- Orlando, Florida (Orlando Police Department, 2011)
- Sioux City, Iowa (Sioux City PD, 2012)
- Vermont DPS (Macarilla, 2010)
- Athens, Georgia (Johnson, 2013; Hockley, 2013)
- Montgomery County, Maryland (Roberts & Casanova, 2012; Hsu, 2014)

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[1] The reported survey results did not identify participating agencies by name; therefore, we were unable to identify which of the participating agencies indicated traffic safety uses for ALPR.

- Alameda, California, Police Department (Alameda PD, 2015)
- East Haven, Connecticut, PD (East Haven Police Department, 2014)

These 15 agencies were identified as potential case studies for this project.

Development, Implementation, Maintenance, and Sharing of ALPR Databases

There are few mentions of specific State databases used by LEAs to identify suspended, revoked, or restricted drivers, or other hotlists pertaining to traffic safety-related offenses. Most sources never explicitly state where this type of information comes from (i.e., which database). Most of the literature's information on State databases points to criminal databases such as the National Crime Information Center (NCIC) (Farrell, 2014; Wolfe, 2011; Eberline, 2008). Law enforcement agencies have the ultimate responsibility for determining which hotlists will be uploaded to their agencies' ALPR systems (Tracy, Cotter, & Nagel, 2009). An agency's priorities for ALPR use (e.g. traffic safety, terrorism/crime prevention, stolen car recovery, parking fine collection) generally determine which hotlists and therefore which alerts are activated for an ALPR-equipped patrol vehicle or monitoring station; the sheer volume of total alerts from all potential hotlists pertaining to a jurisdiction could otherwise exceed the capacity of a patrol officer to respond to them. (Gierlack, 2014; Roberts & Casanova, 2012)

Shared-data repositories known as "fusion centers" began to be established in many States in 2004 and 2005, with the goal of bringing together multiple data sources from law enforcement, public safety agencies, emergency responders, departments of transportation, and the private sector in order to prevent and respond to criminal and terrorist activity (Bureau of Justice Assistance, 2005). The RAND-sponsored study of ALPR use described a regional data fusion center that included Division of Motor Vehicle-related information along with statewide and local criminal hotlists, and noted that one of the large municipal police departments profiled in the same report had access to this fusion center, but did not use the DMV-related information with its ALPR readers. A different case study county from the RAND study uploaded DMV lists of suspended licenses and other vehicle-related infractions each day to the ALPR-equipped patrol vehicles; each officer operating an ALPR system might choose to deactivate certain classes of alerts to manage daily alert volumes (Gierlack, 2014). The Vermont Information and Analysis Center pushes DMV information on expired vehicle registrations and suspended driver licenses to ALPR-equipped law enforcement agencies twice daily, along with criminal warrants and alerts from the NCIC (Bromage, 2013).

A 2009 survey of law enforcement agencies conducted by National Institute of Justice (NIJ) found that 43 percent of responding agencies that used ALPR were part of a regional ALPR system, and 40 percent shared ALPR data with many other agencies. The survey also found that several regional ALPR databases were under development, including the Southwest Ohio/Southeast Indiana/Northern Kentucky (SOSINK) regional data sharing system and a statewide ALPR network in Maryland (Roberts & Casanova, 2012). As of 2014, some 68 police agencies in the State used ALPR, and 55 of those shared their collected license plate data with the statewide database known as the Maryland Coordination and Analysis Center (Farrell, 2014).

The 2009 George Mason University survey of law enforcement agencies found that 73 percent of responding agencies using ALPR had access to motor vehicle records, and 37 percent had access to an inter-agency information system (Lum, Merola, Willis, & Cave, 2010). This type of data sharing among law enforcement and other agencies can potentially expand both the reactive and investigative capabilities of ALPR, but also leads to increased privacy concerns; various agencies who have access to the same vehicle and/or driver data may have very different policies regarding retention, access, and use of that data (Perera, 2013; ACLU, 2013).

Costs

Cost figures reported in the literature range from $10,000 to $25,000 per camera for mobile ALPR systems (Gierlack, Williams, LaTourrette, Anderson, Mayer, & Zmud, 2014; Hsu, 2014; Wolfe, 2011; Roberts & Casanova, 2012; Police Executive Research Forum, 2012; McKay, 2008; Manson, 2008; Lum, 2011; Weise and Toppo, 2013). Cost elements typically include equipment purchase, software, deployment, and training costs. Subsequent maintenance costs can include vendor support contracts for hardware and software, as well as database maintenance and wireless communication costs. Fixed ALPR camera installations can be considerably more expensive than mobile cameras due to the infrastructure needed for power, communications, and mounting. Depending on how ALPR systems are used by a given agency, some or all of the purchase and operating costs may be paid through ALPR-generated revenues, such as collection of fees from previously-unpaid parking tickets (Gierlack, Williams, LaTourrette, Anderson, Mayer, & Zmud, 2014). Table 1-A provides the agency-specific examples of ALPR cost information that were found in the literature. In most cases, the literature sources did not specify whether stated costs per ALPR unit included deployment and/or training costs. One of the exceptions is the cost-benefit analysis of ALPR systems conducted for the Arizona DOT, which estimates an additional 20 percent over the per-unit purchase price for "soft costs," including ALPR installation and associated fiber optics (Eberline, 2008). Other installation, support, and maintenance costs mentioned in the literature are shown in Table 4.

Table 1-A. ALPR Cost Examples from Literature.

Agency	Capital Cost per Mobile Unit	Installation/ Support/ Maintenance Costs
Vermont Intelligence Center/Vermont State Police (Dobbs, 2014)	$15,183 (total cost for 63 units: $956,585)	n/a
Arnold, Missouri Police Department (Kingsley, 2012)	$16,000 (estimated purchase price)	n/a
Unnamed county LEA (Gierlack, Williams, LaTourrette, Anderson, Mayer, & Zmud, 2014)	$17,000	Unspecified amount
Arizona DOT cost estimate (Eberline, 2008)	$20,000	20% of purchase price
Unnamed small city LEA (Gierlack, Williams, LaTourrette, Anderson, Mayer, & Zmud, 2014)	$20,000	$4,000/year
Greenwich Township, New Jersey (Wolfe, 2011)	$20,000	n/a
Cincinnati Police Department (Ozer, 2010)	$21,500	n/a
Dallas, Texas Police Department (Mossier, 2013)	$21,600 ($603,622 for 28 cameras)	$146,470 (service contract)
Arizona DPS (Eberline, 2008)	$25,000-$50,000 (for 2 or 4 cameras per unit)	n/a
Winooski Police Department, Vermont (Dobbs, 2014)	$25,000	n/a

Effectiveness and Value

ALPR system effectiveness is most frequently described in terms of the number of plates that can be read per unit of time, with additional criteria including the relative vehicle speed at which an ALPR camera can accurately read a plate, the accuracy of the system's optical character recognition, the width of the read "zone," and similar system specifications (Noble, 2008; Traffic Technology International, 2010; Tracy, 2009; Han, 2010). The effectiveness metrics most often cited by law enforcement agencies include the number of plates read by the agencies' ALPR-equipped patrol cars, and the number of vehicle stops, arrests, and citations made by officers as a result of plates flagged by ALPR systems

(Traffic Technology International, 2008; Eberline, 2008). The number of arrests and citations assisted by ALPR data were generally not expressed as a percentage of outstanding warrants, e.g. some articles mentioned the total number of vehicles an ALPR system had identified that were associated with suspended driver's licenses, but this was not put into the context of the total number of suspended licenses in that agency's jurisdiction.

In some police jurisdictions, officers are not required to report whether a given traffic stop was due to an ALPR hit or to some other reason; this adds to the challenge of quantifying the benefits of ALPR technology (Dobbs, 2014).

Measures of effectiveness cited in the reviewed literature are summarized in the following sections.

Effectiveness Cited for Traffic Safety Uses

The Montgomery County, Maryland, Police Department provided an example of the benefits realized from one ALPR unit over a 27-day period, with 48,101 license plates scanned. The police department reported identifying 26 drivers with suspended licenses, as well as issuing 255 traffic citations and a small number of citations and arrests for offenses not related to traffic safety, all based on the ALPR data. Based on these results, the ALPR unit was considered by the police department to be a significant "force-multiplier," vastly increasing the number of violators that could have been found and cited using traditional means (Roberts & Casanova, 2012; Hsu, 2014).

A British Police Force evaluation of ALPR technology in 2002 and 2003 found that over a period of 13 months, 23 ALPR-enabled intercept teams stopped 180,534 vehicles flagged by ALPR systems. The results of these stops included 3,324 arrests for safety-related driving offenses, including driving without a valid license or violating the terms of a provisional license, as well as several thousand citations for lesser offenses such as driving without insurance. The driving-related arrests accounted for just under 25 percent of all arrests made using the ALPR technology; and other arrests were for criminal activity (Watson & Walsh, 2008).

Effectiveness Cited for other ALPR Uses

Some jurisdictions have reported increased effectiveness from ALPR use in crime prevention, particularly auto theft. Examples are New York City's 31 percent increase in arrests for automobile theft the year after ALPR was deployed, and Sacramento's (California) drop in per-capita auto theft after police began using ALPR to recover stolen vehicles (Hsu, 2014).

A study of ALPR use in the Cincinnati Police Department examined three measures of ALPR effectiveness in crime-related policing: the number of follow-up arrests (i.e., arrests made during follow-up investigations of a criminal incident) made before and after ALPR implementation, the use of manpower with and without ALPR, and differences in cost effectiveness between ALPR-assisted and traditional policing. The study found that police made an average of 3.46 times as many follow-up arrests per month using ALPR, compared to the per-month average before ALPR was implemented. The average number of follow-up arrests made per officer also increased with ALPR use, from 0.17 per month to 2.5 per month. Based on these increases in follow-up arrests, the study estimated that the cost of the department's ALPR units would be amortized in days or weeks, depending on the categories of arrests included in the metric (Ozer, 2010).

A randomized controlled trial examining the effects of ALPR use on deterring automobile theft was conducted at two adjacent police jurisdictions in the Washington, DC, metropolitan area. The trial compared the results of policing efforts with and without ALPR assistance at 30 auto-theft "hot spots" across the two jurisdiction areas. Ultimately, the hot spots that were policed using ALPR to identify stolen vehicles did not show a drop in subsequent crimes compared to the hot spots where ALPR was

not deployed. The study discussed several possible reasons for this finding, including differences in patrol methods that were used at the various hot spots and limited data (Lum, Merola, Willis, & Cave, 2010).

Privacy and Other Legal Concerns

The reviewed literature includes dozens of articles, published legal analyses, and recommended guidelines regarding privacy and other legal issues pertaining to ALPR data. This section provides an overview of the most-cited privacy-related concerns and recommendations found in the literature, and a subset of the reviewed sources is referenced in this synthesis.

The most frequently cited privacy concerns pertain to how long LEAs retain license plate data collected by ALPR readers, the number of people or agencies who may have access to that data, and the circumstances under which the data can be accessed. Of particular concern to most privacy advocates is retention of data associated with license plates that were not identified as "vehicles of interest" when they were scanned. Legal challenges to the use of ALPR data is less likely when ALPR use is limited to searching for plates connected with a specific, already-committed crime or violation (Gierlack, Williams, LaTourrette, Anderson, Mayer, & Zmud, 2014; Farrell, 2014). The latter approach is the most likely use of ALPR in the service of traffic safety-related objectives; however, if a law enforcement agency also retains and uses ALPR data for other purposes (such as for crime prevention), the privacy concerns described in the literature may become an issue connected, appropriately or not, to all ALPR use by that agency.

In general, since ALPR cameras are employed on public roadways, the Supreme Court's interpretation of the Fourth Amendment maintains that there is no expectation of privacy regarding the location of any particular vehicle on those roadways (Eberline, 2008; Hermann, 2015). The "mosaic theory" of Fourth Amendment Privacy Law posits; however, that when many individual ALPR readings of a single vehicle are combined to analyze the vehicle's movements over time, they constitute an invasion of privacy even though each individual reading would not (Gutierrez-Alm, 2015). Fourth Amendment litigation regarding large-scale collection and analysis of ALPR data had not, as of 2014, reached the U.S. Supreme Court, but some cases have been heard by lower courts (Merola & Lum, 2012; Gierlack, Williams, LaTourrette, Anderson, Mayer, & Zmud, 2014).

The ACLU has expressed concerns that long-term retention of license plate data, as well as sharing of this data among multiple agencies, creates an environment in which the data could be used abusively by individuals or by institutions. Examples of potential abuses of retained ALPR data include the following.

- Abusive tracking use of collected data for illegitimate purposes, such as stalking or blackmail of an ex-spouse, co-worker, political opponent, etc.
- Institutional abusive tracking for the purposes of political oppression of individuals or communities
- Discriminatory targeting using data and search criteria to target communities based on religion, race, ethnicity, or associations (ACLU, 2013; Public Broadcasting Corporation, 2013; Atiyeh, 2014; Texas Department of Public Safety, 2014)

Additionally, public perception that ALPR data is being retained and used to track vehicles without pre-existing warrants can lead to people choosing to avoid perfectly legal activities that take them to specific locations or gatherings (e.g., union meetings, religious services, medical clinics), a phenomenon known as "chilling effects." Recording the driving habits of people who are engaged in legal activities, as well as the chilling effects of perceived surveillance can amount to an infringement on First Amendment rights (ACLU, 2013; Tracy, Cotter, & Nagel, 2009).

Statewide or regional databases complicate the data retention issue. Even if an individual agency's policy only allows limited retention of data, data shared by that agency to a third-party database may be retained much longer. An example is the police department in Greenbelt, Maryland, which retains collected ALPR data for only three weeks; however, if that data is also shared with the Maryland Coordination and Analysis Center, it could be retained for a year under the Center's data retention policy (Farrell, 2014).

Another issue related to ALPR data retention is whether that data, and/or information about how it is collected and used, is available to the public via open records requests. Existing guidelines for Fair Information Practices, as articulated by the Organization for Economic Cooperation and Development (OECD) in 1980, stipulate that individuals should be able to see records containing information about themselves and know how that information is being used (National Criminal Justice Association, 2002, cited in Tracy, Cotter, & Nagel, 2009; Texas Department of Public Safety, 2014). Laws and legal decisions regarding these and other types of open-records requests pertaining to ALPR appear to still be evolving (Champagne, 2015; Bindsbergen, 2015).

The ACLU has developed a set of recommendations regarding ALPR data use, summarized as follows.

- ALPR data should be used by law enforcement only to investigate "hits" pertaining to an existing criminal investigation or warrant, and not examined in order to create a case for investigation that did not exist before. Hotlists used to flag license plates in an ALPR system should be updated frequently, at least at the beginning of each patrol shift, and patrol officers should verify hits returned by the ALPR system visually and in consultation with dispatch.
- ALPR data from license plates that have not been flagged for an existing legal reason should not be retained for long periods of time. Data on already-flagged plates can be retained for longer periods, but these periods must be appropriate to the reason for the flag.
- Access by law enforcement officers to retained ALPR data must be controlled by the agencies that hold the data. Access should only be granted to agents who have received training on ALPR data policies, and all access should be logged.
- Agencies retaining ALPR data should share data only with other agencies that conform to the same retention and access principles, should be transparent about where data is shared, and should report to the public on its ALPR data use at least annually.
- Individuals should be able to access their own license plate data, or to grant a third-party access to their data (ACLU, 2013).

The ACLU developed these recommendations as a model ALPR policy template for law enforcement agencies to adopt governing their collection, use, and retention of ALPR data (ALCU, 2012).

Acceptance by Law Enforcement Agencies and Communities

Law enforcement agencies, in general, see ALPR as a useful tool and a force multiplier, enabling a single officer in an ALPR-equipped patrol vehicle to identify far more vehicles connected with crimes, traffic violations, and alerts than would be possible otherwise. Additionally, using an ALPR system to scan for vehicles of interest can reduce the potential for racial or other biases in patrol officers' decisions on which vehicles to pull over, since the system scans for license plate numbers rather than basing decisions on the "look" or description of the vehicle drivers (Roberts & Casanova, 2012; Gierlack, Williams, LaTourrette, Anderson, Mayer, & Zmud, 2014; Police Executive Research Forum, 2012). Some agencies have found stored ALPR data useful for investigations and/or data-driven policing (Ozer, 2010; Police Executive Research Forum, 2012; Klein & White, 2011).

Concerns expressed by law enforcement agencies regarding ALPR mainly center around the legal and appropriate use of ALPR data, and the potential of community backlash regarding privacy issues. Some agencies have been careful to define ALPR policies prior to roll-out because of concerns about community resistance to ALPR use (Police Executive Research Forum, 2012). In the 2009 George Mason University survey of LEAs, just under a quarter of respondents indicated that technical problems (such as mis-reads of plates that can lead to false alerts) were a significant concern when using ALPR (Lum, Merola, Willis, & Cave, 2010).

Communities tend to be supportive of ALPR for use against crime. They become less supportive the more they know about the potential issues. Most community concerns focus on how long collected data is retained by law enforcement agencies, potential access to the data (authorized or unauthorized) by third parties, and the use of collected data to track movements of individuals (Kingsley, 2012; Information Management, 2012; Weise & Toppo, 2013). These concerns are discussed more fully in subsequent sections of this synthesis.

A 2010 survey of Fairfax, Virginia, residents found that 80 percent of respondents supported ALPR data being used reactively to detect and retrieve stolen vehicles and 76.6 percent supported ALPR use to identify vehicle owners with outstanding criminal warrants. Support dropped considerably (to 48.1%) for the use of ALPR to check for unpaid traffic and parking tickets. Support for analytic uses of stored ALPR data was lower, in general, than for reactive use; for example, 70.1 percent of respondents supported ALPR being used to scan license plates near important buildings or locations for vehicles associated with suspected terrorists, but just 53.3 percent were in favor of investigating all vehicles that passed by or parked near those locations. The survey also found a small, but measurable impact on the self-reported likelihood of different behaviors: 26 percent of respondents said they would be "somewhat less likely" or "much less likely" to commit a parking or traffic violation if they knew ALPR was in use in their community; 14 percent said they would be less likely to associate with particular people; 13 percent said they would be less likely to visit particular locations or events, and 10 percent said they would be less likely to engage in other activities, even legal activities. This "chilling effect" on individual behaviors, while it might deter certain types of crimes or traffic violations, also indicates some concerns regarding the effects of ALPR on personal privacy (Lum, Merola, Willis, & Cave, 2010; Merola & Lum, 2012; Merola, Lum, Cave, & Hibdon, 2014; Merola & Lum, 2015). Support for use of ALPR data depended in part on respondents' view of the collected data as public or private information, with respondents who considered the data to be non-private more likely to express support or neutrality regarding several of the described uses of that data. Other predictors of support included respondents' overall job approval of local police, respondent race (Caucasians were more likely to support ALPR data use than people of other races) and respondent age (older respondents were more likely to support ALPR for parking ticket enforcement, for criminal investigations of individuals, and for investigations of vehicles near important locations) (Merola & Lum, 2014).

Legal Issues

The team took a twofold approach when researching potential legal issues related to ALPR use. First, the team searched for laws States passed relating to ALPR use, and analyzed these laws to understand their requirements or restrictions. Second, the team reviewed court cases including ALPR, analyzing the cases to identify any legal issues or challenges States have already faced. The process and findings from each effort are described in the following subsections.

State Laws

The research team identified 12 States with laws governing ALPR systems and analyzed their legal requirements, with the purpose of identifying potential legal issues and challenges. To accomplish this

end, researchers identified categories of both frequently-occurring legal requirements, and the specific transportation-relevant uses on which the restrictions were placed.

ALPR Uses

As illustrated in Table 2-A, five different transportation uses were identified, plus a category for laws that did not specifically designate a use.

Table 2-A. ALPR Use Category Descriptions

ALPR Uses	Description
Law Enforcement	Using ALPR to enforce laws, including for surveillance and routine enforcement
Access & Security	Using ALPR to control access to a facility, or for other security uses
Freight Screening & Enforcement	Using ALPR for monitoring and screening commercial vehicles, or enforcing freight-regulated regulations
Tolling & Payment	Using ALPR to collect payment for toll collection or enforcement
Travel Behavior Analysis	Using ALPR to analyze travel behavior for research, transportation planning, and/or engineering purposes
Does Not Specify	The statute does not specify uses of ALPR, or the language is broad or vague

States seem to have particular concerns about law enforcement uses, as all 12 States created legal requirements on law enforcement ALPR use (see Table 3-A). Access and security and freight screening and enforcement were both mentioned three times. Some States also would broadly restrict ALPR use, but then carve out exemptions for certain uses. In Maine, for example, ALPR use is designated as illegal in an initial section of its law, and in subsequent passages it creates a variety of exceptions for when the State DOT, DPS, State Police, and other State and municipal law enforcement can use ALPR (Maine, 2013). The uses that States allow and disallow vary, and the inclusion of a certain use in Table 3-A only implies that it is specifically enumerated in the laws listed not that the State necessarily allows or bans it. The Colorado law, for example, addresses a broad range of issues, and creates restrictions on all forms of "passive surveillance" (Colorado, 2014), defined as a government entity using,

> *a digital video camera, video tape camera, closed circuit television camera, film camera, photo radar recorder, or other image recording device… to capture moving or still pictures or images of human activity on a routine basis or for security or other purposes… .*

The law goes on from this broad statement to enumerate specific uses meeting the definition, "monitoring or recording traffic, weather conditions… transit facilities, parking garages… utility facilities." The restrictions placed on these uses are detailed in the following section.

Table3-A. State Legal Requirements and Enumerated ALPR Uses

States	AR	CA	CO	FL	ME	MD	MN	NH	NC	TN	UT	VT
Legal Sections	§12-12-1801–1808	§1798.29; 1798.90.5 .51; 2413	§24-72-113	§316.077	§2117-A	Ch. 192 §3-509	§13.824; 626.8472	§261.75 b; 236.130	§20-183.23.24	TCA 55-10-302	§41-6a-2003; §63G-2-305	23 V.S.A. §1607
ALPR Uses	AR	CA	CO	FL	ME	MD	MN	NH	NC	TN	UT	VT
Law Enforcement	X	X	X		X	X	X	X	X	X	X	X
Access & Security	X		X								X	
Freight Screening & Enforcement	X		X								X	
Tolling & Payment									X		X	
Travel Behavior Analysis			X								X	
Does Not Specify				X								
Legal Requirements	AR	CA	CO	FL	ME	MD	MN	NH	NC	TN	UT	VT
ALPR Employee Training												X
Public Data Breach Notifications		X										
Protects ALPR Data as PII/sensitive		X		X	X							
Limits Links to External Databases							X		X			
Audits of ALPR Use						X	X					X
Establishes Use Policy	X	X				X	X		X			
ALPR Use or Data Request Records	X	X				X	X		X			X
Restricts ALPR Use	X	X	X		X	X		X			X	X
Restricts Data Use	X	X			X	X		X	X		X	X
Requires Data Destruction	X	X	X		X		X	X	X	X	X	X
Restricts Data Sharing or Access	X	X	X	X	X	X	X	X	X		X	X

The categories for legal requirements were developed by reviewing the laws and identifying requirements that frequently reoccur. The 11 legal requirements categories are described in Table 4-A.

Table 4-A. Legal Requirements Descriptions

Legal Requirement	Description
Restricting Data Sharing or Access	Restricts who may access data, who it may be shared with, how it may be shared, etc.
Requiring Data Destruction	Requires data from ALPR system be destroyed after a certain time period
Restricting Data Use	Restricts who may use ALPR data, how it may be used, etc.
Restricting ALPR Use	Restricts who may use ALPRs, how ALPRs may be used, etc.
Requiring documentation of ALPR Use or Data Request Records	Requires entities using ALPR systems to develop, update, and provide information on ALPR use (how, when, where, frequency) and data request records
Establishing Use Policy	Requires the entity using the ALPR system develop a written policy guiding the entity's ALPR activities and uses
Protecting ALPR Data as PII or sensitive	Designates ALPR data as personally identifying information, sensitive information, confidential information, or similar legal category with special legal protections
Auditing ALPR Use	Requires regular reporting or auditing of ALPR use data, usually to a third party like the State legislature
Requiring Notification of Security Breaches	Requires notification to the public or affected individuals if a security breach of the ALPR system occurs
Requiring ALPR Employee Training	Requires entities using ALPR systems undergo training on their use

Using the 11 identified legal requirements; the research team determined which legal requirements applied to each of the State's laws. The findings are recorded in Table 3-A in the preceding section. Figure 1-A displays how frequently these requirements occur across the States.
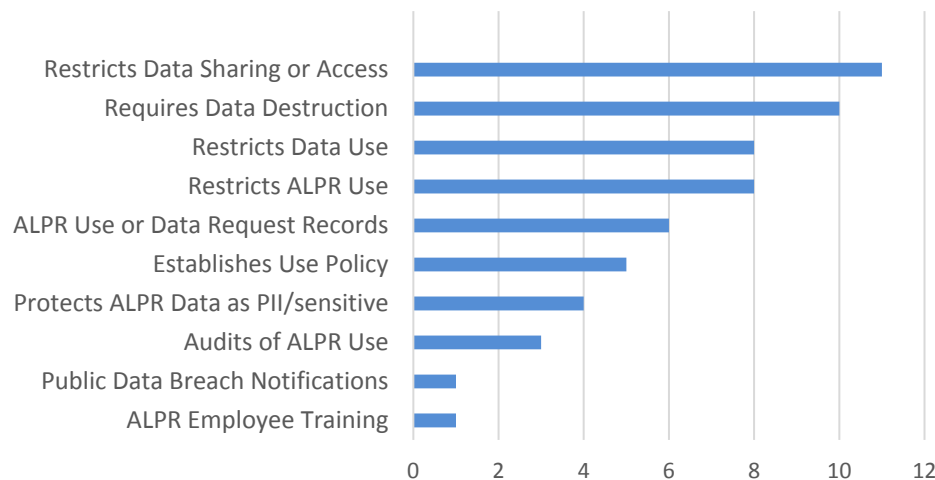

Figure 1. Frequency of Occurrence of Legal Requirements in State Laws Addressing ALPR

Many of the most common policies address ALPR-generated data: how it can be used, shared, or accessed; and when or how it must be destroyed. The most frequently occurring policy—restricting data access or sharing—occurs in 11 out of the 12 States with ALPR laws. Policies in this category commonly restrict who can access ALPR data, or with whom an entity can share related data. Minnesota, for example, requires that ALPR data "not related to an active criminal investigation may only be shared with, or disseminated to, another law enforcement agency…" that meets certain standards laid out in the legislation (Minnesota, 2015). Data destruction requirements varied widely by States. Arkansas requires in HB 1996, for example, that any "Captured plate data obtained… shall not be preserved for more than 150 days" (Arkansas, 2013). States often had some legal exceptions, however, for when data might be held for longer periods. In this case, Arkansas allows that data "may be retained as part of an ongoing investigation," but requires that it be destroyed once the investigation or any criminal legal actions have been completed. Data destruction requirements are included in Table 5-A.

Table 5-A. Data Destruction Requirements by State

State	Number of Days
Utah	14
Maine	21
California	60
Minnesota	60
Tennessee	90
Arkansas	150
North Carolina	365
New Hampshire	548
Vermont	548
Colorado	1,095

Transparency is also a frequent theme, as several categories of requirements involve improving oversight or creating accountability for those using ALPR systems. For example, a written use policy requires agencies develop a publicly-available document detailing how, why, and/or when ALPR systems will be used, along with other potential details. This forces agency leaders to consider the programs they are administering and write public policies guiding their use, which may result in leaders being held accountable if their agency fails to follow the written use policy. Similarly, requiring agencies to maintain records on how or when ALPR systems are used, and then report the results to a third party for auditing, could also improve accountability.

Other requirements focus on the operation of ALPR systems, with some States restricting who can or cannot use ALPR systems. Maine, for example, restricts usage to a few select entities, authorizing the State,

> Department of Transportation for the purposes of protecting public safety and
> transportation infrastructure; the Department of Public Safety, Bureau of State Police
> for the purposes of commercial motor vehicle screening and inspection; and any
> State, county or municipal law enforcement agency when providing public safety,
> conducting criminal investigations and ensuring compliance with local, State and
> federal laws (Maine, 2014).

Several States create special protections for ALPR data, by classifying the data as Personally Identifying Information (PII), sensitive, private, or confidential. Both Florida and Maine designate ALPR data as confidential, making it no longer subject to open records requests. Several States also create additional procedural and legal mechanisms for individuals to access data about personally-owned vehicles that may have been recorded by an ALPR system. Florida, for example, requires "Any such information relating to a license plate registered to an individual may be disclosed to the individual, unless such

information constitutes active criminal intelligence information or active criminal investigative information" (Florida, 2014). States also create requirements on what must happen if there is a data breach. If a breach occurs at a California public agency, the organization must notify individuals in "the most expedient time possible and without unreasonable delay" (California, 2015). Some States create requirements on those operating the ALPR. Vermont's policy, for example, requires operators undergo special training before they can use ALPR systems although the law does not specify what the training should entail (Vermont, 2013).

Case Law

The team searched through a variety of legal databases to identify court cases involving ALPR systems and to understand any legal issues or challenges arising from their use. After searching through the literature, the team initially found 21 cases involving ALPR systems. The team began an in-depth review of these cases, seeking to understand the nature of the case, the ALPR's role, and what legal questions or challenges arose, if any, relating to ALPR use.

Following the initial review, the team winnowed the cases from 21 down to 15. Several cases were dropped due to redundancy: several instances were appeals of the same case, for example. Among the 15 cases, there was a nearly even distribution between State and Federal cases. The cases skew heavily criminal, and all but one of the civil cases were suits against a law enforcement agency (see Table 6-A).

Table 6-A. Case Distribution

Jurisdiction	Frequency
Federal	7
State	8
Civil/ Criminal	
Criminal	11
Civil	4
Outcome	**Frequency**
State won	12
Other	3

The list of cases and associated details are included in Table 7-A.

Table 7-A. Court Case Details

Case	Date	Jurisdiction	Civil/ Criminal	State Win?	LEA Focus?
ACLU v. New Jersey Division of Criminal Justice, 435 N.J. Super. 533 (2014).	13-May-14	State	Civil	Lost	Yes
Gannett Co, Inc. v. County of Monroe. 47 Misc. 3d 898 (2015).	22-Jan-15	State	Civil	Lost	Yes
Green v. San Francisco City and County. 751 F.3d 1039 (2014).	12-May-14	Federal	Civil	Split	Yes
Digital Recognition Network, Inc. v. Hutchinson, 803 F.3d 952 (2015)	13-Oct-15	Federal	Civil	Won	No
Hernandez-Lopez v. State, 319 Ga. App. 662 (2013).	5-Feb-13	State	Criminal	Won	Yes
Hill v. State, 321 Ga. App. 817 (2013).	21-May-13	State	Criminal	Won	Yes
People v. Davila, 27 Misc.3d 921 (2010).	1-Apr-10	State	Criminal	Won	Yes
Rodriguez v. State, 295 Ga. 362 (2014).	30-Jun-14	State	Criminal	Won	Yes

Case	Date	Jurisdiction	Civil/ Criminal	State Win?	LEA Focus?
Saucedo v. State, Not reported in S.W.3d (2009).	23-Apr-09	State	Criminal	Won	Yes
State v. Samalia, 186 Wash.App 224 (2015).	5-Mar-15	State	Criminal	Won	Yes
U.S. v. Gullo. Slip Copy (2014).	2-Oct-14	Federal	Criminal	Won	Yes
U.S. v. Lurry, Not Reported in F.Supp. 2d (2010).	8-Nov-10	Federal	Criminal	Won	Yes
U.S. v. White, Slip Copy (2013).	30-Oct-13	Federal	Criminal	Won	Yes
U.S. v. Wilcox, 415 Fed. Appx. 990 (2011)	28-Feb-11	Federal	Criminal	Won	Yes
USA v. Williams, 796 F.3d 951 (2015).	1-Oct-15	Federal	Criminal	Won	Yes

Civil Cases

Two of the civil cases involved open records requests and LEAs refusing to provide information.[2] In the first case, the ACLU sued the New Jersey Division of Criminal Justice (DCJ) for responding to an open records request for documents "pertaining to all forms of ALPR technology" by providing 79 pages of redacted documents. The court eventually found in favor of the ACLU and required the DCJ to turn over the documents.

The second case involved employees of the *Democrat & Chronicle*, a subsidiary of Gannett, Inc., suing New York's Monroe County for failing to provide ALPR data on personally owned vehicles following a lawful request. The employees requested the data under New York's Freedom of Information Law, but the county employee refused, claiming they had provided inadequate proof of ownership. The court reviewed the evidence and ruled in favor of the newspaper employees.

One of the civil cases was a lawsuit against an LEA for damages relating to a mistaken read from an ALPR system, wherein neither the initial nor arresting officers verified the accuracy of the ALPR read, which is required according to the local police department's policy.[3] An ALPR system can provide the legal proof required to stop a vehicle (a seizure) and perform a search, but because the officers did not follow the correct locality's procedures by verifying the ALPR's accuracy, an individual was inappropriately detained, and the legality of the search and seizure was undermined. The ultimate decision in this case was divided, with the court ruling in part both for the plaintiff and the city. The final civil case is related to ALPR, but is very distinct from the purposes or intentions behind this study.[4] The case involved a private company suing the State of Arkansas over its law restricting ALPR use to specific purposes and certain groups. The legal questions in this case were not germane to transportation agencies' use of ALPR systems or the overall study scope, so analysis was not pursued further.

Criminal Cases

The bulk of the 15 cases were criminal, with many similarities, recurring themes, and most following a similar narrative. The cases often begin with a patrol officer's ALPR identifying a plate tied to a criminal activity (e.g., a stolen vehicle, expired license plate). The officer stops the vehicle, approaches the driver, notices evidence of an unrelated criminal activity (e.g., drugs, firearms), and arrests the individual. The individuals would commonly claim they were pulled over without probable cause, or that they were subject to an illegal search from the ALPR, and any evidence discovered as a result should be suppressed

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[2] *ACLU v. New Jersey Division of Criminal Justice, 435 N.J. Super. 533. (2014).*
[3] *Green v. San Francisco City and County.* 751 F.3d 1039 (2014).
[4] *Digital Recognition Network, Inc. v. Hutchinson,* 803 F.3d 952 (2015).

at trial. Some would contend that their right to privacy was violated as well. The courts would hold that a person does not have a reasonable expectation of privacy for a publicly displayed license plate tag and, as a result, public ALPR surveillance is not an invasion of privacy.[5]

On the question of probable cause, a positive ALPR hit is essentially an extension of a police officer's investigatory ability, wherein an officer checks publicly available and displayed information (a license plate) against a criminal database to determine if the plate is associated with any crimes. Since this is an established legal concept, the courts ruled that a positive ALPR hit can provide a reasonable and articulable suspicion for stopping and detaining a driver to check license and registration. For example, in *Hernandez-Lopez v. State*, the defendant moved to suppress the evidence acquired after an officer received an alert from his ALPR system notifying that the license plate on the vehicle was linked to a person wanted for failure to appear.[6] The court had two holdings in this case: first, that the "officer had a reasonable, articulable suspicion sufficient to support the traffic stop based on alert from the LPR system." Second, "[The] State's alleged failure to establish that LPR system met foundation requirements for admissibility did not require suppression of the stop." In all of the cases following this theme, the State prevailed and attempts to suppress evidence resulting from LPR stops were dismissed.

Law Enforcement Agency ALPR Policies

In addition to the State laws described in the preceding section, many individual law enforcement agencies have developed or intended to develop policies regarding acceptable uses, retention, and protection of ALPR data. Sometimes these policies are developed specifically to address the expressed or anticipated community concerns (Klein, 2013).

Of the agencies responding to the 2009 NIJ survey, 48 percent indicated that they had a policy in place governing ALPR use, data sharing and access, and/or data retention; an additional 15 percent were developing an ALPR policy (Roberts & Casanova, 2012). A survey of 27 law enforcement agencies in 2012 found similar results; 45 percent of the responding agencies currently had policies in place regarding ALPR use and/or data, and 15 percent were developing policies (MCCA, 2013). Table 8-A summarizes selected elements of ALPR policies among agencies that were described in the reviewed literature: (1) whether or not the policy permits analytic use of stored ALPR data (particularly data that is not associated with an existing vehicle hotlist), (2) data retention periods, and (3) whether data is shared with other agencies. This small sample of ALPR policies illustrates the wide spectrum of data retention, as well as (in some cases) the open question of whether and how data is shared among agencies.

Table 8-A. Elements of ALPR Policies at Law Enforcement Agencies.

Agency	ALPR Policy Elements		
	Use of Non-Hit Stored Data?	Retention of Non-Hit Data	Data Sharing
Virginia State Police (Brophy, 2015)	No	24 hours	No
Minnesota State Patrol (MN State Patrol, 2015)	No	48 hours (applies to all data)	Not specified
Culpeper, VA, Police (Brophy, 2015)	Yes	30 days	Not specified
Alameda, CA, Police (Alameda PD, 2015)	Yes	6 months	No
Newark, NJ, Police (Potts & Wright, 2014)	Yes	6 months	Not specified
Fairfax, VA, Police (Brophy, 2015)	Yes	364 days	Not specified
Vermont LEAs (Macarilla, 2010; Newell, 2014)	Yes	18 months (was 4 years prior to 2013 ALPR law)	Yes

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[5] *Hill v. State*, 321 Ga.App. 817 (2013).
[6] *Hernandez-Lopez v. State,* 319 Ga. App. 662 (2013).

Agency	ALPR Policy Elements		
	Use of Non-Hit Stored Data?	Retention of Non-Hit Data	Data Sharing
East Haven, CT, Police (East Haven PD, 2014)	Yes	3 years	Yes
Texas Department of Public Safety Guidelines (2014)	Yes	3 years	Yes (proposed)
Orlando, FL, Police (Orlando PD, 2011)	Yes	Not specified	Not specified
Milwaukee Police (Milwaukee Police Department, 2013)	Yes	Not specified	Yes

Implications for Our Study

There is not a great deal of existing literature regarding law enforcement's use of ALPR specific to traffic safety purposes. This seems to reflect the lower prevalence of traffic safety as a primary objective for ALPR use. Law enforcement agencies more frequently use ALPR to combat criminal activity (ranging from stolen vehicles to terrorist and gang activity), or to improve collection of fines and fees for parking violations and similar minor infractions. Traffic safety appears more frequently as a secondary or incidental objective for a law enforcement agency, as far as ALPR use is concerned. Because traffic safety uses of ALPR are less prevalent overall, there are fewer details and analyses in the literature focusing on practices, effectiveness, policies, or issues relating to ALPR data collected for these purposes.

Because most traffic safety uses of ALPR data involve reactive use of data (meaning that law enforcement officers receive and act on information pertaining to license plates that have been placed on hotlists) rather than analysis of stored data, there are likely fewer associated privacy issues and legal challenges compared with other ALPR uses. However, there is some indication of lower community acceptance of ALPR for some traffic safety uses, such as detecting drivers with suspended or revoked licenses, so there could be potential for legal challenges to these uses.

The literature provides a strong overall background regarding the uses of ALPR data by law enforcement, the background and scope of privacy concerns, the history of legal challenges, and costs associated with ALPR systems. The literature's relative lack of detail about several of this study's research questions regarding use of ALPR for traffic safety purposes (effectiveness and value, traffic-safety-specific legal challenges, data retention and sharing policies) means that much of that information will need to be obtained from the upcoming law enforcement agency case studies.

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Tracy, M., Cotter, H., & Nagel, W. (2009). Privacy impact assessment report for the utilization of license plate readers. Alexandria, VA: International Association of Chiefs of Police.

Traffic Technology International. (2010, April). Everything you wanted to know about ALPR… and more. Dorking, Surrey, United Kingdom: Author. Utah. Section 41-6a-2001: Automatic license plate reader system act. 2014. http://le.utah.gov/xcode/Title41/Chapter6A/C41-6a-P20_1800010118000101.pdf

Vermont. Section § 1607: Automatic License Plate Recognition Systems. 2013. http://legislature.vermont.gov/statutes/section/23/015/01607.

Vermont Department of Public Safety, Division of State Police. (2014). Annual Report to the Vermont Senate and House Committees on Judiciary and Transportation as Required by 23 V.S.A. $ 1607 Automated License Plate Recognition Systems. https://www.theiacp.org/sites/default/files/all/u-z/VT-2014-ALPR-Annual-Report-VPR.pdf

Watson, B., & Walsh, K. (2008). The road safety implications of automatic number plate recognition technology (ANPR). Queensland, Australia: The Centre for Accident Research & Road Safety.

Weise, E., & Toppo, G. (2013, July 19). License plate scanners: Love 'em or loathe 'em. McLean, VA: USA Today. http://web.a.ebscohost.com/ehost/detail/detail?sid=e272e1d6-faca-4219- ba74-d655a4649b85%40sessionmgr4001&vid=1&hid=4104&bdata=JnNpdGU9ZWhvc3QtbG l2ZQ%3d%3d#AN=J0E157315969113&db=a9h

Wolfe, J. (2011, June 3). License plate readers help cops catch more wanted motorists. Swarthmore, PA: Daily Times News. www.delcotimes.com/article/DC/20110306/NEWS/303069989

Wordsworth, S. (2008, February/March). *Recognition in the field: The continued rise of ALPR*. Dorking, Surrey, United Kingdom: Traffic Technology International

Annotated Bibliography

Listed in this annotated bibliography are the documents located through the literature search that addressed one or more of the study research questions and that contributed to the synthesis of findings presented in this report.

Alameda Police Department. (2015, February). Alameda Police Department Policy Manual: Automated License Plate Readers (ALPRs). (Policy Number 462). Available at www.eff.org/files/2016/04/08/alameda_police_department_alpr_policy_20160122.pdf

    The policy document states that appropriate uses of ALPRs include targeting unregistered and expired registered vehicles and unlicensed and suspended licensed drivers.

American Civil Liberties Union. (2013, July). *You are being tracked: How license plate readers are being used to record Americans' movements*. New York: Author. www.aclu.org/files/assets/071613-aclu-alprreport-opt-v05.pdf

    This report focuses on the privacy issues surrounding ALPR. The main issue is data retention; specifically how much data is kept on non-hit reads and for how long. The report also outlines many potential scenarios for ALPR data to be abused.

American Civil Liberties Union. (2012, September 19). Model ALPR Policy for Law Enforcement. www.aclu-ia.org/iowa/wp-content/uploads/2012/09/Model-ALPR-Policy-for-Iowa-Law-Enforcement.pdf

    This model policy created by the ACLU includes using ALPR for targeting unregistered and expired registered vehicles, unlicensed and suspended licensed drivers, and drivers with unpaid fines.

Atiyeh, C. (2014, October). Screen-Plate Club. Ann Arbor, MI: Car & Driver, Vol. 60 Issue 4. www.caranddriver.com/features/screen-plate-club-how-license-plate-scanning-compromises-your-privacy-feature

    This article focuses mostly on private companies that use ALPRs and some of the laws around the US that have been implemented to regulate private and government ALPR use.

Aubry, H., & Danly, E. (2015). Law Enforcement Use of Cameras and Other Technology Usage and Data Retention Policies; Disclosure and Privacy Issues. Sacramento, CA: League of California Cities. www.cacities.org/Resources-Documents/Member-Engagement/Professional-Departments/City-Attorneys/Library/2015/2015-Annual-Conference/10-2015-Annual-Heather-Aubry-Eric-Danly-Law-Enforc.aspx

    This document provides California's legal justification for not releasing ALPR data to the public.

Basich, M. (2012, February 13). Nowhere to hide from license plate recognition. Torrance, CA: Police Magazine.

    This article mentions using ALPR to identify people with suspended licenses.

Bindsbergen, J. (2015, July). Court rules that data from automated license plate reader searches are not discoverable under the Public Records Act. www.lozanosmith.com/news/cnb/CNB352015.pdf

This article is about public access to ALPR searches.

Bromage, A. (2013, February 13). Vermont Legislature considers limiting use of automated license plate readers. Seven Days (Web site). Burlington, VT: Da Capo Publishing, Inc. www.sevendaysvt.com/vermont/vermont-legislature-considers-limiting-use-of- automated-license-plate-readers/Content?oid=2244281

This article discusses ALPR use in Vermont. It mentions that ALPRs are used for expired registrations and suspended licenses. It mentions the process police use to verify information and that DMV info is updated weekly which limits the accuracy of the system.

Brophy, A. (2015, September 5). License plate readers: Privacy vs. public safety. Culpeper, VA: Culpeper Star Exponent (BH Media Group, Inc.). www.dailyprogress.com/starexponent/license-plate-readers-privacy-vs-public- safety/article_557c3530-541a-11e5-9942-c7bf5688b250.html

This newspaper article looks at the data retention and privacy issues surrounding ALPR in Virginia.

Bureau of Justice Assistance. (2005). Fusion Center Guidelines: Developing and sharing information and intelligence in a new era: Guidelines for establishing and operating Fusion Centers at the local, State, and Federal levels: Law enforcement intelligence, public safety, and the private sector Department of Justice & Department of Homeland Security. www.it.ojp.gov/documents/ fusion_center_guidelines_law_enforcement.pdf
Available at www.hsdl.org/?view&did=471518

This is a guidance document for the development and operation of regional fusion centers (multi-agency information and intelligence-sharing projects for law enforcement and homeland security efforts). Topics include development of mission statements, data sharing agreements, information security protocols, and technological needs.

Champagne, D. M. (2015, February 19). Gannett appeals decision in license plate reader case. Rochester, NY: The Daily Record. Available at http://lib-ezproxy.tamu.edu:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=lgh&AN=L54892156DRNY&site=ehost-live.

This news article is about public access to ALPR records. The court ruled a citizen can obtain ALPR records for their own vehicle and for certain government vehicles, but not for other private residents.

Chen, D. (2012, November 6). Automatic License Plate Recognition Systems. (Report No. 2012-R-0482). Hartford, CT: Connecticut General Assembly Office of Legislative Research. http://worldcat.org/arcviewer/6/CZL/2012/11/13/H1352825442959/viewer/file2.htm

This is a brief summary of ALPR in Connecticut that mentions privacy and legal concerns.

Chigos, J. (2014, October 15). License Plate Recognition: The "secret sauce" for successful citywide surveillance. Law enforcement technology. Vol. 41, no. 10. Available at www.officer.com/article/11613653/license-plate-recognition-the-secret-sauce-for-successful-citywide-surveillance.

This article describes potential uses of ALPR data to detect patterns of travel and to track vehicles based on locations they visited, as a tool in terrorism or criminal investigations.

City of Evanston. (2012, February 17). Police Now Using Automated License Plate Reader. www.cityofevanston.org/news/2012/02/police-now- using-automated-license-plate-reader/

An article that mentions the Evanston, IL PD may use ALPR for identifying unlicensed drivers.

Clark, M. (2013, November 20). License plate readers spark privacy, public safety debate. McLean, VA: USA Today. www.usatoday.com/story/news/2013/11/20/license-plate-readers-spark-privacy-public-safety/3650273/

This article looks at the privacy issues of ALPR in the context of the NSA scandal and the Boston Marathon bombing.

Cook, R. (2012, November 30). Are automatic license plate readers a violation of privacy. Atlanta Journal-Constitution. www.ajc.com/news/news/are-automatic-license-plate-readers-a-violation-of/nTKg7/.

This newspaper article looks at the data retention issues surrounding ALPR in Georgia.

Davis, M. (2013, January 23). Vermont Bill Targets License Plate Readers. West Lebanon, NH: Valley News. www.vnews.com/home/3959026-95/readers-information-police-plate

This article is about the Vermont Legislature looking into data retention limits.

Delaney, M. (2012, July 17). Automatic license plate recognition helps police nab wanted vehicles and drivers. (Web page at StateTech). Vernon Hills, IL: CDW LLC. www.statetechmagazine.com/article/2012/07/automatic-license-plate-recognition- helps-police-nab-wanted-vehicles-and-drivers

This online news article includes an anecdotal story of an ALPR to identify a person with a suspended license for a prior DWI conviction.

Dobbs, T. (2014, September 24). License plate scanners raise privacy concerns, but do they help police? (Web page). Concord, NH: New Hampshire Public Radio. http://nhpr.org/post/license-plate-scanners-raise-privacy-concerns-do-they-help-police

This is an article that discusses ALPR use in Vermont. It states there has been no increase in citations issued for traffic violations since ALPRs use began. The article goes over how police use ALPRs and verify the information.

East Haven Police Department. Automated License Plate Readers. (2014, July 29).
www.easthavenpolice.com/files/3114/0682/9572/402.2_-
_Automated_License_Plate_Readers_LPR_Effective_09-01-2014.pdf

States' ALPRs may be used for "the identification and removal of stolen, unregistered, and uninsured motor vehicles, and enforcement of parking rules and regulations."

Eberline, A. (2008, June). *Cost/benefit analysis of electronic license plates* (Report No. FHWA-AZ-08-637). Phoenix, AZ: Arizona Department of Transportation. Arizona Dept. of Transportation at http://ntl.bts.gov/lib/30000/30600/30610/AZ637.pdf but migrated to https://rosap.ntl.bts.gov/view/dot/16564

The paper focuses mostly on the cost benefit analysis of ALPR and RFID (toll tags). The paper analyzes each and compares the two. There is a discussion on the initial costs of ALPRs along with monetizing the benefits, such as increased revenue from unpaid vehicle registrations. The cost benefit analysis is largely based on estimates. Much of the discussion centers around tolling, and identifying unpaid registrations and insurances, but there is discussion on using ALPRs for other traffic safety related purposes, including monitoring traffic flow and congestion.

Farrell, P. (2014, February 12). Maryland license plate recognition networks prompt State, Federal concerns. Annapolis, MD: Capital News Service. http://cnsmaryland.org/2014/02/12/maryland-license-plate-recognition-networks-prompt- state-federal-concerns/

This article provides a statistic that in Maryland, only .2 percent of scanned license plates result in hits, and 97 percent of those are elated to revoked registration or violation of Maryland's Vehicle Emission Inspection Program. The article does not provide information on which hits police choose to act upon.

Gatewood, J. C. (2013). It's raining Katz and Jones: The implications of United States v. Jones A case of sound and fury. *Pace Law Review, Volume 33*, Issue 2, Spring. http://digitalcommons.pace.edu/cgi/viewcontent.cgi?article=1832&context=plr.

This is a law review journal that looks at the legal and privacy implications of ALPR.

Gierlack, K., Williams, S., LaTourrette, T., Anderson, J., Mayer, L., & Zmud, J. (2014). *License plate readers for law enforcement: Opportunities and obstacles.* Santa Monica, CA: RAND Corporation. www.rand.org/content/dam/rand/pubs/research_reports/RR400/RR467/RAND_RR467.pdf

This paper provides an overview of ALPRs and includes case studies for several different cities. The case studies provide information on how different agencies (different based on size, location, etc.) use ALPRs as well as lessons learned. The paper also addresses legal and privacy concerns, as well as the challenges of using ALPRs (i.e., in general, and not specific to traffic safety issues).

Glaskin, M. (2009, February). Camera-shy: Running out of excuses to delay deployment of ALPR? Dorking, Surrey, United Kingdom: Traffic Technology International.

This article focuses on the public's privacy concerns about using ALPRs for traffic enforcement, especially speed enforcement and the use of ALPRs for tolling.

Gordon, A., & Wolf, R. (2007, March). License Plate Recognition Technology Innovation in Law Enforcement Use (Web pages of online publication). FBI Law Enforcement Bulletin. www.researchgate.net/profile/Ross_Wolf/publication/258178060_License_Plate_Recognition_ Technology_Innovation_in_Law_Enforcement_Use/links/0c96053c521d6f00ff000000.pdf

This article gives a general overview of ALPRs.

Gutierrez-Alm, J. (2015). The privacies of life: Automatic license plate recognition is unconstitutional under the mosaic theory of Fourth Amendment privacy law. *Hamline Law Review, 38*(1), 127-160. http://digitalcommons.hamline.edu/cgi/viewcontent.cgi?article=1054&context=hlr

This law review article goes over the law cases relevant to public surveillance, such as with ALPR. It then describes a relatively new idea called the "mosaic theory" that states an individual event, such as one ALPR reading, is not a violation of privacy, but when many of these events are combined, they become an invasion of privacy.

The courts have only recently begun exploring this idea, but there has been no definitive guidance established by the Supreme Court as to when enough individual events become an unreasonable search.

Han, L. D. (2010, June). *U09: License plate recognition (Phase B).* Research and Innovative Technology Administration. Available at https://rosap.ntl.bts.gov/view/dot/18114/dot_18114_DS1.pdf

This paper looks at the use of ALPRs for speed enforcement in order to reduce truck speeds and emissions. The paper provides an in-depth analysis of how ALPRs work and how accuracy is measured.

Hargrove, S. (2007). Commercial Vehicle Enforcement Using License Plate Recognition Technology (Master's degree dissertation). Knoxville, TN: University of Tennessee. http://etd.utk.edu/2007/Theses/HargroveStephanie.pdf

This paper looks at two commercial vehicle traffic safety uses for ALPRs. First, this study used ALPRs to determine the speed of commercial vehicle in urban areas where the speed limit for commercial vehicles had been reduced. Second, the study used ALPRs to identify which commercial vehicles chose not to go to weigh stations and what companies operated those commercial vehicles, to determine if certain companies or drivers regularly chose to avoid weigh stations.

Hermann, J. (2015) The surveillance state: Do license plate readers impinge upon Americans' civil liberties? *Themis: Research Journal of Justice Studies and Forensic Science: Vol. 3*: Iss. 1, Article 4. Available at http://scholarworks.sjsu.edu/themis/vol3/iss1/4

This journal article centers on many of the privacy issues associated with ALPRs, highlighting the points on both sides of the issue. The article describes how private companies that use ALPRs, such as auto repossession companies, share/sell their ALPR data to law enforcement.

Hockley, B. (2013, February 12). Vigilant License Plate Reader (LPR) Aids Police in Athens. (Web page of Vigilant Solutions, a software company producing license plate reading software). Livermore, CA: Vigilant Solutions. http://vigilantsolutions.com/in-the- news/vigilant-license-plate-reader-anpr-lpr-aids-athens-police

This news article discusses using ALPR to identify unregistered vehicles and unlicensed drivers. The article mentions that Athens police officers get more hits than they can stop and they prioritize unlicensed driver hits over unregistered vehicles because they view unlicensed drivers as greater threats to traffic safety.

Hsu, J. (2014, July 8). 70 percent of U.S. police departments use license plate readers. *IEEE Spectrum*. http://spectrum.ieee.org/cars-that-think/transportation/sensors/privacy-concerns-grow-as-us-police-departments-turn-to-license-plate-readers

This article gives an overview of ALPR and cites the number of people issued traffic citations and identified as driving with a suspended license compared to other crimes.

Hubbard, T. E. (2008). Automatic license plate recognition: An exciting new law enforcement tool with potentially scary consequences. Syracuse, NY: Syracuse Science and Technology Law Reporter (Syracuse University College of Law). http://jost.syr.edu/wp-content/uploads/automatic-license-plate-recognition_an-exciting-new-law-enforcement-tool-with-potentially-scary-consequences.pdf

This paper was written by a candidate for a doctor of law degree. He reviews the laws allowing the police to run a license plate check and the privacy issues of retaining the data.

Hughes, T. (2010, March 4). Police partner with license plate readers. McLean, VA: USA Today. Available at http://usatoday30.usatoday.com/news/nation/2010-03-03-license-plate-cameras_N.htm

This news article briefly explains ALPR, lists several agencies using ALPR, and highlights some success stories. It also touches on people's concerns, such as privacy.

Information Management (2012). D.C. Police Criticized for Storing License Plate Data. *Information Management, 46.2* (2012)

This is an article that expresses community privacy concerns with ALPR.

Insinna, V., & Magnuson, S. (2012, November). License plate reader technology sparks lawsuit. *National Defense, Vol. 97* Issue 708.

The ACLU has filed lawsuits against State and Federal agencies to gain access to ALPR data and to understand how ALPRs are used, but these agencies are fighting the requests.

Jackson-Green, B. (2015, April 21). Proposed rules for license-plate tracking balance privacy with effective law enforcement (Web page). Chicago: Illinois Policy. www.illinoispolicy.org/proposed-rules-for-license-plate-tracking-balance-privacy-with-effective-law-enforcement/

This document discusses proposed laws in Illinois to limit ALPR data retention.

Johnson, C. (2015, October 20). Constitutional Law First Amendment; Standing; License Plate Data (Online subscription). Minneapolis: Minnesota Lawyer.com. Available at https://minnlawyer.com/2015/10/20/constitutional-law-first-amendment-standing-license-plate-data/

This article focuses on a court case in Arkansas that was dismissed due to lack of standing. Plaintiffs sued several government officials for using ALPR and violating their rights, but the suit was dismissed because government officials had immunity from lawsuits.

Kingsley, C. (2012, July 19). Arnold residents leery about license plate scanner (Online subscription. St. Louis: Missouri Lawyers Media. Available at https://molawyersmedia.com/2012/07/19/residents-leery-about-license-plate-scanner/

This article mentions residents are concerned about their local police department using ALPRs. States the cost of the ALPRs are $16,000 each.

Klein, A. (2013, March 7). Virginia limits use of police license-plate cameras (Web page news story). The Washington Post. Available at www.washingtonpost.com/local/virginia-limits-use-of-police-license-plate-cameras/2013/03/07/f1344c00-876d-11e2-98a3-b3db6b9ac586_story.html?utm_term=.ba2eb65dc4be

This article discusses the limits Virginia has placed on ALPR data retention.

Klein, A., & White, J. (2011, November 19). License plate readers: A useful tool for police comes with privacy concerns. The Washington Post. www.washingtonpost.com/local/license-plate-readers-a-useful-tool-for-police- comes-with-privacy-concerns/2011/11/18/gIQAuEApcN_story.html

This news article focuses mostly on the crime enforcement capabilities of ALPR. It mentions that in the Washington area, there are now hundreds of cameras that are being used, but there has been little public debate as to how the cameras should be used and for how long the data is stored.

Knapp, F. (2013, July 26). Nebraska License Plate Scanning Raises Technology, Privacy, Legal Concerns (Online news article from Nebraska PBS and NPR affiliate). Lincoln, NE: Net Nebraska. Available at http://netnebraska.org/article/news/nebraska-license-plate-scanning-raises-technology-privacy-legal-concerns

This article discusses the privacy and legal concerns surrounding ALPR, especially in regard to specific Nebraska State laws regarding data retention.

Kostadinov, D. (2014, February 7). Privacy Implications of Automatic License Plate Recognition Technology. (Web page). Chicago, IL: Infosec Resources. http://resources.infosecinstitute.com/privacy-implications-automatic-license-plate-recognition-technology/

This article gives an overview of the many issues surrounding privacy.

Li, V. (2014, October). Law enforcement's latest highway tech speeds up info-gathering, but critics say it violates privacy (Web page). *ABA Journal Vol. 100* Issue 10. Available at www.abajournal.com/magazine/article/data_driven_latest_highway_technology_speeds_up_info_gathering_but_critics/

The main focus is on private companies that use and collect ALPR data to sell to other entities. A court in Arkansas ruled private companies have the right to use ALPR cameras in public.

Lum, C., Hibdon, J., Cave, B., Koper, C. S., & Merola, L. (2011, December). License plate reader (LPR) police patrols in crime hot spots: an experimental evaluation in two adjacent jurisdictions. *Journal of Experimental Criminology, Vol. 7*, Issue 4. Available at https://www.researchgate.net/publication/225532445_License_plate_reader_LPR_police_patrols_in_crime_hot_spots_An_experimental_evaluation_in_two_adjacent_jurisdictions

This article discusses a case study in Alexandria and Fairfax County, Virginia, using ALPRs in crime hot spots. The focus is on auto thefts and other crime reduction. The study found there was no drop in crime in the hot spot areas using ALPRs.

Lum, C., Merola, L., Willis, J., & Cave, B. (2010). *License plate recognition technology (LPR) impact evaluation and community assessment.* Fairfax, VA: George Mason University Center for Evidence-Based Crime Policy Department of Criminology. http://cebcp.org/wp-content/evidence-based-policing/LPR_FINAL.pdf

There are four main sections to this paper. The first is an overview of ALPR technology and use. The second part is a survey of law enforcement agencies around the US about their use and experiences with ALPR (including for traffic safety purposes), as well as law enforcement concerns. The third section is a case study with Virginia's Alexandria Police Department and Fairfax County Police Department that looks at the effectiveness of ALPRs in reducing auto thefts and crime in pre-identified hot spots. The final section discusses legal issues and includes a survey of residents from Fairfax County about their acceptance and concerns of ALPRs in their community.

Luthern, A & Crowe, K. (2013, December 3). Proposed Wisconsin bill would set rules for license-plate readers (Online newspaper article). Milwaukee, WI: Milwaukee Journal Sentinel. www.jsonline.com/news/milwaukee/proposed-wisconsin-bill-would-set-rules-for-license-plate-readers-b99155494z1-234324371.html

This article looks at privacy issues and proposed legislation by the Wisconsin Legislature to set limits on data retention.

Lynch, J., & Bibring, P. (2013, May 6). Automated License Plate Readers Threaten Our Privacy (Web page). San Francisco: Electronic Foundation Frontier. www.eff.org/deeplinks/2013/05/alpr

This article provides a general overview of privacy and data retention issues.

Macarilla, M. C. (2010, December). *Operation of license plate readers for law enforcement agencies accessing the Vermont Justice Information Sharing System (VJISS).* Waterbury, VT: Department of Public Safety. Available at www.yumpu.com/en/document/read/47051904/operation-of-license-plate-readers-for-law-enforcement-aclu

The document notes the use of ALPR in order to improve traffic safety by removing unregistered vehicles and unlicensed drivers.

Manson, T. M. (2008, September). Automatic License Plate Recognition. Deerfield, IL: Public Safety IT (Hendon Media Group).

This article goes over the basics of ALPR. Briefly mentions example of putting ALPRs on school buses to identify people who illegally pass school buses when they should stop.

Martinez, M. (2013, July 18). Policing advocates defend use of high-tech license plate readers (Web page news article). Atlanta: CNN. www.cnn.com/2013/07/18/us/license-plate-readers/

This article provides a general overview of the privacy issues surrounding ALPR.

McKay, J. (2008, April 8). License plate recognition systems extend the reach of patrol officers (Web article in Government Technology, online magazine). Folsom, CA: Government Technology (division of e.Republic, Inc.) Available at www.govtech.com/dc/articles/License-Plate-Recognition-Systems-Extend-the.html?page=1

This article reviews the basics of ALPR technology and highlights the use by a handful of agencies across the United States. Most of the uses discussed are for crime, but the article also mentions that agencies are beginning to use them to identify unregistered vehicles.

Merola, L. M., & Lum, C. (2012) Emerging surveillance technologies: Privacy and the case of license plate recognition (LPR) technology. *96 Judicature 119* (2012-2013) Available at http://heinonline.org/HOL/Page?handle=hein.journals/judica96&div=35&g_sent=1&collection=journals

This journal article focuses on the legal aspects of ALPR. It goes over previous court cases related to police surveillance and more recent cases related directly to ALPR. The main legal debate centers on whether or not large scale data collection and surveillance capabilities of ALPR constitute an unreasonable search. The article notes that the courts have left many questions unanswered as of right now.

The second part of the article is a survey of Washington, DC, residents and their attitudes towards ALPR. The survey found that a majority of respondents thought that data collected by ALPRs was private.

Merola, L. M., & Lum, C. (2014, September). Predicting public support for the use of license plate recognition technology by police. *Police Practice & Research, Vol. 15,* Issue 5. Available at www.tandfonline.com/doi/pdf/10.1080/15614263.2013.814906

This report looks at a survey of community support for ALPR to identify factors related to community support.

Merola, L. M., & Lum, C. (2015). Understanding citizen support for license plate readers. *Translational Criminology,* Spring 2015. www.bja.gov/bwc/pdfs/TC8-Spring2015.pdf

    This article summarizes findings from surveys on public perceptions of ALPRs. The main takeaway is that the public generally supports the use of ALPRs, but support decreases when people do not trust the police and when the issue of data retention is mentioned.

Merola, L. M., Lum, C., Cave, B., & Hibdon, J. (2014). Community support for license plate recognition. *Policing: An International Journal of Police Strategies & Management, Vol. 37* Iss 1 pp. 30 51. Available at http://dx.doi.org/10.1108/PIJPSM-07-2012-0064

    This article is split into two sections. The first details the history of ALPR and the legal framework and questions surrounding ALPR. The second section discusses a survey sent to Washington DC residents. The survey found that people generally support ALPR, but know little about it. Support is generally qualified based upon the issue, with people being concerned with data retention and how police use ALPRs. For example, people support using ALPR to track specific criminals, such as a burglary suspect, but not for finding people with unpaid parking tickets.

Milwaukee Police Department. (2013, December 13). Standard Operating Procedure [Number] 735: Automated License Plate Readers (ALPR) (Web page of department regulation). Milwaukee, WI: Author. www.city.milwaukee.gov/ImageLibrary/Groups/cityFPC/agendas4/131219VIID.pdf

    This document states that "be on the lookout" (BOLOs) can be issued for vehicles believed to be driven by people with suspended or revoked licenses.

Minnesota Legislature. (2012, August 10). MN Legislature Collection of ALPR Articles. [Contains news articles by Eric Roper, Star Tribune (Minneapolis); Ali Winston, NBC; Devlin Barrett, Wall Street Journal; and Sonia Roubini, ACLU Speech, Privacy, and Technology Project]. www.senate.mn/committees/2015-2016/3067_Committee_on_Transportation_and_ Public_Safety/Rich Neumeister Documents (2).pdf

    The Minnesota Legislature organized this collection of articles about ALPRs in Minnesota.

Minnesota State Patrol (2015, February). MN State Patrol License Plate Reader (LPR) Fact Sheet. Saint Paul, MN: Author. www.senate.mn/committees/20152016/3067_Committee_on_ Transportation_and_Public_Safety/MN%20STATE%20PATROL%20LPR%20Fact%20Sheet.pdf

    Minnesota State Patrol allows ALPRs to be used for traffic safety purposes including targeting unregistered and non-licensed drivers. The document cites higher crash rates among non-licensed drivers as justification for ALPR use.

Mossier, J. (2013, January 9). Dallas City Council approves purchase of automated license plate readers for police. Dallas, TX: The Dallas Morning News. www.dallasnews.com/news/community-news/dallas/headlines/20130109-dallas- city-council-approves-purchase-of-automated-license-plate-readers-for-police.ece

    This article discusses the price of the ALPR purchases.

Newell, B. (2014). Local law enforcement jumps on the big data bandwagon: Automated license plate recognition systems, information privacy, and access to government information. *Maine Law Review, 66*:2, 397-436. www.mainelawreview.org/wp-content/uploads/2014/06/03-Newell.pdf

This law review goes over many of the legal arguments surrounding ALPR related to public surveillance and storage of private data. There is a section that details the laws regulating ALPRs at the State level. The article also summarizes many of the legal theories surrounding the Fourth Amendment and the right to privacy and to what extent that exists in a public space.

Newcombe, T. (2015, August 12). States Start Restricting Police License Plate Readers (Wen online magazine article). Governing. www.governing.com/columns/tech-talk/gov-automated-license-plate-readers-police.html

This article discusses how State legislatures are responding to ALPR data retention.

Noble, L. (2008). Identify fraud: Lies, damned lies, and license plate recognition. *Traffic Technology International,* October, 21–22.

This article focuses on how vendors distort how accurate their ALPRs are and what prospective buyers should be aware of.

Ozer, M. M. (2010, July 7). Assessing the Effectiveness of the Cincinnati Police Department's Automatic License Plate Reader System within the Framework of Intelligence-Led Policing and Crime Prevention Theory (Doctoral thesis, University of Cincinnati).

This doctoral dissertation looks into how ALPRs fit into intelligent led policing. The main focus of the study is the effect ALPR has on crime, in terms of crime reduction, arrests, etc. The dissertation tries to identify the best way to use and deploy ALPR for crime reduction.

Perera, D. (2013, July 17). Storing and Sharing License Plate Reader Scans Challenges Americans' Privacy. FierceGovernmentIT & FierceCities.

This article focuses on the privacy and data retention challenges of ALPR. It notes that some agencies participate in regional sharing of ALPR data. While those agencies' policies may allow data retention for a short period of time, the data may stay on the regional database much longer.

Police Executive Research Forum. (2012, January). Critical Issues in Policing: How Are Innovations in Technology Transforming Policing? Author. www.policeforum.org/assets/docs/Critical_Issues_Series/how are innovations in technology transforming policing 2012.pdf

A section of this paper looks at a case study done by Mesa, Arizona Police Department that found ALPRs were useful in identifying stolen cars and other criminals, but the study authors and law enforcement personnel felt more study is necessary because there are numerous factors that could have affected the increase in arrests from ALPRs. Additionally, there is a section with brief comments from seven other agencies that use ALPRs. They briefly discuss how they use ALPRs, their effectiveness, and privacy concerns.

Potts, J., & Wright, C. (2014, September 26). Recommendation to Install Two (2) Automatic License Plate Reader Systems. (Correspondence to Mayor and City Council, Newark, Delaware). http://cityofnewarkde.us/DocumentCenter/View/5288

This document states that ALPRs may be used to identify "local parking scofflaws."

Public Broadcasting Corporation. (2013, August 12). Do License Plate Readers Prevent Crime or Create Privacy Abuses? (Television interview by Gwen Ifill of Jeffrey Brown). Arlington, VA: Author. Available at www.pbs.org/newshour/bb/nation-july-dec13-plates_08-12/

This is a transcript of a video that discusses some of the privacy concerns surrounding ALPR.

Roberts, D., & Casanova, M. (2012). *Automated license plate recognition (ALPR) use by law enforcement: Policy and operational guide.* Alexandria, VA: International Association of Chiefs of Police. Available at www.ncjrs.gov/pdffiles1/nij/grants/239604.pdf

This document gives an overview of ALPRs, including the history and development, technology, uses, and policies of ALPRs. Additionally, there is survey of law enforcement agencies (done in 2009) to identify which types of agencies (based on size and jurisdiction) use ALPRs and for what purpose(s). The survey also goes over LEA ALPR policies such as hotlist management, data retention, and legal and privacy concerns. Finally, there is a legal memo produced by the New York Division of Criminal Justice Services that lays out the legal reasoning allowing the use of ALPRs.

Orlando Police Department. (2011, July 18). Orlando Police Department Policy and Procedure 1137.1, Automated License Plate Reader. Orlando Police Department.

This policy document states that ALPRs may be used against "habitual traffic offenders."

Rushin, S. (2011). The Judicial Response to Mass Police Surveillance. *Illinois Journal of Law, Technology, and Policy, 2*, 281-328. http://illinoisjltp.com/journal/wp-content/uploads/2013/10/Rushin.pdf

This law journal article argues for the court system to take a more proactive approach in regulating emerging technologies, such as ALPR, that can be used for mass surveillance. The journal article lays out the current legal framework allowing ALPR and then discusses some recent cases that can serve as the base for the courts to begin restricting what law enforcement can and cannot do with new technologies and mass surveillance.

Schewe, T. (2014, May 28). ALPR Effective in detection of unlicensed drivers (Newspaper article from now defunct newspaper). Port Alberni, Vancouver, BC: Alberni Valley Times.

This article retrieved from LexisNexis gives a brief overview of ALPR and some statistics on the number of unlicensed and suspended license drivers found in British Columbia.

Schoenberg, S. (2015, February 25). Privacy advocates call for limits on use of police license plate scanners (Web page). Springfield, MA: MassLive Media. www.masslive.com/politics/index.ssf/2014/02/privacy_advocates_call_for_lim.html.

This article discusses many of the privacy and data retention issues in Massachusetts.

Shaw, M. (2015, February 1). License plate data retention debated by police, ACLU. Ogden, UT: Standard Examiner. www.standard.net/Police/2015/02/01/While-other-states

This looks at the privacy perspective of ALPR and how some State legislature are responding with limiting data retention.

Simons, A. (2015, January 24). State lawmakers debate shelf life of license-plate reader data (Web newspaper article) Minneapolis: Star Tribune. www.startribune.com/legislators- debate-shelf-life-of-license-plate-reader-data/289687981/

This article is about the Minnesota Legislature looking into data retention limits.

Stonebrook, M. S. (2013). MCCA Agency Use of License Plate Readers (LPRs): Results of Survey Conducted by Major Cities Chiefs Legal Advisors' Committee. Presented at Major Cities Chiefs Association Winter Conference, Washington DC, January 28–29, 2013. www.majorcitieschiefs.com/pdf/news/mcc_lpr_survey_report.pdf

This article gives statistics on how large police departments use ALPRs. The survey does not include any responses indicating traffic safety use, but there are several questions on data retention and classification.

Sullivan, M. (2013, October). *License-plate scanning: The inside story*. (Web page). Boston: PC World, Vol. 31 Issue 10, p15-17. Available at www.pcworld.com/article/2044779/license-plate-scanning-the-inside-story-of-a-cop-who-tracks-our-data.html

This article discusses the privacy concerns of ALPR.

Texas Department of Public Safety. (2014, September). Privacy Impact Assessment for the Texas Department of Public Safety (DPS) Collection, Storage, Management and Use of Automated License Plate Reader Data.

The document briefly states that TxDPS does not anticipate at this time using ALPR to identify unlicensed/suspended drivers.

Tracy, M., Cotter, H., & Nagel, W. (2009). Privacy impact assessment report for the utilization of license plate readers. Alexandria, VA: International Association of Chiefs of Police.

This is an assessment of the privacy issues surrounding ALPRs. There is discussion and many examples on the types of data collected, how the data is collected, access and dissemination of the data, potential for use in longitudinal analysis, and retention of the data. This document provides an understanding of the privacy concerns surrounding ALPRs.

Traffic Technology International. (2010, April). Everything you wanted to know about ALPR… and more. Dorking, Surrey, United Kingdom: Author. Utah. Section 41-6a-2001: Automatic license plate reader system act. 2014. http://le.utah.gov/xcode/Title41/Chapter6A/C41-6a-P20_1800010118000101.pdf

This article briefly discusses how ALPRs are used and the specifications interested buyers should be aware of, such as how various venders define accuracy. Other articles in the document focus on the use of cameras for speed enforcement.

Tuohy, J. (2015). Do license plate readers invade privacy? McLean, VA: IndyStar [Division of USA Today]. www.indystar.com/story/news/2015/02/16/license-plate-readers-invade-privacy/23508307/

This article looks at privacy and a bill in Indiana to limit ALPR data retention.

Vermont Department of Public Safety, Division of State Police. (2014). Annual Report to the Vermont Senate and House Committees on Judiciary and Transportation as Required by 23 V.S.A. $ 1607 Automated License Plate Recognition Systems. Available at www.theiacp.org/sites/default/-files/all/u-z/VT-2014-ALPR-Annual-Report-VPR.pdf

This Annual Report to the Vermont Legislature provides statistics on the use of ALPRs nd describes ALPR success stories.

Watson, B., & Walsh, K. (2008). The road safety implications of automatic number plate recognition technology (ANPR). Queensland, Australia: The Centre for Accident Research & Road Safety.

This report shows that the vast majority of ALPR manual entries are for crimes, not traffic safety issues.

Watson, B., & Walsh, K. (2008). *The road safety implications of automatic number plate recognition technology (ANPR).* Queensland, Australia: The Centre for Accident Research and Road Safety.

This paper was written in 2008 but gives examples of potential traffic safety uses for ALPRs. These include identifying unlicensed drivers which are involved in a disproportionate number of crashes in Australia, identifying unregistered vehicles which have been associated with drivers with high risk behaviors, identifying provisional licensed drivers driving after hours, and speed enforcement. Additionally it provides numbers of citations issued for driving without insurance or driving an unregistered vehicle from a 2002 British study. Finally, the paper looks at general and specific deterrence theory and how it applies to ALPR.

Weise, E., & Toppo, G. (2013, July 19). License plate scanners: Love 'em or loathe 'em. McLean, VA: USA Today. http://web.a.ebscohost.com/ehost/detail/detail?sid=e272e1d6-faca-4219- ba74-d655a4649b85%40sessionmgr4001&vid=1&hid=4104&bdata=JnNpdGU9ZWhvc3QtbG l2ZQ%3d%3d#AN=J0E157315969113&db=a9h

This article mentions community concerns and cost.

Wolfe, J. (2011, June 3). License plate readers help cops catch more wanted motorists. Swarthmore, PA: Daily Times News.

This news article discusses ALPR use in Delaware and New Jersey. It mentions the types of databases searched.

Wordsworth, S. (2008, February/March). *Recognition in the field: The continued rise of ALPR*. Dorking, Surrey, United Kingdom: Traffic Technology International

This article discusses the use of ALPR for speed enforcement, traffic congestion, criminal enforcement, and the potential for other applications, such as at border crossings.

WTOP Staff. (2015, May 15). Fairfax Co. defends use of license plate readers (Web news article). WTOP. http://wtop.com/fairfax-county/2015/05/fairfax-co-responds-license-plate-reader-privacy-suit/.

This article looks into data retention in Virginia and mentions a bill that was vetoed by the Governor that would have limited ALPR data retention.

APPENDIX B—CASE STUDY SUMMARIES

Case Study #1

1. Describe site.

The case study site is a police department (PD) for a large, fast-growing city of approximately 360,000 people in the western Unites States. According to its 2016 annual report, the PD has nearly 700 sworn officers.

2. Describe how many and who were interviewed.

Four individuals were interviewed in person for this case study. Three are officers with direct experience using the automated license plate recognition (ALPR) units.

The first officer is a patrol officer who handles routine calls and traffic enforcement duties. He is also a field training officer. He has 18 years in law enforcement and 12 years as a field training officer.

The second officer no longer works with ALPR, but did use the technology during his 6 years as a police area representative (PAR). PAR officers are assigned to a specific geographical area in the city and take ownership of the problem-solving process in their assigned geographical area. The interviewee noted that a key concern among residents in his geographical area was traffic safety. This individual now works as a public information officer.

The third officer is a detective who has been using ALPR to investigate hit-and-run incidents for the past 4 years.

The fourth officer is a lieutenant who oversees the electronic support section (ESS) in the PD's investigations bureau. The ESS administers the ALPR program for the PD. The lieutenant has been in this role for 7 years. Patrol officers are not in his chain of command, but he works closely with them in his role of managing electronic support.

3. Summarize findings.

Extent of ALPR Use

General Use

The PD has 36 ALPR units—12 on vehicles and the rest in fixed locations. ALPR use started with two units that had been stored—not maintained or used. Funding from the city council has subsequently been used to increase the number of units over the past 7 years. The funds for purchasing the technology and subsequent maintenance are requested in the city's annual budget. The ESS is responsible for determining the locations of the fixed units, which have been set up in locations with a lot of traffic, major arterials, high crime, etc. The lieutenant used heat maps to specify such locations and has used information on ALPR effectiveness to bolster his requests to the city council for additional ALPR units.

The lieutenant indicated that the technology is used for multiple purposes: identification of stolen vehicles and vehicles involved in hit-and-run incidents, driver's license revocation and suspension, and other investigative purposes (e.g., figuring out where a wanted car is located). The most frequent use is finding stolen vehicles. The lieutenant said, "We don't chase stolen cars—it's a huge safety issue. We'll track the vehicle, and multiple officers will converge."

In terms of individual users, the current patrol officer said he used ALPR for traffic enforcement—identifying suspended and revoked licenses, warrants, stolen cars and plates, and registered sex

offenders. He said, "The ALPR is constantly running—if a vehicle was used in a crime, this is where we've seen it before—then we can go back and locate the vehicle." He has been using the ALPR for the last 7 years: "I was one of the original ones trained in it."

The former PAR officer was assigned an ALPR car, and he "used it every day, targeting traffic offenders, stolen vehicles, just used it for everything." He relished the opportunity to use it and used the system regularly to assist in making traffic stops. He had a good understanding of the system and back end and so could create alerts for himself. He mentioned that about 15 percent of the time, the registered owner was not the offender. He said,

> *"I would run the plate through the databases; here's the registered owner. Then I would make my decision. I didn't want to stop somebody if the driver's license was no longer suspended or there was no longer a warrant."*

The detective has been using ALPR to investigate hit-and-runs for about 4 years. He said,

> *"If a car has been reported as hit-and-run, and the owner doesn't respond to office notices, we put out a tow order. ALPR is a really great tool because [with it] you can find the car."*

His ultimate goal in using ALPR is to get these drivers off the road: "Most people who do hit-and-run do it multiple times."

Use for Traffic Safety Purposes

The two officers (patrol and former PAR) did use ALPR for traffic safety purposes. The patrol officer said he used it for traffic safety purposes "right out of the gate." He focuses on those suspended or revoked drivers to get them off the road. If he has a busy day (e.g., lots of radio calls), then he uses the ALPR less because he's "traveling to all those other radio calls."

The former PAR officer said, "About 40 percent of my use is for traffic safety." He indicated that regular patrol officers have to respond to radio calls, and that dictates what they spend their time on. He said, "But for me, I would just drive up and down the neighborhoods. Just collecting data. Could narrow down to significant information later." He did this because "traffic safety is huge; there have been 13 fatalities so far this year. Getting violators off the road is significant."

ALPR Databases, Hot Lists, and Data Storage

The PD has access to the following databases and hot lists.

- National Crime Information Center list.

- State bureau of investigation.

- The local hot list managed by the ESS, which includes be-on-the-lookout bulletins (BOLOs) on vehicles involved in hit-and-runs, with a higher alert for incidents involving injuries and fatalities.

The State bureau of investigation pulls data from the information center databases and puts the information into one text file that is updated every 4 hours. The bureau then pushes this information to all patrol cars. If there is a BOLO for a certain vehicle, the list can be updated even sooner—every 2 hours. Officers can also contact the lieutenant to add a license plate to the local hot list. Unless otherwise requested by an investigator, plates entered into the BOLO hot list are deleted after a period of 60 days. The patrol officer interviewed said that the lists are very reliable: "Never had a false hit. You do get some misreads [due to] condition of license plate, lighting."

ALPR plate scan information is retained for 1 year. The State legislation actually States that data can be retained for 3 years, but officers can only search 3 years of data if the query is in connection with a felony. Misdemeanor cases are limited to 1 year. So the lieutenant said that they made the decision to only retain data for 1 year: "Worked out—never had a single case where we wished we had more data." Plate scan information deemed as evidence in a criminal investigation can be transferred to the digital media management system for further retention.

The PD stores its ALPR plate scan information in-house and shares it with a State-run database that law enforcement agencies throughout the State use. The database is not ALPR specific but does include reads and photos. It also draws data from the National Data Exchange, which provides criminal justice agencies with a way to share, search, link, and analyze information across jurisdictions.

ALPR Training

No department member can operate the ALPR system or access the ALPR database without first completing department-approved ALPR training. This is one-time training, and training only lasts about 1 hour. It covers fundamental instructions: how to turn the ALPR on and off, and how to deal with hits. The training does not pertain specifically to traffic safety. The lieutenant indicated that "When [trainees] come out, when they're in a car with a field training officer, they can log in and use the system. Once they are out on their own then, [they have] a great tool." Officers have the option of turning off the ALPR. They do not have to use it. As one said, "It's a tool. Now if you don't want to use it, then tell your lieutenant, 'I don't want this car.'"

ALPR Use Policy

The department policy for use of the ALPR technology is as follows.

- When receiving an ALPR alert, an officer must visually confirm the plate against the captured image and verify the validity of the alert through the Public Safety Communications Department or mobile data computer query when circumstances allow.

- When a vehicle stop is made based upon an ALPR alert, officers are required to enter a disposition (or outcome) relating to the stop in the hot list.

- At the start of each shift, members operating a mobile system must ensure that the ALPR system has been updated with the most current hot list available from the back office system server.

The lieutenant stated that the department is very focused on "ensuring that the use of the system is not abused." This PD runs the largest program in its State, and the lieutenant feels that the PD has a successful program "because they have put parameters on it."

Challenges in Use of ALPR

Technical Challenges

The lieutenant and the PD are very pleased with the ALPR system. "It doesn't take a whole lot to train somebody on it. The system is very user friendly," he said. "No accuracy issues." The PD did a comparative test and system to be superior to the other. "Works a lot easier, not as many misreads, and the cameras were great." The lieutenant said that in-house maintenance is minor; the vendor takes care of anything major. The lieutenant did say that the other system had a better back end (e.g., with millions of plates), but this could also be negative, especially if they were not specific to the PD geography.

The former PAR officer mentioned that the PD had one problem in which the system would "go down, grey screen, we were not getting the hot list." But he said that was very rare; it happened when the cord connected to the computer in the trunk got loose.

The detective said, "No challenges."

Operational Challenges

The main operational challenge is the volume of alerts that come through. Several of the interviewees mentioned this. To address the sheer volume, the PD categorizes alerts into high, medium, or low priority, with different color coding. High alerts are felony warrants and stolen vehicles. Low alerts are driver's license revocations. Officers in vehicles can choose to receive all alerts or to turn off all but high alerts.

The patrol officer also mentioned that "I wish they would get [ALPR] put into the newer cars. Those ALPRs in our cars were installed back in 2011.

Institutional Challenges

The lieutenant mentioned that manpower was a challenge. First, doing traffic enforcement based on ALPR uses a lot of manpower resources. The large number of driver's license suspensions or revocations would tie up more officers than the PD could spare. Second, as the program has grown (i.e., it started with 2 and now has 36), he has not been allocated more manpower to manage the program. For example, he would like to do ongoing training but does not have resources.

Legal Issues

None of the interviewees indicated that there had been any legal issues about their use of ALPR. The lieutenant mentioned that the only legal process is to go to court and challenge the validity of the stop. But no such challenges have been successful.

Acceptance of ALPR

Agency

All interviewees indicated that agency acceptance was high. The lieutenant mentioned that ALPR is a "very effective tool for traffic safety, but having resources to target that purpose is tough." The patrol officer said that they use it as a training tool in making traffic stops: "What do you need to do court-wise and what to document, why and how to make a stop, how to determine that the person actually is the person in the alert." The detective called it very effective. He noted, "50 percent of people in this town don't have insurance. There's a lot of the population that is not licensed." He said that there is only one person involved in hit-and-run investigations who does not use ALPR.

Community

All interviewees indicated that people in the community generally do not know about their ALPR use. The officer now in public affairs said, "It's a thing that we try to keep a little bit low key. If I've arrested somebody, I close my laptop. They don't need to see the technology we are using." The city council is supportive and have funded requests for the equipment.

Privacy Issues

Only people who work for the PD and have been trained have access to the stored data. There is no public or civilian review of stored data. The lieutenant said that they have had requests from attorneys,

but they are "flat out denied." There have been no community concerns about privacy of data. The American Civil Liberties Union has raised concerns. The former PAR officer said, "It's a tool. If it's abused, we could lose it. We want to respect the civil liberties."

ALPR Effectiveness and Value

The lieutenant stated that ALPR is "the most effective technology we have. … When I can show how successful ALPR is, then funding [from the city council] is easier, so I keep a file on my computer of use cases of successes." He cited one case that was a homicide at a hotel; three vehicles then left the hotel very quickly. Within 45 minutes of the shooting, they had the license plates that were registered to owners in Colorado Springs. They had the culprits within hours. He said that ALPR is intended to identify the vehicle, not the driver.

The PAR officer said ALPR was very helpful in terms of traffic enforcement: "like using a laser. … You can stop somebody, saying hey, we're here. Other times you can actually target the people you want to get off the street." He recounted an instance when he got an alert on a vehicle plate and started digging into it. He found a suspended license and a warrant. He looked at the recorded height, weight, and hair color. He said, "That's got to be her." He asked her, "Do you know you don't have a license?" She said, "No, I don't." He wrote a summons about the revoked license and had her sign it. This is known as a proof of service—so that the person cannot challenge it in court. He ended by saying he's never had a person challenge a violation.

The patrol officer also said that ALPR was highly effective in identifying habitual traffic offenders and getting them off the road.

The hit-and-run detective said that he experienced good return on investment on the ALPR. The PD has about 3000 cases per year, with some being associated with fatalities. About one-third are investigated, and of these, 90 percent are closed through ALPR.

Case Study #2

1. Describe site.

The case study site is a large law enforcement agency located in the southeast area of the United States. The PD has more than 750 sworn officers and more than 300 civilian employees.

2. Describe how many and who were interviewed.

Four law enforcement officers were individually interviewed. Two patrol officers with 5 and 9 years of law and traffic enforcement experience represent automated license plate reader (ALPR) users. Their primary responsibility is to patrol areas of higher crime, looking for stolen vehicles, wanted persons, suspended registrations, and suspended insurance. ALPR technology is the primary tool used to support the officers' patrol and traffic enforcement activity.

The third participant is a patrol lieutenant (manager) with 35 years of combined law enforcement experience, 10 of which are at the command lieutenant level. The primary responsibility of the lieutenant is to ensure that enforcement staff are using the ALPR units in the field; that ALPR use data is collected and reported; and that data is submitted to administration for inclusion in agency reports and strategic planning activities. The lieutenant is also responsible for the oversight of maintenance and upkeep of the agency's ALPR systems.

The fourth participant is the administrative major who has 25 years of law enforcement experience, 3 months of which are at the chief-of-staff level. The major's primary responsibility is to budget and forecast how ALPR technology is used for the agency. The major is also responsible for the ongoing development of the agency's real-time crime center, which includes the use of captured ALPR enforcement field data. The major assists in the evaluation of the overall effectiveness of the ALPR system's use in the community and its use as an agency best practice.

3. Summarize findings.

Extent of ALPR Use

ALPRs have been actively used in this agency since 2011. The assistant chief made the initial decision to purchase four ALPR units for the agency in 2011, and an addition three ALPR units were purchased in 2012. In total, the agency currently owns and operates seven ALPR units that are used by enforcement officers. Initially, two ALPR units were assigned to the Interdiction Division, two to the Traffic Enforcement Division, and three to the Patrol Division. As of June 2018, all ALPR units were assigned to the Patrol Division for use.

> *"ALPR is used in multiple angles. With regard to criminal investigation, we deploy the asset in the areas where there is criminal activity. Some patrol units use them for traffic safety (suspended registrations, no license, no insurance). Based upon the results of the ALPR use, it supports the agency's use of the tool."*

The primary use of the ALPR units is for targeting privately owned and commercial motor vehicles for nonhazardous traffic infractions. Approximately 90 percent of ALPR use is for traffic enforcement purposes, which includes expired vehicle registrations, no insurance, and revocation of vehicle registration. Additional uses include identification of stolen vehicles, owners of vehicles wanted for questioning in police investigations, and Amber Alerts.

> *"I use it primarily for traffic enforcement. Expired vehicle registrations and vehicle suspensions due to insurance violations. The ALPR is also used for criminal patrol on*

> *things like stolen vehicles or other incidents that are listed on the hot list such as Amber or Silver Alerts."*

The ability of the ALPR units to rapidly read license plates and inspect State and local information databases is a significant enforcement motivator for officers who use the ALPR systems. The ALPR scans, interprets, and then simultaneously checks thousands of license plates per day, which helps improve proactive enforcement activity, allows the officers to multi-task simultaneous activities through automation, and helps officers to be more productive and efficient with their time. The ALPR alerts lead officers to make meaningful traffic stops, which in-turn lead to more meaningful enforcement activities.

> *"I am motivated to use ALPR because I like doing traffic stops and enforcing traffic laws. ALPR does a significant job for me with running thousands of plates a day. There is no way I can run 2000–3,000 tags per day. ALPR allows me to be able to do so much more, which motivates me to do my job."*

Through the lens of agency management and administration, ALPR data help support planning and evaluation for the agency. As part of a reactive response to increased community public safety and traffic needs, ALPR helps target activity in each of the county's five precincts. Captured ALPR data include the number and type of traffic contacts patrol officers have made and how many service hours the ALPR units are actively being used.

> *"Our agency compiles ALPR in the monthly COMPSTAT, and the results are given to the administration. The ALPRs are used in identified hot spots within the precincts as part of a reactive response to increased crime and traffic issues. Traffic stops and hours used are captured, and the information is sent to the uniform commander for review and dissemination."*

Ultimately, all ALPR information is shared with the Patrol Division command lieutenant, who is responsible for the review and dissemination of ALPR after-action reports. These after-action reports supplement the larger agency COMPSTAT reports that are used administratively for the development of operational plans and daily patrol deployment directives in individual precincts.

ALPR Databases, Hot Lists, and Data Storage

In 2018, the State legislature enacted a law that specified that law enforcement agencies may share captured ALPR data with each other but only in the capacity of law enforcement purposes. The mishandling of ALPR data includes persons who knowingly:

- Request, use, obtain, or attempt to obtain captured ALPR data under false pretenses; or

- Request, use, obtain, or attempt to obtain captured ALPR data for any purpose other than for a law enforcement purpose.

Upon conviction, the offender is deemed guilty of a misdemeanor of a high and aggravated nature. The conviction carries with it:

- A fine of up to $5,000 dollars, or

- Confinement in jail for a term not to exceed 12 months.

The databases and storage capabilities listed as follows are populated, warehoused, accessed, and shared between the LEA and the County Sheriff's Department.

Database

The LEA's ALPR program is not a stand-alone system that is housed in the jurisdiction of the police department. While the ALPR camera hardware and software belong to the LEA, the database and hot lists that drive the system are regulated by the licensing agreement managed by the County Sheriff's Department. The LEA participates through a cooperative interface that links its ALPR system to the primary license held at the County Sheriff's Department.

All statewide database information is updated, maintained, and stored electronically though software that is licensed to the County Sheriff's Department. Revoked registration and other crime information is released from the State Department of Revenue on the 15th and 30th day of the month. This information is uploaded into the County Sheriff's Department's ALPR system, and the secondary link that the LEA has with the County Sheriff's Department allows the LEA access to the data that ultimately drive the ALPR system alerts.

Hot List

Hot lists are updated, maintained, and stored electronically through the ALPR software licensed to the County Sheriff's Department. The LEA contributes to the hot list by passing its information to the County Sheriff's Department ALPR coordinator for entry into the master list. The County Sheriff's Department ALPR coordinator uploads new hot list data every 24 hours. The interactive link between the two agencies connects and then allows ALPR information to be uploaded immediately into the LEA's in-vehicle ALPR system when the ignition to the patrol car is activated.

> *"The State's crime information computer and the agency hot list are uploaded and maintained by the Sheriff's Department. Our agency piggybacks off the Sheriff's Office and does not operate its own license for our ALPRs. The State crime information computer list is upgraded on the 15th and 30th of each month while the Sheriff's Office updates its hot list every 24 hours."*

Data Storage

The LEA officers indicated that they did not know how or where the County Sheriff's Department warehouses the captured ALPR data. Since the County Sheriff's Department is the primary license holder, the LEA is outside the loop on these matters.

In general, State law does regulate the length of time an agency can retain ALPR data. Law enforcement agencies that collect ALPR data must:

- Store the information immediately upon collection.

- Destroy collected data no later than 30 months after such data were originally collected unless the data is the subject matter of a toll violation or for a law enforcement purpose.

A law enforcement agency may contract with a person to hold and maintain captured license plate data for that agency, provided, however, that the person is subject to the policies of the agency.

Challenges in Use of ALPR

Technical

The LEA identified several ALPR use challenges. One significant challenge is that the ALPR system reads the alphanumeric characters on the license plate but will only check the results against the State's database. This challenge is especially burdensome when there is a positive alert on the alphanumeric

characters but the license plate is registered outside the State. False positive results often cause officers to initiate enforcement stops on vehicles that are not truly in violation or do not have a wanted status.

> *"The biggest challenge we have is keeping the units operational and out in the field. Unfortunately, we have older ALPR units, and the software is outdated. We get random license plate reads that are not always correct. Sometimes these readings are alerted on, and we have to turn around and chase a vehicle that may not be an actual violator, suspension, or stolen/wanted."*

A second significant use challenge is that the State Department of Revenue updates the State database on the 15th and 30th of each month. The policy gives rise to a situation that creates gaps in the data. For example, a vehicle may be listed in the State database as stolen. In the period between the Department of Revenue download of new information into the database, the vehicle may have been recovered and returned to the registered owner. Yet in the State database, the vehicle is still listed as stolen because the supplemental recovery information has not yet been uploaded. As a result of the gap, the ALPR system will still alert the officer to a stolen vehicle that is, in fact, no longer stolen. In dealing with those situations, the LEA spends a large amount of time attempting to confirm a violation where one no longer exists, which takes officers away from patrol activities.

A third use challenge identified by the LEA is not being the primary ALPR license holder. The LEA is a secondary user that uses the primary license of the County Sheriff's Department. As a result, the LEA is dependent on the County Sheriff's Department to enter the LEA's ALPR data into the system database. Priority entry of data in the ALPR database for hot sheet development and updates rests upon the discretion of the County Sheriff's Department, which may not always be in the LEA's best interest.

Operational

Operationally, the LEA is working with second-generation ALPR technology hardware and software. While some software updates have been performed, the ALPR units are dated and in need of upgrade. Using dated hardware and software has resulted in errant reading of alphanumeric characters on license plates. The license plate misreads result in false positive alerts and incorrect interpretation of the license plate characters. Misreads and false positive alerts cause officers not to fully trust alerts coming from the system, which in turn lessens the effectiveness of the system's usability. The manager said, "With limitations on the usability of the ALPRs, there is a tendency for the officers to become frustrated with the technology. With frustration comes non-use, which does no one any good."

Institutional

Institutionally, the ALPR reports that are generated are isolated for individual precincts and not represented in a countywide report. Administrative officers use the internal assessment of ALPR data for planning directive enforcement activities but only at the precinct level.

An additional challenge is putting officers into units that have the ALPR technology installed. The LEA has only seven vehicles outfitted with ALPR, and the added issue of priority calls for service limit the amount of time the units perform traffic-related activities. Reduced labor force and continuous calls for service have limited the LEA's ability to use the ALPRs to their full potential.

> *"I think our biggest operational challenge is putting officers in the field into units that use the ALPR technology. At present we only have a few vehicle outfitted with ALPRs. In addition to the lack of ALPR units, it is difficult to perform traffic enforcement when the officers are running back-to-back calls for service. Manpower issues and calls for service have limited our ability to utilize the ALPR units to their full potential."*

The greatest institutional challenge encountered is finding funding in the budget to purchase new equipment and provide ongoing support for the ALPR program. While the use of ALPR is important to the chief of police and other administrators, funding for the department is limited, and fiscal resources have to be steered toward critical functions in the department. Grant funding through the highway safety office would be a way to ensure that ALPRs are up to date and operational.

> *"I think our biggest institutional challenge is finding department funds to keep the ALPRs up and running. In the past, there was never a budget to maintain their use. As a department, we need to take the necessary measures to keep the ALPRs in proper working condition and functional so they can be used by our officers. The department paid for the basic units but has not budgeted for hardware and software maintenance, upgrades, or improvements."*

The manager indicated that the use of ALPR technology is important to the Chief, and he was dedicated to using the tool in the field and using the ALPR as part of our department's enforcement strategy.

> *"However, funding for the department is limited, and dollars have to be available for critical functions within the department. Grant funding for updates and maintenance would be a great way to ensure that ALPRs are current and functional."*

Since the latest software and hardware cannot be updated, the tool was considered to be less effective because of its age. Also the ALPR units have to be sent outside of the agency to get maintenance, and it takes time to get the unit back. "When we get them back, they work at times, and in others they don't, so we have to send them back, which means they are not being used."

Legal Issues

A State law was enacted that dictates provisions that law enforcement agencies must follow when using ALPR technology. Agencies performing ALPR activities must:

- Prohibit the retention of captured information over a certain period of time;
- Provide for definitions;
- Provide for the exchange or sharing of data obtained from ALPR systems by law enforcement;
- Provide for criminal penalties for misuse of captured license plate data;
- Provide policies;
- Provide for related matters; and
- Repeal conflicting laws.

While ALPR records may be connected when agencies electronically capture public information and then assemble them into a singular file, when technological merging itself enables the collection, sequence, and analysis of such datasets, it redefines the established concept of what is public, what is private, and what is a reasonable expectation of privacy. What ALPR data is collected, how the data is collected, how long the data is retained, who can access the data and for what purpose, and what kind of analytic tools and methods are available to query and analyze the data is all key issues that could affect public acceptance and legal support.

Creating and applying a comprehensive agency policy—one that addresses ALPR objectives, deployment, records management, data quality, hot list management, systems security, data retention/purging, access and use of stored ALPR data, information sharing, accountability, and sanctions for noncompliance—help to ensure that data is properly collected, used, and managed. The

administrator noted, "ALPR watch groups have questioned the use of ALPR for our community from time to time. However, it has not interfered with our use of ALPR in the field."

> *"Our department has not experienced any legal issues with regard to our using of ALPR. We handle most issues through our public information office. There is an ongoing effort in determining what information the department is legally required to release, maintain, and purge. Our department works in concert with the county/DA's office to determine what we can and cannot release."*

Acceptance of ALPR

Officers who use the ALPRs seem impressed and energetic about using the units for traffic safety purposes. Information that is retrieved via the ALPR system is not unlike that an officer retrieves by running vehicle-tag numbers through the State's database. ALPR systems aid officers by augmenting their senses and provides them with an enhanced ability to process tag information through a law-enforcement database rather than requiring them to manually check the license plate through a dispatch, mobile data terminal, or onboard computer.

Agency

The ALPR units were not used for approximately 3 years. During this time, no one in the agency tracked, maintained, or managed the ALPR units or their use. However, the new chief of police has spurred a resurgence of interest and activity surrounding the re-introduction of ALPR technology. Currently, there is agency-wide acceptance of the use of ALPR technology for traffic safety purposes. An officer said,

> *"The ALPRs are being pushed more by the command staff, so I think they understand the value of the units. We went from high user approval of about 80 percent; then the ALPR's went to the closet, and user approval went to 10 percent. With the resurgence for use by the new command staff, ALPRs have been widely accepted, and user approval is back up to 80 percent."*

Community

Comments from some organizations and community groups have expressed strong feelings about how ALPR technology might track people's locations, which may be considered an invasion of privacy. However, most believe that the limited intrusion can be justified if there is a legitimate law enforcement purpose for it. The manager said,

> *"ALPR watch groups have questioned the use of ALPR for our community. However, it has not interfered with our use of ALPR in the field. Our department has not experienced any legal issues with regard to our use of ALPR. We handle most issues through our Public Information Office. We are still looking into what information we are legally required to release, maintain, and purge. Presently, our department works with the county/DA's office to determine what information we can and cannot release."*

Privacy Issues

Collected ALPR data can enhance law enforcement's ability to investigate and enforce the law. Yet ALPR can also raise concerns that the information collected may be inaccurate, placed into databases and shared without restrictions on use, retained longer than necessary, and used or abused in ways that could infringe on individuals' privacy.

To ensure the privacy of data, the LEA works in partnership with the County Sheriff's Department and County District Attorney's (DA) Office. However, since the County Sheriff's Department is the primary ALPR license holder, the responsibility for privacy resides with it. All LEA-collected ALPR data is warehoused electronically in the agency's Information Technology Division and is restricted to only administrative access privileges.

> *"We are working with the county/district attorney with regard to privacy of the ALPR data. It is more of an issue with the Sheriff's Office since the system we use is theirs. With regard to our agency ALPR data and information that we submit to the Sheriff's Office for hot lists, we keep that information electronically with our Information Technology Division."*

Access to the ALPR data is at the administrative level. There is no public access or civilian review of the data collected. The LEA receives direction from the DA's office on what it can and cannot release.

ALPR Effectiveness and Value

Traffic Safety Purposes

The LEA has not performed a formal cost-benefit analysis of its ALPR units. As a result, the LEA has not been able to project a cost-benefit ratio of the cost of the ALPR equipment compared to lives saved. The administrator mentioned, "I think success is measured by the reduction in crashes and injuries. Unfortunately, it is part of a bigger picture with other variables we cannot control, so in our case, the measurements are not really tracked." He continued,

> *"I think that success for ALPR use is secondary and comes by way of the deterrent effect the unit provides when officers are stationary and performing traffic enforcement. I cannot say with any certainty, however, that it is the ALPR making the difference or just a larger police presence. Success for us is measured on the overall impact our officers have in reducing traffic crashes and improving safety, which may or may not be linked to the use of the ALPR systems. However, I do believe there is a significant deterrent effect that the ALPRs have when units are stationary and running plates. The presence causes motorists to slow down, which improves traffic safety to some degree even if metrics are not available."*

Case Study #3

1. Describe site.

The case study site location was a police department (PD) for a mid-sized city of approximately 150,000 people in the northeast region of the United States. The case study PD has approximately 500 personnel, including 420 officers and 80 supervisors.

2. Describe how many and who were interviewed.

Two individuals were interviewed over the phone for this case study. One is a detective who oversees the auto-theft division and acts as the department liaison for automated license plate recognition (ALPR). This individual also uses ALPR in his day-to-day duties.

The second interview was with an officer from the uniformed patrol division, who has an ALPR on his cruiser and uses it during his day-to-day duties.

3. Summarize findings.

Extent of ALPR Use

This case study PD has seven ALPRs currently installed and deployed on PD vehicles. The PD uses ALPR for the following primary purposes.

- Locating stolen vehicles.

- Identifying vehicles on the road that have revoked registrations.

- Identifying vehicles that are associated with crimes and have a be-on-the-lookout (BOLO) status associated with the vehicle.

This State does not have a hot list that provides restricted, revoked, or suspended licenses, so all ALPR use for traffic safety is a by-product of the three primary uses of ALPR: stolen vehicles, revoked registrations, and BOLOs. Interviewees indicated that the primary traffic safety use of ALPR for their PD is finding individuals with a suspended license when officers pull over a vehicle for a revoked registration. Interviewees are not aware whether the driver's license is suspended, revoked, or restricted until they get a hit for revoked registration and pull the vehicle over.

One interviewee did indicate that he believed traffic safety implications were associated with the PD's ALPR use because he estimated that about a third of the ALPR hits for revoked registrations also found suspended licenses. The interviewee, an officer in the uniform patrol division, believed that a revoked registration is a car that does not need to be on the road, and for a range of reasons (e.g., lack of insurance, uninspected, etc.), these vehicles are unsafe. The detective indicated that if a person has a revoked registration, it is common for that person to also have a suspended license.

Overall, both interviewees indicated that the majority of the hits that they get on ALPRs are not for traffic safety purposes. Interviewees indicated that a revoked registration is a lower priority, so if a patrol car gets a hit for a revoked registration, it does not always result in stopping that vehicle.

ALPR Databases, Hot Lists, and Data Storage

This PD gets two hot lists that are automatically uploaded:

- The revoked registration list, which comes from the State Registry of Motor Vehicles. This list is automatically uploaded every Wednesday at 2 a.m.

- The National Crime Information Center's (NCIC's) active stolen vehicle list for the State and the entire country. This list is uploaded daily at 2 a.m.

Neither interviewee was aware of how the hot lists are maintained or developed. The detective indicated that he would like to have better knowledge as well as a contact for the administration/development of the lists because he often questions the information. Both interviewees indicated that the accuracy of the list can be problematic. Both interviewees provided examples of getting hits on the system where the correct State, plate, and number are matched to the hit, but the plate was never revoked (they check in their system before pulling a car over). This happens with stolen vehicles as well, where an ALPR provides a hit on a stolen vehicle, but the vehicle has been recovered and returned to the owner. The detective indicated that he believed the PD's data retention policy was 1 year, though he was not completely sure. No additional information was provided upon multiple attempts to follow up on this information.

Deployment Strategies

The users who are assigned to the ALPR vehicles have the latitude of how and when to use the ALPRs. According to the detective, the PD does not provide much guidance on how ALPRs are deployed:

> "There isn't much direction on how you are supposed to use [the ALPRs]. There aren't many units or users, so yes, you have the latitude to decide if you use [the ALPR]. There are people who may not be knowledgeable on the units and don't know what it does or does not do."

However, both interviewees indicated that they know that the administration likes for them to use the ALPRs, so both report using the ALPRs frequently. One of the primary objectives of the use of ALPRs for this PD is to locate and recover stolen vehicles, so that is the primary assignment. However, the PD does have secondary uses for the ALPRs.

ALPR Training

Interviewees indicated that they received a limited amount of training on the use of the ALPRs. The detective indicated that they received an 8-hour training when the PD first received the units. The officer indicated that they received less than that, and that the majority of the training is on-the-job training. The PD has no ongoing training for use of ALPRs.

ALPR Use Policy

The interviewees indicated that they do not have or are not aware of any ALPR policy developed by the PD.

Challenges in Use of ALPR

Technical Challenges

The primary technical challenge that interviewees indicated with their use of ALPRs is the inaccuracy of the hot lists and their inability to talk to someone about inaccuracies when they find them. One interviewee provided an example of a stolen car that was on the NCIC list for years after it was recovered.

The detective indicated that the quality of the equipment is also a challenge. The PD has seven units, and the interviewee indicated that a lot of troubleshooting is required to keep them up and running. He indicated that the units seemed to decline in functionality soon after the warranties were up. This PD

does not have the technical expertise in-house to fix the units, so they have to rely on subcontractors, which in itself is problematic (an example was given where a subcontractor went out of business, and the PD had no support). The detective indicated that Vigilant is the PD's current supplier.

Operational Challenges

Outside of the technical challenges, the interviewees did not express any operational challenges, other than not having a hot list for suspended or revoked driver's licenses. The officer indicated that the challenges with ALPRs are no different from any others in performing the duties of his job (e.g., approaching violent subjects that the ALPR hits on) and that using his experience when approaching every stop is how he avoids this challenge. The officer did not provide any challenges specific to the use of ALPRs when probed.

Institutional Challenges

Interviewees did not indicate that they face any institutional challenges in their use of ALPRs.

Legal Issues

Both interviewees were users, so no questions were asked about legal issues.

Acceptance of ALPR

Agency

The detective indicated that the PD acquired and deployed the ALPRs for stolen vehicle recovery specifically. So from his view, and the view of the department, the ALPRs are extremely beneficial because they are very effective in locating stolen vehicles. With respect to the traffic safety purposes, as previously discussed, this PD looks at the traffic safety implications as a by-product of the ALPR's primary function. However, the detective indicated that while he is not looking for suspended drivers and the focus is not primarily on traffic safety, he does see a positive impact on traffic safety based on his experience. The detective added that his PD is clearly pleased with the return on investment of the units because they started with one and have increased to seven units. They are also planning on adding six more units because there is a plan to monitor traffic around a new venue.

The officer felt as though the ALPR is a good safety tool across the board that helps him do his job more effectively. He did not differentiate traffic safety from his regular duties and felt as though the ALPR helps him get law breakers off the streets, which in turn makes the streets safer. In terms of how he perceives how other law enforcement officers feel about the units, he had very little to offer, other than that the ALPRs are viewed as a tool and some officers are more interested in using the tool to be more productive. Some officers are not interested in any tools that will help them do their job better or differently. Again, the officer did not make a distinction about how ALPRs improve traffic safety specifically.

Community

Both interviewees indicated that they have not received any feedback about the ALPR systems. They acknowledged that occasionally when they are on the streets, people ask about the cameras, but when this happens, the response is always positive (e.g., "That's cool!"). The detective acknowledged that he is aware of the concerns of some residents that ALPRs violate their rights, but this is not something that he has heard in his city. Additionally, the officer explained that when he stops people and explains that the ALPR was the reason for the stop, people do not complain or argue because they recognize that the information is accurate, regardless of how the police officer ascertained it. The officer also explained

that he has actually shown the unit to people that he's stopped, and they have always been impressed, and feedback has been positive.

Privacy Issues

Neither interviewee indicated that they were aware of any privacy concerns regarding ALPR use for traffic safety or otherwise. The officer specifically noted that in his State, it is a privilege to drive, so whether an officer or a machine runs the plate, the issue of privacy is irrelevant.

In terms of access to stored data, the PD allows officers who work there access to the data, but not all individuals who work at the PD are trained on how to access it. The officer indicated that he knew how to access it. About 50 detectives in narcotics, major crimes, homicide, etc., know how to use the database to pull historical information. An analysis group also uses the ALPR data. According to the detective, officers can receive information from the database upon request. There is no civilian review of the data. In addition, interviewees indicated that they can see license plate reads throughout the State.

ALPR Effectiveness and Value

With respect to their ability to conduct their duties as police officers (one who focuses on stolen vehicles and the other who is a patrol officer), the consensus from interviewees was that ALPRs are extremely effective tools. The detective felt strongly about this: "They're 100 percent effective. They are the only reason you would possibly be stopping that vehicle. It brings your attention to a car that you might not look at otherwise." The interviewees further explained that the ability for ALPRs to locate and recover stolen vehicles is extremely useful.

When asked specifically how effective ALPRs are at improving traffic safety, interviewees were less sure. As stated previously, many secondary aspects of ALPRs improve traffic safety, such as when a revoked registration results in an arrest for a driver operating with a suspended license. Interviewees indicated that these examples are not as common and not as much of a focus for their PD. The detective focuses on stolen vehicles because that is what the ALPRs were purchased for and that is his main job. The officer focuses on policing in a broad sense, so his perspective is that ALPRs help him stop a wide range of criminal activity, from drugs to gang activity. Based on his responses, it was clear that traffic safety was a lower priority. The officer further indicated that they are a medium-sized agency, so they do not have the manpower to respond to all of the ALPR hits, especially revoked registrations, because these are lower priority. He did indicate that if a team were dedicated to following up on all of these ALPR hits, it would not take that long to get all "risky" cars off the street.

Interviewees indicated that the physical units are very accurate when they are working, but they tend to break down. The officer felt as though the units are extremely high quality, explaining that the photos are very clear, and he rarely gets a misreads.

Both interviewees indicated that they believe that the ALPRs are extremely effective for their purpose and that they are a good return on investment (the officer was not clear about the cost, but he felt as though they are a great investment).

While the detective explained that the hits from ALPRs can lead to suspended licenses, this is not the main focus of the PD's use of ALPRs. The PD does not have hot lists to target these drivers, so the value of the ALPRs for traffic safety is less evident based on the PD's use.

The officer felt as though the ALPRs are effective tools in improving traffic safety:

> *"Once we get a hit on registration or whatever, then we see what else is up with the*

operator. Once we run the plate, then we can find out if their license is expired or revoked. There are unlicensed people registering cars. These tools can be useful in getting them off of the road."

Case Study #4

1. Describe site.

The case study site is a police department (PD) for a county in the mid-Atlantic region of the United States. The PD has approximately 1,300 police officers.

2. Describe how many and who were interviewed.

Five individuals were interviewed in person for this case study. Two are officers who routinely drive vehicles with ALPR units. One officer is assigned to traffic patrol, and his primary duties include traffic enforcement, personal injury collisions, and bicycle and pedestrian crashes. The other officer is assigned to the community action team and conducts investigations at the discretion of the commander. This officer's assignments often include traffic stops in criminal hot spots.

In addition to the officers, one manager was interviewed. This individual is the automated license plate recognition (ALPR) coordinator for the PD and is no longer an active police officer (though his rank before retirement was sergeant). This individual is responsible for managing the database, coordinating with ELSAG (law enforcement system database), and overseeing maintenance of the units.

A captain with the PD was also interviewed. This individual oversees the ALPR program and is responsible for directing his staff in how the ALPR units are deployed.

Finally, an assistant chief was interviewed. The assistant chief is the captain's direct supervisor and is familiar with the PD administration's view and support of the agency's ALPR use. The assistant chief is also responsible for setting the ALPR policy for the PD. In addition, the assistant chief is the public face of the ALPR program for the PD, and part of his responsibility is conducting public outreach with the community to ensure that there is community buy-in and acceptance of ALPR use by the agency.

3. Summarize findings.

Extent of ALPR Use

General Use

The PD has 32 total ALPRs.

- One pole-mounted unit that can be moved from location to location
- One unit that can be set up on a trailer on the side of the road
- 30 units mounted on vehicles

According to the patrol officer, the ALPRs are used for proactive policing. All officers are directed to manually run plates while they are patrolling (manually read and enter the license number into their computer to see if there are any hits). When these officers use vehicles mounted with ALPRs, this process is automated and they run thousands of plates in the same period that an officer may be able to run a couple dozen. All interviewees used the term "force multiplier" numerous times to characterize how the ALPRs are used and how they help the agency do its job.

Use for Traffic Safety Purposes

The PD has an expansive ALPR program that addresses both traffic safety and criminal investigation. When asked what proportion of their use of the ALPR units is for traffic safety, the officers indicated that it was very high: 80 percent for the officer on special detail and 100 percent for the traffic enforcement officer.

The captain agreed with this, saying, "95 percent of the ALPR use is for traffic safety." The traffic enforcement officer explained: "[The ALPR use is] all for traffic safety. Safety is always there, even if it's a criminal act; safety is part of all investigations." So, while the PD uses ALPR for a wide range of criminal investigations, interviewees indicated that the units almost always have traffic safety implications, even if an ALPR unit is not primarily being used to enforce traffic safety.

ALPR Databases, Hot Lists, and Data Storage

The PD has access to the following databases and hot lists:

- National Crime Information Center list.

- Local (State and regional) hot lists.

Hot lists are automatically uploaded to the units twice a day. The hot lists provide hits on suspended drivers (specific individuals who have suspended, revoked, or restricted licenses), uninsured vehicles, stolen vehicles, stolen license plates, and vehicles associated with wanted individuals. In addition, the captain said that the agency can add tags to its hot lists, and one of the PD's primary uses of this ability is to add individuals who are wanted locally on warrants. This allows the warrant squad to locate people who have failed to appear in court or failed to surrender if they have a warrant for their arrest (these are generally local warrants as opposed to the wanted persons in the State and national lists mentioned previously).

Another use of the ALPRs by the PD is a database called equipment repair order (ERO). The ERO database includes cars driven by individuals who have been pulled over and need to have a repair (headlight, taillight, etc.) done to their car in a certain amount of time or they will have their license suspended.

ALPR data is stored on the PD's servers and is destroyed 12 months after the data is collected.

Deployment Strategies

The PD does not have any tools at its disposal to conduct predictive analytics based on the ALPR data it collects. The PD is interested in this (see "Operational Challenges"). Interviewees indicated that when the ALPR units first arrived approximately 6 years ago, they were used primarily for traffic safety. The units were mounted in vehicles that were assigned to traffic enforcement. However, other departments in the agency (e.g., the officer that is assigned to the community action detail) have discovered that the ALPRs are also very useful for criminal investigation. This officer indicated that he was the first officer on one of the community action teams (they have one for each of the six divisions in the PD) to have an ALPR. Now, each division's community action team has at least one ALPR unit.

In terms of how individual officers use the ALPRs while on duty, interviewees indicated that officers have the latitude to use the ALPR as little or as much as they prefer. If officers want to turn off the unit, they are allowed to do so. Alternatively, if officers choose to follow up on every alarm that the ALPR unit provides, that is their prerogative.

ALPR Training

The interviewees indicated that they received a 4-hour in-class training on the ALPR units, which they felt was minimal. However, they also train for 3 months in the field with a field-training officer, where officers get to learn how to use the ALPRs in depth. The PD provides no ongoing training.

ALPR Use Policy

The PD has a written ALPR policy that it provided for review. Highlights of the PD's ALPR policy include:

- All users must receive training prior to operating the ALPR system.
- The users are responsible for ensuring that the ALPR units have the most up-to-date hot lists uploaded on the unit they are using.
- An alert or hit from an ALPR unit is not sufficient probable cause to warrant an arrest without further investigation. This includes verifying that the subject tag and ALPR read are the same and that the hit is still active by running the information through the agency's manual system. This part of the policy also explains that the "ALPR operator will use established department procedures in taking enforcement action based on the seriousness of the offense."
- The ALPR data that ALPR units collect may be stored in a central database, and the "database can be searched and information retrieved by different employees for official law enforcement purposes."
- "The case study agency can share stored ALPR data with other law enforcement agencies for official law enforcement purposes if those agencies have similar [to the case study agency] use restriction policies or procedures in effect."
- "All information collected via ALPR technology will be purged from the database within 12 months of collection."

Interviewees indicated that when pulling a vehicle over for an ALPR hit for a suspended, revoked, or restricted license, they are required to visually confirm "within reason" that the individual operating the vehicle is the person.

Challenges in Use of ALPR

Technical Challenges

Interviewees indicated that the users face technical challenges when working with some of the older ALPR models because they are not as accurate in reading license plate numbers as the newer units. One officer indicated that he had experienced the unit misreading a license plate and explained that he had been written up for pulling over a vehicle incorrectly based on the ALPR's misread.

In addition, users indicated that the ALPR units can be finicky, and small technical issues may render the unit inoperable. For example, one interviewee indicated that the unit he had been using had a loose Ethernet wire, and this caused the entire system to shut down. One interviewee indicated that he felt as though his agency lacks the expertise to fix the ALPR units when they are in need of repair or maintenance. This interviewee indicated that he would rather fix the unit in his off time than bringing it "to the shop" because he felt the technicians (who are consultants, not employees of the PD) knew less about the units than the officer did.

Operational Challenges

One operational challenge interviewees consistently reported is based on the PD's policy on how to use the ALPRs. When the ALPR alerts about a license plate for any reason, the officer is required to manually enter the license plate into the PD's computer (which is how they manually run tags). This process allows the users to confirm that the hit is for the correct car, the reason for pulling the vehicle over is still valid, and the driver (within reason) appears to be the same driver in the system. However, this can take up to 6 minutes, according to one of the interviewees. This officer felt as though this wasted a lot of

time and wished the process were automated: "Once you get a good hit, it would be great if you could hit a button and then run it in the other system."

In addition, the captain explained that he felt that "the largest challenge is that we don't have a readily available analytical tool that allows us to mine and use the data in a proactive fashion." The captain explained that he is very interested in conducting predictive analytics so the PD can better calculate where it needs to deploy larger enforcement presence based on the ALPR data officers collect. The captain felt strongly that the PD was eager to include this as part of its ALPR program, but the PD does not have the tools to actively deploy officers based on patterns and trends.

Institutional Challenges

Interviewees indicated that there is great support from the agency's leadership on the use of ALPRs, and all interviewees indicated that the agency has positive feelings towards the ALPRs.

One interviewee (an officer) indicated that the units are only as effective as the officer assigned to use the unit, and that many in the department do not know or care to learn how to use the unit. In fact, this individual explained that he had to share the unit with a senior officer who did not want to give up the ALPR, so the interviewee actually went to the senior officer's house, took the unit off, and put it on his squad car so he could use it during the senior officer's off days. The interviewee indicated that this senior officer "never even turned on the unit" because the interviewee could tell there were no reads made since the last time he had it mounted on his car. This officer explained that he went to his supervisor and made the case for why he should be given the unit full time. He further explained that the main reason that this other officer got to use the ALPR was based on his seniority alone and had nothing to do with that officer's actual use of the tool. So this led the interviewee to explain that he felt that an institutional challenge is getting the units into the hands of officers who are well trained and motivated to use them.

Legal Issues

None of the interviewees indicated any legal issues beyond the Freedom of Information Act requests that the agency fields.

Acceptance of ALPR

Agency

All interviewees indicated that the PD as a whole feels extremely positive about the use of ALPR. The captain explained,

> *"[They] think [ALPRs] are phenomenal. Once officers learn what they are and how they use them, they love them. Officers have to be assertive, and if they do, they will get the most bang for [their] buck. I think they are fantastic."*

As discussed previously, the ALPRs were initially used for traffic safety/enforcement purposes only, and over time, the agency has expanded the use of the ALPRs to include criminal investigation. The interviewees indicated they felt the case for using ALPRs for traffic safety/enforcement is stronger than for criminal investigation, though ALPRs are effective for both. The assistant chief explained,

> *"The perception is that [ALPRs] are equally important [for traffic safety and criminal investigation]; however, most agencies have way more traffic-related fatalities than homicides. So there are more injury-related issues when you are talking about traffic safety."*

The captain and assistant chief also shared that they have more demand for ALPRs than they can approve, and they would like to provide ALPRs to any officer that wants to use them. The PD is currently exploring all potential funding opportunities to expand the agency's ALPR program.

Community

The two officers had completely different answers in this area. One officer indicated that the public is not supportive of the PD's use of ALPRs because the public has concerns about privacy and "Big Brother."

However, the other officer indicated that in his experience, people "love them and want them to have more." This officer explained that people want their PD to have the most advanced tools to get bad guys off the street.

The captain explained that there is a vocal minority that does not like the units because they worry about privacy. However, except for that small portion of the population, the public seems supportive.

The assistant chief confirmed that the majority of the public is supportive, explaining,

> *"[The public] never are quite sure what they are. That is part of our job, to inform the community. We've got positive feedback from community members. People, generally, want to be safe. We have limits to all our rights, though we do have basic rights to privacy. However, [the ALPRs are] just an automated thing compared to a cop simply writing down license plates. It's just faster."*

Privacy Issues

All interviewees indicated that they were not aware of any issues or concerns with privacy based on their use of ALPR. The captain indicated that detectives and officers can make requests to see ALPR data if it is for official police business, but the request has to go through the manager and the captain. The captain, manager, and assistant chief all echoed the same point: "We have a policy in place that protects the privacy of the data collected." The PD provides no civilian review of ALPR data.

ALPR Effectiveness and Value

All interviewees indicated that they believe that the ALPR units are extremely effective, and the term "force multiplier" was used numerous times to describe how useful the tools are. The following is an example from one of the officers: "[ALPRs are] a force multiplier. I can be out there all day and could maybe run 200 tags manually. The ALPR can run thousands of tags. It is hugely productive." The second officer echoed this sentiment: "[Using ALPRs] has taken hundreds if not thousands of people off the road who shouldn't be on the road."

The captain and assistant chief also indicated that they felt the units were extremely effective in allowing an officer to be more productive (the manager indicated that the unit can make 3500 reads a minute). The units were free to the agency because they were purchased with grant money from the Department of Homeland Security. The captain indicated that the units are about $15,000 each, and he was not sure about maintenance costs because that work is paid for by the grant as well. Overall, all interviewees felt that the ALPR units are worth the investment, and the agency is a strong proponent for the use of ALPRs.

Case Study #5

1. Describe site.

The case study site is a police department (PD) for a small town of approximately 23,000 people in the northeast region of the Unites States. The PD has a force of approximately 30 police officers.

2. Describe how many and who were interviewed.

Four individuals were interviewed in person for this case study. Two are officers with direct experience using the automated license plate recognition (ALPR) units.

The first officer is currently assigned to the patrol division and has been with the PD for 11 years, with 6 of those years working with the PD's ALPR. This officer indicated that he had used an ALPR at another law enforcement agency for 4 years prior to joining the PD.

The second officer is currently assigned to the drug task force but worked in the patrol division using the ALPR for 6 years prior to his current assignment.

In addition to the officers, a sergeant who supervises the patrol division was interviewed. This individual has been with the PD for 14 years. He indicated that he does not have any direct interaction with the ALPR unit; rather, he is responsible for ensuring that an officer is assigned to the vehicle with the ALPR for every shift.

The fourth individual interviewed is a lieutenant who oversees the patrol division and all physical facilities including cars and the ALPR system. The lieutenant has been in the role of ALPR coordinator for 6 years and is the main contact for the grant administrator, maintains all reporting for the grant that paid for the ALPR, and oversees the maintenance and repair of the ALPR unit.

3. Summarize findings.

Extent of ALPR Use

General Use

The PD has one ALPR that it bought through a federal grant six years ago. The ALPR is mounted on one vehicle, and this vehicle is always in use (department policy requires the vehicle to be assigned to a patrol officer for all three shifts, every day). The State that this PD is located in does not distribute a hot list for individuals with suspended, revoked, or restricted licenses. However, the State does provide a hot list for vehicles with restricted or suspended registrations (e.g., tags). The PD primarily uses the ALPR as a device to gather information, which occasionally leads to officers writing citations for expired registrations. The officers interviewed indicated that their primary use of the ALPR is to identify vehicles with suspended tags as a way to provide probable cause to pull vehicles over. The officers interviewed indicated that they use this opportunity to investigate vehicles for illegal activity, such as driving under the influence (DUI), drugs, etc. The sergeant indicated that the PD will occasionally search the ALPR database for a license plate that has had a previous hit to determine where and when the vehicle was located, and this research is occasionally done at the request of another agency.

Use for Traffic Safety Purposes

The PD does not use its ALPR unit specifically for traffic safety purposes. The officers see the tool as a way to gather information and conduct further investigation for criminal activity. One officer highlighted this approach by explaining,

> *"There's not a huge difference [between using ALPR for traffic safety purposes and*

> *using it for other enforcement purposes]. Traffic stops are important because they*
> *lead to other criminal investigations. It's a tool that allows us to stop more vehicles."*

Overall, the tool is used strictly for traffic safety only a very small percentage of the time. The traffic safety implications of the PD's ALPR are indirect, in that a hit for a suspended registration may lead to pulling a vehicle over, and further investigation will identify a DUI or a driver operating with a suspended license. Interviewees did indicate that they always check with State records to see if a driver's license is suspended when they pull a vehicle over based on an ALPR hit.

ALPR Databases, Hot Lists, and Data Storage

The PD has access to the following databases and hot lists.

- National Crime Information Center list

- State crime database

- Megan's Law list

- State Department of Transportation list (revoked, restricted, or suspended registrations)

- List of mission-critical partners (a regional list developed and shared among law enforcement agencies in the region)

The databases and hot lists are automatically downloaded to the ALPR unit twice daily. The PD does not maintain or develop any of the databases or hot lists used by the agency. The PD has the ability to add a license plate to the regional mission-critical partners' hot list by faxing the vehicle information to its operator. The PD indicated it has no ALPR policy, other than requiring that the vehicle that has the ALPR unit is always assigned for patrol.

The lieutenant indicated that the PD stores ALPR data for 30 days in the car, and that is the only storage of ALPR data. All collected data is transmitted to a regional agency that maintains the regional and statewide databases (mission-critical partners), and the PD was not aware of the agency's data storage or retention policies. As stated previously, the PD shares ALPR data if requested but does not have any policy or interagency agreements about data sharing.

Deployment Strategies

The PD requires that the vehicle that has the ALPR unit be on patrol for every shift, and that the officer who is assigned to use that vehicle have the ALPR running for the entire shift. While users have no latitude about whether the ALPR is running, they can decide whether or not to act on an alarm/hit when it occurs. One of the officers indicated that this is not usually an issue, and individuals who are assigned to the vehicle use the unit: "Since we only have one vehicle, the guys that want to use ALPR usually drive that vehicle."

ALPR Training

The officers indicated that they received very little training on the ALPR units. One officer indicated that they received about 2 hours of training, while the other officer indicated that they took a 1-hour course. Both users indicated that training was largely unnecessary because the tool was easy to use, and they both learned on the job. They also indicated that this was common in their line of work.

ALPR Use Policy

The PD ALPR policy focuses on the retention, access, and release of ALPR data. Highlights from the written policy include:

- ALPR data will be retained for 1 year unless used in a criminal investigation.

- ALPR data kept on the car's computer will be retained for 30 days.

- ALPR data will be shared with other law enforcement agencies for purposes of criminal investigation, prosecution, or investigative support as directed by the chief of police and/or the ALPR coordinator.

As discussed previously, the PD only stores data locally on the vehicle computer for 30 days, and the PD does not retain any data on-site.

Challenges in Use of ALPR

Technical Challenges

Interviewees indicated that when the PD first installed and deployed the ALPR unit, they experienced some technical challenges. The officers had to download the hot lists onto a thumb drive and physically load them onto the car's ALPR computer. Officers indicated that uploading the databases was time consuming, and the units often crashed during the process. In addition, the officers indicated that the data were consistently out of date or inaccurate when they first deployed the units. This led to officers being extremely hesitant to trust the accuracy of the hits from the unit when they were on patrol. All interviewees indicated that these challenges are no longer an issue because the hot lists are automatically updated twice daily, and the accuracy of the lists has improved to the point that the unit rarely gives inaccurate hits. Currently, the PD reports no technical challenges with the units.

Operational Challenges

The primary operational challenge is based on the fact that the State does not distribute a hot list with revoked or suspended licenses. This keeps the agency from being able to hone its ALPR use on traffic safety. As one officer explained, "The [ALPR] is a very effective tool but would be more effective for traffic safety if we were able to get alerts on more than suspended or revoked registrations."

The only operational challenge, according to the lieutenant, is that the units are "too efficient, and for some of [the users] who are not as interested in using the information, they get tired of the continual beeping when it makes a read. However, most appreciate the increased effectiveness it gives us on the street."

Institutional Challenges

Interviewees indicated that there were no institutional challenges to using the ALPR because leadership supports the use of the tools. In fact, all interviewees indicated that the PD wants more units, and the lieutenant indicated that the PD had added the cost for an additional unit into its proposed budget for the past few years, but the PD has not yet received approval.

Legal Issues

None of the interviewees indicated that there had been any legal issues about their use of the ALPR.

Acceptance of ALPR

Agency

All interviewees indicated that the PD as a whole feels extremely positive about the use of the ALPR. The interviewees indicated that they do not really see the ALPR as a tool for traffic safety; rather, it is a tool that helps them stop vehicles, and there are implications for traffic safety in addition to a range of other criminal investigations. The sergeant who oversees the patrol division and sees their role as monitoring/improving traffic safety felt strongly that the ALPR improves traffic safety. He indicated that the use of the ALPR has "increased the number of violations reported." However, the additional data items the agency provided indicate that the PD does not track violations that are a direct result of the ALPR unit, so this assertion is likely based on the sergeant's anecdotal experience.

All interviewees indicated that some of the users of the ALPR get annoyed with the constant alerts from the unit, and this may deter them from using it. One interviewee indicated that they would like different alerts for different types of hits, so they could focus only on hits they deem a higher priority.

Community

The officers indicated that the community response to the ALPR units has been extremely positive based on feedback from individuals they interact with while patrolling. The officers indicated that they get stopped by civilians who ask what the ALPR units are, and when the officers explain the technology, including how it works and how it helps the PD do its job, the public is supportive and thinks the technology is cool. Beyond these examples, interviewees indicated that the PD has received no input from the public about their use of the ALPR unit.

Privacy Issues

All interviewees indicated that they were not aware of any issues or concerns with privacy based on their use of the ALPR. The PD does not store any of the ALPR data other than in the computer in the one vehicle that the ALPR is mounted on. The only individuals who have access to these data are the officers who drive the vehicle (although there is no policy about who in the department the ALPR vehicle is assigned to, and thus has access to ALPR data). The PD does not allow any public or civilian review of the ALPR data collected.

ALPR Effectiveness and Value

All interviewees indicated that the ALPR was an extremely effective tool in helping the patrol officers collect more information and get alerts that lead to more traffic stops. The officers indicated that from their perspective, the tool is effective in its ability to police a range of illegal activity. However, they indicated that the tool would be more effective for traffic safety if they could get alerts about the status of drivers, as opposed to information on the vehicle's registration status. Without this information, the officers' ability to use the tool specifically to increase traffic safety is dependent on the chance that an unregistered vehicle is being driven by someone who is drunk or has a suspended license. The lieutenant echoed these sentiments because he felt the tool increased the agency's ability to be more efficient and more effective:

> *"[The ALPRs are] very effective because of their ease of use and speed. Before ALPR, we would have to physically run license plates, and we might run 100 plates per week for all our shifts. With ALPR, we automatically get thousands of reads per day."*

The PD received grant money to purchase the unit 6 years ago. However, the PD has tried for 3 years to include money in its annual budget to purchase an additional unit, so clearly the agency sees the unit as a good investment of limited resources.

One additional point one of the officers made was that he believes that the units improve traffic safety because the officers are able to keep their eyes on the road more often, as opposed to manually running plates, which they were required to do before the ALPR.

Case Study #6

1. Describe site.

The case study site location was a State patrol located in the Midwest area of the United States.

2. Describe how many and who were interviewed.

Four individual troopers were interviewed as part of this case study. Two of the respondents are State patrol troopers with 5 and 9 years of experience. The two troopers represent automated license plate recognition (ALPR) users and are assigned to an ALPR-equipped patrol car used regularly for traffic enforcement. The troopers' primary responsibility is to patrol the State highway system, enforcing traffic law and investigating surface transportation crashes.

The third participant is a 19-year veteran of the LEA and a lieutenant (manager) who directs fleet operation and asset management. The lieutenant is responsible for managing all aspects of the ALPRs, including applying for the grants to obtain the units, monitoring use and maintenance, and complying with State-required usage reporting.

The fourth participant is a 19-year veteran of the LEA and the colonel in charge of the agency. The primary role of the colonel is the oversight and administrative operation of the LEA.

3. Summarize findings.

Extent of ALPR Use

General

The LEA began using ALPR technology for traffic safety purposes in 2008 with the acquisition of a single unit. Two separate grant proposals, one in 2013 and another in 2015, were successful, and the LEA was able to acquire an additional 15 ALPR units. Currently, the LEA has 16 ALPR units, which are individually assigned to different troopers around the State. Troopers are chosen to participate in the LEA's ALPR program based upon their willingness and ability to use the ALPR units regularly during their shifts.

The mid-level manager for the case study agency was responsible for proposing for the original and successive grant funding that supports the agency's ALPR program. "Originally, I received funding from the State's Department of Commerce through insurance agencies. The primary goal for obtaining the ALPRs was to reduce auto theft. However, we quickly found that the use of ALPRs for one specific purpose was limiting the effectiveness of the units. As a result, the agency discovered additional uses for using ALPRs, and traffic safety improvement was one. At present, ALPRs are not assigned permanently to officers or stations; instead they rotated based upon need."

Use for Traffic Safety Purposes

Traffic safety, including identifying suspended, revoked, and cancelled drivers, is the primary use of ALPRs for the LEA. The LEA's hot list also contains license plates for stolen cars, Amber and Silver Alerts, and wanted felons. The interviewed troopers both estimated that over 90 percent of the stops they make while using ALPR are related to traffic safety.

> *"The vast majority of ALPR use for patrol rests with traffic safety. Primarily, it is used for suspended, revoked, and canceled drivers due to earlier infractions. ALPRs are also used to locate and identify stolen vehicles. Additional use can be for vehicles we are on the lookout for, which can vary."*

The table below presents the LEA's ALPR activity report that is required to be presented quarterly to the State legislature.

ALPR activity quarterly report.

DATE	Shift Worked	Total # of LPR reads	Total # of LPR Stops	Total # of Citations	# of DAS/DAR/DAC citations to Owner	# of DAS/DAR/DAC citations to Non-Owner	# of Warrant Arrests/Owner	# of Warrant Arrest/Non-Owner	# of Stolen veh. Recovered	# of Stolen Plates Recovered	Damage to Stolen? Y/N	# of Arrests Made
TOTALS:	2018 Q1	357972	228	241	141	27	11	2	0	0		13
TOTALS:	2017 Q4	384999	345	433	220	39	13	9	3	1		39
TOTALS:	2017 Q3	441567	373	468	251	56	12	7	8	2		27
TOTALS:	2017 Q2	251945	288	359	182	39	6	6	5	1		22
TOTALS:	2017 Q1	298467	318	345	201	39	14	11	7	0		36
TOTALS:	2016 Q4	384999	345	433	220	39	13	9	3	1		39
TOTALS:	2016 Q3	262781	332	412	202	47	16	7	4	0		42
TOTALS:	2016 Q2	334615	300	344	191	23	12	2		1		18
TOTALS:	2016 Q1	275572	284	284	183	16	11	4	3	0		27
TOTALS:	2015 Q4	354745	393	539	256	44	15	16	4	3		55
TOTALS:	2015 Q3	334615	300	344	191	23	12	2	3	1		18
Project totals since 8/2015:		3,682,277.00	3,506.00	4,202.00	2,238.00	392.00	135.00	75.00	40.00	10.00	-	336.00

Note: The columns with "DAS/DAR/DAC citations" contain the combined number of citations given to drivers with suspended, revoked, or cancelled driver's licenses. Yellow highlight was in original received from LEA.

ALPR Databases, Hot Lists, and Data Storage

An agency within the State maintains the hot lists, which are shared with the LEA. Troopers are responsible for updating the hot list for their ALPR units at the beginning of every shift. The categories included in the LEA's hot list are: missing person, wanted person, stolen vehicle, warrant, stolen plate, protection order, driver's license cancelled, disqualified, revoked, suspended, stolen Canadian plate, sexual offender, and immigration violation.

The State's BCA is also responsible for warehousing any data captured by the ALPR units. All captured ALPR data is automatically deleted from the LEA database after 48 hours. The BCA conducts a quarterly audit of the software to ensure that all ALPR data is being deleted according to agency policy.

> *"The purpose of our ALPR use is for traffic safety (i.e., immediately identifying drivers who should not be on the road) and not for other criminal issues, which require longer data storage. Our information technology ensures that the captured data are purged quarterly. The computer should automatically purge captured data after 48 hours."*

Troopers do not have access to all ALPR data. The only information that troopers see is the data displayed when the ALPR system triggers an alert. Only those license plates that trigger an alert are displayed for the trooper to review. License plates that do not trigger an alert are not displayed, and the troopers cannot access that information.

Challenges in Use of ALPR

Technical Challenges

The troopers interviewed mentioned several challenges. The biggest technical challenge is weather and its effect on license plate readability. The LEA operates in a State where it snows during the winter. Snow and salt from the road can obscure a vehicle's license plate and make it difficult to read. Additionally, whenever the road is wet from snow or rain, spray from the road can land on the ALPR

camera lens, reducing its effectiveness. Consequently, the ALPRs get less use during the winter and during inclement weather.

Troopers also indicated that there are occasional software or hardware issues but did not feel that these technical issues were any more common than with any other equipment they regularly use. The troopers indicated that the ALPR units are generally reliable.

Operational Challenges

Operationally, making sure that troopers follow departmental protocol when using the ALPR system is a challenge. The State's vehicle database does allow more than one trooper to be associated with a patrol vehicle. Therefore, there is an ongoing need to ensure that all troopers follow the ALPR use policy and procedure in order to be able to collect and retain the best available data.

With regard to alerts, troopers must personally verify that the vehicle operator at the time of the stop is the person associated with the ALPR alert. Additionally, troopers must double-check through the State database to confirm that the reason for the alert is still correct. For example, there is sometimes a delay from when people have their license reinstated and when the hot list is updated to reflect the change in status.

The troopers also mentioned that the ALPR unit can be distracting when the patrol vehicle is in motion.

Institutional Challenges

All interviewees stated there were no institutional challenges and there is full support for the use of ALPRs from the top down. One agency administrator stated,

> *"For ALPRs to be effective, there are two key factors: placement location of the unit and placing the unit with a trooper that has interest and the capability to effectively use the unit in the field. Some troopers like them and are good at using, and some are not."*

Legal Issues

ALPR use is approved and regulated by the State legislature. None of the interviewees was aware of any instances of a stop using ALPR being challenged in court.

> *"We do get some Freedom of Information Act [FOIAs] requests from time to time. An enterprising techie could FOIA for this data. These can be time consuming and tiresome to deal with. We have a good reputation because we act as guardians of the information, and we remove unused information rapidly and consistent with policy."*

Acceptance of ALPR

Agency

The LEA fully supports the use of ALPRs. All respondents stated that traffic safety is the primary purpose of their agency as a State patrol. ALPRs fit their mission of traffic safety very well because they allow troopers to make many more stops of suspended, revoked, and cancelled drivers than they would be able to without the support of the ALPR. Both the manager and administrator stated that the LEA intends to use agency funds if grant money is no longer available when the current ALPRs need to be replaced. An officer stated, "I like it. Since my primary job is to keep the roadways safe, the use of the ALPR fits the agency's mission." The manager agreed, "I think they are phenomenal. Once officers learn

what and how they do, people love them. Officers have to be assertive; they will get the most bang for your buck. I think they are fantastic."

Community

Overall, the respondents indicated that there is positive community acceptance of ALPR, but there are some who do not like it for privacy reasons and of course the ones who are pulled over. The lieutenant felt the LEA gets less pushback from the public than other agencies that use ALPR. This is because the State statutorily allows ALPR data to be retained for up to 90 days, which some agencies do. However, the LEA only retains its ALPR data for 48 hours. This greatly reduces the pushback the LEA receives from those concerned about privacy compared to other agencies. The troopers mentioned that using ALPR to make a stop could lessen tension because the trooper can tell the driver they were pulled over because of an ALPR alert, not because the trooper picked that driver out due to their race or other characteristic.

> *"From the public perception, a learned public understands why ALPRs are useful and how we use it. We have enough bad actors to deal with to worry about the average Joe. We use the collected data to make the ALPR use as effective as possible."*

> *"Recently, the news media did a piece on the amount of people with suspended, revoked licenses. They highlighted a previous story where a suspended driver killed people in a crash. The news channel liked the ALPRs because it showed law enforcement trying to remove suspended, revoked drivers off road. I think that law enforcement agencies should be proactive with the media and show them that ALPRs are being used to improve traffic safety within the community."*

Privacy Issues

Initially, there were privacy concerns and hearings before the State legislature. The purpose of the hearings was to determine best practices for the State and to identify issues of privacy concerns voiced by the residents. From those hearings, the legislature restricted ALPR data retention for a maximum of 90 days. The LEA made the choice to keep its captured ALPR data for no more than 48 hours. Restrictions were also instituted that kept troopers from gaining access to captured ALPR data. Consequently, the LEA does not have any privacy issues or complaints. "As an administrator, you have to be thinking about privacy issues both before and during deployment."

ALPR Effectiveness and Value

All interviewees felt the ALPRs were extremely effective and valuable. The use of ALPRs helped the troopers make over 1000 extra stops per year for traffic-safety-related purposes because the ALPR scans and checks license plates far more quickly than a trooper can. Each ALPR unit individually leads to over 1000 extra stops over the course of that unit's operational lifespan. One manager indicated, "While the ALPR units are expensive, when you look at the cost per stop, they are very cost effective and valuable. They are very effective at locating unlicensed drivers and greatly enhance our troopers' efficiency." He continued,

> *"The ALPR is like a second set of eyes. Being able to access multiple violators and getting to choose to go after the one with the highest priority violation is a big benefit. The ALPR unit is like having a co-pilot, which adds officer safety benefits since you are not distracted running LPs [license plates]."*

Recently, the LEA conducted an effectiveness analysis as part of its ALPR grant. The results of that analysis indicated that suspended, revoked, or cancelled drivers were 2.2 times more likely to be

involved in a serious or fatal crash than other drivers in the State. The LEA's preliminary finding suggests that using ALPR for identifying drivers with suspended, revoked, or cancelled licenses could affect traffic safety positively by targeting violator vehicles that are more prone to crash risk.

APPENDIX C—FORMAL RECRUITMENT LETTER

Texas A&M Transportation Institute

U.S. Department of Transportation
Volpe, The National Transportation Systems Center

Date
Name of Head of Agency
Law Enforcement Agency
Street Address
City State Zip

RE: State of Knowledge and Practice for Using ALPRs for Traffic Safety Purposes

Dear [insert name]:

I am writing to inform you of an opportunity to participate in a very important research study. The Texas Transportation Institute, a Texas state agency that is part of the Texas A&M University System, is conducting the study, which is on law enforcement's use of automated license plate readers (ALPR) for traffic safety purposes (such as detecting drivers with suspended, revoked, or restricted licenses). This study is being conducted on behalf of the Volpe National Transportation Systems Center, U.S. Department of Transportation for the National Highway Traffic Safety Administration and the Governors Highway Safety Association. It is one of several studies being conducted under the National Cooperative Research and Evaluation Program, a program established under the Moving Ahead for Progress in the 21st Century Act (MAP-21) (Public Law 112-141) to research and evaluate state highway safety countermeasures.

Your agency's participation in the study will provide us with useful information on the use of ALPR technology for traffic enforcement activities to improve highway safety. Participation in the case studies will be confidential; neither your agency nor any individuals participating on behalf of your agency will be identified in any study report or publication. Study findings will help other law enforcement agencies interested in the use of ALPR technology for traffic safety purposes. You will receive a follow-up email from my colleague, Ben Ettelman or Bob Gilbert, which will provide additional information on the research study and next steps in the process.

If you have any questions regarding this research, please contact me at 202-679-3195 or j-zmud@tti.tamu.edu, or Margaret Petrella, Volpe's Contracting Officer Representative at 617-494-3582 or Margaret.Petrella@dot.gov.

Cordially,
Johanna Zmud
Principle Investigator and Senior Research Scientist
Texas A&M Transportation Institute

Dear [INSERT NAME],

This is a follow-up email to a postal letter informing you of the opportunity to participate in a very important research study on law enforcement's use of automated license plate readers (ALPR) for traffic safety purposes (such as detecting drivers with suspended, revoked, or restricted licenses). The Texas Transportation Institute (TTI), a Texas state agency that is part of the Texas A&M University System, is conducting this study on behalf of the Volpe National Transportation Systems Center, U.S. Department of Transportation for the National Highway Traffic Safety Administration and the Governors Highway Safety Association. As noted in the letter, it is one of several studies being conducted under the National Cooperative Research and Evaluation Program, a program established under the Moving Ahead for Progress in the 21st Century Act (MAP-21) (Public Law 112-141) to research and evaluate state highway safety countermeasures.

As part of this study, our research team would like to conduct case studies with law enforcement agencies that use ALPR technology to improve traffic safety. We'll be speaking with law enforcement agencies across the country. The case studies will gather information about the following topics, via interviews with heads of agency, patrol officers, and other agency staff:

- the extent of your agency's ALPR use that is directed toward traffic safety objectives,
- any existing data on the effectiveness of ALPR in detecting drivers are unlicensed or have suspended/revoked licenses,
- information on the purchase, deployment, training, and maintenance costs of your agency's ALPR units/system,
- any challenges your agency has encountered regarding ALPR use for traffic safety purposes, such as citizen/community complaints or concerns, and
- any existing written policies or procedures for ALPR data capture, analysis, storage/retention, and sharing.

In addition, we'll send a brief list of additional information that we are hoping your agency will be able to share (e.g., written policies or procedures related to ALPRs, cost information).

Your agency's participation in the study will provide us with useful information on the use of ALPR technology for traffic enforcement activities to improve highway safety. Participation in the case studies will be confidential; neither your agency nor any individuals participating on behalf of your agency will be identified in any study report or publication. Study findings will facilitate other law enforcement agencies' use of ALPR technology for traffic safety purposes.

I will follow up with a brief telephone call to discuss the study further.

Cordially,

Ben Ettelman
Assistant Research Scientist
Planning and Engagement Program
Texas A&M Transportation Institute

505 E Huntland Dr, Suite 455
Austin, TX 78752
Tel 512.407.1166 | Fax 512.467.8971
b-ettelman@tti.tamu.edu | tti.tamu.edu/group/pep

TTI | Saving Lives, Time & Resources

APPENDIX E—RECRUITMENT TELEPHONE SCRIPTS

Follow-Up Telephone Script with Administrative Assistant

Hello, my name is [name] and I am a researcher with the Texas Transportation Institute, a Texas State agency that is part of the Texas A&M University System. About a week ago, we sent the Chief a postal letter and follow-up email pertaining to a study we are conducting on the uses of automated license plate readers by law enforcement agencies; particularly ALPR use for traffic safety purposes (such as detecting drivers with suspended, revoked, or restricted licenses). This study is being conducted on behalf of the Volpe Center (U.S Department of Transportation) for the National Highway Traffic Safety Administration and the Governors Highway Safety Association. It is one of several studies being conducted under a new federal program to research and evaluate State highway safety countermeasures.

As part of this study, our research team would like to conduct case studies with law enforcement agencies that use automated license plate reader (ALPR) technology to improve traffic safety. The case studies will involve interviews with patrol officers, supervisors, and administrators who are knowledgeable about the agency's use of ALPR.

We are hoping that the Chief can identify a person in the agency who can coordinate with us on setting the necessary interviews. Can you help me with this?

Follow-up Telephone Script with Coordinating individual

Hello, my name is [name] and I am a researcher with the Texas Transportation Institute, a Texas State agency that is part of the Texas A&M University System. The Chief (Chief's secretary) indicated that you could help coordinate interviews with law enforcement officers in your agency for a study on the uses of automated license plate readers by law enforcement agencies; particularly ALPR use for traffic safety purposes (such as detecting drivers with suspended, revoked, or restricted licenses). This study is being conducted on behalf of the Volpe Center (U.S Department of Transportation) for the National Highway Traffic Safety Administration and the Governors Highway Safety Association. It is one of several studies being conducted under a new federal program to research and evaluate State highway safety countermeasures.

Thank you for taking the time to talk me with about our ALPR study. Do you have any questions thus far? *If yes, answer questions. If no, continue with script.*

Does your agency uses ALPR for traffic safety purposes? *If yes, continue. If no, thank and end after explanation of purpose of study.*

Are you willing for your agency to serve as [an on-site/ a telephone] case study site? *If yes, continue. If no, try to identify concerns and counter. If still no, thank and end.*

Thank you for participating in this important study. The next step is to identify individuals to be interviewed in your agency. We are interested in speaking with persons representing the following:

- Two patrol officers who are well-versed in using ALPR for traffic safety purposes
- A mid-level manager who has lead or supervisory responsibility on ALPR use
- A head of agency such as yourself or an individual in executive leadership who is knowledgeable about ALPR policy in the agency.

Can you identify these individuals right now? If so, I can take their names and contact information for follow-up calls to arrange for interviews. *If yes, collect information. If no, continue,*

If you need some time to consider who we should interview, you can email the names and contact information to me. I'll follow-up if I don't receive an email within the week. My email address is [email address].

We also have a brief list of some additional information that we are hoping your agency will be able to share (e.g., written policies or procedures related to ALPRs, cost information). Should I send the list to you or is there someone else in the agency that would coordinate the gathering of this information? *If someone else, get email and phone contact.*

[If on-site case study] We would like to conduct personal interviews with your staff. Should I coordinate the visit with you or is there someone else in the agency I should work with? *Discuss calendar.*

Thank you again for your agency's participation in this study. Next step for us is to send [you/other person] the list of other data elements and to contact the individuals who will be interviewed.

1. What key functions does your job as agency administrator involve?
2. What activities do you perform related to ALPRs
3. For which purposes does your agency use ALPR in general?
4. For which <u>traffic safety</u> purposes does your agency use ALPR technology?
5. Generally, what percent of your agency's ALPR use involves traffic safety purposes?
6. How long have you been involved in administering the oversight of ALPR technology for traffic safety purposes for your agency and community?
7. Do you know why your agency first became involved in applying ALPR technology for improving traffic safety?
8. Does your agency generate reports from collected data and pass that information along to field units for proactive traffic enforcement activities?
   o What type of traffic safety activities, if any, do these reports address at the management and field user levels?
9. Does your agency use data collected with ALPR technology to perform predictive analytics such as temporal and spatial based traffic enforcement?
10. Does your agency share ALPR data/databases with other agencies?
    o If yes: With what other agencies do you share data?
    o If yes: How has this sharing of data proven to be effective in improving traffic safety?
11. Are you familiar with your agency's ALPR data retention and storage practices?
    o If yes: How is the ALPR data that is collected for traffic safety purposes retained and stored?
    o If yes: How long does your agency store ALPR data that is collected?
    o If yes: If your agency purges data, how often is data purged?
12. Does your agency have any type of data sharing or inter-agency agreements with other law enforcement agencies? If yes, please explain?
13. What is your agency's policy on how the collected ALPR data can be linked to State and national criminal and traffic safety database?
14. How do you characterize the effectiveness of using ALPRs as a traffic safety treatment?
15. [IF APPLICABLE] Specifically, how effective is ALPR in detecting drivers who have suspended, revoked, or restricted licenses?
    o Can you provide some specific examples of its effectiveness (or not) for that purpose?
16. How does the agency measure success/effectiveness of ALPR technology for addressing traffic safety?
    o What are some specific indicators or metrics that your agency uses to measure success of using ALPRs for traffic safety purposes?
17. What challenges do you or your agency face in using ALPR technology for traffic safety purposes?
18. [IF APPLICABLE] What about challenges in using ALPR to detect drivers with suspended, revoked or restricted licenses?
    o Were those challenges internal to the agency or external from the community?
    o How did you as an administrator respond to the challenges or limitations?
19. Have these challenges changed in the past year or so?
    o If yes: To what do you attribute those changes?

20. Has your agency run into any legal issues with regard to using ALPR for traffic safety purposes?
    - o If yes: What were they and how did your agency manage those issues.
21. How do you feel about using ALPR for traffic safety purposes as compared to using it for other enforcement activities?
22. How do your law enforcement personnel feel about using ALPRs for traffic safety purposes, relative to other purposes?
23. Has department policy changed in the past year regarding use of ALPR?
    - o If yes: In what ways?
24. Do you believe your agency has community support for using ALPR as a traffic safety treatment?
25. Have you received any feedback from the community regarding the use of ALPRs for traffic safety purposes?
    - o If yes: Was the feedback been positive, negative, or both?
26. [IF APPLICABLE] Have you or the agency received community feedback on the use of ALPR for detecting drivers with suspended, revoked, or restricted licenses?
    - o If yes: What concerns if any have been raised and how has the concerns been addressed?
27. Has your agency run into any privacy issues with regard to using ALPR for traffic safety purposes?
o If yes: Please tell me about how your agency managed those issues.
    - o What steps does your agency take to ensure that privacy of ALPR data is protected?
28. Who has access to review the ALPR data that is stored at your agency?
    - o Does your agency allow the pubic or a civilian review of the stored ALPR data at your agency?
    - o Is the review of the ALPR data all access or is it provided in a "dashboard" format?

Are there any issues or topics that we did not cover, OR do you have any final thoughts you would like to share? Thank you for participating in this interview. Your participation has helped us to better understand how you and your agency commission the use of ALPR technology for improving traffic safety in your community.

1. What key functions does your job as a manager involve?

2. What activities do you perform related to ALPRs?

3. For which purposes does your agency use ALPR technology in general?

4. For which <u>traffic safety</u> purposes does your agency use ALPR technology?

5. Generally, what percent of your agency's ALPR use involves traffic safety purposes?

6. How long have you been involved in managing users of ALPR technology specifically for traffic safety purposes?

7. How do the decisions get made on how/ how much to use ALPR technology for traffic safety?

8. Do you have any latitude in terms of how ALPR is used for addressing traffic safety?

9. Are you responsible for training on use of ALPR for traffic safety purposes? If no: Who in the agency is responsible for training?

   o Can you describe that training?

10. Has the training officers receive on use of ALPR for traffic safety changed in the past year?

    o If yes: In what ways?

    o If yes: To what do you attribute the changes?

11. Do you develop or maintain databases or Hot lists for the agency?

12. Which ALPR databases or Hot lists do you work with?

    o How are those databases developed?

    o How are they maintained?

13. How often is data uploaded to the database or Hot lists?

14. How often is the updated data provided to users in the field?

15. [IF APPLICABLE] What issues do you have, if any, with the databases or Hot lists specific to using them for detecting drivers with suspended, revoked, or restricted licenses?

16. Does your agency share ALPR data/databases with other agencies?

    o If yes: With what other agencies do you share data?

    o If yes: How has this sharing of data proven to be effective in improving traffic safety?

17. Are you familiar with your agency's data retention and storage practices?

    o If yes: How is the ALPR data that is collected for traffic safety purposes retained and stored?

    o If yes: How long does your agency store ALPR data that is collected?

    o If yes: If your agency purges data, how often is the data purged?

18. How would you characterize the effectiveness of ALPRs as a traffic safety treatment?

19. [IF APPLICABLE] Specifically, how effective is ALPR in detecting drivers who have suspended, revoked, or restricted licenses?

    o Can you provide some specific examples of its effectiveness (or not) for that purpose?

20. Based on your agency's experience, how would you characterize the quality of the ALPR systems?

21. Has your agency experienced situations in which the accuracy of the systems has negatively influenced the effectiveness of the system?

22. What is the process for challenging violations?

23. What has been your agency's experience with persons challenging a violation?

24. Do you believe that your agency has received good return on the investment in terms of ALPR as a traffic safety treatment?

    o Can you provide some specific examples of the benefit or value of using ALPR for traffic safety purposes?

25. What challenges does your agency face in the use of ALPR technology for traffic safety purposes?

26. {IF APPLICABLE} What about challenges in managing your ALPR program to detect drivers with suspended or revoked licenses?

    o How do you as a manager respond to those challenges?

27. Have these challenges changed in the past year or so?

    o If yes: To what do you attribute those changes?

28. Has your agency run into any legal issues with regard to using ALPR for traffic safety purposes?

    o If yes: What were they and how did your agency manage those issues?

29. Overall, how do you feel about using ALPR for traffic safety purposes as compared to using it for other enforcement activities?

30. To the best of your knowledge, do law enforcement officers in your agency support the use of ALPRs for traffic safety purposes?

31. How would you characterize your agency administration's support for using ALPRs for traffic safety purposes?

32. Has department policy changed in the past year or so regarding use of ALPR?

    o If yes: In what ways?

33. Have you received any feedback from the community regarding the use of ALPRs for traffic safety purposes?

    o If yes: Has the feedback been positive, negative, or both? Please explain.

34. [IF APPLICABLE] Have you or the agency received community feedback on the use of ALPR for drivers with suspended, revoked, or restricted licenses?

- o If yes: What concerns if any have been raised and how have the concerns been addressed?

35. Has your agency run into any privacy issues with regard to using ALPR for traffic safety purposes?

o If yes: Please tell me about how your agency managed those issues.

- o What steps does your agency take to ensure that privacy of ALPR data is protected?

36. Who has access to review the ALPR data that is stored at your agency?

- o Does your agency allow the pubic or a civilian review of the stored ALPR data at your agency?

- o Is the review of the ALPR data all access or is it provided in a "dashboard" format?

Are there any issues or topics that we did not cover, OR do you have any final thoughts you would like to share? Thank you for participating in this interview. Your participation has helped us to better understand how you manage users of ALPR technology for improving traffic safety in your community.

APPENDIX H—INTERVIEW GUIDE FOR USER

1. What key functions does your job involve?

2. What activities do you perform related to ALPRSs?

3. For which purposes do you *personally* use ALPR in general?

4. For which <u>traffic safety</u> purposes do you use ALPR technology?

5. Generally what proportion of your use of ALPR technology targets drivers of personal vehicles versus commercial vehicle operators?

6. Generally, what percent of <u>your</u> use of ALPR technology involves traffic safety purposes?

7. How long have you used ALPR technology for traffic safety purposes?

8. How do decisions get made on how much to use ALPR technology for traffic safety?

9. Do you have any latitude in terms of how ALPR is used for addressing traffic safety?

10. What do you believe are the motivators for law enforcement personnel like yourself to use ALPRs as tools for improving traffic safety?

11. How much training did you receive on overall use ALPR?

a. How much training was specific to ALPR use for traffic safety purposes?

b. Is the training on-going or was it one-time only?

12. What ALPR databases or HOT lists do you work with?

   o How are/were they developed?

   o How are they maintained?

13. What issues do you have, if any, with the databases or Hot lists specific to using them for detecting drivers with suspended, revoked, or restricted licenses?

14. How would you characterize the effectiveness of using ALPRs as a traffic safety treatment?

   o Specifically, how effective is ALPR in detecting drivers who have suspended, revoked, or restricted licenses?

   o Can you provide some specific examples of its effectiveness (or not) for that purpose?

15. Based on your agency's experience, how would you characterize the quality of the ALPR systems?

16. Has your agency experienced situations in which the accuracy of the systems has negatively influenced the effectiveness of the system?

17. What is the process for challenging violations?

18. What has been your agency's experience with persons challenging a violation?

19. Do you believe that your agency has received a good return on investment in terms of using ALPR as a traffic safety treatment?

20. Can you provide some specific examples of the benefit or value of using ALPR for traffic safety purposes?

21. What challenges do you face in using ALPR technology for traffic safety purposes?

22. [IF APPLICABLE] What about challenges in using ALPR specifically to detect drivers with suspended or revoked licenses?

a. How do you as a user respond to those challenges?

23. Have these challenges changed in the past year or so?

a. If yes: To what do you attribute those changes?

24. Overall, how do you feel about using ALPR for traffic safety purposes- as compared to using ALPR for other enforcement type purposes?

25. To the best of your knowledge, how do other law enforcement agents in your agency feel about using ALPR for traffic safety purposes- as compared to using ALPR for other enforcement type purposes?

26. Has department policy changed in the past year or so regarding use of ALPR?

   o If yes: In what ways?

27. Have you received any feedback from the community regarding the use of ALPRs for traffic safety purposes?

   o If yes: Has the feedback been positive, negative, or both? Please explain.

28. Have you or the agency received community feedback on the use of ALPR for drivers with suspended, revoked, or restricted licenses?

   o If yes: What concerns if any have been raised and how have the concerns been addressed?

29. Has your agency run into any privacy issues with regard to using ALPR for traffic safety purposes?

o If yes: Please tell me about how your agency managed those issues.

   o What steps does your agency take to ensure that privacy of ALPR data is protected?

30. Who has access to review the ALPR data that is stored at your agency?

   o Does your agency allow the pubic or a civilian review of the stored ALPR data at your agency?

   o Is the review of the ALPR data all access or is it provided in a "dashboard" format?

Are there any issues or topics that we did not cover, OR do you have any final thoughts you would like to share? Thank you for participating in this interview. Your participation has helped us to better understand how your use ALPR technology for improving traffic safety in your community.

TEXAS A&M UNIVERSITY HUMAN SUBJECTS PROTECTION PROGRAM

INFORMATION SHEET

Project Title: State of Knowledge and Practice for Using ALPRs for Traffic Safety Purposes

You are being invited to take part in a research study being conducted by the Texas A&M Transportation Institute. You are being asked to read this form so that you know about this research study. The information in this form is provided to help you decide whether or not to take part in the research. If you decide to take part in the study, you will be asked to sign this consent form. If you decide you do not want to participate, there will be no penalty to you, and you will not lose any benefit you normally would have.

WHY IS THIS STUDY BEING DONE?

The purpose of this study is to gather information about the use of automated license plate readers (ALPR) by law enforcement agencies in support of traffic safety objectives. The study is examining how ALPRs are being used for traffic safety purposes; challenges (e.g., legal issues, privacy concerns, community acceptance) to ALPR when used for traffic safety purposes; and the effectiveness of ALPR systems for detecting drivers who have suspended, revoked, or restricted licenses. This study is being conducted on behalf of the United States Department of Transportation (DOT) and the Governors Highway Safety Association (GHSA).

WHY AM I BEING ASKED TO BE IN THIS STUDY?

You are being asked to be in this study because you work for a law enforcement agency that uses ALPR in support of traffic safety objectives.

WHAT ARE THE ALTERNATIVES TO BEING IN THIS STUDY?

The alternative is not to participate.

WHAT WILL I BE ASKED TO DO IN THIS STUDY?

Your participation in this study will last 1 to 1.5 hours and will consist of participating in an interview about your agency's use of and experience with ALPR, particularly uses connected with traffic safety objectives.

ARE THERE ANY RISKS TO ME?

There are minimal risks to participation. No personal information will be linked to any reports. You do not have to answer anything you do not want to.

ARE THERE ANY BENEFITS TO ME?

There is no direct benefit to you by being in this study. By participating you are contributing to our knowledge of ALPRs as traffic safety countermeasures. What the researchers find out from this study will help to assess the use of this enforcement-related technology for improving traffic safety (i.e., reducing vehicle crashes and crash-related injuries). This information will be shared with other law enforcement agencies through our final report to help them better use their ALPR programs to improve traffic safety.

WILL THERE BE ANY COSTS TO ME?

Aside from your time, there are no costs for taking part in the study.

IRB NUMBER: IRB2016-0506D
IRB APPROVAL DATE: 03/09/2018

WILL I BE PAID TO BE IN THIS STUDY?
You will not be paid for being in this study.

WHAT INFORMATION WILL BE COLLECTED DURING THE STUDY?
The study will collect your name, position and contact information (including telephone number and email address). This personal information will be encrypted and stored securely in password protected files/servers and will not be shared with anyone besides TTI staff working on the study. It will be destroyed immediately after completion of the study. The study also will collect your verbal and/or written responses to interview questions. TTI staff working on the study will assign a case number to each participant and then will remove all identifying information (name and contact information) from all records documenting your verbal responses and/or from your written responses to the interview questions. In this manner, the study data will not identify you personally or contain information that may be used to personally identify you. The list correlating participant case numbers with personal information identifying participants will be stored securely, in encrypted form in password protected files/servers and will not be shared with anyone besides TTI staff working on the study. It will used in the event that TTI staff have follow up questions during the study and will be destroyed immediately after completion of the study.

WHO WILL HAVE ACCESS TO DATA ABOUT ME AND FOR WHAT PURPOSES?
TTI researchers and DOT will have access to data collected during and after the study. At the conclusion of the study, these same researchers and DOT may share study data publicly at research conferences, for research purposes (for example, in reports), or in connection with other efforts to improve highway and road safety, and as otherwise required by law, but in so doing, your name will never be disclosed or associated with your study data.

WHOM CAN I CONTACT FOR MORE INFORMATION?
You can call the Principal Investigator to tell him/her about a concern or complaint about this research study. The Principal Investigator, Johanna Zmud, Ph.D, can be called at 512-407-1140 or emailed at j-zmud@tti.tamu.edu.

For questions about your rights as a research participant, to provide input regarding research, or if you have questions, complaints, or concerns about the research, you may call the Texas A&M University Human Subjects Protection Program office by phone at 1-979-458-4067, toll free at 1-855-795-8636, or by email at irb@tamu.edu.

MAY I CHANGE MY MIND ABOUT PARTICIPATING?
You have the choice whether or not to be in this research study. You may decide not to participate or stop participating at any time. If you choose not to be in this study, there will be no effect on your relationship with the Texas A&M Transportation Institute or Texas A&M University. You can stop being in this study at any time with no effect on your relationship with the Texas A&M Transportation Institute or Texas A&M University.

DOT HS 813 051
April 2021

U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**

NHTSA