



# Work Zone Speed Management Study

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# Legislative Request

This report is issued to comply with [2021 Laws of Minn., 1st SS, Ch. 5, Art. 4, Sec. 140](#).

## **Sec. 140. WORK ZONE SPEED MANAGEMENT STUDY.**

(a) The commissioners of transportation and public safety must perform a work zone speed management study. At a minimum, the study must:

- (1) evaluate existing legal authority for strategies, practices, and methods to reduce vehicle speeds and enhance worker safety in work zones, which may include but is not limited to use of traffic control devices, use of barriers, traffic control design modifications, and speed enforcement actions;
- (2) propose a process for contractors operating in a work zone that allows contractors to request modifications to a project's traffic control plan, in order to reduce vehicle speeds or improve worker safety in a work zone;
- (3) make recommendations on changes to current policies and procedures related to work zone safety; and
- (4) make recommendations on changes to state law to improve work zone safety.

(b) By February 1, 2022, the commissioners must complete the study and submit it to the chairs and ranking minority members of the legislative committees with jurisdiction over transportation policy and finance.

*The cost of preparing this report is less than \$85,000.*

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## Executive Summary

Work zones place workers in an inherently dangerous environment. However, when workers are placed next to traffic, the risk of injury or death increases. Changes to the roadway environment, driver behavior, and high levels of traffic volumes and/or speeds each contribute to the dangers faced by road workers.

The most effective method to protect workers is to close the road to vehicular traffic. However, this may not be feasible due to a lack of acceptable detour routes or limited access to businesses and residences. Therefore, each year millions of vehicles travel through Minnesota's work zones. Work zones introduce changes to the roadway that present a more complex environment for drivers to adapt to and maneuver through. Typically, these environments include lane shifts and lane reductions, narrower lanes and reduced shoulders. These conditions reduce the margin for driver error.

Average statewide speeds have marginally increased since the COVID-19 stay-at-home order. However, higher speeds, defined as greater than 15 mph over the posted speed limit, has substantially increased. Research has shown that simply lowering the posted speeds will not change driver behavior, because drivers will reduce speeds only if they perceive a need to do so. Furthermore, effective enforcement of traffic laws in work zones is limited by the number of available resources, a constrained roadway environment, and a desire to not create additional safety risks during the enforcement process.

On June 26, 2021, [2021 Laws of Minn., 1<sup>st</sup> SS, Chap. 5, Art. 4, Sec. 139](#) was passed requiring the Commissioners of Transportation and Public Safety to perform a work zone speed management study. While the law refers to a work zone speed management study, the scope of the study indicates much more than the management of speeds in work zones. The language suggests that the overarching goal of the study is to improve worker safety, with the management of speeds being one of many methods to do so.

The Minnesota Department of Transportation and Minnesota Department of Public Safety collaborated to convene a task force to respond to this request. The Work Zone Speed Management Task Force (Task Force) is composed of representatives from MnDOT, DPS, road building contractors, traffic control contractors, Minnesota State Patrol, Minnesota Safety Council, Minnesota County Engineers Association, League of Minnesota Cities, and the Associated General Contractors. HDR Engineering, Inc. was contracted to conduct research, facilitate the evaluations of potential improvements summarize recommendations proposed by the Task Force and prepare the study.

The scope of this study included four main elements, which are noted below. Findings associated with each element are listed below the element description.

- (1)** Evaluate existing legal authority for strategies, practices, and methods to reduce vehicle speeds and enhance worker safety in work zones, which may include, but is not limited to, use of traffic control devices, use of barriers, traffic control design modifications, and speed enforcement actions;

The study generally found that the current strategies, practices and methods, and laws (statutes) used to design, implement, establish and enforce regulations in work zones represent a typical approach that balances worker safety with mobility. The design of work zones, procedures by contractors within the work zone and

enforcement of regulations each follow industry standards. Even so, traffic speeds remain much higher than intended through work zones, placing workers at risk of injury or death - an experience not limited to Minnesota.

- (2)** Propose a process for contractors operating in a work zone that allows contractors to request modifications to a project's traffic control plan, in order to reduce vehicle speeds or improve worker safety in a work zone;

The proposed formal process for contractor-initiated changes prior to project letting is listed below:

1. The contractor, during the advertisement period, may propose an alternate method of construction staging via comment to the MnDOT project manager for possible contract change
2. MnDOT would be responsible for modifying the contract documents, including potentially issuing updated plans
3. An amendment would be issued and open to all bidders.

The proposed formal process for contractor-initiated changes after project letting is listed below:

1. The contractor proposes a change to the temporary traffic control plan to the project engineer
2. The project engineer and/or resident engineer reviews the proposed change and consults with district traffic staff
3. If the proposed change includes work zone speed limits, the methodology from the [Speed Limits in Work Zones Guidelines](#) is followed
4. The project engineer assesses the proposed change based on a balance between:
  - a. Worker safety
  - b. Technical merit
  - c. Effect on the traveling public and stakeholders
  - d. How the design and cost of the proposed change compares with that proposed by contractors not selected for this contract
5. The resident engineer approves, approves with conditions, or does not approve the proposed changes
6. The contractor requests a discussion with district management if there is a disagreement

This study proposes that this language be placed within the MnDOT special provision boilerplates for use on all MnDOT construction contracts.

- (3)** Make recommendations on changes to current policies and procedures related to work zone safety.

The Task Force jointly evaluated 34 potential improvements to worker safety. Sixteen of the potential improvements were determined to be either:

- Likely to Significantly Influence Work Zone Safety, or
- Likely to Have Some Positive Effect on Work Zone Safety AND have an adequate score as defined in the screening process

MnDOT and DPS convened to discuss how the Task Force's recommendations may be implemented. A key clarification emerged from these discussions: It is not advised that the recommendations be indiscriminately applied to all projects. The agencies will develop criteria for the use of each recommendation so that they may

be applied in the proper context to maximize effectiveness. Through this discussion, three recommendations were eliminated and the terminology of a fourth was significantly changed.

Nine of the 16 recommendations will be implemented by MnDOT. Development of criteria will occur in 2022. However, many construction design plans for projects to be constructed in 2022 have already been completed. While it is expected that some recommendations will be used on projects in 2022 on a per-project basis, these changes are more likely to be seen in 2023 work zones.

1. Include speed monitoring equipment and/or traffic monitoring cameras on select construction contracts
2. Use contractor Speed Control Vehicles on a set frequency to control speed on select construction contracts
3. Encourage more detours and additional limited/full-time closures
4. Engage MnDOT construction staff earlier in the design process
5. Use Intelligent Work Zone strategies, such as Stopped Traffic Ahead systems for end of queue notification within the work area, in addition to in advance of the work area
6. Greater use of end of queue warning systems, in general
7. Greater use of advisory speeds with vehicle speed feedback displays
8. Greater use of Electronic Workers Present Speed Limit signs
9. If using static Workers Present Speed Limit signs, assign responsibility of daily set up and take down in the construction contract

Two recommendations require MnDOT and DPS collaboration for Implementation

10. Use camera/radar technology upstream of law enforcement as identified in the Enhanced Speed Compliance for Work Zones (ESC4WZ) study such that it meets current legal requirements; develop equivalent VAST (Visual, Audio, Speed and Targeted) methodology that meets statutory requirements to admit output as evidence
11. Conduct a pilot project to evaluate effectiveness of stationary presence versus moving enforcement strategies

Two additional recommendations require changes to statute and are discussed in the following section.

- (4)** Make recommendations on changes to state law to improve work zone safety.

Two of the Task Force's recommendations are related to implementation of a Speed Safety Camera program to manage speeds in work zones. The first recommendation was for an SSC pilot project, and the second recommendation was related to a permanent program. Later, these recommendations were combined because the pilot project must precede a permanent program. Research has indicated public support in Minnesota for the use of Speed Safety Cameras to reduce speeds in work zones or school zones. Research has also found that SSC is effective in reducing speeding behavior; the Federal Highway Administration considers SSC as a proven safety countermeasure in improving safety through speed management.

MnDOT and DPS reviewed the Task Force recommendations for the SSC pilot project and refined it to the agencies' recommendations as listed below. The goal of the SSC pilot project is to validate the parameters and evaluate the effectiveness of the program. This recommendation requires action by the legislature. If the pilot

project yielded a successful proof of concept, a permanent SSC program may be pursued. The agencies believe that SSC would be one of the most effective methods to manage speeds in work zones discussed in this study.

- Deploy at two (2) work zones on the state highway system. One (1) in MnDOT's Metro District and one (1) in Greater Minnesota. It is also suggested to have one deployment on a freeway and another deployment on a non-freeway road
- Target the deployments to occur during the 2023 construction season
- Use owner-liability (no driver photo) to minimize resources needed to manage the SSC program
- Allow the owner/lessee to identify the driver of the vehicle to transfer the citation to the actual driver of the vehicle
- Allow the owner/lessee to request a hearing to challenge the citation
- Fund the demonstration project with a direct appropriation. DPS would require additional staff for the demonstration project and has concerns with recruitment.
- Fine revenue should not be tied to administering the SSC program
- Use an SSC system vendor with experience in proven, accepted technology and procedures
- The SSC system vendor is paid a flat rate (not based on number of violations)
- Require that SSC equipment is set up under the supervision of a licensed peace officer
- Require that a licensed peace officer review the evidence before a citation is issued
- Provide locations of SSC equipment on the program's website
- Provide signing that informs drivers of downstream SSC equipment
- Publicize the SSC program ahead of deployment
- No recommendation is included in this document relating to the type of violation (administrative vs. criminal) issued by the demonstration project

Changes to the current laws listed below are recommended to successfully deploy an SSC program in Minnesota.

- [Minn. Stat. 169.04 \(a\) \(2\), Local Authority](#)
- [Minn. Stat. 169.14, Subd. 10, Radar; speed measuring device; standards of evidence](#)
- [Minn. Stat. 169.99, Subd. 1 Uniform Traffic Ticket](#)
- [Minn. Stat. 169.999, Subd. 1, Administrative Citations](#), should the legislature opt to utilize administrative citations

In addition to these changes, the following new legislation is recommended.

- Legislation is needed to explicitly authorize owner-liability for speeding violations documented and cited through the use of SSC, and should address any data practices concerns
- Legislation is needed to impose owner-liability for speeding violations documented by the SSC equipment



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# Introduction

## Purpose

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Work zones place workers in an inherently dangerous environment. When workers are placed next to traffic, the risk of injury or death increases. Changes to the roadway environment, driver behavior and high levels of traffic volumes and/or speeds each contribute to the dangers faced by road workers.

According to trends identified by the *State of Minnesota's Work Zone Crash Report, 2018-2020*, the total number of work zone crashes and the number of severe (fatal and serious injury) work zone crashes are increasing.<sup>1</sup> This report states that 7,403 crashes occurred in work zones in this three-year period. Of these, 122 of these crashes involved fatal and serious injuries and 19 crashes involved workers (5 of which involved either a fatality or serious injury). This information, shown in Table 1, indicates that 96 percent of all fatal and serious injury crashes occurring in work zones during this period involved the traveling public while 4 percent involved workers.

**Table 1: Crashes in Minnesota, 2018-2020**

Period	Total Crashes	Work Zone Crashes	Work Zone Fatal and Serious Injury Crashes	Work Zone Worker Crashes	Work Zone Worker Fatal and Serious Injury Crashes
2018-2020	240,655	7,403	122	19	5

Another report commissioned by MnDOT, *COVID-19 Impacts on Speed and Safety for Rural Roads and Work Zones*, indicates that the amount of traffic traveling at speeds greater than 15 miles over the speed limit has also increased.<sup>2</sup> This report noted that average speeds in the work zones included in this study increased between 1.7 miles per hour (mph) and 4.7 mph from 2019 to 2020.<sup>3</sup>

On June 26, 2021, [2021 Laws of Minn., 1<sup>st</sup> SS, Chap. 5, Art. 4, Sec. 140](#) was signed into law. The law requires Commissioners of Transportation and Public Safety to perform a work zone speed management study. The scope of this study must:

- (1) evaluate existing legal authority for strategies, practices, and methods to reduce vehicle speeds and enhance worker safety in work zones, which may include, but is not limited to, use of traffic control devices, use of barriers, traffic control design modifications, and speed enforcement actions;

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<sup>1</sup> Moreland and Foldesi, "State of Minnesota's Work Zone Crash Report, 2018-2020," 2021.

<sup>2</sup> Shauna Hallmark and Neal Hawkins, "COVID-19 Impacts on Speed and Safety for Minnesota Roads and Work Zones" (Minnesota Department of Transportation, 2021).

<sup>3</sup> Ibid.

- (2) propose a process for contractors operating in a work zone that allows contractors to request modifications to a project's traffic control plan, in order to reduce vehicle speeds or improve worker safety in a work zone;
- (3) make recommendations on changes to current policies and procedures related to work zone safety; and
- (4) make recommendations on changes to state law to improve work zone safety.

While the law refers to a work zone speed management study, the scope of the study discusses much more than the management of speeds in work zones. The study provides ways to improve worker and traveler safety, with speed management being one of many methods to do so.

The Minnesota Department of Transportation and Minnesota Department of Public Safety collaborated to convene a task force to respond to this request. The Work Zone Speed Management Task Force (Task Force) is composed of representatives from MnDOT, DPS, road building contractors, traffic control contractors, Minnesota State Patrol, Minnesota Safety Council, Minnesota County Engineers Association, League of Minnesota Cities, and the Associated General Contractors. The Task Force met at least monthly between July and November 2021. HDR Engineering, Inc. was contracted to conduct research, facilitate the evaluations of potential improvements, summarize proposed recommendations by the Task Force and prepare the report. A project management team consisting of the Assistant State Traffic Engineer, the State Work Zone Engineer and HDR's technical lead met 1-2 times per month outside of the Task Force to discuss project development.

## Background

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The most effective method to protect workers is to close the road to vehicular traffic. This may not be feasible because of a lack of acceptable detour routes or limited access to businesses/residences. Therefore, each year millions of vehicles travel through Minnesota's work zones. Work zones introduce changes to the roadway that present a more complex environment for drivers to adapt to and maneuver through. Typically, these environments include lane shifts and lane reductions, narrower lanes and shoulders, uneven lanes, changes to speed limits and nearby workers and equipment. These conditions reduce the margin for driver error before a crash occurs.

During the busiest times of the day, traffic volumes may reach or exceed the capacity of the roadway. The resulting congestion typically leads to slower speeds. As congestion dissipates, speeds return to free flow levels, with some drivers exceeding the speed limit. This increases the variance between slower and faster moving vehicles, which is referred to as the speed differential. A large speed differential can be hazardous at any speed range. However, at higher speeds, drivers have less time to react to changing conditions ahead of them, and crashes are more likely to result in severe injuries and death. When greater speed differentials occur in work zones, the likelihood of errant vehicles entering the work zones increases, either as a result of near misses or crashes. This concept is referred to as work zone intrusions and poses the greatest risk of injuries and fatalities to construction workers.

While almost all work zones contain devices that separate traffic from workers, these devices vary from work zone to work zone depending on traffic levels, duration of construction operations, the type of work and space

available to accommodate traffic and the work zone. In many cases, workers are separated from traffic by reflective barrels or cones. The main purpose of these devices is to deter traffic from entering the work zone, by channelizing it into the desired lane. Barrels, cones and similar devices are not designed to provide positive protection to workers in the work zone. Although temporary barrier provides significant protection to workers, the barrier is designed to deflect when hit, absorbing some of the energy from impact. When a barrier strikes a worker, it can lead to significant injury and/or death.

## Traffic Control Design Practices

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MnDOT has developed substantial guidance to assist engineers and traffic control contractors with the selection and placement of traffic control devices in work zones. A few of the more commonly used tools are identified in Figure 1. Traffic control and detour plans that rely on a configuration lasting greater than three days are required to be developed by a professional engineer licensed in Minnesota. The plans are also reviewed and approved by the local road authority. The following sections discuss strategies that can be used by traffic control designers, including closures and detours, intelligent work zone applications and barriers with positive protection.

**Figure 1: Commonly Used Traffic Control Design Tools**

<b>Commonly Used Tools by Engineers</b>	<ul style="list-style-type: none"> <li>• MN MUTCD, including Part 6K: Minnesota Traffic Control Field Manual</li> <li>• Chapter 8 of the Traffic Engineering Manual</li> <li>• MnDOT's Long-Term Typical Applications</li> </ul>
<b>Commonly Used Tools by Contractors</b>	<ul style="list-style-type: none"> <li>• Minnesota Traffic Control Field Manual</li> <li>• Standard Plans</li> <li>• Standard Plates</li> <li>• Temporary traffic control typical details</li> </ul>

The Minnesota Manual on Uniform Traffic Control Devices (MN MUTCD) has been deemed by FHWA to be in conformance with the Federal MUTCD.<sup>4</sup> The Minnesota Manual on Uniform Traffic Control Devices and the supplemental design guidance provided in Minnesota is consistent with those in other states.

### Closures and Detours

If determined to be in the best interest of the public, a roadway may be closed with traffic detoured onto other roadways. Work zone speed limits and higher fines for speeding in construction zones are not applicable since the detoured roadway is not under construction. Under these situations, authorization from the Commissioner of Transportation is required for a temporary speed limit. The MnDOT district traffic engineer performs a traffic investigation on the detour and submits a recommendation to the MnDOT Office of Traffic Engineering.<sup>5</sup>

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<sup>4</sup> "[Minnesota Manual on Uniform Traffic Control Devices \(MN MUTCD\)](https://www.dot.state.mn.us/trafficeng/publ/mutcd/)," Traffic Engineering (Minnesota Department of Transportation, September 2020), <https://www.dot.state.mn.us/trafficeng/publ/mutcd/>.

<sup>5</sup> "Speed Limits in Work Zones Guidelines." Office of Traffic, Safety & Technology, Office of Construction & Innovative Contracting, October 2014.

## Intelligent Work Zone Applications

MnDOT has developed processes and guidelines for the use of Intelligent Work Zone (IWZ) tools that use technology to address undesirable issues in existing work zones and mitigate anticipated issues on scheduled projects. Several items in the IWZ Toolbox are specifically used to collect and communicate information related to speeds in and approaching work zones, including:<sup>6</sup>

- Advisory Speed Information: Informs drivers of their speed compared to the advised speed
- Downstream Speed Notification: Warns drivers of slower traffic ahead
- End of Queue Warning: Warns drivers of stopped traffic ahead
- Active and Passive Zipper Merges: Guides drivers to use both lanes until the merge point of a lane drop
- Excessive Speed Warnings, including Vehicle Speed Feedback Displays: Warns drivers that their speed is unsafe for navigating a downstream curve or rough road surfaces
- Electronic Workers Present Speed Limit Signs: Informs drivers of a change in the regulatory speed limit due to the presence of workers near travel lanes

## Positive Protection

[6F.85 of the MN MUTCD](#) lists the five primary functions of temporary traffic barriers:

1. To keep vehicular traffic from entering work areas, such as excavations or material storage sites
2. To separate workers, bicyclists, and pedestrians from motor vehicle traffic
3. To separate opposing directions of vehicular traffic
4. To separate vehicular traffic, bicyclists, and pedestrians from the work area such as false work for bridges and other exposed objects
5. To protect drop-offs of greater than 12 inches on longer term projects when a suitable buffer lane cannot be provided

Temporary traffic barriers can be, and often are, used to protect workers. However, the placement and removal of temporary traffic barriers adds exposure and risk to both the traveling public and the workers placing and removing the barriers.

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<sup>6</sup> "Minnesota Intelligent Work Zone Toolbox." Minnesota Department of Transportation Office of Traffic Engineering, 2020.

## Driver Behavior; Speeding

Driver speed can be based on a wide variety of behavioral factors. Most drivers base their traveling speed on the overall road environment and context, as well as the prevailing speed of other vehicles. Some drivers base their speeds on the posted speed limit, intentionally setting their speed at or above it. Other driver behaviors that negatively impact work zone safety include inattention, social pressure, being in a hurry, lack of congestion, comfort level driving at higher speeds, and perceived ability to not be caught by law enforcement.

Some Task Force members reported that they feel unsafe when traveling at the posted speed limit in work zones when the prevailing speed is much higher.

### COVID-19 Effect on Speeds

A study conducted for MnDOT compared statistics before and after the COVID-19 stay-at-home order, which was in place from March 2020 to December 2020. Results indicated that while the average statewide speeds marginally increased, the number of drivers traveling at higher speeds substantially increased. Higher speeds are defined as **greater than 15 mph over the posted speed limit**. Comparing 2020 to 2019, 69% of sites surveyed state-wide showed an increase in the number of high-speed vehicles and 88% of these sites showed an increase in the percent of vehicles traveling at higher speeds.<sup>7</sup> MnDOT statistics indicate that the number of drivers traveling over 99 mph doubled from 2019 to 2020.<sup>8</sup>

### I-94 Work Zone in Maple Grove

Even with careful planning, ongoing placement and maintenance of traffic control devices, and enforcement of regulations, individual and collective vehicle speeds remained much higher than desired. For example, speed data for westbound traffic was collected in three different locations along the I-94 work zone in Maple Grove continuously during November 1-7, 2020. The speed limit in this work zone has been clearly posted at 60 mph. The number of vehicles passing through this work zone during the seven-day period totaled between 291,000 and 346,470. Table 2 shows that between 7,356 and 13,568 individual vehicles traveled through the work zone at higher speeds in this one-week period.<sup>9</sup>

**Table 2: Westbound Speeds in the I-94 Maple Grove Work Zone, November 1-7, 2020**

Location	Elm Creek Rest Area		Weaver Lake Road		West of I-94	
	# vehicles	% of traffic	# vehicles	% of traffic	# vehicles	% of traffic
76+ mph	13,568	4%	8,587	3%	7,356	2%
61-75 mph	199,417	60%	236,292	81%	225,504	65%
< 60 mph	120,039	36%	46,263	16%	113,610	33%
<b>Total Vehicles</b>	<b>333,024</b>	<b>100%</b>	<b>291,142</b>	<b>100%</b>	<b>346,470</b>	<b>100%</b>

<sup>7</sup> Shauna Hallmark and Neal Hawkins, "COVID-19 Impacts on Speed and Safety for Minnesota Roads and Work Zones" (Minnesota Department of Transportation, 2021).

<sup>8</sup> "Work Zone Speeds," *Work Zone Speeds*, November 2, 2021.

<sup>9</sup> "I-94 Work Zone Speeds," *I-94 Work Zone Speeds*, November 2, 2021.

The number of crashes in this work zone were tracked and compared to numbers prior to construction. Table 3 shows that the number of crashes during the 2020 and 2021 construction years were lower than those documented in 2019, the year prior to construction.<sup>10</sup>

**Table 3: Crashes in I-94 Maple Grove Work Zone, Before and During Construction**

Year	Condition	Total Crashes
2019	No Work Zone	422
2020	Work Zone	374
2021	Work Zone	353*

\*Preliminary data

## Crashes in Minnesota Work Zones

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MnDOT regularly completes Work Zone Crash Reports that analyze the condition of crashes that occurred in work zones. The most current report, which focused on data between 2018 and 2020, revealed several interesting trends over the past decade.<sup>11</sup> First, the total number of work zone crashes increased, as had the number of severe crashes in work zones. The number of fatal crashes (labeled as “K” in Figure 2 and Figure 3, below) in work zones held somewhat steady over the same time period. These statistics represent the number of crashes, not the number of individuals involved or affected by these crashes.

On January 1, 2016, DPS transitioned to its new crash reporting system, MnCRASH. While this upgrade improved the crash data system in many ways, a sizeable increase in the number of reported crashes was observed in the first year with this new system. The Work Zone Crash Report remarks that this new system may have helped document crashes that may have gone under-reported in the previous system. In addition, two injury severity definitions were changed to align with national standard definitions:

- A – Incapacitating Injury → A – Suspected Serious Injury
- B – Non-Incapacitating Injury → B – Suspected Minor Injury

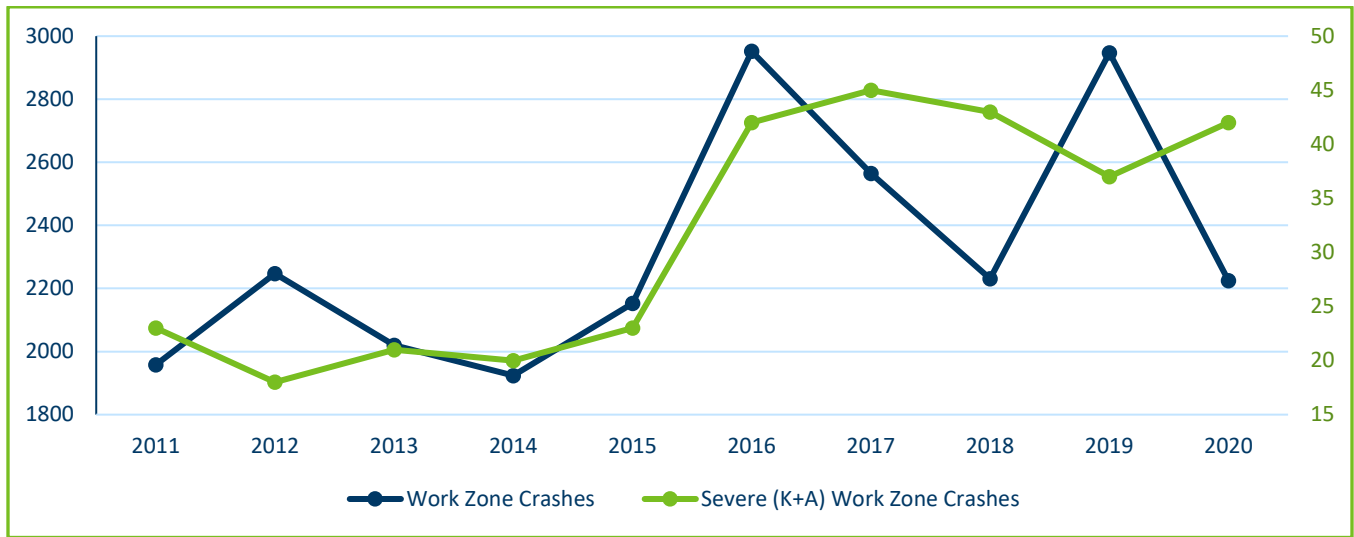
As a result of these two changes, in particular the addition of the term “suspected” to the state’s crash reports, Minnesota experienced a dramatic increase in A and B severity crash rates from 2015 to 2016.

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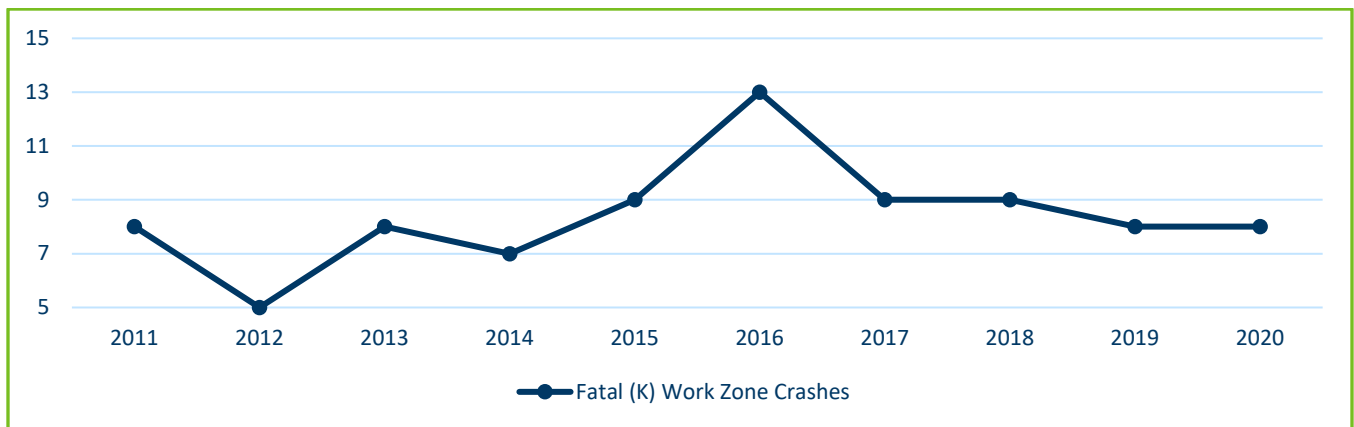
<sup>10</sup> Ibid.

<sup>11</sup> Moreland and Foldesi, “State of Minnesota’s Work Zone Crash Report, 2018-2020,” 2021.

**Figure 2: Total and Severe Work Zone Crashes, Statewide, 2011-2020**



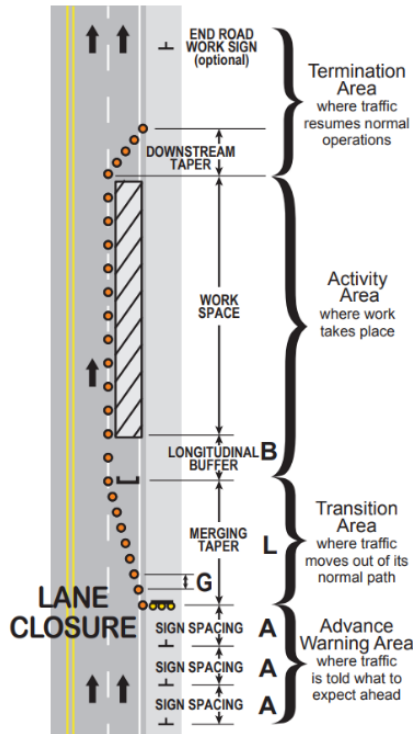
**Figure 3: Fatal Work Zones Crashes, Statewide, 2011-2020**



This study also analyzed the type of work zone in which these crashes occurred. Crashes were sorted into five categories:

- Intermittent/Moving
- Lane Closure
- Lane Shift/Crossover
- Work on Shoulder/Median
- Other/not Found

**Figure 4: Areas of a Work Zone**



The overwhelming majority of both total crashes and fatal crashes occurred in work zones that contained lane closures. This was almost triple the amount of any other type of work zone. Lane closures require merging two through lanes into one, which has proven to be a challenging maneuver. Similar patterns for total crashes and injury and fatal crashes emerged for crash data collected between 2016 and 2018.

The Work Zone Crash Reports also analyzed the location of crashes. This study also analyzed the type of work zone in which these crashes occurred. Crashes were sorted into five categories:

- Intermittent/Moving
- Lane Closure
- Lane Shift/Crossover
- Work on Shoulder/Median
- Other/not Found

Figure 4 shows the four primary areas that make up a work zone. Officers documenting work zone crash location have the option of coding two areas in addition to those shown in Figure 4:

- Before the First Work Zone Warning Sign: Crashes in this area are typically rear end crashes resulting from slow or stopped queues approaching the work zone.
- Other/Not Found: Crashes associated with this description usually involve vehicles that were cleared prior to the officer arriving on the scene.

The data showed that 54.7% of all work zone crashes and 54.1% of severe work zone crashes occurred in the activity area of the work zone. This coincides with the area where workers are most likely to be present.

## Regulating Speeds in Work Zones

Minnesota uses similar tools as other states to establish work zone speed limits. These include statutory speed limits and those based on engineering studies (investigations). Wisconsin also uses written policy criteria to provide guidance for reducing speed limits in work zones. This guidance is based on the type of roadway, characteristics of the work zone and must be supplemented with engineering judgment.<sup>12</sup>

### MN MUTCD Section 6C-1

“Reduced speed zoning (lowering the regulatory speed limit) should be avoided as much as practical because drivers will reduce speeds only if they clearly perceive a need to do so.”

<sup>12</sup> “Traffic Engineering, Operations & Safety Manual” (State of Wisconsin Department of Transportation, August 2021), <https://wisconsindot.gov/dtsdManuals/traffic-ops/manuals-and-standards/teops/13-05.pdf>.



Reducing speed limits in work zones requires careful consideration of the risk to workers, complexity of the travel path through the work zone and proximity of conditions which may require drivers to slow or stop. The MN MUTCD provides guidance relating to when, and how much speed limits should be reduced in work zones. Section 6C-1 states that “Reduced speed zoning (lowering the regulatory speed limit) should be avoided as much as practical because drivers will reduce speeds only if they clearly perceive a need to do so.”<sup>13</sup> The ITE Traffic Engineering Handbook explains the reasoning: “reliance on static work zone speed signing is not an effective method of reducing travel speeds in work zones”. It further recommends that work zones be designed to maintain the normal speed of traffic flow.<sup>14</sup>

The MN MUTCD further states in Section 6H-1 that, “Research has demonstrated that large reductions in the regulatory speed limit... can increase speed variance (differential) and the potential for crashes... A reduction in the regulatory speed limit of up to 10 mph has been shown to be effective in minimizing speed variance and the potential for increased crashes.”<sup>15</sup> Therefore, MnDOT and local authorities must balance several factors before deciding to lower a speed limit in a work zone. Figure 5 lists some of the more common factors.

**Figure 5: Factors Contributing to Reducing Speed Limits in Work Zones**

Risk to Workers	Complexity of the Path Through the Work Zone	Conditions Requiring Drivers to Slow or Stop
<ul style="list-style-type: none"> <li>• Proximity to traffic</li> <li>• Speed limit prior to work zone</li> <li>• Use of positive protection, such as temporary barrier</li> </ul>	<ul style="list-style-type: none"> <li>• Adjacent head-to-head traffic</li> <li>• Isolated changes in alignment, such as crossovers</li> <li>• Narrow Lanes</li> <li>• Merging traffic due to lane closures or entrance ramps</li> </ul>	<ul style="list-style-type: none"> <li>• Stop signs or traffic signals</li> <li>• Flaggers</li> <li>• Congestion related queues</li> </ul>

MnDOT uses several tools to regulate speeds through work zones, including advisory speed signs, 24/7 construction speed limits, and workers present speed limits. Each of these tools requires different levels of authorization. They are designed to reduce speeds within the work zone, giving drivers more time to react to changing roadway conditions and decreasing the likelihood of near misses and crashes.

**Advisory speed signs** inform drivers of the recommended maximum travel speed if that speed is lower than the posted speed limit. Advisory speeds are not regulatory speed limits. They help drivers identify a safer speed for a specific location and are usually placed in advance of hazards, such as areas with reduced visibility or on horizontal curves. An advisory speed sign must be placed in conjunction with a warning sign that communicates the reason behind the advisory speed. Typically, the engineers who are responsible for developing the construction staging and roadway alignments in the work zone coordinate with the engineers who are responsible for placing the temporary traffic control devices to recommend locations where advisory speeds

<sup>13</sup> “Minnesota Manual on Uniform Traffic Control Devices (MN MUTCD) Part 6. Temporary Traffic Control” (Minnesota Department of Transportation, 2021).

<sup>14</sup> ITE Traffic Engineering Handbook, Institute of Transportation Engineers, 2016

<sup>15</sup> Ibid.

may be beneficial. The MnDOT district traffic office reviews and approves the work zone traffic control plans. The MN MUTCD guidance for the use of advisory speeds is consistent with that provided in the federal MUTCD.

**24/7 Construction Speed Limits** are statutorily authorized regulatory speed limits used over consecutive 24-hour periods when a physical feature of the temporary roadway conditions requires a lower speed primarily for traveler safety. These are not recommended for worker safety as there will be significant periods of time when workers are not present, and drivers will not perceive a need to reduce speeds – leading to a disregard of the posted 24/7 Construction Speed Limit.

Speed Limits in Work Zones When Workers Present, referred to by MnDOT as **Workers Present Speed Limits**, are statutorily authorized regulatory speed limits used specifically to improve worker safety.

Additional discussion on the two Minnesota regulatory speed limits used in work zones can be found later in this document, in the section entitled Review of State Statutes.

## Enforcement of Safe Speeds

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Law enforcement is commonly requested to change driver behavior in a work zone. In Minnesota, this is achieved either by routine patrols or through the Extraordinary Enforcement interagency program between MnDOT and Minnesota State Patrol. More information on EE can be found below. When performing speed enforcement in work zones, agencies choose between two industry-wide strategies, active enforcement and presence-only. Active enforcement strategy identifies, pursues and cites traffic law violators. Presence-only strategy aims to increase driver attention, reduce speed and generally calm traffic in the vicinity of the enforcement vehicle.<sup>16</sup>

Over the 5-year period between 2016 and 2020, nearly 2,250 drivers were ticketed in Minnesota for speeding in work zones.<sup>17</sup> It is not clear how many of these tickets were issued as part of routine patrols or EE and how many were issued as a result of crashes where speeding was determined to be a factor.

### Minnesota State Patrol Policy for Speed Enforcement

MSP follows a procedure known as VAST (Visual, Audio, Speed, and Targeted) when performing speed enforcement. The procedure is described below:

1. Trooper visually identifies a vehicle that is believed to be traveling above the speed limit
2. Trooper listens to the audio provided by the radar unit for the strongest signal to verify that the visually sighted approaching vehicle is the fastest moving vehicle
3. Trooper activates the radar unit that displays a speed value in mph assigned to the approaching speeding vehicle

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<sup>16</sup> “[Traffic Enforcement Strategies for Work Zones](https://doi.org/10.17226/22576),” National Academies of Sciences, Engineering, and Medicine (The National Academies Press, May 19, 2013), <https://doi.org/10.17226/22576>.

<sup>17</sup> Tim Harlow, “More than 700 Crashes in Two Years of Work on Stretch of I-94,” Star Tribune (Star Tribune, November 7, 2021), <https://www.startribune.com/drivers-wonder-if-motorists-speeding-in-work-zones-ever-get-caught/600113987/>.

4. Trooper confirms the visually identified speeding vehicle has been targeted from the beginning point of visual detection through the point of passing the trooper on the roadway. The trooper then determines to enforce the speed limit<sup>18</sup>

## Extraordinary Enforcement

The threat of increased speed limit fines and routine patrol activity has not been effective in changing driver behavior through a work zone. For these conditions, MnDOT and DPS have partnered on a program to provide EE on construction projects and maintenance activities where worker safety is at greater risk. MnDOT currently employs Minnesota State Patrol for EE on roadways under MnDOT jurisdiction. EE is staffed by state troopers requesting overtime and is typically placed at the beginning of a work zone as a deterrent to undesirable driver behavior.<sup>19</sup>

## Methods and Challenges of Enforcement in Work Zones

Work zones create unique challenges in law enforcement's efforts to regulate speeds. Primary among them is the constrained driving area caused from balancing the number and width of travel lanes against the space required for construction operations. Two MSP lieutenants were interviewed for this study and provided valuable insight to the challenges faced by troopers in work zones. This input is summarized below.

Troopers engaged in enforcement activities will commonly follow a vehicle suspected of speeding through the end of the work zone. This is in part to avoid creating gawker effects, which can create additional safety concerns, and in part to locate a wide enough shoulder to safely pull the vehicle over.

Troopers stationed at work zones will often place themselves at the beginning of the work zone to act as a deterrent to drivers exceeding the speed limit as they approach the work zone. This practice can be effective but is tempered by the trooper's ability to safely find a suitable gap to enter the flow of traffic and accelerate to speed – and by a driver's perception of the trooper's ability to do so. Troopers stationed at the beginning of a work zone may use their vehicle's air horn or siren as a warning to a particular driver. They have also experimented with having their flashing lights on and off. The perception is that having their lights off is more effective because drivers interpret a vehicle with lights off as "available" to pull them over. Troopers must be selective in their decision to leave their position to engage in enforcement, because doing so removes the deterrent effect they had been providing. National Cooperative Highway Research Program 746 research confirmed that a stationary enforcement vehicle will typically create greater speed reduction than circulating patrols, but the effect will be localized. Specifically, speeds will be reduced from just before the enforcement vehicle to approximately one mile beyond that point. Typical speed reductions are between 5 and 7 mph.<sup>20</sup>

Both NCHRP 746 and the MSP lieutenants agreed that the combined use of two or more troopers is the most safe and effective way approach to enforcement. This practice allows an upstream trooper to identify a violation and maintain the deterrent presence at the beginning of the work zone. The downstream trooper(s) engage in enforcement. This strategy requires the use of additional resources, which are not always available.

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<sup>18</sup> Daniel M. Nelson, "Implementation and Evaluation of the Enhanced Speed Compliance for Work Zones (ESC4WZ) System" (St. Paul, MN: Minnesota Department of Transportation Research Services & Library, 2017).

<sup>19</sup> "Speed Limits in Work Zones Guidelines." Office of Traffic, Safety & Technology, Office of Construction & Innovative Contracting, October 2014.

<sup>20</sup> "Traffic Enforcement Strategies for Work Zones," National Academies of Sciences, Engineering, and Medicine (The National Academies Press, May 19, 2013), <https://doi.org/10.17226/22576>.

## Enhanced Speed Compliance for Work Zone System

Enhanced Speed Compliance for Work Zones was a pilot project conducted in 2017.<sup>21</sup> The project evaluated a mobile system that enabled MSP to safely conduct manual on-site speed enforcement in work zones. The project used a detection and monitoring system previously developed for MnDOT and MSP. The system was placed within the work zone to identify vehicle speeds so that officers would have advance notice of speeding vehicles. This data from the mobile system would send the information to the mobile computers inside the MSP vehicles, which were downstream of the system. The data from the mobile system could not be admitted as evidence of a speeding violation. The officer still needed to use the VAST process and the in-vehicle radar to independently confirm the vehicle identified by the system was in violation of the speed limit.

The pilot project showed a positive impact on speed reduction. MSP indicated that the system enhanced the safety and efficiency of speed enforcement. However, there are several factors that must be resolved for this system to be more effective:

- Advance planning for placement of system elements:
  - Placement of the detection and monitoring system element behind temporary barrier
  - Placement of the officer such that the vehicle is perpendicular to the roadway, including a flat, stable surface
  - An area downstream of the officer where enforcement activities may safely take place. This includes a wide shoulder on the right side of the roadway and adequate sightlines for oncoming vehicles to see the MSP vehicle and move out of the outside driving lane
- Detection and monitoring system enhancements:
  - Ability to function over a longer period of time utilizing a solar power regulator
  - Use a 4G (or better) modem to increase the resolution of the camera and transit data at high speeds
  - Upgrade the software interface used by MSP to observe vehicles in the work zone to present a near real-time summary of violations and allow MSP the ability to schedule shifts when enforcement would be most effective

## Speed Safety Cameras

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The Federal Highway Administration deems Speed Safety Cameras, also referred to as Automated Speed Enforcement and Photo-Radar Speed Enforcement, as effective when the speed limit is 45 mph or greater, workers are exposed, there are motorist hazards, the work zone will remain active for a long period of time, and there are no obstructions to the speed camera's line of sight. FHWA advises placing advance notice of the SSC system, placing equipment behind barrier, and most importantly, that legislation authorizes the use of SSC systems.<sup>22</sup>

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<sup>21</sup> Daniel M. Nelson, "Implementation and Evaluation of the Enhanced Speed Compliance for Work Zones (ESC4WZ) System" (St. Paul, MN: Minnesota Department of Transportation Research Services & Library, 2017).

<sup>22</sup> Kayode Adeniyi, Priscilla Tobias, and Steve Haapala, "Work Zone Automated Speed Enforcement Program," (U.S. Department of Transportation, Federal Highway Administration, 2017).

FHWA's Office of Safety lists Speed Safety Cameras as a proven safety countermeasure effective in reducing roadway fatalities and serious injuries on our Nation's highways. There are three types of devices:

- Fixed units – Stationary devices targeting one location
- Point-to-Point units – Multiple devices placed to capture average speed over a certain distance
- Mobile units – Portable devices, generally mounted in a vehicle or on a trailer

FHWA's research shows that fixed units can reduce crashes on urban principal arterials by up to 54% for all crashes and 47% for injury crashes. Point-to-point and mobile units are also shown to provide reductions in crashes, though not quite at the same level as fixed units.<sup>23</sup>

As of January 2022, SSC programs are used in 19 states, the District of Columbia and over a hundred communities across country, including one pilot study in work zones in Pennsylvania<sup>24</sup>. Two additional states will begin pilot studies in work zones during the 2022 construction season. Eight states have enacted some form of prohibition of SSC programs. Minnesota has no law regarding the use of SSC and is not currently using SSC.<sup>25</sup> States using SSC, such as Maryland and Oregon, have reported a reduction in violations.<sup>26, 27</sup> A crash modification factor for implementing SSC programs on state highways is 0.863, which means crashes are predicted to be reduced by 13.7%.<sup>28, 29</sup>

## Public Perception

The University of Minnesota's Center for Transportation Studies and Humphrey School of Public Affairs have been studying this topic for several years. The following bullets, taken from *Identifying and Reconciling Stakeholder Perspectives in Deploying Automated Speed Enforcement*, summarize public perceptions on SSC:

- SSC are more about government revenue generation than safety improvement
- SSC represent an invasion of privacy and "Big Brother" style of law enforcement
- Drivers dislike the delay between the violation and receiving the ticket
- Drivers prefer to have in-person contact with a ticketing police officer
- Machines should not do police work
- SSC equipment can make ticketing mistakes that are costly and time consuming for individuals to correct

Table 4 on the following page lists the states which currently have a permanent SSC program or plan to implement a pilot study in 2022.

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<sup>23</sup> "Speed Safety Cameras," Safety (U.S. Department of Transportation, Federal Highway Administration, October 28, 2021), <https://safety.fhwa.dot.gov/provencountermeasures/speed-safety-cameras.cfm>.

<sup>24</sup> "Automated Enforcement Laws," Insurance Institute of Highway Safety; Highway Loss Data Institute, January 2022 <https://www.iihs.org/topics/red-light-running/automated-enforcement-laws>

<sup>25</sup> Colleen Peterson, Frank Douma, and Nichole Morris, "Identifying and Reconciling Stakeholder Perspectives in Deploying Automated Speed Enforcement," 2017.

<sup>26</sup> "Maryland Work Zone Fatalities at Lowest Level in More Than a Decade," MDOT State Highway Administration, August 29, 2021, <https://roads.maryland.gov/mdotsha/pages/pressreleasedetails.aspx?PageId=818&newsId=1240>.

<sup>27</sup> Mark Joerger, "Photo Radar Speed Enforcement in a State Highway Work Zone: Yeon Avenue Demonstration Project" (Salem, OR: Oregon Department of Transportation Research Section, 2010).

<sup>28</sup> Joseph E. Hummer, Christopher M. Cunningham, and Jae-Pil Moon, "Analysis of Automated Speed Enforcement Cameras in Charlotte, North Carolina," SAGE Journals (Transportation Research Record: Journal of the Transportation Research Board, June 1, 2008), <https://journals.sagepub.com/doi/10.3141/2078-17>.

<sup>29</sup> "Crash Modification Factors Clearinghouse," 2021, <http://www.cmfclearinghouse.org/>.

**Table 4 Speed Safety Camera Programs, 2022**

State	Pilot/ Permanent	Location	Fine value	Violation on Driving Record
Alabama	Permanent	Specified Jurisdictions	\$60 - \$100	Generally not
Arizona	Permanent	Statewide; not on State Highways	Mirrors traditional penalty amounts	Yes
Colorado	Permanent	Work Zones, School Zones, Neighborhoods, Adjacent to Parks	\$40+	No
Connecticut	Pilot	Work Zones	\$75 - \$150	No
Delaware	Pilot	Work Zones	\$74.50	No
D.C.	Permanent	District-wide	Varies	No
Georgia	Permanent	School Zones	\$75 - \$125 plus processing fees; issued when 11+ mph over Speed Limit	No
Illinois	Permanent	Work Zones when Workers are Present, School Zones, Adjacent to Parks, Large Cities	\$375 in Work Zones	No
Iowa	Permanent	Specified Jurisdictions	Varies; Fines Double in Work Zones	No
Louisiana	Permanent	Specified Jurisdictions	Varies	No
Maryland	Permanent	Specified Jurisdictions	\$40; issued when 12+ mph over Speed Limit	No
New Mexico	Permanent	Specified Jurisdictions; not on State Highways	\$100	No
New York	Permanent	Work Zones; Specified Jurisdictions	\$50 - \$100	No
Ohio	Permanent	Statewide, Except on Interstates Operated by Townships	Mirrors traditional penalty amounts	No
Oregon	Permanent	Statewide, including in Work Zones when Workers are Present	Mirrors traditional penalty amounts	Yes
Pennsylvania	Pilot	Work Zones when Workers are Present; Philadelphia	\$75 - \$150; issued when 11+ mph over Speed Limit	No
Rhode Island	Permanent	School Zones	\$50 - \$95	No
Tennessee	Permanent	Statewide	\$50	No
Virginia	Permanent	Work Zones; School Zones	Not to Exceed \$100; issued when 10+ mph over Speed Limit	No
Washington	Permanent	School Zones	Equal to a Parking Violation	No

## Public Perception

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- SSC are more about government revenue generation than safety improvement
- SSC represent an invasion of privacy and “Big Brother” style of law enforcement
- Drivers dislike the delay between the violation and receiving the ticket
- Drivers prefer to have in-person contact with a ticketing police officer
- Machines should not do police work
- SSC equipment can make ticketing mistakes that are costly and time consuming for individuals to correct

Despite these perceptions, national public opinion surveys have generally shown a majority of Americans support SSC programs in certain conditions. A 2012 survey of Minnesotans generally reflected the national survey:

- 83% support SSC programs in construction zones where workers are endangered
- 82% support SSC programs on roads near schools
- 77% support SSC programs on roads where many people have died
- 69% support SSC programs on roads where many people violate the speed limits

However, only 48% support SSC programs on all roads.

## Variables that made it more likely for Minnesotans to support SSC programs

The following text summarizes variables that may make it more likely for Minnesotans to support an SSC program:<sup>31</sup>

- Using revenue from speeding tickets to improve road safety
- Issuing citations only to those driving at extreme speeds
- Only issuing citations if the SSC equipment also took a facial photograph verifying the driver of the vehicle
- Widely publicizing locations and reason for use of SSC equipment ahead of time

A variable that made it less likely for Minnesotans to support an SSC program was if a portion of the money raised from speeding tickets would go to a private company hired to operate the system.

## Benefits Seen in U.S. SSC Programs

A review of benefits seen in SSC programs in Pennsylvania, New York, Maryland, and Oregon was conducted. Key benefits and findings from this review are summarized below.

### Pennsylvania<sup>32</sup>

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<sup>30</sup> Colleen Peterson, Frank Douma, and Nichole Morris, “Identifying and Reconciling Stakeholder Perspectives in Deploying Automated Speed Enforcement,” 2017.

<sup>31</sup> Frank Douma et al., “Identifying Issues Related to Deployment of Automated Speed Enforcement” (Minneapolis, MN: Intelligent Transportation Systems Institute, Center for Transportation Studies, University of Minnesota, 2021).

<sup>32</sup> Paul Van Osdol, “Records Show 500,000 Violations from Work Zone Speed Cameras,” WTAE, October 28, 2021, <https://www.wtae.com/article/work-zone-speed-cameras-records-show-500000-violations/38096194>.

- The number of monthly violations this year peaked at 72,000 in March 2021 and was down to 34,000 in September 2021.
- "We are steadily seeing the number of violations go down as the year goes on. That's showing me that the program is effective."
- "The goal is not to make money. If the program works at a deficit and the number of speeders continue to be reduced, I think everyone will consider that a huge success."

### New York<sup>33</sup>

- New York's program is currently limited to school zones, will deploy systems in work zones starting in 2022.
- New cameras placed in 2020 saw average weekly violations drop from 68 after the first week to 37 after week 18.
- New cameras placed in 2019 saw an average of 455 weekly violations in the first week, compared to an average of 68 violations in the first week for cameras placed in 2020. This likely reflects two main factors. First, the general deterrent effect speed cameras have citywide. Second, the order in which cameras have been installed reflects the severity of the local speeding problem, therefore locations of cameras placed in 2020 had relatively lower levels of speeding than those installed in 2019.
- Of the over 7.5 million Notices of Liability (citations) issued as a result of speed camera violations between 2014 and 2020, 2.3% requested a hearing. At the hearing, over 95% of the citations were upheld.

### Maryland<sup>34</sup>

- The percent of vehicles exceeding the enforcement speed (defined as 12+ mph over the posted speed) has dropped from 7% to 1% between July 2010 and January 2021.

### Oregon<sup>35</sup>

- During photo radar enforcement periods (using mobile units), speeding was reduced by an average of 23.7% at the traffic sensor site within the work zone. This reduction in speeding was observed even though vehicles passing the sensor from one direction had not yet seen the enforcement activity.
- The observed speeding reduction did not persist after the departure of the photo radar van. Other activities such as work zone signing and the presence of active work in the work zone did not produce an observable effect on speeding compared to the pre-construction monitoring period.

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<sup>33</sup> ["New York City Automated Speed Enforcement Program: 2014–2020 Report"](https://www1.nyc.gov/html/dot/downloads/pdf/speed-camera-report.pdf) (City of New York), accessed December 1, 2021, <https://www1.nyc.gov/html/dot/downloads/pdf/speed-camera-report.pdf>.

<sup>34</sup> ["The Facts about Maryland's SafeZones Program: Summer 2021"](https://www.safezones.maryland.gov/images/Maryland%20SafeZones%20Fact%20Sheet%202021%20Summer.pdf) (Maryland Safe Zones, 2021), <https://www.safezones.maryland.gov/images/Maryland%20SafeZones%20Fact%20Sheet%202021%20Summer.pdf>.

<sup>35</sup> Mark Joerger, "Photo Radar Speed Enforcement in a State Highway Work Zone: Yeon Avenue Demonstration Project" (Salem, OR: Oregon Department of Transportation Research Section, 2010).



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## Review of Existing Legal Authority

This section discusses the current legal authority to establish and enforce speeds and enhance worker safety in work zones. The review is for strategies, practices and methods used to reduce vehicle speeds and enhance worker safety in work zones. This assessment is based on a review of Minnesota's 2021 state statutes from an engineering perspective with influence from Frank Douma whose legal background is in Acknowledgments Section later in this document. Further assessment from a legal perspective is recommended.

## Foundational Regulations

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The following state statutes are foundational regulations related to work zones.

### [Minn. Stat. 164.14, Subd. 1. Duty to Drive with Due Care](#)

No person shall drive a vehicle on a highway at a speed greater than is reasonable and prudent under the conditions.

### [Minn. Stat. 169.011, Subd. 95. Work Zone](#)

Statutory definition of a work zone.

## Establishment of Regulations in Work Zones

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The following state statutes establish regulations in work zones.

### [Minn. Stat. 169.04\(a\)\(2\) Local Authority](#)

Local authorities and Commissioner of Transportation are authorized to regulate traffic by means of police officers and traffic signals.

### [Minn. Stat. 169.06 Signs, Signals, Markings](#)

**Subd. 1:** The Commissioner of Transportation shall adopt a manual and specifications for a uniform system of traffic control devices. In the case of Minnesota, this is the MN MUTCD.

**Subd. 2.** The Commissioner shall place traffic control devices consistent with Subd. 1. on state trunk highways.

**Subd. 3.** Local authorities shall place traffic control devices consistent with Subd. 1. In their respective jurisdictions.

**Subd. 4a.** A driver shall obey the instruction of a traffic control device unless otherwise directed by a police officer or flagger. A flagger in a work zone may stop, hold in place, and direct vehicles to proceed when it is safe.

### [Minn. Stat. 169.14, Subd. 4. Establishment of Zones by Commissioner](#)

The commissioner of transportation may erect signs designating a reasonable and safe speed limit on the basis of a traffic investigation. This affects speed limits intended for a 24-hour continuous posting, which includes permanent speed limits as well as 24/7 Construction Speed Limits.

A 24/7 Construction Speed limit is used when a physical feature of the temporary roadway conditions requires a lower speed, such as a bypass or a 4-lane highway that is reduced to two lanes.

On state trunk highways, a request should be made to the MnDOT District Traffic Office. The request should include a work zone traffic control plan and relevant data to support a temporary reduction in speed. The District Traffic Office will conduct a traffic investigation to determine a safe speed. The results of the investigation will be submitted to the Office of Traffic Engineering. If approved, an authorization to erect regulatory speed limit signs will be issued by the Office of Traffic Engineering. The speed limit goes into effect when the signs are posted.

### **[Minn. Stat. 169.14, Subd. 5d. Speed Limit in Work Zone When Workers Present](#)**

Workers Present Speed Limits are regulatory speed limits specifically established to improve worker safety. They are intended for use along a segment of road where workers are working directly adjacent to the traveled lanes.

There are two conditions where this is used:

1. A Workers Present Speed Limit of 45 mph is required by statute when the regulatory speed limit is 50 mph or higher. No higher authorization or traffic investigation is needed, as long as there is at least a portion of a lane of traffic closed in either direction and workers are present.
  - a. This requirement is not applicable if positive barriers are placed between workers and the traveled roadway, the work zone is in place less than 24 hours, and/or a different speed limit for the work zone is determined by the roadway authority.
2. The local road authority may establish a Workers Present Speed Limit when workers are present adjacent to travel lanes open to vehicular traffic. The speed limit may only be reduced up to 20 mph on a roadway with a 55 mph or greater regulatory speed limit and reduced up to 15 mph on a roadway with a 50 mph or less regulatory speed limit.

A speed limit established under this statute goes into effect when the signs are posted. These signs must be covered or removed when they do not meet the conditions identified in the statute.

## **Enforcement of Regulations in Work Zones**

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The following state statutes are related to enforcement of regulations in work zones.

### **[Minn. Stat. 169.14, Subd. 6a, Work Zone Speed Limit Violations](#)**

A person convicted of operating a motor vehicle in violation of a speed limit in work zone shall be required to pay a fine of \$300 in addition to the surcharge under 357.021, Subd. 6.

### **[Minn. Stat. 169.14, Subd. 9, Standards of Evidence](#)**

The speed indicated on speedometer of a vehicle regularly used in law enforcement is admissible.

### [Minn. Stat. 169.14, Subd. 10, Radar, Speed measuring device, standard of evidence](#)

This statute states that a speed measuring device used in prosecution must meet the following conditions:

1. The officer operating the device has sufficient training to properly operate the equipment;
2. The officer testifies as to the manner in which the device was set up and operated;
3. The device was operated with minimal distortion or interference from outside sources; and
4. The device was tested by an accurate and reliable external mechanism, method, or system at the time it was set up

## Speed Safety Cameras

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This section reviews at a high-level current Minnesota law as it pertains to implementing different SSC programs.

### **Owner vs. Driver Liability**

The Legislature is in the best position to decide whether penalties for SSC speeding violations should incur owner or driver liability. Existing Minnesota law does not require either approach. Driver liability would require that the SSC program identify the person operating the vehicle at the time of the violation, which would involve taking a photo of the driver to compare with the photo in the driver's license database. Owner liability would hold the owner of a vehicle responsible for the violation, which would not require driver photos to be taken or stored. License plates linked with driver information databases would allow for tickets to be given to vehicle owners, not unlike existing owner liability assigned for the following traffic violations:

- Flagger orders ([Minn. Stat. 169.06, Subd. 4a](#))
- Passing parked authorized vehicles ([Minn. Stat. 169.18, Subd. 11\(e\)](#))
- Passing a school bus with gate arm extended ([Minn. Stat. 169.444, Subd. 6](#))

In either strategy, data practices implications will need to be addressed. MSP echoed concerns about the resources needed to manage SSC. Experience in states with SSC suggests that programs with driver-liability have lower citation rates than those with owner liability.

### **Constitutional Due Process Considerations in MN**

While SSC programs often raise constitutional concerns, many other states have designed systems that effectively address and mitigate those concerns. Due process can be provided through the courts using the criminal citation process for driver liability systems; but a noncriminal administrative penalty system may be used for owner-liability systems. Owner liability systems can address due process concerns about liability without evidence that the owner was the one actually operating the vehicle at the time of the violation through the following system design elements:

- Making speeding violations given under SSC as civil penalties (limited to fines) rather than criminal penalties (violation is recorded on the owner's driving record) and by creating procedures for contesting violations.
- Including a process that allows the owner of the vehicle to swear or affirm that they were not driving the vehicle. The statement could include corroborating evidence that the owner was not driving the

vehicle at the time of offense. This evidence could include identification of the person who was driving the vehicle.

Claims that SSC programs violate Equal Protection (Fifth Amendment) have failed in other states. No published court cases have addressed whether SSC programs violate a constitutional right to privacy. U.S. Supreme Court precedents state that a person travelling in a vehicle has no constitutionally protected privacy right on public streets, and agencies may collect license plate numbers that are in plain view.<sup>36</sup>

### **Impact of the Invalidation of Minneapolis' Red Light Camera Program**

In September 2004, The City of Minneapolis enacted an ordinance that authorized photo enforcement of traffic control signals. Minneapolis police began enforcing the ordinance in July 2005. Cameras took photos of the vehicle, not the driver. The Minnesota Supreme Court invalidated the city ordinance<sup>37</sup> because it was preempted by state law, meaning that the ordinance was not authorized by state law and it conflicted with state law by imposing owner-liability for some red-light violations. The Minnesota Supreme Court did not reject the use of automated enforcement, nor the use of owner-liability to enforce traffic violations on constitutional grounds. This decision means that in order to implement an SSC program with owner-liability, the legislature must expressly authorize the owner-liability for identified offenses.

### **Standard of Evidence**

[Minn. Stat. 169.14, Subd. 10](#) discusses standards of evidence for ticketing from SSC. This statute states that a speed measuring device used in prosecution must meet the following conditions:

1. The officer operating the device has sufficient training to properly operate the equipment;
2. The officer testifies as to the manner in which the device was set up and operated;
3. The device was operated with minimal distortion or interference from outside sources; and
4. The device was tested by an accurate and reliable external mechanism, method, or system at the time it was set up

An SSC program would need to be defined in statute as a speed measuring device.

### **Uniform Traffic Ticket**

The Uniform Traffic Ticket statute ([Minn. Stat. 169.99, Subd. 1](#)) states that all tickets must be uniform throughout the state, as detailed by the commissioner of public safety.<sup>38</sup> Citations issued using SSC would need to be designed to meet the statute requirements, or legislation must be enacted to create an alternate ticket that is consistent with the information contained on the Uniform Traffic Ticket.

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<sup>36</sup> Frank Douma et al., "Identifying Issues Related to Deployment of Automated Speed Enforcement" (Minneapolis, MN: Intelligent Transportation Systems Institute, Center for Transportation Studies, University of Minnesota, 2021).

<sup>37</sup> State V. Kuhlman, 729 N.W.2d 577 (2007)

<sup>38</sup> Minn. Stat. §169.99, Subd. 1, 2, & 3(n.d.)

## **Administrative Citations**

Administrative citations are civil fines issued in response to certain listed violations. [Minn. Stat. 169.999, Subd. 1](#) states that peace officers employed by the Minnesota State Patrol may issue administrative citations. The statute allows peace officers from local units of government to issue administrative citations if their governing body passes a resolution that:

1. Authorizes issuance of administrative citations
2. Obligates the local unit of government to provide a neutral third party to hear and rule on challenges to administrative citations; and
3. Bars peace officers from issuing administrative citations in violation of this section

To the extent that SSC do not involve a peace officer issuing administrative citations for the few violations identified in this section, legislation would be needed to allow an SSC program to issue administrative citations.

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# Process for Requesting Modifications to a Traffic Control Plan

A formal process for contractor-initiated changes to work zones had not been documented prior to the development of this study. Through the course of this study, the informal process currently in use was documented and presented to MnDOT Resident Engineers, MnDOT Traffic Engineers, members of the road and traffic control contracting community and a representative from the AGC for review and comment. Feedback from these groups was assessed and incorporated into the formal process described below.

## Existing Informal Process

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1. The contractor proposes a change to the temporary traffic control plan to the project engineer
2. The project engineer reviews the proposed change and may or may not consult with district traffic staff
  - a. If it includes work zone speed limits, the methodology from the Speed Limits in Work Zones Guidelines is followed
3. The project engineer approves or does not approve the proposed changes
4. The contractor could request a discussion with the resident engineer if there is a disagreement
5. Costs and fairness with the bidding process must be considered

## Proposed Formal Process

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The proposed formal process for contractor-initiated changes prior to project letting is listed below:

1. The contractor, during the advertisement period, may propose an alternate method of construction staging via comment to the MnDOT project manager for possible contract change
2. MnDOT would be responsible for modifying the contract documents, including potentially issuing updated plans
3. An amendment would be issued and open to all bidders

The proposed formal process for contractor-initiated changes after project letting is listed below:

1. The contractor proposes a change to the temporary traffic control plan to the project engineer
2. The project engineer and/or resident engineer reviews the proposed change and consults with district traffic staff
3. If the proposed change includes work zone speed limits, the methodology from the Speed Limits in Work Zones Guidelines is followed
4. The project engineer assesses the proposed change based on a balance between:
  - a. Worker safety
  - b. Technical merit
  - c. Effect on the traveling public and stakeholders

- d. How the design and cost of the proposed change compares with that proposed by contractors not selected for this contract
5. The Resident Engineer approves, approves with conditions, or does not approve the proposed changes
6. The contractor requests a discussion with District Management if there is a disagreement

This study proposes that this language be placed within the MnDOT special provision boilerplates for use on all state roadway construction contracts.

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## Development of Recommendations

Several brainstorming sessions were held to better understand the safety risks facing road workers and maintenance staff, and to brainstorm potential improvements to mitigate these risks. The following groups provided input:

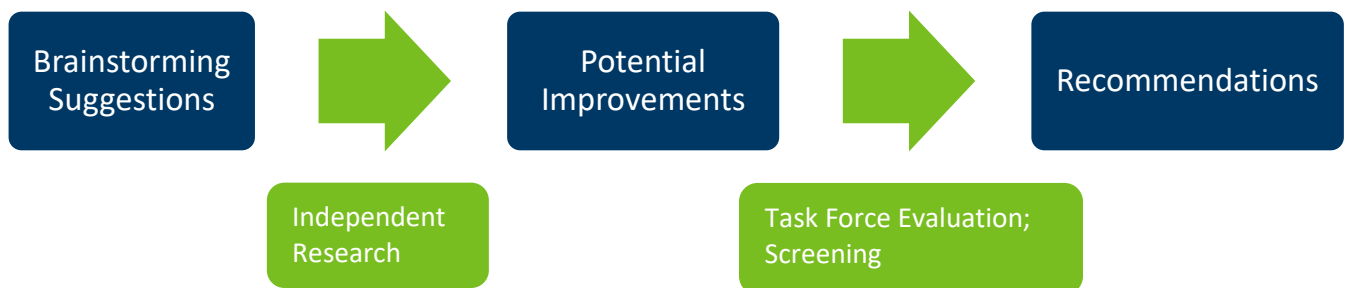
- Work Zone Speed Management Task Force
- Minnesota State Patrol
- Roadbuilding Contractors
- Traffic Control Contractors
- MnDOT Resident Engineers
- MnDOT Traffic Engineers
- Minnesota Citizens for Safe Work Zones
- Insurance Federation of Minnesota
- AAA's Insurance and Auto Club branches
- Associated General Contractors
- HDR's National Maintenance of Traffic Practice Group

Summaries of each brainstorming session can be found in **Appendix C**. The complete Task Force roster can be found in **Appendix A**.

In addition, Frank Douma, State and Local Policy Program Director at the Humphrey School of Public Affairs, shared a presentation with the Task Force entitled, "Identifying Issues Related to Deploying Automatic Enforcement" in Minnesota and hosted a question-and-answer session following the presentation.

The project management team developed a process by which suggestions gathered from the task force and brainstorming sessions could be validated, evaluated, and ultimately carried forward into recommendations that may be implemented. The recommendations in Table 6 and Table 7 are not intended to be used on every project but can be strategies to improve safety depending on the conditions of the project. The process for developing the recommendations is shown graphically in Figure 6.

**Figure 6: Process for Developing Recommendations**



Suggestions identified at these brainstorming sessions were verified by HDR with independent research. Those that involved misperceptions or misinterpretations of current strategies, practices, methods and laws (statutes) were eliminated. The remaining suggestions were assembled to create a list of 34 different potential improvements aimed at creating a safer work zone. These potential improvements were jointly evaluated by the Task Force using the Mentimeter voting platform and applying the five criteria and scoring system shown in Table 5. The evaluation criteria were developed by HDR and accepted by the project management team before being presented to the Task Force for concurrence.



**Table 5: Evaluation Criteria and Scoring**

Relative Cost	Under \$1 million	3 Points
	Between \$1 and \$5 million	2 Points
	Greater than \$5 million	1 Points
Complexity of Implementation	Can be implemented by MnDOT	3 Points
	Requires Collaboration Between MnDOT and other State Departments	2 Points
	Requires Collaboration with other Industry and/or Change in Legislation	1 Points
Administrative Implementation Timeline	Less than 6 Months	3 Points
	Between 6 and 18 Months	2 Points
	Greater than 18 Months	1 Points
Effort to Achieve Stakeholder Consent	Existing Public Consent	3 Points
	Mixed Public Opinions	2 Points
	Existing Public Resistance	1 Points
Anticipated Effectiveness	Likely to Significantly Influence Work Zone Safety	3 Points
	Likely to have some Positive Effect on Work Zone Safety	2 Points
	Unlikely to Significantly Influence Work Zone Safety	1 Points
	Likely to have a Negative Effect on Work Zone Safety	0 Points

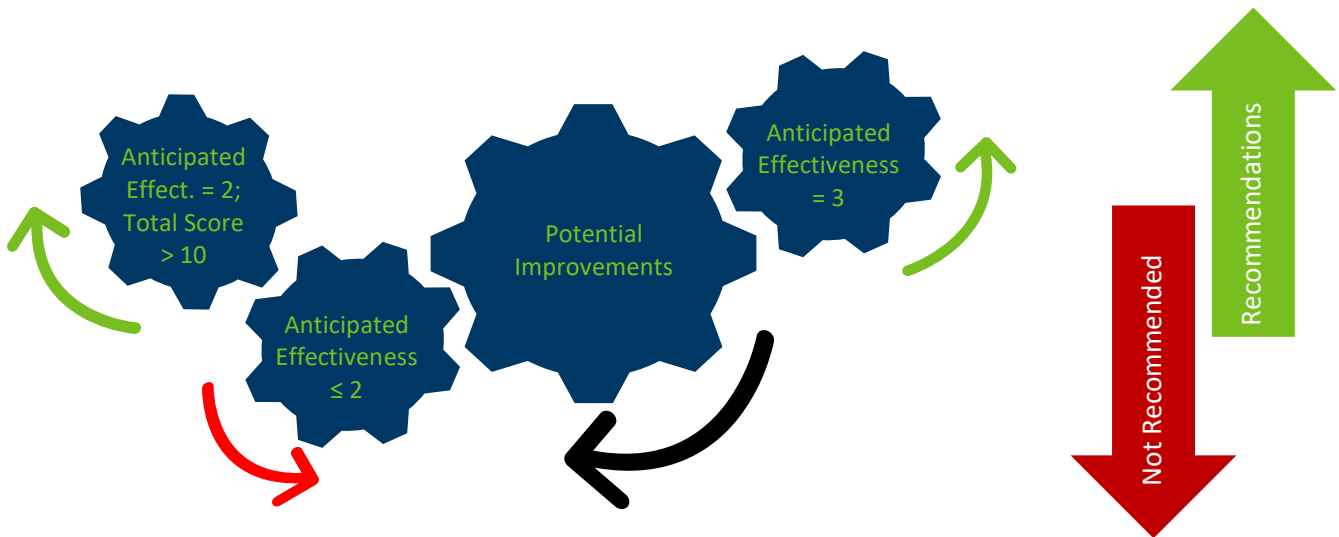
If an evaluation category was tied in votes, half points were assigned. For example, if Administrative Implementation Timeline received an equal number of Task Force votes for “Less than 6 months” which is worth 3 points and “Between 6 and 18 months” which is worth 2 points, the scoring for that potential improvement would be 2.5 points.

After each potential improvement was evaluated by the Task Force, it became clear to the project management team that several achieved a high overall score even though its anticipated effectiveness received a low score. In order to focus on potential improvements with a likelihood of positively improving work zone safety, the screening process described in the following bullets was applied.

- Potential Improvements where the Anticipated Effectiveness was Likely to Significantly Influence Work Zone Safety (3 points) are recommended for implementation.
- Potential Improvements where the Anticipated Effectiveness was Likely to Have Some Positive Effect on Work Zone Safety (2 points) are recommended for implementation if the total evaluation score was greater than 10 (out of 15) points.
- Potential Improvements where the Anticipated Effectiveness was either Unlikely to Significantly Influence Work Zone Safety (1 point) or were Likely to Have a Negative Effect on Work Zone Safety (0 points) are not recommended for implementation as part of this study.

Figure 7 shows this process graphically.

Figure 7: Screening Process of Potential Improvements



Recommendations that passed the screening process were separated into those that may be implemented by MnDOT (listed in Table 6) and those that require MnDOT to collaborate with outside entities (listed in Table 7). Additional information related to the Task Force’s assessment of the evaluation criteria for each listed above can be found in **Appendix D**.

# Recommendations for Changing Policies and Procedures

**Table 6 : Recommendations that MnDOT Can Implement**

Recommendation	Total Evaluation Points	Context
Include speed monitoring equipment and/or traffic monitoring cameras on select construction contracts.	14.5	<ul style="list-style-type: none"> <li>- Collect data to determine baseline for speeds across the state and help with future research on decreasing work zone speeds</li> <li>- Used to assess effectiveness of implemented recommendations</li> <li>- Used to determine when to use Extraordinary Enforcement</li> <li>- Would be written into construction contract</li> </ul>
Use contractor pilot cars (speed control vehicles) on a set frequency to control speed.	15	<ul style="list-style-type: none"> <li>- Expected to be highly effective in reducing speeds and improving worker safety</li> <li>- Would be written into construction contract</li> </ul>
Encourage more detours and additional limited/full-time closures.	13	<ul style="list-style-type: none"> <li>- Separates traffic from the work zone</li> <li>- Would shorten construction time frame but depends on capacity of alternate routes</li> <li>- MnDOT needs to reassess criteria for doing so as this is already encouraged</li> </ul>
Make constructability reviews part of all design contracts.	12	<ul style="list-style-type: none"> <li>- Requires additional resources to implement</li> <li>- May not be needed for all projects</li> </ul>
Use IWZ Stopped Traffic Ahead systems for end of queue notification within the work area, in addition to in advance of the work area.	14	<ul style="list-style-type: none"> <li>- Potential decrease in rear end crashes caused by increased driver awareness</li> <li>- Integrate with the Work Zone Data Initiative and 511 to provide audible notification</li> </ul>
Greater use of Dynamic Message Signs to alert traffic of end of queue locations.	14	<ul style="list-style-type: none"> <li>- Potential decrease in rear end crashes caused by increased driver awareness</li> </ul>
Greater use of advisory speeds with vehicle speed feedback displays.	14	<ul style="list-style-type: none"> <li>- Expected to be highly effective for alerting drivers of short-term geometry changes</li> <li>- Not as effective for long term use</li> <li>- Perceived to be ignored by a segment of the population</li> </ul>
Greater use of electronic Workers Present Speed Limits.	14	<ul style="list-style-type: none"> <li>- Would reduce the number of resources needed compared to the static sign equivalent</li> <li>- Would be written into construction contract</li> </ul>
If using static Workers Present Speed Limit signs, assign responsibility of daily set up and take down.	14	<ul style="list-style-type: none"> <li>- More consistent placement/takedown would increase driver confidence that workers are actually present, which could decrease drivers' speed</li> <li>- Would be written into construction contract</li> </ul>

**Table 7 : Recommendations for Implementation That Require Collaboration with Other Agencies/Industries**

Recommendation	Total Evaluation Points	Context
Use camera/radar technology upstream of law enforcement (as identified in the ESC4WZ study) such that it meets current legislation. Modify VAST methodology to include citations issued through this process.	11	<ul style="list-style-type: none"> <li>- This is a good alternative to SSC</li> <li>- This should be tied to a public awareness plan</li> </ul>
Clarify language enabling MnDOT to contract with law enforcement when MSP is not available.	13	<ul style="list-style-type: none"> <li>- This would clear up misconceptions about revenue distribution</li> <li>- Current interagency agreement explicitly references MnDOT and DPS/State Patrol</li> <li>- The formulas for General Allocation of Base Fines for Traffic Violations are split between the State General Fund and local Political Subdivision</li> <li>- Payment for staffing EE requests is made by MnDOT to the officer performing the service</li> </ul>
Clarify placement and expectations of law enforcement prior to bringing them on the job.	14	<ul style="list-style-type: none"> <li>- Current guidance exists; however, better awareness and execution is needed</li> </ul>
Pilot project to evaluate effectiveness of stationary presence versus moving enforcement strategies.	14	<ul style="list-style-type: none"> <li>- This study would improve effectiveness of extraordinary enforcement</li> <li>- The likelihood of consequences is more compelling than the severity of consequences because drivers have to believe they will get a ticket for speeding</li> </ul>
Before and after study to measure effect of proposed changes.	14	<ul style="list-style-type: none"> <li>- This could help inform decision makers of the biggest impact(s) to improving safety and provide data to back it up</li> </ul>

## Recommendations Related to Changing to State Law

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Two of the Task Force's recommendations were related to implementation of SSC as a means to manage speeds in work zones. The first recommendation was related to a pilot project, and the second recommendation was related to a permanent program. Later, these recommendations were combined with the thought that the pilot project must precede a permanent program.

The goal of the pilot project is to validate the parameters and evaluate the effectiveness of the program. This recommendation requires action by the legislature. If the pilot project yielded a successful proof of concept, a permanent SSC program may be pursued.

Details of the proposed SSC program are found in the Agency Recommendations section of this report.

## Proposed Ideas Not Recommended as Part of This Study

Recommendations noted in Table 8 may contain merit and may be effective in improving safety in work zones but were deemed less likely by the Task Force to significantly influence work zone safety. Many also scored low in other evaluation criteria categories.

**Table 8 : Proposed Ideas Not Recommended for Implementation**

Proposal	Total Evaluation Points	Basis for Not Moving Forward
Public education through driver education to change culture.	8	<ul style="list-style-type: none"> <li>- Younger drivers are most likely to be influenced by education</li> <li>- This does not have enough anticipated effectiveness compared to effort, time, and cost of completing it</li> </ul>
Authorize insurance surcharge for particular violations such as speeding in a work zone.	8	<ul style="list-style-type: none"> <li>- Not many \$300 work zone fines are handed out since most extraordinary enforcement efforts are about deterrence, not ticketing; therefore, this would not have much of an impact</li> </ul>
Require some level of training to renew driver’s licenses.	6	<ul style="list-style-type: none"> <li>- This is a good Idea; however, it would take massive effort requiring legislation and an organization willing to develop and administer the program</li> </ul>
Use of additional lane closures or chicanes to slow traffic.	13.5	<ul style="list-style-type: none"> <li>- More research is needed on this; it could have adverse safety impacts by increasing rear end crashes and potential increase work zone length and duration</li> </ul>
More formal inspection policies, including video. (13.5)	13.5	<ul style="list-style-type: none"> <li>- This could improve maintenance of work zone, which could improve drivers’ respect for the work zone, but issues with reviewing videos would likely occur</li> </ul>
Partner with Waze and other mapping apps to communicate to drivers approaching the work zone of the reduced speed, worker’s present, and end of queue locations.	11.5	<ul style="list-style-type: none"> <li>- This is unlikely to change driver speed or behavior</li> <li>- MnDOT is already currently working on this</li> <li>- The benefits of this information need to be balanced with the amount of information provided to the driver given that their attention should primarily be on the road</li> </ul>
Offer driver improvement class (possibly online) for work zone violations in to reduce penalty for 1st citation in work zone.	7.5	<ul style="list-style-type: none"> <li>- This could have a positive impact by having offenders pay with their time rather than money</li> <li>- This does not have enough anticipated effectiveness compared to effort, time, and cost of completing it</li> </ul>
Utilize narrow lane widths, but don’t decrease overall available pavement.	13	<ul style="list-style-type: none"> <li>- More research is needed on this; it could reduce speed but might increase crashes</li> </ul>
Decrease spacing between channeling devices.	13	<ul style="list-style-type: none"> <li>- More research is needed on this; it could increase workers interaction with traffic because of potential increase in channeling devices being knocked over</li> </ul>

Proposal	Total Evaluation Points	Basis for Not Moving Forward
Increase use of emergency pull off areas on projects.	13	<ul style="list-style-type: none"> <li>- This would increase the ability for police to pull over violators but would increase construction time and workers interaction with traffic. The cost could be greater than potential benefits.</li> </ul>
Provide temporary transverse rumble strips in > 45 mph speed zones approaching a change in traffic pattern.	13	<ul style="list-style-type: none"> <li>- This could startle drivers and cause crashes</li> <li>- Someone in the task force has driven these in Illinois and didn't see any reduction in speed or behavior</li> <li>- May be most effective in small work zones</li> </ul>
Replace amber lights with different lights on construction vehicles. Drivers are used to amber lights and don't move over for them.	12	<ul style="list-style-type: none"> <li>- Changing to colors associated with law enforcement could diminish compliance to those as well</li> <li>- The real issue about drivers not moving over is likely caused by congestion</li> </ul>
Streamline authorization for 24/7 speed limits.	10	<ul style="list-style-type: none"> <li>- This could actually increase speed differentials if work zone speed limits are too low. Currently 24/7 WZ Speed limits are set the same ways as permanent speed limits.</li> </ul>
Allow self-paced, webinar-style learning as a more equitable way to provide driver education.	9	<ul style="list-style-type: none"> <li>- While this is a good option to improve equity, do not expect this to improve workers' safety</li> </ul>
More funding to Work Zone Safety Public Awareness campaigns aimed at the general public.	7.5	<ul style="list-style-type: none"> <li>- This would be expensive to develop and implement with questionable effectiveness</li> </ul>
Change state law to remove the Dimler Amendment, 171.12, Subd. 6, to have all speeding citations issued in work zones go on a driver's record.	9	<ul style="list-style-type: none"> <li>- Education and outreach will be needed</li> <li>- Consider revisiting when SSC become permanent program</li> </ul>
Update the driver's education curriculum to include additional content on driving in work areas.	9	<ul style="list-style-type: none"> <li>- Depending on the changes, this would require legislative input</li> <li>- Current curriculum is limited in content and is at capacity. Adding more specialized topics will require reducing detail in other areas deemed important for new drivers.</li> </ul>
Coordinate with insurance companies to create incentives for ongoing driver's education, similar to the Alive 55 program.	8.5	<ul style="list-style-type: none"> <li>- Requires collaboration with legislature and insurance industry</li> <li>- Anticipated effects on work zone safety are questionable</li> </ul>

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# Agency Recommendations

MnDOT and DPS met to discuss how the Task Force’s recommendations may be implemented. A key clarification emerged from these discussions that these recommendations should not be indiscriminately applied to all projects. Rather, the agencies will develop criteria for the use of each recommendation so that they may be applied in the proper context to maximize effectiveness.

The discussions between MnDOT and DPS also led to additional refinements to the recommendation descriptions. It also included four significant changes to Task Force recommendations:

1. The following recommendation was eliminated: “Clarify language enabling MnDOT to contract with local law enforcement when MSP is not available for Extraordinary Enforcement”.

The basis for removal is that contracting with local agencies involves the development of individual interagency contracts with each agency. It would also require that the local law enforcement officers undergo training used by MSP. This may still occur on a case-by-case basis where the need arises.

2. The following recommendation was eliminated: “Clarify placement and expectations of law enforcement prior to bringing them on the job”.

The basis for removal is that there is an existing process for doing so identified on the Extraordinary Enforcement request form and includes contact information. No further changes to the process or form are recommended.

3. The following recommendation was eliminated: “Before and after study to measure effect of proposed changes”.

The basis for removal is that this was determined to be a generic process, not a specific recommendation to manage speeds in work zones or improve worker safety.

4. Terminology of the following recommendation was changed: “Make constructability reviews part of all design contracts”.

The basis for this change is that the term “constructability reviews” is used by MnDOT to signify one-on-one meetings with contractors to discuss complex staging and constructability issues on a project. The recommendation was changed to “Engage MnDOT construction staff earlier in the design process to identify staging configurations where speed management tools may be effective” to describe the intended suggestion more accurately.

Table 9 on the following page describes the nine recommendations that can be implemented by MnDOT. Development of criteria will occur in 2022. However, many construction plans programmed for 2022 have already been completed. While it is expected that some recommendations will be used on projects in 2022 on a per-project basis, these changes are more likely to be seen in 2023 work zones.

Table 10 describes three additional recommendations that require collaboration between MnDOT and DPS.



**Table 9 : Agency Recommendations that MnDOT Can Implement**

Recommendation	Context
<p>Include speed monitoring equipment and/or traffic monitoring cameras on select construction contracts. Contractor would be responsible for providing a summary to the Engineer.</p>	<ul style="list-style-type: none"> <li>- Collect data to determine baseline for speeds across the state and help with future research on decreasing work zone speeds</li> <li>- Used to determine when to use Extraordinary Enforcement</li> <li>- Criteria may include Length of work zone, project duration, Average Daily Traffic, among others.</li> <li>- May be incorporated into the Transportation Management Plan process</li> </ul>
<p>Use contractor Speed Control Vehicles on a set frequency to control speed on select construction contracts.</p>	<ul style="list-style-type: none"> <li>- Expected to be most valuable when workers are present during uncongested traffic conditions.</li> <li>- Would be written into construction contract</li> </ul>
<p>Encourage more detours and additional limited/full-time closures.</p>	<ul style="list-style-type: none"> <li>- Separates traffic from the work zone</li> <li>- Would shorten construction time frame but depends on capacity of alternate routes</li> <li>- Reassess criteria as this is already encouraged</li> </ul>
<p>Greater utilization of Electronic Workers Present Speed Limits.</p>	<ul style="list-style-type: none"> <li>- May be incorporated into the TMP process</li> </ul>
<p>Engage MnDOT construction staff earlier in the design process to identify staging configurations where speed management tools may be effective.</p>	<ul style="list-style-type: none"> <li>- Requires additional resources to implement</li> <li>- May be incorporated into the TMP process</li> </ul>
<p>Use IWZ Stopped Traffic Ahead systems for end of queue notification within the work area, in addition to in advance of the work area.</p>	<ul style="list-style-type: none"> <li>- Potential decrease in rear end crashes caused by increased driver awareness</li> <li>- Integrate with the Work Zone Data Initiative (WZDI) and 511 to provide audible notification</li> <li>- May be incorporated into the TMP process</li> </ul>
<p>Greater use of end of queue warning systems.</p>	<ul style="list-style-type: none"> <li>- May be incorporated into the TMP process</li> </ul>
<p>Greater use of advisory speeds with vehicle speed feedback displays.</p>	<ul style="list-style-type: none"> <li>- MnDOT Temporary Traffic Control committee will consider adding these as a standard rather than an option in certain conditions.</li> </ul>
<p>If using static Workers Present Speed Limit signs, assign responsibility of daily set up and take down in the construction contract.</p>	<ul style="list-style-type: none"> <li>- Will encourage use of electronic system</li> <li>- Would be written into construction contract</li> </ul>

**Table 10 : Agency Recommendations That Require Collaboration for Implementation**

Recommendation	Context
<p>Use camera/radar technology upstream of law enforcement (as identified in the ESC4WZ study) such that it meets current legislation.</p>	<ul style="list-style-type: none"> <li>- This may improve the ability to enforce speed limits in work zones as vehicles would be pulled over past the constrained work zone area</li> <li>- Modifications are needed due to weaknesses in electronic communication protocols identified in the study</li> <li>- This should be tied to a public awareness plan</li> <li>- Would still need signing in advance of the system</li> <li>- Develop equivalent VAST methodology that meets current statutory requirements to admit output as evidence</li> </ul>
<p>Research project to evaluate effectiveness of stationary presence versus moving enforcement strategies.</p>	<ul style="list-style-type: none"> <li>- Identify funding/method for evaluation.</li> <li>- NCHRP 746 report includes alternatives</li> </ul>

# Speed Safety Camera Demonstration Project

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As mentioned earlier, the Work Zone Speed Management Task Force recommended a pilot project for Speed Safety Cameras to assess the effectiveness within work zones on Minnesota's state highway system. MnDOT and DPS agree that the proposed demonstration project would be a worthwhile endeavor. The Minnesota State Patrol is open to the idea, depending on the parameters and support for the endeavor. Furthermore, the Minnesota State Patrol recognizes that work zones create extraordinary challenges to traditional enforcement methods for a variety of reasons. The agencies believe that SSC would be one of the most effective methods to manage speeds in work zones discussed in this study.

While Speed Safety Cameras have been shown to be effective in many other states, there are a variety of methods of implementation. The agencies have taken the recommendations of the Task Force and research conducted by the Center for Transportation Studies at the University of Minnesota into consideration to develop the following suggested criteria for the demonstration project:

- Deploy at two (2) work zones on the state highway system. One (1) in MnDOT's Metro District and one (1) in Greater Minnesota. It is also suggested to have one deployment on a freeway and another deployment on a non-freeway road
- Target the deployments to occur during the 2023 construction season
- Use owner-liability (no driver photo) to minimize resources needed to manage the SSC program
- Allow the owner/lessee to identify the driver of the vehicle to transfer the citation
- Allow the owner/lessee to request a hearing to challenge the citation
- Fund the demonstration project with a direct appropriation. DPS would require additional staff for the demonstration project and has concerns with recruitment.
- Fine revenue should not be tied to administering the SSC program
- Use an SSC system vendor with experience in proven, accepted technology and procedures
- The SSC system vendor is paid a flat rate (not based on number of violations)
- Require that SSC equipment is set up under the supervision of a licensed peace officer
- Require that a licensed peace officer review the evidence before a citation is issued
- Provide locations of SSC equipment on the program's website
- Provide signing that informs drivers of downstream SSC equipment
- Publicize the SSC program ahead of deployment
- No recommendation is included in this document relating to the type of violation (administrative vs. criminal) issued by the SSC demonstration project.

Changes to the current laws listed below are also recommended to successfully deploy an SSC program in Minnesota.

- [Minn. Stat. 169.04 \(a\) \(2\), Local Authority](#)
- [Minn. Stat. 169.14, Subd. 10, Radar; speed measuring device; standards of evidence](#)
- [Minn. Stat. 169.99, Subd. 1 Uniform Traffic Ticket](#)
- [Minn. Stat. 169.999, Subd. 1, Administrative Citations](#), should the legislature opt to utilize administrative citations

In addition to these changes, the following new legislation is recommended.

- Legislation is needed to explicitly authorize owner-liability for speeding violations documented and cited through the use of SSC
- Legislation is needed to impose owner-liability for speeding violations documented by the SSC equipment

## Administrative Versus Criminal Citations

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As mentioned above, the agencies make no recommendation related to the type of violation (administrative vs. criminal) issued by the demonstration project. The vast majority of SSC programs in the United States use administrative citations. Following are some elements to consider when evaluating which method to use:

### **Administrative citations**

Administrative citations are similar in legal nature to those for non-moving violations, such as a parking ticket. Violations are not recorded against the owner's driving record; because of this, unless another tracking system is created, the ability to track repeat offenders is not available. Administrative citations have no court costs.

### **Criminal citations**

The e-citation system, the processing system and the administrative process to appeal already exists for criminal citations. Upon conviction, the citation goes on the drivers' record – this allows the ability to identify habitual offenders. Criminal citations generally have court fees, which will raise the amount that the offender will need to pay.

## Appendix A: Task Force Members and Staff

Name	Agency
Paul Aasen	MN Safety Council
Rashmi Brewer	MnDOT State Aid
Brent Carron	Valley Paving
Nancy Daubenberger	MnDOT Chief Engineer
Ericca Erhard	MnDOT Chief Counsel's Office
Major Chris Erickson	State Patrol
JP Gillach	MnDOT Communications
Joe Gustafson	Washington County
Mike Hanson	DPS Traffic Safety
Ken Johnson	MnDOT Traffic
Kevin Kosobud	MnDOT Construction
Greg Laine	MnDOT Maintenance
Reed Leidle	Safety Signs
Tim Lewis	Warning Lites of MN
Mike Martinez	HDR
Michelle Moser	MnDOT Traffic
Ron Rauchle	MnDOT Metro Traffic
Tom Ravn	MnDOT Construction
Reid Romer	Egan Company
Paul Sandy	City of Brainerd
Matt Semerad	AGC
Brian Sorenson	MnDOT Traffic
Ted Ulven	MnDOT Construction
Bob Vasek	MnDOT Maintenance
Tracey Von Bargaen	Grant County
Brent Wilber	Mathy Construction & Rochester Sand and Gravel
Jennifer Witt	MnDOT Government Affairs
Andrew Witter	Sherburne County
Laura Ziegler	AGC

## Appendix B: Acronyms and Abbreviations

Acronym	Meaning
AGC	Associated General Contractors (of Minnesota)
ASE	Automated Speed Enforcement/Speed Safety Camera
DMS	Dynamic Message Sign
DPS	Department of Public Safety
EE	Extraordinary Enforcement
ESC4WZ	Enhanced Speed Compliance for Work Zones
FHWA	Federal Highway Administration
HDR	HDR Engineering, Inc.
IWZ	Intelligent/Smart Work Zone
MnDOT	Minnesota Department of Transportation
mph	miles per hour
MSP	Minnesota State Patrol
MN MUTCD	Minnesota Manual on Uniform Traffic Control Devices NCHRP
NCHRP	National Cooperative Highway Research Program
SSC	Speed Safety Camera/Automated Speed Enforcement
Task Force	Work Zone Speed Management Task Force
VAST	Visual, Audio, Speed and Targeted
WZDI	Work Zone Data Initiative

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# Appendix C: Brainstorming Session Summaries

## Meeting Summary

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Project: Work Zone Speed Management Study

Subject: Brainstorming Interview

Date: Friday, September 17, 2021

Location: WebEx

Attendees: Sherry Munyon, MN Citizens for Safe Work Zones

Mike Martinez, HDR Engineering, Inc.

- MNCSWZ represents contractors, unions and family members of deceased workers.
- Sherry was the one that forwarded the legislation to create this study. Is upset that she hasn't been able to speak at the task force meetings. Feels she is being excluded.
- Feels the task force is moving too slow. Once a month is not enough.
- Feels task force has not spent enough time on ASE
- Practices or policies she feels are not effective:
  - Previous ASE legislation was too general
  - Telling people what they should do with signs has not been effective
  - Using channelizers has not been effective
  - Lack of enforcement is the biggest issue
  - Passive enforcement, i.e., presence, provides only spot improvements, often entering the work zone. Drivers will speed up once they are past enforcement
  - If MSP leaves, drivers will immediately speed up
  - She feels that doubled fines are not helpful
- Suggestions
  - Need more live enforcement
  - ASE or more use of troopers to achieve more compliance/enforcement
  - MD, PA, IL each have ASE that's making a difference.
  - Include signs that advise drivers that ASE is in use
  - Have a web page that graphically shows which work zones have ASE
  - Feels that ASE eliminates the possibility of racial profiling
  - Use a system of increasing penalties, where citations for excessive speeding in work zones thru the use of ASE could start with a warning and lead to increasing fines.

- Would support either financial penalties or impacts to driving records and insurance rates.
  - The more punitive the fines, the harder it will be to gain support.
- Need to meet more, including after the recommendations are sent to the legislature.
- The American Road Builders Transportation Association has also started to look at this.
- Barriers to implementation
  - Lack of awareness by DPS, policy makers and specifically MnDOT, who makes decisions on whether or not to improve a specific work zone from behind a desk
  - MnDOT has been invited to job sites to witness site conditions and have turned down suggestions to modify the work zone. No specific instances were provided.
    - Red light enforcement overstepped what was allowable by state law. Need to make changes in state law and address data privacy concerns.
    - Need to have an open conversation in the task force meetings
    - Lack of leadership. Other DOTs are taking the lead in ASE use.
    - Lack of data. Don't have the equipment deployed to track volumes and speeds.
    - Feels that MnDOT is worried about slowing the traveling public
      - Why is MnDOT not more active in advocacy of enforcement?
      - Need to post data on traffic speeds
      - Use technology
    - Need ASE and law enforcement to use consistent fines
      - Feels that \$300 work zone fine is not being imposed. Is open to lowering the fine to equalize the amounts issued through ASE and police.

## Meeting Summary

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Project: Work Zone Speed Management Study

Subject: Brainstorming Interview

Date: Friday, September 17, 2021

Location: WebEx

Attendees: Lt. Robert Zak, MN State Patrol

Mike Martinez, HDR Engineering, Inc.

- Work zone sensing systems (Rashmi's project) was a good start.
  - Technology was sound
  - Challenge was using it to testify. Unable to confirm that the calibration process before deployment was legally valid.
  - Signs were placed prior to the work zone stating (approx.), Actively Enforced by Radar and Law Enforcement. This appeared to have an impact.



- Presence of a squad car is effective
  - Trooper placement and activity can sometimes create more problems, like gawker effects.
  - Have tried various positioning in work zones, but the beginning is best as it provides deterrence. Mid-project can be a challenge due to finding gaps and accelerating to speed.
  - Can use air horn or siren to get people’s attention without leaving post to slow people down.
  - Experimented with and w/o lights. W/o lights seemed to be more effective b/c drivers interpreted that the trooper was “available” to pull someone over as opposed to “being busy” with someone else, allowing them to continue to speed.
  - Troopers have to wait to pull people over until after the work zone, where there is a wide enough shoulder to do so.
    - Additional emergency pull-off areas (typically once every 2 miles in longer work zones), may be helpful.
      - The trooper will have to know that there is a nearby pull off area, which isn’t always the case.
      - Drivers can do unpredictable things like stop in a travel lane, so troopers may still wait until the end of the work zone to pull people over.
  - Most effective to have two or more troopers in the same direction. This is commonly done for enhanced enforcement. One at the start of the work zone to identify the speeder and the second at the far end to provide enforcement.
  - In work zones, two troopers will be used, but most often on bigger projects, but one in each direction to provide deterrence. Did not think that using two troopers in 1 direction and zero in the other would be a better option
  - Troopers may request OT to work on construction projects, though in 2020 there was a decrease in this as they were needed elsewhere in response to public unrest. Starting to see more troopers request to work on construction projects again.

He has seen Vehicle Speed Feedback Displays to be effective because they target individuals

## Meeting Summary

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Project: Work Zone Speed Management Study

Subject: Brainstorming Interview

Date: Friday, September 17, 2021

Location: WebEx

Attendees: MOT Contractors

Mike Martinez, HDR Engineering, Inc.

- Construction speed limits
  - Dynamic speed displays don’t work.

- Diminishing effect over time
- Keeps honest people honest
- People may try to see how fast they can get it to display
- Advisory speeds are not effective at all.
- Perception of using construction speed limits is important in that it lowers the top speed people may drive
- Enforcement is effective, but is a spot effect
  - Most common location is at the start of work zones.
    - Few other places for them to sit in the work zone.
    - When there are many lane closures, it limits opportunities for troopers to sit in a particular spot in the work zone.
  - Having trouble getting enforcement onto the I-94 job in Maple Grove
  - If state patrol is not available to staff work zones, can local law enforcement?
  - Group has not witnessed multiple troopers paring up; one at the start of the work zone and a second one at the end, where there is space to pull people over.
  - Troopers are too busy to catch everyone and often only go after those traveling well over the speed limit
- No one moves over for construction vehicles
  - If they are placed too close to the traveled lanes, they become exposed to adjacent traffic
  - People are getting used to seeing amber lights.
  - Can other strobe colors be used on construction vehicles?
- On I-94, having barrier on both side of traffic (12' lanes +2' shoulders) seemed to have an effect on slowing traffic
  - Even if this couldn't be done for the entire work zone, using barrier to occasionally pinch people down into this configuration could help.
  - If using PPCB is not an option due to cost and time to deploy, tube delineators could be an alternative. However, when they are hit, they become a maintenance/exposure issue. Anchoring is an option if not in new pavement.
  - The group was not reduced lanes during off peak hours to artificially reduce roadway capacity/increase congestions.
    - If off peak lane reductions are used, it's to increase the work zone.
    - Lane restrictions/rentals some into play.
- Introducing additional lane shifts in advance of the work zone was not perceived to effectively reduce speeds, especially in single lane configurations
  - It extends the work zone
  - Minimum spacing requirements between consecutive lane closures.

- Use pace vehicles on a recurring basis
- No consistent process to change MOT configurations in the field.
  - Some inspectors and resident engineers are more open to contractor requested changes.
  - Very difficult to get construction speed limits.
  - Some RE's do not have the authority to change the plans.
  - Sometimes RE's are on a different page with MnDOT engineers.
- No standard for moving crossovers
- Group was not familiar with using thermoplastic rumble strips on high-speed roadways
  - Removal could be an issue if placed on new pavement
  - Issue for motorcycles?
- Partner with Waze or other mapping apps to communicate to drivers approaching the work zone
  - Reduced speeds ahead
  - End of queue notices
- Declutter work zone. There are too many signs

## Meeting Summary

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Project: Work Zone Speed Management Study

Subject: Brainstorming Interview

Date: Friday, September 17, 2021

Location: WebEx

Attendees: Road and MOT Contractors, MnDOT Staff

Mike Martinez, HDR Engineering, Inc.

- Extraordinary Enforcement
  - Some perceive that EE is not effective and can cause more issues
  - Only is effective in the immediate area around the parked trooper.
  - Requests go through Ted's office for approval.
    - In most cases, only a single trooper is assigned to a job.
- D2 reduced speeds with speed trailers. Hard to get enforcement due to limited number of troopers available, much less willing to request OT to work EE.
- If speed data were to be collected, it could be used to determine if and when there is a speeding problem.
  - (How do we get this to be more prevalent in contracts?)

- Resources become an issue. It's one more thing that requires someone to look at and follow up.
- The TPI project had lots of resources and a bigger budget for things like EE. Other projects do not have any resources
- (Do we need to write something into construction contracts to require contractors to collect this data?)
- RTMC collects aggregated average speeds to let people know when to expect traffic ahead.
  - Is this conveyed to the public through DMSs? In-vehicle navigation equipment?
  - How often do the conditions trigger a notification?
- Prime contractors are often hesitant to scrutinize MOT set ups.
- Contractor initiated change process:
  - If MnDOT thinks the speeds should be lowered, then that's what should be enforced.
  - District Traffic Engineer must be consulted
  - "Bidding" term needs to be reviewed since this process happens well after bidding
- Pilot cars are not practical due to logistics and cost.
- Using barrier on both sides of a lane(s) to create a "chute" lane
  - Best thing we can do
  - Effective, but expensive.
  - MnDOT does a good job of spec'ing barrier when it is needed.
  - Consider design vehicles, including ag equipment and OSOW.
  - Difficult for first responders to maneuver through. MUTCD states that barrier should not be used
  - Can be simulated using barrels tucked closer to the edge line. Has a similar effect until trucks push them back. (Use for speeds below a certain threshold – 45 MPH???)
  - Much easier/quicker to deploy barrels (hour/mile) than barrier (day/mile)
  - Barrier can create a hazard and false sense of security for motorists. It's present 24/7, even when construction is not active.
- (Follow up with Ken on his statement that Worker's Present Speed Limits are required in certain conditions
  - How often does provision (a) happen without (b) overriding it? No study is required and this appears to give people other than the commissioner and DTE's the ability to change a speed limit from 70 to 45 mph)

# Meeting Summary

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**Martinez, Michael J.**

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**From:** Hauser, Tiffany  
**Sent:** Tuesday, October 5, 2021 7:19 AM  
**To:** Martinez, Michael J.  
**Cc:** Christine Zimmer, Mitts, Meredith, Morgan, Karen  
**Subject:** RE: Speed in Construction Zones Follow Up

**CAUTION: [EXTERNAL]** This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Mike,

Feedback on your insurance-related questions are below in RED.

Thank you for the opportunity to provide our expertise and information, Tiffany

**From:** Martinez, Michael J.  
**Sent:** Tuesday, September 28, 2021 6:39 PM  
**To:** Hauser, Tiffany  
**Cc:** Christine Zimmer, Mitts, Meredith, Morgan Karen  
**Subject:** [EXTERNAL] RE: Speed in Construction Zones Follow Up

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Good afternoon Tiffany,

I really appreciate our conversation this morning and for the information you provided below. There were a few additional topics we discussed that I want to make sure I captured accurately given my inability to take notes while I driving. If I misunderstood or read too much into the discussion, I won't be offended by your editing. Likewise, if I missed a key point in our conversation please feel free to add it.

- AAA has two branches, Insurance and Auto Club. One of the initiatives of the Auto Club is education, which is especially important for new drivers. Programs for older drivers and driver improvement are also

available. It's unlikely that the MN legislature would have the appetite to mandate programs for driver improvement. Older driver education is currently incentivized with lower insurance rates.

- An educational ad campaign would be an effective way change overall driver behavior, including to control speeds in work zones. (I'm not sure I'll be involved in the details of an educational ad campaign, but I'll recommend that you be included in that conversation).
- We've seen a generational change in the desire to get a driver's license as soon as possible after turning 16. A greater percentage of the population is waiting longer to get a driver's license (can you please elaborate on the impact this has on young drivers? I recall some interesting points, but my memory failed me on the details).
- Access to new driver education in Minnesota has challenges because participants must attend in-class sessions. This can exclude families without the financial means to attend these classes. It can also force families to choose between driving a child to these classes and other conflicting responsibilities. Allowing self-paced, webinar-style learning could provide an equitable way to provide driver education training. This would not change the current behind-the-wheel and testing requirements. This needs legislative support to happen.

I also have a few questions that are more on the insurance side. If you aren't the most appropriate person to respond, I would appreciate your help by connecting me to the right person.

- While the MN legislature does not currently mandate programs for driver improvement, could this be required by insurance companies for drivers with bad driving records? **No, I do not see this being mandated by insurance companies. This would be something the state legislature would have to require.**
- Are motor vehicle violations that occur in work zones treated any differently by insurance companies? If not, could they be? We look at the violation points the state assigns. **We do not treat work zones differently. The state would need to assign higher violation points in work zones.**
- How are successive speeding violations viewed from an insurance premium perspective, regardless of where they occur? **Our curve for surcharging for an accident or violation gets steeper with each accident or violation within 5 years.**
- Are there other ways that the auto insurance industry can change driver behavior? For instance, how widespread is the use of devices that monitor driving habits? In what way(s) are they currently used?
  - **The primary way in which the auto insurance industry can influence driver behavior is through Usage Based Insurance (UBI) programs. These programs are increasingly mainstream, and shape driving behavior through providing feedback and incentivizing safer driving. It is estimated that the percentage of US auto policies enrolled in a UBI program grew from 2% in 2014 to 26% in 2020. The Auto Club Group is in line with this figure, with 26.6% of New Business policies in the first half of 2021 enrolling in the AAADrive program.**
  - **AAADrive and other UBI programs monitor driving behavior and provide feedback to the user. Different factors are used by different programs and companies, but common factors include hard braking and acceleration, distraction, cornering, speeding, and time of day. Speeding is most commonly scored based on whether the speed can be safely maintained (referred to as contextual speeding) rather than by comparison to the speed limit due to the difficulty of finding and consistently updating legal speed limits.**

I believe I mentioned that we are nearing the end of our data collection/interview stage and will soon be using the information gathered to generate recommendations. It would be very helpful to receive your feedback in the next week.

Thanks again for your insight. You added a few dimensions to this conversation we hadn't heard before. Mike

Mike Martinez, PE\*

*MN/WI Traffic Section Manager North Central Regional Traffic Lead*

HDR

1601 Utica Avenue South, Suite 600 St. Louis Park, MN 55416-3400

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**From:** Hauser, Tiffany

**Sent:** Tuesday, September 28, 2021 9:09 AM

**To:** Martinez, Michael J.

**Cc:** Christine Zimmer; Mitts, Meredith;

Morgan, Karen

**Subject:** Speed in Construction Zones Follow Up

**CAUTION:** [EXTERNAL] This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hello Mike,

Thanks for a great call this morning. Below you will find AAA's policy statement on speed in construction zones, the main concepts we cover in driver education on driving in construction zones, a link to AAA Foundation research on speed and an IIHS link on speed. I have also attached the one pager we have used in Minnesota on the online driver education issue.

Please let me know if you have any questions or would like to schedule a time to chat some more. Thanks,

Tiffany

### **Speed Management in Construction Zones**

Roadway construction and maintenance operations present serious hazards for both workers and road users. Authorities should adopt an integrated and uniform approach to speed and safety management in construction and maintenance zones which complies with the Manual on Uniform Traffic Control Devices and includes:

- criteria for setting speed limits specific to the site in question and the type of work involved;
- an awareness and education campaign including educational signs at the site; and
- signage to indicate the distance under construction and speed limits.

## Driver Education Concepts

- Stay alert
- Obey posted speed limits
- Conditions change quickly, so be ready to respond
- Minimize distractions
- Honor work zone signs
- Actively search for workers, pedestrians, and bicyclists
- Merge with caution, maintain extra space in front of you, and do not change lanes
- Follow the directions of flaggers
- Be patient

## AAA Foundation Research

Impact Speed and a Pedestrian's Risk of Severe Injury or Death <https://aaafoundation.org/impact-speed-pedestrians-risk-severe-injury-death/>

## IIHS Speed Information

<https://www.iihs.org/topics/speed#overview>

Tiffany Hauser

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## Meeting Summary

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Project: Work Zone Speed Management Study

Subject: Brainstorming Interview

Date: Friday, September 17, 2021

Location: WebEx

Attendees: Lt. Andrew Martinek, MN State Patrol

Mike Martinez, HDR Engineering, Inc.

- Believes the Vehicle speed feedback displays are effective since they target individual vehicles



- MSP is generally used as a visual deterrent
- Some uncertainty of a trooper's role in work zones. Is it speed reduction, worker protection (placing themselves in front of exposed workers), congestion relief (flagging in intersections) or first responders? Probably all to some extent.
- To change behavior, need to cite enough people in order to make a difference
  - Enforcement in work zones present a challenge because MSP doesn't want to create incidents. Although troopers do a good job of clearing incidents.
  - If additional pull off areas could be added to work zones (not just in head-to-head configurations), it would help enforcement as they could be used as opportunities to pull people over or for troopers to monitor traffic. Suggestion is for designers to add more emergency pull off areas to projects where possible.
- Advertising helps, though it needs to catch people's attention. CO DOT invested a lot of resources into an ad campaign that clarified that it's illegal to drive under the influence of marijuana.
- Troopers working in tandem is common and very effective.
  - Stationing one as a deterrent at the start of a work zone and a second one at the end of the work zone would be an effective way to cite drivers that speed up after they pass the first trooper.
  - Having troopers regularly drive through the work zone would be more effective because drivers are more likely to change their behavior for a longer period of time when they see a patrol in motion as opposed to one that's parked.
- Feels that ASE is a highly effective deterrent but is worried about the resources needed to run (manage) that program. Don't want it to take away from the effectiveness of troopers. (I responded that there are many variables to implementing ASE, including methods that require less back end work by troopers)
- Need to focus ASE in certain areas like work and school zones.
- We already have cameras mounted on school buses activated with the gate arms. Bus drivers can report the image and if the license is clear, MSP will follow up on the offense.
  - This process is somewhat similar to ASE in that a trooper does not need to be on site in order to cite people.
  - It could be applied now with regards to hit and runs in work zones

## Meeting Summary

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Project: Work Zone Speed Management Study

Subject: Brainstorming Interview

Date: Wednesday, September 29, 2021

Location: MS Teams

Attendees: MnDOT Resident and Traffic Engineers

Mike Martinez, HDR Engineering, Inc.

- Group's thoughts Informal process:
  - Generally accurate
  - Need a PE to sign off on a contractor proposed change
  - Some concern regarding the use of the term "bidding" in the last sentence since modifying an in-place work zone happens well past the bidding process.
    - Ken clarified that the intent was to be aware that MOT subcontractors operate in a low bid environment. Substantial changes to the traffic control (i.e., changing work under traffic to a detour) could lead to challenges from a losing contractor saying they could have done the detour cheaper than the contractor receiving the change order.
- Contractors are constantly asking for reduced speed limits.
- Need to better understand the design speed of the work zone.
  - Don't unnecessarily lower design speed
  - Don't artificially lower the speed limits
  - Differentiate between speed limits and advisory speeds.
- Need an educational component
- Human factors tactics:
  - Use narrower lane widths.
  - Reduce spacing between devices
  - Need to balance this with the risk of more devices being hit, causing contractor staff to be exposed while placing the devices back in place.
- Use of troopers placed at the front of the work zone is not effective
- 24/7 speed limits must be authorized by Commissioner. Is that necessary (could it be done at the district level?)
- Driver feedback signs help a small percentage of people.
  - Use on bridge maintenance/inspection projects in metro.
- [ClearGuide](#) technology was used. (I don't get the sense this is common on project)
  - Could be used to better predict when patrols could be more effectively used (so they aren't there during recurring congestion periods).
- Some confusion regarding role of law enforcement in work zones: enforcement, deterrent, first response.
  - Need to be on the same page regarding expectations.
  - Some hesitancy by troopers to pull people over in work zones. There is a risk that the act of pulling people over causes secondary incidents
  - In Metro, enforcement is not intended to catch speeders and is used as more of a deterrent.
  - Look at the special provisions for extra enforcement. Changes needed here???
  - MSP is often willing to come out on short notice before they are officially under contract. In these cases, they will stick around until they get a call to do something else.
  - When using zipper merges, it is important to update troopers on where they should be as the end of queue locations shifts.
  - Perception that local law enforcement won't write tickets because proceeds go to state or county.

- Idea of pilot/pace cars was well received. May need to write this into the specs/contract.
  - Paving trains have a similar effect.
- Use of troopers in tandem was effective when used, though this might be rare.
  - One successful example on a Lowry tunnel project had two troopers stationed at the beginning of the work zone. One used radar and the other chased offenders down. This project also had troopers roll through the zone, did not notice a reduction in speeds.
  - No one had experienced them set up with one at the beginning of the work zone and one at the end.
  - (How about a study/pilot project that places troopers working in tandem in different configurations to see which is most effective at lowering speeds and facilitates pulling people over while minimizing the risk of secondary incidents?)
- How can we get commercial trucks to slow down? Trucking association? What's the best way to reach/influence them?
- Use of electronic speed limit displays (not vehicle speed feedback displays) are a more reliable method of using workers present speed limits.
  - Use of static signs don't reliably get put up/taken down.
  - Electronic devices have had good results in D6. They have been built into the design, not added via change order, though that is an option.
- How do crash rates in MN compare with other states in 2020/2021
- Use of additional lane closures or chicanes to slow traffic:
  - No one had actually tried this
  - A few people thought it would be counterproductive in that it increases the length of the work zone, number of devices to maintain and increases the potential for incidents.
- Have constructability reviews be part of the design review process.
  - This is already done in many districts.
  - How do we make this standard practice? Write it into scopes? State's PM responsibility? Based on TMP recommendations?
- The Work Zone Speed Limit guide is being updated. Won't include substantial changes, but best to take the date off.
- (What does the pilot project look like (Includes ASE, design improvements, MSP, educational campaign?))

## Meeting Summary

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Project: Work Zone Speed Management Study  
 Subject: Brainstorming Interview  
 Date: Tuesday, November 30, 2021  
 Location: WebEx

Attendees: Mark Kulda, Insurance Federation of MN

Mike Martinez, HDR Engineering, Inc.

- IFMN represents insurers and have two distinct areas of interest
  - Worker's compensation injuries
  - Drivers
- Insurance companies attempt to change behavior by adversely underwriting drivers' policies (increased premiums)
- The law could be made clearer by authorizing a surcharge for particular offenses, such as those in work zones
  - Currently, each insurance company has their own strategy to modify premiums.
  - This is regulated to some extent by the Mn Department of Commerce, which provides ranges for rates depending on factors contributing to the risk they take on to provide insurance. Companies compete within these ranges to underbid the competition.
- When premiums increase, drivers shop around for lower rates.
  - Some companies offer Accident Forgiveness discounts, which can substantially underbid those that don't offer it.
- Need a better path to verify that people have insurance. MnDRIVE requires that insurance be entered when renewing tabs.
  - Dirty little secret is that no one is actively verifying this information. DVS eliminated the group that was supposed to provide this verification 15 years ago!!!
  - Some estimates state that uninsured rates are around 8%
  - Other estimates based on claims suggest the rates could be above 15%
- Repeat violations could lead to not renewing insurance – dropping coverage.
- In MN, if someone can't find a company to insure them, the MN Auto Insurance Program state law provides a requirement to provide a plan at very high rates.
- Incentive programs available, though ironically neither is based on driving record.
  - Alive 55 discount is gained through 8 hours of webinars
  - Student discounts are gained through "straight A's" on a report card.
- Could be support in theory for a mandate for a safe driving/driving improvement class.
  - Would need to figure out who develops the program and offers the class (AAA, individual insurers? Same entities that offer the Alive 55 program?)
  - How would it work? Surcharge for a violation removed/lowered if class is taken within a certain period after the violation?
- Telematics (devices that monitor driving habits) is a growing industry
  - Use of these devices to establish insurance rates is voluntary. People who use them can decide to submit info if they think the data will reflect well on them or opt to take

- the standard rate.
- Insurers are increasingly using this data.
- Newer model cars have technology built in to help people understand circumstances that contributing to crashes (black box). Will take a decade for the vehicle fleet to turnover to a point where it is the norm.
- Some devices beep when a poor habit is detected. For instance, a hard break indicate tailgating or speeding.
- This technology could be used to institute a Pay by Mile program which is a trend gaining momentum that assesses how much people drive actually drive more. Current practice is to use the honor system by asking individuals to estimate this. Someone could say that they only drive 9000 miles per year when in reality, they drive 15000.
- Navigation queues
- Congestion and location of work zones are already communicated.
- Might support additional alerts such as upcoming end of queue locations but need to be careful to not give people too much information.
  - ASE
    - Industry supports this
    - Need to be clear that owner is responsible in the same manner that school bus violations are handled.
    - Need to carefully assess support in the legislature. For the hands free law, the house supported the proposal, senate did not. Took turning a key senator using first-hand stories from families that lost a loved one. Senator went from strong opponent to authoring the bill that eventually passed.
  - Mn is a No-fault insurance state
    - Finding fault in a crash is not required for the first \$20,000 of a claim. Each insurance company automatically covers this amount.
    - If the driver is not insured, then the vehicle owner's insurance steps in. If that person is not insured, the insurance of ANYONE in the vehicle would step in to cover the claim

## Meeting Summary

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To: Martinez, Michael J.

From: Laura Ziegler

Sent: Tuesday, November 16, 2021 4:23 PM

To: Kenneth Johnson (DOT); Martinez, Michael J.

Cc: Kosobud, Kevin (MN Dept of Transportation); Michelle Moser (DOT)

Subject: Feedback from AGC of MN – Contractor Process item for Work Zone Speed Management Report

Ken and Mike,

Thank you for the opportunity to provide feedback, particularly with the tight timelines associated with drafting the report. First – and this is a very common correction for us- our association name is Associated General Contractors of Minnesota. (AssociatED not Association)

We solicited comments from our contractors on the formalized “Process for Modifying Inplace Work Zone Traffic Control Configurations.” Based on my reading of the draft report, there appears to be some additions since the last communication Ken sent us on the proposed process that I sent out to some of our folks. (One item I’m seeing are actions prior to letting and actions after the letting.) Here is our primary take, along with some direct feedback collected based on the six steps initially proposed. I also want to explicitly say that it’s clear they (contractors) are looking for enforcement, which is outside the scope of our directed comments for this portion of the report, but interrelated to overall safety and speed management.

Overall Position: Worker safety should be a top priority in any proposed process. When it comes to safety in active work zones, the convenience of the traveling public currently holds a lot of weight. Contractors acknowledge that MnDOT has to consider many factors when determining work zone configurations – traffic backups, cost, staging, timing, etc. The formal processes presented within the six steps identified will not necessarily create effectual change – perhaps marginal- because it’s essentially formalizing the current informal process. That said, we support having benchmarks and a process written down for reference. Contractors appreciate when changes to traffic control after a project starts based on new information is discussed in a collaborative way.

A Recommendation: We propose that MnDOT develop a threshold for a work zone safety review prior to the project being advertised. A work zone safety review could include average daily traffic, speed limit posted, actual speeds, lane constraints, etc.. This would not have to be done on every project nor are we recommending full constructability reviews on every project. We are supportive of a flexible, documented approach that allows for MnDOT to have some criteria or threshold to conduct a work zone safety review and integrate that into the project prior to advertisement of higher risk project. This levels the playing field in a predominantly low-bid environment. If the proposed process occurs after it’s advertised/let, time is limited to get substantial change. Additionally, we understand requests after a project is awarded have to be balanced in a low bid environment. We agree that MnDOT should standardize an approach to have a benchmark with worker safety as a top consideration for these work zone reviews.

### **Specific Feedback**

There was no feedback specifically for Steps 1 and 2.

Step 3: If it includes work zone speed limits, the methodology from the Speed Limits in Work Zones Guidelines, October 2014 is followed

**Most always get denied or allowed but provisional and not enforceable. The traveling public rules all over the safety of the workers.**

*Step 4: The Project Engineer assesses the proposed change based on:*

*a) Technical Merit*

b) Effect on the traveling public and stakeholders

c) How the design and cost of the proposed change...

**Predominant Feedback: Safety of the worker should be A).**

*Step 5: The Project Engineer approves, approves with conditions, or does not approve the proposed changes*

**The safety of the worker even though said is of the utmost importance but is rarely an accepted reason for a change, especially in a speed reduction request.**

*Step 6: The contractor could request a discussion with the Resident Engineer if there is a disagreement*

**Usually, the discussions happen through email for the Resident Engineer.**

Overall thoughts toward this process.

From a contractor's perspective, if the speed is too high for a work zone, the last thing we would want to worry about is if we're inconveniencing someone for the work we are doing. To apply safety principles to this, our system is flawed in that we put production way ahead of safety. Production in this case is the convenience of others.

Another reality is that we have a low bid system and the traffic control specifications and plans we are given to bid on are the bare minimum. Any contractor who would want to improve the traffic control of a site is at a disadvantage to being awarded the job or, if they get the work, upgraded traffic control comes at the contractor's expense. This is a challenging subject because the true solutions of using actual barriers (not cones) between the workers, complete road closures, and simply reducing work zone speeds further are not standard practice, cost money, and are inconvenient so the system works around the edges to put band aids on the issue instead of actually fixing it.

This process is used informally on every job already. There are very few times where the "danger" in the work zone is prioritized higher than the other factors and speed zones are rarely used as a tool. Changing the traffic control and staging is already used on projects and has been a very successful and collaborative process.

I don't really see a change here, this is the process we use now. But the safety of the worker has no weight to this. It's always the traveling public with the power. Make traffic changes SAFER and ENFORCEABLE. People will change their habits or find a new route if they don't like the traffic control. But right now the habit to know orange signs are enforceable and that there are real human beings working in these areas is unforeseen by the traveling public until someone gets hurt.

Thank you for your work on this report and we are readily available for any follow up questions and discussions. We understand that this proposed process are not recommendations for changes in state statute, but rather at the agency level.

Best,

Laura

**LAURA ZIEGLER**

Director of Highway/Heavy and Government Affairs



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## Appendix D: Mentimeter



Recommendation	Cost (3: Low, 1: High)	Complexity of Implementation (3: MnDOT, 1: Legislative)	Administrative Implementation Timeline (3: < 6 Months, 1: > 18 Months)	Effort to Achieve Stakeholder Consent (3: Low, 1: High)	Anticipated Effectiveness (3: Very Likely, 1: Unlikely)	Total	Mentimeter open answers
Use pilot cars on a set frequency to control speed (contractor needs to be written into the contract)	3	3	3	3	3	15	<ul style="list-style-type: none"> <li>- MnDOT could implement pretty easily. As sad as it may be to make sure people follow the speed limit, this may result in some road rage...</li> <li>- Safety of pilot vehicle drivers is a key factor</li> <li>- Answers depend on how this is done and how frequently this is done.</li> <li>- Seems that this would be limited to certain types of projects and that the public might find the delays unjustified.</li> <li>- Consider a phased approach to influence driver behavior</li> <li>- Pilot projects for a year with high transparency and adequate (a lot) communications</li> </ul>
Required inclusion of speed monitoring equipment and/or traffic monitoring cameras in work zones. Contractor to provide a summary to the Engineer	3	2.5	3	3	3	14.5	<ul style="list-style-type: none"> <li>- Implementation would be different between construction projects and maintenance.</li> <li>- Ongoing and widely held support for protecting work zones is very helpful.</li> <li>- Doing this consistently with work zones across the state would be important for providing a baseline for speeds that would help us understand how changes affect behaviors.</li> <li>- Does this technology exist and is it readily available?</li> <li>- Need to consider how to obtain legislative support, due to the resistance in previous demonstrations of red light running or automated enforcement</li> </ul>
Encourage more detours and limited/full-time closures. Revenue offsets operational costs.	3	2	3	2	3	13	<ul style="list-style-type: none"> <li>- MnDOT currently does this, is there more opportunity to do so?</li> <li>- This could actually save cost in getting lower bids from contractors that now do not have to work in traffic.</li> <li>- County Engineers would like to see more revenue from MnDOT when detouring traffic on to their roads.</li> <li>- If we're already doing this "as much as possible" then be mindful that this may not have a new or additional impact.</li> <li>- Provide information on website and coordinate with RTMC to include on 511</li> <li>- Metro currently tries to implement this strategy as much as possible. However, there are impacts that need to be considered on detoured routes!</li> <li>- Public communication of full road closures, as with a FDR, takes a lot of effort to do well.</li> </ul>
PILOT ASE program in work zones with Owner-liability, administrative citations, In-vehicle equipment. Revenue offsets operational costs.	2	1	2	2	3	10	<ul style="list-style-type: none"> <li>- Pilot will require much of same work as a permanent roll out to get it right.</li> <li>- A clear understanding of where the revenue goes is required</li> <li>- Fair amount of work needed to draft legislation that addresses the main challenges with legislative approval.</li> <li>- Pilot would likely have less issues with public or legislature but limited initial impact on safety unless fairly widespread</li> <li>- Clear messaging for both legislative and public purposes</li> <li>- Agreed - the target of improving safety in work zones should not blur lines with revenue generation. It may be an added bonus, but this should be viewed as making and industry and public safer on the road</li> <li>- Need to have risk mitigation plan for potential unforeseen issues that may arise.</li> <li>- I think many folks are ready to make an exception for work zones only!</li> </ul>
PERMANENT ASE program in work zones with Owner-liability, Administrative/civil citations, In-vehicle equipment	1	1	2	2	3	9	<ul style="list-style-type: none"> <li>- this has been successful in other states with reducing speeds in work zones as well as reducing crashes</li> <li>- Implementation ease changes based on effectiveness and issues identified as part of A Pilot project.</li> <li>- Contract terms and duration.</li> <li>- I think A temporary ASE will be easier to pursue rather than permanent</li> </ul>

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Before and after study to measure effect of proposed changes	3	3	3	3	2	14	<ul style="list-style-type: none"> <li>- May not capture all seasonal variations but that's ok.</li> <li>- Related to time scale is it realistic to think we can get statistically significant results from a short term evaluation.</li> <li>- This would serve as a way to use data to support (hopefully) to continue with ASE beyond a pilot program</li> <li>- Studies to see if things work are always a good idea.</li> <li>- Include opportunity to obtain before and after feedback from IWZ vendor, MSP, etc.</li> <li>- Objective data will be important to support proposed and implemented changes. Especially at the political level</li> </ul>
Monitor speed data to determine best use of extraordinary enforcement resources	3	3	3	3	2	14	<ul style="list-style-type: none"> <li>- Measure speeds for a couple of days and then work with enforcement for most effective use of extraordinary enforcement</li> <li>- Civil versus criminal penalties will greatly influence any data privacy discussions.</li> <li>- Important in assessing effectiveness. We should be doing this already.</li> <li>- I suspect this would show that speeding doesn't occur when it's congested. And when it's not congested, speeding occurs independently of time of day.</li> <li>- Establish a backup plan for extraordinary enforcement. If enforcement is pulled to address an immediate safety concern, this may present an issue.</li> </ul>
Pilot project to evaluate Stationary vs. moving enforcement presence	3	3	3	3	2	14	<ul style="list-style-type: none"> <li>- Need to consider 24/7 potential against active shift only especially if WZ crashes without active work are a concern for a specific site.</li> <li>- Likelihood of consequences is usually more compelling than severity of consequences. Whether moving or stationary, drivers have to believe that they WILL get a ticket for speeding.</li> <li>- Timing should be considered during a 24/7 period to improve driver behavior</li> <li>- Tandem vs Pacer vs static car placement</li> </ul>
Clarify placement and expectations of law enforcement prior to bringing them on the job	3	3	3	3	2	14	<ul style="list-style-type: none"> <li>- MnDOT OCIC has developed a one pager giving some guidance on this.</li> <li>- Necessary step for sure.</li> <li>- Consider obtaining enforcement's perspective on placement, based on their technology, line of sight, safety, etc., understanding each work zone is unique. Eventually, develop a placement consideration process or resource</li> <li>- Enforcement, speed reduction, worker protection, first response? OCIC has a 1 pager</li> </ul>
Greater utilization of Electronic Workers Present Speed Limits	3	3	3	3	2	14	<ul style="list-style-type: none"> <li>- Needs to be done for appropriate projects. Short term or mobile operations may not be the best application</li> <li>- Medium effectiveness at best. Not sure about pinger term value.</li> <li>- Elec WPSL would be better than static but I'm doubtful it will result in a different outcome, without enforcement.</li> <li>- Potentially less physical effort to implement the WPSL. Same level of mental/administrative effort by the contractor/inspector.</li> <li>- Need to establish improved credibility of system use based on when workers are actually present.</li> <li>- Dynamic "this is your speed" signs have been shown to have some effect in slowing folks down while they are up in spot locations, or so I've heard from some TZD folks.</li> <li>- Need to assign as a primary responsibility in the contract</li> </ul>

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If using static workers present speed limit signs, assign responsibility of daily set up and take down in the contractor's contract	3	3	3	3	2	14	<ul style="list-style-type: none"> <li>- Workers present speed limits are more effective when drivers can see why they need to follow a certain speed limit - the fact that workers are there.</li> <li>- Perhaps signs could be left "up" and used for general speed messaging when workers aren't present.</li> <li>- Would likely require concerted effort from MnDOT to make sure sign is managed appropriately</li> <li>- Need enforcement</li> <li>- Potential inefficiencies of having a traffic control supervisor hang around into the evening just to take a sign down. But subs may not want to get involved in the traffic control setup/takedown, or to accept liability of messing with traffic control.</li> <li>- Safety of set up crew</li> <li>- This will improve the consistency and proper use of the static signing but without enforcement it will be no different than it is now.</li> <li>- Need to assign as a primary responsibility in the contract</li> </ul>
Greater use of Advisory Speed Limit with Vehicle Speed Feedback Signs	3	3	3	3	2	14	<ul style="list-style-type: none"> <li>- These have been shown to be effective when used; however, long term use at the same location degrades the effectiveness</li> <li>- Good idea. Seems to help in similar situations.</li> <li>- Speed limit signs are often not adhered to. Advisory speeds even less.</li> <li>- Compliance may be an issue</li> </ul>
Increased use of DMS to alert traffic of end of queue locations	3	3	3	3	2	14	<ul style="list-style-type: none"> <li>- Not sure DMS locations are proximal enough.</li> <li>- Seems like this doesn't pertain to speeding... more about warnings for slow / stopped traffic.</li> <li>- End of queue is definitely a location of major concern especially if workers are in that same area. Difficult part is making the DMS signs accurate and credible.</li> <li>- Consideration of coordination with DMS and 511 audible notifications</li> <li>- Reprogramming needed to make this a reality due to capital costs</li> </ul>
Use IWZ Stopped traffic Ahead devices for end of queue notification within the work area (as opposed to in advance of the work area)	3	3	3	3	2	14	<ul style="list-style-type: none"> <li>- Just difficult to know where the queue will be on any given day and having a warning at that location.</li> <li>- Integrate with WZDI &amp; 511 to provide audible notification</li> <li>- Consider on a per project basis as space allows. Need to be able to anticipate where to place devices during design. Most effective in high speed environments</li> </ul>
Clarify language enabling MnDOT to contract with law enforcement when state patrol is not available. OCIC has been able to fill requests.	3	3	2	3	2	13	<ul style="list-style-type: none"> <li>- Good idea to allow any LE agency to participate.</li> <li>- Isn't overall availability of enforcement officers the main issue here? Are more officers even available?</li> <li>- Flexibility is good. Though I've learned that enforcement agencies sometimes have "turf" concerns so be cautious.</li> <li>- Remember to allow for appropriate time for posting and scheduling, per enforcement process</li> <li>- MnDOT pays the enforcement agency to perform the OT. The officer benefits.</li> </ul>

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Make constructability reviews part of all design contracts	2	3	3	2	2	12	<ul style="list-style-type: none"> <li>- Some of these answers depend on the size and complexity of the projects themselves.</li> <li>- There are many projects that seem very simple where traffic disruptions are not anticipated. It is hard to predict where we will have issues on some projects.</li> <li>- Coordination with all project phases is key.</li> <li>- This is a somewhat complex but essential element. There are a number of representatives that need to be part of this effort.</li> <li>- Additional MnDOT Staffing would be required.</li> </ul>
Utilize camera/radar technology upstream of law enforcement (as identified in the ESC4WZ study) such that it meets current legislation; Modify VAST description to include citations issued through this process. This is NOT ASE.	3	2	2	2	2	11	<ul style="list-style-type: none"> <li>- Good ASE alternative.</li> <li>- For full effectiveness, would need to be tied to a communications plan to make the public aware this is being done.</li> <li>- Effort would be high due to misconception that this is ASE by the motorist.</li> <li>- I like the idea of coupling this with ASE</li> </ul>
Change state law to remove the Dimler Amendment for citations that occurs in work zones	3	1	2	1	2	9	<p>I think most motorists are unaware of Dimler. Need to establish an understanding of what Dimler is and why amend current state law. If changed, education and outreach will be needed. It might surprise you how well know it is. Consider re-visiting to remove the Dimler Amendment when ASE becomes a permanent program. I don't believe most people understand the Dimler amendment. Its perceived fairness may be tied to how enforcement is fined (ASE or not).</p>
Update the driver's education curriculum to include additional content on driving in work areas.	3	1	1	2	2	9	<p>Definite Benefits here, but they would be long term. Would be more effective if people renewing their licenses had some exposure to it but since we don't retest here, we would only reach people who are taking driver's ed classes or the odd people who looks up the driver's manual on their own accord. Would need to add more time to accommodate learning.</p>
Coordinate with insurance companies to create incentives for ongoing driver's education, similar to the Alive 55 program	1.5	2	1	2	2	8.5	<p>Not bad, but possible equity issues. People who spend a larger share of their income on insurance will be likely to want to save money on it. Good Idea but unsure what the state's role would be here</p>
Public education effort (effect of high speeds, ASE, Worker's safety) through driver education to change culture	1	1	2	2	2	8	<ul style="list-style-type: none"> <li>- Considering potential benefit vs cost, we should definitely increase this in coming construction seasons.</li> <li>- Education can't hurt / is important but it's in vain without enforcement.</li> <li>- Start Education even in elementary school.</li> <li>- I think it would help to stress this topic, perhaps even shifting focus of the current program.</li> </ul>
Authorize insurance surcharge for particular violations through violation points, such as those in work zones.	3	1	1	1	2	8	<ul style="list-style-type: none"> <li>- Could this be modified to remove the Deming amendment for speed limit violations in work zones?</li> <li>- Violation points are needed to create economic consequences.</li> <li>- Were insurance companies specific as to what would need to change in statute?</li> <li>- Are there many "\$300 tickets" written. (Can it be shared how many in the last 2 years?) If not many than what's the impact?</li> <li>- Seems like a lot of potential for abuse and/or public pushback, since lots of areas might be considered "work zones" which are far from workers.</li> <li>- The folks that have \$ to spend, may continue on as their normal and not improve driver behaviors/speeding</li> <li>- Need to have public awareness campaign</li> </ul>

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Require some level of training to renew driver's licenses	1	1	1	1	2	6	<ul style="list-style-type: none"> <li>- Good idea. Massive lift. WZ part of a larger conversation. Think aging drivers etc.</li> <li>- This would be hard, but there are a lot of potential safety benefits, so we should start the discussion.</li> <li>- Education is one component of making drivers aware and changing their behavior. Even if aware the attitude is what we want to change.</li> <li>- Might help a lot with traffic safety, not just in work zones. New laws happen, so do new devices. Also, could be useful to help train drivers regarding rights/responsibilities/interactions with law enforcement if they are stopped for an infraction.</li> <li>- May want to fold into continuing education for businesses to promote for their employees</li> </ul>
Use of additional lane closures or chicanes to slow traffic.	3	3	3	3	1.5	13.5	<ul style="list-style-type: none"> <li>- really depends on the work. For projects that have a major backup, could increase rear end crashes.</li> <li>- Could add to rear end crashes. Also, would come with increased public frustration in many cases. Would likely require additional public messaging efforts.</li> <li>- Additional lane closures could cause diversion of traffic to local roads which will cause a different set of problems.</li> <li>- Can be challenging on Projects where multiple lanes are open to traffic.</li> <li>- Coordination with RTMC to display on DMS, 511, project information page on MnDOT website</li> <li>- This may help to some degree, but may be less effective during low demand or nighttime setups</li> </ul>
More formal inspection policies, including video via special provision or contract language. Video supplement to daily log form	3	3	3	3	1.5	13.5	<ul style="list-style-type: none"> <li>- Seems like a quite a bit of discussion is needed on this to obtain the desired result.</li> <li>- I'd rather see this inspection be done by agency staff rather than the contractor. Either one can document, but I think it's important for the agency inspector to set good expectations.</li> <li>- Video needs to be reviewed in a timely manner, in order to make improvements. Consideration of weekly, and reviewed at weekly project meetings to discuss, learn and improve collaboratively. May need to be less frequent, based on project changes</li> <li>- Device maintenance is important to helping drivers navigate through the WZ. Contractor responsibility. MnDOT could do QA on the video</li> </ul>
Partner with Waze and other mapping apps to communicate to drivers approaching the work zone of the reduced speed, worker presence and end of queue locations	3	2	2	3	1.5	11.5	<ul style="list-style-type: none"> <li>- This may allow drivers to avoid work zones, which could benefit work zone safety. I wouldn't expect any operating speed changes.</li> <li>- Real time driver intel would be great for WZ and other road conditions. Drivers need to be educated or acclimated to using it.</li> <li>- Our industry needs to head this direction. We should start pushing.</li> <li>- Effectiveness limited by those with devices/vehicles with apps and enabled.</li> <li>- Seems like this could be the next big effort to tackle, after ASE.</li> <li>- Mapping apps already do this to some degree, but I don't think it makes much difference in driver speed or behavior (except to maybe have them seek an alternate route if delays are large). If an app suggests 30 mph but everyone's going 50, then what?</li> <li>- Need to coordinate with the WZDI effort, with FHWA &amp; MnDOT RTMC</li> <li>- ITS devices are capable to speak to IRIS (smartphones) and in-vehicle technology, such as adaptive cruise</li> </ul>
Offer driver improvement class (could be online) for violations in work zones to reduce penalty for 1st citation in work zone	2	1	1	2	1.5	7.5	<ul style="list-style-type: none"> <li>- Like this approach. Many people could be more affected by having to pay with their time vs money.</li> <li>- A reduction in consequences would have the effect of reducing effectiveness</li> <li>- I think many may just go thru the motions to merely lower their fine</li> </ul>

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Utilize narrow lane widths, but don't decrease overall available pavement	3	3	3	3	1	13	<ul style="list-style-type: none"> <li>- there is a documented crash modification factor related to lane width - depending on width reduction, could increase crashes. would need to carefully consider</li> <li>- Could slightly reduce speeds, but likely not enough to change incidence of crashes. Proximity of work or barriers would have greater effect but could also increase crashes.</li> <li>- Narrowing lanes could cause an increase in traffic accidents.</li> <li>- unless a more direct correlation to speed and safety with narrower lanes it could cause more issues.</li> <li>- Speeding is currently an issue of Projects where this strategy is being implemented.</li> <li>- I am not a fan of narrower lanes in work zones.</li> <li>- MnDOT Metro often narrows lanes to 11' with 1' left reaction and 2' right. This has little effect on driver speed. Would need to narrow lanes even more, but need to consider trailers and freight</li> <li>- With 6-lane road, the center lane at 11' may cause some line straddling</li> </ul>
Decrease spacing between channeling devices	3	3	3	3	1	13	<ul style="list-style-type: none"> <li>- could be strategically placed - perhaps not for the entire length, but where workers are?</li> <li>- Are there studies on this? Concerned about the potential to increase crashes.</li> <li>- Need to consider that the cost is across industry and includes replacing when hit.</li> <li>- How would this change driver behavior? Is there any experience that more devices impact speeds?</li> <li>- Need more information to support this. The visual impact to the driver may be an issue.</li> <li>- Don't think this will have much effect</li> <li>- Might be good thing to test/study/pilot.</li> </ul>
Increase use of emergency pull off areas on projects	3	3	3	3	1	13	<ul style="list-style-type: none"> <li>- Don't think this will have an impact on improving worker or driver safety. For specific projects, it could be beneficial - but not overall</li> <li>- Additional pull off lane requirements could increase the total construction time and increase exposure to traveling public.</li> <li>- Effectiveness is contingent on associated enforcement.</li> <li>- I've driven through work zones where these are used in Illinois and didn't see any reduction in speed or change in behavior</li> </ul>
Temporary transverse rumble strips in > 45 mph areas, Change in traffic control. Make people aware that a work zone is coming up in small work zones.	3	3	3	3	1	13	<ul style="list-style-type: none"> <li>- Love this. It's a "pay attention" alarm clock.</li> <li>- Anticipate little/no effect in speeds.</li> <li>- Had some initial concern about drivers avoiding them so placement is important.</li> <li>- Can these be left unattended / will they move over time? Do workers have to place, maintain and remove these "under traffic"?</li> </ul>
Replace amber lights with different lights on construction vehicles. Drivers are used to amber lights and don't move over for them.	3	2	3	3	1	12	<ul style="list-style-type: none"> <li>- Long standing debate between transportation and law enforcement agencies.</li> <li>- Anticipate little/no effect on driver behavior. Most drivers have no idea what different colors mean.</li> <li>- Concern that all changing to colors that are associated with law enforcement would diminish compliance there as well.</li> <li>- I don't foresee this making much difference in driver behavior. And if the lights were replaced with red/blue police style lights, that might just make police lights less effective.</li> <li>- The various colors of lights and their meaning can be difficult to remember/understand.</li> </ul>
Streamline authorization for 24/7 speed limits	3	1	2	3	1	10	<ul style="list-style-type: none"> <li>- if a speed limit is set for worker safety is there for 24 hours where a driver doesn't see a need to reduce speeds, they will tend to ignore it when we want them to slow down</li> <li>- Changing speed limits or the process to determine speed limits would have little to no effect on safety unless enforcement changes with them (ASE).</li> <li>- ASE seems like it will result in drivers complying with the posted speed limit. 24/7s may not be needed as much with a culture/behavior change around complying with Work Zone speeds.</li> <li>- Consideration of workers present and driver behavior impacts</li> <li>- Merely getting a lower speed needs to be coupled with increased enforcement</li> <li>- Study needed to authorize a 24/7 by statute. May increase speed differential</li> </ul>

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Allow Self-paced, webinar-style learning as a more equitable way to provide early driver education.	2	1	2	3	1	9	<ul style="list-style-type: none"> <li>- worth considering, but don't see how this will improve work zone safety</li> <li>- It is important to consider evaluating to ensure the learning meets overall purpose. May need to adjust to ever-changing needs</li> <li>- I think there are some things that may be more impactful if taught in-person</li> </ul>
More funding to Work Zone Safety Public Awareness campaigns aimed at the general public	1.5	1	2	2	1	7.5	<ul style="list-style-type: none"> <li>- Very hard to target people now with all the various ways for people to take in information. YouTube, TikTok, Billboards, News, reddit, etc...</li> <li>- Going through the process of requesting funding through the legislature could create awareness in and of itself.</li> <li>- Awareness campaigns are good (only) if coupled with enforcement.</li> <li>- Many strategies can be built on existing efforts to reduce speeds and distracted driving more generally.</li> <li>- Consider starting education segments in elementary school and continue through high school.</li> <li>- Cost - We're at \$0 cash cost now. A lot could be done with \$1-5M.</li> </ul>

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