



# Case Study of Pennsylvania's Work Zone Speed Safety Camera Program

Source: Getty Images.

In recent years, the use of speed safety cameras (SSCs)—also referred to as speed camera enforcement or automated speed enforcement systems—has gained increased national attention and application in work zones. SSCs are a Federal Highway Administration (FHWA) proven safety countermeasure and a National Highway Traffic Safety Administration (NHTSA) 5-star countermeasure to help reduce speeds and crashes. Jurisdictions use SSCs as part of a comprehensive speed management program to target speeding-related safety problems.

This case study presents experiences and lessons learned from Pennsylvania's work zone SSC pilot and program (referred to as the Automated Work Zone Speed Enforcement (AWZSE) program and the Work Zone Speed Safety Camera program). The information is reflective of what other agencies may encounter when planning, deploying, and operating a work zone SSC pilot and program.

## AUTHORIZING LEGISLATION

Pennsylvania's work zone SSC efforts began in 2018 and continue today. In 2018, the State legislature authorized a 5-year pilot program on Federal-aid highways operated by the Pennsylvania Department of Transportation (PennDOT) and highways operated by the Pennsylvania Turnpike Commission (PA Turnpike). The full 2018 Act 86 titled *Speed Timing Devices, Automated Speed Enforcement Systems in Active Work Zones, and Establishing a Pilot Program for Automated Speed Enforcement System on Designated Highway* is available at <https://www.legis.state.pa.us/cfdocs/legis/li/uconsCheck.cfm?yr=2018&sessInd=0&act=86>.

The authorizing legislation specified several provisions for the pilot program, such as:

- Violations are to be issued for vehicles traveling 11 mph over the posted speed limit threshold
- Penalties are to be organized as a tiered penalty structure:
  - \$0 first violation
  - \$75 second violation
  - \$150 third and subsequent violations
- The Pennsylvania State Police (PSP) will be responsible for reviewing fine-carrying and appealed violations
- There shall be a clearly defined contest and appeals process

### PENNSYLVANIA WORK ZONE SSC PROGRAM PURPOSE

- Reduce speeds in work zones
- Improve driver behavior
- Save worker and traveler lives
- Complement existing enforcement by State police
- Promote work zone safety

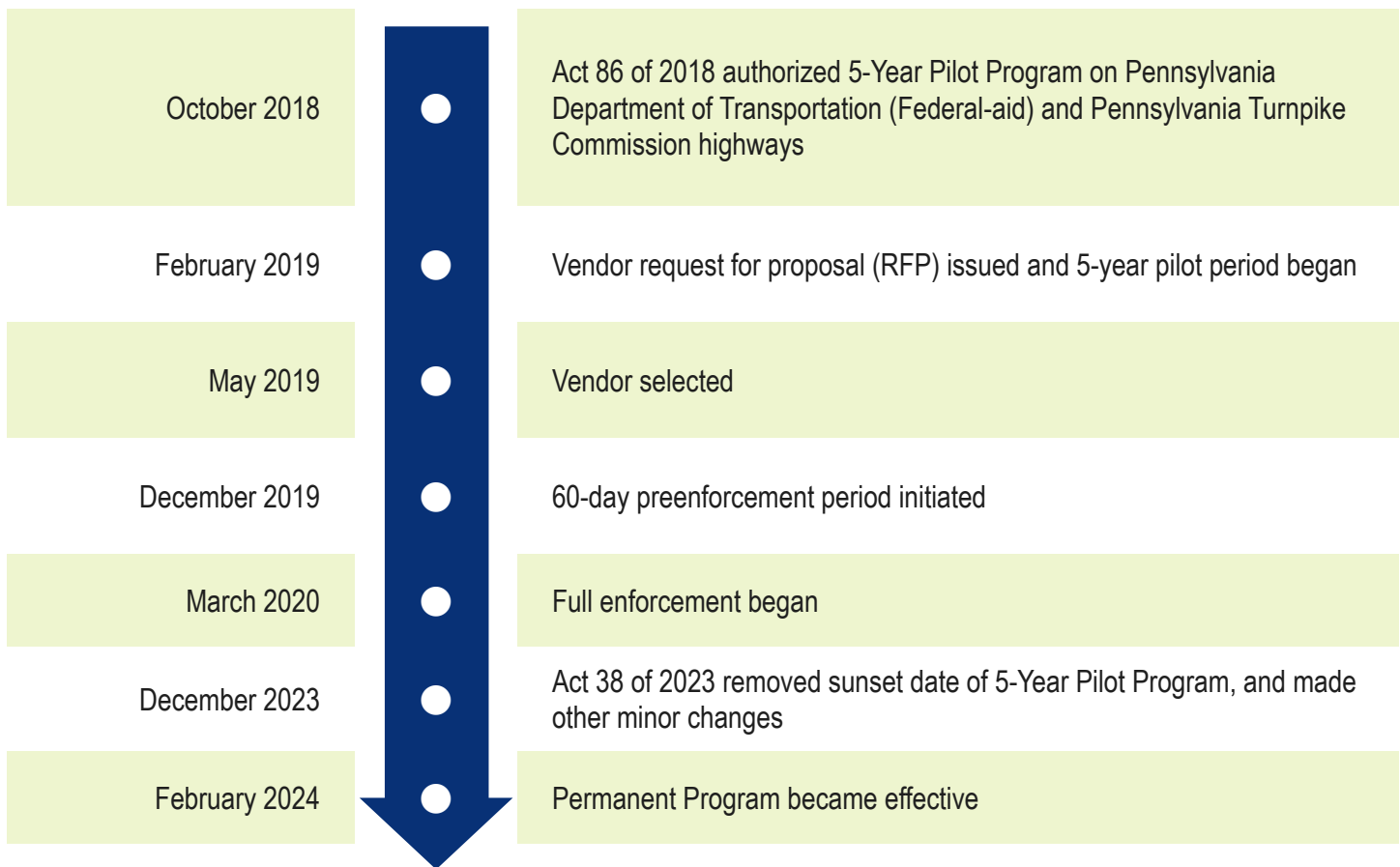
Additionally, the State legislation required an annual report to the legislature on the performance of the program each calendar year. Information in the report includes work zone crash data, speed data, the number of violations, and program fines. These annual reports are intended to provide insights on the utility and effectiveness of the program, the overall cost of operating the program, and possible changes that may be needed. The annual reports are available at <https://workzonecameras.pennidot.gov/about>.



After demonstrated success of the work zone SSC pilot program in Pennsylvania at reducing work zone speeds and crashes, the State legislature removed the sunset date of the 5-year pilot program, such that the permanent program officially became active in February 2024.

## DESIGNING AND PLANNING A WORK ZONE SPEED SAFETY CAMERA PROGRAM

After the SSC-authorizing legislation was enacted, PennDOT and PA Turnpike conducted many activities to establish the pilot program in a relatively brief period of time, as depicted in [figure 1](#). Establishing roles and responsibilities and understanding agency staffing and resourcing needs was a key priority. In order to help establish and operate the pilot program, PennDOT and PA Turnpike decided to hire vendors to help with program administration and system administration.



**Figure 1.** Pennsylvania speed safety camera program development timeline (Source: Pennsylvania Department of Transportation (PennDOT)).

2018:

<https://www.legis.state.pa.us/cfdocs/legis/li/uconsCheck.cfm?yr=2018&sessInd=0&act=86>

2023:

[https://www.legis.state.pa.us/cfdocs/legis/li/uconsCheck.cfm?yr=2023&sessInd=0&act=38#:~:text=Amending%20Title%2075%20\(Vehicles\)%20of,pilot%20program%20for%20automated%20speed](https://www.legis.state.pa.us/cfdocs/legis/li/uconsCheck.cfm?yr=2023&sessInd=0&act=38#:~:text=Amending%20Title%2075%20(Vehicles)%20of,pilot%20program%20for%20automated%20speed)



### PENNSYLVANIA DEPARTMENT OF TRANSPORTATION



- Scheduling and monitoring (State highways)
- Fiscal processes and auditing
- Regulations and standards development
- Hearing officers

### PENNSYLVANIA TURNPIKE COMMISSION



- Scheduling and monitoring (commission highways)
- Auditing and vendor contract compliance
- Standards development

### PENNSYLVANIA STATE POLICE



- Violation review and affirmation
- Field speed and quality control testing

## CONTRACTED VENDOR SERVICES

### PROGRAM ADMINISTRATOR TEAM

- Project selection and scheduling
- Field and back-office quality assurance and quality control
- Operational compliance and process updates
- Program outreach
- Performance monitoring and reporting
- Technical and administrative support

### SYSTEM ADMINISTRATOR (VENDOR)

- Field unit deployment
- Violation review, collection, mailing, and disbursement
- Customer service and record keeping
- Informal hearing support
- Annual certifications

**Figure 2.** Chart. Agency and contractor roles and responsibilities in Pennsylvania's Speed Safety Camera Program. (Source: Pennsylvania Department of Transportation (PennDOT)).

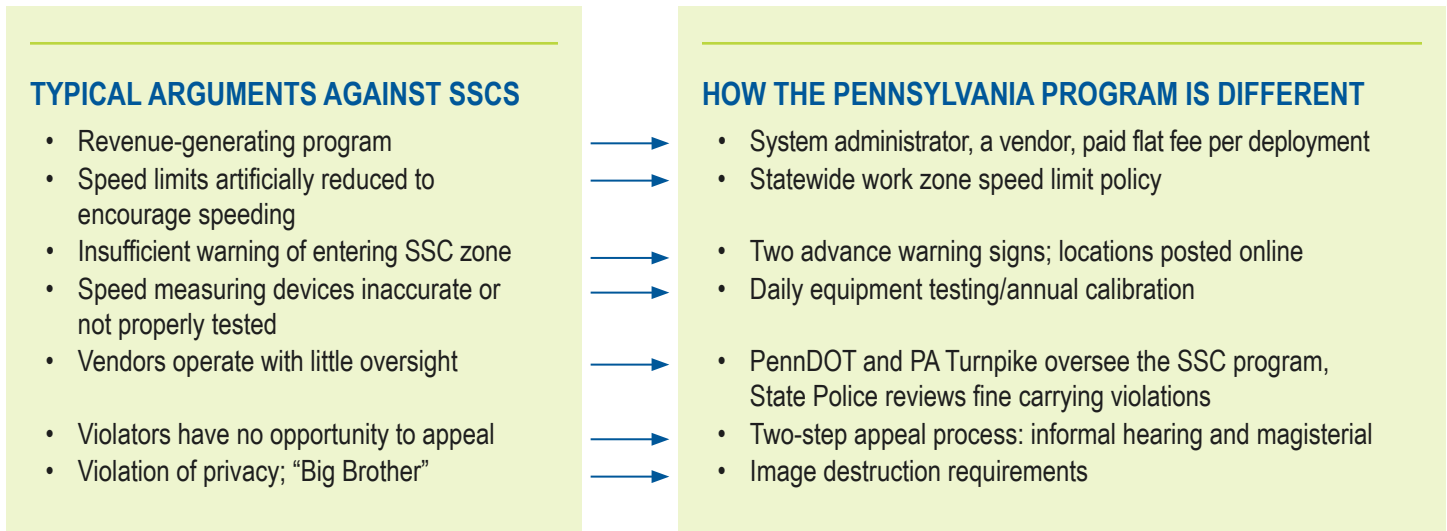
Activities that were helpful for PennDOT and PA Turnpike when initiating the work zone SSC pilot program included:

- **Plan activities around the longest anticipated lead time.** The request for proposal (RFP)-process timeline drove a number of activities. The steps in this process were generally expected to take the longest amount of time.
- **Learn from peer agencies that have had similar experiences.** Agencies that already have a work zone SSC program in place can provide information to help an agency starting the process make better decisions faster. PennDOT conducted a meeting with Maryland State Highway Administration (SHA) staff early in the development process to understand lessons learned by Maryland SHA and gather recommendations.
- **Engage diverse stakeholders.** PennDOT staff conducted meetings with their agency legal team and with other Pennsylvania State agencies to facilitate interagency agreements and to understand effects of executive or leadership changes. In particular, PennDOT and PA Turnpike engaged PSP as a key stakeholder collaborator. PennDOT also engaged the FHWA Pennsylvania Division Office when developing new signing for work zone SSCs to conform to and supplement the Manual on Uniform Traffic Control Devices for Streets and Highways.
- **Engage the traveling public.** As part of program development, PennDOT and PA Turnpike developed a public messaging case, depicted in [figure 3](#), to help mitigate concerns about how the SSC program was being implemented.





- **Consider support from consultant staff.** PennDOT learned from Maryland SHA that its work zone SSC program has a full-time staff member plus consultant staff to provide technical assistance. PennDOT and PA Turnpike selected a Program Administrator team (engineering consultant team) through a competitive RFP process to help with program planning and logistics during program development, including development and execution of various program guidance documents, signing and work zone standard drawings, and business rules for the SSC pilot. A consultant with national knowledge about different SSC programs may be particularly valuable.
- **Consider program priorities within the vendor RFP.** SSC technologies and backend processing systems available from vendors are different, and agencies should select the right vendor based on what the agency values for their SSC program and emphasize in the RFP. PennDOT and PA Turnpike were vendor agnostic in selecting SSC technologies but wanted a system that was reliable and proven, and PennDOT and PA Turnpike focused on proven solutions for backend operations that would avoid issues like mailing incorrect violations. PennDOT and PA Turnpike included demonstrations as part of the vendor selection process.



**Figure 3.** Chart. The public messaging case for speed safety cameras distinguished how the Pennsylvania program was different from common perceptions. (Source: Pennsylvania Department of Transportation (PennDOT)).

## OPERATING A WORK ZONE SPEED SAFETY CAMERA PROGRAM

Work zone SSC operations began statewide in Pennsylvania on March 9, 2020, and have been in continuous operation since that time, with a brief break due to the COVID-19 pandemic that halted construction activities statewide from March 16 to April 20 in 2020. Since operations began, there have been 17 SSC units (vehicle or other apparatus-based system) operating per shift, generally distributed with 10 units for PennDOT roadways and 7 for PA Turnpike roadways. Each SSC unit is deployed on an 8-hour shift, with up to two shifts daily (i.e., day and night shifts) to support both weekday and weekend work activity.

The operational requirements for the 5-year work zone SSC pilot program authorized in 2018 are similar to the work zone SSC program that was authorized and initiated in February 2024, as shown in [table 1](#). A notable exception is that the allocation of fine revenues was modified.



Topic	Initial Legislation Operational Requirements	Modified Legislation Operational Requirements
Authorization Year	2018	2023
Authorization Type	Pilot	Program
Type of Infraction	Civil	Civil
Speeding Threshold	11 mph or more over the posted speed limit	11 mph or more over the posted speed limit
Worker Presence Required?	Yes	Yes
Allowable Roadway and Work Zone Characteristics	Federal-aid and Pennsylvania (PA) Turnpike highways	Federal-aid and PA Turnpike highways
Motorist Notification Requirements	Two advance warning signs, first indicating “Active;” notification at work zone and on website	Two advance warning signs, first indicating “Active;” temporary speed limit sign; notification at work zone and on website
Fine Structure	1st: \$0 2nd: \$75 3rd-plus: \$150	1st: warning 2nd: \$75 3rd-plus: \$150
Allocation of Excess Fine Revenues	Pennsylvania State Patrol (PSP) cadet recruitment, PSP work zone enforcements, driver education Pennsylvania Department of Transportation (PennDOT) and PA Turnpike safety program	PennDOT and PA Turnpike safety program

**Table 1.** Pennsylvania work zone speed safety camera operational requirements.

Work zone selection is based on a data-driven process in order to maximize effectiveness. Both PennDOT and PA Turnpike deploy SSCs in varied types of work zone settings:

- **Construction and maintenance activities.** While SSC deployments in maintenance work zones tend to have shorter enforcement durations given the short-term nature of maintenance activities, these scenarios reflect locations where workers are most vulnerable. In 2023, 14 percent of SSC deployments (445 of 3,161 deployments) were in maintenance work zones.
- **Barrier-protected and channelizer (unprotected) work zones.** Overall, 68 percent of Pennsylvania work zone SSC deployments have been in channelized work zones, where workers are not protected and often at higher risk. However, data have shown that speeds have been higher in barrier-protected work zones than in unprotected work zones, and the percentage of traffic over the speed limit and percentage excessively speeding is twice as high in barrier-protected work zones. Based on this data, PennDOT and PA Turnpike deployed work zone SSCs in barrier-protected work zones to help reduce speeds and improve driver safety.





- **Work zones with and without speed limit reductions.** PennDOT has used before-and-after evaluations from the work zone SSC program to refine how speed limit reductions in work zones are determined, and speed limit reductions are not implemented in all work zones. This change has resulted in improved speed limit compliance and improved work zone safety. In 2022, 50 percent of the 76 projects where SSCs were deployed did not have a reduced work zone speed limit.



**Figure 4.** Photograph. Pennsylvania work zone speed safety camera enforcement vehicle in a channelized work zone. (Source: Pennsylvania Department of Transportation (PennDOT)).



Deployments, Violations, and Repeat Rates	Annual Totals				Total 2020–2023
	2020	2021	2022	2023	
<b>Deployments</b>	2,084	3,302	3,482	3,161	<b>12,029</b>
<b>1st Violations (\$0)</b>	191,595	359,697	362,195	371,428	<b>1,284,915</b>
<b>2nd Violations (\$75)</b>	19,226	45,967	57,114	58,507	<b>180,814</b>
<b>3rd-Plus Violations (\$150)</b>	8,409	19,119	25,458	26,646	<b>79,632</b>
<b>Total Violations Issued</b>	219,230	424,783	444,767	456,581	<b>1,545,361</b>
<b>Repeat Rate</b>	12.61%	15.32%	18.57%	18.65%	<b>16.85%</b>

**Table 2.** Annual and total number of deployments, violations, and repeat offenders in Pennsylvania’s Work Zone Speed Safety Camera Pilot Program from 2020 to 2023. (Source: Pennsylvania Department of Transportation (PennDOT)).

As shown in [table 2](#), in the first 4 years of operations, there have been more than 12,000 work zone SSC deployments with more than 1.5 million violations issued and a 16.9-percent repeat rate.

The vendor manages all payment processing, providing a consistent process to the violator, regardless of whether the SSC was on a PennDOT or PA Turnpike roadway. The vendor is responsible for correctly distributing funds between PennDOT and PA Turnpike accounts. Payments are accepted by online portal, mail, or phone/interactive voice response (IVR).

In Pennsylvania, the recourse for an unpaid violation, driven by authorizing legislation, is to send it to collections. Before a violation goes to collections, it goes through three levels of notifications and successive late fees totaling \$75 if nonresponsive after 90 days. PennDOT and PA Turnpike have noted that 75 percent of violations are paid. Pennsylvania has a two-tiered adjudication approach for these SSC deployments—the first layer is an informal hearing, as defined by the enabling legislation, in which the Pennsylvania Office of General Counsel provides an informal hearing officer to review the materials the program and the violator provide and renders a determination of liable or not liable. If a violator receives a liable and wishes to further contest their violation, they have the option to appeal to the district court system.

## ASSESSING PROGRAM EFFECTIVENESS

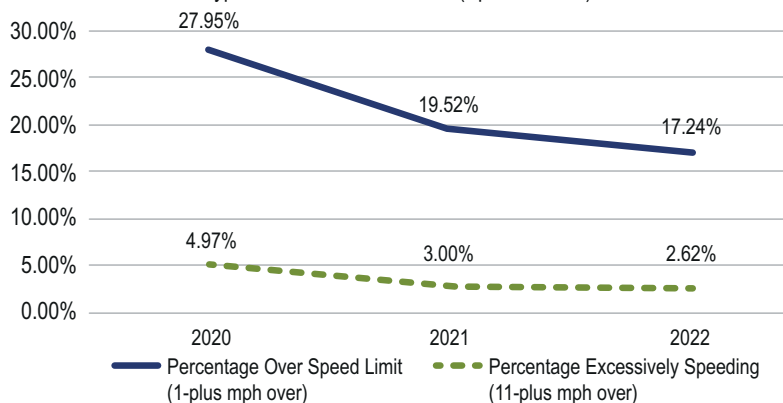
The authorizing legislation for Pennsylvania’s work zone SSC program requires annual reports to the legislature. Additionally, a [Purdue University study](#) included an examination of the effectiveness of Pennsylvania’s SSC deployments. Overall, these evaluations have shown that the SSC program is effective at reducing speeds and crashes.

Firstly, Pennsylvania’s work zone SSC program is effective in reducing speeds, when measured by both percentage of vehicles over the speed limit and percentage excessively speeding 11-plus mph over the speed limit, as depicted in [figure 5](#). [Figure 6](#) shows how speeds reduced at a specific work zone location when an SSC unit was present. Additionally, while measured and sustained speed reductions have been observed in SSC-enforced work zones, smaller but measurable speed reductions have been detected at times when SSC units and signing are not present in those same zones.



### Automated Work Zone Speed Enforcement (AWZSE) Speed Trends

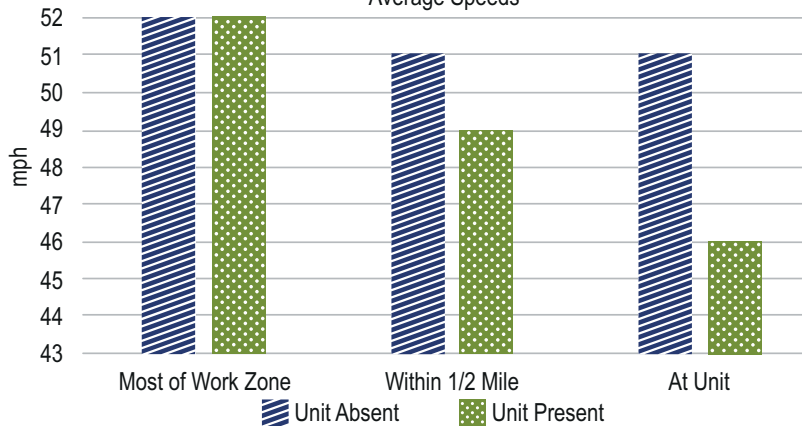
Typical Construction Season (April–October)



**Figure 5.** Graph. Effectiveness of Pennsylvania work zone speed safety cameras at reducing speeds. (Source: Pennsylvania Department of Transportation (PennDOT)).

### I-79 Southern Beltway

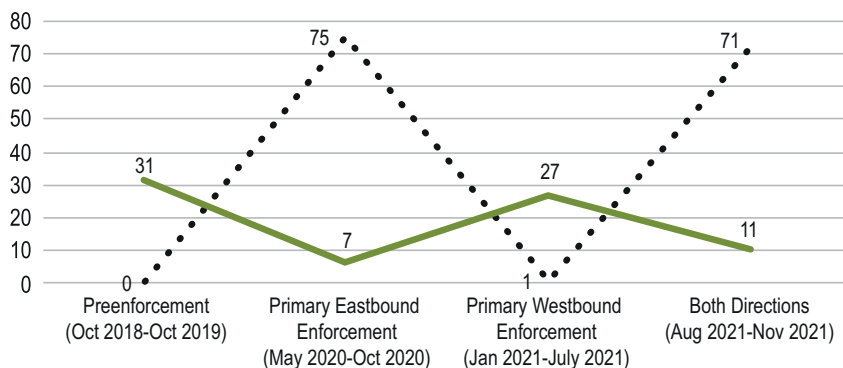
Average Speeds



**Figure 6.** Graph. Sample location showing work zone speed safety cameras reduced speeds when present. (Source: Pennsylvania Department of Transportation (PennDOT)).

Data have also shown that crashes were reduced when SSCs were deployed in work zones. This metric was primarily studied for long-term barrier-protected work zones. Overall, an increased frequency of SSC enforcements has resulted in a reduced number of work zone crashes and fatalities since the start of the program. Meanwhile, national and overall Pennsylvania crash trends have increased over this same period of time, helping to demonstrate that work zone SSCs are successfully helping to reduce work zone crashes. As an example, [figure 6](#) depicts a lower frequency of crashes when more SSC units are present, and [figure 7](#) shows fewer crashes occurred at this work zone location when SSCs were deployed.

### 1-78 12M Eastbound



**Figure 7.** Graph. Number of crashes in work zone with speed safety cameras. (Source: Pennsylvania Department of Transportation (PennDOT)).

••• Total Enforcements  
— Total Crashes





## LOOKING AHEAD

Authorizing legislation drives several aspects of the Pennsylvania work zone SSC program but PennDOT and PA Turnpike also continue to refine SSC operations every year based on lessons learned. The legislation passed in 2023 to remove the sunset date of the SSC pilot and establish a permanent work zone SSC program. The legislation also made minor adjustments to improve SSC program effectiveness, including a statutory requirement for speed limit sign placement within the advance signage and a mandatory 15-day grace period between the warning notice and any subsequent notice.

Since initially deploying in 2020, PennDOT’s and PA Turnpike’s in-house institutional knowledge for operating the work zone SSC program and the established framework has grown such that the agencies could now run the program on their own without a consultant, if desired. However, while the agencies have institutional knowledge, they do not have enough staff available to manage all of the necessary day-to-day activities and are satisfied with the consultant services provided.

Overall, Pennsylvania continues to enhance the work zone SSC program as one tool for improving work zone safety through reduced vehicle speeds and fewer crashes.

## FOR MORE INFORMATION

**Pennsylvania automated work zone speed enforcement website** (Annual Reports required as part of authorizing legislation are posted on the “About” page)  
<https://workzonecameras.penndot.gov>

**NHTSA Countermeasures that Work: Speed Safety Camera Enforcement**  
<https://www.nhtsa.gov/book/countermeasures-that-work/speeding-and-speed-management/countermeasures/enforcement/speed-safety-camera-enforcement>

**Purdue University study evaluating the impact of Pennsylvania AWZSE**  
<https://www.mdpi.com/1424-8220/22/8/2885/htm>

**FHWA Proven Safety Countermeasures** (“Speed Safety Cameras” subheading under “Speed Management” topic)  
<https://www.nhtsa.gov/book/countermeasures-that-work/speeding-and-speed-management/countermeasures/enforcement/speed-safety-camera-enforcement>

**The FHWA and NHTSA Speed Safety Camera Program Planning and Operations Guide**  
[https://highways.dot.gov/sites/fhwa.dot.gov/files/Speed\\_Safety\\_Camera\\_Program\\_Planning\\_and\\_Operations\\_Guide\\_2023.pdf](https://highways.dot.gov/sites/fhwa.dot.gov/files/Speed_Safety_Camera_Program_Planning_and_Operations_Guide_2023.pdf)

**National Work Zone Safety Information Clearinghouse** (“Speed Safety Cameras” subheading under “Smart Work Zones”)  
<https://workzonesafety.org/topics-of-interest/smart-work-zones>

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