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Identifying and Reconciling Stakeholder Perspectives in Deploying Automated Speed Enforcement

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Final Report



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16. Abstract (Limit: 250 words) Speeding is a public-health crisis, making up approximately a third of roadway deaths each year in the United States. One countermeasure with clearly documented efficacy to reduce speed is automated speed enforcement (ASE). Public acceptance of ASE, however, has been marginal with many drivers calling into question its need and legality. This project used surveys and interviews to better understand public rejection of ASE and to strategically provide individualized information to determine whether opinions can be shifted toward a more favorable view of ASE. Statistically significant movement on ASE opinion was achieved after respondents engaged with a tailored survey addressing their particular ASE concerns. Those who changed their opinion were more engaged (e.g., considered the opposite of their current stance more fully) and were persuaded by evidence of safety benefits resulting from reduced speeds and effective speed reduction with ASE deployment.					
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FINAL REPORT

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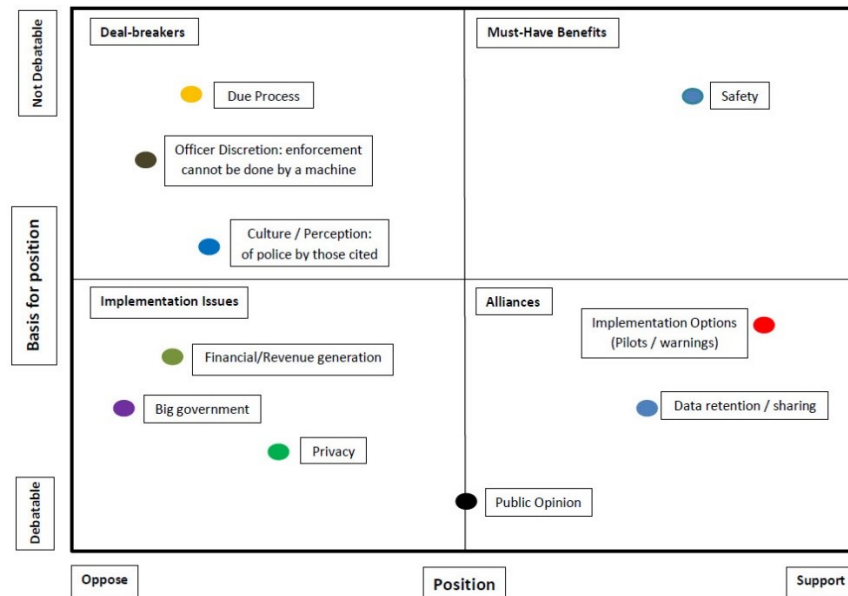
EXECUTIVE SUMMARY

Speeding is a public-health crisis, implicated in roughly a third of roadway deaths each year in the United States. One countermeasure with clearly documented efficacy to reduce speed and the severity of crashes is automated speed enforcement (ASE). Despite the demonstrated safety benefits of ASE, it is only being deployed in approximately 142 communities across the United States, and some states ban the practice altogether. Politically, ASE is a controversial issue, with many drivers questioning the legality of ASE and the need to improve speed enforcement. In Minnesota, ASE is not being utilized and would require legislative action to be implemented.

The purpose of this study, which focuses on Minnesota's potential ASE use, was threefold: to investigate attitudes toward ASE among stakeholders in Minnesota who would be involved in deployment of ASE; to quantitatively compare the rates of motor fatalities in states using ASE to Minnesota rates in work zones; and better understand the causes for the continued conflict regarding ASE deployment among the general Minnesota population and identify potential avenues for reconciling this conflict.

To investigate stakeholder attitudes toward ASE, we conducted 18 in-person interviews of professionals in four fields relevant to ASE deployment. We asked each interviewee a range of questions designed to elucidate their ideas and attitudes surrounding ASE. The stakeholder interviews revealed some level of support for ASE within each stakeholder category, especially when ASE was supported by strong data showing its positive benefits, and implemented in way that prevents abuse. Ten categories where respondents took issue with deployment of ASE were also identified through the interviews, and we plotted these categories on a position-basis matrix. The matrix is a four-quadrant graph, with various arguments placed on a two-dimensional scale.¹ The horizontal axis measures the interviewee's position regarding automated speed enforcement, from opposition (left) to support (right). The vertical axis measures the basis for that position and ranges from debatable (bottom) to not debatable (top), with "debatable" referring to areas in which interviewees were open to movement when information contrary to their initial opinion, and "not debatable" referring to areas in which interviewees held unshakable beliefs unlikely to change even in the face of contrary information.

¹ Please note that we are not judging the validity or strength of these arguments based on the quadrant titles or placement on the matrix. Rather, the matrix is mainly an analytical tool to help organize and visualize the various arguments and positions.



Position-Basis Matrix

We used roadway fatality data from the Fatal Accident Reports System (FARS) to perform the quantitative comparison in this study. We focused on the years 2004-2013 and compared the rates and numbers of work zone fatalities in Minnesota and the nine states (plus the District of Columbia) that deploy ASE in work zones. The quantitative aspect of this study did not reveal a quantifiable difference in work zone fatality statistics in Minnesota compared with the jurisdictions that deploy ASE in work zones.

To better understand causes for continued conflict surrounding ASE among the general Minnesota population, we distributed a survey with questions informed by the areas of concern identified in the interviews of Minnesota stakeholders. The surveys of general members of the Minnesota population found that 100 of the 203 respondents had favorable opinions of ASE upon entering the survey, and that there is broad public support for limited forms of ASE deployment, such as in school or work zones. The survey also revealed that a significant portion of people who are against or unsure about ASE can be persuaded to think better of it by addressing their key concerns and misconceptions. For instance, providing information about the safety impacts of speed can move someone with a negative opinion of ASE in a positive direction. Even for those respondents who did not change their opinions of ASE when provided with information favorable to ASE implementation, most were not further polarized into rejection of ASE, indicating a good dialog was achieved and further entrenchment into negative views was not a result of the engagement with most of the participants.

Overall, this study finds that negative perceptions of ASE are often related to misunderstandings about ASE and the public safety threat posed by speeding. Framing the use of ASE as a clear and effective safety tool to address a serious public health problem will increase public support for its deployment. Because large majorities in several surveys approve of its use in high-risk areas like school and work zones and where people often speed excessively, limited ASE deployment may be a useful foothold to gaining more support for expanded implementation of ASE.

CHAPTER 1: AUTOMATED SPEED ENFORCEMENT INTRODUCTION

1.1 SPEEDING

Independent research has shown that the deployment of automated speed enforcement (ASE) is effective in reducing average speed and crashes of most types (1). Moreover, ASE reduces crash-related personal injuries (2) and fatalities (3). ASE has the greatest potential in reducing serious injury and fatal crashes where traditional law enforcement efforts are less effective such as in rural areas where crash rates are high (4), average daily traffic is low, and high speeds are prevalent (5). Despite consistent evidence, use of ASE remains highly contentious (6), as demonstrated by legislative prohibitions in some states (7) and at the federal level (8).

Compared with 19 other high-income countries, the United States has the most motor vehicle fatalities per 100,000 population and per 10,000 registered vehicles (9). Speeding greatly contributes to the frequency and severity of motor vehicle fatalities; it is the leading factor involved in fatal crashes, equivalent to the impact the use of drugs, alcohol, and medication and distracted driving combined (10). In 2013, approximately one third of all fatal crashes (9,613) included speed as a contributing factor (11). The proportion of speed-related fatal crashes has remained stable at around 30 percent of total fatal crashes since 2007.

Drivers often underestimate the risks of traveling at high speeds (12). Speeding increases inherent driving risks by reducing a driver's safe maneuverability around curves or hazards in the roadway, requires increased safe stopping distance, and increases the distance a vehicle may travel during a critical situation (13). Moreover, higher driving speeds mean higher speeds at impact and hence greater impact force. Greater impact forces reduce the effectiveness of vehicle safety systems (e.g., seatbelts, crumple-zones, and air-bags) and roadway safety hardware (e.g., guardrails, barriers, and impact attenuators) (13, 14). Speed-related crashes also generate an enormous economic burden. For example, in 2010, crashes where at least one driver was exceeding the legal speed limit or driving too fast for conditions cost \$51.9 billion in direct costs and \$203 billion in comprehensive costs (e.g., health insurance costs, lost productivity due to traffic, and other opportunity costs) (15).

Therefore, it is of concern that Americans value driving at high speeds: Surveying U.S. drivers, the National Highway Traffic Safety Administration (NHTSA) found one-third agreed with the statement "I enjoy the feeling of speed," and more than half said they often get impatient with slower drivers (16). Unsurprisingly then, Americans exceed the speed limit with some regularity. A 2003 survey of four U.S. states found 11 percent to 78 percent of drivers exceeded the 55 mph speed limits by 15 mph or more. In two states with 75 mph limits on rural interstates, 10 percent to 24 percent of drivers drove faster than 80 mph (17). The most recent data (2011) also shows that the likelihood of speeding does vary by gender and age: as depicted in Figure 1 below, the percentage of fatal crashes involving male speeders substantially outnumbers that of female speeders in every age group until 75+ and the percentage of fatal crashes involving speeding decreases as drivers age (10).

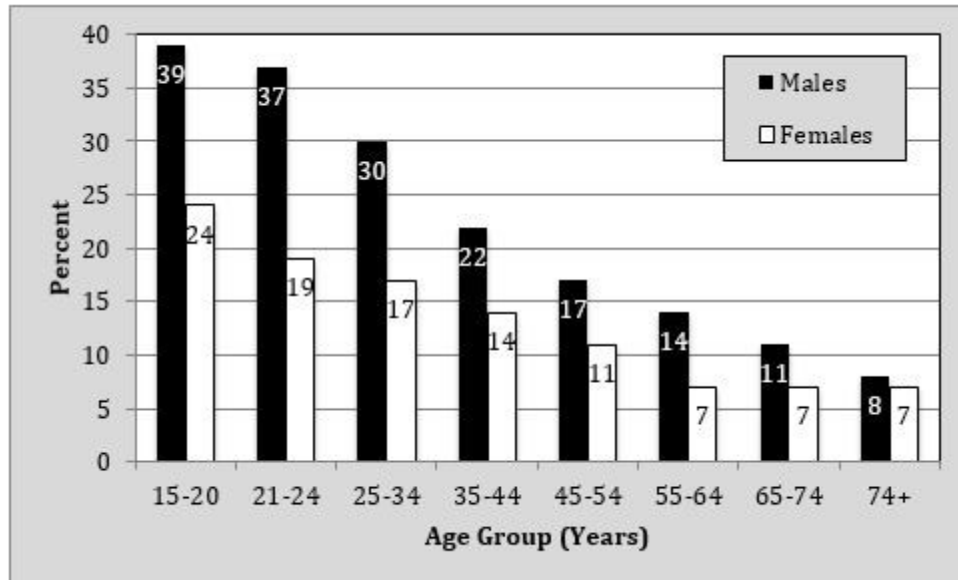


Figure 1. Percent of speeding drivers in fatal crashes by age and gender, 2011

(Source: NHTSA)

1.2 AUTOMATED SPEED ENFORCEMENT

Automated speed enforcement (ASE) has been described as a method of traffic enforcement so fundamentally different from traditional methods of enforcement that it has significantly altered citizens' basic expectations of law enforcement (18). ASE is a safety system that can improve operational safety by providing certainty that drivers who exceed the posted speed limit will receive the appropriate sanction. Modern, automated photo-radar equipment was deployed in pilot ASE trials in the 1980s (19, 20). By 1998, automated photo-radar was described as "one of America's hottest new trends in traffic control" (20). Today, there are approximately 142 communities across several states using photo-radar systems (21).

ASE deployment results in a reduction of average speeds and in most types of crashes while reducing the number and severity of both injurious and fatal speed-related crashes (1-3). As one example, in a review of the ASE system deployed throughout Montgomery County, Maryland, the Insurance Institute for Highway Safety found speed cameras were associated with a 10 percent reduction in average speeds and a 59 percent reduction in the likelihood that a vehicle was driving more than 10 mph above posted speed limits at ASE sites. They also reported a 19 percent reduction in the likelihood that a crash resulted in a debilitating or fatal injury (22). Other research has shown network-wide reductions in speeds (i.e., "halo effects") beyond demarcated ASE zones (23).

Despite these demonstrated safety benefits, deployment of ASE continues to be an exceedingly controversial issue (6). Several states have enacted restrictions (24-27) or banned the use of photo-radar (7, 28-30). Moreover, ASE systems have been rejected in a number of public referendums (31). In Region 5, only Ohio (32) and Illinois (33) permit ASE, and Illinois is the only state that articulates further

deployment in its Strategic Highway Safety Plan. Further, use of cameras for speed enforcement is illegal in Wisconsin (7).² Although not part of Region 5, Iowa state statute may be instructive for states within Region 5 considering ASE. “Automated traffic enforcement,” as it is called in Iowa, is widely deployed across the state. Furthermore, the technology survived a number of legal challenges, including a class action suit in federal court (34), state and federal constitutional due process and inalienable rights challenges (35),³ and preemption challenges (36).⁴

1.2.1 Research Objectives

This report will focus on Minnesota’s potential ASE use. The focus on Minnesota is appropriate given that automated enforcement received significant attention in its 2007 Strategic Highway Safety Plan (37) and was listed as a potential strategy, but with reduced emphasis, again in its 2014 plan (38). Progress on ASE, however, halted after a court decision voided deployment of red-light cameras in Minneapolis (39), which created the perception that ASE is unconstitutional in Minnesota. While the grounds were merely legal (not constitutional) and thus the Minnesota legislature has the power to change the law cited in the case and allow deployment, misunderstandings regarding the grounds for the decision and emboldened opposition to camera deployment have dampened enthusiasm for introducing bills that would do so (40). Lessons from the intricacies of the public discussion of the issue and resulting lack of progress in Minnesota may be applicable in other states.

This report contains the results of three distinct, but correlated, investigations into ASE and its deployment in Minnesota. The aim of the first investigation was to better understand the arguments for and against ASE held by influential Minnesota stakeholders. The aim of the second investigation was to quantitatively compare the rates of motor fatalities in states using ASE to Minnesota rates. The aim of the third investigation was to better understand the causes for the continued conflict regarding ASE deployment among the general Minnesota population and potentially identify avenues for reconciling this conflict.

² This statute states: “(a) In this subsection, “photo radar speed detection” means the detection of a vehicle’s speed by use of a radar device combined with photographic identification of the vehicle. (b) Notwithstanding sub. (1), the state and local authorities may not use photo radar speed detection to determine compliance with any speed restriction imposed by s. 346.57, 346.58, 346.59, 346.595 or 349.11 or a local ordinance in conformity therewith.”

³ Holding that an ATE ordinance, consistent with concepts of due process, may rationally impose liability on a defendant when the defendant concedes he is the registered owner of a vehicle, that he owns the vehicle involved in the infraction, and he offers no evidence that he was not driving the vehicle when the infraction occurred.

⁴ Holding that ATE ordinance was not preempted by traffic regulations and enforcement mechanisms of state statutes.

CHAPTER 2: STAKEHOLDER INTERVIEWS

2.1 INTRODUCTION

This qualitative research via in-person interviews attempted to more clearly articulate the differing points of view among the different stakeholders that would be involved in deployment of ASE. The purpose of the interviews was to identify commonalities and discrepancies among different stakeholder groups' knowledge about ASE, their attitudes about the barriers and opportunities presented by ASE, and their perception of others' attitudes about ASE.

2.2 METHODS

2.2.1 Stakeholder Selection

Through review of scholarly papers, legislative testimony, news reports and other records on the topic, we drafted a "stakeholder map", identifying expected categories and perspectives of those involved in this discussion, as well as potential sources of influence, both among the groups identified, and external to them. This map was then used to identify specific individuals in each category and contact them for interviews on speeding and ASE. Interviews were done via surveys and structured questions with key members of the affected institutions, both inside and outside of government.

We conducted 18 interviews, with a few individuals from each of four stakeholder categories. The "Non-Enforcement Government" stakeholder category included state and local elected officials, state executive department officers, businesses and non-profits, and policy think-tanks and lobbying interests. The "Public Health" stakeholder category included state, county, and local public health officials from urban, suburban, and rural communities. Interviews with the "Law Enforcement" stakeholder category attempted to capture a range of perspectives including the Minnesota State Patrol, county sheriffs, and municipal police departments. The "Judicial" stakeholder category included judges and magistrates. Effort was made to ensure that questions asked of judges avoided breaching any relevant ethical obligations. We purposely created a pool of respondents representative of roles within each category, the rural-suburban-urban divides, and both major political parties.

2.2.2 Interviews and Their Analysis

Topics for the interviews included perspectives on differences between automated and in-person enforcement (penalties, period of enforcement, opportunities to interact), use of the revenue generated by automated enforcement, the extent of deployment, and privacy concerns associated with ASE. Finally, we requested respondents to articulate circumstances where ASE could potentially be deployed. We with the University of Minnesota's Institutional Review Board (IRB) to ensure compliance with University policies. To encourage open discussion, individual names and interview transcripts were held in strict confidence. Direct quotations used in this paper were not attributed to the source, but rather identified only by the stakeholder group to which the speaker belonged. After conducting the interviews, we reviewed past recommendations for ASE deployment and identified new strategies for deployment in an attempt to address the needs and concerns expressed by these groups.

We used word clouds to visualize and analyze the qualitative data gathered through the stakeholder interviews. To create these word clouds, first we transcribed our stakeholder interviews. Then, we

removed our interview questions, leaving only the interviewees' responses. Then, we used WordItOut, an online tool, to visualize these responses. In total, we generated five word clouds, one for the entire interview pool and one for each stakeholder group (41). The word clouds are featured and described below.



Figure 2. Entire Interview Pool Word Cloud

As evidenced by the prominence of the words “support” and “public” in the word cloud for our conversations with all four stakeholder groups (Figure 2), each conversation involved discussion of the nature of public and stakeholder support (or lack thereof) for ASE. The word “officer” points to recurring mentions of the possible effects of ASE on the job of law enforcement officers, and the nature of law enforcement officer support for the ASE. Interestingly, “safety” and “revenue” appear the same size, and represent the two possible motivations for ASE implementation discussed by the interviewees. While this general word cloud points to some trends across stakeholder groups, the word clouds corresponding to each separate stakeholder group reveal significant differences in themes emphasized by each stakeholder group.



Figure 3. Non-Enforcement Government Stakeholder Interviews Word Cloud

“Revenue” appears larger in the word cloud for our interviews with Non-Enforcement Government stakeholders than any of the others (Figure 3). This indicates broad recognition among Non-Enforcement Government interviewees that revenue is central to the debate over ASE, both as a selling point and source of public concern. “Citation,” often mentioned during discussions of revenue, also appears prominently. The word cloud also demonstrates Non-Enforcement Government interviewees’ recognition of other dimensions of the debate surrounding ASE, such as concerns over “privacy” and benefits regarding “safety.”



Figure 4. Public Health Stakeholder Interviews Word Cloud

The word cloud corresponding to our conversations with Public Health stakeholders (Figure 4) demonstrates that the interviewed public health practitioners kept speed at the center of the conversation. They emphasized themes such as changing driver behavior and changing the perception that speed is not a major problem. Public Health stakeholders were also the group most concerned with reducing the severity of crashes. As one might expect, the Public Health interviewees spoke of transportation as a public health issue with implications for safety, mental health and physical activity levels, repeating words like “crosswalk,” “injury,” “safer,” “engineering,” “environment,” “livability” and “active”. However, they were not blind to practical and legal considerations regarding ASE implementation, regularly referring to “cost,” “revenue,” “law” and other terms, suggesting an awareness that those outside the public health sphere might view ASE in more logistical, financial or procedural terms.

took issue with deployment of ASE were identified. These ten categories (which are not in any particular order) include:

- Constitutional issues
- The lack of enforcement discretion in automated systems
- The general driving culture of Minnesota drivers
- The safety benefits of ASE
- How the system will be deployed
- The implications of huge amounts of data gathered by ASE
- The public's opinion
- The financial aspects of ASE
- Fear of big government
- Privacy both of the general public and specific individuals

The Non-Enforcement Government stakeholders did not talk about speed, but rather moved right in to reasons to support or oppose ASE. On the other hand, the Law Enforcement and Public Health stakeholders kept speed in the center of their discussion. Although each had very different perspectives, Law Enforcement was concerned with procedure (i.e., enforcing speed laws in a way that will change behavior) while public health took a more holistic view, considering a wide variety of factors that could impact a driver's decision to speed.

The categories are organized around the Position-Basis Matrix. The four quadrants are titled (in clockwise order, starting in top left):

- Deal-breakers
- Must-have Benefits
- Alliances
- Implementation Issues

The matrix is a four-quadrant graph, with various arguments placed on a two-dimensional scale.⁵ The horizontal axis measures the interviewee's position regarding automated speed enforcement, from opposition (left) to support (right). The vertical axis measures the basis for that position and ranges from debatable (bottom) to not debatable (top), with "debatable" referring to areas in which interviewees were open to movement when information contrary to their initial opinion, and "not debatable" referring to areas in which interviewees held unshakable beliefs unlikely to change even in the face of contrary information. The following section attempts to present the breadth and depth of commentary from the interviews.

⁵ Please note that we are not judging the validity or strength of these arguments based on the quadrant titles or placement on the matrix. Rather, the matrix is mainly an analytical tool to help organize and visualize the various arguments and positions.

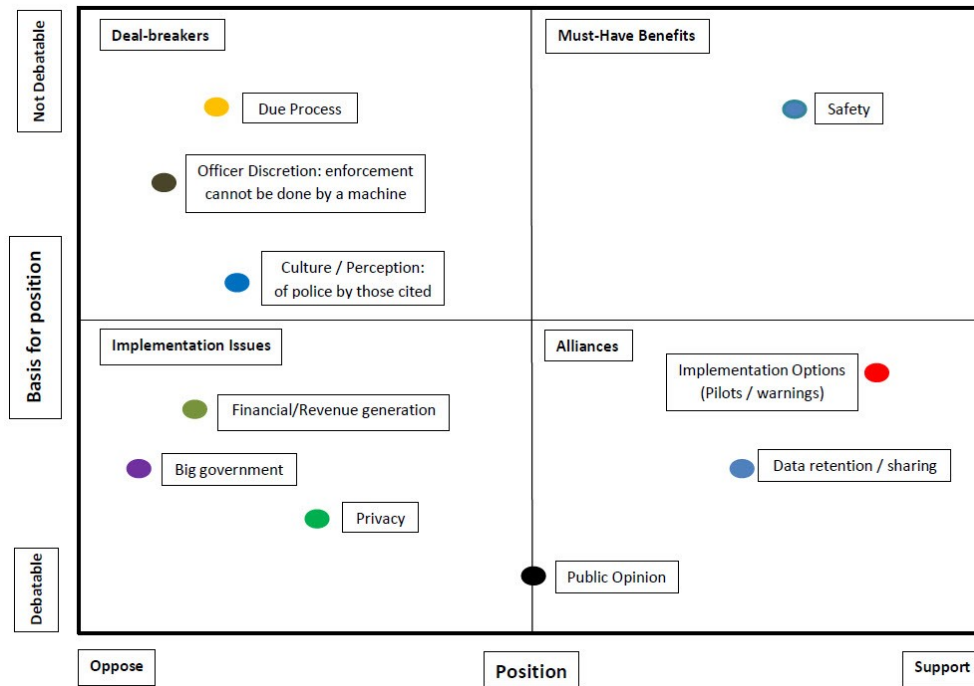


Figure 7. Position-Basis Matrix

2.3.1 Deal-Breakers

The title for this quadrant was chosen because it consists of arguments and issues that many cite as fundamental reasons to oppose ASE. According to some interviewees, these are positions that are more or less intractable, or very difficult to overcome. As such, they are deal breakers, and entirely prevent ASE from becoming reality in Minnesota. Several statements are quoted and described below. Such beliefs prompted us to conduct further background research on three major constitutional issues—due process and equal protection clauses, privacy, and vicarious liability.

2.3.1.1 Constitutionality of ASE

As one interviewee asked: “Does the constitution make a difference?” Constitutional protections are the most frequently raised arguments opposing ASE. More specifically, many people, and several of the interviewees, believe that automated speed enforcement violates either the Due Process clause or the Equal Protection clause of the U.S. Constitution. For instance, one law enforcement officer stated: “Officers want to improve safety but constitutional issues make automated enforcement illegal.” Another stated simply, “automated enforcement is illegal.” Other stakeholders believed that the Minnesota constitution prohibited ASE. In fact, more than one interviewee said his/her colleagues believe ASE is illegal because of the State Supreme Court’s ruling in *State v. Kuhlman* (42). This case was not, however, determined on constitutional grounds. Instead, *Kuhlman* turned on the fact that the state legislature had failed to give Minneapolis the authority to hold the owner of the vehicle responsible for the actions of the drivers in the instance of running a red light (39, 42). A Non-Enforcement Government interviewee stated that this understanding of the ruling is pervasive even among state legislators. More

problematic, one interviewee believed “this perception will be difficult and take a long time to overcome.” One Law Enforcement stakeholder expressed concerns about whether photographic evidence of speeding violations was sufficient to obtain a conviction in court.

The frequency and veracity with which interviewees raised constitutional concerns inspired us to thoroughly examine the scholarly literature and case law behind these arguments. Constitutional issues have been asserted in challenges to ASE systems across the country, by both scholars and litigants. For example, some contend that such automatic ticketing violates the Due Process Clause of the Fourteenth Amendment, which is supposed to prevent the government “from abusing [its] power or employing it as an instrument of oppression” (43). Most commonly, opponents argue that a cited driver is considered guilty upon receiving a ticket and is only then given the opportunity to prove their innocence—the exact reverse of a maxim of the American legal system: innocent until proven guilty (44).

Substantially all litigation founded in due process has been dismissed for jurisprudential reasons⁶ or has upheld the automated enforcement system. Courts have upheld systems even when a private company owns and operates the system and when the system generated significant revenues. Arguments that an owner is deprived of due process when an automated system uses first class or certified mail to and that a one-week delay in mailing the citation was prejudicial have been unsuccessful. An example of this is in the 8th Circuit, where the Northern District of Iowa recently dismissed a class action suit against the City of Cedar Rapids for a number of reasons (34). Several plaintiffs did not have a case or controversy sufficient to allow the court to decide the case. Those claims and plaintiffs that did have standing were also dismissed for several reasons. First, the fundamental right to travel is not infringed by the city’s ASE system. Thus, the municipal ordinance must be rationally related only to a legitimate government interest—a burden that it easily meets. Furthermore, the court dismissed claims that plaintiffs’ procedural due process rights were denied because the city’s operation of the system did not meet the Iowa DOT’s rules for such systems. There is no authority that violation of state regulation implicates the due process clause. The nature and weight of the violation, and the risk of erroneous deprivation of property or rights are insufficient to raise a violation of the due process clause.

The United States Constitution’s Equal Protection Clause is also a common argument raised against automated enforcement. This clause commands that no state shall deny to any person within its jurisdiction the equal protection of the laws, which is essentially a direction that all persons similarly situated should be treated alike. Scholars have yet to probe the depths of an equal protection argument against automated speed enforcement, beyond describing litigation that asserted an equal protection challenge. Again, ASE systems are generally upheld as constitutionally valid in the face of equal protection challenges (44, 45). Under rational relation review, courts have refused to distinguish between drivers, owners, or dealers and manufacturers; locations where cameras are deployed; or drivers stopped by human law enforcement officers and those cited by automated systems. One equal protection challenge achieved limited success in overturning an ASE system in Ohio. This case turned, however, on the fact that warnings posted for mobile ASE systems were different from the warning posted for fixed systems (46). Other arguments include the vicarious liability of the registered owner for the driver’s violations (47) and when the burden of proving a case is switched from the state or city to forcing the driver to prove her/his innocence (48).

⁶ These are foundational thresholds that must be met for a case to be allowed in to court, for instance standing, ripeness, mootness, etc.

2.3.1.2 Officer Discretion

Every stakeholder group mentioned whether or not an automated speed enforcement system would affect the discretion wielded by law enforcement officers. Law enforcement interviewees were particularly concerned with this issue. However, there does not appear to be a clear consensus among the interviewees about whether the effect would be positive or negative. One Law Enforcement respondent stated that regardless of the use of ASE, “officers would continue to conduct speed enforcement.” Another law enforcement officer stated that the impact on discretion would be a “non-factor,” as ASE would just be “something extra” in the methods communities have to enforce their laws. One law enforcement officer suggested one positive of ASE would be the reduction in officers’ speed enforcement caseload, presumably because fewer people would be speeding.

A few Non-Enforcement Government and Public Health stakeholders, and all Law Enforcement interviewees discussed how ASE might affect the enforcement of other laws. These interviewees suggested that implementing ASE “could reduce the number of stops made for reasons other than speeding.” Specifically, interviewees, especially law enforcement officers, were concerned that ASE would “remove the opportunity to find other, more serious violations, such as impaired drivers, felony warrants” and other major crimes. Furthermore, one law enforcement officer stated that human “officers would lose discretion with automated enforcement,” noting that an automated system would not have the ability to have a person-to-person interaction with a driver, but only automatically issue a ticket.

2.3.1.3 Driving Culture

Only Non-Enforcement Government and Public Health interviewees made statements about the prevailing “driving culture.” Generally, these comments appeared to be very much supportive of implementing ASE. For instance, “ASE presents an opportunity for the county to lead and be at the forefront of speed enforcement.” One high-ranking Non-Enforcement Government interviewee commented several times on the prevailing driving culture. This respondent stated that ASE may be the only way to get people to slow down, and that state and local authorities “have tried lots of other things that haven’t worked,” including signs, fines, education, and other tools. A Public Health interviewee stated that “the environment is not conducive to obey speed limit [sic]—police don’t even obey crosswalk laws.” In the same vein, another Public Health interviewee suggested that ASE would require a major change in behavior, but ultimately ASE could make people behave in a safer manner. Work-zone safety was a common topic among all stakeholders. One interviewee made a particularly interesting statement, saying that “currently, the public tends to speed up to get through work zones.” In response to this extremely risky driving behavior, “construction workers take informal measures to force drivers to slow down, including parking large vehicles close to traffic lanes, making lanes through work zones especially narrow, and even driving personal vehicles through the work zone slowly.” A Judicial interviewee recommended “building in structures to help people adjust behavior, such as advanced warnings with dynamic speed display signs of automated system and warnings for first time offenders, while also focusing the system on people who cannot or will not change.” In summary, many stakeholders believed that ASE might “help change driving culture and remind drivers that use of the roads is a privilege and not a right.”

2.3.2 Must-Have Benefit: Safety

Arguably the single most important rationale for implementing automated speed enforcement is improving safety. Indeed, some might even contend that safety alone is a sufficient rationale for implementing ASE. Compellingly, most respondents in this research were interested to learn more about the safety impacts of ASE. In fact, many claimed that if the positive effect of automated enforcement was significant, they would support—not just consider, but advocate for—deploying automated enforcement. Based on the interviews we conducted, a significant measureable improvement in roadway safety is an absolute requisite for garnering public support for ASE. In fact, only two respondents did not expressly mention safety as a necessary benefit.

A few examples of statements will illustrate the importance of safety to the interviewees. A Judicial interviewee said, “the closer the purpose and effect of the system is to improving public safety, the better on all accounts.” From a Law Enforcement interviewee: “anything to help reduce speed and crashes is a good thing.” As expected, Public Health interviewees focused the most on safety, and these interviewees described a diverse array of potential benefits, from protecting “vulnerable citizens” to “improving livability by reducing speeds,” to “reducing the severity of crashes” to making speed enforcement safer for law enforcement officers and highway workers. Non-Enforcement Government interviewees also provided stimulating comments regarding safety. These included the role ASE might play in improving pedestrian and bicycle environments, that ASE has changed driving behavior, and that “speed plays a role in one-third of all crashes.” Other comments either suggested or stated that the safety benefits would be the key issue for generating and maintaining support for ASE. One interviewee thought ASE would be most beneficial if deployed only in conjunction with rigorous statistical analysis, and only in “high risk crash areas.” A few Non-Enforcement Government interviewees believed that ASE would likely have a positive impact on safety, but that decision-makers would need to see convincing results to support deployment. In the words of the interviewee, “if safety numbers are compelling enough, all other questions would be addressed.”

As mentioned previously, there is a substantial body of literature on the positive safety benefits associated with automated speed enforcement. This section introduces and reviews only a small part of the available literature. The first study of automated speed enforcement in the United States reviewed ASE systems deployed in Illinois work zones. Benekohal and colleagues reported that ASE was effective in reducing the average speed and increasing compliance with work zone speed limit (49). Speed reductions in lanes adjacent to the median were greater than reductions in lanes adjacent to the shoulder. In addition, the speed of free-flowing vehicles was more greatly reduced than for vehicles traveling in congested conditions. Similarly, the percentage of vehicles exceeding the speed limit near speed enforcement programs was reduced from approximately 40 percent to 8 percent for free-flowing cars and from 17 percent to 4 percent for free-flowing heavy vehicles. Speed reductions were especially apparent near the speed camera—none of the cars exceeded the speed limit by more than 10 mph, and none of the heavy vehicles exceeded it by more than 5 mph.

Hajbabaie and colleagues, studied the sustained and “halo effects” (a continuation of speed reductions even after the speed reduction system was removed) of three speed reduction treatments in highway work zones (23). The authors compared a speed feedback trailer, a police patrol car, and the combination of a police patrol car and a speed feedback trailer. The results indicated that the automated enforcement system and the combination of police and automated enforcement treatments reduced the mean speed of both the general traffic stream and free-flowing vehicles by about 5 to 7 mph. Reductions in speed lasted for the duration of the system deployment. The proportion of drivers

speeding by more than 10 mph was reduced by 8.7 percent by the ASE system alone and by 8.9 percent with a combination of a police vehicle and an ASE system. Hajbabaie et al. also found minimal halo effect for the automated system was quite limited in both magnitude of speed reductions and the lanes in which speed reductions occurred (e.g., median vs. shoulder lanes).

Arizona has, arguably, the most well-known ASE systems in the U.S., and as such these systems have been frequently reviewed. Shin, Washington, and van Schalkwyk analyzed the impact of ASE on speeds ticketed by the Scottsdale Loop system during four periods of deployment, the impact on mean speeds, and safety impacts (1). These analyses found that the ASE system reduced the average speed at the enforcement camera sites by about 9 mph and reduced the speed dispersion (the variation of speeds found on a particular road at the same time) at the enforcement camera sites. The speed reductions increased as traffic flow decreased as would be expected based on the relationship between speed and traffic flow. Safety impacts were also significant: Depending on the analysis method, the study reports that the total number of crashes during non-peak periods decreased by 44 percent to 54 percent. The total number of injury crashes decreased by 28 percent to 48 percent, while the total number of non-injury/non-fatal crashes decreased by 46 percent to 56 percent. Ultimately, the authors estimate that, given Arizona-specific crash related injury costs, ASE yields about \$17 million in annual safety benefits from crash frequency reductions.

Retting, Kyrychenko, and McCartt evaluated traffic speeds at three locations on the same Scottsdale Loop (50). Four data collection points were set at each location, at a range of distances (0.5 mile to 2 miles) from the ASE camera. Traffic speeds were analyzed 2 months prior to activation of the ASE system, and six weeks, five months, and 8 months after system activation. The results suggest that ASE along the 8-mile enforcement corridor of the Scottsdale Loop 101 freeway was associated with large declines in mean speeds. ASE was also associated with an 88 percent decrease in the odds of vehicles traveling 11 mph or more above the 65 mph limit. In addition, speed cameras were associated with a halo effect: large reductions in speeding on the same highway but 25 miles away from the camera installations. However, the halo effect was limited to the Loop 101, and did not spill over onto other parts of the metropolitan freeway network. That traffic speeds increased soon after the pilot program was suspended, is another factor the authors believe suggests that ASE is effective.

Retting, Kyrychenko, and McCartt included random digit dialing telephone surveys of Scottsdale residents, and the larger Phoenix metro concerning the Loop 101 speed camera program. The survey was conducted both before and while the system was active. Results of the survey suggest that large majorities of drivers were aware that ASE was deployed in their area. Drivers were also asked their opinion of the ASE system. The proportion of drivers who favored speed cameras increased from 63 percent before camera enforcement to 77 percent during enforcement. Support for cameras increased markedly among drivers ages 35–64 (from 55 percent before enforcement to 78 percent after) and declined among younger drivers ages 18–34 (from 53 percent before enforcement to 40 percent after). In both surveys, male and female drivers had somewhat similar opinions, and older drivers were most in favor of speed cameras. During enforcement, 54 percent of respondents said the system caused them to reduce their speed while driving on the Loop 101 in Scottsdale. Of those who reduced their speed, 61 percent said that the ASE system caused them to reduce their speeds when driving on other sections of the Loop 101. Eight months after the system was activated, 71 percent of those surveyed said they approved of speed cameras.

Retting, Farmer, and McCartt studied vehicle speeds six months before and six months after speed cameras were deployed in Montgomery County, Maryland (51). In Montgomery County, camera-based

enforcement is permitted on residential streets with speed limits up to 35 mph and in school zones. Tickets can be issued for vehicles observed traveling at least 10 mph above the speed limit. The study conducted telephone surveys before and after implementation to gauge awareness of and attitudes toward automated enforcement. The surveys found that nearly three out of four Montgomery County drivers thought speeding on residential streets was a problem. Six months after enforcement began, 60 percent of drivers were aware of the camera program and 62 percent supported it. The authors concluded that the camera program was effective at reducing speeding on residential streets where deployed. Further, speed reductions outside targeted locations suggest that highly visible automated enforcement can promote community-wide changes in driver behavior. In terms of vehicle speeds, Retting et al. found that the proportion of drivers traveling more than 10 mph above posted speed limits declined by about 70 percent at locations with both warning signs and speed camera enforcement. The effect on vehicle speeds when no warning was provided was significantly less. The authors observed a 39 percent reduction in the proportion of drivers traveling at more than 10 mph above the posted limit at locations with warning signs but no speed cameras. The impact of ASE on speeders also led to a halo effect: the proportion of drivers traveling at more than 10 mph above the posted limit dropped 16 percent on residential streets with neither warning signs nor speed cameras.

Several researchers evaluated the impact of ASE specifically in work zones. Medina et al. compared the effects of automated speed enforcement with a variety of traditional speed reduction treatments (speed feedback trailer, presence of police vehicles with emergency lights on and off, and combinations of the speed feedback trailer and police presence) on vehicle speeds downstream of the actual treatment (52). The results consistently show significant halo effects of ASE systems, while other treatments had no significant downstream effects. On average, ASE reduced downstream speeds of free-flowing traffic by 2 to 3.8 mph for cars and by 0.8 to 5.3 mph for trucks. The proportion of speeding cars was also reduced by 7.1 percent to 23.4 percent, and the proportion of speeding trucks was reduced 4.2 percent to 48.3 percent. ASE also reduced the percentage of cars in the general traffic stream exceeding the work zone speed limit by more than 10 mph in virtually all cases, and eliminated such trucks in all but one case.

In response to a significant increase in fatal crashes in work zones in 2001 and 2002, Illinois implemented an automated enforcement in work zones (49). The system consisted of a mobile van equipped with cameras, both down the road and across the road radar, and an officer monitoring the equipment. Benekahol et al., studied the impact of this system by comparing vehicle speeds in work zones without a mobile automated speed enforcement van, with vehicle speeds in work zones with an ASE treatment. The authors found that ASE was associated with reduced average speeds for free-flowing passenger cars by 6.4 mph in the median lane and by 4.2 mph in the shoulder lane. Additionally, ASE was associated with a narrower distribution of speeds, which was more pronounced in median lanes than in shoulder lanes. Work zones with the mobile automated speed enforcement vans also saw decreases in the percentage of speeding drivers in free flow-traffic from 39.8 percent to only 8.3 percent and 27.7 percent to 6.3 percent in congested traffic situations.

2.3.3 Alliances

The bottom-right quadrant is titled Alliances, as these facets of ASE represent opportunities to build political support for it among various stakeholder groups. The key issues here are implementation options and public opinion.

2.3.3.1 Implementation Options

Every stakeholder group used the interviews to pose solutions for deploying an advanced, effective, and legal automated speed enforcement system. This topic was by far the most common subject discussed by all interviewees. Interviewees shared both their personal opinions, as well as their perceived colleagues' opinions. Because it was such a popular topic, the range of suggestions, ideas, and further concerns was vast, and will not be completely reviewed. However, a few conclusions can be drawn from the comments. First, both ongoing and advance notice of the deployment of an ASE system are crucial to the system's effectiveness and fairness. Stakeholders appear to believe that notice is defined by more than just signs near ASE systems, but also includes widespread publication that the system is deployed and education about how the system works, where the system is, and why it is being deployed. Public Health stakeholders stressed the importance of education as a part of a three-pronged approach—engineering, enforcement, and education.

Second, limited deployment is likely the most acceptable solution in the near term. One example of limit deployment is pilot projects to evaluate the benefits of ASE, demonstrate to the public how the system works, and acclimate the public to the behavior changes necessary to deploy automated enforcement. As one interviewee stated, "pilot projects would be a way for people to get used to it and begin to adjust to its impact." A Non-Enforcement Government interviewee thought that, "starting with State Patrol could help, because they have more tools at their disposal—legislative and public awareness and education." Another aspect of limited deployment concerned the precise placement of ASE technology. Nearly every interviewee thought that pilot projects in work and school zones would be the best initial form of ASE deployment prior to any permanent deployment. Even interviewees who suggested or directly stated that ASE is illegal appeared to be open to pilot projects or full-scale deployment in work zones and school zones.

A possible option to address concerns about taking pictures of the driver is for the legislature to impose liability on the vehicle owner for any offenses detected by an ASE system, regardless of who was driving the vehicle at the time of the offenses. This would be an example of vicarious liability, which is a very common, and valid method for imposing liability across the nation that has been upheld in several situations (53). By statute in Minnesota, owners are vicariously liable for crimes and torts committed by the driver of their vehicle who uses the car with either express or implied permission (54). For example, in Minnesota, the owner of a vehicle, even if driven by another, which fails to stop for an extended and flashing school bus stop-signal arm, is guilty of a petty misdemeanor (55).

2.3.3.2 Public Opinion

Like other topics discussed in this study, the stakeholders were unable to express a clear consensus on whether the public supports or opposes ASE. In fact, a few interviewees were equivocal in their understanding of the public's opinion. Notwithstanding this ambivalence, the stakeholders generally believed certain groups would have strong opinions regarding ASE. For instance, Non-Enforcement Government interviewees believed that state department of transportation employees, road construction workers, bicyclists and pedestrians, safe community coalitions, and those earning a living on the road (i.e., truckers) would strongly support automated enforcement. Groups the interviewees thought would oppose ASE included young drivers, drivers with numerous citations, and most commuters. Overriding concerns for those opposing ASE typically involved disdain for big government,

and unfair or excessive revenue generation by ASE systems. A Non-Enforcement Government interviewee thought that these groups would oppose ASE because of the impacts to “their bank accounts, their driving generally, and specifically their commutes.” A Law Enforcement interviewee suggested that advocacy groups like Mothers Against Drunk Driving (MADD) might oppose ASE because it would reduce the number of officers doing speed enforcement, and thereby reduce the chances of catching drunk drivers.

All stakeholders were more uncertain about the perspective of law enforcement officers. Even the Law Enforcement stakeholder group made statements reflecting both support and opposition to automated enforcement. A few statements from this stakeholder group are instructive of this equivocation. A high-ranking Law Enforcement interviewee expressed feeling “pressure to implement” ASE from legislators and agency officials. That same interviewee said that “officers on the street” do not feel the same pressure, and likely perceive public opinion to be against ASE implementation. A different Law Enforcement interviewee had a slightly different point of view, saying that most officers, including those in leadership positions, feel no pressure to implement automated enforcement. Law Enforcement stakeholders generally believed that most other officers would oppose ASE for three reasons. First, speed enforcement is “a huge chunk of what” law enforcement officers do on a daily basis, and thus “some would be concerned about what their role is.” Second, any “public backlash against ASE could be directed towards officers.” As law enforcement officers already struggle with negative public opinion about their role and impact, further negative opinion would only diminish law enforcement’s capacity to fulfill its duties. Third, ASE is a potentially disruptive technology and could require significant changes in roles and practices. Officers “would not like the change in practices.”

Although there does not appear to be any research specifically on public opinion and the relation between ASE and perceptions of law enforcement, there is research on the public’s opinion of ASE more generally. Most studies of automated enforcement systems in the U.S. include a public opinion component. A few studies focused entirely on public perception of ASE: Streff and Molnar report that the public generally favors use of ASE in select situations, particularly in school zones, in areas where traffic enforcement is dangerous for police, for heavy trucks, and in construction zones. Streff and Molnar also report greater opposition to ASE from speeders and persons who reported having multiple citations in the previous two years. In fact, previous research in Minnesota showed broad public support for deployment in work zones and school zones (40).

A number of national and regional surveys of public opinion indicate that a majority of the public supports automated enforcement. In a national survey by NHTSA in 2002, 68 percent of participants responded in favor of automated speed enforcement systems targeting drivers going 20 mph or more over the posted limit (16). Similarly, 78 percent favored deploying ASE in school zones. In addition, 56 percent of drivers preferred that citations be issued by taking photos of the driver from the front and matching that photo to the driver’s license, but only 32 percent preferred using photos of the rear license plate only. Similar surveys in individual jurisdictions report wide ranges of majority support. For instance a survey in Washington, D.C reported only 51 percent of respondents supported ASE (56), while a survey in Scottsdale, Arizona reported 77 percent of the public supported ASE (57). Public opinions polls also reveal some interesting contrasts, for instance female drivers compared to male drivers, and those who identify speeding as a problem are more likely to support automated enforcement.

2.3.4 Implementation Issues

2.3.4.1 Financial Issues

“What to do with the money raised from the citations?” This question abounds in media coverage of ASE, as well as in the interviews conducted for this study. Much, if not most of the media coverage appears to connect automated speed enforcement with invidious schemes by elected officials to generate huge revenues, balance budgets, or to provide private companies lucrative business opportunities (58–61). Multiple interviewees mentioned several times the “need to be transparent” about how the money generated from automated enforcement is used. Non-Enforcement Government and Public Health stakeholders made the vast majority of statements regarding the financial aspects of automated enforcement. Non-Enforcement Government interviewees generally expressed opposition to ASE when discussing financial matters. Many mentioned how the considerable revenues generated by automated systems are “usually” the underlying reason for implementing an automated enforcement system. One Non-Enforcement Government interviewee stated that many “legislators don’t believe the rationale [for ASE] is improving safety, but instead believe it is for revenue or other reasons.” According to another Non-Enforcement Government interviewee, “other states are using it for money, and not for enforcement purposes.” A Law Enforcement interviewee believed the public would view the system as the “government making money.”

The few Public Health and Law Enforcement interviewees who mentioned financial issues expressed support for ASE. A Public Health interviewee said that automated enforcement “saves money” because it is cheaper and safer to deploy than human officers. That same interviewee understood ASE to be a good idea because the revenues generated allowed the system to “pay for itself.” Two Law Enforcement interviewees suggested that fears of revenue generation were unfounded. These interviewees rejected this argument because “that is not the way [the police department] operates.” In other words, law enforcement officers in those communities do not enforce speed laws as a means of generating revenue.

The most revealing comment about ASE’s financial impact came from a Non-Enforcement Government stakeholder. This interviewee rejected the revenue generation argument because Minnesota law prohibits such motives. In the interviewee’s words: “Traffic enforcement is not a money maker for cities, [because] the state gets a large share of citation revenue.” Under state law, revenue from all criminal and administrative fines is shared between both the local government unit that issued the ticket, and the state government. Allocation of fine revenue has several components: the type of fine (administrative vs. criminal), who handled the prosecution, who issued the fine, and, in limited cases, the specific infraction (62). For instance, in Hennepin County, revenue from the base fine of a speeding citation would generally be distributed as follows: 80 percent to Hennepin County, 20 percent to state general fund. However, if the County Attorney prosecuted the case, 100 percent of the fine is allocated to the state general fund. Administrative sanctions, which differ from criminal fines in that they are meant as compensation to the government for harm done to society rather than as punishment, are also subject to distribution mandates (63). Two-thirds of a fine collected from administrative fines goes to the local government that issued the fine; one third goes to the state general fund. This law would very likely prevent, if not act as a significant obstacle to any local government that attempts to use ASE as a moneymaker. Further, this same law also restricts the use of this revenue. Subdivision 5(b) requires local governments to use one-half of the proceeds of the fine for law enforcement purposes, and fine proceeds cannot “supplant” but rather only supplement existing funding (64). Legal restrictions on the

use of administrative fines are even more substantial if the citation is issued by the State Patrol. In these circumstances, one-third of the fine is distributed to the local government and two-thirds goes to the state general fund.

2.3.4.2 Privacy

Drivers have only minimal rights to privacy in regards to their movements on public thoroughfares, and even less right to protection of information about traffic violations while driving on public roads. The right to privacy on public roadways is substantially limited by United States Supreme Court case law. In the seminal case *U.S. v. Knotts*, the court reaffirmed that individuals have

“a lesser expectation of privacy in a motor vehicle because its function is transportation A car has little capacity for escaping public scrutiny. It travels public thoroughfares where both its occupants and its contents are in plain view A person travelling in an automobile on public thoroughfares has no reasonable expectation of privacy in his [or her] movements from one place to another” (65).

As a result of this and subsequent cases, drivers cannot expect complete privacy of their use of, or movement along public roadways. If a driver is using public roadways her or his use can be recorded, monitored, and shared in many ways.

The federal Drivers Privacy Protection Act (DPPA) does, however, limit the use of information collected by state traffic and public safety agencies. According to Section 2721(a) of the DPPA, State departments of motor vehicles, and anyone employed or contracted by the agency, are prohibited from disclosing personal information to anyone (66). Personal information includes,

“information that identifies an individual, including an individual's photograph, Social Security Number, driver identification number, name, address (but not the 5-digit zip code), telephone number, and medical or disability information, but does not include information on vehicular accidents, driving violations, and driver's status” (67).

The DPPA does permit disclosure of personal information (and highly restricted personal information) in a limited number of situations. These situations include, but are not limited to: use by a government agency including courts and law enforcement agencies (68); use in relation to motor vehicle or driver safety and theft (69); and use by insurers in claims investigations, and rating or underwriting (70).

Analogous to speeding cameras, Mary Lehman reviewed whether red light cameras invade drivers' right to privacy (71). Lehman argues that cameras are not an unconstitutional invasion of privacy for two reasons: cameras record information that is in plain view in a public place; and the Supreme Court of the United States has long held that drivers do not have a right to privacy on a public street (65).⁷ Further, Lehman contends a driver forfeits their right to privacy by breaking the law when they run a red light. Although Lehman includes an interesting discussion on potential alternatives to red-light cameras, she ultimately argues that cameras are at least comparable if not typically the better solution. She believes that opponents focus on the fear of government control while purposely overlooking the significant positive benefits of automated enforcement.

⁷ Holding that a person does not have a reasonable expectation of privacy while traveling by automobile in public spaces; e.g., an automobile's movement on public roads, including its arrival at a private residence, is not protected by the Fourth Amendment.

Nearly every reported case with a challenge to red light cameras or ASE systems based on a privacy argument has upheld the system. This includes Fourth Amendment search and seizure challenges; general constitutional privacy challenges; infringement of the right to travel; and challenges for violations of state Department of Motor Vehicle privacy statutes.

2.3.4.3 Big Government

Mistrust of government by members of the public is evident in political rhetoric, mass media coverage, and even day-to-day conversations with individual citizens. Distrust of the political and bureaucratic system is often raised as the primary concern of those in opposition to automated speed enforcement. However, fear of government overreach—colloquially “big government” or “big brother”—was mentioned by only three interviewees. One Non-Enforcement Government interviewee cited “trust of government” as the issue most commonly raised by his/her colleagues regarding ASE. A Public Health interviewee suggested that “libertarian types” believe such programs “[smack] of more government, more control, more enforcement.” The most vehement criticism was raised by a Non-Enforcement Government interviewee, who expressed the perception that his/her colleagues believed that “[ASE] is big government—the only intention is to generate revenue and make money” A Law Enforcement interviewee insightfully noted that “limited deployment will look less like ‘big brother’ is ticketing everyone.” This limited deployment would help communities and the state generate more support for automated enforcement.

A more common topic was the appropriate level of government to conduct automated enforcement. Various stakeholders were concerned about state-level implementation because traffic control generally, and speeding in particular, is “a local issue—the city, and only the city should have the option” to implement ASE. Another interviewee questioned the ability of cities to undertake an ASE program because “most cities have no experience” with the technology and systems required for automated enforcement. One Non-Enforcement Government interviewee expressed dissatisfaction with current enforcement systems and practices, in particular the alleged failure of the state patrol to issue citations for speeding even when Troopers are present in work zones. Finally, a Judicial interviewee was particularly happy to have the opportunity to discuss the policy underlying automated enforcement. This interviewee stated “judges don’t typically get asked about new laws before they are implemented. Policy makers develop the laws/policy, and courts get the law with little input about it.”

CHAPTER 3: QUANTITATIVE EVALUATION OF ASE IN WORK ZONES

3.1 INTRODUCTION

Public opinion is favorable to ASE at least on certain roadways. A nationally representative survey found a majority believed ASE would be effective in improving road safety and especially supported the use of ASE in construction zones (72). Researchers from the University of Minnesota found similar results in a 2012 public opinion poll of Minnesota residents, as shown in Table 1 (39). By their nature, a work zone can be dangerous for police officers. There may be few safe areas to post a police officer or stop speed violators. In addition to reducing police visibility, leaving a work zone to issue a ticket poses the extra threat of being struck by a passing vehicle (73). Therefore, ASE systems can cite more drivers while keeping officers out of dangerous work zones.

Table 1. Impact of Location on Support for ASE in Minnesota

Automated camera and radar devices to monitor speeding...	“Very supportive”	“Somewhat supportive”	Net “supportive”
In work/construction zones	57%	26%	83%
Near schools	59%	22%	81%
Where many have died	50%	27%	77%
Where many speed	39%	30%	69%
On all roads	16%	32%	48%

(Source: Douma et al. [2012])

The goal of this analysis was to compare speed statistics and motor vehicle fatality rates in states that deploy ASE in work zones (such as Illinois) to determine if ASE contributes to improved safety in these areas.

3.2 METHODS

We looked into whether there is a quantifiable difference in speeding statistics in Minnesota compared with states with ASE. Because data concerning non-injurious speeding violations are typically maintained at the county level, due to time and other resource constraints, we examined data on fatalities, which is the health impact of speed that we most want to mitigate. While most states provide only general fatality data, for the states where ASE was deployed in work zones and evaluated with respect to fatalities (e.g., Ohio and Maryland), we present that data.

We analyzed work zone and speed-related fatality data from Minnesota and nine states (Arizona, Illinois, Iowa, Maryland, Ohio, Oregon, Tennessee, Utah and Washington) plus the District of Columbia where some form of ASE is being deployed. The first step in comparing motor vehicle fatalities across states that utilize ASE in work zones was to look at a broad overview of the states' fatalities before and after ASE implementation. Using Fatality Analysis Reporting System (FARS) data from the National Highway Traffic Safety Administration, we examined whether states that implement ASE in work zones have experienced appreciable differences in work zone-related fatalities. Second, because evaluation processes differed so widely state-to-state, we present a verbal summary of specific ASE performance reviews in work zones.

3.3 RESULTS

3.3.1 FARS Data

Despite the reductions in speeding due to ASE discussed earlier in Chapter 3, few substantial changes in traffic fatalities attributable to ASE were identified in this analysis. Between 2004 and 2014, without ASE, Minnesota experienced a notable reduction in total traffic fatalities. The nine states and the District of Columbia that have ASE all followed the same downward trend as Minnesota, and it is worth mentioning that the drop in statewide fatalities began before the 2009 start of the Toward Zero Deaths: A National Strategy on Highway Safety campaign (74).

Similarly, speed-related fatalities dropped between 2004 and 2013 in most of the jurisdictions we analyzed, with the notable exceptions of Iowa and Ohio, where speed-related deaths rose, and Utah, where they held roughly steady. Overall, these state-level fatality statistics speak to a nationwide reduction in traffic fatalities, but shed little light on ASE's impact.

Fatality statistics specifically from work zones also do not paint a clear picture. Work zone fatalities occur in small numbers (the largest number of such deaths in one year in any of the states examined was 38, in Illinois in 2004) and are subject to massive variation (Figure 8). For instance, Washington State experienced 16 work zone fatalities in 2006 and just 2 the following year. The District of Columbia had either 0 or 1 work zone deaths in every year from 2004 to 2013, making any trends virtually impossible to ascertain.

The contrast between the literature review, which cites numerous studies that identify definitive reductions in speeding due to ASE, and our quantitative state-level analysis, which sheds little light on ASE's potential to reduce traffic fatalities, might be due to limitations with FARS data and to the fact that the literature review examines very focused studies carried out at scales much narrower than the statewide level. ASE has been deployed in a limited fashion in the states examined in this report, perhaps not widely enough so that discernible drops in fatalities statewide could be expected. Furthermore, fatality statistics are subject to confounding variables. For instance, the drop in motor vehicle deaths nationwide between 2004 and 2014 could be partially explained by the decrease in vehicle miles driven associated with the Great Recession. Additionally, FARS data just describe fatalities, not injuries.

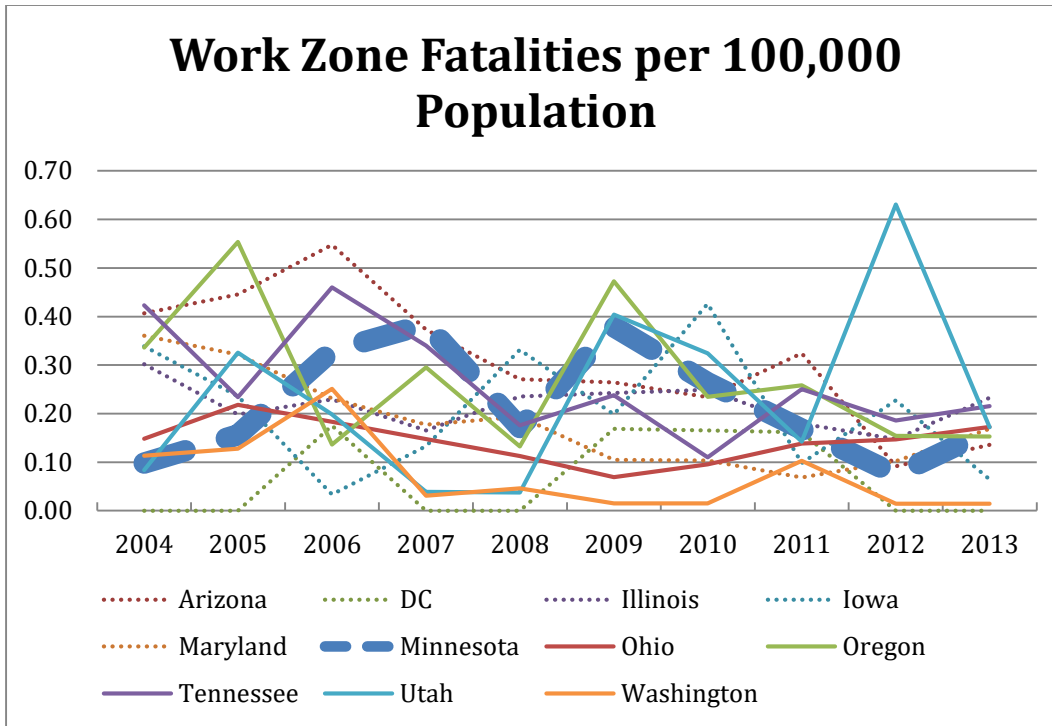


Figure 8. Work Zone Fatalities per 100,000 Population, 2004-2013

(Source: FARS Data)

3.3.2 Work Zone ASE Evaluations

Several jurisdictions have deployed ASE in work zones and as a result have experienced a reduction in speeds in the ASE enforcement areas (49). Specific evaluations of ASE implementation in work zones are discussed in more detail below. To inform Minnesota regarding the possible implementation of ASE within the state, we begin by describing its work zone data.

3.3.2.1 Minnesota

Minnesota has not deployed ASE systems anywhere, including work zones. Therefore, instead, we present current data on crashes and speed in work zones that could be affected by future ASE deployment. From 2004 to 2011, there were on average 1,820 work zone crashes per year in Minnesota. During this period, work zone crashes represented 2.3 percent of all crashes in the state. Of the work zone crashes during this period 0.4 percent were fatal, 30 percent were injury causing, and 69.6 percent were property-damage-only. This record is similar to the crash-type distribution seen on all roads suggesting that work zones are no safer than Minnesota roads generally (40).

Table 2 shows the relative frequency of contributing factors cited for work zone crashes (40). For all work zone crashes, speeding is the third most frequently cited factor, behind driver distraction and following too closely. However, the results show that the more severe the crash, the importance of speeding increases. For example, in fatal crashes the importance of speeding as a contributing factor increases, and is second only to driver distraction. In addition, the two factors cited more frequently than speeding—driver distraction and following too closely—are speed related. That is, as speed

increases, so do the dangers of driver distraction and short following distances. Although speeding is not the leading cause of work zone crashes, it is a substantial contributor.

Table 2. Contributing Factors Cited in Work Zone Crashes (2003-2012)

Contributing Factor	All Crashes	Fatal Crashes	Injury Crashes
	(N=26,224)	(N=107)	(N=8,145)
Driver inattention or distraction	27%	27%	29%
Following too closely	19%	2%	17%
Illegal or unsafe speed	12%	21%	14%
Failure to yield right of way	8%	4%	8%

(Source: MnDOT)

From 2003 to 2012, the largest percentage of work zone crashes (41 percent) as well as the largest percentage of fatal crashes (36 percent) occurred on interstate highways. State trunk highways were also notable in this regard, accounting for 16 percent of work zone crashes and 26 percent of fatal crashes. Data on the amount of work zone miles on particular road types was not available, so these figures represent the simple, unweighted percentages of all work zone crashes that occurred on a given road type. Overall, the Minnesota crash data indicate that speed-related crashes in work zones are an important problem and one that ASE could potentially help address.

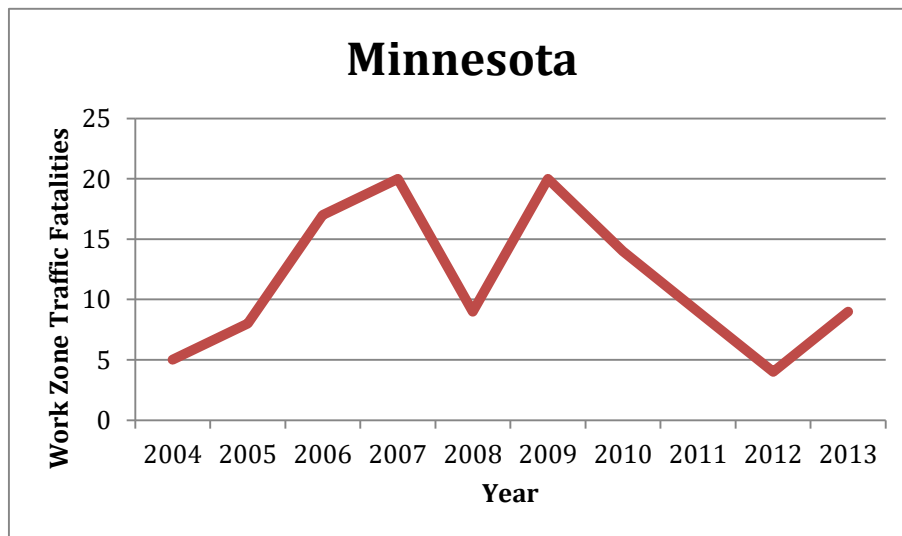


Figure 9. Minnesota Work Zone Traffic Fatalities

(Source: FARS Data)

3.3.2.2 Ohio

Ohio’s automated speed enforcement program was deployed in 2008. Ohio statutes require that local traffic enforcement “[erect] signs giving notice” in order to use photo-monitoring devices (OH ST § 4511.094) (75). The state legislature made a law that requires that signs be posted about ASE in order to do photo enforcement. Unlike other states’ fatality trends, both Ohio’s statewide fatality rate and work zone fatalities were on the rise, with work zone fatalities doubling between 2009 and 2011. According to the Ohio DOT, excessive speed has contributed to more than 1,500 work zone crashes since 2003 (76). Senate Bill 342 requires a police officer to be present during use of ASE. They do not have to issue a ticket at the time of the violation, but have to do so within 30 days (77). Ohio does not have specific research regarding speeding and ASE use in work zones, but does have data on speeding around work zones. They show the 85th percentile before the work zone sign was three to seven mph over the original posted speed limit, leading to the 85th percentile speeds being about thirteen to fifteen mph throughout the reduced work zone speed limit (78).

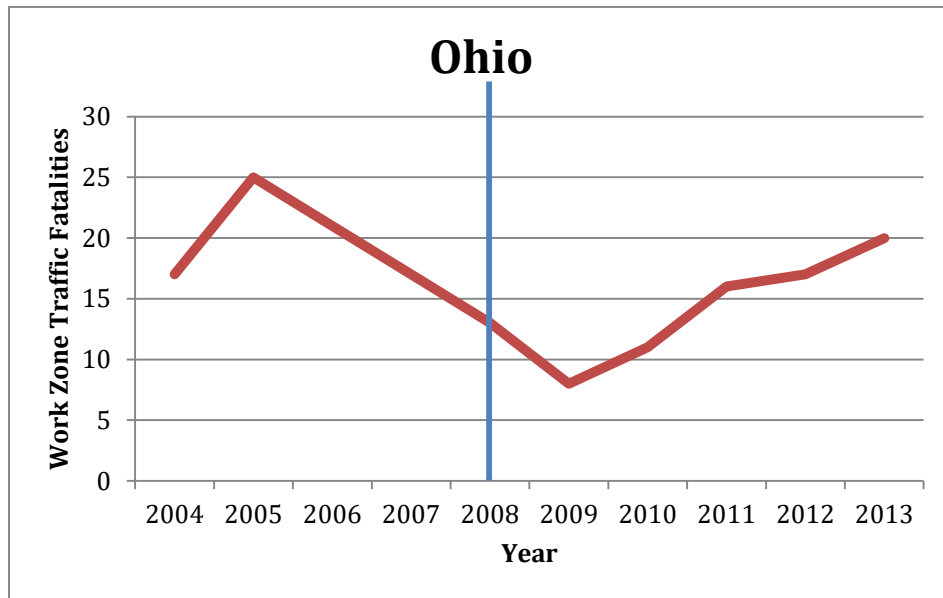


Figure 10. Ohio Work Zone Traffic Fatalities

(Source: FARS Data)

3.3.2.3 Maryland

Maryland authorized limited use of ASE to specific counties and cities and limited zones within those jurisdictions (e.g., work zones and school zones; MD TRANS § 21-809) (75). Maryland’s SafeZones pilot ASE program began in October 2009 and began its permanent rotation through work zone sites beginning July 1, 2010. Research has shown the SafeZone ASE systems have contributed to a 54 percent reduction in the number of vehicles exceeding posted work zone speed limits by 10 mph. By reducing the range of speeds among motorists, SafeZone ASE systems have also resulted in more uniform flow through work zones. The number of injury-causing crashes in work zones has decreased by 15 percent and work zone fatalities decreased by 65 percent in the first three years the program was in place. At the same time, work zone crashes across Maryland decreased by 12 percent (79).

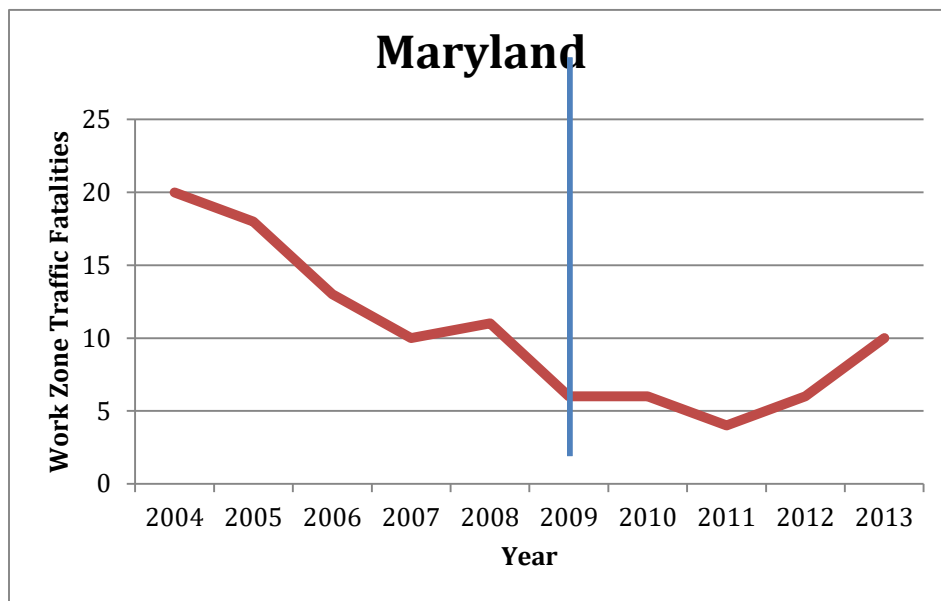


Figure 10. Maryland Work Zone Traffic Fatalities

(Source: FARS Data)

3.3.2.4 Illinois

Illinois was the first state to authorize the use of ASE on highway work zones, doing so in 2006. In 2006, work zone crashes were just two percent of all Illinois fatalities, but twenty percent of Interstate fatalities (80). Although work zone speeds and fines apply whether workers are present or not, ASE can be used only when workers are present (625 ILCS 5/11-602; 625 ILCS 5/11-605.1; 625 ILCS 5/11-612; 625 ILCS 7/) (81). Research has shown the average speed of free-flowing vehicles in Illinois ASE work zones decreased between three and eight mph and the proportion of speeders decreased by up to 54 percent. Additionally, there was a small halo effect: Speeds were reduced by 2 to 5 mph up to 1.5 miles downstream of the ASE vehicle and for an hour after the ASE vehicle was removed (49). In a comparison to traditional police presence, Hajbabaie et al. found both significantly reduced speed to an equal degree, but the police presence did not result in a significant halo effect (23).

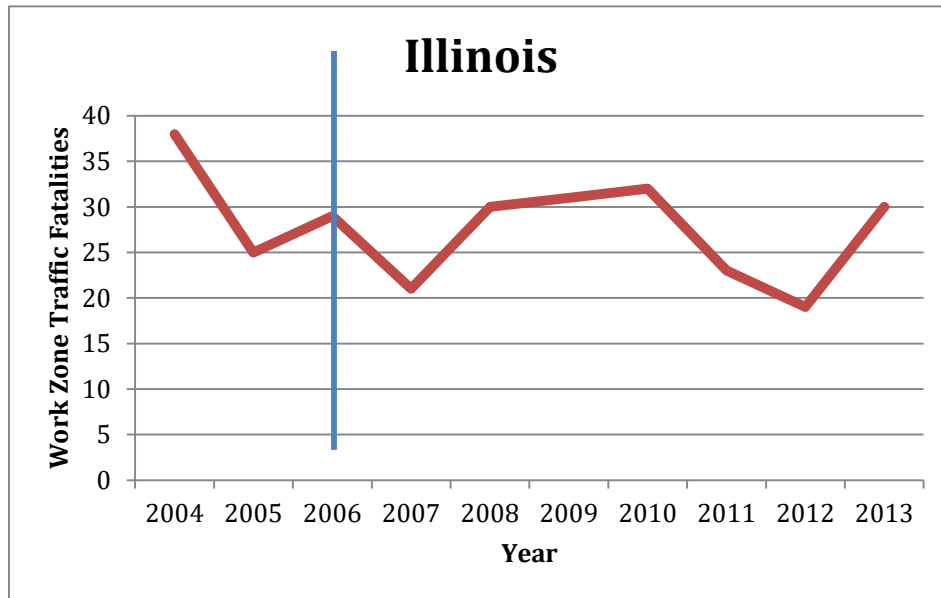


Figure 11. Illinois Work Zone Traffic Fatalities

(Source: FARS Data)

3.3.2.5 Iowa

There were no specific state laws inhibiting the use of ASE in Iowa (75) and ASE cameras were deployed in Iowa starting in about 2005 (82). Local jurisdictions could adopt traffic safety statutes and ordinances that allow for ASE use as long as they were not “in conflict with the goal of uniformity throughout the state” (81). However, in 2014, the Department of Transportation adopted rules that required cameras on or next to highways to be justified on an annual basis by showing significant safety improvements (e.g., reduced crash rates) (83). Of the five most recently submitted reports made available (2014), all speed cameras were approved for continued use (84), indicating continued safety benefits in terms of reducing crashes and crash severity. No actual speed data were submitted.

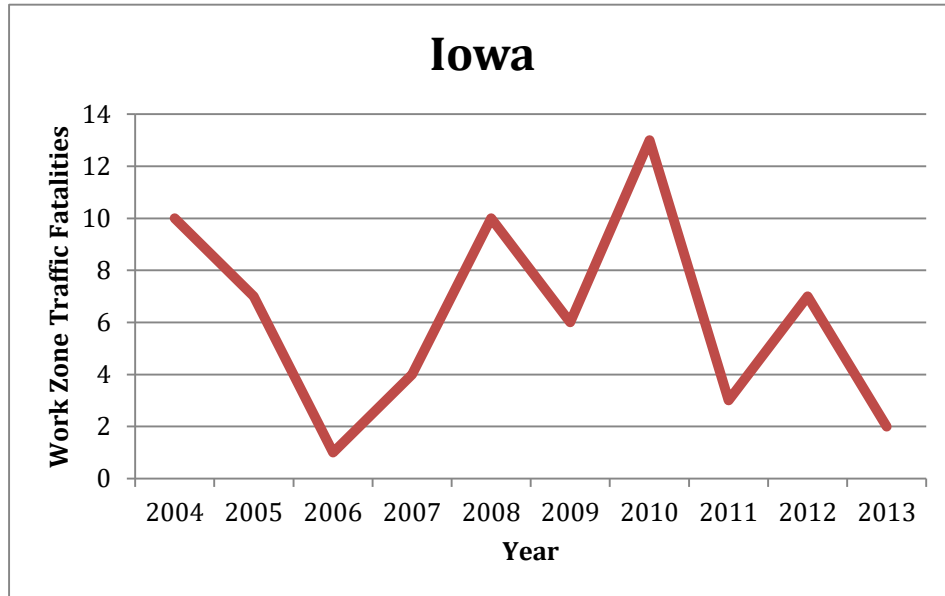


Figure 12. Iowa Work Zone Traffic Fatalities

(Source: FARS Data)

3.3.2.6 Arizona

Investigations show that speeding is pervasive on Arizona highways and worse on high-volume, urban interstates (85). ASE in Arizona was piloted for nine months in 2006 before being introduced officially in 2008. Briefly, evaluation of Loop 101 in Scottsdale, Arizona found that the ASE system reduced the average speed at the enforcement camera sites by about nine mph (1) and was associated with an 88 percent decrease in the odds of vehicles traveling 11 mph or more above the 65 mph limit (50). ASE on Loop 101 also resulted in significant safety benefits; Crash frequency reductions due to ASE use on the 101 loop were estimated to yield savings of about \$17 million for the nine-month test period (1).

The share of drivers favoring the use of ASE actually increased from 63 percent before camera enforcement to 77 percent during enforcement. Approval was still high eight months after the system was activated (71 percent) (50). Despite the 19 percent reduction in fatal crashes in the first nine months of use, the program was shut down in 2010 after Governor Jan Brewer took office (86). The statute originally allowing for use of ASE was repealed in 2012 (81).

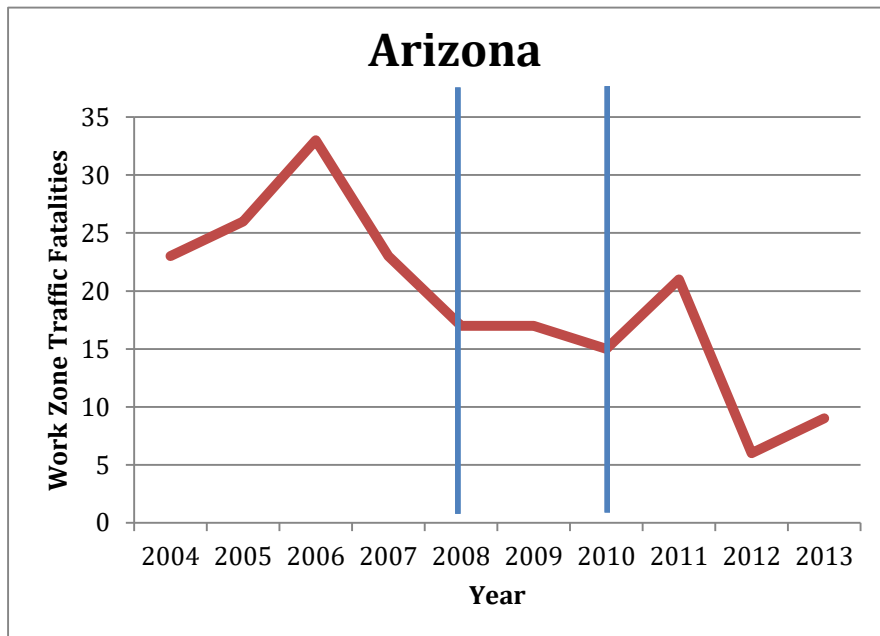


Figure 13. Arizona Work Zone Traffic Fatalities

(Source: FARS Data)

3.3.2.7 Washington

The Washington State DOT launched its initial ASE pilot project in September 2008. Speed cameras are permitted by state statute in school zones, “arterial streets in cities with a population over 5,000,” and where local ordinances authorize more expansive use (WA ST § 46.63.170) (75). Excessive speed was a contributing factor to 50 percent of traffic fatalities and serious injuries in 2013 (87). Evaluating its pilot program, Washington State found the ASE roads experienced lower speeds in general, the number of vehicles exceeding 70 mph decreased, and there were no traffic incidents in the area studied as part of the pilot program (88).

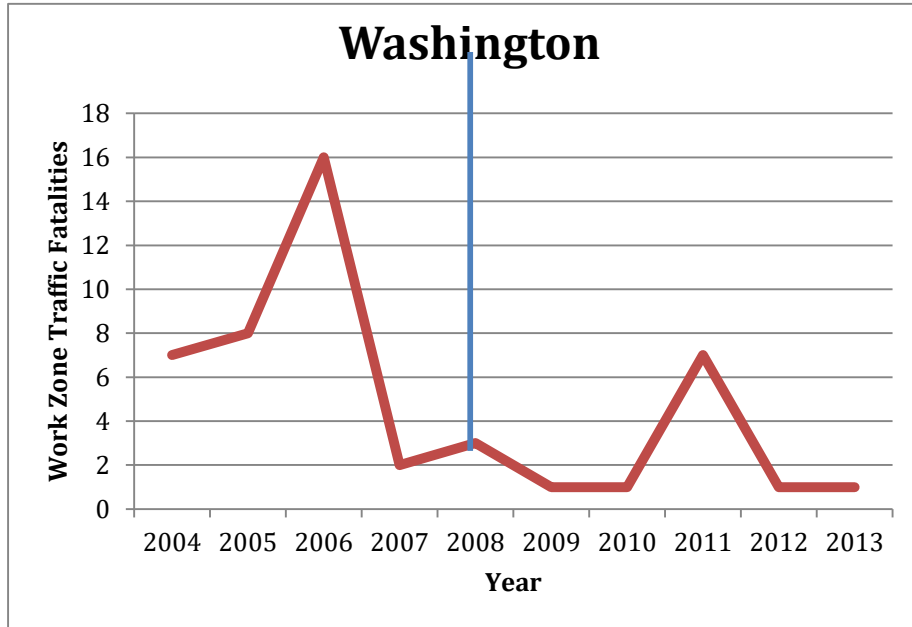


Figure 14. Washington State Work Zone Traffic Fatalities

(Source: FARS Data)

3.3.2.8 Washington D.C.

Washington, D.C.'s ASE program was launched in 2001 after legislation made it expressly legal (DC ST § 50-2209.01) (75). Retting and Farmer measured driving speeds at seven sites (of 60) one year before deployment and again six months after deployment. They found that mean speeds decreased by a statistically significant 14 percent. The proportion of drivers driving more than 10 mph above the speed limit was also largely reduced at each study site (56).

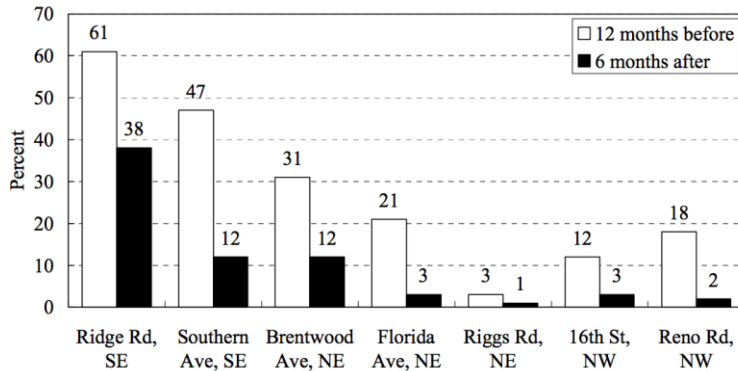


Figure 15. Percent of Vehicles Traveling >10 mph above Speed Limit, Washington Camera Sites (from Retting and

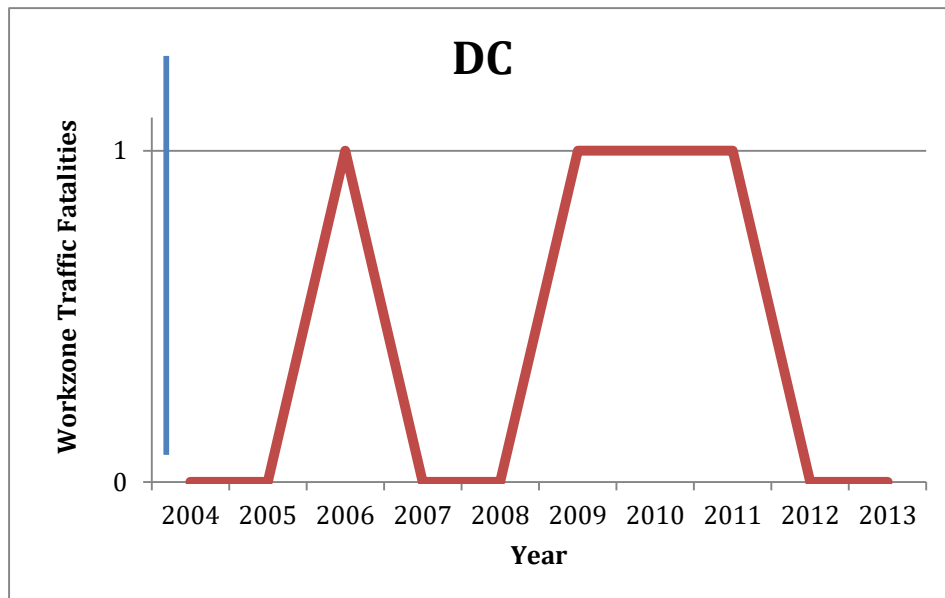


Figure 16. Washington, D.C. Work Zone Traffic Fatalities

(Source: FARS Data)

CHAPTER 4: QUALITATIVE EVALUATION OF GENERAL POPULATION ASE CONCERNS

4.1 INTRODUCTION

To better understand the causes for the continued conflict regarding ASE deployment, this study utilized a survey with guided and responsive interview methods to examine the perceptions of affected stakeholders in Minnesota. The specific purpose was to identify potential avenues for communication by which to address points of contention against ASE. Identifying the nuanced perspectives of those who are against ASE and where they may be persuaded to shift their opinion will help build more effective cases for deploying ASE in the future.

4.2 METHODS

Participants were recruited for this online survey from online research portals, like ResearchMatch, and on volunteer threads on Craigslist and Reddit. It was described as a study about speed cameras and targeted drivers in Minnesota. All participants were entered to win one of four Target gift cards (about 1 in 50 chance based on expected participation rates). Participants affirmed their consent to participate. The survey and recruitment materials were approved by the University of Minnesota Internal Review Board.

All participants were asked basic demographic questions and about their driving habits and history (e.g., if they had been in a crash or issued a ticket in the last year). ASE was then defined and participants were asked their opinion of it. Specifically, the text read: “Automated speed enforcement involves using roadside technologies that combine radar and image-capturing capabilities. These technologies identify when a vehicle is speeding and capture an image of the vehicle’s license plates and, if called for, an image of the vehicle’s driver. Do you think automated speed enforcement is a good idea?”

Participants responded to this question on five-item scale: *definitely yes*, *probably yes*, *unsure*, *probably not*, and *definitely not*. Participants who were in favor of ASE (*definitely* or *probably yes*) were asked why they are in favor of it and thanked for the participation. Participants who were *unsure* or reported ASE was *probably not* or *definitely not* a good idea were presented with a list of nine randomly presented topic areas to indicate their primary and secondary reasons for their opposition against ASE. These participants were presented a series of tailored questions and prompts based on their top two reasons. After the questions and prompts, participants were asked to reevaluate their opinion on ASE using the previous scale.

4.2.1 Issue identification

The list of reasons offered to participants in the survey was built upon previous work interviewing key stakeholders in Minnesota about ASE (see Chapter 2). From these interviews, we identified a list of leading reasons stakeholders reported they held and they perceived their colleagues held for opposing ASE. To refresh the reader’s memory, the main issues identified include:

ASE is unconstitutional

Many argued ASE is illegal on constitutional grounds, as a matter of fact. Regarding Minnesota specifically, some interviewees pointed to a nearly 10 year-old Minnesota State Supreme Court's ruling against the use of red light cameras; notably, that decision was not based on constitutional grounds (42). According to one interviewee, this misunderstanding of the ruling is pervasive even among state legislators.

ASE makes the owner of the car responsible for tickets regardless of who is driving

In certain situations, such as failing to stop for an extended and flashing school bus stop-signal arm, Minnesota law holds owners vicariously liable for crimes and torts committed by the driver of their vehicle who uses the car with either expressed or implied permission (55). However, the Minnesota legislature has not authorized owner-liability for speed violations. In a similar fashion, Minnesota had not authorized owner-liability for red-light violations, which was the grounds for overturning the Minneapolis automated red-light enforcement ordinance discussed above (40).

ASE will have negative impact on law enforcement duties

ASE would affect officers' ticketing discretion and there is a concern ASE would result in reduction of the labor force if ASE is used as the primary traffic controlling force. Officers and other interviews argued that ASE would remove the opportunity to find other, more serious violations.

ASE will not work

There were concerns that ASE will not be effective in reducing speeds or the likelihood of crashes and injuries. As such implementing ASE was thought to be a waste of time and money that should be spent elsewhere.

ASE would not be implemented fairly

ASE may discriminate against certain races or classes of people depending on deployment location. Opponents to ASE also argued that a cited driver is considered guilty upon receiving a ticket and is only then given the opportunity to prove their innocence.

ASE is not supported by the public

Most were unsure how the general public would feel about ASE, but wagered a majority is against it. Groups especially expected to be against it included those who are most likely to be ticketed or care about travel time above safety concerns (e.g., young drivers, drivers with numerous citations, and most commuters).

ASE is only to make money for the government

Opponents had concerns about unfair or excessive revenue collection. Many mentioned how the revenues are the underlying goal of ASE implementation, not safety.

ASE is an invasion of a driver's privacy

Many were anxious about the government gathering huge amounts of data on its citizens and their driving habits. A few stakeholders also mentioned that pictures of drivers using the roads pose an additional privacy problem.

ASE expands the reach and control of the government

General distrust of political systems was often raised as the primary concern of those in opposition to ASE. For them, ASE is not about increasing safety; it is about more government and control.

4.2.2 Questionnaire development

Using these nine concerns, a series of questions was developed with the intention to engage those who were opposed to or unsure about ASE in thoughtful consideration of the issues in two ways. First, we asked “consider the opposite” questions. Often people are biased in selecting new evidence and will reject information that is contrary to their beliefs, especially related to social issues, and may become more polarized in their attitudes (89). A successful strategy in unbiassing people’s acceptance of new evidence is through asking them to actively engage in considering the view opposite their own (90). For example, for those who expressed the opinion that ASE is just about revenue collection by the government, we asked, “What are some potential positives about the increases in revenue ASE would bring?” For those who said ASE would have a negative impact on law enforcement, we asked “How might ASE help to alleviate some constraints or unwanted duties officers currently have?” These consider-the-opposite questions were open-ended with a large text input box for participants to engage as much as they wanted with the topic.

Second, we presented the opportunity to learn more about each topic. It was hoped that the new information would help correct some misguided perceptions (e.g., in reality, the U.S. Supreme Court ruled we do not have a right to privacy on public roads). Sometimes facts were embedded in the question itself, such as this question from the “ASE will not work” category, when we asked, “If the general public knew how speed affects the frequency and severity of crashes, do you think they would be less likely to speed?” Or, as another example, “Would you change your position if you knew that a recent public opinion survey showed overwhelming public support for deployment of ASE in work and school zones?” in the public support category. Other times we asked if they would like to learn more information about a specific topic: “Would you like to learn about a recent public opinion survey about ASE support?” or “Would you like to learn about some pilot ASE data from the United States?” When they did want to know more, the information was presented in simple paragraph form and we asked whether and how their opinions of that contention changed. At the end of the survey, they were asked to report their stance on ASE as a whole on the same, previous 5-point Likert scale.

The questions and logic chains were piloted among undergraduate students and other staff at the University of Minnesota. Revisions were made to ensure clarity and a lack of obvious bias in the questions.

4.3 RESULTS

4.3.1 Demographics

There were 216 surveys initiated, which resulted in 203 complete participant responses. Most participants who dropped out of the study did so in the first few demographic questions. There were no differences between completers and non-completers based on available data (i.e., age, gender, licensed years, and education level). Nearly all participants were from Minnesota (95.5 percent). The remaining participants represented Region 5 states (Ohio, Illinois, Michigan Wisconsin, and Indiana) and one participant was a resident of Arizona. Most participants were female (72 percent) and ranged in age

from 18 to 84 (Mean=43.9, Standard Deviation=15.7). The participants had held a driver’s license for an average of 27.7 years (Standard Deviation=15.9). Number of licensed years was highly correlated with age ($R^2=0.99$).

Of the 203 responses, 100 had favorable opinions on the use of ASE upon entering the survey. Using an ordinal logistic regression model and adjusting for gender, driving frequency, and education, those in favor of ASE were more likely to be older ($p=0.032$), while those not in favor of ASE had driven more miles in the past year ($p=0.042$). There were no differences in baseline ASE opinion by gender, education, or driving frequency. Of the remaining 103 who did not have a favorable opinion of ASE at the start of the survey, 30 were unsure about the use of ASE, 30 thought it was probably not a good idea, and 43 thought ASE was definitely not a good idea (Figure 18).

After engaging with the survey materials, 54 people did not change their opinion of ASE (13, 13, and 28 maintained their stance of unsure, probably not, or definitely not, respectively). There were 49 “movers”: 31 moved to having a positive opinion of ASE; 7 reported feeling unsure after previous negative opinions of ASE; and 11 moved to a more negative opinion of ASE. Chi-square analyses show that the amount of movement was statistically significant, $\chi^2(8, n=103)=52.72, p<0.001$.

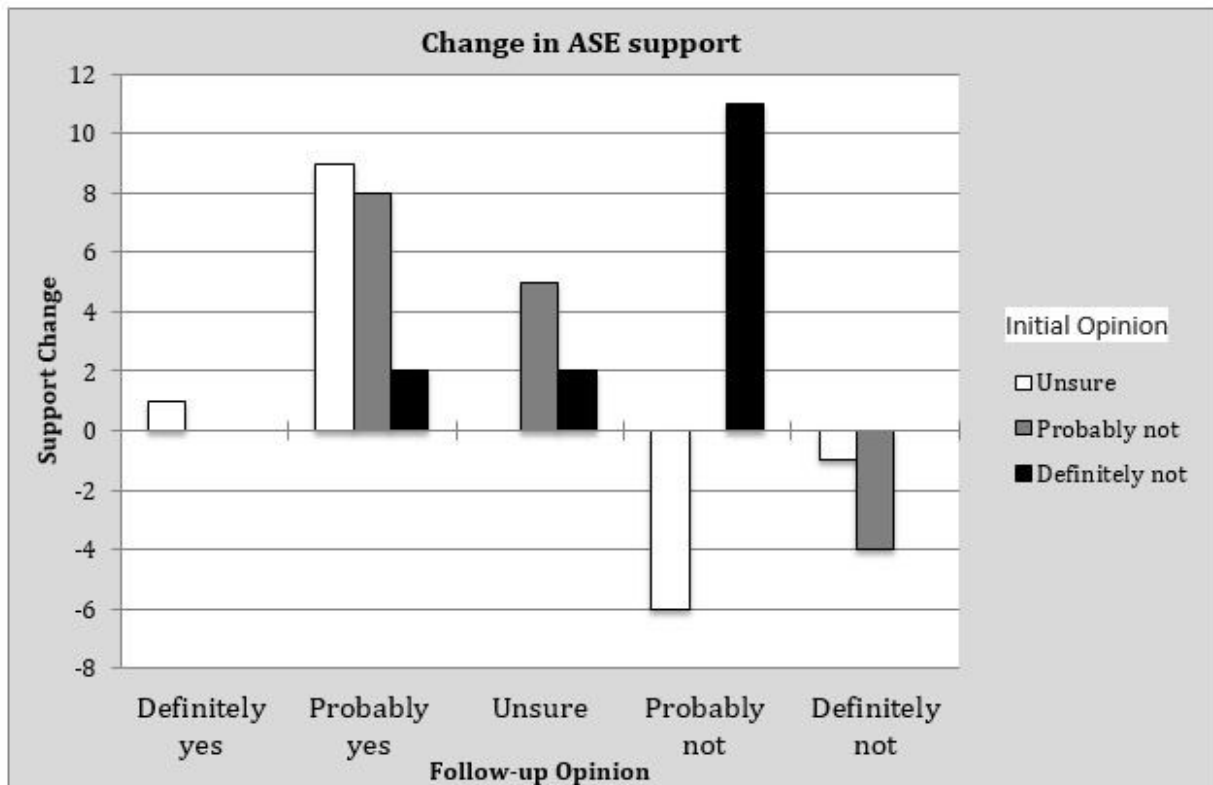


Figure 17. Movement on “Do you think automated speed enforcement is a good idea?”

Controlling for gender, age, and miles driven over the past year, an ordinal logistic regression model showed that those with higher education attainment were more likely to move in a positive direction regarding their ASE opinion ($p=0.033$), while those who drove more frequently were more likely to move

in a negative direction ($p=0.027$). Comparing non-movers to only those who moved toward a more positive opinion of ASE, chi-square analyses show there was no statistically significant difference in terms of age, education, or average miles driven. However, those who made a positive change were more likely to be female, $\chi^2(1, n=91)=4.30, p=0.038$.

4.3.2 Themes associated with moving toward positive ASE beliefs

4.3.2.1 Safety

Positive-changers responded more enthusiastically to information about the safety impacts of speed. This is illustrated by some of these respondents saying they would be most moved if they saw data suggesting significant benefits. Explaining why it would improve their opinion of ASE, respondents said evidence like that is persuasive: “Data-driven decision making makes this more acceptable to me” and “results prove more progress than anything.” ASE would also be more acceptable if they are “...able to show that the ASE programs have a significant impact on crashes and fatalities OR that fewer people are speeding/instances of ticketing declines in areas with ASE.” When asked about the potential uses the revenue generated from ASE, positive-changers were still very safety-focused. Besides using the money to fix roadway infrastructure, one respondent said, “The revenue should go back into safety and engineering programs or be made available to help support crash victims and their families. Or possibly education interventions.” Another wrote, “If it is just being done to increase revenue I would not support it. It should be done only as a public safety measure.” Among those who were already positive on ASE, a majority highlighted safety concerns as part of their reasons for supporting it.

Positive-changers also more explicitly recognized the importance of speed in work and school zones. When asked, “What effects do you think speeding has on the safety of school and work zones?” positive-changers said “It endangers the workers and children when people speed in those zones” and “It causes an unsafe environment for all involved.” On the other hand, those whose opinion on ASE stayed the same were more vague, saying speeding was “bad to an extent” or had “a big effect” in these areas. One non-mover further clarified, “there are already plenty of deterrents in place [in school and work zones]. Additional technology and tax payer money isn’t needed.” Still, in the open-ended comments at the end, many non-movers indicated their approval of limited deployment to school and work zones: “...School zones and work-zones are something I would consider, but that’s it” and “School and work zones should be the limit of use.” Furthermore, although speeders make up the majority of the driving population, the majority may be convinced that targeting excessive speeders with ASE would be acceptable. In response to, “Would you be more likely to support ASE if tickets were only issued to the worst violators? (e.g., those going more than 15 mph over the speed limit),” two-thirds of both positive changers and non-changers said they would (none of the 11 negative changers were directed to this question).

4.3.2.2 More engagement

Those who moved toward more positive beliefs about ASE showed more active engagement with consider-the-opposite questions. The written responses from the positive-changers more frequently had substantive thoughts compared to the negative and non-movers. More often negative and non-movers did not input any answer or wrote simply “no” or “none,” etc. It appears the positive-changers actually considered the opposite of the subject matter more thoroughly; however, we do not know the causal direction here. The positive-changers may have already been more willing to entertain positive thoughts

about ASE (i.e., had more open minds) and therefore engaged more on these questions. On the other hand, the engagement prompted by the consider-the-opposite questions may have (as proposed in theory) reduced initial biases toward ASE (i.e., created more open minds) and helped move them toward their more positive ASE beliefs.

4.3.3 Themes associated with negative or no movement on ASE beliefs

4.3.3.1 Constitutionality

Correcting the belief that ASE is unconstitutional or illegal did not create change in people's opinion who thought it was unconstitutional. Instead, a number of respondents appeared to rely on their own opinion of what was constitutional, saying "it seems to violate my rights as a driver" or "I am not sure that I would ever find it to be constitutional." Many wanted the United States Supreme Court to weigh in on the topic before they would change their mind about its constitutionality.

4.3.3.2 Penalty dilemma

Regarding the current legislation that would make the owner of the car responsible for ASE-issued tickets, respondents appeared to experience a "penalty dilemma." Respondents disliked how the owner of a car would be ticketed regardless of who was driving. At the same time, they showed little support for the alternative, namely, taking a picture of the driver. While positive-changers were more open to the idea, some non-movers and negative-changers had experienced difficulty in the past trying to correct errors with red-light camera photos and worried the same problems would persist with ASE. One related, "When thinking about it, my picture could be mistaken for many people. (Sister, cousin, etc.) So it would be very difficult to prove who the driver is with a picture of a speeding vehicle..." Another said, "My daughter, who looks very similar to me, ran a red light in a car registered to both her and I in [San Diego], CA where they use automated enforcement. I was falsely ticketed. It was a nightmare trying to get it straightened out from MN. Cameras should be a supportive tool; they cannot replace officers."

Physical police presence desired

Respondents from all change categories noted the potential for reducing discrimination and other biases from ticketing when using ASE speed algorithms. However, non-movers still favored keeping the human element in ticketing: "I feel that we need the human element in public service and law enforcement for it to be successful," adding, "Please keep in mind this is coming from someone with a Mathematics degree who loves logic and equality." One said, "Whenever you take the human factor out of the equation you eliminate an important element in law enforcement and take another step closer to dividing the populace from the government. We need more humanity, not less." Another non-mover said, "I think it is a necessary thing to have the Police visible on the roads. I feel that a machine taking pictures and sending out tickets to drivers is unfair." Another preferred the potential for police discretion, saying they dislike a "blanket response to a violation when not all situations are the same."

4.3.3.3 Have other priorities

Several respondents did not understand the attention speeding is receiving when there are other more pressing, safety-related issues at hand. A non-changer asked, "Why are we concerned with speeding when there are MANY more problematic driving behaviors that need to cease first. Distracted driving (texting, using a cell phone), running red lights, not stopping for pedestrians, etc., are much higher of a

concern for me than speeding.” A negative-changer said ASE is a “Waste of time and money. How about using that money to stem the tide of gun violence?” Another said, “I don't think that this is a good use of taxpayers' money or of law enforcement's time. There are far more important issues than speeding drivers.”

4.3.3.4 Denying speed impacts

Some negative- and non-changers provided grossly inaccurate statements regarding the impact of speeding, saying speed is not a factor in crashes or their severity. Specifically, one said, “speed is seldom the underlying issue in driving accidents.” Another said, “Speed has never killed anyone, [it's] suddenly becoming stationary that kills.” In fairness, they shared these thoughts before being presented questions and information that demonstrated the safety significance of not speeding. But, despite receiving the safety information, they did not accept the safety benefits of reduced speeds nor did they change their opinion to favor the use of ASE. In fact, one negative-changer reiterated his disbelief about the impact of speed in the final question where respondents could add any other thoughts they had on the subject. He said, “[ASE] is a wasted avenue. Speed is too small a portion of the root cause of traffic accidents and fatalities.”

4.3.4 Opportunities & Recommendations

Advocating for automated speed enforcement remains difficult and controversial. In part, because nearly everyone speeds at some point, speeding is not an ‘everybody else’ problem. As such, speeders are not a marginalized minority of the population and a majority needs to perceive ASE as a useful endeavor in order to successfully promote it. The current study shows that a significant portion of people who are against or unsure about ASE can be persuaded to think better of it by addressing their key concerns. While this method did not move everyone to a positive opinion of ASE, most were not further polarized into rejection of ASE, indicating a good dialog was achieved and further entrenchment into negative views was not a result of the engagement with most of the participants. Findings show some differences with regard to who may be more open to supporting ASE.

4.3.4.1 Age gap

Older respondents were more favorable on the use ASE. This is similar to previous polling of opinion of evidence-based road safety policies; Munnich and Loveland found a statistically significant generational difference in support of ASE in their national public opinion survey (72). Support for ASE was approximately 60 percent for those aged 18 to 54 and jumped to 67 percent among 55-64 year olds and 79 percent among people aged 65 or older. Because younger drivers are more likely to be involved in speed-related crashes (10), it is important to develop communication strategies about speed and safety that target younger drivers.

4.3.4.2 Gender gap

Although the baseline ASE opinion of respondents was not different by gender, females were more likely to move to having a favorable ASE opinion after engaging with the survey materials. Similarly, Munnich and Loveland found a significant gender gap in their polling; they found 72 percent of surveyed women to be in favor of ASE compared to 56 percent of men (72). Because men are more likely to be involved in

a speed-related crash (10), the current study highlights the potential difficulty of convincing this group of the impact of the utility of ASE. Taken together, special communication strategies need to be considered to reach younger drivers and especially younger, male drivers.

4.3.4.3 Highlight safety impacts

The findings of this research support concentrating public awareness campaign efforts on how speed affects crashes. Doing so will have a two-pronged effect that will serve as a foundation for future ASE discussions. First, it will help create an environment in which speeding is understood to be a serious problem. Second, akin to the hazards of secondhand smoke, speeders will be seen as an endangerment to others. Together, the safety benefits of not speeding and the denigration of speeders will serve as a strong foundation to make the case for the use of ASE to effectively address speeding.

Thus, a major stumbling block for promoting ASE, or speed compliance in general, is the lack of public awareness of the relationship between speeds and road safety. Indeed, ASE advocates and other stakeholders are themselves probably not aware that some of the public denies the safety impacts of speeding. As can be noted from the methodology section above, the initial stakeholder interviews did not identify lack of awareness of the dangers of speeding as a reason to oppose ASE. Accordingly, it is key that campaigns promoting ASE do not assume the public knows about the risks of speeding and/or believes it to be a dangerous behavior. Findings from this study suggest that communication strategies should feature the risks of speeding, highlighting its impact on rates of injury and fatalities in motor vehicle crashes. The lack of information about the importance of speed in public sphere probably also fuels the perception that negative-changers and neutral respondents shared that speeding should be a low priority, if a priority at all. For instance, some respondents who did not support ASE cited distracted driving or non-roadway related issues as a higher priority for attention than speeding.

Periodic “speed kills” campaigns occur, but the results of this study show that either the information has not been sufficiently disseminated, is overshadowed by other campaigns and media, or the information is not being believed. Indeed, recent media campaigns on the dangers of distracted driving may be to blame, in part, because they miss or overshadow the impact of speeding. Data from the National Highway Traffic Safety Administration details that driving too fast for conditions or in excess of posted speed limits was a factor in 18.8 percent of fatal motor vehicle crashes compared with distracted driving (e.g., being on the phone, eating, or talking), which was a factor in just 6.7 percent of fatal roadway crashes (10).

Furthermore, in this study, there is some evidence of mistrust in government when it comes to the reasons behind speed limits. One respondent said frankly, “governmental transparency is sham [sic].” Those who did change their opinion on ASE were more likely to say that transparency regarding speed limits would be useful whereas most of the non-changers said transparency would not matter. If these skeptics are to be reached at all, the information about speed limits and safety effects will probably need to come from independent, non-governmental bodies that will not benefit from ticket revenue. Overall, the success among the positive-changers and lack of movement among the others highlights the need for better public understanding and awareness of speed’s impact on road crashes before making the argument for ASE. Questions that remain to be addressed by those campaigning for ASE include: How do we get safety information out there? Similarly, how do we convey that speed limits are meaningful? And, who will convey this information in a trustworthy and effective manner? Effective communication of the direct relationship between speed and safety is key to framing the debate over the usefulness of ASE.

4.3.4.4 Avoid talking politics

In contrast with the change seen as a result of discussing the safety impacts of speeding, engaging with participants on the politics or the legality of ASE did not tend to make its deployment more acceptable. Explicitly detailing how ASE has not been deemed unconstitutional did not convince respondents that it was constitutional. Explaining that the Supreme Court has ruled that privacy is not to be expected on public roads did not reassure those with privacy concerns. Likewise, describing the extensive privacy safeguards in place for any ASE-related photos did not mitigate privacy anxieties. Therefore, public education campaigns about the legality of ASE or about privacy rights and protections are not expected to be worthwhile campaigns.

4.3.4.5 Consider limited deployment

There is broad support for limited forms of ASE deployment. Even among respondents who did not change their unsure or negative opinion, there was a positive response to limited deployment in school and work zones. Many explicitly volunteered that they were against ASE in all forms except for these extra high-risk areas. Research among other Minnesotans³⁹ and nationally representative surveys (72) have broad support for ASE near schools (81 percent and 87 percent, respectively), on roads where many people have died (77 percent and 81 percent), and on roads where many speed (69 percent and 75 percent). Although speeders make up the majority of the driving population, the majority may be convinced that targeting excessive speeders with ASE would be acceptable. Respondents were in favor of ASE when it would target those traveling 15 mph or more over posted speed limits. Previous polling of Minnesotan drivers also showed a majority support ASE use for extreme speeds (71 percent) (39). Consequently, in order to have the most public support, ASE use should be initially introduced to selected high-risk areas and/or target only excessive speeders.

Note benefits to law enforcement

To address the public's concerns regarding the dynamic between ASE and law enforcement, it should be stressed that ASE will not replace all police enforcement. First, emphasize its limited deployment. Second, as many respondents pointed out, there are other criminal issues police need to attend to (e.g., catch drunk or reckless drivers) that will ensure their continued presence on the road. ASE implementation should actually help increase their attention to these matters because they can spend less time ticketing speeders. Third, police will be employed to monitor ASE processes to make sure errors do not happen. Hence, law enforcement will not be diminished and can actually be supported through the use of ASE.

4.3.5 Limitations and future directions

Many respondents reported they learned about ASE for the first time via this survey and desired more information before making more formal decisions about its use. The survey targeted the MN population where ASE is not in place. Despite the ongoing controversy and vocal opponents of ASE in the state, there is a lack of awareness of what automated speed enforcement is and how it could benefit drivers and communities. This study may have proceeded differently if respondents had been familiar with ASE. Nonetheless, it offers insights into how a population without much knowledge of ASE responds to it and thus where campaign and advocacy groups should focus their initial efforts to gain support. Future research with a well-informed population may result in different turning points on ASE opinions. This or

a similar survey could be performed in other states where ASE is more prevalent (e.g., Arizona and Illinois) in order to prepare communication strategies during later stages of ASE deployment.

The current study design affected results in two ways. First, respondents did not receive all of the same information. Each person's survey was tailored to his or her top two reasons for not holding a favorable opinion of ASE. It is possible that more positive movement could have been initiated if all had been given information about the link between speeding and crash rates. Additionally, the tailoring meant that there were smaller numbers of respondents in each category with which to make comparisons. Future studies with larger sample sizes may yield further insight into the interaction between additional points of contention against ASE and the ability to shift opinions through engagement with this method. Second, the format of the survey allowed respondents to leave open-ended questions blank. More often negative and non-movers did not supply any answer or wrote simply "no" or "none," etc. Some people may have been more active in participation had the "consider the opposite" activity not been an online survey. For example, an in-person interview could have elicited more engagement; however, in taking the interactive human element out of the equation, the engagement was potentially more effective because it was less emotionally laden (i.e., less combative).

A final point to remember is that while this information could contribute to better public understanding and support of ASE, the Minneapolis case discussed above remains an example of how a small group opposing ASE can still prevent its implementation if the implementation is not designed to meet legal requirements, as discussed by Adams (6) and Douma (39, 40).

CHAPTER 5: CONCLUSIONS AND NEXT STEPS

Automated speed enforcement is controversial despite its significant potential to deter speeding and reduce traffic deaths. In this study, we looked to identify the basis for public opposition to ASE and determine how entrenched that opposition is. Through stakeholder interviews and public surveys, we found that negative perceptions of ASE are often related to misunderstandings about the constitutionality of ASE and the public safety threat posed by speeding. Concerns about big government and use of revenues generated by ASE are also not uncommon.

Framing the use of automated speed enforcement as a clear and effective safety tool to address a profound public health problem will increase public support for its deployment. Because large majorities in several surveys approve of its use in high-risk areas like school and work zones and where people often speed excessively, limited ASE deployment may be a useful foothold to gaining even more support for expanded use.

Thoughtful consideration must go into designing effective communication campaigns about speed and its effects on car crash fatality rates and injury severity. Extensive work should be done to understand the barriers to unbiased consumption of educational materials and media to prevent the unintended consequence of further entrenchment and flat out rejection of the information that such campaigns may encounter. Campaigns will probably need special communication strategies to reach younger and male drivers. Connecting speed and its effects on road safety in the minds of the public will enable a more conducive environment for the deployment of more effective enforcement tools, including automated speed enforcement.

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