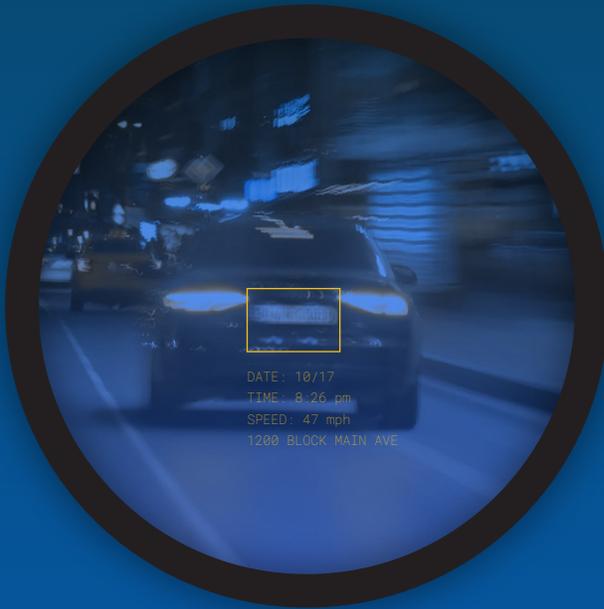




# Automated Enforcement in a New Era



- Lifesaving Programs
- Meaningful Community Engagement
- Equitable Enforcement
- Component of the Safe System Approach



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### Abbreviations Used in This Report

<b>AE</b>	Automated enforcement
<b>ASE</b>	Automated speed enforcement
<b>IIJA</b>	Infrastructure Investment and Jobs Act of 2021
<b>CDL</b>	Commercial driver's license
<b>U.S. DOT</b>	United States Department of Transportation
<b>FMCSA</b>	Federal Motor Carrier Safety Administration
<b>GHSA</b>	Governors Highway Safety Association
<b>IIHS</b>	Insurance Institute for Highway Safety
<b>NHTSA</b>	National Highway Traffic Safety Administration
<b>NRSS</b>	National Roadway Safety Strategy
<b>SHSO</b>	State Highway Safety Office
<b>SSA</b>	Safe System approach

# Introduction

Roadway fatalities have increased significantly in recent years, a fact that every safety and law enforcement professional knows all too well. In 2022, 42,795 people died in traffic crashes in the United States. That’s an average of 117 people dying on our roads every single day. Traffic deaths surged 30% over the past decade, with nearly 10,000 more fatalities annually when compared to 32,893 in 2013 (Governors Highway Safety Association [GHSA], 2023).

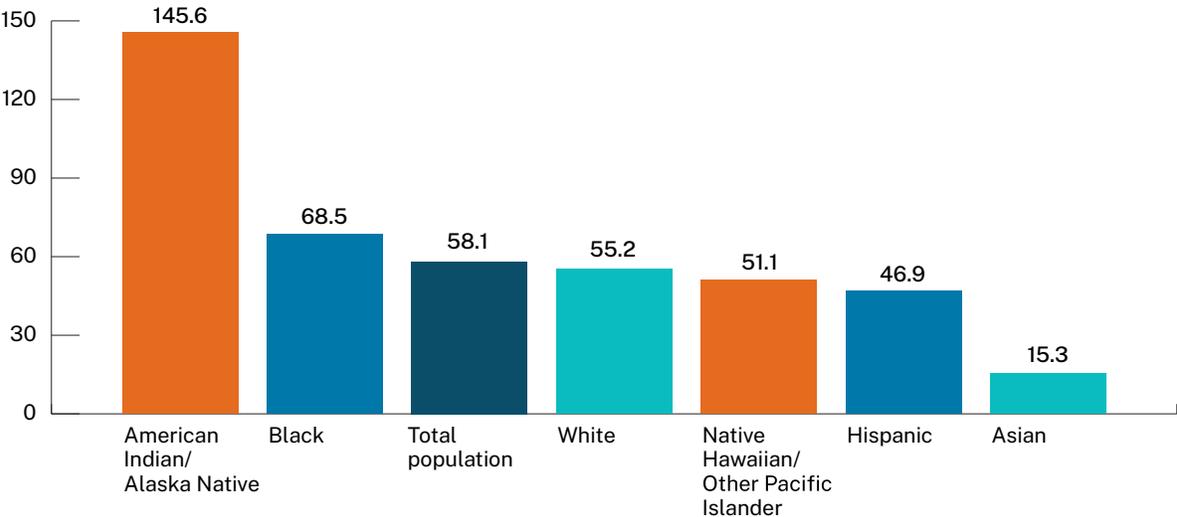
These increases are due to a combination of factors, including inadequate infrastructure, missed opportunities to improve vehicle safety, inadequate post-crash care, and shifts in mobility patterns and traffic safety during the COVID-19 pandemic. One key factor is persistent and increasing unsafe driver behaviors like speeding, impairment and distraction, which have contributed to a historic increase in pedestrian fatalities. The National Highway Traffic Safety Administration (NHTSA) released its 2021 Fatality Analysis Reporting System (FARS) data in April 2023, showing a 10% increase in fatalities in just one year (from 2020 to 2021). This included increases of 7.9% for speed-related fatalities, 13% for pedestrian fatalities, 12% for distraction-affected fatalities and 8.1% for unrestrained fatalities (NHTSA, 2023).

These annual increases are disturbing enough on their own, but Black, Indigenous and People of Color are disproportionately impacted by traffic crashes, as multiple studies have confirmed. For example, a 2021 GHSA study found that American Indian/Alaska Native (145.6 deaths per 100,000 population) and Black people (68.5 deaths) were killed at far higher rates than the national average of 58.1 deaths (GHSA, 2021). Reducing these disparities and advancing more equitable safety outcomes must be a central goal of all roadway safety efforts.



↑ **30%**  
The surge in traffic deaths in the United States over the past decade — with nearly 10,000 more fatalities annually.

**Total U.S. traffic deaths per 100,000 population, 2015–2019**



Source: GHSA analysis of FARS data

As we continue to leverage a range of countermeasures to improve traffic safety, technology plays a significant role in this safety formula. Improvements in auto safety, such as air bags, help to mitigate injuries in serious crashes. Alcohol breathalyzers help police detect and remove impaired drivers from the road. Radar speed displays give drivers instant feedback on how fast they are going, encouraging them to slow down.

**GHSA believes the expanded use of automated enforcement is essential to reversing the tragic increase in deaths and injuries on the nation's roadways.**



Now a new generation of technological advances is available to safety and enforcement professionals. GHSA believes the expanded use of automated enforcement (AE) is essential for reversing the unprecedented increase in motor vehicle-related deaths and injuries on the nation's roadways.

With funding from State Farm®, GHSA commissioned this report to provide State Highway Safety Offices (SHSO) guidance on what is needed to implement an effective AE program. Through extensive research and interviews with a panel of traffic safety experts, this report presents an introduction to automated enforcement, identifies challenges and potential solutions, and outlines an effective implementation strategy. When managed correctly, AE can contribute meaningfully to the Safe System approach (SSA) and increase community engagement in traffic safety.

AE can also advance more equitable outcomes by reducing bias and interactions between law enforcement and the public that can result in tragic and unacceptable outcomes. While AE programs provide safety and bias reduction benefits, they will be negated if the community is not engaged in program planning and implementation. That includes addressing program goals, what the cameras capture, where they will be placed, and why that site was selected. Any AE program that is perceived to be revenue-focused, or implemented in an underserved community without justification, will not succeed.

And most importantly, this technology can help reverse the rise in traffic fatalities on our roads, potentially saving thousands of lives.

This report is directed not only to SHSOs, but also elected officials, law enforcement professionals, transportation engineers, community members and others who wish to partner with their respective SHSO. State Highway Safety Offices are in a unique position to help guide the AE implementation process and provide resources — such as funding, data, technical expertise and meeting facilitation — to communities seeking to implement a program.

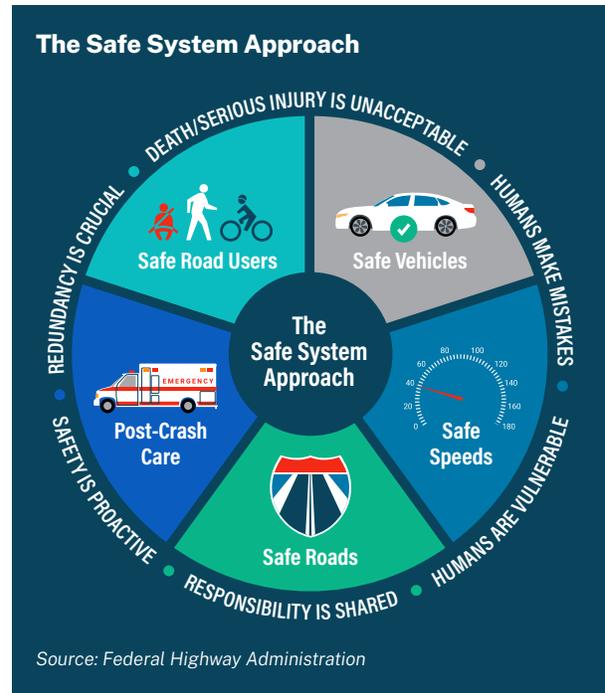
# AE in the Safe System Approach

The U.S. Department of Transportation's (U.S. DOT) [National Roadway Safety Strategy](#) (NRSS) provides a roadmap for addressing the national crisis in roadway fatalities and serious injuries. The NRSS outlines actionable steps to address this crisis systemically and prevent these deaths and serious injuries.

As part of the NRSS, the U.S. DOT adopted the SSA. The SSA originated in Sweden and the Netherlands; these and other early adopters have seen fatalities drop by as much as 80% (Johns Hopkins University, 2021).

The objectives of the SSA are to design safer roads, build safer vehicles, promote safe speeds, encourage responsible driving behavior and enhance post-crash care. These five complementary objectives correspond to the six SSA principles:

- » Death and serious injuries are unacceptable.
- » Humans make mistakes.
- » Humans are vulnerable.
- » Responsibility is shared.
- » Safety is proactive.
- » Redundancy is crucial.



The vision of the SSA is to create a system of safety layers that can protect everyone by preventing crashes and ensuring that, if crashes do occur, they do not result in serious injury or death.

The NRSS recognizes that reducing traffic fatalities will take sustained and concerted action from everyone across all sectors and levels of government. The use of AE is a potent strategy that aligns with the SSA. AE programs, when implemented as part of a multidisciplinary approach to traffic safety, are a proven countermeasure for reducing traffic crashes, injuries and fatalities by promoting safer speeds and changing driver behavior. It is important to note that AE is designed to augment traditional enforcement efforts, not replace them, and it should be considered in the

“Automated speed enforcement, if deployed equitably and applied appropriately to roads with the greatest risk of harm due to speeding, can provide significant safety benefits and save lives.”

—U.S. Transportation Secretary Pete Buttigieg



context of the full range of other countermeasures. This, along with how AE can help achieve more equitable outcomes in roadway safety, will be discussed in greater detail later in this report.

When U.S. Transportation Secretary Pete Buttigieg announced the NRSS in February 2022, he highlighted AE as an effective tool to aid in the reduction of highway fatalities: “Automated speed enforcement, if deployed equitably and applied appropriately to roads with the greatest risk of harm due to speeding, can provide significant safety benefits and save lives” (U.S. DOT, 2022).

States have multiple tools at their disposal to end the serious injury and fatality epidemic on the nation’s roadways. AE is an underutilized tool in this fight.

## Defining Automated Enforcement

Automated enforcement uses cameras to capture images of drivers committing traffic violations. There are three major AE technologies in use today in the U.S.: red-light safety cameras, automated speed safety cameras and school bus stop-arm cameras. AE for distracted driving and seat belt enforcement is also being tested in some jurisdictions.

**Three major AE technologies used in the United States**

The graphic is a blue-bordered collage. At the top left, it features icons for a smartphone with a red 'X' and a seat belt, with the text 'AE for distracted driving and seat belt enforcement is also being tested.' Below this is a photograph of a camera pole. To the right is a photograph of a red-light camera at an intersection with a traffic light and a yellow diamond sign showing a red light. At the bottom left is a photograph of a speed camera on a road with a 'SPEED LIMIT 25' sign. At the bottom right is a photograph of a school bus stop-arm camera with a yellow diamond sign showing a school bus.

- Red-light safety cameras
- Automated speed safety cameras
- School bus stop-arm cameras

AE for distracted driving and seat belt enforcement is also being tested.

Totally automated systems capture offender license plate information and send a citation to the registered owner. More advanced systems capture the image of the driver’s face and can send citations to an individual driver.

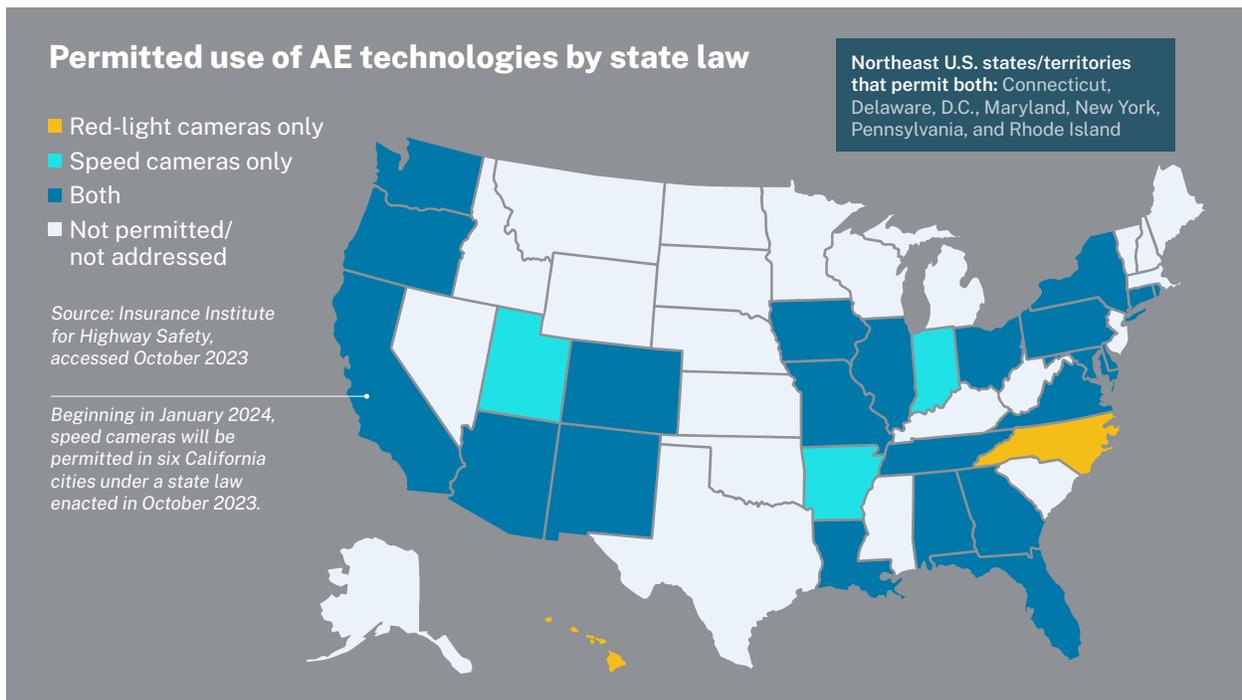
Camera technology can also be used to assist law enforcement by transmitting images of violations to a police officer further down the roadway. Because of limited resources, many local governments have turned to automated enforcement to address red-light running and speeding violations to avoid diverting law enforcement resources from other areas.

This report examines the most prevalent forms of AE technology as well as the effectiveness and the limitations or sensitivities associated with their deployment.

## State and Federal Legislative Efforts

Prior to implementing an AE program, it is important to review and understand state and local statutes regarding the technology's use.

As of November 2023, 24 states and the District of Columbia (D.C.) permit red-light safety cameras by state law, city ordinance or both, while 24 states and D.C. permit speed safety cameras (Insurance Institute for Highway Safety [IIHS], n.d.a). Beginning in January 2024, California will permit speed safety cameras in six cities under a law enacted in October 2023, becoming the 25th state to allow the use of these cameras. These state laws generally establish guidelines for municipal governments. Some laws limit the use of cameras to certain cities or specific streets, such as in school or work zones, while other laws allow their use statewide. Some states do not have any laws addressing the use of AE, thus deferring to municipalities.



The number of communities with speed safety cameras has increased in recent years (from 137 in 2018 to 183 in 2022), but red-light safety camera use has dropped (from 403 in 2018 to 337 in 2022). While AE usage has grown across the country in the long term, the prevalence of legislative prohibitions and limitations underscores the need to implement best practices and build public trust.

At the time of this publication, 24 states had enacted laws permitting the use of school bus stop-arm cameras to reduce instances of illegal passing (National Conference of State Legislators [NCSL], 2023). Most state laws require vehicles on both sides of a road without a median to stop and remain stopped while school bus stop arms and flashing red lights are engaged.

As of November 2023, no state laws address the use of automated enforcement specifically to combat distracted driving. However, nearly all states have distracted driving laws. Forty-nine states, D.C., Guam, Puerto Rico, and the U.S. Virgin Islands ban texting for all drivers. Twenty-four states, D.C., Guam, the Northern Mariana Islands, Puerto Rico, and the U.S. Virgin Islands prohibit all drivers from using a handheld mobile device while driving (NCSL, 2023).

Even in states that have passed distracted driving laws, enforcement of these violations is difficult. Texting bans are difficult to enforce due to drivers concealing their phone use. AE technology to prevent distracted driving has proven successful in Australia and is currently being tested in North Carolina with commercial motor vehicle operators only. The system uses both fixed and mobile cameras to capture driver footage, which is then reviewed by artificial intelligence to identify the operator and violation. Once the violation is captured, citations can be sent to the registered owner after being reviewed by law enforcement, or images can be shared with law enforcement downstream for a traditional traffic stop.

In addition to being used to enforce distracted driving laws, this technology can also be used to enforce seat belt laws and address traffic violations such as expired registrations. In 2019, efforts were undertaken in Maryland to have a bill introduced to permit the use of this technology to reduce distracted driving violations; this effort failed.

The use of AE has also been addressed on the federal level. When the U.S. Congress passed the Infrastructure Investment and Jobs Act (IIJA) in 2021, it granted states the ability to use NHTSA grant funding for AE to address speeding and red-light running in school and work zones only. Previously, Congress had long banned the use of federal funds for AE. Under this new allowance, states are permitted to use funding provided under the State and Community Highway Safety Grant Program, 23 U.S.C. 402 (also known as “Section 402”), and these AE programs must comply with U.S. DOT guidelines (U.S. National Archives, n.d.).



GHSA's report *Directing Drivers' Attention* offers a comprehensive look at this preventable traffic safety problem.

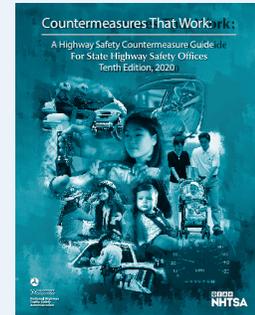
[Read the Report](#)

# AE Systems and Their Effectiveness

The traffic safety community agrees on the general value of automated enforcement. Speed and red-light safety camera systems are used extensively in roadway safety programs in other industrialized countries. Though AE is sometimes discussed as if it were a new countermeasure, it has been used in the U.S. for decades. Speed safety cameras were first deployed in the U.S. in 1987, while red-light safety cameras were first deployed five years later.

The National Transportation Safety Board (NTSB) recommends the use of AE as an effective countermeasure to reduce the frequency and severity of crashes and to maximize safety improvements with the most efficient use of resources (NTSB, 2017).

The 10th edition of NHTSA's [Countermeasures That Work](#) lists AE as a five-star countermeasure based on research assessing its effectiveness (Venkatraman et al., 2021). However, red-light safety cameras, speed enforcement cameras, school bus stop-arm cameras and other AE systems each operate differently and have been subject to separate evaluations.



NHTSA's guide offers insight into safety countermeasures for major highway safety problems — including AE technologies.

[Read the Guide](#)

## Red-Light Safety Cameras



Red-light safety cameras take photographs of vehicles entering signalized intersections after the light has turned red. The cameras are connected to the traffic signal and sensors that monitor traffic flow just before the crosswalk or stop line. The sensors provide additional violation data such as vehicle speed and how long the light was red before the vehicle entered the intersection. The system continuously monitors the traffic signal, and the camera captures any vehicle that fails to stop during the red phase. Many red-light safety camera programs provide motorists with a grace period of up to half a second after the light turns red. Photos are reviewed by police officers, or by both the camera vendor and law enforcement officials, prior to issuing a citation.

There has been a plethora of studies conducted in the U.S. and abroad that demonstrate the effectiveness of using cameras to reduce red-light violations and crashes. IIHS lists several studies on its website that demonstrate these positive results (IIHS, n.d.b). In one study in Arlington, Va., the researchers found significant reductions in red-light violations at camera intersections one year after ticketing began (IIHS, n.d.c).

↓ **21%** An IIHS study comparing large cities with red-light safety cameras to those without found the devices **reduced the fatal red-light running crash rate by 21%** and the rate of all types of fatal crashes at signalized intersections by 14%.

As it relates to crash reductions, an IIHS study comparing large cities with red-light safety cameras to those without found the devices reduced the fatal red-light running crash rate by 21%. In addition, the rate of all types of fatal crashes at signalized intersections fell by 14%. Some studies have concluded that while right-angle crashes and injuries are reduced at red-light safety camera intersections, rear-end collisions may increase. However, these crashes tend to be less severe, so the overall positive impact is still achieved. A Federal Highway Administration (FHWA) study evaluating red-light safety camera programs in seven cities found that, overall, right-angle crashes (which are more severe) decreased by 25%, while rear-end collisions (which tend to be less severe) increased by 15%. The results also showed a positive economic benefit of more than \$18.5 million in seven communities (U.S. DOT, 2005).

A review of international literature concluded that camera enforcement is highly effective in reducing red-light violations and right-angle injury crashes associated with red-light running. Although results vary considerably due in part to the different types of research performed, the results all indicate that red-light safety camera enforcement reduces injury crashes; the best estimate is 25% to 30% (Retting et al., 2003).

### **Automated Speed Enforcement (ASE) Safety Cameras**



Speed cameras photograph a speeding vehicle's license plate, driver or both, then send a citation to the registered owner. Mobile speed cameras are often used to cover multiple road segments, unlike red-light safety cameras that are used only at signalized intersections. Automated speed enforcement (ASE) safety cameras should be used to supplement traditional enforcement efforts, or placed in locations where traffic stops are impractical or unsafe (Venkatraman et al., 2021).

ASE cameras use photo radar technology to enforce speed limits four different ways. ASE systems can use fixed cameras that continually monitor speeds without an operator, semi-fixed cameras that are rotated between housings with active cameras and "dummy housings" without cameras, mobile camera systems deployed in vehicles with or without law enforcement officers present, and average speed enforcement systems that measure the average speed between two points on a roadway. These cameras take a photograph of the vehicle and license plate when the vehicle exceeds a set speed limit, recording the time, date, location and speed. In states that require driver liability, photographs are also taken of the vehicle operator.

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**Automated speed safety camera enforcement should be used to supplement traditional enforcement efforts, or in locations where traffic stops are impractical or unsafe.**

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According to NHTSA, for more than two decades, speeding has been a factor in approximately one-third of all motor vehicle fatalities. In 2021, speeding was a contributing factor in 29% of all traffic fatalities (NHTSA, 2023). While traditional high visibility enforcement has been an effective countermeasure to reduce speed-related crashes, speed safety cameras have also been shown to have a preventative effect by reducing speeds, thereby mitigating some crashes.

According to the Centers for Disease Control and Prevention, a review of studies through 2010 evaluating speed safety cameras found that all studies measuring speed have shown a reduction in speeds when cameras were present (Wilson et al., 2010). More recent studies have also shown

speed cameras are effective. For example, a 2016 study reported on the results of a comprehensive evaluation conducted seven and a half years after the introduction of speed cameras to residential streets and school zones in Montgomery County, Md. Relative to comparable sites without cameras, sites with the technology saw a decrease in mean speeds, a decrease in the likelihood that a driver was driving at more than 10 miles per hour above the speed limit, and a reduction in the likelihood of a crash resulting in an incapacitating or fatal injury. A phone survey of drivers in the community revealed that 95% were aware of the speed cameras, and of those drivers who were aware, 76% had reduced their speeds because of the cameras (Hu & McCartt, 2016).

In another study, the Pennsylvania Transportation Advisory Committee conducted research that spanned the year before and after the height of the COVID-19 pandemic in 2020. The study evaluated speed safety cameras on Roosevelt Boulevard in Philadelphia and found that total crashes and fatal crashes dropped 36% and 11%, respectively, after the cameras were installed. This is compared to a 6% reduction in total crashes and a 16% increase in fatal crashes throughout the city during the same period (Brunet, 2022).

### School Bus Stop-Arm Cameras



A school bus stop-arm camera is another form of AE technology available to improve traffic safety. The camera is mounted to a school bus stop arm and activated when the red lights on the bus are flashing, notifying motorists to stop when children are boarding or exiting a school bus.

The National Association of State Directors of Pupil Transportation Services estimated there were more than 50,000 illegal school bus passings in the U.S. on a single day during the 2021-2022 school year. Thirty-four states and 22% of the nation's school bus drivers participated in a voluntary, one-day count in the spring to record motorists who passed their stopped school buses (Ekbatani, 2022).

Using data collection and video monitoring, stop-arm camera vendors collaborate with law enforcement to reduce stop-arm violations and change driver behavior through the issuance of citations. Twenty-four states have school bus stop-arm camera laws (NCSL, 2023).

While research on the effectiveness of speed and red-light cameras is abundant, there is far less research on the effectiveness of stop-arm cameras on school buses. However, stakeholders in this space laud the value of this countermeasure. According to *School Transportation News*, a monthly business-to-business magazine serving pupil transportation professionals, 98% of stop-arm violators who were caught on camera and cited did not re-offend (Gray, 2023). Meanwhile, stop-arm camera technology vendor Bus Patrol's research indicated that stop-arm enforcement programs can reduce these violations by 30% (Bus Patrol, 2023).

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**98%**

According to *School Transportation News*, **98% of school bus stop-arm violators who were caught on camera and cited did not re-offend.** Twenty-four states have stop-arm camera laws.

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While these results are not based on scientific research, they do corroborate much of what NHTSA has found on the effectiveness of the technology from its review of U.S. state and local programs (NHTSA, n.d.).

## Distracted Driving and Seat Belt Enforcement Cameras



AE technology has also been successfully deployed to enforce seat belt and distracted driving laws. Both fixed-location and mobile-unit cameras can review traffic flow on a roadway and automatically record clear images of passing vehicles. Artificial intelligence software can review images and data, detecting potential traffic infractions such as distracted driving or seat belt noncompliance.

The data and images can be sent electronically for review by a law enforcement officer stationed further down the road who can then conduct a traffic stop. The evidence also can be transmitted for review by a law enforcement officer prior to mailing out a citation.

Only one vendor is currently testing camera technology in the U.S. to enforce distracted driving laws via a North Carolina program focused solely on commercial motor vehicles. Acusensus' patented "Heads-Up" solution can detect and capture evidence of illegal driver behavior. The technology has the capability to detect illegal mobile phone use, seat belt noncompliance and speeding, and is equipped with automatic license plate recognition (Acusensus, 2023).

The technology has been more fully deployed in Australia. In New South Wales, warning letters rather than fines were issued to violators for three months beginning in December 2019. After six months of operation, the rate of distracted driving offenses fell steadily from 1.2% to 0.3%. In 2019, one in every 82 drivers was using a mobile phone while driving. The rates have dropped to one in 534 drivers, as of 2023.

This technology also has been deployed in Queensland, Australia as both fixed and portable installations. It can capture high-resolution evidence 24 hours a day, seven days a week, in all weather conditions. Most citations were issued to drivers for either using their mobile phone or not wearing a seat belt. At the end of July 2022, the weekly average distracted driving offense rate was six offenses per 1,000 vehicles scanned. By June 2023, that number had fallen to approximately one offense per 1,000 vehicles scanned. During that same period, the weekly average seat belt offense rate was nearly two offenses per 1,000 vehicles and dropped below 0.5 offenses per 1,000 vehicles scanned — a decrease of more than 75%.

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↓ **75%** The use of AE technology to enforce seat belt and distracted driving laws has proven successful in Queensland, Australia: The seat belt offense rate dropped from two to fewer than 0.5 offenses per 1,000 vehicles scanned — a decrease of more than 75%.

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# Challenges and Solutions

When implementing an AE program in a state or community, it is imperative to learn from others who have successfully or unsuccessfully operated similar programs. The U.S. DOT has developed two resources to help states and communities implement an AE program. These resources provide operational guidelines for implementing [red-light](#) and [speed](#) safety camera enforcement programs and should be reviewed and consulted for operational guidance before, during and after program implementation. Even with this guidance, SHSOs and their partners will encounter challenges. Here are some of the most common and how they can be overcome.

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**AE program administrators must make clear to constituents that the objective of this technology is to deter violators, not to catch them.**

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## Public Acceptance, Transparency and Fairness

Nothing will derail an AE program faster than lack of public acceptance. Critics of AE argue these programs exist to generate revenue for law enforcement agencies and/or technology providers. To best allay these sentiments, AE program administrators must make clear to constituents, through the values evident in the operation of the program, that the objective of this technology is to deter violators, not to issue citations.



**Public Information:** A robust public information and education campaign is critical for gaining public support prior to implementation and during its use. Campaigns should clearly define the scope of the problem AE aims to address by using data to identify high crash intersections or corridors. Campaigns should also fully describe the AE rollout to the public, including where cameras are located and why, and be transparent about how violations may be challenged.

Throughout implementation, jurisdictions should regularly review the data to assess whether AE is working to address the problem and report the findings to the community. Communities must have an active voice throughout the process to determine if modifications to the AE program are needed and to provide input into future highway safety plans.



**Meaningful Community Engagement:** Public information can also be conveyed in community forums where program goals can be communicated. These events may be part of a state's required Public Participation and Engagement Plan, a new component of state highway safety planning required by the IIJA. When preparing their triennial highway safety plans, SHSOs analyze data from multiple sources to identify communities that are underserved and/or overrepresented in crashes resulting from traffic safety problems. SHSOs then engage with these communities to seek input and feedback on potential countermeasures, and incorporate that feedback into projects, programs and plans. The inclusion of AE in a state's highway safety plan presents an opportunity to discuss it with communities directly, gather input and build public trust.

SHSOs can play a key role in helping to plan and facilitate these forums but they should lean heavily on local partners and stakeholders to set the agenda, develop and

disseminate the public outreach, and share what was discussed after the event is over. Jurisdictions should plan to explain both the benefits and potential pitfalls of AE with the goal of determining if implementation is both a desirable and effective countermeasure for the issues the community is facing. Community members will have opinions about AE, both positive and negative. States should consider enlisting trusted and well-respected local voices to help convey accurate information.

In addition to engaging with community members, SHSOs should also involve the stakeholders who will handle program administration and implementation. Jurisdictions should include state and/or local DOT officials who can speak to what countermeasures have already been employed to address the applicable safety problem, as well as what may not be feasible based on the configuration of the roadway and the surrounding environment.



**Onsite Publicity:** Signage and publicity campaigns should warn drivers not only that safety cameras are in use, but also the parameters of their use (time of day, days of the week, only when workers are present, etc.). The goal is to ensure there are no hidden surprises for drivers and, ultimately, for drivers to take action on their own to drive safely. Media coverage of the program clearly describing its effectiveness throughout the rollout is also critical in gaining public acceptance.



**Pilot Projects and Program Onboarding:** Another strategy for allaying community concerns is to launch AE as a pilot program. Advise community members the program will be consistently evaluated for effectiveness to ensure that it is working, rather than giving the impression that it will remain in place indefinitely, no matter the outcome. The same considerations for selecting the type of AE, deployment locations and community engagement all still apply.

Once AE is implemented, program administrators should also consider a 30-day grace period where warnings are issued prior to the program going live. As an alternative, some programs issue warnings to all first-time offenders.



**Appropriate Use of Revenue:** As with all traffic enforcement programs, revenue is generated from violator fines, but this is not the end purpose. The goal of traffic enforcement is to increase motorist compliance with safety laws, which means when drivers no longer violate traffic laws, the revenue from AE cameras will decline. States and localities should consider using revenue from AE programs to pay for the cost of implementing and maintaining the technology. Any supplemental revenue can be used for current or additional traffic safety initiatives, including infrastructure improvements. Funds should not be deposited into a government's general fund where they can be diverted away from safety. To build public trust, it is critical to decouple the fine revenue from the enforcement agency and to communicate to the public how the revenue is used.

The generation of revenue can also be addressed in the agreements established with the vendors providing the equipment or operating the program. Jurisdictions should avoid providing a percentage of revenue per citation to vendors, which shifts the focus away from safety and more towards maximizing the number of citations issued.



**Fairness in Fines:** Traffic enforcement should balance safety and the individual financial burdens of offenders. Traffic fines should be designed to change behavior, not inflict financial hardship. Aggressive sanctions hit low-income offenders the hardest and can lead to a downward spiral of debt, financial insecurity and increased involvement in the criminal justice system that in practice disproportionately impacts communities of color. An AE program that appears predatory or exacerbates existing inequities will lose public trust.

A range of strategies are available to achieve more equitable outcomes in the use of fines and fees, including due date extensions, payment plans, the reconsideration of fees for nonpayment, income-based fines, community service and possibly traffic safety education in lieu of fines.



**Technology Quality:** If the AE technology selected for implementation is poor, the public may start to question its credibility. Jurisdictions should consider factors such as the accuracy and image quality of photographs and the reliability, accuracy and thresholds set for enforcement (speed and signal timing), which should be reasonable and publicly justifiable.



**Program Staffing:** Finally, it is essential that the agency managing the AE program have adequate staffing to implement the campaign necessary to secure and maintain public support, ensure timely dissemination of violation notices, fulfill the need for due process and respond to inquiries from offenders in a timely manner.

## Site Selection

After establishing a strong legal basis for AE and gaining stakeholder and community support, site selection is a critical consideration for program success. AE can be placed in a work or school zone, in a residential neighborhood or on a limited-access highway or major road. Localities that have installed AE in the wrong locations have faced pushback and criticism.

Jurisdictions should consider a range of criteria when making site selections.

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**AE can be placed in a work or school zone, in a residential neighborhood or on a limited-access highway or major road. Localities that have installed AE in the wrong locations have faced pushback and criticism.**

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**Safety and Community Data:** Regardless of the type of photo enforcement being implemented, authorities must select locations with both a history of violations and crashes. Implementing AE in areas with high rates of violations, but where crashes are rare, can undermine trust in the program as it appears to prioritize enforcement and revenue rather than safety. However, jurisdictions will want to consider other relevant factors for site selection, such as the abundance of vulnerable road users, the likelihood of tragic or severe crashes, and whether the underlying traffic safety problems significantly and adversely impact the residents' quality of life. Jurisdictions should consider whether other safety countermeasures have or can be put in place and may be a better option. Each potential site will be unique and deserves careful analysis.

As stated earlier, the IIJA permits SHSOs to expend Section 402 funds on AE, but only in school and work zones. The use of AE in these locations has garnered strong public support, making them a good choice to introduce the technology as a supplement to traditional traffic enforcement.



**Community Input:** As part of the public campaign conducted to introduce the program, which was discussed earlier in this report, jurisdictions can gather input from communities about which sites are preferred or acceptable and which may be problematic.



**Physical Installation:** Cameras should also be safely and correctly installed. Jurisdictions will want to consider factors such as whether the placement of AE equipment itself might cause a safety hazard, or if the lines of sight between cameras and vehicles are uninterrupted.

## Equity

Equitable traffic enforcement is one of the guiding principles of the Safe System approach to eliminating traffic crashes, injuries and fatalities. Implemented correctly and in the proper locations, AE is one solution to support more equitable traffic enforcement.

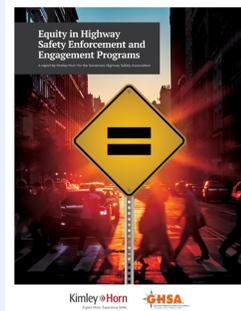
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**AE affords jurisdictions an opportunity to use camera technology to enforce traffic laws as a racially neutral, unbiased and contact-free alternative, while simultaneously regaining trust within communities.**

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Traffic stops are the most common way the public encounters law enforcement and, increasingly, the public is witnessing examples of these stops leading to tragic consequences. It is well documented that racial disparities exist both in the frequency of traditional traffic stops and their outcomes. A 2021 GHSA report, [Equity in Highway Safety Enforcement and Engagement Programs](#), cited numerous studies showing that Black drivers are stopped more frequently during enforcement activities, including an analysis of nearly 100 million traffic stops by the Stanford Open Policing Project. In addition, 2015 survey data from the U.S. Department of Justice indicated that Black and Hispanic drivers are more than twice as likely to have experienced the threat of physical force during their most recent police-initiated contact and are more likely to have multiple contacts with the police.

Black and Hispanic drivers are also more likely to have their vehicles searched during a traffic stop, although the likelihood of finding illegal material during a search is higher for white drivers (Davis et al., 2018). These realities must also be balanced with an understanding that traffic crash fatalities disproportionately affect Black, Indigenous and People of Color as was recently pointed out in the GHSA report, [An Analysis of Traffic Fatalities By Race and Ethnicity](#), and the U.S. DOT NRSS launched in 2022.



**GHSA's equity report offers recommendations to support more equitable outcomes for Black, Indigenous and People of Color.**

**Read the Report**

These disparities can aggravate existing financial hardships, erode community trust and result in more negative outcomes such as arrests, use of force and even death. Such outcomes can collectively undermine public support for all traffic enforcement programs (Retting, 2021).

As public frustration grows with each instance of real or perceived inequity, AE affords jurisdictions an opportunity to use camera technology to enforce traffic laws while achieving more equitable outcomes. The equity potential of AE programs is self-evident. AE can reduce in-person interactions between drivers and law enforcement. Unlike individual officers, safety cameras are not at risk of selecting individual drivers or vehicles in a consciously or unconsciously biased way. Cameras impartially record violations that happen to occur.

However, camera placement itself can be biased, lead to inequitable outcomes or worsen existing disparities in historically marginalized communities. In many cities, especially in low-income communities and communities of color, there exists a history of underinvestment in transportation infrastructure and many other government services. This lack of investment may have inadvertently created roadways where vehicle speeds have not been moderated through engineering solutions.

The installation of cameras, without consideration of these wider environmental factors, may further penalize residents in these areas. As part of the planning for AE programs, jurisdictions should carry out an equity analysis that examines who is impacted and who benefits from the placement of AE cameras. Consider who is using the roadway and for what purpose, and plan appropriately to avoid unintended consequences. In addition, in underserved communities, it may be appropriate to first consider other investments that may be missing. As discussed earlier, infrastructure countermeasures like speed calming can help solve traffic safety problems prior to implementing AE at a particular location.

### **Judiciary Support**

Issuing a citation is only the first step in the criminal justice process, as AE tickets are still processed by court systems. Jurisdictions implementing an AE program sometimes fail to adequately engage with the judiciary early in planning. Judges can nullify automatic enforcement programs by dismissing individual cases on legal grounds or even invalidate an entire program. Determining which court(s) will have jurisdiction over citations issued via AE and who will be hearing contested tickets is critical. Involve these judges in the design of the program and ask them to review the implementation and operational guidelines. These judicial partners can advise on legal, procedural or other concerns prior to program launch.

### **Privacy**

Most motorists have the perception of privacy while operating their vehicles and some believe that AE violates this right. While AE does not technically violate a citizen's legal right, according to the legal community, these concerns persist (ATS, n.d.). Communities should take steps to address this issue.



**While AE technology can help achieve more equitable outcomes by reducing in-person interaction, the placement of cameras can be biased and worsen existing disparities.**

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For example, during the public information campaign that accompanies AE implementation, explain the safety benefits the public is expected to gain by leveraging camera programs.

One effective operational strategy is to photograph vehicles from the rear, capturing only the license plate, instead of from the front where the plate (in states that require a front license plate) and driver's image may be captured. To allay privacy concerns, jurisdictions may choose to only mail photos of vehicle license plates instead of both the plates and driver.

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**According to the legal community, automated enforcement does not violate a citizen's legal right to privacy. It is vital to the success of any program to address this issue up front and make very clear what the public is gaining in return in terms of public safety.**

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The inability to identify the driver, however, will preclude jurisdictions from issuing citations to that individual, which undermines the safety goal of AE — to increase compliance and change individual driver behavior. The vehicle registrant may not be the same as the driver. To cite the actual driver, rather than the vehicle registrant, AE programs must capture approaching and departing images that document the person behind the wheel. But capturing images of the driver places a greater burden on the implementing jurisdiction to fully review the citation, identify who this person is and differentiate them from the vehicle registrant, and make a conviction.

### **Persistent Offenders**

AE program administrators should be prepared to address those drivers who fail to respond to citations, either willfully or due to extenuating circumstances. Scofflaws are particularly prevalent in cities where a significant number of commuters live in neighboring jurisdictions.

Drivers that regularly cross borders may not be easily subject to driver license and vehicle-based consequences in the jurisdiction in which they might offend. For example, in Washington, D.C., which is the workplace for many Virginia and Maryland residents and has a high proportion of out-of-state visitors and diplomatic vehicles, more than 6.2 million traffic tickets have gone unpaid since 2000, totaling nearly \$1.3 billion in lost fines (Lazo & Davies, 2023). However, the bigger issue is that each unpaid citation represents a missed opportunity to alter driver behavior.

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**Developing reciprocity agreements with neighboring states prior to setting up an AE program can assist states in recovering fines from out-of-state violators.**

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To encourage offenders to respond to an initial citation notice, the procedures and penalties for overdue violation notices should be a part of the program's initial and ongoing public information campaign. For overdue citations, a reminder notice should be sent to the offender with a new due date and information detailing any penalties associated with failure to respond to the initial or subsequent notice. Additional penalties for failing to respond may include the inability to re-register a vehicle or have a vehicle inspected (in the 19 states with annual or biennial inspection mandates). Jurisdictions may also consider vehicle immobilization (booting) or impounding; however, both require significant resources that are currently constrained in local governments and can only be done when a vehicle is on public property. Another solution for collecting AE citation fines is to turn scofflaws over to a collection agency. However, before doing this, the potential equity impacts discussed earlier must be carefully considered.

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**\$1.3B** Washington, D.C. has seen more than 6.2 million tickets go unpaid since 2000, resulting in \$1.3 billion in lost fines. In addition to lost revenue, these unpaid citations highlight **a critical missed opportunity to alter driver behavior.**

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A significant obstacle preventing offender accountability is the way in which offender information is (or sometimes isn't) shared between agencies. For example, sometimes courts that adjudicate these cases do not expediently share the disposition of the case with state departments of motor vehicle administration (DMVs). Absent this process, violations may not be entered on a person's driving record. Because of this, the DMV may not be able to apply administrative consequences to address a person's pattern of poor driving behavior. This could include a warning letter or suspension of a motorist's driving privilege, either for unsafe driving behavior or unpaid fines, even if the state was able to capture both the vehicle license plate and image of the driver for identification.

Most states are party to the Driver License Compact, an interstate agreement that provides for the sharing of license suspensions, traffic violations and related data (The Council of State Governments, 2019). With the goal of "One Driver, One License, One Record," offenders should be unable to escape a record of their prior offenses. However, some states may not enter AE violations on a driver's record, enabling out-of-state drivers to escape the consequences associated with an AE violation.

Neighboring states can unilaterally or multilaterally partner to develop mechanisms to share registered owner information, help recover fines from out-of-state violators, agree to prevent vehicle registrations in partner states for AE scofflaws, or apply other sanctions and consequences across state lines. Such agreements may require legislative action, so consultation with your state's legal office is highly recommended.

State policymakers who are hostile to AE are already cognizant of the potential of state reciprocity. The New Jersey Senate recently voted unanimously to advance a bill prohibiting the state's Motor Vehicle Commission from providing New Jersey licensed drivers' identifying information to camera enforcement entities in other states. The legislation is modeled after a South Dakota law that prohibits the state from sharing information with other states for the collection of civil fines that result from camera citations.

Finally, states can review their own AE data to determine habitual or scofflaw offenders, record where and when violations are occurring, and then place road patrols in these areas to catch violators using traditional enforcement techniques. This technique can be effective for catching violators who traverse the same routes on a frequent basis and these violations would then be recorded on the drivers' records.

## Masking

Another challenge facing communities looking to implement an AE program is whether such programs violate the Federal Motor Carrier Safety Administration's (FMCSA) rule on "masking." To ensure that commercial driver's license (CDL) records are accurate, FMCSA regulations prohibit masking, which occurs when a court allows the CDL holder's conviction for a violation of a traffic control law to be deferred, dismissed or go unreported. Since AE citations may not be entered onto a driver's record, there is no reporting of the violation. Because of this, a CDL holder could accumulate multiple AE moving violations that would not be recorded and thus not used to disqualify that driver's commercial license. States are encouraged to consult with their state FMCSA officials regarding this issue prior to implementing a program.

The solution to the challenges posed with scofflaws and masking is to implement a program where cameras record both the image of the driver and the license plate, have the violation reviewed by law enforcement officials, and place the violation on the driver's record, as is done with traditional enforcement. Under this scenario, states would ensure compliance with FMCSA masking regulations and could suspend the licenses of violators who fail to pay fines.

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# Recommendations

When used correctly, AE can be a valuable tool to address the dangerous driving behaviors that contribute to crashes. Agencies seeking to implement programs should learn from the experiences of those who have previously implemented such programs to avoid making common mistakes. These recommendations are

applicable to all types of automated enforcement. Assuming a community is legally authorized to set up an AE program, the following, at minimum, should be essential elements:

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**Agencies seeking to implement programs should learn from the experiences of those who have previously implemented programs to avoid making common mistakes.**

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 **Equity:** Make equity a core goal of AE programs and ensure all decisions are viewed through an equity lens. This can take many forms, all of which should be considered. In the outreach process, identify underserved communities or groups that have not traditionally been a part of highway safety discussions. Involve them in the planning process, so they understand AE program goals and can be public advocates for safety cameras. Be transparent about where cameras will be placed and why, making sure to share what other countermeasures have been implemented and/or considered. Regularly report AE program outcomes and how the revenue is being used to further advance safety.

 **Community participation and engagement:** Members of the community where AE will be deployed must be part of the planning and implementation process. This not only helps to ensure the solution is what is needed and wanted by the community to help eradicate undesirable behavior, but also that they have a say in that solution. Plus, meaningful public engagement that begins early in the planning process will help bolster public acceptance.

 **Transparency and accessibility:** For the public to support an AE program, jurisdictions should share the data and insight into the decision-making that prompted its adoption. Jurisdictions should also publicize how AE will be deployed (e.g., when and where). The public also needs assurances about the accuracy of the technology and advanced notice should be provided to drivers through highly visible and easy to understand signage.

 **Motivated by safety:** If a program is or is perceived to be motivated by revenue rather than safety, it is likely to fail. Revenue generated by AE should be used to support program start-up and maintenance costs, with any excess revenue dedicated to traffic safety initiatives such as increased education and/or infrastructure enhancements. Sharing periodic updates of program success in reducing crashes will help to strengthen public acceptance.

 **Proper site selection:** Choose locations that have crash and/or injury/fatality data to justify the use of AE or that have a high likelihood of crashes involving vulnerable road users. Select a location that has proper, unobstructed sight lines for cameras and ensure their equitable placement, so as not to erode community trust.



**Stakeholder input:** Involve all stakeholders in program planning and implementation to secure widespread support and acceptance. This should include, at minimum, elected officials; law enforcement; the judiciary; traffic engineers; school, business and community leaders; public health professionals; and the media. Ensuring these individuals reflect the makeup of the community is essential.



**Monitoring and evaluation:** A successful AE program has regular and consistent monitoring. Regular monitoring will help ensure the program is operating as intended and that program goals are being met. Evaluation should be shared with all stakeholders to increase transparency and allay fears that AE was implemented for revenue generation.



**Supplementing other countermeasures:** AE is not a replacement for traditional enforcement, engineering and education countermeasures, and should be used to supplement other traditional and proven countermeasures.



**Persistent offender and reciprocity agreements:** Establish penalties for scofflaws, such as vehicle impounding or “booting,” preventing vehicle re-registrations and inspections and/or prohibiting license renewals. Create a plan to address out-of-state violators who fail to pay citations by developing reciprocity agreements with neighboring states.



**Provide due process:** Develop and promote an easy to understand and accessible procedure for violators to contest citations.



**Legislative action:** Pursue legislation enabling motor vehicle administrators to record AE violations on a person’s driving record.

In May 2021, GHSA partnered with AAA, Advocates for Highway and Auto Safety, the National Safety Council and IIHS to produce an [Automated Enforcement Program Checklist for Red-light and Automated Speed Enforcement](#) to help communities set up a transparent and effective AE program. SHSOs should share this resource with communities looking to implement AE programs in their state and consider requiring entities applying for grant funding for AE programs to utilize the checklist.

**Automated Enforcement Program Checklist for Red-light and Automated Speed Enforcement**

**FIRST STEPS**

- 1. Determine whether your state has the legal authority to implement an automated enforcement program.
- 2. Determine whether your state has the legal authority to implement an automated enforcement program.
- 3. Determine whether your state has the legal authority to implement an automated enforcement program.

AAA | GHSA | IIHS | NSC

**AE Program Checklist**

**Download**

# Promising Practices

In addition to what was discussed previously, SHSOs that work with communities to implement AE programs should review a 2012 Transportation Research Board (TRB) report issued as part of the National Cooperative Highway Research Program (TRB, 2012).

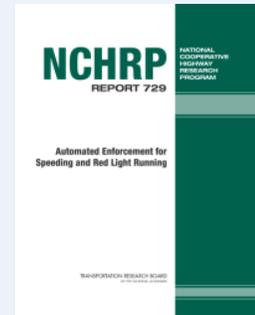
[Automated Enforcement for Speeding and Red Light Running](#) provides guidelines for the start-up and operation of AE programs to improve highway safety. The guidelines are based on a national review of both ongoing and terminated programs. This publication illustrates well-run programs that were implemented in Portland, Oregon; Virginia Beach, Virginia; San Diego, California; and Edmonton, Alberta. Before implementing their own programs, communities can learn much from reviewing the noteworthy practices these jurisdictions put in place.

The FHWA also updated its [Speed Safety Camera Program Planning and Operations Guide](#) to help jurisdictions plan, deploy and operate speed safety cameras to improve safety and maintain program reliability and accountability. It emphasizes the use of AE as one component of a comprehensive speed management program that should be applied carefully and includes five new case studies for jurisdictions that have or are working towards implementing speed safety camera programs.

In addition to these TRB and FHWA resources, SHSOs and their partners are encouraged to learn more about these AE programs:

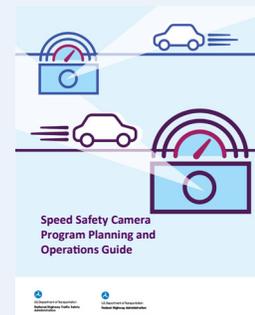
- » The New York City (NYC) DOT was granted authority in 2013 to pilot an automated speed enforcement program to deter speeding in 20 school speed zones between the hours of 6 a.m. and 10 p.m. on weekdays. The program was expanded in 2014 to 140 school speed zones to support the city's Vision Zero goal of eliminating traffic deaths and serious injuries. The DOT's *Automated Speed Enforcement Program Report*, which covers 2014-2017, showed speeding during school hours was reduced by 63%, and the overall number of people killed or severely injured in crashes in school speed zones with speed cameras declined by over 21% in the period after cameras were activated (NYC DOT, 2018).

Legislation was enacted in 2022 allowing the safety cameras to be turned on around-the-clock. As a result, violations dropped 30% over the subsequent year, with speeding dropping as much 96% on one Manhattan roadway. The NYC DOT reported that traffic fatalities on city streets fell by 25% in speed camera zones during the expanded hours. Steep declines in traffic injuries ranging from 18% to 45% were also recorded during overnight and weekend hours at camera locations across the city (NYC DOT, 2023).



## AE for Speeding and Red Light Running

Download



## Speed Safety Camera Program Planning and Operations Guide

Download

- » In 2021, Pennsylvania enacted legislation establishing a pilot program to provide for automated speed enforcement systems in active work zones. After two years of operation, speeding in work zones during peak construction season (April-October) fell by 38%, while excessive speeding was reduced by 47%. The Pennsylvania DOT's *2023 Annual Report on Automated Work Zone Speed Enforcement* showed a 6% reduction in work zone crashes when comparing 2021 crash data to pre-COVID-19 pandemic crash rates (Pennsylvania DOT, 2023). Pennsylvania's program has become a national model for the effective use of automated work-zone speed enforcement.

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# Summary

The unprecedented rise in traffic fatalities requires new approaches to roadway safety. State Highway Safety Offices are encouraged to fully embrace the Safe System approach, which calls for implementing a redundant system to protect all road users. Equitable traffic enforcement is a proven countermeasure

for bolstering driver compliance with traffic safety laws and contributes to redundancy called for by the SSA. But police officers cannot be present on every roadway or address all traffic violations that occur. Automated enforcement affords states the ability to augment traditional enforcement efforts with proven technology that can prevent serious injuries and save lives. In addition, AE can help advance equitable enforcement and be integrated into a state's meaningful community engagement efforts.

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**Automated enforcement affords states the ability to augment traditional enforcement efforts with proven technology that can prevent serious injuries and save lives.**

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State Highway Safety Offices are tasked with coordinating traffic safety activities and viewed as leaders in the safety space. Albert Einstein once said, "The leader is one who, out of the clutter, brings simplicity... out of discord, harmony... and out of difficulty, opportunity." Leadership involves influencing others to follow and providing partners with the tools necessary to succeed. By following the recommendations and best practices discussed in this report, and by learning from the missteps made by others, SHSOs will be well-positioned to use their resources to help communities plan and implement effective automated enforcement programs that can change driver behavior and save countless lives.

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