Work Zone Speed Limits and Motorist Compliance

Final Report
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SWZDI
Smart Work Zone Deployment Initiative

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16. Abstract

This study sought to identify best practices for setting work zone speed limits by state departments of transportation (DOTs) and to evaluate select strategies for improving compliance with work zone speed limits. This was achieved by synthesizing information from a literature review, a state DOT survey, and field evaluations of select speed management strategies.

The state DOT survey found that work zone speed limits are typically established based on the characteristics and conditions of the site, including permanent speed limit, facility type, worker presence, positive protection, work duration, and type and location of work activity.

Work zone speed limit reductions of 10 mph are most frequently utilized on high-speed facility types, with further reductions provided based on worker presence in the absence of positive protection (e.g., concrete barrier). While the 10 mph speed limit reduction is often viewed as effective, the use of a 45 mph work zone speed limit when workers are present may require the use of additional speed reduction countermeasures to be effective.

Research studies have generally shown several types of work zone speed management strategies, such as speed display signs, law enforcement, variable (dynamic) speed limits, temporary rumble strips, and portable changeable message sign (PCMS) messages, to be effective in reducing vehicle speeds in work zones.

The work zone speed management strategies most frequently implemented by state DOTs include higher fines for speeding in work zones and lights on contractor or maintenance vehicles. While DOTs generally view law enforcement with an officer present as the most effective strategy for managing work zone speeds, they also perceive the availability of law enforcement as the greatest challenge to managing work zone speeds, followed by driver indifference and distracted drivers.

Based on the findings from the literature review and DOT survey, a field study was performed to assess the effectiveness of two work zone speed management strategies, which included a speed feedback trailer (SFT) and law enforcement. In general, the magnitude of the speed reduction effects were greatest in the general proximity of the SFT.

A second field evaluation assessed the effectiveness of a specialized work zone enforcement strategy. The visible presence of law enforcement activities at this location reduced work zone speeds by approximately 5 to 7 mph.

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LIST OF ABBREVIATIONS

DOT	department of transportation
DSL	digital speed limit
FHWA	Federal Highway Administration
LED	light-emitting diode
LiDAR	light detection and ranging
mph	miles per hour
MUTCD	Manual on Uniform Traffic Control Devices (for Streets and Highways)
NCHRP	National Cooperative Highway Research Program
PC	point of curvature
PCMS	portable changeable message sign
SB	southbound
SFT	speed feedback trailer
SHA	State Highway Administration
SWZDI	Smart Work Zone Deployment Initiative
TAC	technical advisory committee
USC	U.S. Code (and § stands for Section after USC)
VSL	variable speed limit
WB	westbound
WWP	when workers present
WZSZ	work zone speed zone

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EXECUTIVE SUMMARY

Work zone speed limits and management of work zone speeds continue to be critical areas of concern for state departments of transportation (DOTs). To address these concerns, this study sought to document and inform best practices for setting work zone speed limits by state DOTs and to evaluate select strategies for improving compliance with work zone speed limits.

The research team reviewed and synthesized resources including research reports, journal articles, and DOT guidelines, policies, and standards. In addition, they developed and distributed an online survey to practitioners from all 50 state DOTs and the District of Columbia DOT.

Survey responses were received from 43 DOTs for a response rate of 86 percent, and the response rate was 100 percent for the Smart Work Zone Deployment Initiative (SWZDI) participating states. Finally, a field study was performed to assess the effectiveness of select work zone speed management strategies.

Results from the literature review and survey indicated that work zone speed limits are typically based on the characteristics and conditions of the site, including permanent speed limit, facility type, worker presence, positive protection, work duration, and type and location of work activity.

Work zone speed limit reductions of 10 mph are most frequently utilized on high-speed (i.e., 50 mph and higher) facility types, with further reductions provided based on worker presence in the absence of positive protection (e.g., concrete barrier). Speed limit reductions are often not used on lower speed (i.e., 45 mph and below) facilities.

Previous studies have generally shown that speed limit reductions in work zones are associated with lower vehicle speeds, but the magnitude of the effect varies. While the 10 mph speed limit reduction is often viewed as effective, the use of a 45 mph work zone speed limit when workers are present may require the use of additional speed reduction countermeasures to be effective. Many respondents to the state DOTs survey emphasized the need to set appropriate work zone speed limits based on the specific conditions for the work zone.

To facilitate implementation of work zone speed limits, most DOTs have developed their own guidelines, policies, or standards. These policies provide for a wide range of work zone speed limits based on various criteria, such as permanent posted speed limit, worker presence, positive protection, work duration, and type and location of work activity.

Some DOTs provide decision matrices or flowcharts as guidance for determining work zone speed limits based on the site and work characteristics. Approval of work zone speed limit reductions is often prescribed by DOTs, with some DOTs using customized forms to document the approval process. Most DOTs do not require approval to maintain the permanent posted speed limit on lower speed roadways. Some DOTs also specify procedures for documenting work zone speed limits to help with enforcement and to be prepared for potential litigation. To

encourage compliance with work zone speed limits, some states include provisions for higher fines in work zones.

Along with work zone speed limit reductions, various strategies are implemented by DOTs to manage work zone speeds. Research studies have generally shown several types of work zone speed management strategies, such as speed display signs, law enforcement, variable (dynamic) speed limits, temporary rumble strips, and portable changeable message sign (PCMS) messages, to be effective in reducing vehicle speeds in work zones.

State DOTs typically select speed management strategies for a work zone based on the permanent speed limit and facility type, although other factors may be considered. The work zone speed management strategies most frequently implemented by state DOTs include higher fines for speeding in work zones and lights on contractor or maintenance vehicles. While DOTs generally view law enforcement with an officer present as the most effective strategy for managing work zone speeds, they also perceive the availability of law enforcement as the greatest challenge to managing work zone speeds, followed by driver indifference and distracted drivers.

Based on the findings from the literature review and DOT survey, a field study was performed to assess the effectiveness of two common speed management strategies for work zones: use of a speed feedback trailer (SFT) and law enforcement.

The SFT was tested at the start and end of the work zone taper within a freeway work zone single lane closure to determine which position provided the most favorable speed reduction effects. In general, the magnitude of the speed reduction effects were greatest in the general proximity of the SFT. Accordingly, positioning the SFT near the end of the lane reduction taper led to lower speeds for a more sustained distance into the work zone compared to when the SFT was positioned near the start of the taper. Therefore, the researchers recommend that the SFT be positioned near the location of greatest need for speed reduction in the work area.

The second field evaluation assessed the effectiveness of a specialized work zone enforcement strategy that included a covert speed measurement vehicle positioned near the end of the work zone along with four police cars positioned just beyond the end of the work zone to stop speeding drivers. The visible presence of law enforcement reduced work zone speed by approximately 5 mph, which increased to 7 mph shortly beyond the end of the work zone as motorists passed by the police cars positioned on the shoulder.

These speed reduction effects were only observed when at least one law enforcement vehicle was visibly present at the site, and the findings suggest that visible police presence has a substantial speed reduction effect on work zone speeds. Therefore, the researchers recommend that future work zone enforcement deployments leave at least one police vehicle in-place (with periodic active enforcement) near the work area at all times to achieve a sustained speed reduction effect.

1. INTRODUCTION

1.1 Background, Problem Statement, and Project Overview

Speed management continues to be a high priority nationally, both in regards to setting appropriate speed limits and to what degree drivers comply with work zone speed limits. One area that remains a particular challenge for speed management is construction work zones, particularly as maximum speed limits have increased to 75 mph or more in 19 states as of October 2022 (IIHS HLDI 2022).

In 2018, an estimated 123,000 work zone crashes resulted in 45,000 injuries and 755 fatalities, including 124 worker fatalities (American Road and Transportation Builders Association 2022). Many work zone crashes can be attributed to excessive speed or speed variance given that speeding has been identified as a contributory factor in about 25 percent of all work zone fatal crashes (FHWA 2022). Consequently, setting appropriate work zone speed limits is an important component in improving work zone safety.

The Manual on Uniform Traffic Control Devices (MUTCD) for Streets and Highways recommends that reduced speed limits should be used only where conditions or restrictive features are present (FHWA 2009). The MUTCD notes that frequent changes in the speed limit should be avoided and that reductions should not exceed 10 mph. Further, where a speed reduction of more than 10 mph is required, additional driver notification should be provided.

Specific work zone speed limit policies tend to vary from state to state. As a part of this study, the research team explored the differences between various state department of transportation (DOT) policies in setting work zone speed limits.

One important concern in the establishment of work zone speed limits is the degree to which drivers comply with these limits. This is particularly true in work zones, where speeds are often reduced as compared to normal (non-work zone) conditions.

Notably, several studies have concluded that although certain measures can reduce speeds, drivers generally tend to regulate their speeds as they feel necessary (Brewer et al. 2006, Finley 2011). Studies show that driver speed selection can be influenced by several factors beyond the speed limit, including the level of traffic congestion, weather conditions, and geometric characteristics (e.g., lane widths, shoulder widths).

Work zone speeds have also been shown to vary based on free-flow speeds under normal conditions, as well as under various levels of traffic volume and at different times of day (Chen et al. 2007). The physical characteristics of the work zone and the associated temporary traffic control plans also play an important role. For example, reduced lane widths have been shown to be effective in reducing average speeds (Bham and Mohammadi 2011).

The presence of workers and the level of work activity that is ongoing are also important concerns, as research has shown that speeds tend to be lower during periods of construction activity. These are also the periods during which the risks to workers are highest, leading to states such as Michigan introducing lower work zone speed limits where workers are present. However, speeds often remain above these limits regardless of whether activity is ongoing (Bham and Mohammadi 2011). From an agency perspective, additional research is warranted to assess the degree to which drivers comply with work zone speed limits under various conditions.

The National Cooperative Highway Research Program (NCHRP) Synthesis 482 report focuses on speed management strategies for work zones on high-speed roads (Shaw et al. 2015). This review looked at various speed management techniques, including speed management devices, changes in the physical driving environment, and enforcement.

While studies have generally shown enforcement to reduce speeds (Finley 2011, Benekohal et al. 1992, Medina et al. 2009, Wasson et al. 2011), the reductions tended to be greatest when enforcement activity was highest (Wasson et al. 2011). Further, these effects dissipated almost immediately after enforcement activities cease (Benekohal et al. 1992, Wasson et al. 2011). The efficacy of enforcement also tends to be influenced by the normal operating speeds of the roadway, as well as details of the temporary traffic control plan (Wasson et al. 2011). NCHRP Report 746 details pertinent information about the administration of work zone speed enforcement, along with related issues such as determining how much enforcement is required and where to position police vehicles (Ullman et al. 2013).

Given practical difficulties that arise with speed enforcement in work zones, a clear need remains to examine how other strategies can help to maintain work zone speed limit compliance. To this end, NCHRP Synthesis 482 notes that various site-specific characteristics impact speed selection, including the number of available lanes, surface condition, vertical and horizontal geometry, and type of delineation (e.g., concrete barrier vs. drums) (Shaw et al. 2015). Furthermore, several of these factors may change over time and the available space at individual work zone locations. Consequently, this research study aimed to provide insights into how various site- and work zone-specific factors affect driver speed selection.

A recent Smart Work Zone Deployment Initiative (SWZDI) study that focused on work zone speed limits was completed in 2017 (Sharma et al. 2017). This study largely focused on differences in speeds across work zones where speed limits included sites that maintained the same speed limit as the one under normal conditions as well as sites where speed limits were reduced by 5 to 15 mph.

The results showed that drivers maintained good compliance with both the original speed limit and the work zone speed limit. However, compliance was found to vary from site to site, which the authors noted was likely reflective of important site-specific factors. This study also relied on data from radar sensors installed at nine work zones, which limited the ability to account for other important factors such as the duration and intensity of work activity, as well as changes in the speeds of individual vehicles over time and space.

The work performed as a part of this project aimed to address these limitations, resulting in quantitative, empirical evidence in support of the most effective means of maintaining acceptable levels of compliance with work zone speed limits. The research was performed through a collaborative effort by a team comprised of work zone safety experts from Michigan State University (MSU) and the University of Missouri (MU).

1.2 Project Objectives

This study sought to document and inform best practices for setting work zone speed limits by state DOTs, with a focus on the SWZDI states, and also included an evaluation of select strategies for improving compliance with work zone speed limits. The objectives of this research were as follows:

- Conduct a synthesis of best practices in setting work zone speed limits in the US through an extensive literature review and state agency survey. This synthesis provides details on state laws and policies related to work zone speed limits.

- Assess the impacts of various strategies on driver speed selection and speed limit compliance in work zones. This included consideration of how temporary traffic control devices, enforcement, and other work zone-specific factors impact work zone speeds.

- Provide guidance for speed limits that are appropriate for various contexts (e.g., various roadway types, statutory speed limits), as well as recommendations for specific traffic control devices and other speeding-related countermeasures of interest.

The work performed as a part of this study included a literature review, a survey of state DOTs, and the collection of field data, culminating in a synthesis of current practices regarding the setting of work zone speed limits and guidance on how to best obtain work zone speed limit compliance.

2. LITERATURE REVIEW

This chapter presents the results of the literature review for work zone speed limits and countermeasures to reduce work zone speeds. Sources compiled for the literature review included guides, research reports, journal articles, and state DOT guidelines, policies, and standards.

This chapter is organized into the following sections: general guidance and research studies for work zone speed limits; state DOT guidelines, policies, and standards for work zone speed limits; and work zone speed countermeasures. Tabular summaries of state DOT guidelines, policies, and standards are provided in Appendix A.

2.1 General Guidance and Research Studies for Work Zone Speed Limits

This section describes general guidance available for work zone speed limits as well as results from various research studies on the effects of speed limit reductions in work zones.

2.1.1 General Guidance for Work Zone Speed Limits

General guidance regarding setting work zone speed limits and work zone speed management is available in the MUTCD and other sources. As noted on a Federal Highway Administration (FHWA) webpage, 18 state DOTs have adopted the national MUTCD, 23 state DOTs have adopted the national MUTCD with a state supplement, and 10 state DOTs have adopted a state MUTCD (FHWA 2022). (The District of Columbia and Puerto Rico are considered states pursuant to 23 USC § 101(a)(28).)

Section 6C.01 of the MUTCD indicates that reductions in work zone speed limits should be avoided when possible (FHWA 2009). When used, speed limit reductions in work zones should be constrained to 10 mph or less unless there are restrictive features. Supplemental driver notification should be included for speed limit reductions greater than 10 mph.

According to a FHWA report on setting speed limits, factors that should be considered in setting work zone speed limits include stopping sight distance, type of construction project, and crossing of construction equipment (FHWA 2012). Guidelines on work zone speed management highlight the importance of law enforcement and describe conditions that may require speed reductions in work zones (e.g., worker presence without positive protection, temporary traffic barrier or pavement drop-off near traffic, narrow lanes, lane closures, temporary crossovers, and unexpected conditions) (The Roadway Safety Consortium n.d.). A flowchart to help a practitioner determine whether to implement speed countermeasures based on work zone conditions is also provided in Appendix B.

2.1.2 Research Studies for Work Zone Speed Limits

Previous studies have generally shown that speed limit reductions in work zones are associated with lower vehicle speeds, but the magnitude of the effect varies.

In a prior SWZDI study, analysis of speed data from a subset of work zones in Iowa indicated that vehicle speeds decreased when work zone speed limits were implemented (Sharma et al. 2017). However, data quality issues prevented the researchers from being able to investigate the effects of work activity type.

A field investigation of speeds at three work zones on I-70 in Missouri found that speed limit reductions of 10 mph and 20 mph were effective in reducing average vehicle speeds by 19 mph and 33 mph, respectively, compared to no speed limit reduction (Hou et al. 2013).

Results from a study of work zone speed compliance at 36 work zones (19 with speed reductions, 11 without speed reductions, and five with permanent speed increases) sponsored by the Wisconsin DOT (WisDOT) found that 85th percentile speeds in the work zones were reduced by an average of 9.7 mph, and speed compliance (within 5 mph of the work zone posted speed limit) was obtained at 27 of the work zones (Schoon 2016).

A research study sponsored by the Texas DOT (TxDOT) found that the extent of the decrease in vehicle speeds in work zones varied based on the permanent posted speed limit. (Finley et al. 2008). Another Texas study of two Interstate corridors found speed reductions of 1 mph or less for a work zone speed limit reduction of 5 mph (Finley 2022).

Other research studies have investigated procedures for setting work zone speed limits and drivers' perceptions of work zone speeds. A process to set work zone speed limits based on the presence of potential hazards was developed by Migletz et al. (1999).

An Australian research study by Debnath et al. (2015) found that self-nominated speeds determined by drivers who viewed photographs of two work zones were lower than the observed vehicle speeds.

2.2 State DOT Guidelines, Policies, and Standards for Work Zone Speed Limits

This section summarizes state DOT guidelines, policies, and standards for work zone speed limits. For example, the Missouri DOT (MoDOT) recommends no speed limit reduction for work 10 ft beyond the traveled way and a 10 mph speed limit reduction for work within this distance, although lower speed limits can be used in special circumstances (MoDOT 2020).

Michigan's work zone speed limit policy considers various factors such as the existing speed limit, type of work activity, presence of construction workers, and presence of channelizing devices or concrete barriers (MDOT 2005).

The guidelines in Minnesota allow for work zone speed limit reductions of up to 15 mph (MnDOT 2014).

Additional information is included in tabular summaries in Appendix A and sample guidance is included in Appendix B.

2.2.1 Determination of Work Zone Speed Limits

State DOTs provide for a wide range of work zone speed limits based on various criteria. For example, the Indiana DOT (INDOT) prescribes worksite speed limits of 55 mph on rural Interstates and 40 to 45 mph on urban Interstates and high-speed non-Interstates (Table 1) (INDOT 2015).

Table 1. Worksite speed limits for Indiana

Roadway Type	Normal Speed Limit	Worksite Speed Limit
Rural Interstate	65–70 mph	55 mph
Urban Interstate and High-Speed Non-Interstate	55–60 mph	45 mph
Urban Interstate and High-Speed Non-Interstate	50 mph	40 mph

Source: INDOT 2015

MoDOT sets work zone speed limits based on the location of activity, with a speed reduction of 10 mph used when work is within 10 feet of the traffic lane or head-to-head on multi-lane highways (Table 2) (MoDOT 2020).

Table 2. Recommended work zone speed reductions for Missouri

Activity (i.e. Workers, Equipment, or Material) Location	Recommended Work Zone Speed Reduction (When Applicable)
10 ft beyond edge of travel way to edge of right-of-way	No speed reduction
In traffic lane or within 10 ft of traffic lane	10 mph
Head-to-head on multi-lane	10 mph

Special circumstances within a temporary traffic control work zone may warrant a lower speed limit than recommended above. All speed limit reductions greater than 10 mph shall be documented, submitted to, and approved by the District Work Zone Coordinator.
Source: MoDOT 2020

The Nebraska DOT (NDOT) considers several factors, including work zone conditions, existing posted speed limit, and presence of work behind concrete barriers, when setting work zone speed limits (Table 3) (NDOT 2018).

Table 3. Recommended Interstate work zone speed limits for Nebraska

Work Zone Condition	Existing Posted Speed Limit – Rural (mph)	Existing Posted Speed Limit – Urban (mph)	Work behind concrete barriers?	Maximum Speed Limit Reduction (mph)
Night Work	75	65 or less	Both	Rural – 20 Urban – 10
Shoulder Activity	75	65 or less	No	10
Shoulder Activity	75	65 or less	Yes	0
Lane Shift	75	65 or less	Both	10
Lane Closure	75	65 or less	No	20
Lane Closure	75	65 or less	Yes	10
Milled Surface/ Uneven Lanes	75	65 or less	No	10
Median Crossover	75	65 or less	Both	10*
Head to Head Traffic	75	65 or less	Both	10

* Median crossovers designed to a speed limit lower than the recommended work zone speed limit will be posted with an appropriate advisory speed through the crossover. Median crossover design speed will not dictate the posted speed limit.
Speed reductions should only be in effect for the limits of the work zone condition, not the entire work zone.
Source: NDOT 2018

The Michigan DOT (MDOT) provides guidelines for work zone speed limit reductions for six conditions based on type and location of activity (MDOT 2021).

State DOTs often discourage the use of speed reductions for work zones unless restricted conditions are present. For example, the Louisiana Department of Transportation and Development (LA DOTD) allows the Engineer to approve speed reductions of 10 mph for the following conditions: milled surfaces or travel lane elevation differences of at least 1.5 in., work near the traveled way with lane closure or reduced lane widths of 11 ft or less, or workers present within 2 ft of the traveled way edge with no positive protection (LA DOTD 2022).

The Nevada DOT (NDOT) emphasizes the use of other safety strategies (e.g., positive protection, pilot car, and temporary rumble strips) to reduce vehicle speeds and improve worker safety but allows for speed reductions based on consideration of various roadway, operational, and human factors (NDOT 2019).

Guidelines from the New York State DOT (NYSDOT) indicate that, if possible, the work zone should accommodate the design speed or permanent posted speed plus 5 mph (NYSDOT 2021).

Multiple DOTs, such as Minnesota (MnDOT), Pennsylvania (PennDOT), Tennessee (TDOT), and the Vermont Agency of Transportation (VTrans), also include provisions for different categories of speed reductions in work zones. MnDOT classifies speed reductions as Advisory Speed (Road Conditions), Advisory Speed (Worker), Workers Present Speed Limits, and 24/7 Construction Speed Limits (MnDOT 2014). The guidelines from MnDOT indicate that advisory speeds should be considered first. A Workers Present Speed Limit of 45 mph is required by law under certain conditions and typically a lane closure when workers are present, with some exceptions. MnDOT allows the use of 24/7 Construction Speed Limits under certain conditions, such as bypasses, lane drops, drop-offs, narrow lanes, no shoulders, and restricted sight distance.

To encourage compliance, some DOTs include provisions for higher fines in work zones. For example, the North Carolina DOT (NCDOT) deploys $250 fine signs along with speed reduction signs for both temporary speed reductions (30 days or less) and long-term speed reductions (NCDOT 2019). The Maryland DOT State Highway Administration (MDOT SHA) requires signs for double fines in work areas when speed limits are reduced on highways with permanent posted speed limits of 60 mph or 65 mph, while the Nebraska DOT prescribes that fines are doubled when workers are present (MDOT SHA 2002, NDOT 2018).

2.2.2 Processes for Determining Work Zone Speed Limits

Some DOTs provide decision matrices or flowcharts as guidance for determining work zone speed limits. Decision matrices from the Alabama DOT (ALDOT) prescribe work zone speed limits for two-lane highways (Table 4), multi-lane highways, and Interstates based on posted speed limit and type of work (roadside activity, lane or paved shoulder closure, or temporary roadway diversion).

Table 4. Alabama decision matrix for work zone speed limits for two-lane highways

Type of Work	Posted Speed Limit	Work Zone Speed Limit
1	All	No Reduction
2	55 mph	45 mph
2	50 mph	45 mph
2	45 mph or less	No Reduction
3	55 mph	45 mph (Desirable), 35 mph (Minimum)
3	50 mph	45 mph (Desirable), 35 mph (Minimum)
3	45 mph or less	45 mph (Desirable), 35 mph (Minimum)

Refer back to the "Decision Matrix" Section if further speed reduction should be considered for the "Type of Work" being performed
Type of Work: 1 = Roadside Activity, 2 = Lane/Paved Shoulder Closure, 3 = Temporary Roadway Diversion
Source: ALDOT 2019

Flowcharts from various DOTs, such as the NYSDOT, Ohio DOT (ODOT), and VTrans, outline processes for determining work zone speed limits based on factors such as work duration, length

of activity area, preconstruction posted speed limit, and activity type (NYSDOT 2021, ODOT 2022a, VTrans 2020). ODOT provides separate flowcharts for the design phase, construction phase, and operations or maintenance work.

Approval of work zone speed limit reductions is often prescribed by DOTs, with some DOTs using customized forms to document the approval process. For example, INDOT requires the approval of the District Construction Director for temporary worksite speed limits with an authorization form (INDOT 2015). The Utah DOT (UDOT) outlines separate processes for short-term (20 calendar days or less) and long-term (more than 20 calendar days) speed limit reductions (UDOT 2015). Short term speed limit reductions of 10 mph or less may be approved by the Region Director, while other speed limit reductions must be authorized by the Engineer for Traffic and Safety. WisDOT specifies that a Speed Zone Declaration must be submitted and approved prior to approval of the 90 percent Transportation Management Plan (WisDOT 2021). PennDOT requires preparation of a form for requesting regulatory speed limit reductions that includes data such as existing 85th percentile speeds, traffic volumes, crash data, and type of work (PennDOT n.d.) The form must be approved by the District Traffic Engineer, with additional concurrence needed if automated speed enforcement is under consideration. An example form from the Maine DOT (MaineDOT) is shown in Figure 1.

TEMPORARY WORK ZONE SPEED LIMIT FORM

The following changes in maximum speed limits are being posted to the roadway described below in order to perform the following work in a safe and efficient manner.

TOWN:_____ROUTE OR ROAD NAME: _____
STARTING AT_____AND
EXTENDING TO: _____
TEMPORARY SPEED POSTED _____* EXISTING SPEED LIMIT: _____
DATE AND TIME POSTED _____
SIGNATURE:_____ DATE AND TIME REMOVED _____
SIGNATURE:_____ WORK PERFORMED:_____
COMMENTS: _____

APPROVED:_____ Traffic Engineer Date _____

Use physical features such as project stationing, bridges, mile markers or intersections and distances from these features to describe locations. DO NOT USE SIGNS, BARRICADES, OR TEMPORARY DEVICES FOR REFERENCE.
Please note in comments if signs are vandalized, blown over , or otherwise obstructed, noting time discovered and time corrected.
Submit this form to the Region Traffic Engineer and Work Zone Safety Engineer.
* Reductions greater than 10 mph require review and recommendation from a MaineDOT Traffic Engineer and Commissioner approval.

MaineDOT 2014

Figure 1. Form for approval of temporary work zone speed limits for Maine

2.2.3 Processes for Documenting Work Zone Speed Limits

DOTs also specify procedures for documenting work zone speed limits to facilitate enforcement and potential litigation efforts. For example, the Georgia DOT (GDOT) requires that weekly records for reduced speed zones, including need for the reduction, times and location for the reduction, and accidents while the reduction was in place, be submitted to the Engineer (GDOT 2020). INDOT specifies that the contractor will submit a form weekly with information on times and locations for the reduction as part of the final construction record (INDOT 2015). The Nebraska DOT prescribes the maintenance of a daily log that identifies times and locations for work zone speed limits using a designated form (NDOT 2018).

2.2.4 Signage Requirements

Some DOTs include requirements for signage for work zone speed limits in their policies or standards. For example, the Ohio DOT provides layouts for signage for both digital speed limit (DSL) assemblies and temporary flatsheet speed limit signs in its Standard Construction Drawings (ODOT 2022b). The South Dakota DOT (SDDOT) includes standards for signage for Interstates and high-speed multi-lane highways in its Standard Plates (SDDOT 2022) and for other facility types (including a FINES DOUBLE plaque when workers are present) in its Construction Manual (SDDOT 2020). Details are provided in Appendix B.

2.3 Work Zone Speed Countermeasures

This section presents the results of a review of existing literature for work zone countermeasures, such as speed display signs, law enforcement, and variable (dynamic) speed limits.

2.3.1 Studies of Work Zone Speed Countermeasures

Several research studies have evaluated multiple work zone speed countermeasures. An NCHRP synthesis on management of work zone speeds included an overview of 28 work zone speed countermeasures and their effectiveness (Shaw et al. 2015). The study found that DOTs often use multiple countermeasures in the following categories: public outreach, upstream treatments, buffer area and activity treatments, downstream enforcement, and post-work zone treatments.

In a driving simulator study, 20 work zone speed countermeasures were assessed. The results showed that presence of workers and construction vehicles, law enforcement, speed photo enforcement, and lane shifts led to the highest speed reductions (Sommers and McAvoy 2013). Rumble strips, channelizing devices, and changeable message signs were the least effective methods for reducing vehicle speeds.

A field evaluation of six work zone speed countermeasures in New Brunswick found the following three combinations to be the most effective: Traffic Control Person and Floating Speed Zone, Fake Police Vehicle and Floating Speed Zone, and Radar Speed Display Board and Floating Speed Zone (Mason 2013).

In a study sponsored by MnDOT, 16 potential countermeasures to decrease vehicle speeds and improve safety in work zones were suggested for implementation based on an evaluation of 34 potential countermeasures (HDR 2022).

Findings from a series of three studies sponsored by the Oregon DOT (ODOT) indicated that a combination of reduced speed limit signs, radar speed displays, and portable changeable message sign (PCMS) messages along with 35 mph advisory speed signs was effective in reducing vehicle speeds (Gambatese et al. 2013, Gambatese and Zhang 2014, Gambatese and Zhang 2015).

2.3.2 Speed Display Signs

Speed display signs have been shown to be effective in reducing vehicle speeds and deceleration rates in work zones. Some examples include the following:

- Deceleration rates decreased when accurate information regarding downstream speeds was displayed to drivers on PCMSs in Minnesota (Hourdos et al. 2019).
- The use of radar speed feedback signs on multi-lane maintenance work zones in Oregon was associated with lower vehicle speeds and less speed variation between vehicles (Jafarnejad et al. 2017).
- In a field evaluation in South Carolina, mean speeds on two-lane highways were reduced by an average of 3.3 mph with a speed-activated sign, and similar results were also obtained on a multi-lane divided highway and Interstate freeway (Mattox et al. 2007).
- The use of presence lighting and digital speed limit trailers at an Interstate work zone in Indiana resulted in reductions in median speeds of 4 mph to 13 mph during nighttime (Sakhare et al. 2021).
- Results from a field study in Arizona (Figure 2) showed that the use of radar speed feedback signs and an alternating monetary fine message led to a 50% reduction in the number of motorists exceeding the speed limit by 15 mph or more (Roberts and Smaglik 2014).

Roberts and Smaglik 2014

Figure 2. Speed display sign in Arizona study

2.3.3 Law Enforcement

Research studies have also generally shown that the use of law enforcement in work zones leads to lower vehicle speeds.

- Based on the analysis of speed data from six California work zones, police presence at any level was found to reduce the mean and 85th percentile speeds (Ravani and Wang 2018).

- In a field study in Vermont, the use of targeted police enforcement resulted in lower speed reductions than radar speed feedback displays or the presence of a uniformed traffic officer (Lee et al. 2014).

- Results from a field evaluation at two Illinois work zones indicated that 57% of drivers were not speeding at the location of a police patrol car but were found to be speeding at a location 1.5 miles downstream (Lodes and Benekohal 2013).

- Based on field studies from four regions in the United States, the use of active or passive enforcement practices was associated with a decrease of 4 mph in vehicle speeds in research funded by the NCHRP (Ullman et al. 2013).

- In a field evaluation at six work zones in Indiana, researchers concluded that distributing enforcement resources among multiple work zones may work better than concentrating them at fewer work zones and that the use of complementary variable message signs lowered speeds (Chen and Tarko 2013).

- Results from an Illinois field study by Benekohal et al. (2010) showed that speed photo enforcement lowered average vehicle speeds by 4.1 mph to 7.9 mph, and similar results were obtained when a police patrol car was present with no emergency lights.

- Results from a demonstration project of photo radar speed enforcement at two work zones in Oregon indicated that speeding decreased by 23.7 percent at one location but slightly increased at the other location (Joerger 2010).

2.3.4 Variable (Dynamic) Speed Limits

The use of variable speed limits (VSLs) has been shown to be effective in reducing vehicle speeds. Results from a Missouri study of a Variable Advisory Speed Limit System (Figure 3) showed that average speeds decreased and speed compliance increased when the system was used (Edara et al. 2013).

Edara et al. 2013

Figure 3. Variable Advisory Speed Limit system used in Missouri study

Mean vehicle speeds were reduced by up to 4.7 mph in a field evaluation of VSLs in Indiana, but researchers found that three pairs of signs were needed to obtain substantial speed reductions (Mekker et al. 2016).

A portable VSL system was assessed at four locations in Utah (Van Jura et al. 2018). Findings from an evaluation of a portable VSL system at four locations in Utah showed that speeds decreased to 15 to 25 mph below the original posted speed limit.

2.3.5 Other Work Zone Speed Countermeasures

Research studies have investigated the use of other work zone speed countermeasures, such as lights on construction vehicles, temporary rumble strips, and alternative signage. Evaluations of flashing white, amber (Figure 4), and blue lights on construction equipment in Oregon found that mean vehicle speeds were reduced by 1.5 mph to 16.0 mph, with flashing blue lights shown to be more effective than flashing amber or white lights (Ahmed et al. 2021, Hurwitz et al. 2021).

Hurwitz et al. 2021

Figure 4. Use of flashing amber lights on construction equipment in Oregon

Results from a field investigation of temporary rumble strips in Missouri (Brown et al. 2022) found that speed violations were reduced by 18.2 percent to 21.2 percent, while field studies in Wisconsin (Sippel and Schoon 2016) and Iowa (Hawkins and Knickerbocker 2017) found that vehicle speeds decreased by 3.7 mph to 5.5 mph with the use of temporary rumble strips.

Mean vehicle speeds decreased by 13 percent to 17 percent with the use of graphic aided PCMS messages in a Kansas study (Huang and Bai 2019). A PCMS with alternating messages of

MAINTAIN CONSTANT SPEED and THRU WORK ZONE was found to reduce speed variation in Oregon work zones (Gambatese and Jin 2021).

Based on results from a survey of motorists in Texas, researchers recommended the use of electronic speed limit signs with white light-emitting diodes (LEDs) and flexible roll-up signs to indicate speed limits in short-term work zones (Trout et al. 2010).

The use of lighting at nighttime led to a slight increase in vehicle speeds in an Oregon study (Gambatese and Jafarnejad 2018).

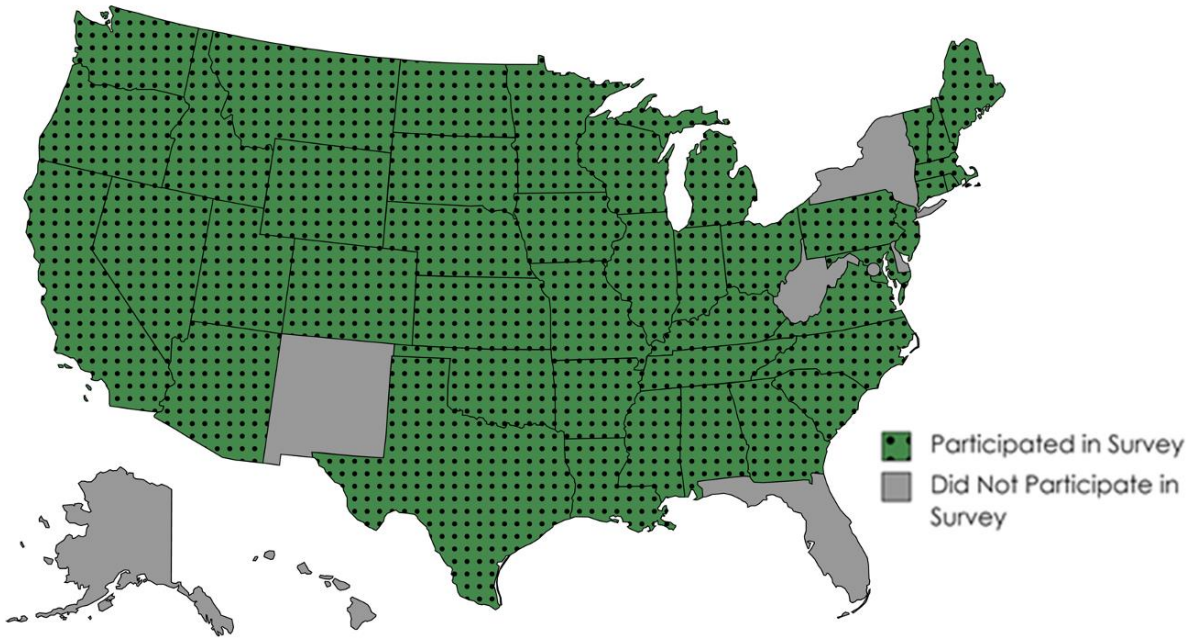
3. STATE DOT SURVEY

This chapter presents the methodology and results for the survey that was administered to DOTs from all 50 states and the District of Columbia.

3.1 Methodology

An online survey on work zone speed limits and speed management strategies in work zones was developed and administered by the researchers. The survey consisted of 15 questions and was reviewed by the project technical advisory committee (TAC) before being sent to the DOTs of all 50 states and the District of Columbia using commercial software. The survey was sent to one respondent from each DOT using a contact list that was developed based on information obtained from the FHWA and from previous surveys conducted by the researchers on work zone related topics.

Each DOT respondent received a unique survey link that could be shared within the DOT for collaboration purposes, with responses limited to one per DOT. As shown in Figure 5, responses were received from 43 DOTs for a response rate of 84 percent. The survey response rate for participating SWZDI states was 100 percent.



Created with mapchart.net

Figure 5. DOTs that responded to the survey on work zone speed limits

The survey covered various topics, such as practices and policies for work zone speed limits, strategies for managing work zone speeds, and the use of worker presence in setting work zone

speed limits. A copy of the full survey is provided in Appendix C, and the survey responses for each DOT, including comments and resources submitted, are included in Appendix D.

3.2 State Survey Results

This section presents the survey results and is divided into the following subsections: Practices for Work Zone Speed Limits (survey questions 1 through 6), Work Zone Speed Management Strategies (survey questions 7 and 8), Worker Presence (survey questions 9 through 11), and General Approach to Managing Work Zone Speeds (survey questions 12 through 15).

3.2.1 Practices for Work Zone Speed Limits

The first section of the survey sought information from DOTs regarding their general practices for setting speed limits in work zones. The first question asked about DOT resources for work zone speed limits. As shown in Table 5, 84 percent of responding DOTs indicated that they have developed policies, guidance, or standards for work zone speed limits.

Table 5. Survey results for development of policies, guidance, or standards for work zone speed limits (question 1)

Answer Choice	Response
Yes	84%
No	16%
No Response	0%

Twenty-nine DOTs submitted documents in response to this question, and a list of these documents (with hyperlinks if available) is provided in Appendix D.

In question 2, DOTs were asked about their maximum permanent speed limits on rural freeways, urban freeways, and rural two-lane highways. As shown in Table 6, 86 percent of responding DOTs have a maximum permanent speed limit of 70 mph or higher on rural freeways.

Table 6. Survey results for maximum permanent speed limit (question 2)

Facility Type	75 mph or higher	70 mph	65 mph	60 mph	55 mph	No Response
Rural Freeways	37%	49%	7%	0%	0%	7%
Urban Freeways	7%	21%	44%	9%	12%	7%
Rural Two-lane Highways	2%	16%	19%	12%	42%	9%

Maximum permanent speed limits were more widely distributed on urban freeways and rural two-lane highways. Almost half of the responding DOTs have maximum permanent speed limits of 65 mph on urban freeways and 55 mph on rural two-lane highways.

Question 3 sought information regarding the extent to which different speed reductions are allowed on rural freeways, urban freeways, and rural two-lane highways. As shown in Table 7 through Table 9, for all three facility types, the majority of responding DOTs do not require approval for cases where no speed limit reduction is applied.

Table 7. Survey results for allowable speed limit reductions in work zones on rural freeways (question 3)

Speed Limit Reduction	Allowed	Only with Approval	Not Allowed	No Response
0 mph (no reduction)	60%	5%	7%	28%
5 mph	28%	33%	9%	30%
10 mph	44%	37%	5%	14%
15 mph	26%	44%	9%	21%
20 mph or more	26%	37%	21%	16%

Table 8. Survey results for allowable speed limit reductions in work zones on urban freeways (question 3)

Speed Limit Reduction	Allowed	Only with Approval	Not Allowed	No Response
0 mph (no reduction)	63%	5%	2%	30%
5 mph	33%	30%	5%	33%
10 mph	44%	35%	2%	19%
15 mph	28%	42%	9%	21%
20 mph or more	23%	37%	21%	19%

Table 9. Survey results for allowable speed limit reductions in work zones on rural two-lane highways (question 3)

Speed Limit Reduction	Allowed	Only with Approval	Not Allowed	No Response
0 mph (no reduction)	65%	0%	9%	26%
5 mph	28%	28%	16%	28%
10 mph	51%	30%	9%	9%
15 mph	23%	37%	19%	21%
20 mph or more	21%	35%	26%	19%

Depending on the facility type and magnitude of the speed limit reduction, 28 percent to 44 percent of responding DOTs require approval of speed limit reductions. Approximately one fifth to one quarter of responding DOTs do not allow speed limit reductions of 20 mph or more.

In question 4, DOTs were asked how frequently they use different speed limit reductions on rural freeways, urban freeways, and rural two-lane highways. The results are provided in Table 10 through Table 12.

Table 10. Survey results for frequency of speed limit reductions in work zones on rural freeways (question 4)

Speed Reduction	Always	Usually	Sometimes	Rarely	Never	No Response
0 mph (no reduction)	2%	16%	42%	12%	14%	14%
5 mph	0%	5%	14%	33%	28%	21%
10 mph	7%	33%	37%	5%	5%	14%
15 mph	2%	26%	33%	12%	14%	14%
20 mph or more	2%	9%	26%	30%	19%	14%

Table 11. Survey results for frequency of speed limit reductions in work zones on urban freeways (question 4)

Speed Reduction	Always	Usually	Sometimes	Rarely	Never	No Response
0 mph (no reduction)	2%	19%	37%	16%	12%	14%
5 mph	0%	5%	14%	33%	28%	21%
10 mph	9%	35%	33%	5%	5%	14%
15 mph	2%	21%	28%	21%	12%	16%
20 mph or more	0%	7%	19%	35%	26%	14%

Table 12. Survey results for frequency of speed limit reductions in work zones on rural two-lane highways (question 4)

Speed Reduction	Always	Usually	Sometimes	Rarely	Never	No Response
0 mph (no reduction)	7%	35%	16%	14%	14%	14%
5 mph	0%	2%	14%	33%	33%	19%
10 mph	9%	26%	23%	26%	7%	9%
15 mph	0%	2%	23%	33%	26%	16%
20 mph or more	0%	5%	23%	30%	28%	14%

Speed limit reductions of 10 mph are most commonly utilized, with at least 80 percent of responding DOTs applying them on all three facility types. No speed limit reductions are also used to some extent by 72 percent to 74 percent of responding DOTs, and 72 percent of responding DOTs use speed limit reductions of 15 mph on freeways. Speed limit reductions of 20 mph or more are more prevalent on rural freeways than urban freeways or rural two-lane highways. Speed limit reductions of 5 mph are only implemented by about half of the responding DOTs.

Question 5 of the survey sought information regarding the frequency of use for different speed limit reductions in work zones based on the permanent posted speed limit, and the results are shown in Table 13 through Table 17.

Table 13. Survey results for frequency of speed limit reductions in work zones on facilities with permanent posted speed limits of 75 mph or higher (question 5)

Speed Limit Reduction	Always	Usually	Sometimes	Rarely	Never	No response
0 mph (no reduction)	2%	5%	9%	9%	30%	44%
5 mph	0%	2%	0%	14%	37%	47%
10 mph	2%	12%	16%	7%	21%	42%
15 mph	2%	9%	12%	7%	26%	44%
20 mph or more	0%	14%	14%	7%	23%	42%

Table 14. Survey results for frequency of speed limit reductions in work zones on facilities with permanent posted speed limits of 60 mph to 70 mph (question 5)

Speed Limit Reduction	Always	Usually	Sometimes	Rarely	Never	No response
0 mph (no reduction)	2%	19%	37%	14%	9%	19%
5 mph	0%	7%	12%	33%	23%	26%
10 mph	5%	40%	35%	5%	2%	14%
15 mph	2%	19%	42%	12%	9%	16%
20 mph or more	0%	9%	28%	28%	19%	16%

Table 15. Survey results for frequency of speed limit reductions in work zones on facilities with permanent posted speed limits of 50 mph to 60 mph (question 5)

Speed Limit Reduction	Always	Usually	Sometimes	Rarely	Never	No response
0 mph (no reduction)	5%	21%	30%	19%	7%	19%
5 mph	0%	7%	19%	30%	19%	26%
10 mph	5%	30%	35%	14%	7%	9%

Speed Limit Reduction	Always	Usually	Sometimes	Rarely	Never	No response
15 mph	0%	9%	28%	28%	16%	19%
20 mph or more	0%	5%	16%	30%	30%	19%

Table 16. Survey results for frequency of speed limit reductions in work zones on facilities with permanent posted speed limits of 40 mph to 50 mph (question 5)

Speed Limit Reduction	Always	Usually	Sometimes	Rarely	Never	No response
0 mph (no reduction)	7%	33%	26%	9%	7%	19%
5 mph	0%	7%	14%	33%	23%	23%
10 mph	2%	12%	16%	7%	21%	42%
15 mph	0%	2%	19%	30%	23%	26%
20 mph or more	0%	0%	9%	26%	42%	23%

Table 17. Survey results for frequency of speed limit reductions in work zones on facilities with permanent posted speed limits of 35 mph or lower (question 5)

Speed Limit Reduction	Always	Usually	Sometimes	Rarely	Never	No response
0 mph (no reduction)	12%	40%	19%	9%	2%	19%
5 mph	0%	5%	12%	37%	26%	21%
10 mph	2%	14%	23%	30%	19%	12%
15 mph	0%	0%	9%	28%	37%	26%
20 mph or more	0%	0%	2%	28%	47%	23%

For permanent posted speed limits of 50 mph or higher, a 10 mph speed reduction is most common, as it is used by 37 percent to 84 percent of responding DOTs. Approximately one third of responding DOTs implement speed limit reductions of 20 mph or higher to some extent for permanent posted speed limits of 75 mph or higher. No speed limit reduction is also used to some extent by approximately three quarters of DOTs for permanent posted speed limits of 50 mph to 70 mph. A 15 mph speed limit reduction is also implemented by approximately three quarters of responding DOTs for permanent posted speed limits of 60 mph to 70 mph. When the permanent posted speed limit is 50 mph or lower, no speed reduction is used to some extent by approximately three quarters of responding DOTs.

The results for DOT ratings of speed limit reductions are shown in Table 18 through Table 20.

Table 18. Survey results for DOT ratings of speed limit reductions in work zones on rural freeways (question 6)

Speed Reduction	Average Rating	Standard Deviation	Lowest Rating	Highest Rating	Number of Ratings
0 mph (no reduction)	2.85	1.43	1	5	27
5 mph	2.08	1.29	1	5	25
10 mph	2.91	1.03	1	5	33
15 mph	2.45	1.00	1	4	29
20 mph or more	2.33	1.22	1	4	27

1 = highly ineffective, 5 = highly effective

Table 19. Survey results for DOT ratings of speed limit reductions in work zones on urban freeways (question 6)

Speed Reduction	Average Rating	Standard Deviation	Lowest Rating	Highest Rating	Number of Ratings
0 mph (no reduction)	2.89	1.40	1	5	27
5 mph	2.15	1.23	1	5	26
10 mph	2.82	1.04	1	5	34
15 mph	2.27	1.06	1	4	30
20 mph or more	2.22	1.17	1	4	27

1 = highly ineffective, 5 = highly effective

Table 20. Survey results for DOT ratings of speed limit reductions in work zones on rural two-lane highways (question 6)

Speed Reduction	Average Rating	Standard Deviation	Lowest Rating	Highest Rating	Number of Ratings
0 mph (no reduction)	3.15	1.46	1	5	27
5 mph	2.04	1.15	1	5	25
10 mph	3.03	0.97	1	5	35
15 mph	2.00	1.04	1	4	24
20 mph or more	2.00	1.10	1	4	23

1 = highly ineffective, 5 = highly effective

No speed limit reduction and a 10 mph speed limit reduction were assigned the highest average ratings for all three facility types by the responding DOTs. A speed limit reduction of 10 mph received the highest average rating for rural freeways, while no reduction was rated the highest for urban freeways and rural two-lane highways. The lowest average ratings were given for a 5 mph reduction on freeways and for reductions of 15 mph or greater on rural two-lane highways. The standard deviation for the rating for no reduction was the highest for all three facility types, which suggests a wide range of DOT experiences when the speed limit is not reduced in work

zones. Nearly all the average ratings were less than 3, indicating in general that DOTs find it difficult to get drivers to reduce their speeds in work zones.

3.2.2 Work Zone Speed Management Strategies

Questions 7 and 8 of the survey asked the DOTs about their use of work zone speed management strategies. As shown in Table 21, higher fines for speeding in work zones and lights on contractor or maintenance vehicles are the most frequently used strategies and are used always or usually by 86 percent of responding DOTs.

Table 21. Survey for regarding frequency of use of work zone speed management strategies (question 7)

Strategy	Always	Usually	Sometimes	Rarely	Never	No Response
Automated Speed Enforcement	0%	2%	7%	14%	77%	0%
Dynamic (Variable) Speed Limits or Advisory Speeds	0%	7%	35%	21%	37%	0%
Flashing Lights on Speed Limit Signs	0%	16%	16%	28%	40%	0%
Higher Fines for Speeding in Work Zones	70%	16%	9%	2%	0%	2%
Law Enforcement Vehicle (Officer Present)	0%	37%	53%	5%	2%	2%
Law Enforcement Vehicle (Officer Not Present)	0%	0%	7%	14%	77%	2%
Lights on Contractor or Maintenance Vehicles	77%	9%	2%	0%	7%	5%
Public Outreach/Education	12%	40%	37%	7%	0%	5%
Radar Speed Display Feedback Signs	0%	19%	60%	14%	2%	5%
Reduced Lane Widths	5%	5%	60%	16%	9%	5%
Sign with Speed Limit when Workers Present	12%	7%	12%	9%	56%	5%
Temporary Rumble Strips	12%	7%	12%	9%	56%	5%
Other	0%	2%	2%	0%	0%	95%

Higher fines for speeding in work zones and public outreach and education are used to some extent by all responding DOTs. The majority of responding DOTs do not use automated speed enforcement, law enforcement without officers present, signs with speed limit when workers are present, or temporary rumble strips. Responding DOTs rated law enforcement with an officer present the highest for effectiveness (Table 22).

Table 22. Survey results for DOT ratings of effectiveness of work zone speed management strategies (question 7)

Strategy	Average Rating	Standard Deviation	Lowest Rating	Highest Rating	Number of Ratings
Automated Speed Enforcement	3.46	1.38	1	5	24
Dynamic (Variable) Speed Limits or Advisory Speeds	3.14	0.94	1	5	29
Flashing Lights on Speed Limit Signs	2.45	0.91	1	4	31
Higher Fines for Speeding in Work Zones	2.58	0.92	1	4	40
Law Enforcement Vehicle (Officer Present)	4.08	0.89	1	5	39
Law Enforcement Vehicle (Officer Not Present)	2.33	1.04	1	4	21
Lights on Contractor or Maintenance Vehicles	2.61	1.01	1	5	38
Public Outreach/Education	2.56	0.71	1	4	39
Radar Speed Display Feedback Signs	3.10	0.94	1	4	40
Reduced Lane Widths	2.81	0.95	1	5	37
Sign with Speed Limit "When Workers Present"	2.22	0.72	1	3	23
Temporary Rumble Strips	2.94	1.12	1	5	35
Other	4.00	1.00	3	5	2

1 = highly ineffective, 5 = highly effective

Flashing lights on speed limit signs, law enforcement without an officer present, and signs with speed limit When Workers Present all received average ratings of less than 2.5 on a scale of 1 to 5 for effectiveness.

3.2.3 Worker Presence

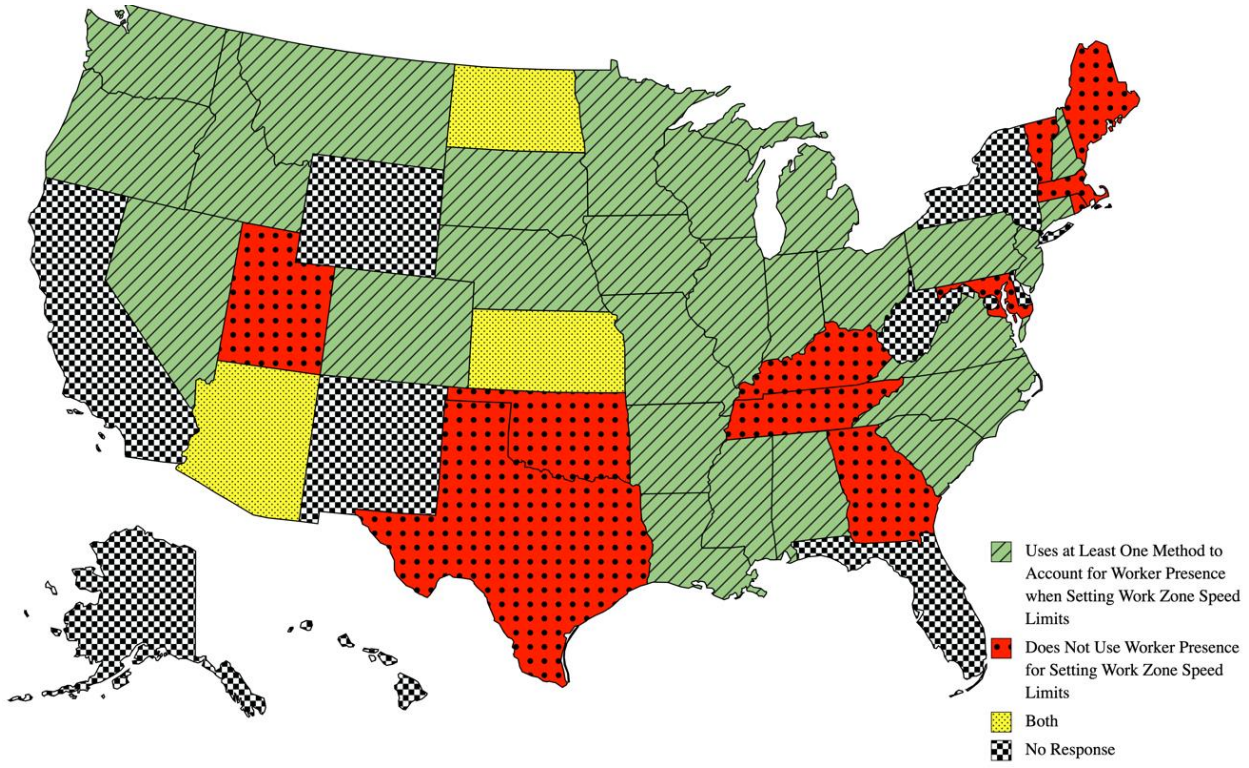
The survey included three questions regarding the use of worker presence in setting work zone speed limits. As shown in Table 23, absence of positive protection and type of work activity are the most commonly used definitions for worker presence when setting work zone speed limits.

Table 23. Survey results for definition of worker presence for setting work zone speed limits (question 9)

Definition	Response
Distance beyond traveled way (Please provide distance in the box below)	19%
Absence of positive protection	44%
Type of work activity	40%
Other (Please describe in the box below)	19%
My agency does not use worker presence for purposes of setting work zone speed limits	33%
No Response	5%

Approximately one fifth of DOTs incorporate distance beyond the traveled way, with distances ranging from 2 ft to 30 ft. Other DOTs base the definition on the physical presence of workers under certain conditions. Almost two thirds of responding DOTs use worker presence for the purpose of setting speed limits.

A map showing the use of worker presence to set work zone speed limits by DOTs is shown in Figure 6.



Created with mapchart.net

Figure 6. Use of worker presence to set work zone speed limits by DOTs

As shown in the map, the use of worker presence to set work zone speed limits is common practice in several states, especially in the midwest and northwest states. The practice is less common in the northeast, southeast, and south-central states. Three DOTs indicated both use and non-use of worker presence to set work zone speed limits, possibly suggesting that their policies on worker presence may vary based on project or region. Details regarding specific methods used to define worker presence by each DOT are included in Appendix D (Table D-28).

As shown in Table 24, DOT respondents indicated that a 10 mph speed limit reduction for the work zone was the most effective method of speed reduction, while a 45 mph work zone speed limit when workers present was viewed as the least effective method.

Table 24. Survey results for most effective method of speed reduction (question 10)

Method	Response
No speed limit reduction for work zone	16%
10 mph speed limit reduction for work zone	42%
45 mph work zone speed limit when workers present	9%
Other (please describe)	26%
No response	7%

Other methods viewed by DOTs as effective include physical cues (e.g., speed feedback signs, narrower lanes), higher speed reductions with high permanent speeds, police presence in conjunction with the speed reduction, and case-by-case basis. As indicated in Table 25, only one third of responding DOTs indicated that contractors adjust speed limits on a regular basis (e.g., hourly or daily) for worker presence.

Table 25. Survey results for adjustment of speed limits on a regular basis for worker presence (question 11)

Answer Choice	Response
Yes	33%
No	63%
No response	5%

3.2.4 General Approach to Managing Work Zone Speeds

Questions 12 through 15 of the survey sought information regarding the general approaches of DOTs in managing work zone speeds. In response to question 12, DOTs indicate that they most frequently consider permanent speed limit when setting speed limits in work zones or determining which work zone speed strategies to implement (Table 26).

Table 26. Survey results for factors considered when setting speed limits in work zones or determining which work zone speed strategies to implement (question 12)

Factor	Always	Usually	Sometimes	Rarely	Never	No response
Area Type (Urban or Rural)	28%	19%	26%	12%	9%	7%
Availability of Law Enforcement	9%	2%	26%	30%	26%	7%
Crash History	21%	12%	26%	26%	9%	7%
Duration of Work Zone	28%	21%	28%	7%	9%	7%
Functional Classification	21%	16%	26%	19%	12%	7%
Length of Work Zone	23%	28%	19%	14%	9%	7%
Percent Trucks	14%	14%	23%	28%	12%	9%
Permanent Speed Limit	51%	30%	9%	2%	2%	5%
Presence of Positive Protection	28%	33%	21%	5%	7%	7%
Terrain	9%	21%	16%	30%	16%	7%
Traffic Volumes	30%	21%	23%	14%	5%	7%
Type of Work Activity	44%	26%	19%	7%	0%	5%
Worker Presence	30%	37%	9%	2%	12%	9%
Other	30%	37%	9%	2%	12%	9%

Permanent speed limit, presence of positive protection, length of the work zone, and traffic volumes are always or usually considered by a majority of responding DOTs. Approximately one quarter of responding DOTs do not take the availability of law enforcement into consideration. Other factors mentioned by DOTs include roadway geometry and the presence of a drop-off.

As shown in Table 27, approximately one quarter of responding DOTs indicate that they have completed evaluation studies for work zone speed limits or speed management strategies. Six DOTs submitted evaluation studies, as shown in Appendix D.

Table 27. Survey results for completion of evaluation studies for work zone speed limits or speed management strategies (question 13)

Answer Choice	Response
Yes	26%
No	70%
No response	5%

In question 14, DOTs were asked to rank their top three challenges to work zone speed management, and the results are shown in Table 28.

Table 28. Survey results for ranking of work zone speed management challenges (question 14)

Challenge	Rank = 1	Rank = 2	Rank = 3	No Ranking
Agency Understaffed	7%	2%	5%	86%
Availability of Law Enforcement	19%	30%	16%	35%
Contracting Considerations	0%	2%	5%	93%
Distracted Drivers	28%	16%	9%	47%
Driver Indifference	19%	21%	23%	37%
Funding Constraints	0%	2%	9%	88%
Lack of Agency Buy-In	5%	2%	2%	91%
Lack of Evidence of Effectiveness of Strategies	0%	9%	16%	74%
Legislative Barriers	14%	7%	7%	72%
Other	5%	2%	2%	91%

Responding DOTs indicated that availability of law enforcement, driver indifference, and distracted drivers were the greatest challenges to managing work zone speeds, as they were ranked by a majority of respondents. Less than 10 percent of responding DOTs ranked contracting considerations and lack of agency buy-in as one of their top three challenges. Other

challenges mentioned include the lack of educated designs and the need to establish appropriate speed limits for the existing conditions.

The final question of the survey asked DOTs to provide other comments, which are shown in Appendix D. Notable comments included the need to use data to set appropriate speed limits in work zones, the importance of buy-in from field staff, and the importance of law enforcement in encouraging drivers to reduce their speeds.

3.3 Summary of Key Survey Findings

Some of the key findings from the survey are summarized below.

3.3.1 State DOT Policies and Practices for Setting Work Zone Speed Limits

- The use of policies, guidelines, or standards for establishing work zone speed limits is very common, as 84 percent of responding DOTs indicated that they have developed such documents.

- State DOTs typically establish work zone speed limits based on the characteristics and conditions of the site, including permanent speed limit, facility type, work duration, and type and location of work activity.

- Work zone speed limit reductions of 10 mph are most frequently utilized on high-speed (i.e., 50 mph and higher) facility types, with some states requiring approvals for such reductions.

- For lower speed facilities (i.e., 45 mph and below), speed limit reductions are not used by most DOTs, and this action typically does not require approval.

- Speed limits are often further reduced based on worker presence in the absence of positive protection. Some DOTs allow contractors to adjust speed limits on a regular basis (e.g., hourly or daily) based on worker presence.

- DOTs highlighted the importance of setting appropriate work zone speed limits based on the conditions.

3.3.2 Speed Management Strategies for Work Zones

- The selection of speed management strategies for a work zone is typically based on the permanent speed limit and facility type.

- The strategies most frequently used by state DOTs for work zone speed management include higher fines for speeding in work zones and lights on contractor or maintenance vehicles.

- The use of law enforcement with an officer present was rated as the most effective work zone speed management strategy.

- While 10 mph speed limit reductions were viewed as effective, the use of a 45 mph work zone speed limit when workers are present was not viewed as effective unless used in combination with other countermeasures.

- Availability of law enforcement, driver indifference, and distracted drivers are perceived by state DOTs as the greatest challenges to managing work zone speeds.

- The availability of evaluation studies for work zone speed limits or speed management strategies is limited, which may inhibit identification and selection of effective strategies.

4. FIELD EVALUATIONS OF WORK ZONE SPEED MANAGEMENT STRATEGIES

A primary speed management concern in work zones is the degree to which drivers comply with work zone speed limits, which has become increasingly problematic for states, like for Michigan with its 2017 speed limit increases on freeways and rural state highways (Gupta et al. 2022; Mahmud et al. 2021). Historically, for example, MDOT policy has been to reduce freeway work zone speeds by 10 and 25 mph without and with workers present, respectively. However, after its 2017 increase in freeway speed limits to 75 mph, the work zone speed limit reductions have increased to 15 mph and 30 mph without and with workers present, respectively.

The efficacy of such reductions in impacting driver speed selection is critical to state DOT attempts to balance the competing objectives of mobility and worker safety. Driver reluctance to transition to low work zone speed limits, and specifically lower speed limits where workers are present, has been a persistent concern. Prior research has shown the mere presence of a reduced work zone speed limit sign does not necessarily result in reductions in travel speeds, although several studies have shown specific strategies to reduce speeds. This warranted additional research on active speed reduction strategies in work zones.

To achieve that end, this study evaluated driver response to selected speed management strategies in a series of field studies at freeway work zones with lane closures. A number of strategies were identified, with two speed management strategies specifically targeted for the field evaluations:

- Speed feedback trailers (SFTs)
- Police enforcement

The series of field evaluations were performed at two different freeway lane closures to assess the impacts of traffic control devices on driver travel speeds while traversing critical sections of the work zones. The field evaluations were performed across multiple phases, each of which assessed important aspects related to the implementation of the various strategies. The following sections provide information on the field data collection methods and the two site-specific strategies evaluated, along with the associated results.

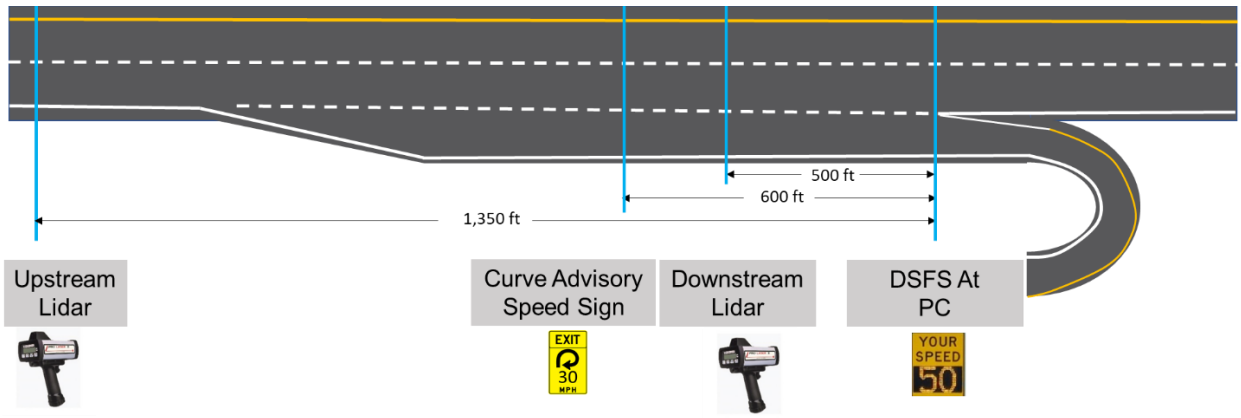
4.1 Data Collection Methods

Data were collected from each study location broadly in three phases: under the existing site conditions without the speed management strategy present, with the speed management strategy implemented and active, and after modifying the setup or operation of the strategy. The same data collection procedures were utilized across all data collection periods for a given evaluation. Most of the data were collected under dry daylight conditions on weekdays between the hours of 10:00 a.m. and 4:00 p.m. Furthermore, in wherever possible, to control for the general work zone, traffic, and weather conditions at the site, data were collected during each of the various speed management conditions within each day that data were collected.

Speed data were collected using a series of handheld light detection and ranging (LiDAR) guns operated by a team of technicians positioned in unmarked vehicles on the roadside within the work zone. The LiDAR guns were used to continuously track individual vehicle speeds throughout the entire target area at a site. At the locations that required continuous vehicle tracking over 1,000 ft, a sequence of two or three handheld LiDAR guns were operated by technicians in separate vehicles spaced appropriately within the work zone.

The LiDAR guns utilized in this study were ProLaser III from Kustom Signals, Inc. These devices are able to measure vehicular speed and distance three times per second with an accuracy of ±1 mph at a range of 6,000 ft. For purposes of this study, each LiDAR gun was typically only utilized over a range of 1,000 ft due to sight limitations caused by geometry or encroachment of other vehicles.

The LiDAR data collection vehicles were positioned on the roadside at strategic locations that were away from any critical speed measurement points (e.g., start of taper, end of taper, work area) to minimize the influence of the data collection vehicle on drivers. A sample LiDAR data collection setup at a freeway exit ramp is shown in Figure 7.



Mahmud et al. 2022

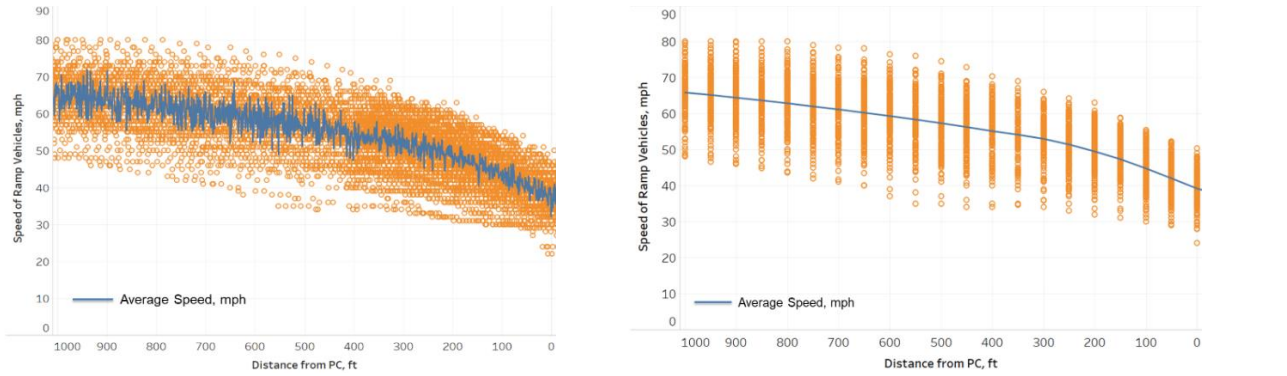
Figure 7. Typical two-person LiDAR data collection setup

This general data collection technique was utilized for all work zone field evaluations in this study.

During the data collection, the upstream data collector would begin to track each subject vehicle and continue tracking at least 100 ft beyond the downstream LiDAR technician. At this point, the tracking responsibilities were then transferred to the downstream technician, who would track each subject vehicle over the remaining distance. The data collectors communicated via cellular communications to ensure a seamless hand-off of the LiDAR speed tracking as each subject vehicle proceeded through the site. In doing so, the upstream technician would convey the type and color of each subject vehicle to the downstream LiDAR collector. To isolate driver response to the traffic control devices, only freely flowing vehicles (e.g., minimum 5-second headway) were tracked.

Each LiDAR gun was connected to a laptop using a data transfer cable, which allowed for all measurements to be recorded in real-time using proprietary software. The computer LiDAR recordings included timestamps, distances, and speeds for each measurement. After completion of the LiDAR tracking for each subject vehicle, all data collectors entered remarks on the type and color of the vehicle, in addition to any other comments. This information was later used to combine the data sets into a continuous speed profile for each subject vehicle while traversing through the site. Collecting data using this LiDAR tracking method provides a significant advantage over cameras, as it provides continuous speed measurements over the entire segment of interest, as opposed to spot speeds at fixed points.

After completion of the LiDAR tracking data collection from the field, both files from the upstream and downstream LiDAR collector were joined using the vehicle information recorded in the comments. As the relative distances between the LiDAR collectors and the fixed reference points at the sites (e.g., start of taper, end of taper/beginning of lane closure) were known, all distances were converted to be relative to the fixed point on the road. An example that represents the output of this process is shown in Figure 8a for vehicles approaching a horizontal curve.



a) Raw LiDAR data (n=203 vehicles) b) LiDAR data interpolated at 50 ft increments

Figure 8. Raw and interpolated vehicle speed data from LiDAR

Because LiDAR speeds cannot be measured at the same locations on the roadway for every vehicle, it was necessary to convert this data to a series of spot speeds using an interpolation technique, thereby allowing speeds to be assessed at specific reference points. The combined raw data were linearly interpolated at 1 ft increments using the adjacent speeds. Interpolated speeds were then calculated at 50 ft intervals using the point of curvature (PC) as a reference point, as shown in Figure 8b. Compiling the data in this manner provided a robust array of spot speeds throughout each study site.

4.2 Analytical Methods

The speed data were analyzed to determine the effects of the traffic control devices and the various conditions of their use. First, to determine any obvious trends in the data, sources for potential bias, and data distributions, a preliminary comparison of the descriptive statistics (i.e., mean, standard deviation, percentiles, etc.) and graphical representations (i.e., frequency

distribution, box plot, scatterplot) for the vehicular data was performed across the data collection periods. From there, different statistical models were developed to evaluate the effectiveness of a traffic control device.

All the analyses were performed using RStudio statistical software. Speeds were analyzed using multiple linear regression, while logistic regression was utilized to analyze the binary response variables, which included the probability of vehicles speeding. The general form of the multiple linear regression is shown in equation (1):

$$Y_i = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \cdots + \beta_k X_{ik} + \varepsilon_i \quad \textbf{(1)}$$

where Y_i is the measured speed at the PC for vehicle i, X_{i1} to X_{ik} are independent variables affecting the dependent variables (including test condition), β_0 is an intercept, β_1 to β_k are estimated regression coefficients for each independent variable, and ε_i is a normally distributed error term with variance σ^2.

When analyses were conducted using the data from multiple sites or a single site on multiple dates, the linear regression included a random effect (intercept) term in the model, with the form shown in equation (2):

$$Y_i = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \cdots + \beta_k X_{ik} + \varepsilon_i + \delta_i \quad \textbf{(2)}$$

where, δ_i is a random intercept term. This accounts for unobserved factors affecting driver behavior between the data collection periods.

4.3 Field Evaluation of Driver Response to a Speed Feedback Trailer

This study evaluated the effectiveness of an SFT in reducing driver speed while approaching and entering a freeway lane closure. The SFT utilized in this study was a solar-powered trailer-mounted radar speed feedback sign, with a high-definition full-matrix display. The sign was capable of displaying real-time speed information (in mph) and feedback messages to the approaching vehicles. The sign assembly, as shown in Figure 9, included a static 60 mph speed limit sign (which was the work zone speed limit at the freeway lane closure study site when no workers were present), a 35-in. by 36-in. feedback display capable of displaying 20-inch speed display digits, a smaller black-on-white YOUR SPEED panel on top of the display panel, and a solar panel on top of the sign.

Figure 9. Speed feedback trailer at a work zone lane closure

The sign uses Doppler radar capable of detecting vehicles up to 2,000 ft in advance of the sign. For the purpose of this study, the feedback sign was programmed to display the speed of the approaching vehicles alternating with a SLOW DOWN feedback message, which is consistent with MDOT's special provision for dynamic speed feedback signs.

4.3.1 Study Site

A single freeway work zone with a lane closure on westbound I-69 near Imlay City, Michigan, was selected to evaluate driver response to a SFT. The site was a two-lane rural limited-access freeway with a speed limit of 75 mph for passenger cars and 65 mph for heavy vehicles. The left lane was temporarily closed using orange barrels for the long-term construction project. The work zone contained all typical traffic control elements required by MDOT. In addition, three sets of transverse rumble strips were installed prior to entering the lane closure taper. The spacing between the individual rumble strips decreased with the proximity to the work zone start, providing drivers with additional alerts to reduce their speeds before entering the work zone.

4.3.2 Test Conditions and Data Collection

The position of the SFT was varied to identify the optimal location for driver speed reduction while entering and traveling through the lane closure. To assess the effects of SFT position, data were collected across three test conditions:

- Inactive SFT
- Active SFT at taper start
- Active SFT at taper end

Speed data were collected for all three SFT conditions within the same day. This allowed for increased control of external factors such as weather and work activity that may otherwise contribute to speed variation. For all test conditions, the SFT was positioned on the left shoulder past orange barrels, keeping an adequate lateral buffer from the open travel lane on the right. An example of the SFT positioned at the end of the taper during this field evaluation is shown in Figure 10.

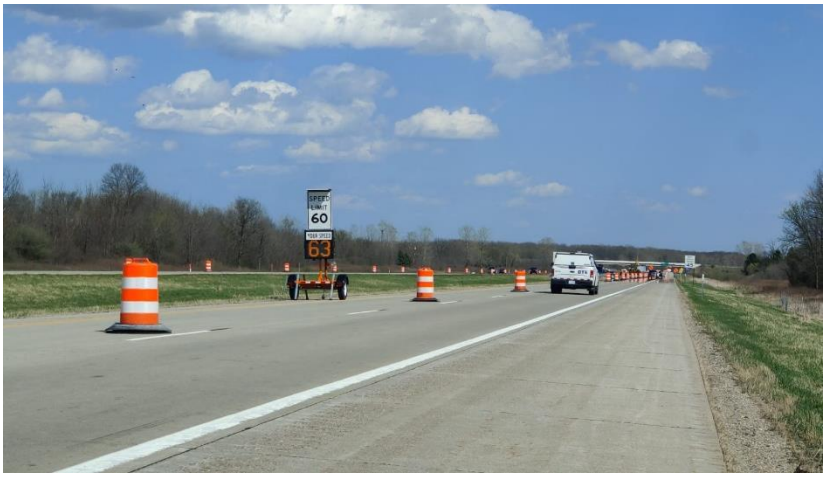


Figure 10. Speed feedback trailer positioned at the end of taper at WB I-69 work zone

Speed data were collected for vehicles in the open right lane using a sequence of three handheld LiDAR guns operated by technicians from within separate vehicles parked just beyond the right shoulder. This method allowed for continuous measurement of speeds for vehicles approaching and entering the work zone. Vehicles were tracked for more than 4,500 ft covering the approach, tapered section, and inside of the work zone. The LiDAR technicians began tracking vehicles nearly one-half mile upstream of the start of the taper and prior to the SFT being visible. This allowed for a measure of driver speed selection behavior during normal freeway driving conditions. Locations of the data collectors, rumble strips, taper start, taper end, and SFT positions are shown in Figure 11.

Figure 11. WB I-69 work zone and data collection setup

4.3.3 Work Zone Speed Data Summary

The individual vehicle speed profiles collected for all three SFT test conditions were joined between the LiDAR data files and organized into a single master data file. The final data set included complete speed profiles for 297 vehicle observations. The 85th percentile, average, and 15th percentile vehicle speed profiles for all three test conditions are shown in Figures 12, 13, and 14, respectively.

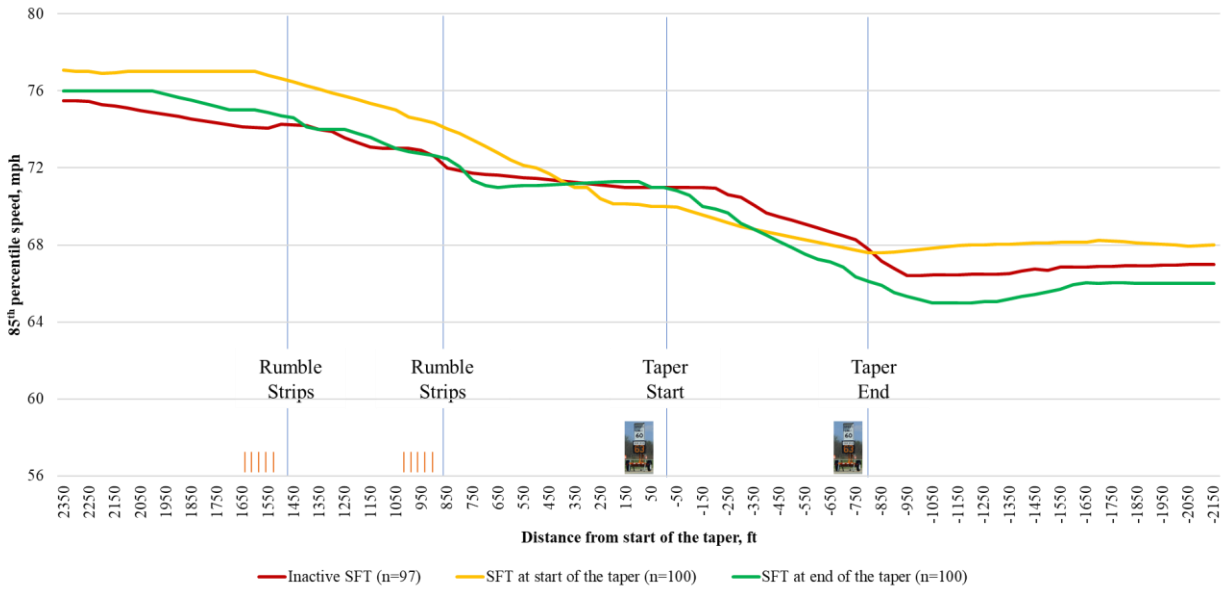


Figure 12. 85th percentile vehicle speed profiles for different SFT locations

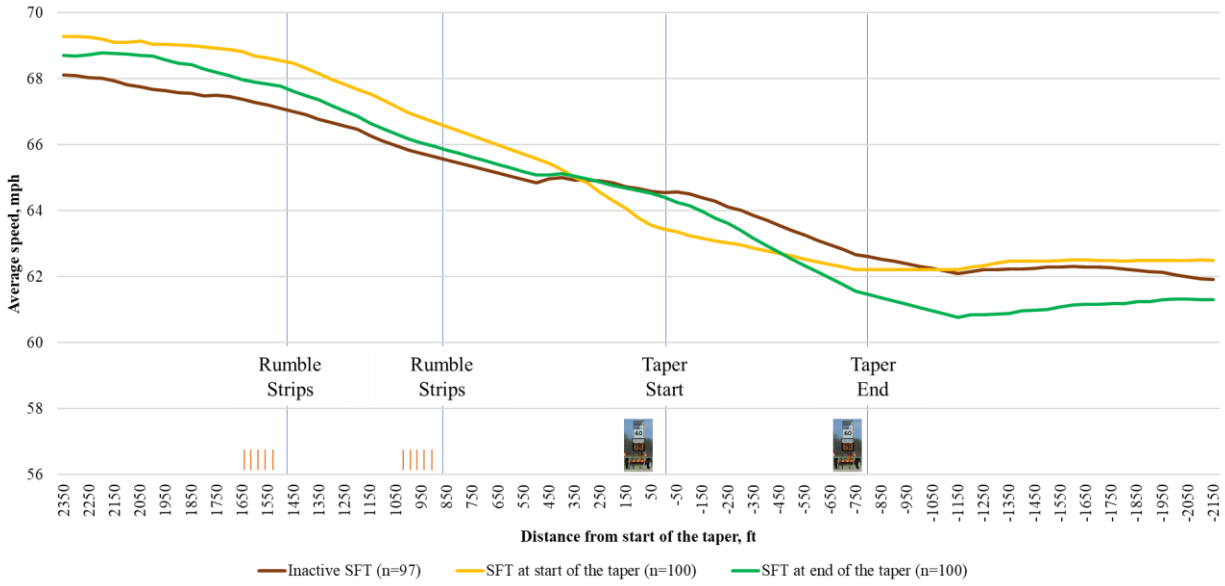


Figure 13. Average vehicle speed profiles for different SFT locations

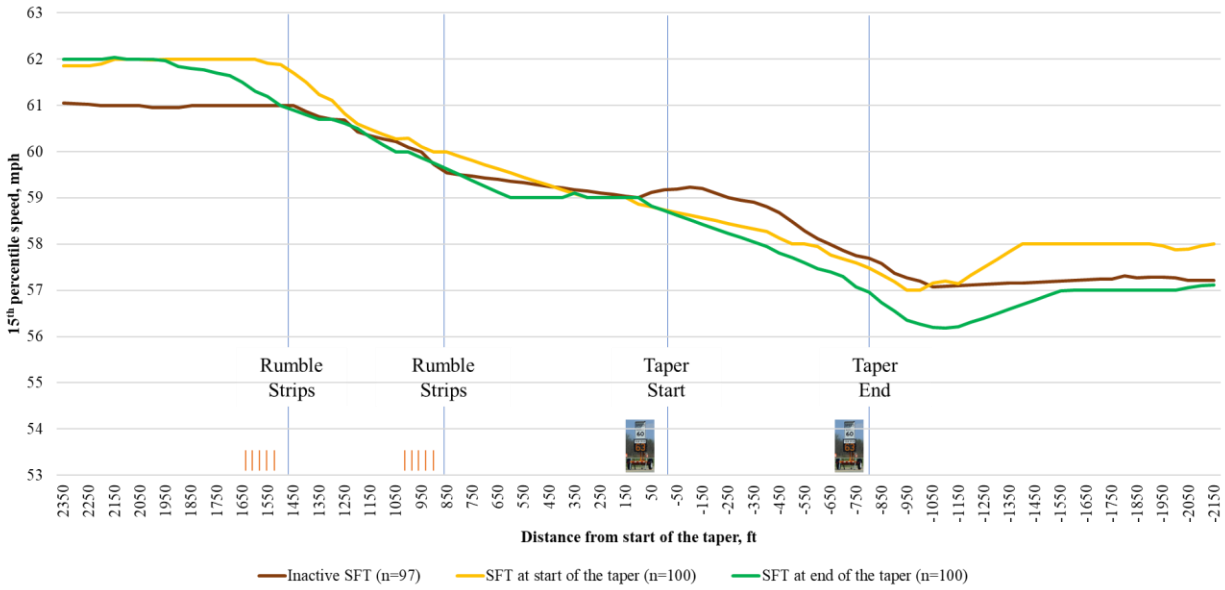


Figure 14. 15th percentile vehicle speed profiles for different SFT locations

The aggregated 15th percentile, average, 85th percentile, and standard deviation of speeds at different critical locations for the three different test conditions are presented in Table 29.

Table 29. Speed measurements at different locations for three SFT conditions

Speed Measurement Location and SFT Condition	15th Percentile	Average	85th Percentile	Std. Dev
Speed at Start of Taper				
Inactive Speed Trailer	59.178	64.558	71.000	6.011
Active Speed Trailer at Taper Start	58.588	63.437	70.000	5.757
Active Speed Trailer at Taper End	58.000	64.411	71.000	5.529
Speed at End of Taper				
Inactive Speed Trailer	57.688	62.533	67.768	5.611
Active Speed Trailer at Taper Start	57.483	62.111	67.606	5.239
Active Speed Trailer at Taper End	56.963	61.370	66.112	4.618
Speed 1,300 ft Beyond Start of Taper				
Inactive Speed Trailer	57.780	62.217	66.372	5.497
Active Speed Trailer at Taper Start	57.627	62.406	68.245	5.214
Active Speed Trailer at Taper End	56.898	60.868	65.055	4.465
Speed 1,800 ft Beyond Start of Taper				
Inactive Speed Trailer	57.694	62.232	65.615	5.297
Active Speed Trailer at Taper Start	58.000	62.479	67.969	5.053
Active Speed Trailer at Taper End	57.000	61.191	66.048	4.695

The table and figures reveal a few important insights on the effect of SFT location within the work zone, which are summarized as follows:

- **SFT Positioned at Start of Taper:** When the SFT was positioned at the start of the taper, vehicles began to decelerate more rapidly in advance of the taper compared to the other conditions. By the time vehicles had reached the start of the taper, average speeds were approximately 1 mph lower than those measured during the other test conditions. Vehicles continued to decelerate through the taper, with minimum speeds achieved by the end of the taper. These speeds were generally sustained through the end of the LiDAR tracking range (i.e., more than 1,300 ft beyond the end of the taper).The data in Table 29 indicate that the SFT positioned at start of taper resulted in a smaller standard deviation of speeds at all the critical locations evaluated here compared to the inactive SFT.

- **SFT Positioned at End of Taper:** When the SFT was positioned at the end of the taper, rapid deceleration did not begin to occur until the start of the taper, which was further downstream compared to the start of the taper. However, deceleration was sustained for a longer duration, and by the time vehicles had reached the end of the taper, average speeds were approximately 1 mph lower than those measured during the other test conditions. Additionally, vehicles continued to decelerate beyond the end of the taper, reaching a minimum speed approximately 350 ft beyond the end of the taper. These speeds were generally sustained through the end of the LiDAR tracking range (i.e., more than 1,300 ft beyond the end of the taper) but did begin to gradually increase. The SFT positioned at end

of taper resulted in a smaller standard deviation of speeds at all the critical locations evaluated here compared to the inactive SFT and SFT positioned at start of taper.

4.3.4 Results for Effect of SFT Position on Work Zone Speeds

To confirm the graphical observations presented in the prior sections, the vehicle speed data were statistically analyzed to determine the effects of SFT operation and installation location on driver speed selection while approaching and entering the work zone. Prior to analyzing the data, the speed measurements were binned at 50 ft increments, which covered from 2,350 ft upstream of the start of the work zone taper to 2,150 ft beyond the start of the work zone taper—for a total tracking distance of 4,500 ft. Binning the data in this manner allowed for the speed-reduction effects of the SFT to be statistically analyzed at various locations of interest throughout the work zone. Separate multiple linear regression models were generated for vehicle speed measured at the following locations of interest within the work zone:

- Speed at the start of taper
- Speed at the end of taper (800 ft beyond the start of taper)
- Speed 1,300 ft beyond the start of taper
- Speed 1,800 ft beyond the end of taper

The primary independent variables entered into each regression model were as follows:

- **SFT operation and location within the work zone:**
  - Inactive
  - Active and positioned at the start of taper
  - Active and positioned at the end of taper
- **Vehicle type:**
  - Passenger vehicle
  - Heavy vehicle
- **Speed 2,350 ft upstream of the taper start**

While evaluating the effects of the SFTs, the vehicle speed at the furthest upstream point (i.e., 2,350 ft upstream of the taper start) was treated as an independent variable (covariate) in the regression models. This allowed for variations in the normal speeding tendencies of drivers between the data collection periods to be controlled for within the models. Controlling for variations in upstream speed between the data collection periods was important, as the upstream speeds were found to be slightly higher during the two active SFT test conditions (see Figures 12 through 14), which suggested a slightly faster sample of drivers during the two active SFT test conditions. Analysis of the data in this manner allowed for direct comparison of the speed reduction effects of each SFT test condition at various locations within the work zone while controlling for vehicle type and speed measured upstream of the work zone.

The multiple linear regression results for speeds across the three SFT conditions are presented in Table 30.

Table 30. Multiple linear regression results for speeds of vehicles traversing the work zone as a function of SFT location and operation

Parameter	Estimate	Std. Error	t-value	p-value
Speed at Start of Taper				
Intercept	20.395	3.061	6.662	<0.001
Upstream Speed	0.648	0.043	14.994	<0.001
Passenger Cars		***Base Condition***		
Heavy Vehicles	0.120	0.646	0.186	0.852
Inactive Speed Trailer		***Base Condition***		
Active Speed Trailer at Taper Start	-1.886	0.578	-3.261	0.001
Active Speed Trailer at Taper End	-0.539	0.579	-0.931	0.353
Speed at End of Taper (800 ft Beyond Start of Taper)				
Intercept	28.902	3.103	9.314	<0.001
Upstream Speed	0.494	0.044	11.274	<0.001
Passenger Cars		***Base Condition***		
Heavy Vehicles	-0.019	0.655	-0.030	0.976
Inactive Speed Trailer		***Base Condition***		
Active Speed Trailer at Taper Start	-1.013	0.586	-1.729	0.085
Active Speed Trailer at Taper End	-1.457	0.587	-2.483	0.014
Speed 1,300 ft Beyond Start of Taper				
Intercept	33.804	3.223	10.490	<0.001
Upstream Speed	0.419	0.046	9.208	<0.001
Passenger Cars		***Base Condition***		
Heavy Vehicles	-0.439	0.680	-0.645	0.519
Inactive Speed Trailer		***Base Condition***		
Active Speed Trailer at Taper Start	-0.345	0.609	-0.567	0.571
Active Speed Trailer at Taper End	-1.584	0.610	-2.599	0.010
Speed 1,800 ft Beyond Start of Taper				
Intercept	36.826	3.240	11.366	<0.001
Upstream Speed	0.377	0.046	8.234	<0.001
Passenger Cars		***Base Condition***		
Heavy Vehicles	-0.943	0.684	-1.379	0.169
Inactive Speed Trailer		***Base Condition***		
Active Speed Trailer at Taper Start	-0.276	0.612	-0.452	0.652
Active Speed Trailer at Taper End	-1.233	0.613	-2.012	0.045

The parameter estimates from Table 30 can be directly interpreted as the difference in mean speed compared to the base condition (i.e., the inactive SFT). For example, compared to the inactive SFT, mean speeds at taper start were 1.9 mph lower with the SFT positioned at the start of the taper and 0.5 mph lower for the active SFT at the end of the taper.

The results shown in Table 30 suggest that the SFT operation and location had a statistically significant effect on driver speed selection while traversing the work zone. Speed at the start of the taper was significantly lower when the SFT was positioned at the start of the taper compared to the inactive SFT or the SFT at the end of the taper. Similarly, speed at the end of the taper was significantly lower when the SFT was positioned at the end of the taper. These findings indicate that the speed reductions were greatest at or near the SFT itself. This finding has implications on the positioning of the SFT with respect to the work area, which is described in further detail in the paragraphs that follow.

Assessment of driver speed selection beyond the end of the taper found that the SFT positioned at the end of the taper provided a more sustained speed-reduction benefit compared to the SFT positioned at the start of the taper. With the SFT positioned at the end of the taper, speeds continued to decrease beyond the end of the taper, with the lowest overall vehicle speeds in this condition occurring approximately 350 ft beyond the end of the taper. Speeds measured 500 ft beyond the end of the taper were 1.2 mph lower with the SFT positioned at the end of the taper compared to at the start of the taper. Similarly, when vehicles had reached 1,000 ft beyond the taper, speeds were 1.0 mph lower with the SPF positioned at the end of the taper versus at the start of the taper.

The results indicate that, while the SFT positioned at the start of the taper resulted in an early reduction in speed, the effectiveness of the SFT began to diminish earlier than when the SFT was positioned at the end of the taper. By the time vehicles had reached 500 ft beyond the end of the taper, speeds with the SFT positioned at the start of the taper were not statistically different than those measured with the inactive SFT. On the other hand, the SFT placed at the end of the taper resulted in later driver response, but with speed reductions that were significantly greater by the end of the taper and sustained a much greater distance into the work zone, continuing to the end of the measurement area (2,150 ft beyond the start of the taper). This finding suggests that the SFT (or a series of SFTs) be positioned near the work area so that the speed reduction effect of the SFT is maximized near the workers.

An interesting aspect of this evaluation was the magnitude of speed reduction. While earlier studies have reported a reduction of 8 to 10 mph in the average work zone speeds with the SFT present, this study found a decrease of only up to 1.5 mph in the average speed. This may have been due to the presence of three sets of temporary rumble strips at the site, which followed MDOT standards for long-term freeway lane closures. Given the rumble strips were present from the initial implementation of the work zone and associated traffic control, the researchers could not discern the effects of the rumble strips across the various SFT test conditions.

4.4 Field Evaluation of Driver Response to Work Zone Enforcement Presence

A second field study was performed to evaluate the effect of law enforcement presence on the behavior of drivers traversing a freeway lane closure. This evaluation was conducted on a four-lane section of southbound I-75 in Saginaw County, Michigan, with a non-work zone speed limit of 70 mph for passenger vehicles and 65 mph for heavy trucks. The work zone consisted of a closure of the rightmost lane, leaving the three left lanes open. The enforcement area and

corresponding data collection area were positioned near the end of the work area. Workers were present during the entire data collection period, and, consequently, the 45 mph speed limit was in effect during the enforcement operation.

4.4.1 Enforcement Procedures

To remain covert, the officer responsible for monitoring work zone travel speeds was seated in an MDOT work truck positioned near the end of the work area, approximately 600 ft upstream of the end of the work zone traffic control. Four Michigan State Police vehicles were parked on the shoulder 150 ft downstream from the end of the work zone and were visible to motorists traversing the work area. The speed monitoring officer, who utilized LiDAR to measure speeds, would relay information on speeding motorists to the downstream officers. The downstream officers would then pursue, stop, and potentially cite the offending vehicle drivers. The cluster of police cars were positioned downstream of the work zone so that vehicles could be stopped beyond the end of the work zone to minimize interference with work zone operations.

4.4.2 Test Conditions and Data Collection

Data were collected before and during the police enforcement activity. During the enforcement period, at many times, none of the downstream police cars were present at the site due to the frequency of traffic stops for vehicles caught speeding in the work zone. This allowed for the collection of data with no visible police present during the enforcement period. Data were collected for a total of three test conditions:

- Before enforcement
- During enforcement, at least one downstream police car present
- During enforcement, all downstream police cars absent

Data were collected on the same day for all three conditions. Vehicle speed data at this site were collected using a sequence of two handheld LiDAR guns operated by technicians from within separate vehicles parked just beyond the shoulder. The upstream LiDAR speed data collector was positioned with the state police officer inside the MDOT work truck 600 ft upstream of the end of the work zone. The downstream LiDAR speed data collector was positioned 1,625 ft downstream of the upstream collector, approximately 1,000 ft beyond the position of the pursing police vehicles. An annotated map depicting the data collection setup and position of the enforcement vehicles is provided in Figure 15.

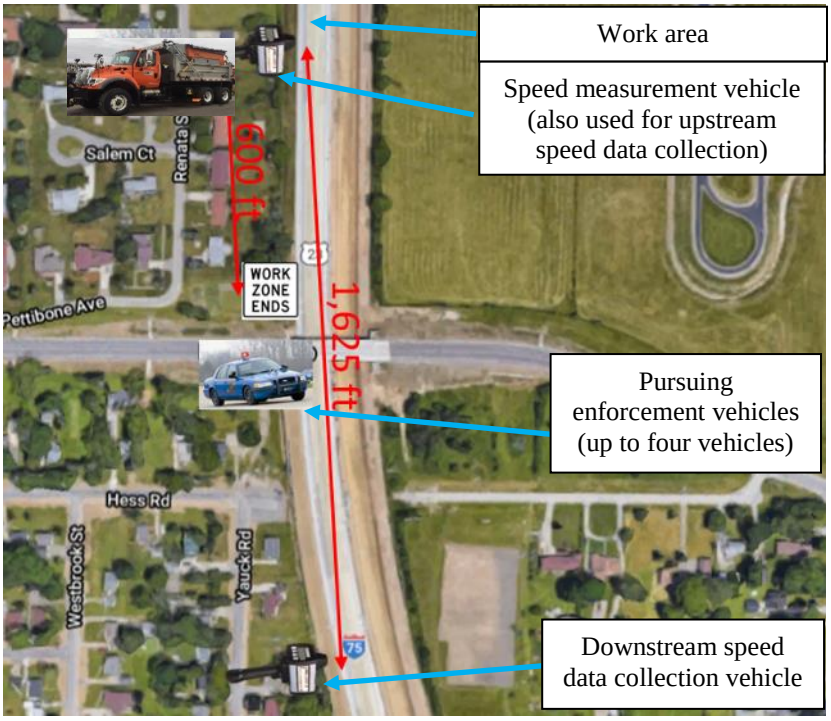


Figure 15. SB I-75 work zone data collection setup and law enforcement vehicle locations

4.4.3 Data Summary

A total of 320 vehicle speed profiles were collected between the three different enforcement test conditions during the I-75 work zone evaluation. The 85th percentile, average, and 15th percentile speed profiles for three test conditions are presented in Figures 16, 17, and 18, respectively.

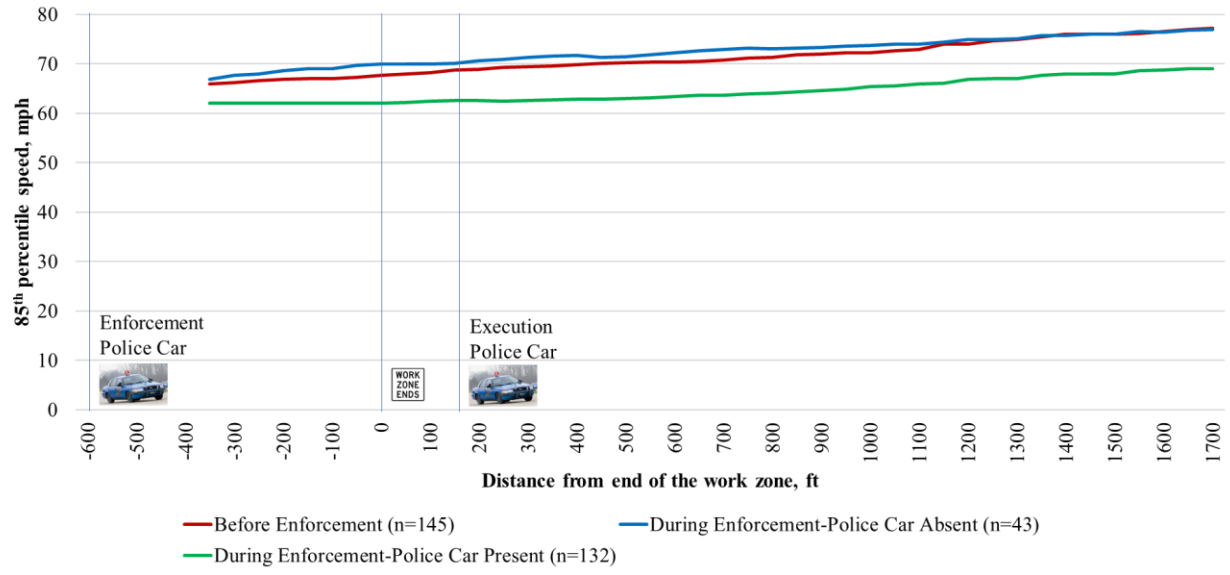


Figure 16. 85th percentile vehicle speed profiles before and during police enforcement

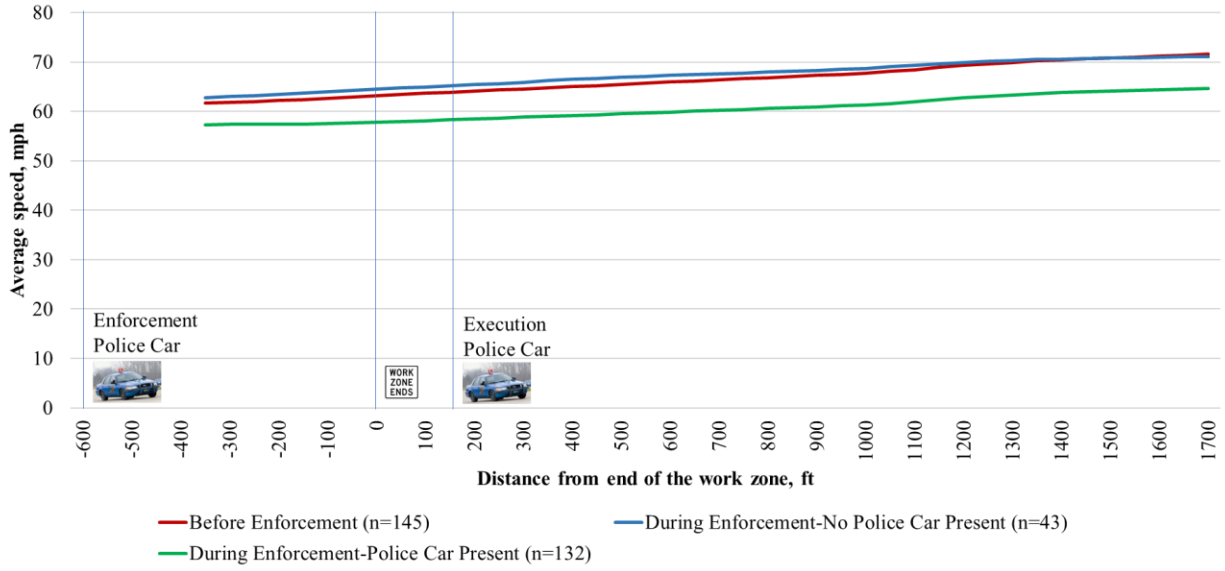


Figure 17. Average vehicle speed profiles before and during police enforcement

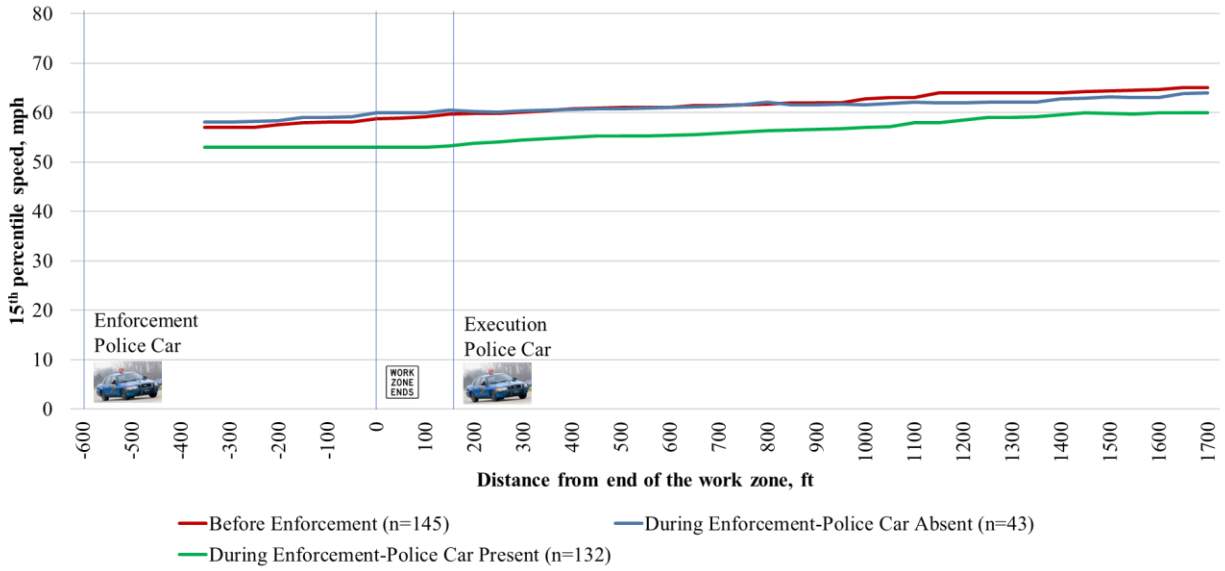


Figure 18. 15th percentile vehicle speed profiles before and during police enforcement

The aggregated 15th percentile, average, 85th percentile, and standard deviation of speeds at different critical locations for three different enforcement conditions are presented in Table 31.

Table 31. Speed measurements at different locations for three enforcement conditions

Speed Measurement Location and Enforcement Condition	15th Percentile	Average	85th Percentile	Std. Dev
Speed 350 ft Prior to the End of the Work Zone				
Before Enforcement	57.000	61.661	66.000	4.590
During Enforcement-No Police Car Present	58.150	62.726	66.860	5.719
During Enforcement-Police Car Present	53.000	57.336	62.000	4.347
Speed at End of the Work Zone				
Before Enforcement	58.705	63.128	67.645	4.633
During Enforcement-No Police Car Present	59.965	64.484	69.946	6.002
During Enforcement-Police Car Present	53.000	57.797	62.031	4.358
Speed 150 ft Beyond the End of the Work Zone				
Before Enforcement	59.675	63.865	68.747	4.552
During Enforcement-No Police Car Present	60.509	65.143	70.100	6.028
During Enforcement-Police Car Present	53.280	58.284	62.565	4.119
Speed 500 ft Beyond the End of the Work Zone				
Before Enforcement	61.020	65.464	70.265	4.474
During Enforcement-No Police Car Present	60.744	66.921	71.460	5.781
During Enforcement-Police Car Present	55.282	59.513	63.016	3.884
Speed 1,000 ft Beyond the End of the Work Zone				
Before Enforcement	62.742	67.793	72.267	4.933
During Enforcement-No Police Car Present	61.613	68.719	73.761	5.982
During Enforcement-Police Car Present	57.000	61.301	65.372	4.020
Speed 1,500 ft Beyond the End of the Work Zone				
Before Enforcement	64.360	70.814	76.015	5.362
During Enforcement-No Police Car Present	63.131	70.767	76.032	6.169
During Enforcement-Police Car Present	59.838	64.101	68.000	4.212

Figure 17 and Table 31 show that average speeds were approximately 5 mph lower within the work zone when at least one law enforcement vehicle was present, and this reduction increased to approximately 7 mph beyond the end of the work zone as vehicles passed by the police cars positioned on the shoulder. Interestingly, when police vehicles were not visibly present at the site during the enforcement period, the average speed profile was similar to the before enforcement period. Similar trends in speed differences for different test conditions were observed for vehicle 15th and 85th percentiles speeds.

Note that, the police speed monitoring at the upstream enforcement point was performed covertly from within an MDOT work truck. These findings suggest that visible police presence has a substantial speed reduction effect on work zone speeds.

The results in Table 31 also indicate that the standard deviation of speeds decreased when at least one police car was present during the enforcement period. Further analysis and subsequent discussion on the effects of law enforcement presence are discussed in the following section.

4.4.4 Results for Effect of Law Enforcement Presence on Work Zone Speeds

To confirm the graphical observations presented in the previous section, the vehicle speed data were statistically analyzed using linear regression to determine the effects of law enforcement presence on driver speed selection while traversing the work zone. Prior to analyzing the data, the speed measurements were binned at 50 ft increments, which covered from 350 ft upstream of the end of the work zone (250 ft beyond the speed measurement vehicle) to 1,700 ft beyond the end of the work zone—for a total tracking distance of 2,050 ft.

Similar to the SFT analysis, binning the data in this manner allowed for the speed-reduction effects of the enforcement activity to be statistically analyzed at various locations of interest throughout the work zone and beyond. However, unlike the SFT linear regression analysis, this regression model did not control for normal driver speed selection tendencies given it was not possible to collect speeds upstream of the work zone. Thus, to simplify the analysis, a single multiple linear regression model was generated with vehicle speed as the dependent variable, along with the following independent variables, each of which was coded in the model as a series of binary indicator variables:

- **Speed measurement location:**
  - 350 ft prior to the end of the work zone
  - Speed at the end of the work zone
  - Speed 150 ft beyond the end of the work zone
  - Speed 500 ft beyond the end of the work zone
  - Speed 1,000 ft beyond the end of the work zone
  - Speed 1,500 ft beyond the end of the work zone
- **Enforcement activity:**
  - Before enforcement
  - During enforcement – no police car present
  - During enforcement – at least one police car present
- **Vehicle type:**
  - Passenger vehicle
  - Heavy vehicle
- **Lane:**
  - Left
  - Center
  - Right

The multiple linear regression results for speeds across the three enforcement conditions are presented in Table 32.

Table 32. Multiple linear regression results for speeds of vehicles traversing the work zone as a function of law enforcement activity

Parameter	Estimate	Std. Error	t-value	p-value
Intercept	60.686	0.412	147.323	<0.001
Passenger Cars		***Base Condition***		
Heavy Vehicles	-3.781	0.283	-13.363	<0.001
Right Lane		***Base Condition***		
Center Lane	1.880	0.248	7.587	<0.001
Left Lane	7.824	0.697	11.224	<0.001
Speed 350 ft Prior to the End of the Work Zone				
Before Enforcement		***Base Condition***		
During Enforcement-No Police Car Present	0.898	0.734	1.224	0.221
During Enforcement-Police Car Present	-4.280	0.511	-8.383	<0.001
Speed at End of the Work Zone				
Before Enforcement	1.467	0.497	2.949	0.003
During Enforcement-No Police Car Present	2.657	0.734	3.620	<0.001
During Enforcement-Police Car Present	-3.819	0.511	-7.481	<0.001
Speed 150 ft Beyond the End of the Work Zone				
Before Enforcement	2.204	0.497	4.431	<0.001
During Enforcement-No Police Car Present	3.315	0.734	4.518	<0.001
During Enforcement-Police Car Present	-3.332	0.511	-6.527	<0.001
Speed 500 ft Beyond the End of the Work Zone				
Before Enforcement	3.803	0.497	7.645	<0.001
During Enforcement-No Police Car Present	5.094	0.734	6.941	<0.001
During Enforcement-Police Car Present	-2.103	0.511	-4.119	<0.001
Speed 1,000 ft Beyond the End of the Work Zone				
Before Enforcement	6.132	0.497	12.327	<0.001
During Enforcement-No Police Car Present	6.891	0.734	9.391	<0.001
During Enforcement-Police Car Present	-0.315	0.511	-0.617	0.537
Speed 1,500 ft Beyond the End of the Work Zone				
Before Enforcement	9.153	0.497	18.401	<0.001
During Enforcement-No Police Car Present	8.940	0.734	12.182	<0.001
During Enforcement-Police Car Present	2.486	0.511	4.868	<0.001

The parameter estimates from Table 32 can be directly interpreted as the difference in mean speed compared to the base condition. For the case of the law enforcement variable, all parameter estimates were computed relative to the speed measured 350 ft prior to the end of the work zone and before the enforcement period.

For example, compared to the before enforcement period, mean speeds at this location were 4.3 mph lower during enforcement when at least one police car was present and 0.9 mph higher during enforcement when no police car was present. It follows that the effects of the law enforcement presence are interpreted by taking the difference between the parameter estimates at

each speed measurement location. So, for speeds measured at the end of the work zone, the parameter estimates would suggest that the presence of at least one police car at the site during enforcement had a -6.5 mph effect (i.e., -3.8 minus 2.7 mph) on speeds compared to when no police car was present during the enforcement period. These marginal effects on work zone travel speeds associated with the enforcement conditions are shown graphically in Figure 19.

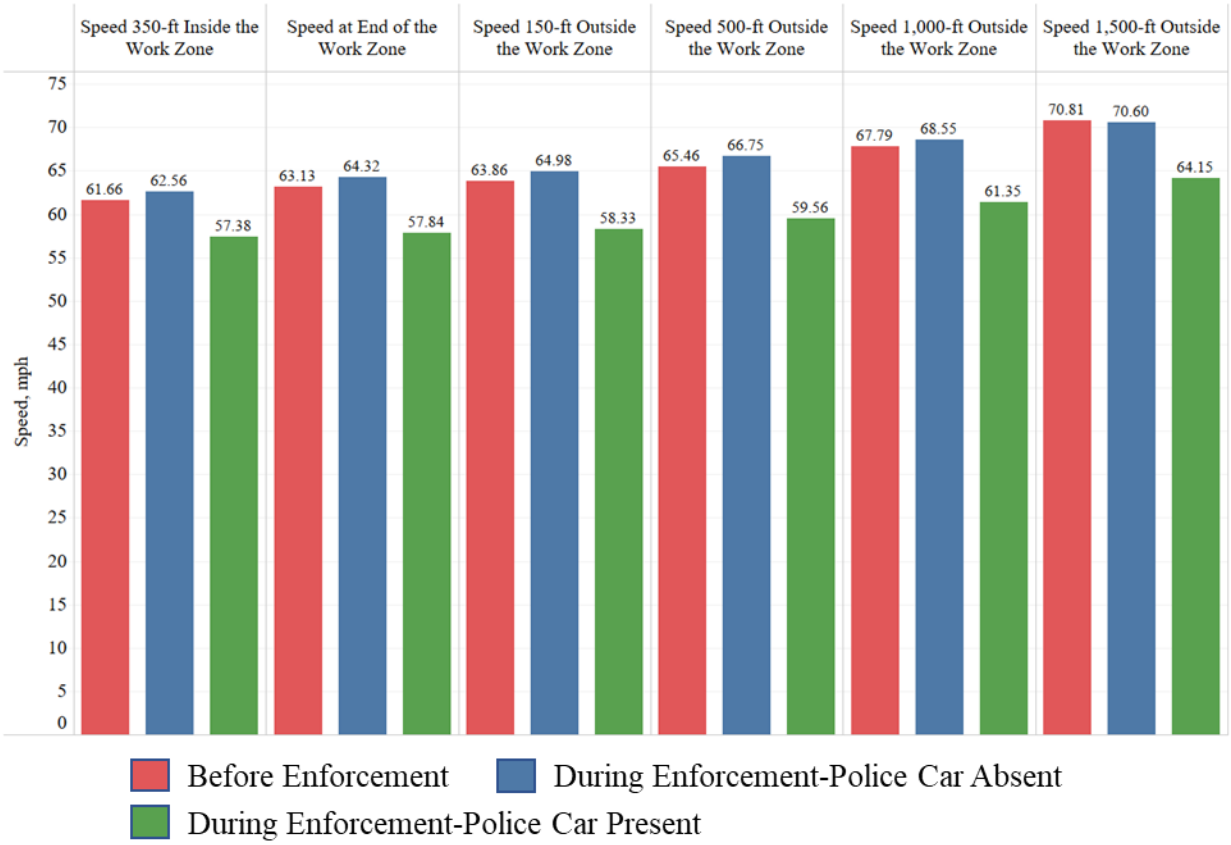


Figure 19. Average speeds measured at various locations within and beyond the work zone as a function of law enforcement activity

The results presented in Table 32 and Figure 19 suggest that the visible presence of at least one law enforcement vehicle has a significant effect on vehicle speeds while exiting the work zone, and this reduction persisted beyond the end of the work zone. Not surprisingly, during enforcement when the downstream police car was not present, the speeds at different locations were similar to the conditions prior to enforcement.

Given that the conditions were most similar during the enforcement period, assessment of the effects of law enforcement presence was made by comparing the speeds with and without at least one police car present during the enforcement period.

At the initial speed measurement location 350 ft prior to the end of the work zone, the presence of at least one police car resulted in a speed reduction of 5.2 mph, which had increased to 6.5

mph upon reaching the end of the work zone. The law enforcement effects on speeds were maximized between 500 ft and 1,000 ft beyond the end of the work zone, where speeds were 7.2 mph lower with at least one police car present on the shoulder. Even 1,500 ft beyond the end of the work zone, where the 70 mph speed limit was in effect, the average speed was 64.2 mph.

5. CONCLUSIONS AND RECOMMENDATIONS

Work zone speed limits and management of work zone speeds continue to be critical areas of concern for state DOTs. To address these concerns, this study sought to document and inform best practices for setting work zone speed limits by state DOTs and to evaluate select strategies for improving compliance with work zone speed limits. This was achieved by synthesizing information from a literature review, a state DOT survey, and field evaluations of two speed management strategies. The conclusions and recommendations resulting from these efforts are detailed in the following sections.

5.1 Establishing Work Zone Speed Limits

- State DOTs typically establish work zone speed limits based on the characteristics and conditions of the site, including permanent speed limit, facility type, worker presence, positive protection, work duration, and type and location of work activity.

- Work zone speed limit reductions of 10 mph are most frequently utilized on high-speed (i.e., 50 mph and higher) facility types, with some states requiring approvals for such reductions.

- For lower speed facilities (i.e., 45 mph and below), speed limit reductions are not used by most DOTs, and this action typically does not require approval.

- Speed limits are often further reduced based on worker presence in the absence of positive protection. Some DOTs allow contractors to adjust speed limits on a regular basis (e.g., hourly or daily) based on worker presence.

- Previous studies have generally shown that speed limit reductions in work zones are associated with lower vehicle speeds, but the magnitude of the effect varies. Specifically, the use of a 45 mph work zone speed limit when workers are present may require the use of additional speed reduction countermeasures to be effective.

5.2 DOT Guidelines, Policies, and Standards for Work Zone Speed Limits

- DOTs emphasize the need to set appropriate work zone speed limits based on the specific conditions for the work zone. To assist in this process, most DOTs have developed guidelines, policies, or standards for work zone speed limits.

- Some DOTs provide decision matrices or flowcharts as guidance for determining work zone speed limits based on the site and work characteristics.

- Approval of work zone speed limit reductions is often prescribed by DOTs, with some DOTs using customized forms to document the approval process. Most DOTs do not require approval to maintain the permanent posted speed limit on lower speed roadways.

- Some DOTs also specify procedures for documenting work zone speed limits to help with enforcement and to be prepared for potential litigation.

- To encourage compliance with work zone speed limits, some states include provisions for higher fines in work zones.

5.3 Strategies to Manage Work Zone Speeds

- The available research studies have generally shown several types of work zone speed management strategies, such as speed display signs, law enforcement, variable (dynamic) speed limits, temporary rumble strips, and PCMS messages, to be effective in reducing vehicle speeds in work zones.

- The selection of speed management strategies for a work zone is typically based on the permanent speed limit and facility type.

- As indicated by the state DOT survey results, higher fines for speeding in work zones and lights on contractor or maintenance vehicles are the most frequently used strategies to manage work zone speeds.

- DOTs generally view law enforcement with an officer present as the most effective strategy for managing work zone speeds. However, availability of law enforcement is noted by DOTs as the greatest challenge to managing work zone speeds, followed by driver indifference and distracted drivers.

5.4 Guidance on the Use of Speed Feedback Trailers and Law Enforcement in Work Zones

An SFT was tested at the start and end of the taper within a freeway work zone single lane closure. In general, the magnitude of the speed reduction effects were greatest in the general proximity of the SFT. Accordingly, positioning the SFT near the end of the taper led to lower speeds for a more sustained distance into the work zone compared to when the SFT was positioned near the start of the taper.

It was concluded that the SFT should be positioned near the location of greatest need for speed reductions, such as the work area. Future research in this area should seek to determine the optimal SFT location with respect to the work area, in addition to how worker presence influences the speed reduction effects of the SFT.

Furthermore, future research should also include assessment of the distance that SFT effects are sustained within the work zone in an attempt to determine spacing guidelines for work zone SFTs.

Additional evaluations may also consider the use of SFTs in combination with DSL signs (which have recently been approved for use in Michigan, for example) and allow for the displayed speed limit to vary in real-time based on worker presence at the site.

Finally, it is likely that the results showing the effectiveness of the SFT as a work zone speed-reduction strategy for this evaluation were dampened by the use of rumble strips in advance of the work zone. Future research could also evaluate the effects of SFTs at work zone lane closures without rumble strips.

A second evaluation assessed the effectiveness of a specialized work zone enforcement strategy that included a covert speed measurement vehicle positioned near the end of the work zone along with four police cars positioned just beyond the end of the work zone to stop speeding drivers. The visible presence of law enforcement at this location reduced work zone speed by approximately 5 mph, which increased to 7 mph shortly beyond the end of the work zone as vehicles passed by the police cars positioned on the shoulder. It must be emphasized that this speed reduction effect was only observed when at least one law enforcement vehicle was visibly present at the site. No speed reduction effects were observed during periods where each of the four patrol cars were pursuing violators downstream of the work zone.

These findings suggest that visible police presence has a substantial speed reduction effect on work zone speeds. Future deployment of this enforcement strategy should consider leaving at least one police vehicle in place (with periodic active enforcement) near the work area at all times to achieve a sustained speed reduction effect.

Future work could also assess the effectiveness of law enforcement vehicles positioned at other locations within the work zone, including in advance of the work area, in addition to assessment of whether the effects of enforcement vary as a function of work zone length and/or duration.

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APPENDIX A: SUMMARY OF EXISTING GUIDANCE, POLICIES, AND STANDARDS FOR WORK ZONE SPEED LIMITS

Table A-1. Summary of DOT guidance, policies, and standards for work zone speed limits

State	Title	Reference	Summary
Alabama	Standard Operating Procedure for Determining Speed Limit(s) in a Work Zone	ALDOT 2019	Describes procedure for work zone speed limits. Speed reduction to be used only in areas of high importance. Signs must be covered when not in use. Speed reduction exceeding 10 mph requires prior postings in 10 mph increments. Includes decision matrix for work zone speed limits.
Alabama	AL Code Section 32-5A-176.1 (2012) (Speed limits in construction zones)	Alabama Code 2012	The construction zone speed limits should be posted at least 100 feet before the start of the work zone. Fines for speeding are doubled when construction workers are present.
Alaska	DOT&PF Policy and Procedure 05.05.020, Establishment of Speed Limits and Zones	Alaska DOT&PF 2012	Speed limit reductions for work zones should only be used for specific situations (traffic control devices are placed close to the road, workers are near the traveled way without positive protection for extended periods of time, pavement drop-offs, pavement removal, and restricted horizontal and vertical curvature). Speed limit reductions should not be used for durations under 48 hours. Speed limit reductions exceeding 10 mph should not be used unless there are limitations due to horizontal or vertical curvature. Documentation should be developed and distributed in accordance with the provided table.
Arizona	Temporary Traffic Control Design Guidelines	ADOT 2019	Refers to 6C.01 of the MUTCD. Speed reduction exceeding 10 mph requires prior postings in increments of 10 mph or less. Documentation of the speed reduction should be prepared and kept in the project file.
Arkansas	–	–	Adopted national MUTCD. Refer to National MUTCD Section 6C.01: Temporary Traffic Control Plans.

State	Title	Reference	Summary
California	California Manual for Setting Speed Limits	Caltrans 2020	Speed reduction exceeding 10 mph is reserved for special cases and requires advanced notice. Speed reduction of 15 mph or more requires prior postings in 10 mph increments. 25 mph is the lowest allowable speed limit through work zones. Includes criteria for temporary construction work zone speed limit reduction and continuous (24 hours, 7 days a week) construction work zone speed limit reduction. Construction Work Zone Speed Limit Reduction Determination form must be completed by Project Engineer.
Colorado	CDOT Temporary Speed Limit Reduction (Form 558)	CDOT 2019	Form for requesting a work zone speed limit reduction. Includes a table of recommended minimum work zone speed limits based on existing posted speed limit, width of travel lane plus shoulder, and work zone conditions (active or non-active work and approach to a potential full stop condition). Signature authority for temporary speed limits is delegated by the Chief Engineer to the Region Traffic Engineers or other personnel.
Connecticut	Guidelines on Establishing Speed Limits in the State of Connecticut	CTDOT 2021	Temporary speed limit reductions should be 10 mph or less unless restrictive conditions are present. Use of temporary speed limits on state highways requires approval of Division of Traffic Engineering. Examples of conditions for the use of temporary speed limit reductions include lane closures, reductions in lane widths, and shoulder reductions.
Delaware	Delaware MUTCD (Section 6C.01: Temporary Traffic Control)	DelDOT 2011	For temporary traffic control plans, the posted speed limit or 85th percentile speed should be used unless constrained conditions exist. Work zone speed limit reductions require approval of Delaware DOT Traffic. Speed limit reduction of more than 10 mph should only be used under constrained conditions with additional driver notification and incremental postings.
District of Columbia	D.C. Temporary Traffic Control Manual Guidelines and Standards (Section 4.1: Temporary Traffic Control Plans)	DDOT 2006	Speed limit reduction for work zones should be avoided if possible and requires traffic and engineering study and documentation. Speed limit reduction exceeding 10 mph should be avoided unless constrained conditions exist and requires stepping down.

State	Title	Reference	Summary
Florida	Work Zone Speed Limit (Florida)	ARTBA 2021a	Speed limit reduction for work zones should only be used when needed by temporary geometry and requires traffic and engineering study and documentation. Speed limit reduction exceeding 10 mph requires approval of District Traffic Operations Engineer and District Director.
Georgia	Special Provision (Section 150-Traffic Control)	GDOT 2020	Speed limit should be reduced when one of the following conditions exists: lane closure, elevation difference adjacent to travel lane greater than two inches, equipment or workers located within 10 feet of travel lane, temporary portable concrete barriers located within two feet of the traveled way, or at the direction of the Engineer. If existing speed limit is 65 mph or 70 mph, speed reduction should be 10 mph. If existing speed limit is 60 mph, speed reduction should be 5 mph. Speed reduction must be approved by the Engineer if the existing speed limit is 55 mph or less. Speed reduction should not exceed 10 mph. Includes requirements for record-keeping and signage.
Hawaii	–	–	Adopted national MUTCD. Refer to National MUTCD Section 6C.01: Temporary Traffic Control Plans.
Idaho	Work Zone Safety & Mobility Program	ITD 2012	Sections of reduced speed should be as short as possible. Highest speeds possible should be maintained. Speed reductions require state approval. See national MUTCD section 6C.01 for further guidance.

State	Title	Reference	Summary
Illinois	Policy on Establishing and Posting Speed Limits on the State Highway System	IDOT 2015	Speed limit reduction should not be used if there is not a lane closure. Provides speed limit reductions for different scenarios multi-lane and two-lane highways. For multi-lane highways with existing speed limit of 70, 65, or 60 mph, work zone speed limit should be 55 mph for lane closures or crossovers and 45 mph when workers are present next to traffic with no temporary concrete barrier. Speed limit reduction should not be used on two-lane highways with lane closure. Other situations that may allow speed limit reduction include narrow lanes (10 feet or less), drop-offs, temporary change in road alignment, or insufficient sight distance. In these situations, documentation must be prepared and approved by the District Operations Engineer. Illinois Vehicle Code allows for higher fines in work zones. Signage for work zone speed limits must be posted based on standards and design plans.
Indiana	Construction Memorandum 14-06 (Use of Worksite Speed Limit Assembly Signs during Construction)	INDOT 2015	Outlines process for using Worksite Speed Limit Assembly during construction. Speed reduction requires submittal and approval of authorization form. Includes table of worksite speed limit based on the normal speed limit. Speed limit reduction should be at least 10 mph. Provides guidance for both Intermittent Use (“When Flashing”) Type and Continuous Use (24/7) Type. Includes examples with signage layout, relevant statues, authorization form, and tracking form.
Indiana	Indiana Design Manual (Section 503-3.04(01): Construction Zone Design Speed and Section 503-7.01(02): Regulatory Signing)	INDOT 2021	Design speed for construction zone should be shown on maintenance of traffic plans. Design speed should ideally meet the existing posted speed limit but should not be more than 10 mph under the posted speed limit. Includes guidance for layout of signage.
Iowa	Design Manual (9A-4: Regulatory Speed Limit Changes)	Iowa DOT 2012	Provides guidance for work zone speed limit reductions for two-lane highways and multi-lane divided highways (four or six lanes). Use of work zone speed limit reduction for other scenarios requires approval of Work Zone Traffic Control Engineer and Traffic Safety Field Engineer.

State	Title	Reference	Summary
Kansas	2019 Statute (Article 15. – Uniform Act Regulating Traffic; Rules of the Road)	Kansas Legislature 2022	Local authorities can reduce speed limits in work zones to 20 mph unless qualifications put forth by K.S.A 8-1560a are met.
Kentucky	Standard Drawings (No. TTD-130: Speed Zone Signing for Work Zones)	KYTC 2020	Speed limits in work zones should only be reduced under restrictive conditions. For an existing speed limit of 70 mph, a speed limit reduction exceeding 15 mph requires an engineering/traffic investigation. For other highways, a speed limit reduction exceeding 10 mph requires an engineering/traffic investigation. Provides standards for signage.
Louisiana	Standard Plans (TTC-00(A): Temporary Traffic Control General Notes Sheet)	LA DOTD 2022	Speed limit reductions of 10 mph may be approved by the Engineer for posted speeds of 45 mph or higher for the following conditions: milled surfaces or travel lane elevation differences of at least 1.5 inches, work near traveled way with lane closure or reduced lane widths of 11 feet or less, or workers present within 2 feet of traveled way edge with no positive protection. Other speed limit reductions require approval of Chief Construction Engineer. Speed limit reduction should only be used within the applicable project limits. “SPEED LIMIT WHEN FLASHING” signs may be used as supplementary signage.
Maine	Administrative Policy Memorandum No. 431: Establishment of Speed Limits in Work Zones	MaineDOT 2014	Speed limit reductions for work zones should be used under constrained conditions such as crossovers, lane closures, drop-offs, narrow lanes, poor road surface conditions, or limited sight distance. Worker presence should not be the main reason for the speed reduction. A “REDUCED SPEED AHEAD” sign should be deployed for speed reductions of 15 mph or higher. Documentation of the work zone speed limit reduction should be prepared and maintained. Higher work zone speed limit reductions require approval. Includes form for temporary work zone speed limit reduction.

State	Title	Reference	Summary
Maryland	Application Guideline No. 6-F1 (Work Zones on 65 / 60 mph Roadways)	MDOT SHA 2002	Work zone speed limit reductions on highways with existing speed limits of 60 mph or 65 mph should be approved by the District Engineer based on engineering judgement or an engineering study. When used, the speed limit reduction should typically be 5 mph but not more than 10 mph. The speed reduction should only be posted when the conditions justifying its use are present. A "FINES DOUBLED IN WORK ZONES" sign should be posted. Advisory speed limits should be used for spot situations such as narrow lanes for a short distance or abrupt changes in alignment. Development of revised guidelines to include existing speed limits of 70 mph is in progress.
Massachusetts	Work Zone Speed Limit (Massachusetts)	ARTBA 2021b	Speed limit reductions are discouraged. Advisory speed limits are posted in some situations. Speed limits are to be reduced in 10 mph intervals.

State	Title	Reference	Summary
Michigan	Work Zone Safety and Mobility Manual	MDOT 2021	Provides guidelines for work zone speed limit reductions for six conditions. • Roadside activity with workers and equipment more than 15 feet from the edge of traveled way (no reduction) • Roadside activity with workers and equipment between 2 feet and 15 feet from the edge of traveled way (10 mph reduction or work zone speed limit of 45 mph, temporary traffic control order required) • Roadside activity with workers and equipment within 2 feet of edge of traveled way or up to 2 feet into the lane (10 mph reduction or work zone speed limit of 45 mph, no temporary traffic control order required) • Short duration or mobile activities on the shoulder (no reduction) • Roadside activity with workers and equipment in the traffic lanes (10 mph reduction or work zone speed limit of 45 mph, no temporary traffic control order required) • Temporary detour (no reduction) Other exceptions may be considered on a case-by-case basis.
Minnesota	Speed Limits in Work Zones Guidelines	MnDOT 2014	Provides guidelines for four types of work zone speed limits: Advisory Speed (Road Conditions), Advisory Speed (Worker), Workers Present Speed Limits, and 24/7 Construction Speed Limits. Advisory speeds should be considered first. Workers Present Speed Limit of 45 mph is required by law under certain conditions (lane closure when workers present with some exceptions). 24/7 Construction Speed Limits may be used under certain conditions such as bypasses, lane drops, drop-offs, narrow lanes, no shoulders, and restricted sight distance. Statutes include $300 fine for speeding in work zone. Also includes guidance for dynamic speed display signs in work zones and layout drawings for work zone speed limit signage.

State	Title	Reference	Summary
Minnesota	Minnesota MUTCD (Section 6C.1: Temporary Traffic Control Plans)	MnDOT 2020	Reductions exceeding 15 mph should be avoided unless required by restrictive features. In such cases, provide additional driver warning.
Mississippi	Work Zone Speed Limit (Mississippi)	ARTBA 2021c	Speed reduction of 10 mph is required for high-speed facilities.
Missouri	Engineering Policy Guide (Section 616.12 Work Zone Speed Limits)	MoDOT 2020	Includes table with recommended work zone speed limit reductions based on location of activity. Activity further than 10 ft. beyond road edge: No speed reduction. Activity closer than 10 ft. behind road edge *and/or* head-to-head on multi-lane: 10 mph maximum speed reduction. Speed reduction exceeding 10 mph must be approved and, if exceeding 20 mph, must be done in two steps.
Montana	Standard Specifications for Road and Bridge Construction (Section 618: Traffic Control)	MDT 2020	Table 618-5 (Traffic Control Speed Limits in Construction Zones) contains work zone speed limit guidelines depending on road type and activity type.
Nebraska	Operating Instruction 60-18: Work Zone Speed Limits	NDOT 2018	Requires submittal and approval of form to use speed limits greater than 35 mph in rural areas and greater than 25 mph in urban areas. Provides tables with recommended work zone speed limits based on work zone condition, existing posted speed limit, and presence of work behind concrete barriers for Interstates, multi-lane highways, and two-lane highways. Allows for use of double fines for speeding when workers are present. Includes requirements for signage and record-keeping.

State	Title	Reference	Summary
Nevada	Work Zone Safety and Mobility Implementation Guide	NDOT 2019	For projects with existing speed limit greater than 55 mph, speed reduction of 10 mph or work zone speed limit of 55 may be requested and requires approval of Chief Traffic Operations Engineer. Speed reduction to a speed below 55 mph requires approval from Chief Traffic Operations Engineer and Directors Office. Provides list of strategies to reduce worker exposure and vehicle speeds when workers are present. Also provides list of various roadway, operational, and human factors for consideration when assessing the need for a speed reduction. A matrix of work zone speed reduction countermeasures is included in Appendix C of the guide.
New Hampshire	NH Construction Speed Limit Update	Lambert 2019	Work zone speed limits are determined during development of traffic control plan and reviewed by Traffic Control Committee. Authority rests with State Traffic Engineer. Minimum speed reduction of 10 mph reduction required if workers close enough to be endangered by traffic.
New Jersey	–	–	Adopted national MUTCD. Refer to National MUTCD Section 6C.01: Temporary Traffic Control Plans.
New Mexico	–	–	Adopted national MUTCD. Refer to National MUTCD Section 6C.01: Temporary Traffic Control Plans.
New York	Highway Design Manual (16.4.6: Work Zone Speed Limits)	NYSDOT 2021	If possible, work zone features should meet design speed or permanent posted speed limit plus 5 mph. Speed limit reductions for work zones should be 10 mph or less unless an engineering study demonstrates the need for a greater reduction. State code allows higher fines for speeding in work zones. Provides flowcharts to help assess the need for work zone advisory speeds or work zone regulatory speed limit reductions, layout drawings for signing patterns, and table summarizing advantages and disadvantages of different speed control methods. Documentation should be prepared.

State	Title	Reference	Summary
North Carolina	Work Zone Speed Limit Ordinances	NCDOT 2019	Speed limit reductions should only be used under restrictive conditions. Speed limit reduction should be limited to 10 mph or less, but reductions of more than 10 mph are allowed when restrictive features are present. Additional driver notification should be provided for reductions of more than 10 mph. Speed limits should be stepped down in advance. Allows for both temporary speed limit reduction (30 days or less) and standard speed signs (long term). Includes $250 fine signs in addition to the speed reduction signs. Speed reductions need a speed ordinance signed by State Traffic Engineer. Lays out an extensive list of qualifiers for work zone speed limit reduction. Also provides guidelines for "variable" speed limit reductions.
North Dakota	NDDOT Traffic Operations Manual	NDDOT 2020	Speed limits may be reduced by more than 20 mph if necessary for work zones. Speed limit reductions exceeding 10 mph require a reduced speed limit ahead sign.
Ohio	Traffic Engineering Manual [Part 6 (Sections 640-18.2, 641-34, Plan Note 642-24, and others) and Part 12 (Sections 1203-2.9, Table 1297-7, and others)]	ODOT 2022a	Outlines process for speed reduction (Work Zone Speed Zone, or WZSZ) for multi-lane highways with permanent speed limit of at least 55 mph, minimum length of 0.5 miles, minimum duration of three hours, and constrained conditions (such as lane closures, lane shifts, crossovers, contraflow, or shoulder closures). For signage, either digital speed limit (DSL) or temporary flatsheet speed limit signs may be used. Figure 1298-1 provides flowcharts for the Work Zone Speed Zoning Process. Table 1297-7 provides warranted work zone speed limits based on original posted speed limit and presence of positive protection and workers. WZSZs for other facility types are assessed on a case-by-case basis and require approval.
Ohio	Standard Construction Drawings: Traffic (MT-104.10 - Work Zone Speed Zones (WZSZs) on High Speed (>=55 mph) Multi-Lane Highways)	ODOT 2022b	Provides layouts and supplementary notes for signage for work zone speed zones for both digital speed limit (DSL) sign assemblies and temporary flatsheet speed limit signs.

State	Title	Reference	Summary
Oklahoma	Oklahoma Supplement to the 2009 Manual on Uniform Traffic Control Devices for Streets and Highway	ODOT 2009	Does not contain information regarding work zone speed limits in its temporary traffic control section (Section 6); refer to national MUTCD.
Oregon	Speed Zone Manual (Construction / Maintenance Speed Zones)	ODOT 2020	Includes list of conditions that may warrant a speed limit reduction. On state highways, a request is completed by the Traffic Control Plan Designer, Region Project Manager or Region Traffic Manager/Engineer using the *Work Zone Speed Reduction Request Form*.
Pennsylvania	Work Zone Regulatory Speed Limit Policy	PennDOT n.d.	Includes guidance for three types of regulatory speed limits for work zones: Advisory Regulatory Speed Limit, Variable Regulatory Speed Limit, and Continuous Regulatory Speed Limit. Reductions in regulatory work zone speed limit require completion of Traffic Engineering Form (TE-Form) *Work Zone Regulatory Speed Limit Reduction Evaluation* and approval by District Traffic Engineer. Includes table with considerations for regulatory speed limit reduction.
Pennsylvania	Pennsylvania Code (212.405. Regulatory speed limits)	Pennsylvania Code 2021	Speed limit reductions up to 10 mph do not require an engineering traffic study (if posted speed limit is 25 mph or above). Speed limit reductions over 10 mph require an engineering study, approval of the Department for State-designated Highways, and approval of local authorities for local highways.
Rhode Island	–	–	Adopted national MUTCD. Refer to National MUTCD Section 6C.01: Temporary Traffic Control Plans.
South Carolina	Standard Drawings (610-025-00 through 610-120-00: Lane Closures)	SCDOT 2021	Provides layouts for work zone speed limit signs for various types of lane closures.
South Carolina	Work Zone Speed Limit (South Carolina)	ARTBA 2021d	Speed limit reduction permissible only in instances of lane closures or changes in roadway alignment.

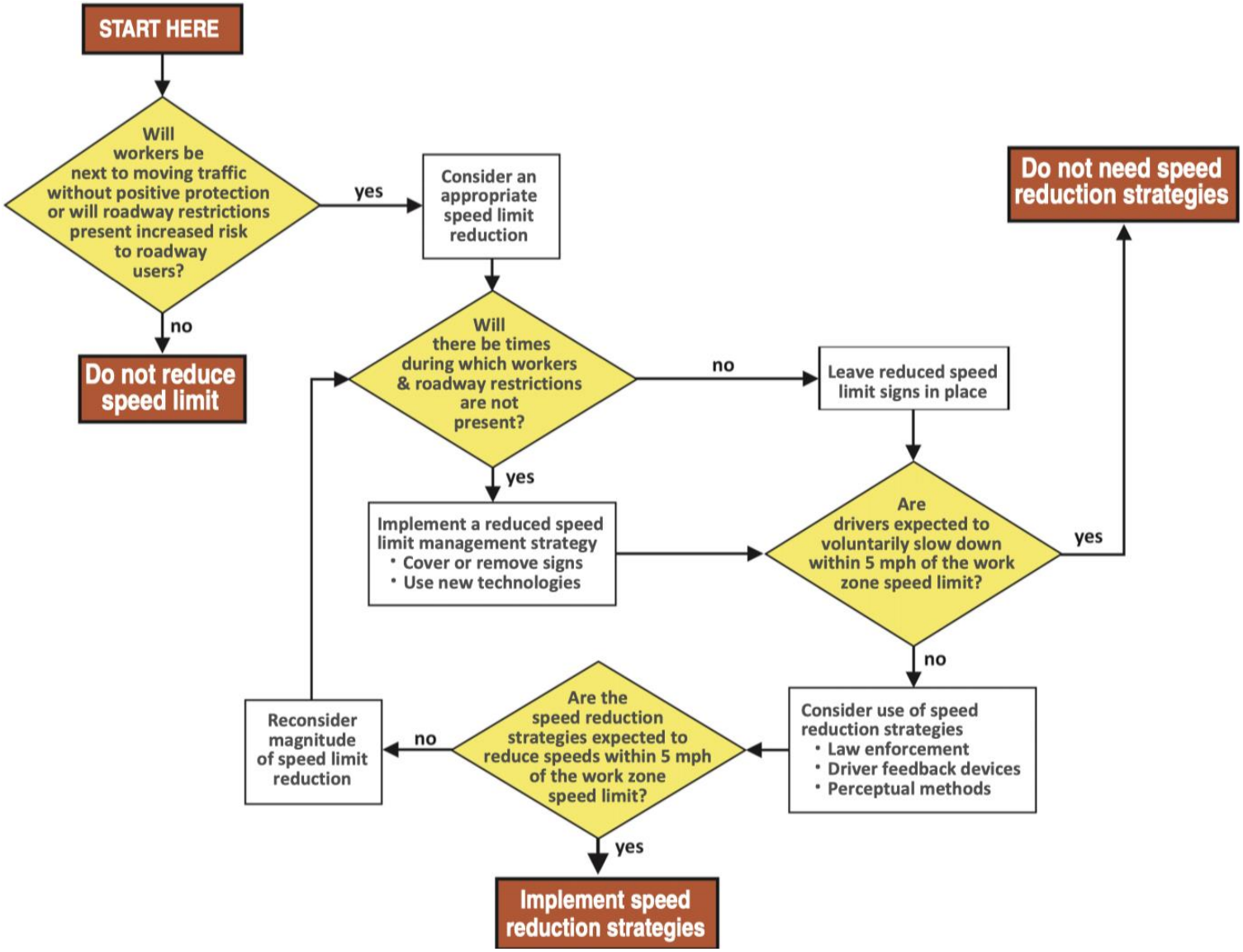
State	Title	Reference	Summary
South Dakota	SDDOT Construction Manual (Chapter 15: Work Zone Traffic Control)	SDDOT 2020	For lane closures, work zone speed limits of 65 mph or 10 mph below the original posted speed limit are typically used. A work zone speed limit of 45 mph may be used when workers are present and work is adjacent to traffic. Use of work zone speed limits requires submission and approval of a form. Includes requirements for signage.
South Dakota	Standard Plates (634.63: Work Zone Speed Reduction for Interstate and High Speed Multi-Lane Highways)	SDDOT 2022	Provides layouts for signage for work zone speed reductions.
Tennessee	Traffic Operations Memorandum No. 1801: Guidance on Setting Speed Limits (Chapter 4: Work Zone Speed Control)	TDOT 2018	Includes table with descriptions and example uses for three types of speed control: advisory speed, regulatory speed limit (worker safety/variable), and regulatory speed limit (continuous). Advisory speeds should be considered first. Work zone site supervisor may set advisory speed limits for 10 mph or less below the posted speed limit. For regulatory speed limits, 10 mph is normally the maximum allowed speed limit reduction. All regulatory speed limit reductions require approval from the State Traffic Engineer. A form is provided for contractors to request a regulatory speed limit reduction.
Texas	Form 1204: Request for Regulatory Construction Speed Zone	TxDOT 2021a	Form to request regulatory construction speed zone for project sections based on existing speed limit and types of work.
Texas	Form 1204M: Regulatory Maintenance Activity Speed Zone	TxDOT 2021b	Form to request regulatory construction speed zone for maintenance activities based on existing speed limit and types of work.
Texas	Traffic Safety Division Standard: Maintenance Work Zone Speed Limit Signs	TxDOT 2021c	Provides details for maintenance work zone speed limit signs.

State	Title	Reference	Summary
Utah	Work Zone Speed Limits (Document UDOT 06C-61)	UDOT 2015	Speed limits may be temporarily reduced for serious safety concerns. For a short-term reduction (20 calendar days or less), the Region Director may approve reductions up to 10 mph but must request approval from the Engineer for Traffic and Safety for reductions greater than 10 mph. For a long-term reduction (more than 20 calendar days), a request must be sent to the Division of Traffic and Safety.
Utah	Utah MUTCD (Section 6C.01: Temporary Traffic Control Plans)	UDOT 2020	Speed limits reductions should not exceed 10 mph. If they do, additional driver notification should be provided. Speed limits should be stepped down in advance.
Vermont	Traffic Engineering Instructions (TEI 20-603: Guidance to Establishing a Temporary Speed Limit Reduction within the Work Zone)	VTrans 2020	Includes flowchart for temporary speed limit reductions in work zones. Methods used for speed reduction include Advisory Speeds, Continuous Regulatory Speed Limit Reduction in the Work Zone, and Intermittent Regulatory Speed Limit Reduction in the Work Zone. Advisory Speeds should be considered first. Continuous Regulatory Speed Limit Reduction should be used under certain conditions for work zones with a length of at least one mile, such as lane drops, narrow lanes, no shoulder, temporary guardrail, construction entrances, and restricted sight distance. Intermittent Regulatory Speed Limit Reduction may be used under specific conditions, such as bridge painting, resurfacing, guardrail installation, or other operations where workers or equipment are present in a travel lane or shoulder while work is being done. Includes layout drawings for signage and certificate form for temporary speed limit.
Virginia	Traffic Engineering Division Memorandum TE – 350.1: Work Zone Speed Analysis	VDOT 2009	Form for documenting the analysis and results for a traffic engineering investigation to determine if a work zone speed limit reduction is needed. Includes sections on existing roadway conditions and proposed conditions for the work zone.

State	Title	Reference	Summary
Virginia	Virginia Work Area Protection Manual Standards and Guidelines for Temporary Traffic Control (Section 6C.01 Temporary Traffic Control Plans)	VDOT 2015	Speed limit reductions should only be used under restrictive conditions. Speed limit reductions exceeding 10 mph should be avoided as much as possible. If such reductions are necessary, drivers should be given additional warning and the speed limit shall be stepped down in increments of 10 mph. Speed reductions must be designated by Regional Traffic Engineer after completion of a traffic study justifying the reduction. A Work Zone Speed Analysis Form must be completed to document the reduction.
Washington	Traffic Manual M-51-02.10 (5-18: Speed Limit Reductions in Work Zones)	WSDOT 2021	Includes table showing guidance for continuous work zone speed limits on freeways. Approval process is described in Secretary's Executive Order E1060.02. Variable work zone speed limit reduction may be used for stationary work zones with a duration of three days or less, and tables with guidance for variable work zone speed limit reduction is provided. Provides details on worksheet for work zone speed limit reduction.
Washington	Secretary's Executive Order Number: E 1060.03: Speed Limit Reductions in Work Zones	WSDOT 2022	Speed limit reductions may be continuous regulatory, variable regulatory, or advisory speed limit. Approved signing for speed limit reduction should be shown on traffic control plans. Regulatory speed limit reduction requires completion of worksheet and approval by Regional Administrator. Continuous regulatory speed limit reduction to 45 mph or lower on freeways requires approval of State Traffic Engineer. Public notice is required for regulatory speed limit reduction.
West Virginia	Manual on Temporary Traffic Control for Streets and Highways (Section C.01: Temporary Traffic Control Plans)	WVDOT 2006	Speed limit reductions through work zones are discouraged. Vehicles should be able to navigate safely through the work zone with a speed limit reduction of 10 mph or less. Reductions exceeding 10 mph should be used only when constrained conditions exist and should be posted in steps.

State	Title	Reference	Summary
Wisconsin	Wisconsin Manual on Traffic Control Devices (6C.01: Temporary Traffic Control Plans)	WisDOT 2017	Drivers should be able to travel through the work zone with a speed limit reduction of 10 mph or less. Speed limit reductions over 10 mph should only be used when necessary. In such cases, additional driver notice is required.
Wisconsin	Traffic Engineering, Operations, and Safety Manual (13-5-6: Temporary Traffic Control Zones)	WisDOT 2021	Includes policy criteria for work zone speed limits for Interstates, expressways, multi-lane highways, two-lane rural highways, and two-lane urban roadways based on conditions and worker presence. Speed Zone Declaration must be submitted and approved prior to approval of the 90 percent Transportation Management Plan.
Wyoming	Traffic Control for Roadway Work Operations	WYDOT 2011	Speed limit reductions exceeding 15 mph require special permission.
Wyoming	WYDOT Standard Plans (703-5D: Construction Traffic Control Standards)	WYDOT 2022	Includes table showing typical speed reductions based on posted speed limit.

APPENDIX B: SAMPLE GUIDANCE AND STANDARDS FOR WORK ZONE SPEED LIMITS



The Roadway Safety Consortium n.d.

Figure B-1. Flowchart to determine whether to implement work zone speed reduction strategies

Reduced Speed Limits Per Date/Time (This form is to be used per project.)

Reduction Request 1

State Highway*	From Mile Point*	To Mile Point*	Direction of Traffic*
Posted Speed Limit*	Temporary Reduced Speed Limit*	From Date & Time*	To Date & Time*

Please provide justification for speed reduction (You must include a reason for reducing the speed limit any time a speed reduction is requested. Examples include: reduced clear zones, temporary alignment or geometric changes, exposure to workers, reduced sight distances, physical hazards, etc.)*

Reduction Request 2

State Highway	From Mile Point	To Mile Point	Direction of Traffic
Posted Speed Limit	Temporary Reduced Speed Limit	From Date & Time	To Date & Time

Please provide justification for speed reduction (You must include a reason for reducing the speed limit any time a speed reduction is requested. Examples include: reduced clear zones, temporary alignment or geometric changes, exposure to workers, reduced sight distances, physical hazards, etc.)

Reduction Request 3

State Highway	From Mile Point	To Mile Point	Direction of Traffic
Posted Speed Limit	Temporary Reduced Speed Limit	From Date & Time	To Date & Time

Please provide justification for speed reduction (You must include a reason for reducing the speed limit any time a speed reduction is requested. Examples include: reduced clear zones, temporary alignment or geometric changes, exposure to workers, reduced sight distances, physical hazards, etc.)

Reduction Request 4

State Highway	From Mile Point	To Mile Point	Direction of Traffic
Posted Speed Limit	Temporary Reduced Speed Limit	From Date & Time	To Date & Time

Please provide justification for speed reduction (You must include a reason for reducing the speed limit any time a speed reduction is requested. Examples include: reduced clear zones, temporary alignment or geometric changes, exposure to workers, reduced sight distances, physical hazards, etc.)

CDOT Form #568 (4/19)

CDOT 2019

Figure B-2. Excerpt from form for temporary speed limit reduction for Colorado

AUTHORIZATION FOR TEMPORARY WORK SITE SPEED LIMIT

This form is to be completed for all locations where temporary work site speed limits will be in use.

Temporary work site speed limits are hereby authorized for the contracts/jobs listed below:

Contract	Location		Begin Date	End Date	Speed Limit Type	DTSD Concurs	Permanent Speed Limit	Work Site Limit
	Road	County						

Signed: _____ Date: _____

Title: _____

Original to be sent to District Traffic Office, with a copy to the project file

INDOT 2015

Figure B-3. Form for authorization for temporary worksite speed limit for Indiana

AUTHORIZATION FOR TEMPORARY WORK SITE SPEED LIMIT

(For speed limit reduction **greater than 15** mph)

This form is to be completed for locations where work site speed limits will be reduced greater than 15mph.

Temporary work site speed limits are hereby authorized for the contracts/jobs listed below:

Contract	Location		Begin Date	End Date	Speed Limit Type	DTSD Concurs	Permanent Speed Limit	First Step Limit	Work Site Limit
	Road	County							

Signed: _____ Date: _____

Title: __DCD or designee_____

Original to be sent to District Traffic Office, with a copy to the project file

INDOT 2015

Figure B-4. Form for authorization for temporary worksite speed limit (for speed limit reduction greater than 15 mph) for Indiana

TEMPORARY WORK SITE SPEED LIMIT ACTIVATION SUMMARY

This form is to be used to record each period of temporary work site speed limits activation.

Contract: _____

Road: _____ County: _____

Speed Limit Type *(circle one):* When Flashing 24/7

No of Sign Locations: _____

Location No. 1: _____

Location No.2 (*if applicable)*: _____

Location No. 3 *(if applicable):* _____

Location No. 4 *(if applicable):* _____

Temporary work site speed limits were activated for this work zone as listed below:

Location No.	Date	Activation Time	
		Start	End

Location No.	Date	Activation Time	
		Start	End

Signed: _____ Date: _____

Title: _____

Original to be sent to District Traffic Office, with a copy to the project file

INDOT 2015

Figure B-5. Form for documenting temporary worksite speed limit activation for Indiana

TEMPORARY WORK ZONE SPEED LIMIT FORM

The following changes in maximum speed limits are being posted to the roadway described below in order to perform the following work in a safe and efficient manner.

TOWN:_____ROUTE OR ROAD NAME: _____
STARTING AT_____AND
EXTENDING TO: _____
TEMPORARY SPEED POSTED _____* EXISTING SPEED LIMIT: _____
DATE AND TIME POSTED _____
SIGNATURE:_____ DATE AND TIME REMOVED _____
SIGNATURE:_____ WORK PERFORMED:_____
COMMENTS: _____

APPROVED:_____ Traffic Engineer Date _____

Use physical features such as project stationing, bridges, mile markers or intersections and distances from these features to describe locations. DO NOT USE SIGNS, BARRICADES, OR TEMPORARY DEVICES FOR REFERENCE.
Please note in comments if signs are vandalized, blown over , or otherwise obstructed, noting time discovered and time corrected.
Submit this form to the Region Traffic Engineer and Work Zone Safety Engineer.
* Reductions greater than 10 mph require review and recommendation from a MaineDOT Traffic Engineer and Commissioner approval.

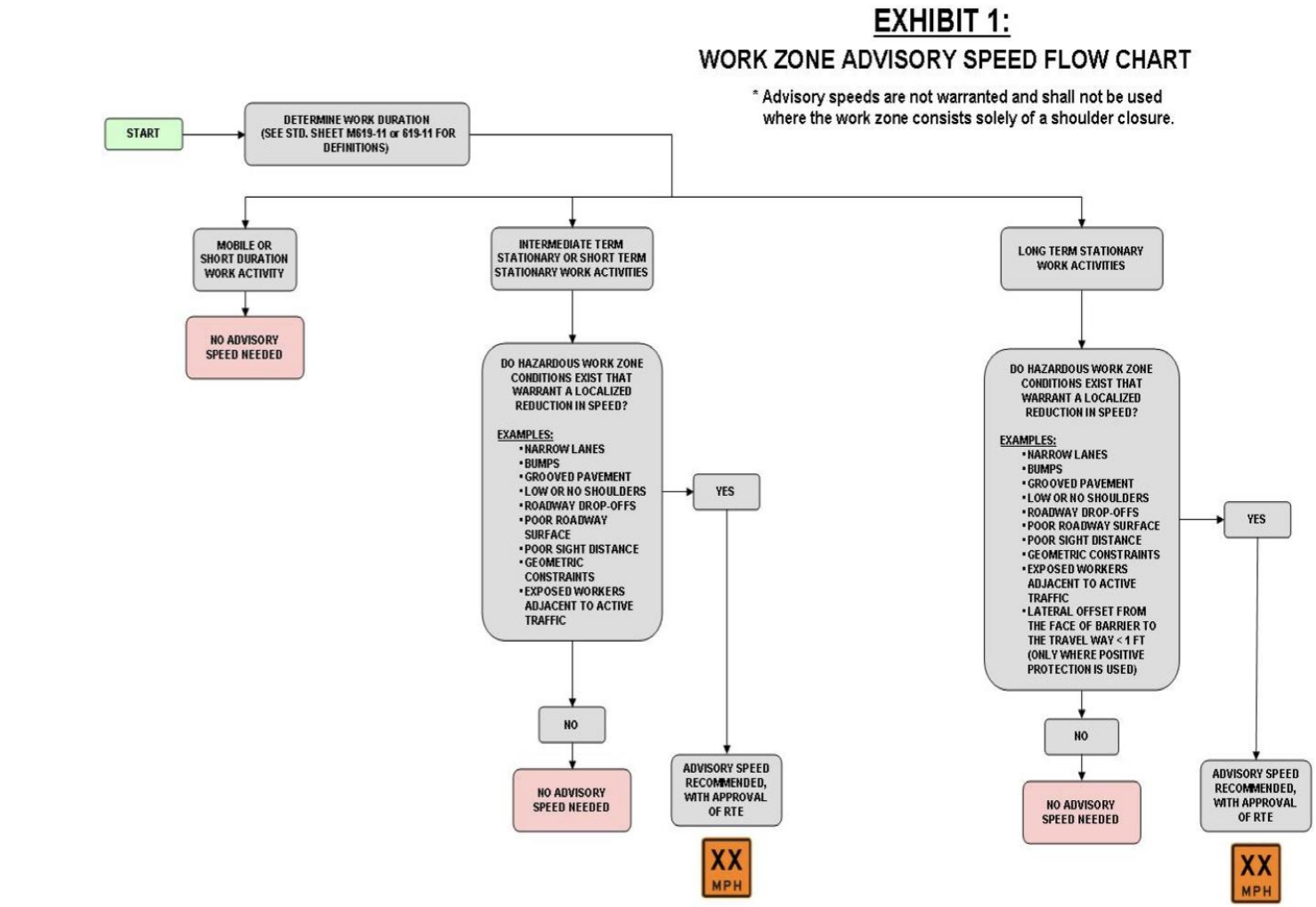
MaineDOT 2014

Figure B-6. Temporary work zone speed limit form for Maine

Table B-1. Work zone speed countermeasures matrix for Nevada

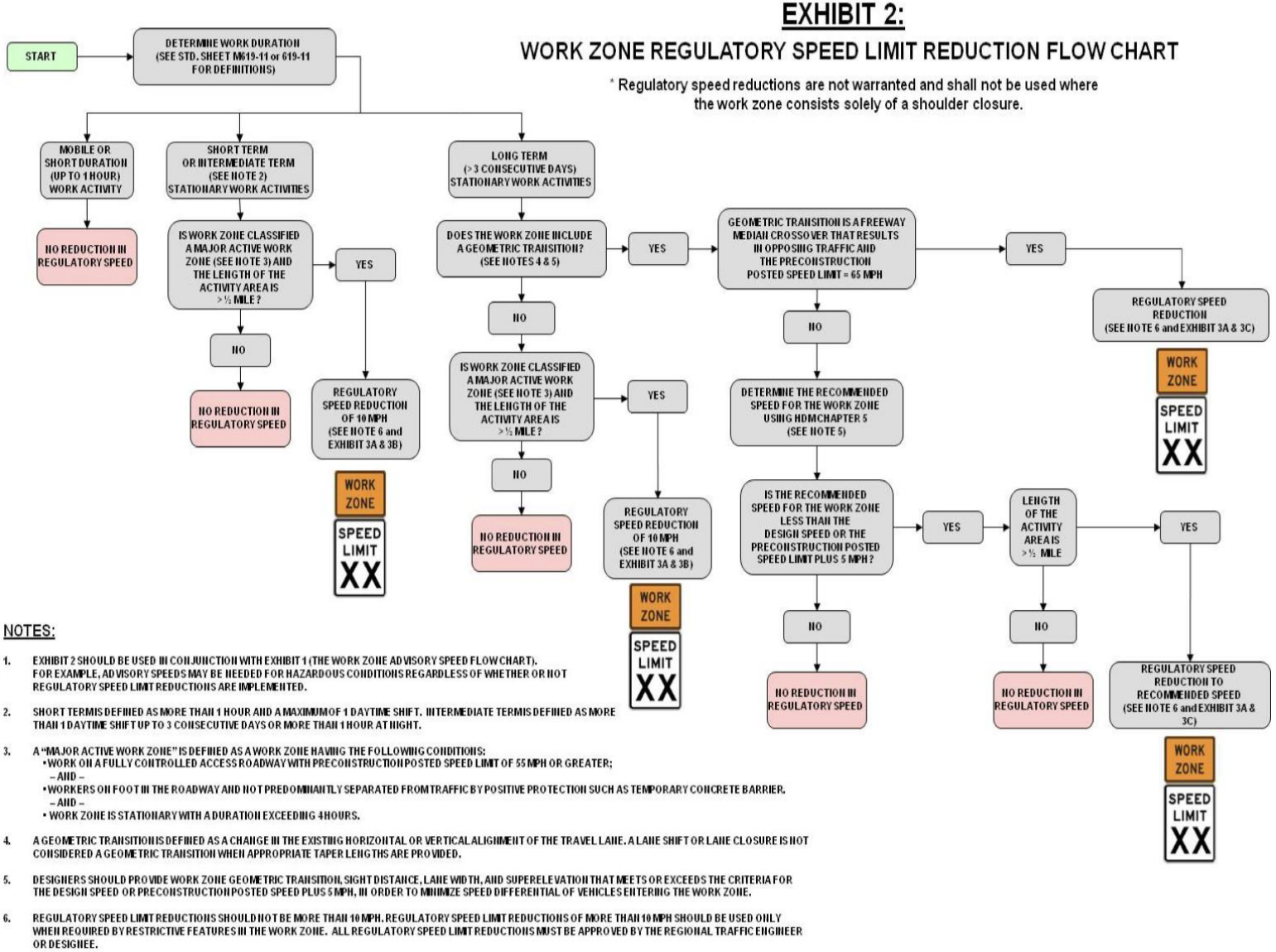
Work Zone Conditions	Changeable Message Sign	Uniformed Traffic Control Officer	*Temporary Lighting	Temporary Rumble Strips	Speed Feedback Sign	Lateral Deflection	Lane Narrowing	Flashing Beacon	*Smarter Work Zone System	**Required Cumulative Point Value
Alignment changes designed for speed below the existing posted speed limit	1	1	1	2	1	2	2	1	0	5
Concrete barrier rail less than 2 ft from high-speed traffic	1	1	0	2	1	0	2	1	0	3
Insufficient sight distance	1	1	1	2	1	2	2	1	0	4
Pilot Car	1	1	0	2	1	2	2	1	2	6
Ramp Closure	1	1	1	2	1	0	2	1	0	3
Traffic lanes less than 11 ft wide	1	1	0	2	1	2	2	1	0	3
Trucks entering roadway	1	1	1	2	1	0	2	1	2	4
Uneven Lanes/ Rough Road	1	1	0	2	1	2	2	1	0	3
Unprotected Work Activities	1	1	0	2	1	2	2	1	0	3
Unusual/Reduced Roadway Geometrics	1	1	1	2	1	2	2	1	0	3
Narrow Shoulders	1	1	1	2	1	2	2	1	0	3
Expected Reduction (mph)	1.4–2.8	2–6		2.5–5.5	2–10		3–8	3–6		
***Source**	Ukkusuri et al. 2016	Shaw et al. 2015	Bryden and Mace 2002	****Bai and Li 2009, 2011	Roadway Safety Consortium n.d.	–	ITE 2013	FHWA 2014	–	–

*These measures do not necessarily decrease operating speeds but are proven safety countermeasures
**Cumulative point values are determined by aggregating scores of all mitigation strategies implemented in particular work zone
Source: NDOT 2019 with last row of Source documents (***) adapted to include them in the References list for this report
****Could not determine which publications NDOT was citing



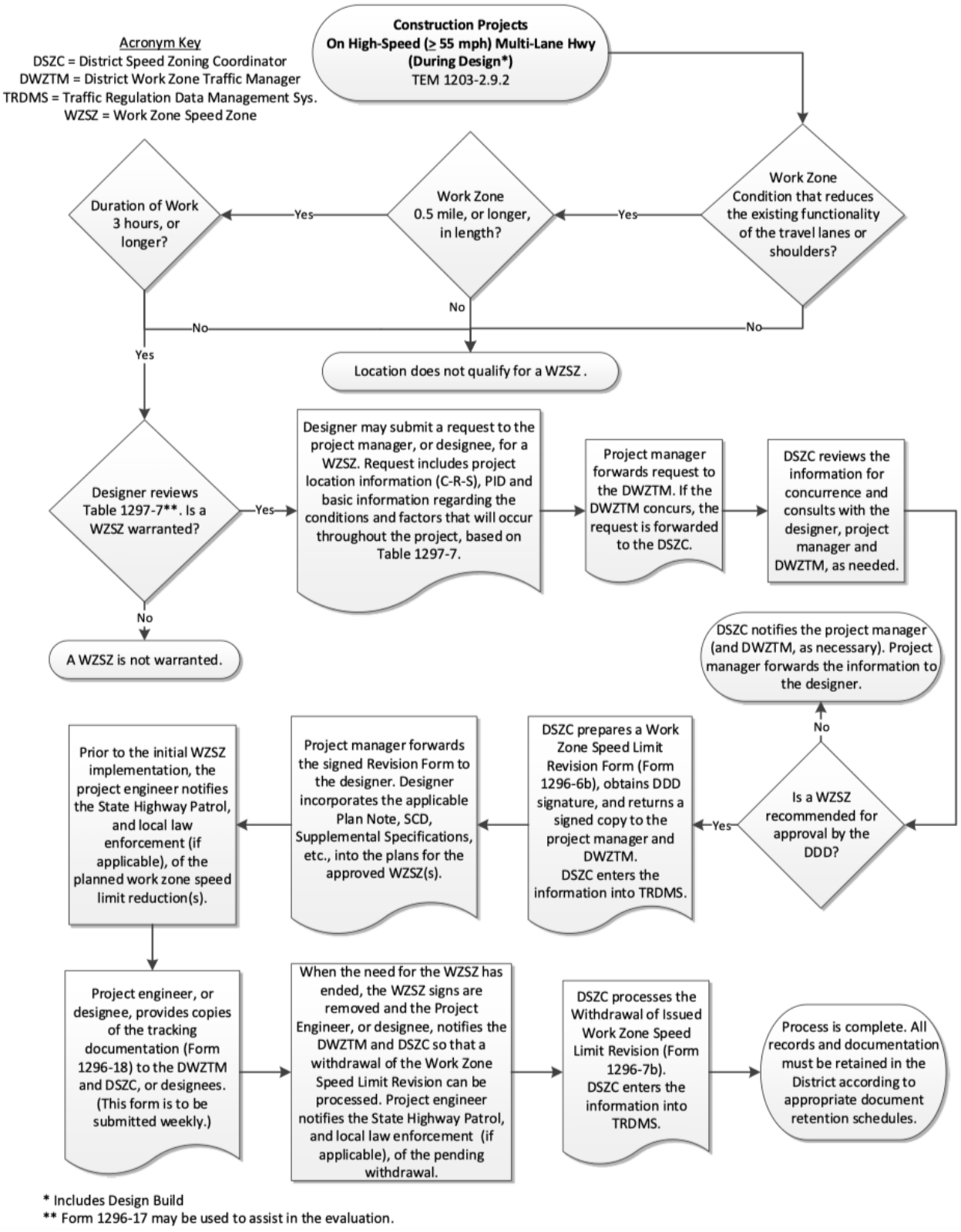
NYSDOT 2021

Figure B-7. Flowchart for work zone advisory speeds for New York



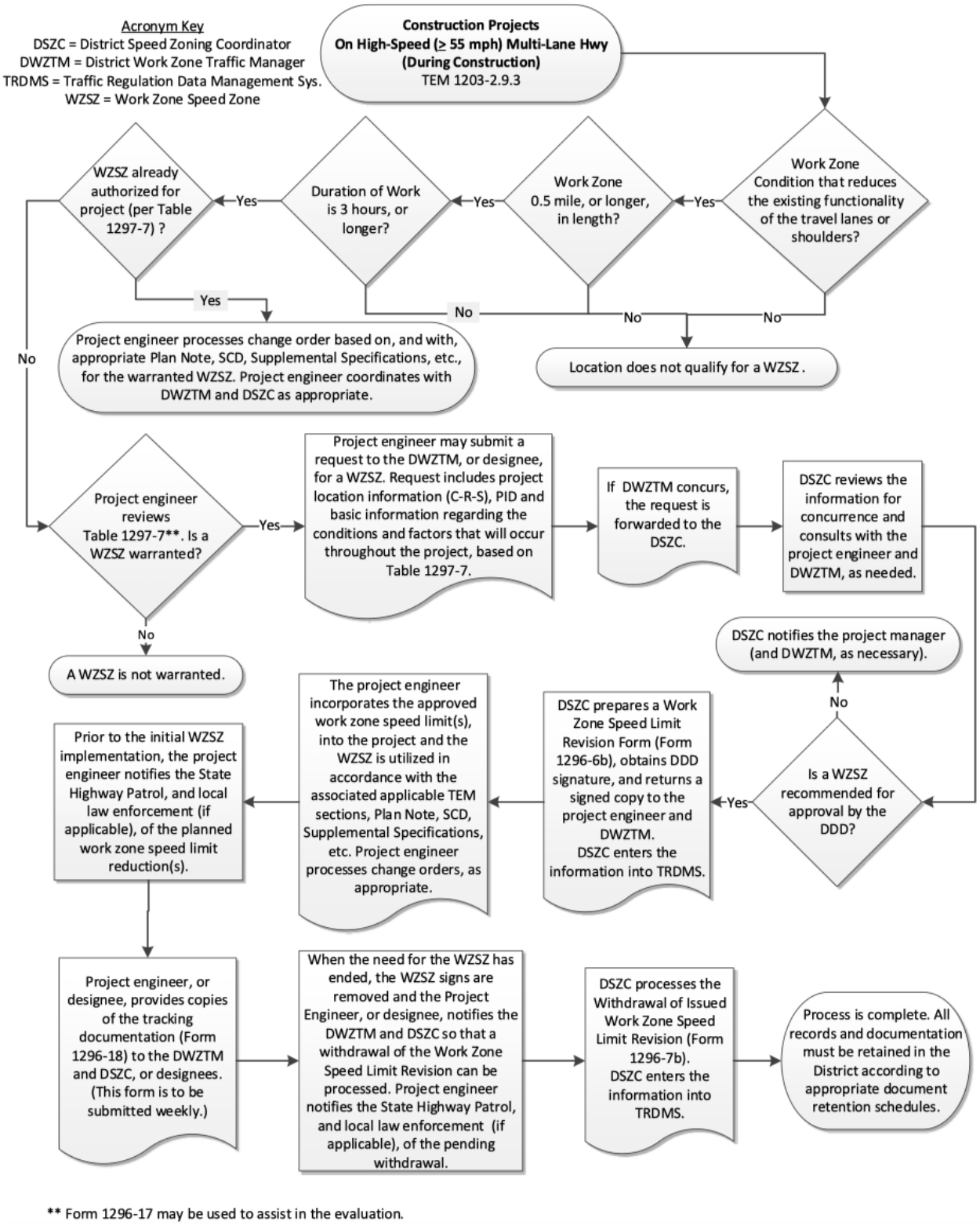
NYSDOT 2021

Figure B-8. Flowchart for work zone regulatory speed limit reductions for New York



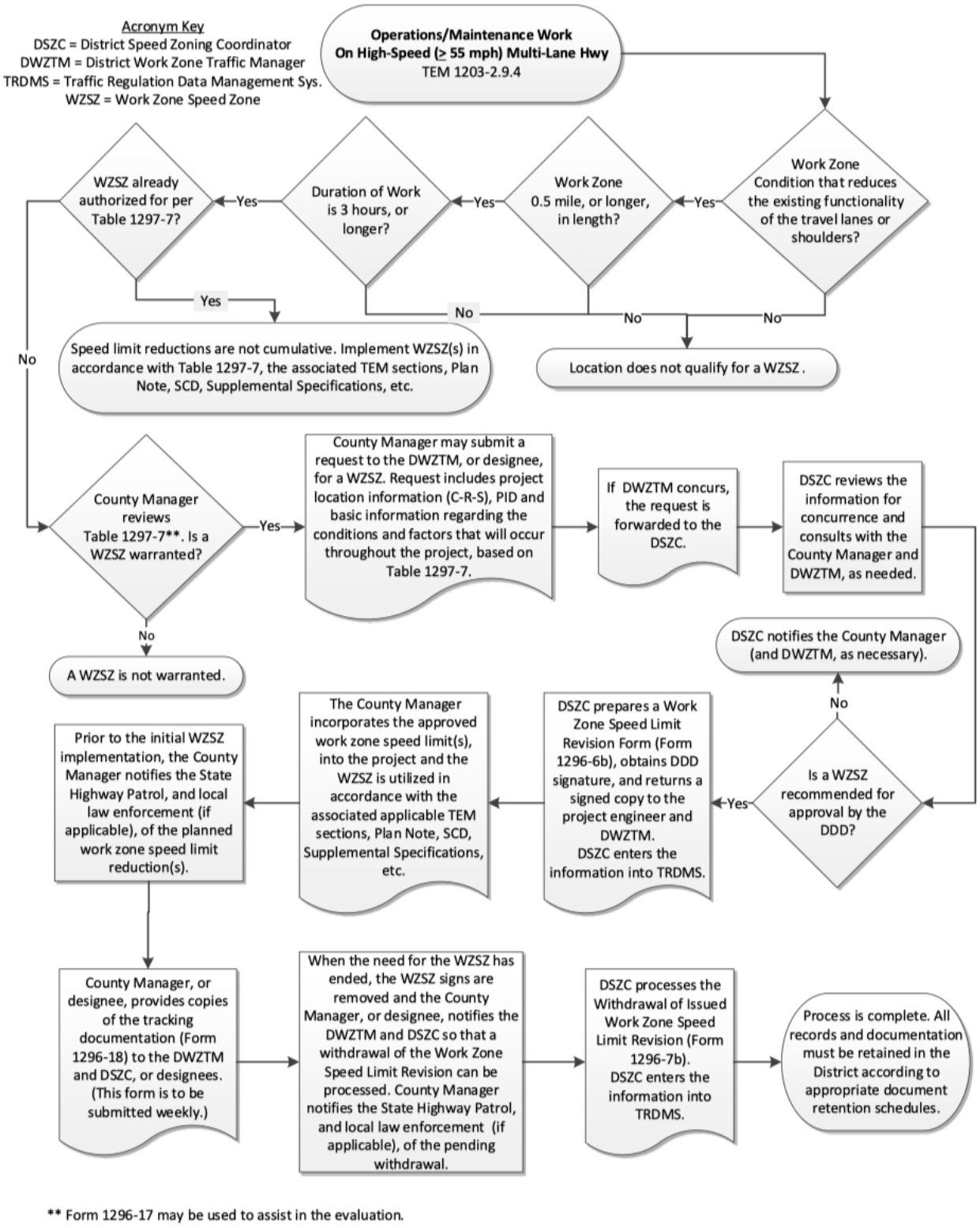
ODOT 2022b

Figure B-9. Flowchart for work zone speed limits during design phase for Ohio



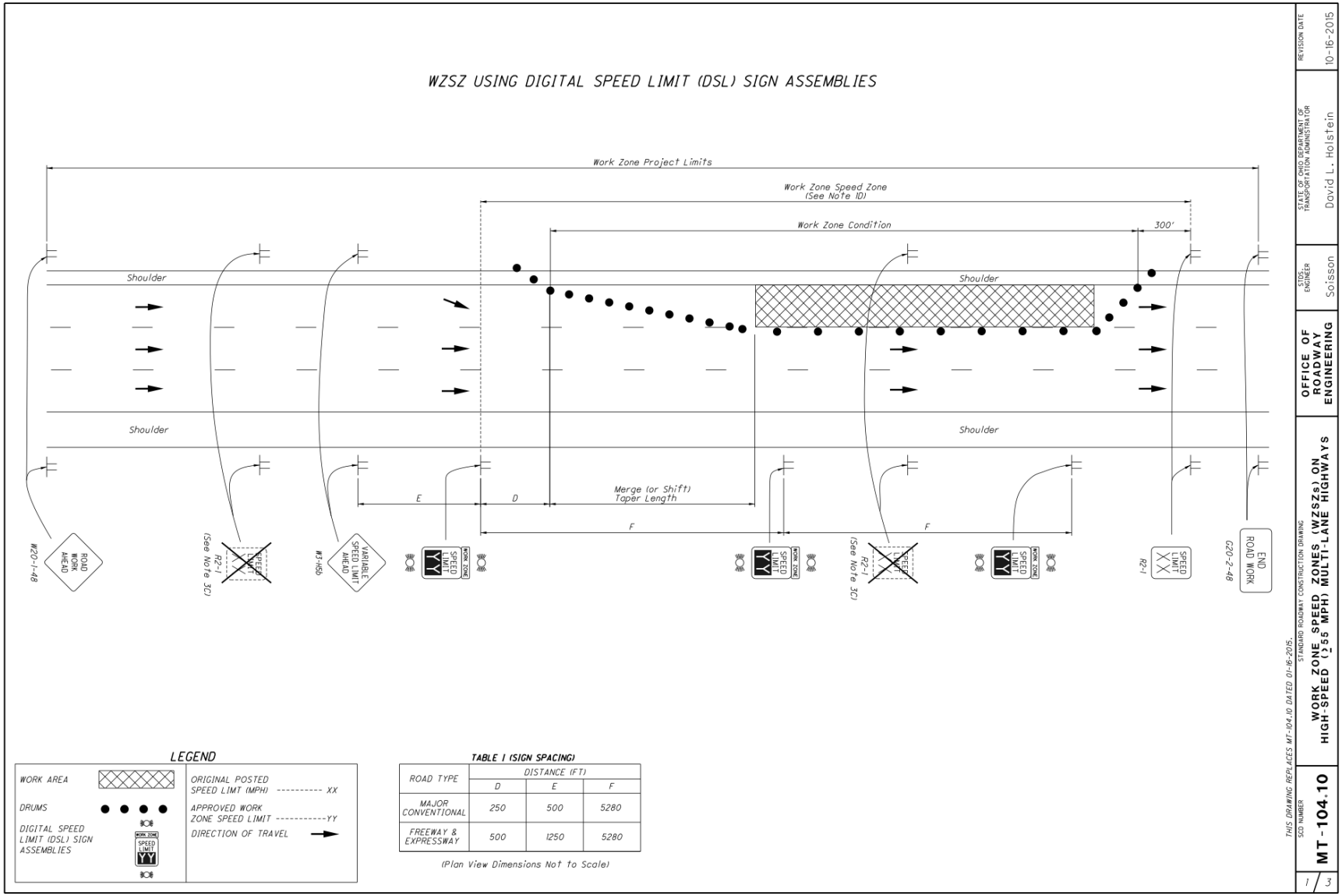
ODOT 2022a

Figure B-10. Flowchart for work zone speed limits during construction phase for Ohio



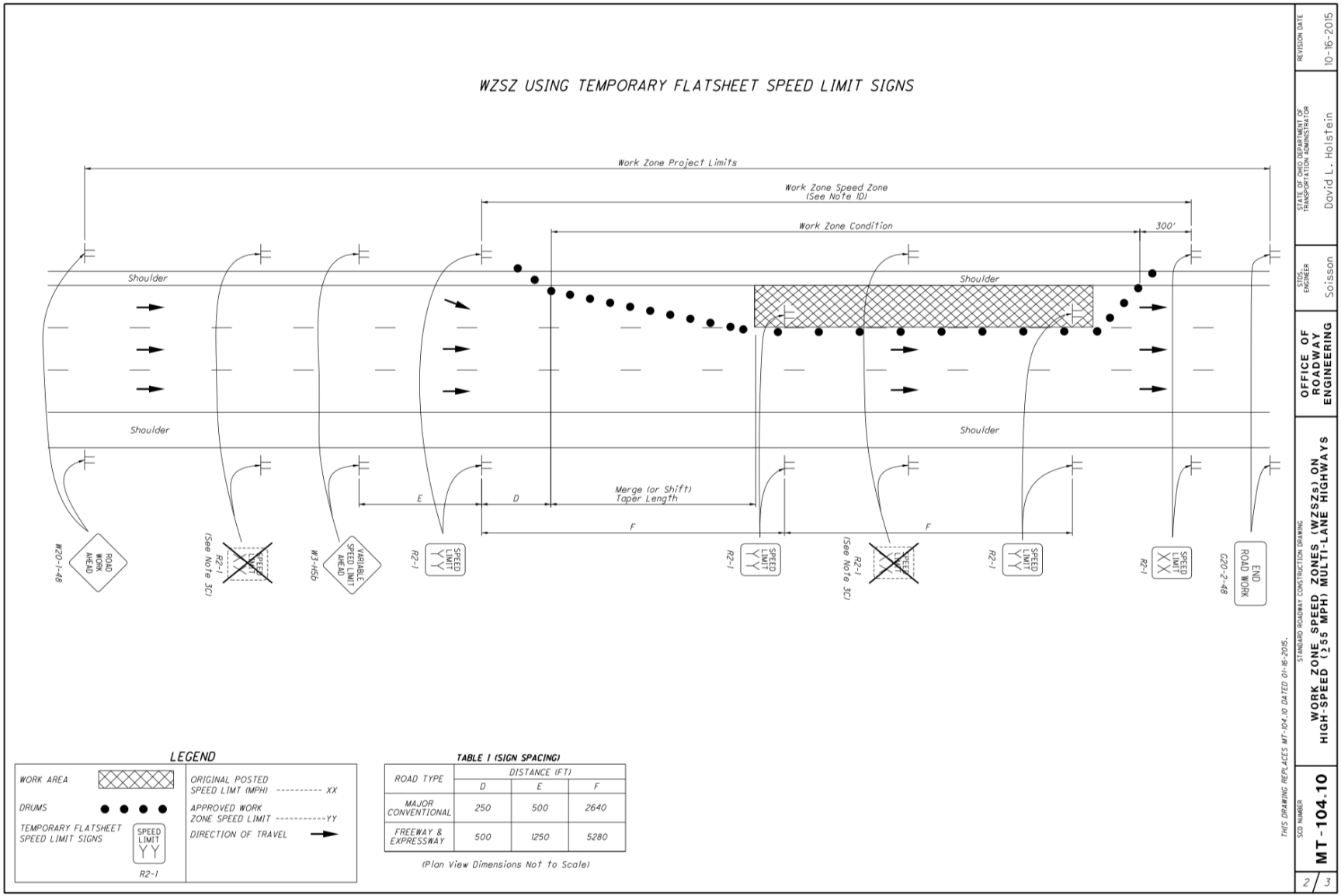
ODOT 2022a

Figure B-11. Flowchart for work zone speed limits for operations or maintenance work for Ohio



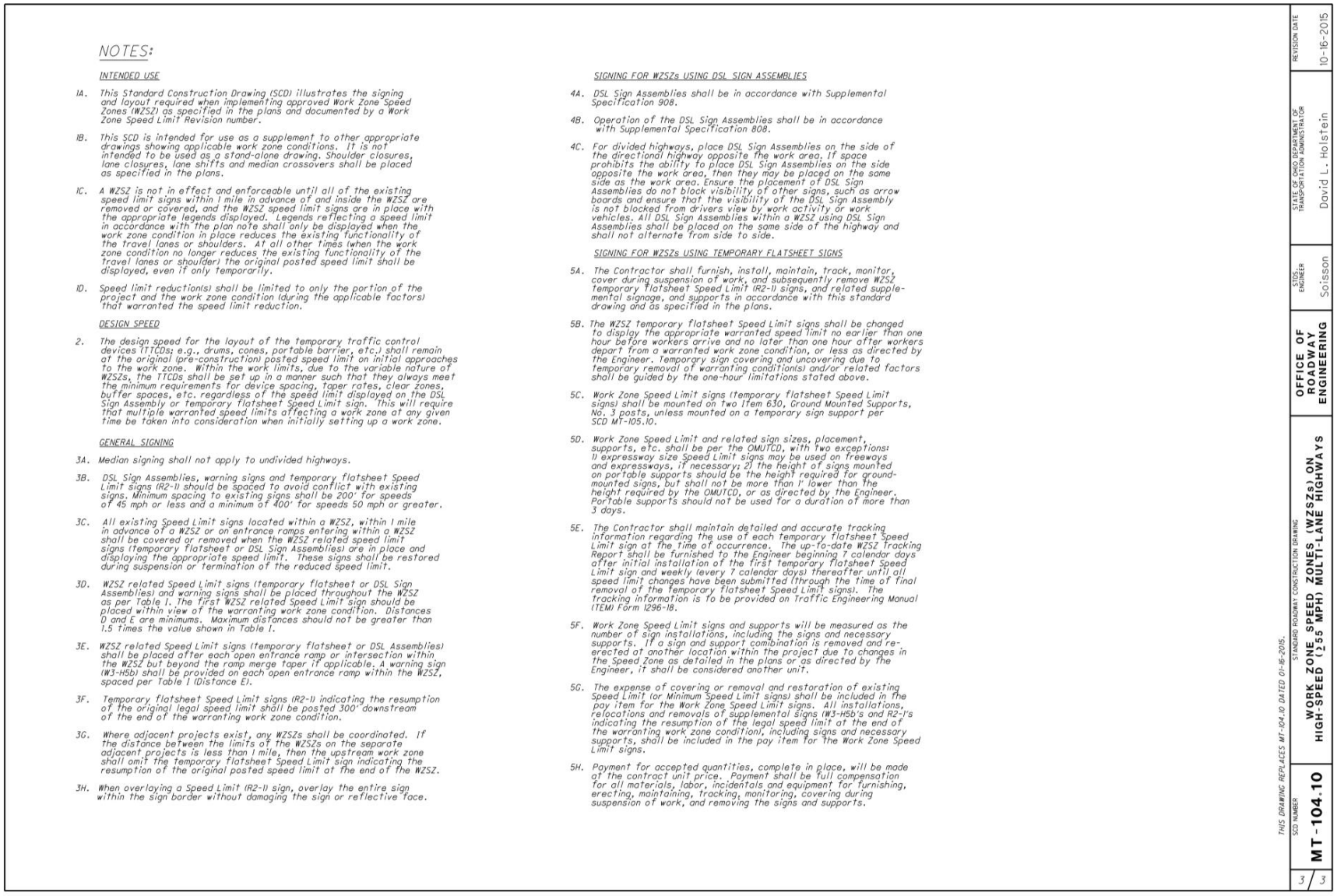
ODOT 2022b

Figure B-12. Layout for digital speed limit (DSL) assemblies for Ohio



ODOT 2022b

Figure B-13. Layout for temporary flatsheet signs for Ohio



NOTES:

INTENDED USE

1A. This Standard Construction Drawing (SCD) illustrates the signing and layout required when implementing approved Work Zone Speed Zones (WZSZ) as specified in the plans and documented by a Work Zone Speed Limit Revision number.

1B. This SCD is intended for use as a supplement to other appropriate drawings showing applicable work zone conditions. It is not intended to be used as a stand-alone drawing. Shoulder closures, lane closures, lane shifts and median crossovers shall be placed as specified in the plans.

1C. A WZSZ is not in effect and enforceable until all of the existing speed limit signs within 1 mile in advance of and inside the WZSZ are removed or covered, and the WZSZ speed limit signs are in place with the appropriate legends displayed. Legends reflecting a speed limit in accordance with the plan note shall only be displayed when the work zone condition in place reduces the existing functionality of the travel lanes or shoulders. At all other times (when the work zone condition no longer reduces the existing functionality of the travel lanes or shoulders) the original posted speed limit shall be displayed, even if only temporarily.

1D. Speed limit reduction(s) shall be limited to only the portion of the project and the work zone condition (during the applicable factors) that warranted the speed limit reduction.

DESIGN SPEED

2. The design speed for the layout of the temporary traffic control devices (TTCDs; e.g., drums, cones, portable barrier, etc.) shall remain at the original (pre-construction) posted speed limit on initial approaches to the work zone. Within the work limits, due to the variable nature of WZSZs, the TTCDs shall be set up in a manner such that they always meet the minimum requirements for device spacing, taper rates, clear zones, buffer spaces, etc. regardless of the speed limit displayed on the DSL Sign Assembly or Temporary Flatsheet Speed Limit sign. This will require that multiple warranted speed limits affecting a work zone at any given time be taken into consideration when initially setting up a work zone.

GENERAL SIGNING

3A. Median signing shall not apply to undivided highways.

3B. DSL Sign Assemblies, warning signs and temporary flatsheet Speed Limit signs (R2-1) should be spaced to avoid conflict with existing signs. Minimum spacing to existing signs shall be 200' for speeds of 45 mph or less and a minimum of 400' for speeds 50 mph or greater.

3C. All existing Speed Limit signs located within a WZSZ, within 1 mile in advance of a WZSZ or on entrance ramps entering within a WZSZ shall be covered or removed when the WZSZ related speed limit signs (temporary flatsheet or DSL Sign Assemblies) are in place and displaying the appropriate speed limit. These signs shall be restored during suspension or termination of the reduced speed limit.

3D. WZSZ related Speed Limit signs (temporary flatsheet or DSL Sign Assemblies) and warning signs shall be placed throughout the WZSZ as per Table 1. The first WZSZ related Speed Limit sign should be placed within view of the warranting work zone condition. Distances D and E are minimums. Maximum distances should not be greater than 1.5 times the value shown in Table 1.

3E. WZSZ related Speed Limit signs (temporary flatsheet or DSL Assemblies) shall be placed after each open entrance ramp or intersection within the WZSZ but beyond the ramp merge taper if applicable. A warning sign (W3-H5b) shall be provided on each open entrance ramp within the WZSZ, spaced per Table 1 (Distance E).

3F. Temporary flatsheet Speed Limit signs (R2-1) indicating the resumption of the original legal speed limit shall be posted 300' downstream of the end of the warranting work zone condition.

3G. Where adjacent projects exist, any WZSZs shall be coordinated. If the distance between the limits of the WZSZs on the separate adjacent projects is less than 1 mile, then the upstream work zone shall omit the temporary flatsheet Speed Limit sign indicating the resumption of the original posted speed limit at the end of the WZSZ.

3H. When overlaying a Speed Limit (R2-1) sign, overlay the entire sign within the sign border without damaging the sign or reflective face.

SIGNING FOR WZSZs USING DSL SIGN ASSEMBLIES

4A. DSL Sign Assemblies shall be in accordance with Supplemental Specification 908.

4B. Operation of the DSL Sign Assemblies shall be in accordance with Supplemental Specification 808.

4C. For divided highways, place DSL Sign Assemblies on the side of the directional highway opposite the work area. If space prohibits the ability to place DSL Sign Assemblies on the side opposite the work area, then they may be placed on the same side as the work area. Ensure the placement of DSL Sign Assemblies do not block visibility of other signs, such as arrow boards and ensure that the visibility of the DSL Sign Assembly is not blocked from drivers view by work activity or work vehicles. All DSL Sign Assemblies within a WZSZ using DSL Sign Assemblies shall be placed on the same side of the highway and shall not alternate from side to side.

SIGNING FOR WZSZs USING TEMPORARY FLATSHEET SIGNS

5A. The Contractor shall furnish, install, maintain, track, monitor, cover during suspension of work, and subsequently remove WZSZ temporary flatsheet Speed Limit (R2-1) signs, and related supplemental signage, and supports in accordance with this standard drawing and as specified in the plans.

5B. The WZSZ temporary flatsheet Speed Limit signs shall be changed to display the appropriate warranted speed limit no earlier than one hour before workers arrive and no later than one hour after workers depart from a warranted work zone condition, or less as directed by the Engineer. Temporary sign covering and uncovering due to temporary removal of warranting condition(s) and/or related factors shall be guided by the one-hour limitations stated above.

5C. Work Zone Speed Limit signs (temporary flatsheet Speed Limit signs) shall be mounted on two Item 630, Ground Mounted Supports, No. 3 posts, unless mounted on a temporary sign support per SCD MT-105.10.

5D. Work Zone Speed Limit and related sign sizes, placement, supports, etc. shall be per the OMUTCD, with two exceptions: 1) expressway size Speed Limit signs may be used on freeways and expressways, if necessary; 2) the height of signs mounted on portable supports should be the height required for ground-mounted signs, but shall not be more than 1' lower than the height required by the OMUTCD, or as directed by the Engineer. Portable supports should not be used for a duration of more than 3 days.

5E. The Contractor shall maintain detailed and accurate tracking information regarding the use of each temporary flatsheet Speed Limit sign at the time of occurrence. The up-to-date WZSZ Tracking Report shall be furnished to the Engineer beginning 7 calendar days after initial installation of the first temporary flatsheet Speed Limit sign and weekly (every 7 calendar days) thereafter until all speed limit changes have been submitted (through the time of final removal of the temporary flatsheet Speed Limit signs). The tracking information is to be provided on Traffic Engineering Manual (TEM) Form 1296-18.

5F. Work Zone Speed Limit signs and supports will be measured as the number of sign installations, including the signs and necessary supports. If a sign and support combination is removed and re-erected at another location within the project due to changes in the Speed Zone as detailed in the plans or as directed by the Engineer, it shall be considered another unit.

5G. The expense of covering or removal and restoration of existing Speed Limit (or Minimum Speed Limit signs) shall be included in the pay item for the Work Zone Speed Limit signs. All installations, relocations and removals of supplemental signs (W3-H5b's and R2-1's indicating the resumption of the legal speed limit at the end of the warranting work zone condition), including signs and necessary supports, shall be included in the pay item for the Work Zone Speed Limit signs.

5H. Payment for accepted quantities, complete in place, will be made at the contract unit price. Payment shall be full compensation for all materials, labor, incidentals and equipment for furnishing, erecting, maintaining, tracking, monitoring, covering during suspension of work, and removing the signs and supports.

THIS DRAWING REPLACES MT-104.10 DATED 01-16-2015.

STANDARD ROADWAY CONSTRUCTION DRAWING

WORK ZONE SPEED ZONES (WZSZs) ON HIGH-SPEED (≥55 MPH) MULTI-LANE HIGHWAYS

SCD NUMBER MT-104.10

3 / 3

OFFICE OF ROADWAY ENGINEERING

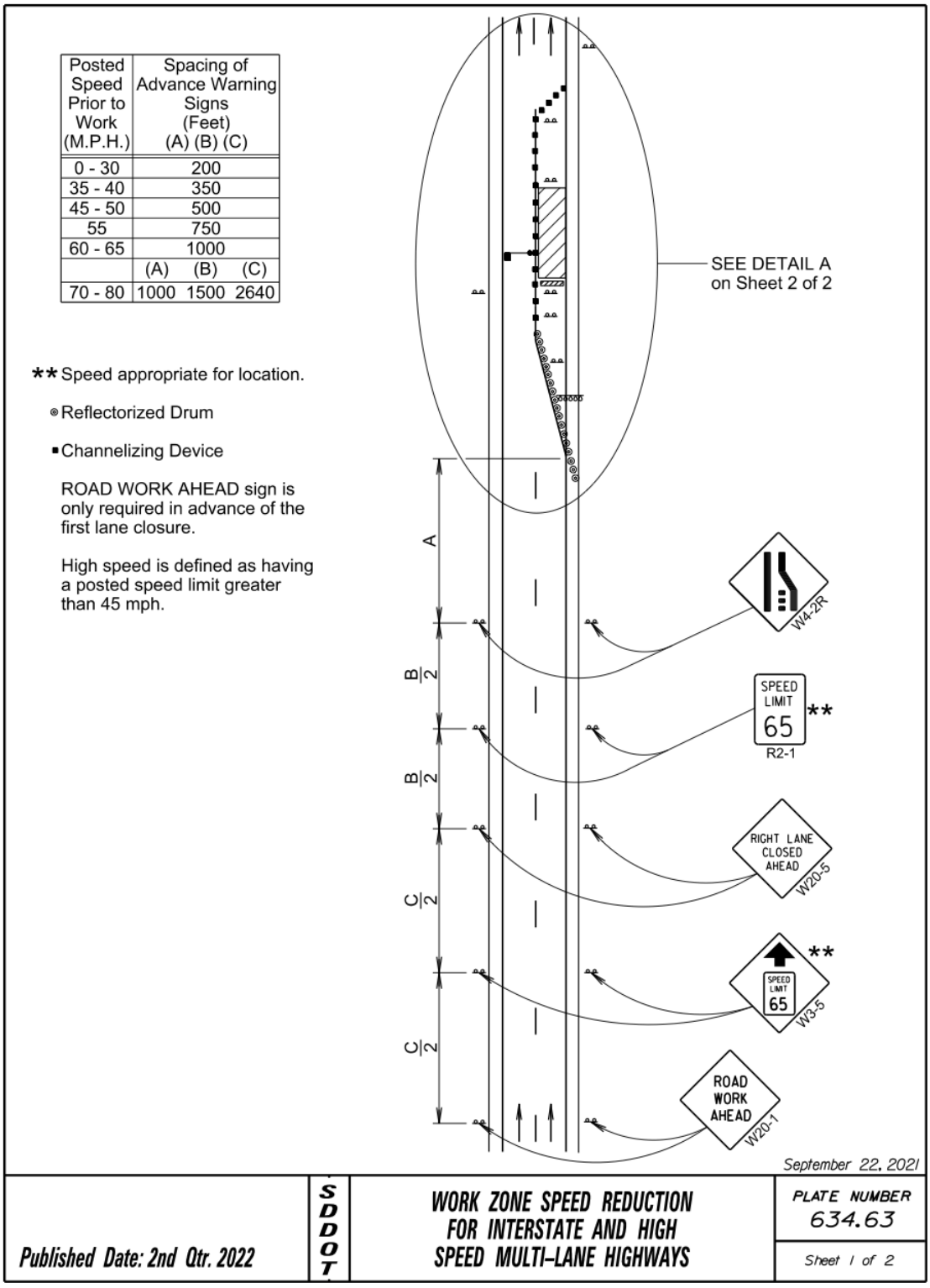
STDS. ENGINEER Soisson

STATE OF OHIO DEPARTMENT OF TRANSPORTATION ADMINISTRATOR David L. Holstein

REVISION DATE 10-16-2015

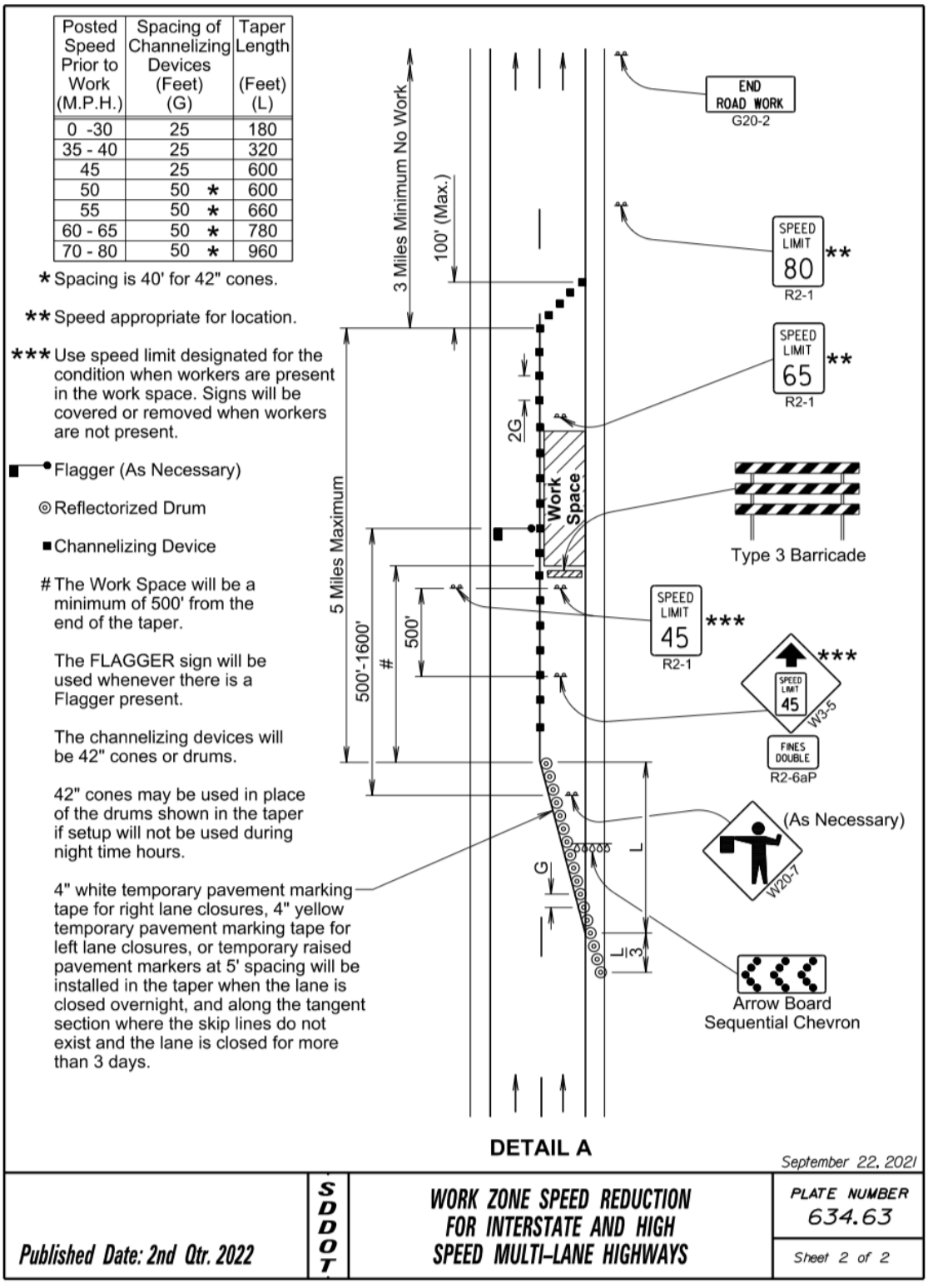
ODOT 2022b

Figure B-14. Standard construction drawing notes for work zone speed limits for Ohio



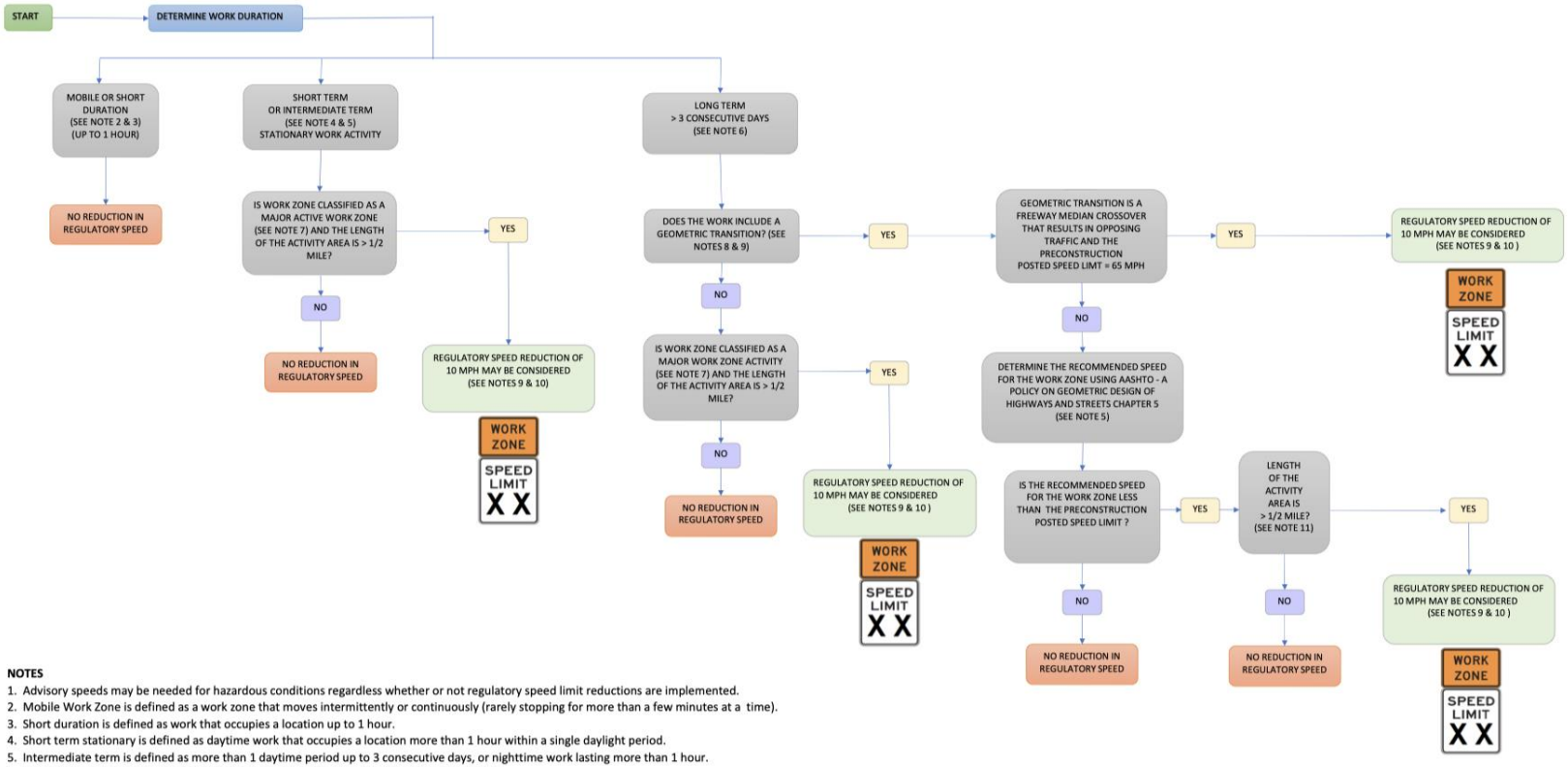
SDDOT 2022

Figure B-15. Signage layout for work zone speed reduction from South Dakota (1 of 2)



SDDOT 2022

Figure B-16. Signage layout for work zone speed reduction from South Dakota (2 of 2)



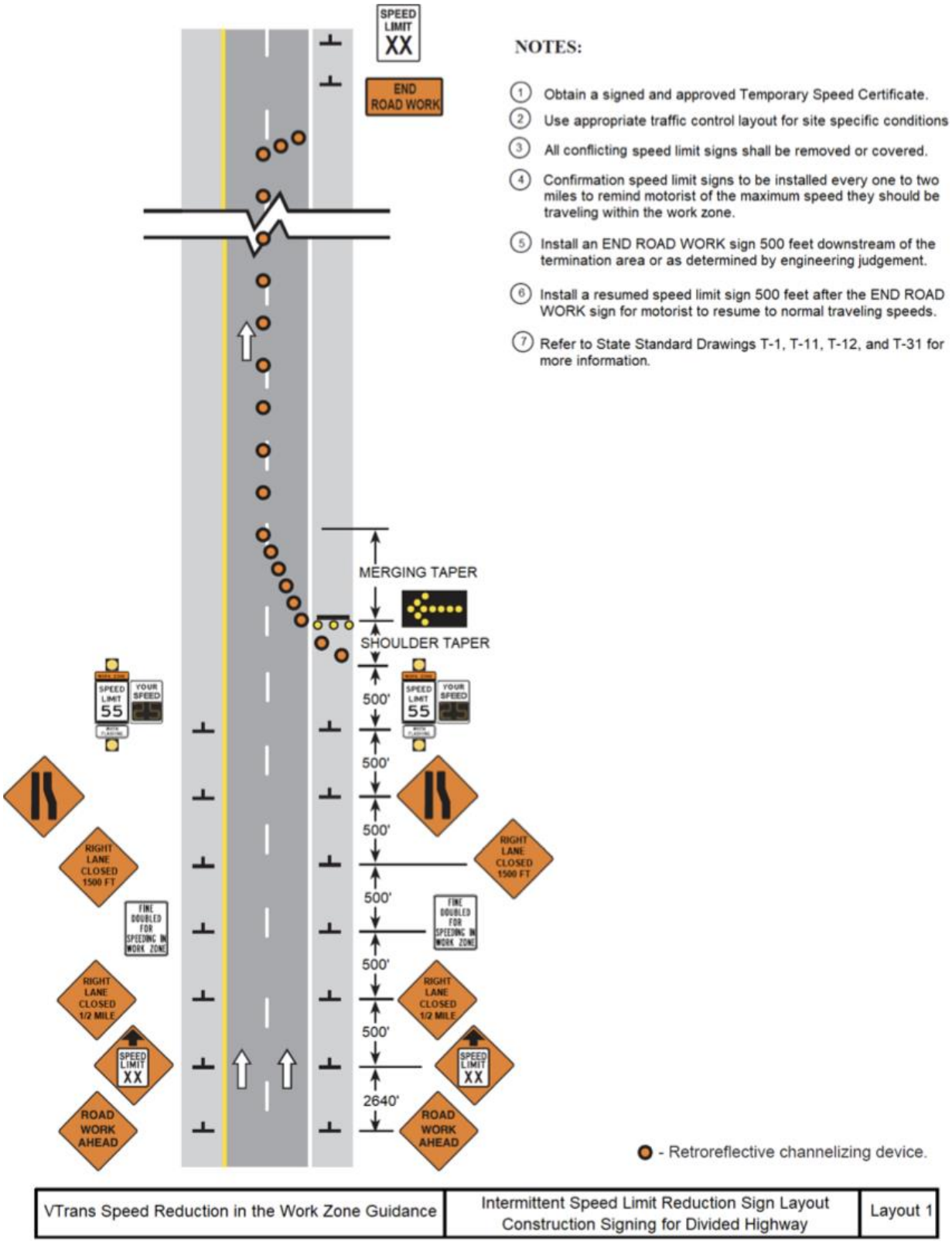
NOTES

1. Advisory speeds may be needed for hazardous conditions regardless whether or not regulatory speed limit reductions are implemented.
2. Mobile Work Zone is defined as a work zone that moves intermittently or continuously (rarely stopping for more than a few minutes at a time).
3. Short duration is defined as work that occupies a location up to 1 hour.
4. Short term stationary is defined as daytime work that occupies a location more than 1 hour within a single daylight period.
5. Intermediate term is defined as more than 1 daytime period up to 3 consecutive days, or nighttime work lasting more than 1 hour.
6. Long-term is defined as a work zone that occupies a location more than 3 consecutive days.
7. A "Major Work Zone Activity", is defined as a stationary work zone having a duration exceeding 4 hours and unprotected workers on foot are within the roadway, who are not predominantly separated from traffic by positive protection.
8. A geometric transition is defined as a change in the existing horizontal or vertical alignment of the travel lane. A lane shift or lane closure is not considered a geometric transition when appropriate taper lengths are provided.
9. Work zone geometric transitions, sight distance, lane width, and super elevation should meet or exceed applicable state and federal design standards in order to minimize speed differential of vehicles entering the work zone. The basic safety principals governing the design of permanent roadways should also govern the design of temporary traffic control zones. The goal should be to route users through such zones using roadway geometrics and roadside features and temporary traffic control devices as nearly as possible to normal highway situations.
10. The speed limit should not be reduced more than 10 MPH below the preconstruction posted speed limit, unless an engineering study indicates the geometric conditions warrant a greater speed limit reduction. The speed limit reduction should be design in accordance with the 2009 Manual on Uniform Traffic Control Devices and its latest revisions, Section 6C.01 Temporary Traffic Control Plans. The District Transportation Administrator (DTA), Director of Construction & Materials Bureau, Director of Project Delivery Bureau, or their designee will be responsible for approving all work zone temporary speed limits.
11. Regulatory zones less than ½ mile in length are not considered warranted or affective.

This guidance is not intended to be a standard and should not substitute for the exercise of good engineering judgment by engineers nor the determination by contractors of the appropriate manner and method of construction on projects under their control. It is the user's obligation to make sure that he/she uses the appropriate practices.

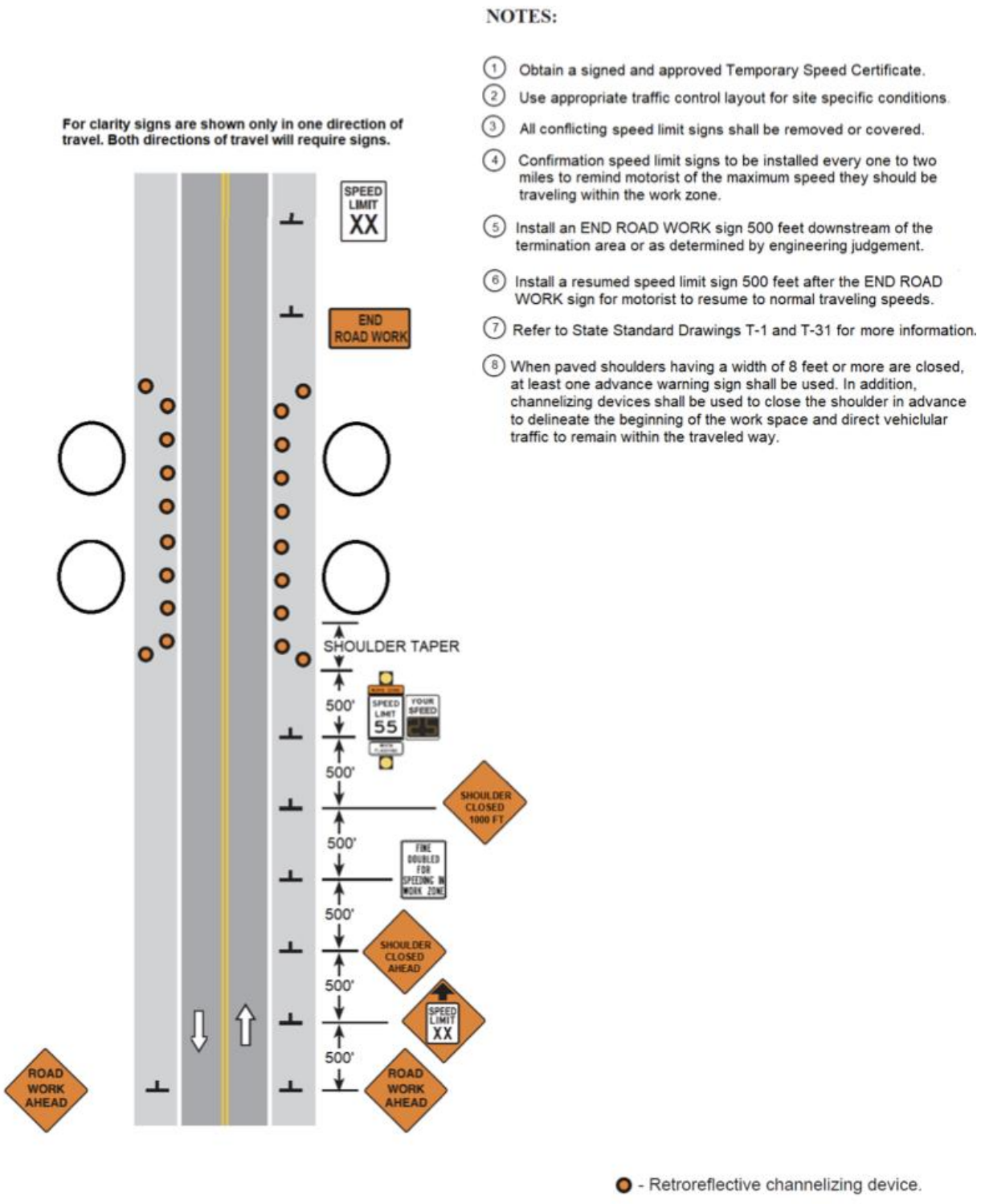
VTrans 2020

Figure B-17. Flowchart for temporary speed limit reductions for Vermont



VTrans 2020

Figure B-18. Signage layout for intermittent speed limit reduction on divided highway for Vermont



VTrans 2020

Figure B-19. Signage layout for intermittent speed limit reduction on divided highway for Vermont

APPENDIX C: STATE DOT SURVEY QUESTIONNAIRE

Work Zone Speed Limits and Motorist Compliance Survey: Letter to the Respondent

Dear Participant,

The Smart Work Zone Deployment Initiative (SWZDI) is sponsoring a research study titled "Work Zone Speed Limits and Motorist Compliance." The research is being performed by Michigan State University and the University of Missouri. The objectives of the research are to conduct a synthesis of best practices in setting work zone speed limits in the United States, to assess the impacts of various work zone characteristics on driver speed selection and speed limit compliance, and to provide guidance for speed limits that are appropriate for various contexts.

Completion of this synthesis will assist state DOTs with making more proactive data-driven decisions regarding the establishment of work zone speed limits, the design of temporary traffic control plans, and the implementation of various speed control measures.

Your cooperation in completing this survey will help to ensure the success of this research project. This survey is being sent to one person from each state DOT. You have been identified as the appropriate person at your DOT to complete this survey. The survey link that you received for completing the survey is unique for your DOT. If it would be more appropriate for someone else at your DOT to take this survey, please forward the email with the survey link to them or send their name and email address to Henry Brown (brownhen@missouri.edu). Additional instructions are provided at the beginning of the survey. If you would like to download a PDF version of the survey for informational purposes, please click here.

Please complete this survey by February 28, 2021. The survey includes 15 questions, and we estimate that the survey will take approximately 15 to 30 minutes to complete, depending on the level of detail you provide in the comments. If you have any questions, please contact Henry Brown at (573) 882-0832 or brownhen@missouri.edu. Any supporting materials may be sent by email to Henry in lieu of providing URLs. Thank you for participating in this survey!

Survey Instructions

1. To begin the survey, click the forward arrow at the bottom of this page.
2. To view and print the entire survey for informational purposes, click on this survey link and download and print the document.
3. To save your partial answers and complete the survey later, close the survey. Answers are automatically saved upon closing the browser window. To return to the survey later, open the original email from Henry Brown and click on the survey link.
4. To pass a partially completed survey to a colleague, close the survey and forward the original email from Henry Brown to a colleague. Note that only one person may work on the survey at a time; the survey response should only be active on one computer at a time.

5. To view and print your answers after completing the survey, submit the survey by clicking "Submit" on the final page. Download and print the PDF on the following page which contains a summary of your responses.
6. To submit the survey, click on "Submit" on the last page.

Survey Tips

1. Survey navigation is conducted by selecting the forward and back arrows at the bottom of each page.
2. If you are unable to complete the survey, you can return to the survey at any time by reentering through the survey link.

Questions

Contact Information

Name _____
State _____
Job Title _____
Phone Number _____
Email Address _____

1. Has your agency developed any policies, guidance, or standards regarding the setting of work zone speed limits?

   ☐ Yes
   ☐ No

If you answered yes, please briefly describe your agency's policy, guidance, or standards in the box below.

_____

If you answered yes, please provide URL(s) for the relevant documents in the box below or email files to brownhen@missouri.edu:

_____

Additional comments:

_____

2. For each of the following facility types, what is the maximum permanent speed limit used on roadways in your agency's jurisdiction?

Facility Type	75 mph or higher	70 mph	65 mph	60 mph	55 mph
Rural Freeways					
Urban Freeways					
Rural Two-Lane Highways					

Comments: _____

3. For each of the following facility types, to what extent does your agency allow for the following speed limit reductions in work zones? (Answer choices = Allowed, Allowed Only with Approval, Not Allowed)

Permanent Speed Limit	Rural Freeways	Urban Freeways	Rural Two-lane Highways
0 mph (no reduction)			
5 mph			
10 mph			
15 mph			
20 mph or more			

4. For each of the following facility types, how frequently does your agency implement the following speed limit reductions in work zones? (Answer choices = Always, Usually, Sometimes, Rarely, Never).

Reduction	Rural Freeways	Urban Freeways	Rural Two-lane Highways
0 mph (no reduction)			
5 mph			
10 mph			
15 mph			
20 mph or more			

Comments: _____

5. For each of the following permanent speed limits, how frequently does your agency implement the following speed limit reductions in work zones? (Answer choices = Always, Usually, Sometimes, Rarely, Never)

Reduction	75 mph or higher	60 mph to 70 mph	50 mph to 60 mph	40 mph to 50 mph	35 mph or lower
0 mph (no reduction)					
5 mph					
10 mph					
15 mph					
20 mph or more					

Comments: _____

6. For each of the following facility types, how would you rate the effectiveness of the following work zone speed limit reductions in your agency's jurisdiction on a scale of 1 to 5 (1 = Highly Ineffective, 5 = Highly Effective)?

Speed Limit Reduction	Rural Freeways	Urban Freeways	Rural Two-lane Highways
0 mph (no reduction)			
5 mph			
10 mph			
15 mph			
20 mph or more			

Comments: _____

7. How frequently does your agency use each of the following strategies to manage vehicle speeds in work zones?

Method	Always	Usually	Sometimes	Rarely	Never
Automated Speed Enforcement	☐	☐	☐	☐	☐
Dynamic (Variable) Speed Limits or Advisory Speeds	☐	☐	☐	☐	☐
Flashing Lights on Speed Limit Signs	☐	☐	☐	☐	☐
Higher Fines for Speeding in Work Zones	☐	☐	☐	☐	☐
Law Enforcement Vehicle (Officer Present)	☐	☐	☐	☐	☐
Law Enforcement Vehicle (Officer Not Present)	☐	☐	☐	☐	☐
Lights on Contractor or Maintenance Vehicles	☐	☐	☐	☐	☐
Public Outreach/Education	☐	☐	☐	☐	☐
Radar Speed Display Feedback Signs	☐	☐	☐	☐	☐
Reduced Lane Widths	☐	☐	☐	☐	☐
Sign with Speed Limit "When Workers Present"	☐	☐	☐	☐	☐
Temporary Rumble Strips	☐	☐	☐	☐	☐
Other (Please describe) _____	☐	☐	☐	☐	☐

Comments: _____

8. On a scale of 1 to 5 (1 = Highly Ineffective, 5 = Highly Effective), how would you rate the effectiveness of each of the following work zone speed management strategies?

Method	Rating
Automated Speed Enforcement	
Dynamic (Variable) Speed Limits or Advisory Speeds	
Flashing Lights on Speed Limit Signs	
Higher Fines for Speeding in Work Zones	
Law Enforcement Vehicle (Officer Present)	
Law Enforcement Vehicle (Officer Not Present)	
Lights on Contractor or Maintenance Vehicles	
Public Outreach/Education	
Radar Speed Display Feedback Signs	
Reduced Lane Widths	
Sign with Speed Limit "When Workers Present"	
Temporary Rumble Strips	
Other (Please describe) _____	

Comments: _____

9. How does your agency define worker presence for purposes of setting work zone speed limits? Please select all that apply.

   - ☐ Distance beyond traveled way (Please provide distance) _____
   - ☐ Absence of positive protection
   - ☐ Type of work activity
   - ☐ Other (please describe) _____
   - ☐ My agency does not use worker presence for purposes of setting work zone speed limits

Comments: _____

10. Which of the following do you believe is most effective?

    - ☐ No speed limit reduction for work zone
    - ☐ 10 mph speed limit reduction for work zone
    - ☐ 45 mph work zone speed limit when workers present
    - ☐ Other (please describe) _____

Comments: _____

11. Do contractors in your jurisdiction adjust speed limits on a regular basis (e.g., hourly or daily) for worker presence?

    - ☐ Yes
    - ☐ No

Comments: _____

12. How often does your agency consider the following factors when setting speed limits in work zones or determining which work zone speed strategies to implement?

Factor	Always	Usually	Sometimes	Rarely	Never
Area Type (Urban or Rural)	☐	☐	☐	☐	☐
Availability of Law Enforcement	☐	☐	☐	☐	☐
Crash History	☐	☐	☐	☐	☐
Duration of Work Zone	☐	☐	☐	☐	☐
Functional Classification	☐	☐	☐	☐	☐
Length of Work Zone	☐	☐	☐	☐	☐
Percent Trucks	☐	☐	☐	☐	☐
Permanent Speed Limit	☐	☐	☐	☐	☐
Presence of Positive Protection	☐	☐	☐	☐	☐
Terrain	☐	☐	☐	☐	☐
Traffic Volumes	☐	☐	☐	☐	☐
Type of Work Activity	☐	☐	☐	☐	☐
Worker Presence	☐	☐	☐	☐	☐
Other (Please describe) _____	☐	☐	☐	☐	☐

Comments: _____

13. Has your agency completed any studies to evaluate the effectiveness of the work zone speed limits set by your agency or strategies used by your agency to manage work zone speeds?

☐ Yes
☐ No

If you answered "yes" to Question 9, please provide URL(s) for evaluation documents in the box below, upload files, or email files to brownhen@missouri.edu:

_____

Comments: _____

14. A list of possible challenges to the management of work zone speeds is provided below. Please rank the top **three** challenges based on the degree to which they hinder your agency's efforts to manage work zone speeds (1 = greatest challenge, 2 = greatest challenge, etc.)?

Concern	Ranking
Agency Understaffed	
Availability of Law Enforcement	
Contracting Considerations	
Distracted Drivers	
Driver Indifference	
Funding Constraints	
Lack of Agency Buy-In	
Lack of Evidence of Effectiveness of Strategies	
Legislative Barriers	
Other (Please describe) _____	

Comments: _____

15. Please provide any additional comments that you may have regarding the setting of work zone speed limits and management of work zone speeds.

_____

_____

_____

Submittal Instructions

To complete the survey and record your answers, please click the "Submit" button.

Please note that once you click the "Submit" button, you will not be able to modify your answers. To save your partial answers and complete the survey later, close the survey. Answers are automatically saved upon closing the browser window. To return to the survey later, open the original email from Henry Brown and click on the survey link. To pass a partially completed survey to a colleague, close the survey and forward the original email from Henry Brown to a colleague. Note that only one person may work on the survey at a time; the survey response should only be active on one computer at a time. To review your answers before submitting, please select the forward and back arrows at the bottom of each page.

End of Survey

Thank you for completing this survey. Your efforts are greatly appreciated. Your responses are very important, and your feedback is welcome. For your information, a copy of your responses is provided below. You may download your responses in pdf format using the "Download pdf" link shown below. If you have any questions or comments, please contact the principal investigator, Henry Brown:

Henry Brown, PE
E2509 Lafferre Hall
University of Missouri
Columbia, MO 65211
(573) 882-0832
brownhen@missouri.edu

Your responses have been recorded, and you may now close your browser.

APPENDIX D: INDIVIDUAL SURVEY RESPONSES FROM STATE DOTS

Table D-1. Individual survey responses for question 1 (development of policies, guidance, or specifications regarding the setting of work zone speed limits)

Respondent	Response Text
Alabama	Yes
Alaska	-
Arizona	Yes
Arkansas	No
California	Yes
Colorado	Yes
Connecticut	Yes
Delaware	-
District of Columbia	-
Florida	-
Georgia	Yes
Hawaii	-
Idaho	No
Illinois	Yes
Indiana	Yes
Iowa	Yes
Kansas	Yes
Kentucky	Yes
Louisiana	Yes
Maine	Yes
Maryland	Yes
Massachusetts	No
Michigan	Yes
Minnesota	Yes
Mississippi	Yes
Missouri	Yes
Montana	Yes
Nebraska	Yes
Nevada	Yes
New Hampshire	No
New Jersey	Yes
New Mexico	-

Respondent	Response Text
New York	-
North Carolina	Yes
North Dakota	No
Ohio	Yes
Oklahoma	No
Oregon	Yes
Pennsylvania	Yes
Rhode Island	No
South Carolina	Yes
South Dakota	Yes
Tennessee	Yes
Texas	Yes
Utah	Yes
Vermont	Yes
Virginia	Yes
Washington	Yes
West Virginia	-
Wisconsin	Yes
Wyoming	Yes

Table D-2. DOT descriptions for question 1 (policies, guidance, or specifications regarding the setting of work zone speed limits)

Description
We do a 10 mph speed reduction for flagging operations and lane closures. Additionally, we allow reductions for milled surfaces, uneven pavement, workers within 2 ft of traveled way, etc.
The department has utilized the Code of Alabama Section 32-5A-176.1, Speed Limits in Construction Zones, along with our GFO parts 3-49 & 4-9 and our General Traffic Control Plan Notes to come up with a decision matrix during the design phase based on the type of work and any additional factors such as geometry/location specifics/crash history to determine the most effective and safe way to implement reduced speed zones.
https://www.michigan.gov/documents/mdot/MDOT_Work_Zone_Safety_and_Mobility_Manual-May_2021_727303_7.pdf Section 6.02 and Appendix E
From previous studies in the past by various agencies and MUTCD recommendations a reduced construction speed limit should not exceed 10 mph below the existing posted speed limit. One of three conditions must exist to be applicable: workers on or near the pavement, construction barrier curb used or other hazards to the motorist as determined by the regional traffic engineer.
Our guidance related to work zone speed limit establishment is to reduce the posted speed by 10 mph. If the normal roadway segment posted speed is 65 mph; during maintenance/construction periods, the work zone speed limit would be posted at 55 mph.
The information noted below is a guidance document for our designers when developing strategies for adopting a speed reduction for an Agency project.
Generally speaking, we require the existing speed limit to be 65 mph or higher to consider work zone speed limit reductions. More often than not, we only permit variable work zone speed limits, with posted speeds depending on work zone conditions such as lane closures, uneven lanes, barrier installations, etc.
Indiana has two tracks for work zone speed limits, a Construction Memo for projects without detailed temporary traffic control plans, and design guidance for projects with full temporary traffic control plans.
55 mph regulatory for lane closures where workers are adjacent to traffic 55 mph regulatory for freeway work zones less than 30 ft. between barriers (chute) 55 mph regulatory for single lane freeway/expressway bridge with barrier Other regulatory work zone speed limits as needed
ODOT reduces speeds on a project-by-project basis. The reduced work zone speed limit is project specific, except ODOT does standardize speed reductions for Freeway paving work. Oregon law requires that a legal speed zone order is issued for each reduction, these orders have to be signed by the State Traffic Engineer. ODOT TCP Design Manual discusses work zone speed limit reductions. https://www.oregon.gov/odot/Engineering/Pages/TCP-Manual.aspx https://www.oregon.gov/odot/Forms/2ODOT/7342874.pdf This document is the request form, but the instructions/guidance for when to reduce speed are attached to the document as an attachment.

Description
Per PennDOT's Temporary Traffic Control Zone (work zone) Regulatory Speed Limit Policy, all work zones should be designed to accommodate the existing posted regulatory speed limit whenever possible, and documented justification is required when a regulatory speed limit reduction is being considered. Completion of a Temporary Traffic Control Zone Regulatory Speed Limit Reduction Evaluation form is required for all regulatory speed limit reduction requests on utility projects, highway occupancy permit (HOP) projects, and local jurisdiction construction or maintenance projects impacting a state highway. Some key highlights of the policy are: o Data driven and quantified through the completion of a TE-162 (Temporary Traffic Control Zone Regulatory Speed Limit Reduction Evaluation) Form. o Mitigates speed variance in work zones that often leads to crashes. o Considers other mitigation strategies in lieu of speed reductions. o District Traffic Engineer (DTE) approval required. o HSTO Division Chief concurrence required for use with Automated Work Zone Speed Enforcement.
Attached is our guidance: http://epg.modot.org/index.php/616.12_Work_Zone_Speed_Limits
Speed limit may be reduced by 15 mph without a traffic engineering investigation on highways where the normal posted speed limit is 70 mph. The speed limit may be reduced by 10 mph without a traffic engineering investigation on other highways. Larger speed reductions require a traffic engineering investigation and approval of the secretary of transportation.
We have a table in specification that details work zone configuration and proper speed for those activities.
We permit the lowering of speed limits of 10 mph without any additional review or approval. More than 10 mph reduction to be approved by state traffic engineer.
Traffic control standards require 10 mph regulatory speed reduction for lane drops on multi-lane facilities.
Guidance can be found in our Construction Manual chapter on Work Zone Traffic Control, which will be emailed or linked below.
Reduced speed limits in work zones
Our policy states the allowable speed limit decrease in work zones depending on the type of roadway the work is occurring on- 2 lane, 4 lane or freeway. It also discusses reductions based on items such as presence of concrete barrier and day vs. night work.
We only lower the speed limit if there is a need to do so, mainly on our high-speed Interstates/expressways only. If workers are present without positive protection we lower the speed limit from 70 mph to 55 mph or 65 mph to 55 mph. If there are narrowed lanes, lane shifts, barrier wall, no shoulders we will lower from 70 mph to 60 mph or 65 to 60 mph. If we have short bridge projects, work area less than 0.5 miles with positive protection, we will only post advisory speed limits.
Set criteria must be met to qualify for use. If qualify and approved, then follow a preset table of speeds that vary based on original posted speed limit, positive protection presence and worker presence. Can be implemented using flatsheet signs or using digital speed limit signs; however, both will involve posting changes at the same intervals.
Per OSTA Reference Guide, Reduced speed zoning ought to be avoided as much as practicable.
MDOT SHA is the process of updating out Work Zone speed limit guidelines is in progress. We will email the current and in-progress documents to you. The preference is to maintain posted speed limits, however smaller reductions in the speed limit of up to 10 mph may be considered.
WSDOT has a Secretary's Executive Order 1060 on regulatory, variable regulatory and advisory speed limit reductions is work zones. It defines regional and HQ approvals criteria and process. A pdf of the document will be emailed.

Description
We have developed a protocol for a legal reduction in increments of 10, 15, and 20 mph.
TxDOT has a form to request a regulatory construction speed zone, they have to describe the type of work. The form has guidelines based on current speed limits. Then, submit it for review if it passes the review it goes to the TxDOT Commission for approval. The legislature just passed a law that allows Maintenance crews to temporarily lower speed limits with TxDOT District Approval.
NDOT's Work Zone Safety Mobilization Plan identified Transportation Management Plan (TMP), which includes the traffic control recommendations for construction work zone speed limits. Construction work zone speed limit reductions follow plan procedures for review, traffic control mitigation requires for the reduced speed limit and approval through the Traffic Ops Division.
We have guidance on setting advisory, 24/7 and workers present speed limits. MN also has a statute that covers workers present speed limits. Document will be attached.
Over a 10 mph drop should be documented and justified. But this is not enforced or documented.
Reductions are typically allowed during permitted lane closures. There has rarely been an occasion where a reduction was allowed when there wasn't a lane closure present.
Region 1 lane closure and smart work zone guidelines.

Table D-3. Resources submitted for question 1 (policies, guidance, or standards regarding the setting of work zone speed limits)

Respondent	Resource Description
Alabama	AL Code Section 32-5A-176.1 (2012) (Speed limits in construction zones)
Alabama	Guidelines for Operation
Alabama	Standard Operating Procedure for Determining Speed Limit(s) in a Work Zone
Arizona	Temporary Traffic Control Design Guidelines
California	California Manual for Setting Speed Limits
Connecticut	Guidelines on Establishing Speed Limits in the State of Connecticut
Georgia	Special Provision (Section 150 – Traffic Control) (Section 150.3.04.B)
Illinois	Policy on Establishing and Posting Speed Limits on the State Highway System
Indiana	Construction Memorandum 14-06 (Use of Worksite Speed Limit Assembly Signs during Construction)
Indiana	Indiana Design Manual (Section 503-3.04(01): Construction Zone Design Speed and Section 503-7.01(02): Regulatory Signing)
Iowa	Design Manual (9A-4: Regulatory Speed Limit Changes)
Kentucky	Standard Drawings (No. TTD-130: Speed Zone Signing for Work Zones)
Louisiana	Standard Plans (TTC-00(A): Temporary Traffic Control General Notes Sheet)
Maine	Administrative Policy Memorandum No. 431: Establishment of Speed Limits in Work Zones
Maryland	Application Guideline No. 6-F1 (Guidelines on Reduced Work Zone Speed Limits on Maryland State Highways) (Proposed draft)
Maryland	Application Guideline No. 6-F1 (Work Zones on 65 / 60 mph Roadways) (Current version)
Michigan	Work Zone Safety and Mobility Manual
Minnesota	Speed Limits in Work Zones Guidelines
Missouri	Engineering Policy Guide (616.12 Work Zone Speed Limits)
Montana	Standard and Supplemental Specifications for Road and Bridge Construction (618.03.13 Traffic Control Device Location and Installation)

Respondent	Resource Description
Nebraska	Operating Instruction 60-18: Work Zone Speed Limits
Nevada	Work Zone Safety and Mobility Implementation Guide
North Carolina	Work Zone Speed Limit Ordinances
Ohio	Standard Construction Drawings: Traffic (MT-104.10 - Work Zone Speed Zones (WZSZs) on High Speed (>=55 mph) Multi-Lane Highways)
Ohio	Supplement 1108: Digital Speed Limit (DSL) Sign Assembly Prequalification Procedure
Ohio	Traffic Engineering Manual [Part 6 (Sections 640-18.2, 641-34, Plan Note 642-24, and others) and Part 12 (Sections 1203-2.9, Table 1297-7, and others)]
South Carolina	Standard Drawings (610-025-00 through 610-120-00: Lane Closures)
South Dakota	SDDOT Construction Manual (Chapter 15 - Work Zone Traffic Control)
Texas	Activity Memorandum: Activity Report A10FY21, Operating Speed / Posted Speed Limit Changes
Texas	Form 1204: Request for Regulatory Construction Speed Zone
Texas	Form 1204M: Regulatory Maintenance Activity Speed Zone
Texas	Memorandum: New Texas Law - District Engineer Authority to Temporarily Lower Speed Limits at Maintenance Activity Sites Additional Guidance
Texas	Studies to Improve the Management of Regulatory Speed Limits in Texas Work Zones
Texas	Traffic Safety Division Standard: Maintenance Work Zone Speed Limit Signs
Texas	Updated Guidance Related to Speed Limits (Email)
Utah	UDOT 06C-61: Work Zone Speed Limits
Vermont	Traffic Engineering Instructions (TEI 20-603: Guidance to Establishing a Temporary Speed Limit Reduction within the Work Zone)
Virginia	Traffic Engineering Division Memorandum TE – 350.1: Work Zone Speed Analysis
Washington	Secretary's Executive Order Number: E 1060.03: Speed Limit Reductions in Work Zones
Wisconsin	Traffic Engineering, Operations, and Safety Manual (13-5-6: Temporary Traffic Control Zones)
Wyoming	WYDOT Standard Plans (703-5D: Construction Traffic Control Standards)

Table D-4. Survey comments for question 1 (development of policies, guidance, or specifications regarding the setting of work zone speed limits)

Comment
Speeds determined by Legislature.
This is currently in the early development stages.
Typically, this is done by committee and is a case-by-case situation, with the input from various professionals from different bureaus, including: Construction, Design, Traffic.
We commonly have 45 mph work zones on 75 mph freeways. Completely for ease of design, and they think, minimize exposure.
We do have 45 When Workers Present (WWP) and have a new bill just passed allowing flashing lights to be used to note worker presence.
We typically do 65 mph for lane closures on Interstate where the posted speed limit is 80 or 75 mph. We also do a workers presence speed limit of 45 mph within these. Two-way traffic operations on Interstate will be posted at 65 mph on Interstate, where the posted speed limit is 80 or 75 mph.
We're in the process of developing a Work Zone Speed Guidance Memo.

Table D-5. Individual survey responses for question 2 (maximum permanent speed limit)

Respondent	Rural Freeways	Urban Freeways	Rural Two-Lane Highways
Alabama	70 mph	70 mph	55 mph
Alaska	-	-	-
Arizona	75 mph or higher	65 mph	65 mph
Arkansas	75 mph or higher	65 mph	60 mph
California	-	-	-
Colorado	75 mph or higher	65 mph	65 mph
Connecticut	-	-	-
Delaware	-	-	-
District of Columbia	-	-	-
Florida	-	-	-
Georgia	70 mph	65 mph	55 mph
Hawaii	-	-	-
Idaho	75 mph or higher	65 mph	70 mph
Illinois	70 mph	65 mph	55 mph
Indiana	70 mph	55 mph	55 mph
Iowa	70 mph	65 mph	55 mph
Kansas	70 mph	65 mph	65 mph
Kentucky	70 mph	70 mph	55 mph
Louisiana	75 mph or higher	70 mph	55 mph
Maine	75 mph or higher	70 mph	55 mph
Maryland	70 mph	70 mph	55 mph
Massachusetts	65 mph	65 mph	55 mph
Michigan	75 mph or higher	75 mph or higher	65 mph
Minnesota	70 mph	60 mph	60 mph
Mississippi	70 mph	70 mph	55 mph
Missouri	70 mph	65 mph	60 mph
Montana	75 mph or higher	65 mph	70 mph
Nebraska	75 mph or higher	65 mph	65 mph
Nevada	75 mph or higher	65 mph	70 mph
New Hampshire	70 mph	55 mph	55 mph
New Jersey	65 mph	65 mph	55 mph
New Mexico	-	-	-
New York	-	-	-
North Carolina	70 mph	65 mph	55 mph

Respondent	Rural Freeways	Urban Freeways	Rural Two-Lane Highways
North Dakota	75 mph or higher	60 mph	65 mph
Ohio	70 mph	65 mph	60 mph
Oklahoma	75 mph or higher	70 mph	70 mph
Oregon	70 mph	65 mph	70 mph
Pennsylvania	70 mph	55 mph	55 mph
Rhode Island	65 mph	55 mph	-
South Carolina	70 mph	60 mph	55 mph
South Dakota	75 mph or higher	65 mph	65 mph
Tennessee	70 mph	65 mph	60 mph
Texas	75 mph or higher	75 mph or higher	75 mph or higher
Utah	75 mph or higher	70 mph	70 mph
Vermont	-	-	-
Virginia	70 mph	55 mph	55 mph
Washington	70 mph	60 mph	65 mph
West Virginia	-	-	-
Wisconsin	70 mph	70 mph	55 mph
Wyoming	75 mph or higher	75 mph or higher	70 mph

Table D-6. Individual survey responses for question 3 (allowable speed reductions in work zones) for rural freeways

Respondent	0 mph (no reduction)	5 mph	10 mph	15 mph	20 mph or more
Alabama	Allowed	Allowed	Allowed	Allowed	Allowed
Alaska	-	-	-	-	-
Arizona	Allowed	Allowed	Allowed	Allowed	Allowed
Arkansas	Allowed	Allowed	Allowed	Not Allowed	Not Allowed
California	-	-	-	-	-
Colorado	Allowed	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval
Connecticut	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed
Delaware	-	-	-	-	-
District of Columbia	-	-	-	-	-
Florida	-	-	-	-	-
Georgia	Allowed	Allowed Only with Approval	Allowed	Allowed Only with Approval	Allowed Only with Approval
Hawaii	-	-	-	-	-
Idaho	Allowed	Allowed	Allowed	Allowed	Allowed
Illinois	Allowed	-	Not Allowed	Allowed	Allowed
Indiana	Allowed	Allowed Only with Approval	Allowed	Allowed	Allowed Only with Approval
Iowa	Allowed	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval	Not Allowed
Kansas	Allowed	Allowed	Allowed	Not Allowed	Not Allowed
Kentucky	Not Allowed	Allowed	Allowed	Allowed	Allowed Only with Approval
Louisiana	-	-	Allowed	-	Allowed Only with Approval
Maine	-	-	Allowed	Allowed	Allowed

Respondent	0 mph (no reduction)	5 mph	10 mph	15 mph	20 mph or more
Maryland	Allowed	Allowed Only with Approval	Allowed Only with Approval	Not Allowed	Not Allowed
Massachusetts	Allowed	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval
Michigan	Allowed	Not Allowed	Allowed	Allowed Only with Approval	Allowed Only with Approval
Minnesota	Allowed	Allowed	Allowed	Allowed	Allowed
Mississippi	-	-	Allowed	Allowed Only with Approval	Allowed Only with Approval
Missouri	Allowed	Allowed	Allowed	Allowed Only with Approval	Allowed Only with Approval
Montana	Not Allowed	Not Allowed	Allowed Only with Approval	Allowed	Allowed
Nebraska	-	-	-	-	Allowed
Nevada	Allowed	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval
New Hampshire	-	-	Allowed Only with Approval	-	-
New Jersey	-	-	-	Allowed Only with Approval	-
New Mexico	-	-	-	-	-
New York	-	-	-	-	-
North Carolina	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval	Not Allowed
North Dakota	-	-	-	-	Allowed
Ohio	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval	Not Allowed
Oklahoma	Allowed	Allowed	Allowed	Allowed	Allowed
Oregon	-	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval
Pennsylvania	Allowed	Allowed	Allowed Only with Approval	Allowed Only with Approval	Not Allowed

Respondent	0 mph (no reduction)	5 mph	10 mph	15 mph	20 mph or more
Rhode Island	Allowed	Allowed	Allowed	Allowed	-
South Carolina	-	-	-	-	Allowed
South Dakota	Allowed	-	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval
Tennessee	Allowed	Allowed	Allowed	Allowed Only with Approval	Allowed Only with Approval
Texas	Allowed	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval
Utah	Allowed	Not Allowed	Allowed	-	-
Vermont	-	-	Allowed	-	-
Virginia	Allowed	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval
Washington	Allowed	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval
West Virginia	-	-	-	-	-
Wisconsin	Allowed	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval	Not Allowed
Wyoming	-	-	-	-	-

Table D-7. Individual survey responses for question 3 (allowable speed reductions in work zones) for urban freeways

Respondent	0 mph (no reduction)	5 mph	10 mph	15 mph	20 mph or more
Alabama	Allowed	Allowed	Allowed	Allowed	Allowed
Alaska	-	-	-	-	-
Arizona	Allowed	Allowed	Allowed	Allowed	Allowed
Arkansas	Allowed	Allowed	Allowed	Not Allowed	Not Allowed
California	-	-	-	-	-
Colorado	Allowed	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval
Connecticut	-	-	-	-	Allowed Only with Approval
Delaware	-	-	-	-	-
District of Columbia	-	-	-	-	-
Florida	-	-	-	-	-
Georgia	Allowed	Allowed	Allowed	Allowed Only with Approval	Allowed Only with Approval
Hawaii	-	-	-	-	-
Idaho	Allowed	Allowed	Allowed	Allowed	Allowed
Illinois	Allowed	-	Not Allowed	Allowed	Allowed
Indiana	Allowed	Allowed Only with Approval	Allowed	Allowed	Allowed Only with Approval
Iowa	Allowed	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval	Not Allowed
Kansas	Allowed	Allowed	Allowed	Not Allowed	Not Allowed
Kentucky	Not Allowed	Allowed	Allowed	Allowed	Allowed Only with Approval
Louisiana	-	-	Allowed	-	Allowed Only with Approval
Maine	-	-	Allowed	Allowed	Allowed

Respondent	0 mph (no reduction)	5 mph	10 mph	15 mph	20 mph or more
Maryland	Allowed	Allowed Only with Approval	Allowed Only with Approval	Not Allowed	Not Allowed
Massachusetts	Allowed	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval
Michigan	Allowed	Not Allowed	Allowed	Allowed Only with Approval	Allowed Only with Approval
Minnesota	Allowed	Allowed	Allowed	Allowed	Allowed
Mississippi	-	-	Allowed	Allowed Only with Approval	Allowed Only with Approval
Missouri	Allowed	Allowed	Allowed	Allowed Only with Approval	Allowed Only with Approval
Montana	Allowed	Allowed	Allowed	Allowed	Allowed
Nebraska	-	-	-	-	Allowed
Nevada	Allowed	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval
New Hampshire	-	-	Allowed Only with Approval	-	-
New Jersey	-	-	-	Allowed Only with Approval	-
New Mexico	-	-	-	-	-
New York	-	-	-	-	-
North Carolina	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval	Not Allowed	Not Allowed
North Dakota	-	-	-	-	Allowed
Ohio	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval	Not Allowed
Oklahoma	Allowed	Allowed	Allowed	Allowed	Allowed
Oregon	-	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval
Pennsylvania	Allowed	Allowed	Allowed Only with Approval	Allowed Only with Approval	Not Allowed

Respondent	0 mph (no reduction)	5 mph	10 mph	15 mph	20 mph or more
Rhode Island	Allowed	Allowed	Allowed	Allowed	-
South Carolina	-	-	-	Allowed	-
South Dakota	Allowed	-	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval
Tennessee	Allowed	Allowed	Allowed	Allowed Only with Approval	Allowed Only with Approval
Texas	Allowed	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval
Utah	Allowed	Not Allowed	Allowed	-	-
Vermont	-	-	Allowed	-	-
Virginia	Allowed	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval	Not Allowed
Washington	Allowed	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval
West Virginia	-	-	-	-	-
Wisconsin	Allowed	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval	Not Allowed
Wyoming	-	-	-	-	-

Table D-8. Individual survey responses for question 3 (allowable speed reductions in work zones) for rural two-lane highways

Respondent	0 mph (no reduction)	5 mph	10 mph	15 mph	20 mph or more
Alabama	Allowed	Allowed	Allowed	Allowed	Allowed
Alaska	-	-	-	-	-
Arizona	Allowed	Allowed	Allowed	Allowed	Allowed
Arkansas	Allowed	Allowed	Allowed	Not Allowed	Not Allowed
California	-	-	-	-	-
Colorado	Allowed	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval
Connecticut	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed
Delaware	-	-	-	-	-
District of Columbia	-	-	-	-	-
Florida	-	-	-	-	-
Georgia	Allowed	Allowed Only with Approval	Allowed	Allowed Only with Approval	Allowed Only with Approval
Hawaii	-	-	-	-	-
Idaho	Allowed	Allowed	Allowed	Allowed	Allowed
Illinois	Allowed	-	Allowed	Allowed	Allowed
Indiana	Allowed	Allowed Only with Approval	Allowed	Allowed	Allowed Only with Approval
Iowa	Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed
Kansas	Allowed	Allowed	Allowed	Not Allowed	Not Allowed
Kentucky	Not Allowed	Allowed	Allowed	Allowed Only with Approval	Allowed Only with Approval
Louisiana	-	-	Allowed	-	Allowed Only with Approval
Maine	-	-	Allowed	Allowed	Allowed

Respondent	0 mph (no reduction)	5 mph	10 mph	15 mph	20 mph or more
Maryland	Allowed	Allowed Only with Approval	Allowed Only with Approval	Not Allowed	Not Allowed
Massachusetts	Allowed	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval
Michigan	Allowed	Not Allowed	Allowed	Allowed Only with Approval	Allowed Only with Approval
Minnesota	Allowed	Allowed	Allowed	Allowed	Allowed
Mississippi	-	-	Allowed	Allowed Only with Approval	Allowed Only with Approval
Missouri	Allowed	Allowed	Allowed	Allowed Only with Approval	Allowed Only with Approval
Montana	Not Allowed	Not Allowed	Allowed	Allowed	Allowed
Nebraska	-	-	Allowed	Allowed Only with Approval	Allowed Only with Approval
Nevada	Allowed	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval
New Hampshire	-	-	Allowed Only with Approval	-	-
New Jersey	-	-	Allowed Only with Approval	-	-
New Mexico	-	-	-	-	-
New York	-	-	-	-	-
North Carolina	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed
North Dakota	-	-	-	-	Allowed
Ohio	Allowed	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval	Not Allowed
Oklahoma	Allowed	Allowed	Allowed	Allowed	Allowed
Oregon	-	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval	Not Allowed
Pennsylvania	Allowed	Allowed	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval

Respondent	0 mph (no reduction)	5 mph	10 mph	15 mph	20 mph or more
Rhode Island	Allowed	Allowed	Allowed	Allowed	-
South Carolina	Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed
South Dakota	Allowed	-	-	-	-
Tennessee	Allowed	Allowed	Allowed	Allowed Only with Approval	Allowed Only with Approval
Texas	Allowed	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval
Utah	Allowed	Not Allowed	Allowed	-	-
Vermont	-	-	Allowed	-	-
Virginia	Allowed	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval	Not Allowed
Washington	Allowed	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval	Allowed Only with Approval
West Virginia	-	-	-	-	-
Wisconsin	Allowed	Allowed Only with Approval	Allowed Only with Approval	Not Allowed	Not Allowed
Wyoming	-	-	-	-	-

Table D-9. Survey comments for question 3 (allowable speed reductions in work zones)

Comments:
A buffer zone is required if dropping more than 15 mph.
The current guidelines allow up to 10 mph. Future updates will allow up to 15 mph for roadways with permanent speed limits of 70 mph.
There is no limit on amount of speed reduction. Century Code allows up to 30 mph reduction in one step. Further reduction would require the second set of signs.
We don't not allow a 5 mph drop but normally do not do it or have anything set-up for it. For the 15 mph when we go from 75 to 60 that is approved. anything else needs approval. To go from 70 to 60 with 45 WWP is approved and allowed, if it is a hard drop we need approval. So, the dropdown boxes didn't give me all the options to talk about what we can do.
15 mph and 20 mph or more regulatory reductions are usually associated with temporary alignments, lane shifts, narrowed lanes or roadway conditions such as chip seal operations not just as a work zone safety practice.
We have no formal approval process. I have never seen a project that doesn't lower the speed limit by a minimum of 10mph.
Although the above chart lists DOT does not allow a 15 mph or 20 mph speed reduction for WZs in 1 transition, we are allowed, on special cases to conduct a step down a WZ speed limit using in a maximum interval of 10 mph. Meaning if work activities and barrier conditions within the WZ dictate, we could implement a double 10 mph reduction in posted WZ speeds.
Regulatory construction speed zones with greater than a 10 mph reduction must be justified before the elected Transportation Commission and approval given by that body.
Currently the District Engineers determine the appropriate speed reduction for the work zones in their district.
5 mph reductions are not typically used or requested, though it doesn't mean these wouldn't be allowed. All speed reductions in work zones require approval of the Secretary of Transportation, the Secretary of Public Safety, and the Superintendent of the Highway Patrol per state law. DOT Maintenance work zones can have the same speed reductions approved; however, the process to obtain approval is not typically sought for these shorter duration work zones, therefore, 0 mph (no reduction) is allowed on all facilities as well. While we could request approval for work zone speed limits on rural two-lane highways, we typically don't because they often use a flagger operation (or temporary signal or stop control) for one-lane, two-way operation which requires drivers to come to a stop and we don't implement speed reductions for these. We use advisory speed plaques with warning signs for traffic diversions on these facilities.
Our decision matrix is based on type of work and type of facility (two-lane highway, multi-lane highway, multi-lane divided (non-Interstate), and Interstate highway) with additional factors such as geometry/location specifics/crash history determining the difference between desired and minimums.
A TTC plan should be designed so that vehicles can travel through the TTC zone with a speed limit reduction of no more than 10 mph. A reduction of more than 10 mph in the speed limit should be used only when required by restrictive features in the TTC zone. Where restrictive features justify a speed reduction of more than 10 mph, additional driver notification should be provided. The speed limit should be stepped down in advance of the location requiring the lowest speed, and additional TTC warning devices should be used.
We typically do not lower the speed limit on rural 2 lane highways.
We strive to design work zone traffic control to accommodate normal operating speed as much as possible. Our DOT lowers speeds as described question #1. Other reductions allowed when deemed appropriate. Contractor does not have authority to reduce speeds other than those mentioned in #1.
The 0 mph is tricky to answer for Urban/Rural Freeways. If the qualifying conditions are not present to implement the approved WZSZ or if the plans do not include an approved WZSZ then there is no approval required to not reduce the speed limit. However, if the conditions are present and there is a WZSZ in the plans then it is not the contractor's option to not implement. It would be considered a non-compliance and a deduction for the month would be made. There are also parts of our approved table of speeds that call for a 0 mph reduction in certain situations.

Comments:
Our DOT Procedural Directive 1502.2 defines approval requirements: all work zone speed reductions require approval by the Region Traffic Engineer. Maintenance supervisors may approve speed limit reductions up to 10 mph for maintenance work zones.
Higher than 10 mph speed reductions are allowed with approval from State Traffic Engineer. 10 mph is standard practice for regions to implement.
We don’t do it that often. This is not always popular with our construction bureau.
24/7 reductions always need approval, but advisory or workers present limits do not generally. Specifics are covered in the guidance document.
Refer to OSTA for any permanent speed limit questions.
As seen in our standard drawings for lane closures, we only reduce speeds to 45 mph or 35 mph. The above answers reflect the difference between the maximum permanent speed limit and the lane closure speed limit. We do not reduce speeds on two-lane routes.
Our Districts typically make their own decisions on speed reduction through the work zone and the district engineers would be the approver.

Table D-10. Individual survey responses for question 4 (frequency of use of speed limit reductions in work zones) for rural freeways

Respondent	0 mph (no reduction)	5 mph	10 mph	15 mph	20 mph or more
Alabama	Rarely	Rarely	Sometimes	Usually	Sometimes
Alaska	-	-	-	-	-
Arizona	Never	Never	Sometimes	Never	Usually
Arkansas	Always	Usually	Usually	Never	Never
California	-	-	-	-	-
Colorado	Usually	Sometimes	Usually	Sometimes	Sometimes
Connecticut	-	-	-	-	-
Delaware	-	-	-	-	-
District of Columbia	-	-	-	-	-
Florida	-	-	-	-	-
Georgia	Sometimes	Rarely	Usually	Never	Sometimes
Hawaii	-	-	-	-	-
Idaho	Never	Never	Always	Sometimes	Rarely
Illinois	Rarely	-	-	Usually	Sometimes
Indiana	Sometimes	Rarely	Sometimes	Usually	Sometimes
Iowa	Sometimes	Sometimes	Sometimes	Usually	Never
Kansas	Rarely	Rarely	Always	Rarely	Rarely
Kentucky	Never	Never	Never	Always	Rarely
Louisiana	Never	Never	Usually	Never	Rarely
Maine	Sometimes	Never	Always	Usually	Always
Maryland	Usually	Rarely	Rarely	Rarely	Never
Massachusetts	Usually	Sometimes	Rarely	Rarely	Rarely
Michigan	Sometimes	Never	Usually	Sometimes	Sometimes
Minnesota	-	-	-	-	-
Mississippi	Sometimes	Never	Sometimes	Never	Rarely
Missouri	Sometimes	Rarely	Usually	Sometimes	Rarely
Montana	Never	Never	Sometimes	Usually	Usually
Nebraska	Sometimes	Never	Usually	Sometimes	Sometimes
Nevada	Sometimes	Sometimes	Usually	Sometimes	Rarely
New Hampshire			Sometimes		
New Jersey				Usually	
New Mexico	-	-	-	-	-
New York	-	-	-	-	-
North Carolina	Sometimes	Usually	Usually	Usually	Never

Respondent	0 mph (no reduction)	5 mph	10 mph	15 mph	20 mph or more
North Dakota	Sometimes	Rarely	Sometimes	Sometimes	Sometimes
Ohio	Sometimes	Sometimes	Sometimes	Sometimes	Never
Oklahoma	Rarely	Rarely	Sometimes	Usually	Rarely
Oregon	Sometimes	Rarely	Usually	Sometimes	Sometimes
Pennsylvania	Usually	Rarely	Sometimes	Sometimes	Never
Rhode Island	Usually	Rarely	Sometimes	Sometimes	Rarely
South Carolina	Never	Never	Never	Never	Usually
South Dakota	Sometimes	-	Usually	Usually	Usually
Tennessee	Sometimes	Never	Sometimes	Rarely	Rarely
Texas	Rarely	Sometimes	Sometimes	Sometimes	Sometimes
Utah	Sometimes	Never	Usually	Rarely	Rarely
Vermont	Sometimes	-	Usually	-	-
Virginia	Usually	Rarely	Sometimes	Sometimes	Sometimes
Washington	Usually	Rarely	Sometimes	Sometimes	Rarely
West Virginia	-	-	-	-	-
Wisconsin	Sometimes	Rarely	Usually	Usually	Never
Wyoming	-	-	-	-	-

Table D-11. Individual survey responses for question 4 (frequency of use of speed limit reductions in work zones) for urban freeways

Respondent	0 mph (no reduction)	5 mph	10 mph	15 mph	20 mph or more
Alabama	Rarely	Rarely	Sometimes	Usually	Sometimes
Alaska	-	-	-	-	-
Arizona	Never	Never	Sometimes	Never	Usually
Arkansas	Always	Usually	Usually	Never	Never
California	-	-	-	-	-
Colorado	Usually	Sometimes	Usually	Rarely	Rarely
Connecticut	-	-	-	-	Sometimes
Delaware	-	-	-	-	-
District of Columbia	-	-	-	-	-
Florida	-	-	-	-	-
Georgia	Sometimes	Sometimes	Usually	Never	Rarely
Hawaii	-	-	-	-	-
Idaho	Rarely	Never	Always	Rarely	Rarely
Illinois	Rarely	-	-	Usually	Sometimes
Indiana	Sometimes	Rarely	Usually	Rarely	Never
Iowa	Usually	Sometimes	Sometimes	Usually	Never
Kansas	Rarely	Rarely	Always	Rarely	Rarely
Kentucky	Never	Never	Never	Always	Rarely
Louisiana	Never	Never	Usually	Never	Rarely
Maine	Sometimes	Never	Always	Usually	Never
Maryland	Usually	Rarely	Rarely	Rarely	Never
Massachusetts	Usually	Sometimes	Rarely	Rarely	Rarely
Michigan	Sometimes	Never	Usually	Sometimes	Sometimes
Minnesota	-	-	-	-	-
Mississippi	Sometimes	Never	Sometimes	Never	Rarely
Missouri	Sometimes	Rarely	Usually	Sometimes	Rarely
Montana	Never	Never	Sometimes	Usually	Usually
Nebraska	Sometimes	Never	Usually	Sometimes	Sometimes
Nevada	Sometimes	Rarely	Always	Sometimes	Rarely
New Hampshire	-	-	Sometimes	-	-
New Jersey	-	-	-	Usually	-
New Mexico	-	-	-	-	-
New York	-	-	-	-	-
North Carolina	Sometimes	Usually	Usually	Sometimes	Never

Respondent	0 mph (no reduction)	5 mph	10 mph	15 mph	20 mph or more
North Dakota	Sometimes	Rarely	Sometimes	Sometimes	Sometimes
Ohio	Sometimes	Sometimes	Sometimes	Sometimes	Never
Oklahoma	Rarely	Rarely	Sometimes	Usually	Rarely
Oregon	Sometimes	Rarely	Usually	Sometimes	Sometimes
Pennsylvania	Usually	Rarely	Sometimes	Sometimes	Never
Rhode Island	Usually	Rarely	Sometimes	Sometimes	Rarely
South Carolina	Never	Never	Never	Usually	Never
South Dakota	Sometimes	-	Usually	-	Usually
Tennessee	Rarely	Never	Usually	Rarely	Rarely
Texas	Rarely	Sometimes	Sometimes	Sometimes	Sometimes
Utah	Sometimes	Never	Usually	Rarely	Rarely
Vermont	Sometimes	-	Usually	-	-
Virginia	Usually	Rarely	Sometimes	Rarely	Never
Washington	Usually	Rarely	Sometimes	Sometimes	Rarely
West Virginia	-	-	-	-	-
Wisconsin	Sometimes	Rarely	Usually	Usually	Never
Wyoming	-	-	-	-	-

Table D-12. Individual survey responses for question 4 (frequency of use of speed limit reductions in work zones) for rural two-lane highways

Respondent	0 mph (no reduction)	5 mph	10 mph	15 mph	20 mph or more
Alabama	Rarely	Rarely	Usually	Sometimes	Sometimes
Alaska	-	-	-	-	-
Arizona	Never	Never	Sometimes	Never	Usually
Arkansas	Always	Usually	Usually	Never	Never
California	-	-	-	-	-
Colorado	Usually	Sometimes	Usually	Sometimes	Sometimes
Connecticut	-	-	-	-	Never
Delaware	-	-	-	-	-
District of Columbia	-	-	-	-	-
Florida	-	-	-	-	-
Georgia	Usually	Never	Rarely	Never	Rarely
Hawaii	-	-	-	-	-
Idaho	Never	Never	Always	Rarely	Sometimes
Illinois	Rarely	-	Usually	Rarely	Rarely
Indiana	Sometimes	Rarely	Sometimes	Rarely	Never
Iowa	Always	Never	Never	Never	Never
Kansas	Rarely	Rarely	Always	Rarely	Rarely
Kentucky	Never	Never	Always	Rarely	Rarely
Louisiana	Never	Never	Usually	Never	Rarely
Maine	Sometimes	Never	Always	Usually	Never
Maryland	Usually	Rarely	Rarely	Never	Never
Massachusetts	Usually	Sometimes	Rarely	Rarely	Rarely
Michigan	Sometimes	Never	Usually	Rarely	Sometimes
Minnesota	-	-	-	-	-
Mississippi	Usually	Never	Rarely	Never	Never
Missouri	Usually	Rarely	Sometimes	Rarely	Rarely
Montana	Never	Never	Rarely	Sometimes	Usually
Nebraska	Sometimes	Never	Usually	Rarely	Rarely
Nevada	Usually	Sometimes	Usually	Sometimes	Sometimes
New Hampshire	-	-	Rarely	-	-
New Jersey	-	-	Sometimes	-	-
New Mexico	-	-	-	-	-
New York	-	-	-	-	-
North Carolina	Usually	Sometimes	Rarely	Never	Never

Respondent	0 mph (no reduction)	5 mph	10 mph	15 mph	20 mph or more
North Dakota	Sometimes	Rarely	Sometimes	Sometimes	Sometimes
Ohio	Usually	Rarely	Rarely	Never	Never
Oklahoma	Rarely	Rarely	Usually	Sometimes	Rarely
Oregon	Usually	Rarely	Usually	Sometimes	Sometimes
Pennsylvania	Usually	Rarely	Sometimes	Sometimes	Rarely
Rhode Island	Usually	Rarely	Sometimes	Sometimes	Rarely
South Carolina	Never	Never	Never	Never	Never
South Dakota	Always	Never	Never	Never	Never
Tennessee	Sometimes	Rarely	Sometimes	Rarely	Sometimes
Texas	Rarely	Sometimes	Sometimes	Sometimes	Sometimes
Utah	Sometimes	Never	Usually	Rarely	Rarely
Vermont	Rarely	-	Rarely	-	-
Virginia	Usually	Sometimes	Sometimes	Rarely	Rarely
Washington	Usually	Rarely	Rarely	Rarely	Sometimes
West Virginia	-	-	-	-	-
Wisconsin	Usually	Rarely	Rarely	Rarely	Never
Wyoming	-	-	-	-	-

Table D-13. Survey comments for question 4 (frequency of use of speed limit reductions in work zones based on facility type)

Comments:
We don't typically do the 5 mph reduction. If we're going to reduce speed, it's usually 10 mph or more.
Sometimes this is a permanent down-posting, while sometimes it's only when workers are present.
It is extremely rare to see a speed limit ending in zero.
Level of speed reduction depends on the nature and constraints of the specific work zone. Reductions to posted speeds less than 40 mph are allowed only in special cases (e.g., higher design speed geometry for detour is not practical).
Rural I-90 on the west side of the state is posted at 75 mph. Standard reduction is 65 mph in a lane closure, with a further reduction to 45 mph when and where workers are present. The rest of our rural Interstate system is posted at 80 mph and receives these same standard work zone speed reductions. "Urban Freeways" in SD are considered to be the Interstate loop around Sioux Falls, SD and I-90 at Rapid City, SD. These are posted at 65 mph and typically have a 55 mph speed limit for lane closures with a 45 mph reduction when and where workers are present. Rural Two-Lane highways rarely receive a work zone speed reduction.
Districts have the discretion to choose the speed limits for their projects. They can implement workers present and advisory limits at the district level without approval. Our office does not track the usage of either of these speed limits. We may be able to get data on 24/7 reductions.
Again, our answers our based on the 35 mph and 45 mph speed limits of our lane closure standards.
Speed limit reductions are required to be studied and sign and sealed by the District Traffic Engineer prior to implementation.
As stated in section above, this is determined using a decision matrix based on activity and road type (2-lane, multi-lane highway, multi-lane divided highway (non-Interstate), and Interstate Highway) and based on the posted with a desirable and then a minimum for the situations with additional factors such as geometry/location specifics/crash history/etc.
Our table (limited to multi-lane highways with a preconstruction speed limit of 55 mph or greater that also meet a list of criteria) is not broken down between Rural/Urban. Based on Original Posted speed limit and the Positive Protection presence and Worker presence. All other highways (multi-lane 50 mph and less and two-lane highways) do not have a standard process and are evaluated on a case-by-case basis requiring central office concurrence.

Table D-14. Individual survey responses for question 5 (frequency of use of speed limit reductions in work zones) for permanent speed limits of 75 mph or higher

Respondent	0 mph (no reduction)	5 mph	10 mph	15 mph	20 mph or more
Alabama	-	-	-	-	-
Alaska	-	-	-	-	-
Arizona	Never	Never	Sometimes	Never	Usually
Arkansas	Always	Usually	Usually	Never	Never
California	-	-	-	-	-
Colorado	Sometimes	Rarely	Sometimes	Sometimes	Usually
Connecticut	-	-	-	-	-
Delaware	-	-	-	-	-
District of Columbia	-	-	-	-	-
Florida	-	-	-	-	-
Georgia	Never	Never	Never	Never	Never
Hawaii	-	-	-	-	-
Idaho	Never	Never	Always	Usually	Sometimes
Illinois	-	-	-	-	-
Indiana	-	-	-	-	-
Iowa	Never	Never	Never	Never	Never
Kansas	-	-	-	-	-
Kentucky	-	-	-	Always	-
Louisiana	-	-	Usually	-	Sometimes
Maine	Sometimes	Rarely	Sometimes	Sometimes	Usually
Maryland	-	-	-	-	-
Massachusetts	Never	Never	Never	Never	Never
Michigan	Usually	Never	Rarely	Usually	Rarely
Minnesota	Never	Never	Never	Never	Never
Mississippi	-	-	-	-	-
Missouri	Never	Never	Never	Never	Never
Montana	Never	Never	Rarely	Sometimes	Usually
Nebraska	Rarely	Rarely	Sometimes	Rarely	Sometimes
Nevada	Rarely	Rarely	Rarely	Sometimes	Usually
New Hampshire	-	-	-	-	-
New Jersey	-	-	-	-	-
New Mexico	-	-	-	-	-

Respondent	0 mph (no reduction)	5 mph	10 mph	15 mph	20 mph or more
New York	-	-	-	-	-
North Carolina	-	-	-	-	-
North Dakota	Sometimes	Rarely	Sometimes	Sometimes	Sometimes
Ohio	Never	Never	Never	Never	Never
Oklahoma	Never	Never	Sometimes	Usually	Sometimes
Oregon	-	-	-	-	-
Pennsylvania	-	-	-	-	-
Rhode Island	Never	Never	Never	Never	Never
South Carolina	Never	Never	Never	Never	Never
South Dakota	Sometimes	-	Usually	-	Usually
Tennessee	Usually	Never	Usually	Rarely	Rarely
Texas	Rarely	Rarely	Sometimes	Usually	Sometimes
Utah	Rarely	Never	Usually	Rarely	Rarely
Vermont	-	-	-	-	-
Virginia	Never	Never	Never	Never	Never
Washington	-	-	-	-	-
West Virginia	-	-	-	-	-
Wisconsin	-	-	-	-	-
Wyoming	-	-	-	-	-

Table D-15. Individual survey responses for question 5 (frequency of use of speed limit reductions in work zones) for permanent speed limits of 60 mph to 70 mph

Respondent	0 mph (no reduction)	5 mph	10 mph	15 mph	20 mph or more
Alabama	Sometimes	Sometimes	Usually	Usually	Sometimes
Alaska	-	-	-	-	-
Arizona	Never	Never	Sometimes	Never	Usually
Arkansas	Always	Usually	Usually	Never	Never
California	-	-	-	-	-
Colorado	Sometimes	Sometimes	Usually	Usually	Rarely
Connecticut	-	-	Sometimes	Sometimes	Sometimes
Delaware	-	-	-	-	-
District of Columbia	-	-	-	-	-
Florida	-	-	-	-	-
Georgia	Sometimes	Rarely	Usually	Never	Rarely
Hawaii	-	-	-	-	-
Idaho	Never	Never	Always	Sometimes	Sometimes
Illinois	Rarely	-	-	Usually	Sometimes
Indiana	Sometimes	Rarely	Sometimes	Usually	Sometimes
Iowa	Sometimes	Sometimes	Sometimes	Sometimes	Never
Kansas	-	-	-	-	-
Kentucky	-	-	-	Always	-
Louisiana	-	-	Usually	-	Sometimes
Maine	Sometimes	Rarely	Sometimes	Sometimes	Usually
Maryland	Usually	Rarely	Rarely	Rarely	Never
Massachusetts	Usually	Sometimes	Sometimes	Rarely	Rarely
Michigan	Usually	Never	Usually	Rarely	Sometimes
Minnesota	Rarely	Rarely	Sometimes	Sometimes	Rarely
Mississippi	Sometimes	Never	Sometimes	Never	Rarely
Missouri	Sometimes	Rarely	Usually	Sometimes	Rarely
Montana	Never	Never	Rarely	Usually	Usually
Nebraska	Rarely	Rarely	Usually	Sometimes	Rarely
Nevada	Rarely	Usually	Always	Sometimes	Rarely
New Hampshire	-	-	Sometimes	-	-
New Jersey	-	-	-	Usually	-
New Mexico	-	-	-	-	-

Respondent	0 mph (no reduction)	5 mph	10 mph	15 mph	20 mph or more
New York	-	-	-	-	-
North Carolina	Sometimes	Usually	Usually	Usually	Never
North Dakota	Sometimes	Rarely	Sometimes	Sometimes	Sometimes
Ohio	Sometimes	Sometimes	Sometimes	Sometimes	Never
Oklahoma	Rarely	Never	Usually	Sometimes	Sometimes
Oregon	Usually	Rarely	Usually	Sometimes	Sometimes
Pennsylvania	Usually	Rarely	Sometimes	Sometimes	Never
Rhode Island	Usually	Never	Sometimes	Sometimes	Never
South Carolina	Never	Never	Never	Sometimes	Sometimes
South Dakota	Sometimes	-	Usually	-	Usually
Tennessee	Usually	Never	Usually	Rarely	Rarely
Texas	Rarely	Rarely	Usually	Sometimes	Sometimes
Utah	Sometimes	Never	Usually	Rarely	Rarely
Vermont	Sometimes	-	Usually	-	-
Virginia	Usually	Rarely	Sometimes	Sometimes	Rarely
Washington	Sometimes	Rarely	Sometimes	Sometimes	Rarely
West Virginia	-	-	-	-	-
Wisconsin	Sometimes	Rarely	Usually	Usually	Never
Wyoming	-	-	-	-	-

Table D-16. Individual survey responses for question 5 (frequency of use of speed limit reductions in work zones) for permanent speed limits of 50 mph to 60 mph

Respondent	0 mph (no reduction)	5 mph	10 mph	15 mph	20 mph or more
Alabama	Sometimes	Sometimes	Usually	Usually	Sometimes
Alaska	-	-	-	-	-
Arizona	Never	Never	Sometimes	Never	Usually
Arkansas	Always	Usually	Usually	Never	Never
California	-	-	-	-	-
Colorado	Sometimes	Sometimes	Usually	Rarely	Rarely
Connecticut	-	-	Sometimes	Sometimes	Sometimes
Delaware	-	-	-	-	-
District of Columbia	-	-	-	-	-
Florida	-	-	-	-	-
Georgia	Sometimes	Sometimes	Rarely	Never	Rarely
Hawaii	-	-	-	-	-
Idaho	Rarely	Never	Always	Rarely	Rarely
Illinois	Rarely	-	Usually	Usually	Sometimes
Indiana	Sometimes	Rarely	Usually	Sometimes	Never
Iowa	Always	Never	Never	Never	Never
Kansas	-	-	-	-	-
Kentucky	-	-	Always	-	-
Louisiana	-	-	Usually	-	Rarely
Maine	Sometimes	Rarely	Sometimes	Sometimes	Never
Maryland	Usually	Rarely	Rarely	Never	Never
Massachusetts	Usually	Sometimes	Rarely	Rarely	Rarely
Michigan	Usually	Never	Usually	Rarely	Sometimes
Minnesota	Usually	Sometimes	Rarely	Rarely	Rarely
Mississippi	Sometimes	Never	Sometimes	Never	Never
Missouri	Usually	Rarely	Sometimes	Rarely	Rarely
Montana	Never	Rarely	Usually	Usually	Usually
Nebraska	Rarely	Rarely	Usually	Sometimes	Rarely
Nevada	Rarely	Usually	Rarely	Rarely	Rarely
New Hampshire	-	-	Sometimes	-	-
New Jersey	-	-	-	Usually	-
New Mexico	-	-	-	-	-

Respondent	0 mph (no reduction)	5 mph	10 mph	15 mph	20 mph or more
New York	-	-	-	-	-
North Carolina	Usually	Rarely	Never	Never	Never
North Dakota	Sometimes	Rarely	Sometimes	Sometimes	Sometimes
Ohio	Sometimes	Sometimes	Sometimes	Sometimes	Never
Oklahoma	Rarely	Never	Usually	Sometimes	Sometimes
Oregon	Usually	Rarely	Usually	Sometimes	Sometimes
Pennsylvania	Usually	Rarely	Sometimes	Sometimes	Never
Rhode Island	Usually	Rarely	Sometimes	Rarely	Never
South Carolina	Never	Sometimes	Never	Sometimes	Never
South Dakota	Sometimes	-	Sometimes	-	-
Tennessee	Sometimes	Never	Sometimes	Rarely	Rarely
Texas	Rarely	Usually	Usually	Sometimes	Never
Utah	Sometimes	Never	Usually	Rarely	Rarely
Vermont	Rarely	-	Sometimes	-	-
Virginia	Sometimes	Sometimes	Sometimes	Rarely	Rarely
Washington	Sometimes	Rarely	Sometimes	Sometimes	Rarely
West Virginia	-	-	-	-	-
Wisconsin	Rarely	Rarely	Rarely	Rarely	Never
Wyoming	-	-	-	-	-

Table D-17. Individual survey responses for question 5 (frequency of use of speed limit reductions in work zones) for permanent speed limits of 40 mph to 50 mph

Respondent	0 mph (no reduction)	5 mph	10 mph	15 mph	20 mph or more
Alabama	Sometimes	Sometimes	Usually	Rarely	Rarely
Alaska	-	-	-	-	-
Arizona	Never	Never	Usually	Sometimes	Sometimes
Arkansas	Always	Usually	Usually	Never	Never
California	-	-	-	-	-
Colorado	Usually	Sometimes	Sometimes	Rarely	Rarely
Connecticut	-	-	-	-	-
Delaware	-	-	-	-	-
District of Columbia	-	-	-	-	-
Florida	-	-	-	-	-
Georgia	Usually	Never	Never	Never	Never
Hawaii	-	-	-	-	-
Idaho	Rarely	Never	Usually	Never	Never
Illinois	Sometimes	Sometimes	Usually	-	-
Indiana	Sometimes	Rarely	Sometimes	Rarely	Never
Iowa	Always	Never	Never	Never	Never
Kansas	-	-	-	-	-
Kentucky	-	-	Always	-	-
Louisiana	-	-	Usually	-	Rarely
Maine	Sometimes	Rarely	Sometimes	Sometimes	Never
Maryland	Usually	Rarely	Rarely	Never	Never
Massachusetts	Usually	Rarely	Rarely	Rarely	Never
Michigan	Usually	Never	Usually	Rarely	Rarely
Minnesota	Usually	Rarely	Rarely	Sometimes	Rarely
Mississippi	Usually	Never	Sometimes	Never	Never
Missouri	Usually	Rarely	Sometimes	Rarely	Rarely
Montana	Never	Never	Sometimes	Usually	Sometimes
Nebraska	Sometimes	Rarely	Sometimes	Sometimes	Rarely
Nevada	Usually	Sometimes	Sometimes	Rarely	Rarely
New Hampshire	-	-	Sometimes	-	-
New Jersey	-	-	Sometimes	-	-
New Mexico	-	-	-	-	-

Respondent	0 mph (no reduction)	5 mph	10 mph	15 mph	20 mph or more
New York	-	-	-	-	-
North Carolina	Always	Rarely	Never	Never	Never
North Dakota	Sometimes	Rarely	Sometimes	Sometimes	Sometimes
Ohio	Usually	Rarely	Rarely	Never	Never
Oklahoma	Rarely	Never	Usually	Rarely	Never
Oregon	Usually	Rarely	Sometimes	Sometimes	Sometimes
Pennsylvania	Usually	Rarely	Sometimes	Sometimes	Never
Rhode Island	Usually	Sometimes	Sometimes	Never	Never
South Carolina	Never	Usually	Never	Never	Never
South Dakota	Usually	-	Rarely	-	-
Tennessee	Sometimes	Never	Sometimes	Rarely	Rarely
Texas	Rarely	Usually	Usually	Sometimes	Never
Utah	Sometimes	Never	Sometimes	Rarely	Rarely
Vermont	Sometimes	-	Rarely	-	-
Virginia	Sometimes	Sometimes	Sometimes	Rarely	Never
Washington	Sometimes	Rarely	Sometimes	Rarely	Rarely
West Virginia	-	-	-	-	-
Wisconsin	Rarely	Rarely	Rarely	Rarely	Never
Wyoming	-	-	-	-	-

Table D-18. Individual survey responses for question 5 (frequency of use of speed limit reductions in work zones) for permanent speed limits of 35 mph or less

Respondent	0 mph (no reduction)	5 mph	10 mph	15 mph	20 mph or more
Alabama	Usually	Rarely	Rarely	Rarely	Rarely
Alaska	-	-	-	-	-
Arizona	Rarely	Never	Usually	Rarely	Rarely
Arkansas	Always	Usually	Usually	Never	Never
California	-	-	-	-	-
Colorado	Usually	Rarely	Rarely	Rarely	Never
Connecticut	-	-	-	-	-
Delaware	-	-	-	-	-
District of Columbia	-	-	-	-	-
Florida	-	-	-	-	-
Georgia	Always	Never	Never	Never	Never
Hawaii	-	-	-	-	-
Idaho	Sometimes	Never	Rarely	Never	Never
Illinois	Usually	Sometimes	-	-	-
Indiana	Usually	Rarely	Rarely	Never	Never
Iowa	Always	Never	Never	Never	Never
Kansas	-	-	-	-	-
Kentucky	-	-	Always	-	-
Louisiana	-	-	Usually	-	Rarely
Maine	Sometimes	Rarely	Sometimes	Sometimes	Never
Maryland	Usually	Rarely	Rarely	Never	Never
Massachusetts	Usually	Rarely	Rarely	Never	Never
Michigan	Usually	Rarely	Rarely	Rarely	Rarely
Minnesota	Usually	Rarely	Rarely	Rarely	Rarely
Mississippi	Usually	Never	Never	Never	Never
Missouri	Usually	Rarely	Sometimes	Rarely	Rarely
Montana	Sometimes	Rarely	Usually	Sometimes	Rarely
Nebraska	Usually	Rarely	Sometimes	Rarely	Never
Nevada	Usually	Rarely	Rarely	Rarely	Rarely
New Hampshire	-	-	Never	-	-
New Jersey	-	-	Rarely	-	-
New Mexico	-	-	-	-	-

Respondent	0 mph (no reduction)	5 mph	10 mph	15 mph	20 mph or more
New York	-	-	-	-	-
North Carolina	Always	Never	Never	Never	Never
North Dakota	Sometimes	Rarely	Sometimes	Sometimes	Sometimes
Ohio	Never	Never	Never	Never	Never
Oklahoma	Sometimes	Sometimes	Usually	Never	Never
Oregon	Usually	Rarely	Sometimes	Rarely	Never
Pennsylvania	Usually	Rarely	Sometimes	Sometimes	Never
Rhode Island	Usually	Sometimes	Sometimes	Never	Never
South Carolina	Usually	Never	Never	Never	Never
South Dakota	Usually	Sometimes	Rarely	-	-
Tennessee	Sometimes	Never	Rarely	Rarely	Rarely
Texas	Rarely	Usually	Usually	Never	Never
Utah	Sometimes	Never	Sometimes	Rarely	Rarely
Vermont	Always	-	Never	-	-
Virginia	Rarely	Sometimes	Sometimes	Rarely	Rarely
Washington	Sometimes	Never	Sometimes	Never	Rarely
West Virginia	-	-	-	-	-
Wisconsin	Rarely	Rarely	Rarely	Never	Never
Wyoming	-	-	-	-	-

Table D-19. Survey comments for question 5 (frequency of use of speed limit reductions in work zones based on permanent speed limit)

Comments:
Maximum regulatory speed limit is 70 mph. Other speed limit reductions depend on special circumstances as listed in question #1. Iowa tries to design work zones for normal operating speeds.
As stated in section above, this is determined using a decision matrix based on activity and road type (2-lane, multi-lane highway, multi-lane divided highway (non-Interstate), and Interstate Highway) and based on the posted with a desirable and then a minimum for the situations with additional factors such as geometry/location specifics/crash history/etc.
Again, our answers our based on the 35 mph and 45 mph speed limits of our lane closure standards.
We do not have statutory preconstruction speed limits above 70 mph. Multi-lane highways with a preconstruction speed limit of 55 mph or greater follows a set table of speeds, if approved, based on worker presence and positive protection presence. All other highways (multilane 50 mph and less and two-lane highways) do not have a standard process and are handled case by case and require central office concurrence.
For low-speed highways through towns, we may do a 5 to 10 mph reduction for urban reconstruction projects.

Table D-20. Individual survey responses for question 6 (effectiveness of work zone speed limit reductions) for rural freeways

Respondent	0 mph (no reduction)	5 mph	10 mph	15 mph	20 mph or more
Alabama	5	-	3	3	2
Alaska	-	-	-	-	-
Arizona	-	-	3	-	1
Arkansas	3	3	3	-	-
California	-	-	-	-	-
Colorado	4	3	3	2	2
Connecticut	-	-	-	-	-
Delaware	-	-	-	-	-
District of Columbia	-	-	-	-	-
Florida	-	-	-	-	-
Georgia	3	1	3	1	4
Hawaii	-	-	-	-	-
Idaho	5	1	1	1	1
Illinois	-	-	-	4	2
Indiana	1	1	3	2	1
Iowa	5	4	3	3	1
Kansas	-	1	3	1	1
Kentucky	1	1	1	3	-
Louisiana	-	-	2	-	-
Maine	1	-	4	3	4
Maryland	3	3	3	-	-
Massachusetts	-	-	-	-	-
Michigan	5	1	4	1	2
Minnesota	3	3	3	2	1
Mississippi	-	-	3	-	3
Missouri	4	-	3	3	3
Montana	1	1	2	3	3
Nebraska	2	1	5	3	4
Nevada	3	3	3	3	3
New Hampshire	-	-	3	-	-
New Jersey	-	-	-	3	-
New Mexico	-	-	-	-	-

Respondent	0 mph (no reduction)	5 mph	10 mph	15 mph	20 mph or more
New York	-	-	-	-	-
North Carolina	3	5	5	3	1
North Dakota	1	1	3	4	4
Ohio	-	-	-	-	-
Oklahoma	2	2	1	1	1
Oregon	3	3	4	4	4
Pennsylvania	4	3	3	2	1
Rhode Island	2	2	2	2	-
South Carolina	-	-	-	4	4
South Dakota	-	-	-	-	-
Tennessee	2	-	-	-	-
Texas	5	5	5	3	2
Utah	1	1	3	1	3
Vermont	-	-	3	-	-
Virginia	1	1	2	2	1
Washington	-	1	3	3	4
West Virginia	-	-	-	-	-
Wisconsin	4	1	1	1	-
Wyoming	-	-	-	-	-

1 = highly ineffective, 5 = highly effective

Table D-21. Individual survey responses for question 6 (effectiveness of work zone speed limit reductions) for urban freeways

Respondent	0 mph (no reduction)	5 mph	10 mph	15 mph	20 mph or more
Alabama	5	-	3	3	2
Alaska	-	-	-	-	-
Arizona	-	-	3	-	1
Arkansas	3	3	3	-	-
California	-	-	-	-	-
Colorado	4	3	3	1	1
Connecticut	-	-	2	3	3
Delaware	-	-	-	-	-
District of Columbia	-	-	-	-	-
Florida	-	-	-	-	-
Georgia	3	1	3	1	4
Hawaii	-	-	-	-	-
Idaho	5	1	1	1	1
Illinois	-	-	-	3	2
Indiana	1	1	2	1	1
Iowa	5	2	2	1	1
Kansas	-	1	3	1	1
Kentucky	1	1	1	3	-
Louisiana	-	-	3	-	-
Maine	1	-	4	3	4
Maryland	3	3	3	-	-
Massachusetts	-	-	-	-	-
Michigan	5	1	4	1	2
Minnesota	3	3	3	1	1
Mississippi	-	-	3	-	3
Missouri	4	-	2	3	3
Montana	1	2	2	4	3
Nebraska	2	1	5	3	4
Nevada	3	3	3	3	3
New Hampshire	-	-	3	-	-
New Jersey	-	-	-	3	-
New Mexico	-	-	-	-	-

Respondent	0 mph (no reduction)	5 mph	10 mph	15 mph	20 mph or more
New York	-	-	-	-	-
North Carolina	3	5	5	3	1
North Dakota	1	1	3	4	4
Ohio	-	-	-	-	-
Oklahoma	2	2	1	1	1
Oregon	3	3	4	3	3
Pennsylvania	4	3	3	2	1
Rhode Island	2	2	2	2	-
South Carolina	-	4	-	4	-
South Dakota	-	-	-	-	-
Tennessee	2	-	-	-	-
Texas	5	5	5	3	2
Utah	1	1	3	1	3
Vermont	-	-	3	-	-
Virginia	2	2	2	2	1
Washington	-	1	3	3	4
West Virginia	-	-	-	-	-
Wisconsin	4	1	1	1	-
Wyoming	-	-	-	-	-

1 = highly ineffective, 5 = highly effective

Table D-22. Individual survey responses for question 6 (effectiveness of work zone speed limit reductions) for rural two-lane highways

Respondent	0 mph (no reduction)	5 mph	10 mph	15 mph	20 mph or more
Alabama	5	-	2	2	2
Alaska	-	-	-	-	-
Arizona	-	-	3	-	1
Arkansas	3	3	3	-	-
California	-	-	-	-	-
Colorado	4	3	3	2	2
Connecticut	-	-	-	-	-
Delaware	-	-	-	-	-
District of Columbia	-	-	-	-	-
Florida	-	-	-	-	-
Georgia	3	1	3	1	1
Hawaii	-	-	-	-	-
Idaho	5	1	1	1	1
Illinois	-	-	3	3	-
Indiana	1	1	2	1	1
Iowa	5	1	1	1	1
Kansas	-	1	3	1	1
Kentucky	1	1	4	-	-
Louisiana	-	-	4	-	-
Maine	1	-	4	-	-
Maryland	3	3	3	-	-
Massachusetts	-	-	-	-	-
Michigan	5	1	5	1	1
Minnesota	3	3	3	1	1
Mississippi	-	-	3	-	-
Missouri	4	-	4	3	3
Montana	1	1	2	3	3
Nebraska	2	1	5	3	4
Nevada	3	3	3	3	3
New Hampshire	-	-	3	-	-
New Jersey	-	-	3	-	-
New Mexico	-	-	-	-	-

Respondent	0 mph (no reduction)	5 mph	10 mph	15 mph	20 mph or more
New York	-	-	-	-	-
North Carolina	5	3	3	1	1
North Dakota	1	1	3	4	4
Ohio	-	-	-	-	-
Oklahoma	4	3	2	1	1
Oregon	3	3	4	4	3
Pennsylvania	4	3	3	2	1
Rhode Island	3	3	3	-	-
South Carolina	-	-	-	-	-
South Dakota	-	-	-	-	-
Tennessee	2	-	-	-	-
Texas	5	5	5	3	2
Utah	1	1	3	1	3
Vermont	-	-	3	-	-
Virginia	3	3	3	2	2
Washington	-	1	3	3	4
West Virginia	-	-	-	-	-
Wisconsin	5	1	1	1	-
Wyoming	-	-	-	-	-

1 = highly ineffective, 5 = highly effective

Table D-23. Survey comments for question 6 (effectiveness of work zone speed limit reductions)

Comments:
No official analysis has been completed after wide scale implementation of variable speeds based on the table (for multi-lane highways with preconstruction speeds of 55 mph or greater that meet certain criteria). A research project was completed around 2014 by TTI/TA&M in Ohio. Ultimately found that the digital speed limit sign format performed no less effective than the flatsheet signs, but did provide the flexibility to change the posted speed limit. Overall, we do see a drop in speed through the zone; however, not to the levels posted on the sign. The intent with the variable was in hopes to increase compliance by only lowering when necessary rather than 24/7. Follow up research has not been performed to date. Anecdotally it appears that speeds remain high (particularly during the pandemic) and there continues to be a concern about speeding. Link to 2014 research report: https://www.dot.state.oh.us/Divisions/Planning/SPR/Research/reportsandplans/Reports/2014/Roadway/134716_FR.pdf Link to 2014 research results presentation: https://www.youtube.com/watch?v=h-HoiTvYptE&list=PLUUYDCHurzg5XWNbclITF2hxQd5RAI43f&index=17
We haven't done any specific studies to analyze the effectiveness of the speed reduction.
In general, work zone speed limit reduction through signing is not very effective without the presence of law enforcement. We don't get to have law enforcement on many of our projects so my answers are based on work zone with speed reduction without law enforcement.
Feedback signs provide better effectiveness.
Again, 20 mph or more will usually be associated with a work zone condition that the drivers feel the need to slow down, so these are often more effective.
If a work zone is congested, we will see compliance to the work zone speed limit. During free flow operations, we have limited compliance to the work zone speed limit.
I think the effectiveness of work zone speed limits are based on devices and type of work so hard to answer general effectiveness for a facility because it is very dependent on activity and how the driver feels and is managed with devices and enforcement.
We have no backing data to understand the effectiveness of lowering the speed limit in work zones.
Success of speed reduction has many factors: construction activity, law enforcement support, roadway geometrics; mitigation measures to support reduced speeds.
We do not have quantifiable data to support whether our work zone speed reductions are effective or not. We want to collect and analyze data on this, but have not had the resources to put toward this yet. If this research would like to analyze large work zone speed reductions on high-speed (80 mph) facilities, please contact the DOT.
Without the presence of law enforcement, you get very little compliance with the posted speed limit in work zones.
It depends if there is enforcement. There is no guarantee.

Table D-24. Individual survey responses for question 7 (frequency of use of strategies to manage vehicle speeds in work zones)

Respondent	Automated Speed Enforcement	Dynamic (Variable) Speed Limits or Advisory Speeds	Flashing Lights on Speed Limit Signs	Higher Fines for Speeding in Work Zones	Law Enforcement Vehicle (Officer Present)	Law Enforcement Vehicle (Officer Not Present)	Lights on Contractor or Maintenance Vehicles	Public Outreach/Education	Radar Speed Display Feedback Signs	Reduced Lane Widths	Sign with Speed Limit "When Workers Present"	Temporary Rumble Strips	Other
Alabama	R	R	R	A	S	N	A	S	S	S	A	R	-
Alaska	-	-	-	-	-	-	-	-	-	-	-	-	-
Arizona	N	R	N	A	R	N	A	A	S	N	N	S	-
Arkansas	N	N	R	A	U	N	A	S	S	U	S	S	-
California	S	S	S	-	-	-	-	-	-	-	-	-	-
Colorado	N	S	S	A	S	N	A	U	S	S	N	S	-
Connecticut	N	N	R	U	U	N	A	U	S	S	N	N	U
Delaware	-	-	-	-	-	-	-	-	-	-	-	-	-
District of Columbia	-	-	-	-	-	-	-	-	-	-	-	-	-
Florida	-	-	-	-	-	-	-	-	-	-	-	-	-
Georgia	R	N	R	A	U	N	U	U	R	R	N	N	-
Hawaii	-	-	-	-	-	-	-	-	-	-	-	-	-
Idaho	N	R	U	A	S	R	A	U	U	S	N	S	S
Illinois	S	N	N	A	U	N	U	S	U	S	N	S	-
Indiana	N	R	U	A	S	S	A	R	S	S	U	S	-
Iowa	N	R	N	A	S	N	A	R	U	R	N	S	-
Kansas	R	R	N	U	S	N	A	S	R	S	R	S	-
Kentucky	N	N	S	A	S	N	A	U	S	S	U	R	-
Louisiana	R	S	R	A	U	N	A	S	S	S	N	R	-
Maine	N	U	U	A	S	N	A	U	U	A	S	S	-

Respondent	Automated Speed Enforcement	Dynamic (Variable) Speed Limits or Advisory Speeds	Flashing Lights on Speed Limit Signs	Higher Fines for Speeding in Work Zones	Law Enforcement Vehicle (Officer Present)	Law Enforcement Vehicle (Officer Not Present)	Lights on Contractor or Maintenance Vehicles	Public Outreach/Education	Radar Speed Display Feedback Signs	Reduced Lane Widths	Sign with Speed Limit "When Workers Present"	Temporary Rumble Strips	Other
Maryland	S	R	N	S	S	R	A	U	S	S	N	R	-
Massachusetts	N	N	R	A	U	N	A	U	S	S	N	U	-
Michigan	N	S	R	A	U	N	S	S	U	R	U	U	-
Minnesota	N	N	N	A	S	N	A	S	S	S	S	N	-
Mississippi	N	N	N	S	R	N	A	A	S	S	A	R	-
Missouri	N	N	N	S	U	N	A	A	S	S	S	S	-
Montana	N	S	S	A	S	N	A	S	S	U	N	U	-
Nebraska	N	N	N	A	S	N	A	S	S	N	A	N	-
Nevada	N	S	U	A	U	R	A	U	U	S	R	S	-
New Hampshire	N	S	U	A	S	N	A	U	S	S	N	R	-
New Jersey	N	N	N	A	S	N	A	R	N	S	N	N	-
New Mexico	-	-	-	-	-	-	-	-	-	-	-	-	-
New York	-	-	-	-	-	-	-	-	-	-	-	-	-
North Carolina	N	U	U	U	S	R	A	S	S	A	N	R	-
North Dakota	N	S	R	A	U	R	A	S	S	R	A	S	-
Ohio	N	U	U	U	S	N	U	S	R	N	N	N	-
Oklahoma	N	S	R	A	U	N	A	U	S	S	N	R	-
Oregon	R	N	R	A	U	N	A	U	S	S	N	S	-
Pennsylvania	U	S	S	R	S	N	N	U	U	S	S	S	-
Rhode Island	N	S	N	U	S	R	U	S	R	S	N	N	-
South Carolina	N	N	N	U	U	N	A	S	S	N	N	R	-
South Dakota	N	R	N	U	S	N	A	S	R	R	N	R	-

Respondent	Automated Speed Enforcement	Dynamic (Variable) Speed Limits or Advisory Speeds	Flashing Lights on Speed Limit Signs	Higher Fines for Speeding in Work Zones	Law Enforcement Vehicle (Officer Present)	Law Enforcement Vehicle (Officer Not Present)	Lights on Contractor or Maintenance Vehicles	Public Outreach/Education	Radar Speed Display Feedback Signs	Reduced Lane Widths	Sign with Speed Limit "When Workers Present"	Temporary Rumble Strips	Other
Tennessee	N	S	S	A	S	N	A	U	S	S	N	S	-
Texas	N	N	N	A	S	S	A	S	S	R	A	S	-
Utah	N	R	N	A	U	N	A	U	R	R	R	S	-
Vermont	N	S	S	A	U	S	N	A	U	S	N	R	-
Virginia	R	S	R	S	U	N	A	U	S	S	N	S	-
Washington	N	S	R	A	S	N	A	U	S	S	R	R	-
West Virginia	-	-	-	-	-	-	-	-	-	-	-	-	-
Wisconsin	N	N	N	A	S	N	N	A	S	S	N	S	-
Wyoming	N	N	N	A	N	N	-	-	-	-	-	S	-

A= Always, U = Usually, S = Sometimes, R = Rarely, N = Never
Other responses included pilot car and smart work zone systems

Table D-25. Survey comments for question 7 (frequency of use of strategies to manage vehicle speeds in work zones)

Comments:
Our DOT will deploy variable advisory speeds on I-80 for the first time this spring. If successful we will deploy more regularly.
Smart Work Zones used in conjunction with a travel time display though the work zone.
We do not allow “Blue Lights” on contractor’s vehicles.
Our DOT will be including specifications for temporary rumble strips in our 2023 standard specifications. Guidance to regions is to considered them on 55 mph+ two-lane highways projects with flagging operations.
The 10 mph regulatory speed reductions that are required for lane drops on multi-lane facilities also require the R16-3 When Workers Present Speeding Fines Doubled. But R16-3 signs are only used with a regulatory speed reduction–they are never standalone.
Digital speed limits signs use flashing lights during the time that workers are present and the speed is lowered but doesn’t have a sign saying “when workers present.” There are other times in the same zone that the speed may still be lowered (but less) during non-work hours and at that time the flashing lights would not be activated. We felt it was too difficult for the driver to know for sure when workers are present. Sometimes it could not be obvious to the driver.
Our State Police are about to issue an RFP for a pilot on Work Zone Photo Speed Enforcement. It is anticipated that cameras will begin to show up in work zones on the Interstate system in June. We require the use of portable temporary rumble strips in flagging operations on two-lane roadways when operations last longer than three hours. We are not currently using them on high-speed multilane highways.
Photo Enforcement is against state law.
Temporary rumble strips–we are currently piloting on several high-speed roadways. We can’t do variable speed limits, but we do have speed limits specifically when workers are present and then when they leave for the day, the permanent speed limit sign is re-posted.
Our signs usually say “Speed limit when flashing” not workers present. We have tried temporary rumble strips.
When dynamic speed reduction is used (within the day-to-day work not a permanent work zone drop), dynamic message signs are sometimes used to convey when that is expected and then to bring extra attention to a temporary work zone reduced speed limit situation.
Automated speed enforcement is extremely restricted by current state laws to the point of not being practical at this time.

Table D-26. Individual survey responses for question 8 (effectiveness of work zone speed management strategies)

Respondent	Automated Speed Enforcement	Dynamic (Variable) Speed Limits or Advisory Speeds	Flashing Lights on Speed Limit Signs	Higher Fines for Speeding in Work Zones	Law Enforcement Vehicle (Officer Present)	Law Enforcement Vehicle (Officer Not Present)	Lights on Contractor or Maintenance Vehicles	Public Outreach/Education	Radar Speed Display Feedback Signs	Reduced Lane Widths	Sign with Speed Limit "When Workers Present"	Temporary Rumble Strips	Other
Alabama	3	3	3	2	4	1	2	3	3	5	1	2	-
Alaska	-	-	-	-	-	-	-	-	-	-	-	-	-
Arizona	5	3	1	2	4	2	1	2	1	3	2	4	-
Arkansas	3	3	3	3	3	3	3	3	3	3	3	3	-
California	-	-	-	-	-	-	-	-	-	-	-	-	-
Colorado	5	3	3	3	4	3	2	2	1	2	2	3	-
Connecticut	-	-	3	3	5	-	3	2	3	3	-	-	3
Delaware	-	-	-	-	-	-	-	-	-	-	-	-	-
District of Columbia	-	-	-	-	-	-	-	-	-	-	-	-	-
Florida	-	-	-	-	-	-	-	-	-	-	-	-	-
Georgia	3	-	2	3	4	-	3	3	3	-	-	4	-
Hawaii	-	-	-	-	-	-	-	-	-	-	-	-	-
Idaho	3	3	2	2	5	3	3	3	3	4	3	4	5
Illinois	4	-	-	3	5	-	2	2	3	2	-	1	-
Indiana	4	3	2	2	4	3	1	1	3	3	2	3	-
Iowa	-	-	-	3	5	1	3	2	3	3	-	4	-
Kansas	2	3	3	4	5	-	5	3	4	3	3	4	-
Kentucky	-	-	4	4	5	-	4	3	4	4	2	-	-
Louisiana	3	3	3	2	5	-	4	3	2	2	-	1	-
Maine	1	3	3	3	4	1	4	4	4	4	2	4	-

Respondent	Automated Speed Enforcement	Dynamic (Variable) Speed Limits or Advisory Speeds	Flashing Lights on Speed Limit Signs	Higher Fines for Speeding in Work Zones	Law Enforcement Vehicle (Officer Present)	Law Enforcement Vehicle (Officer Not Present)	Lights on Contractor or Maintenance Vehicles	Public Outreach/Education	Radar Speed Display Feedback Signs	Reduced Lane Widths	Sign with Speed Limit "When Workers Present"	Temporary Rumble Strips	Other
Maryland	5	5	-	1	4	4	3	3	2	3	-	-	-
Massachusetts	-	-	3	2	3	-	1	3	4	3	-	5	-
Michigan	5	4	1	3	4	4	2	2	3	2	1	5	-
Minnesota	5	3	2	2	3	1	2	1	3	3	2	1	-
Mississippi	3	3	2	4	5	3	4	4	4	4	3	3	-
Missouri	-	-	-	3	4	-	3	3	4	4	3	3	-
Montana	-	3	2	3	5	-	1	3	4	3	-	4	-
Nebraska	-	-	-	3	3	1	3	3	4	1	3	2	-
Nevada	-	4	4	3	5	3	3	3	4	4	3	4	-
New Hampshire	-	2	3	1	5	-	2	2	4	2	-	-	-
New Jersey	1	1	1	3	3	1	3	2	1	2	1	1	-
New Mexico	-	-	-	-	-	-	-	-	-	-	-	-	-
New York	-	-	-	-	-	-	-	-	-	-	-	-	-
Nrth Carolina	-	5	4	3	3	-	3	3	4	4	-	2	-
Nrth Dakota	1	3	1	3	4	2	5	3	4	1	3	3	-
Ohio	4	2	3	3	4	2	3	2	2	2	2	1	-
Oklahoma	-	2	1	1	1	-	1	3	2	1	-	2	-
Oregon	4	-	-	2	4	-	2	2	2	3	-	3	-
Pennsylvania	5	4	3	4	3	2	2	3	2	2	1	2	-
Rhode Island	-	4	-	1	4	-	2	1	4	3	-	-	-
South Carolina	-	-	-	3	5	-	3	3	4	-	-	4	-
South Dakota	-	-	-	-	-	-	-	-	-	-	-	-	-

Respondent	Automated Speed Enforcement	Dynamic (Variable) Speed Limits or Advisory Speeds	Flashing Lights on Speed Limit Signs	Higher Fines for Speeding in Work Zones	Law Enforcement Vehicle (Officer Present)	Law Enforcement Vehicle (Officer Not Present)	Lights on Contractor or Maintenance Vehicles	Public Outreach/Education	Radar Speed Display Feedback Signs	Reduced Lane Widths	Sign with Speed Limit "When Workers Present"	Temporary Rumble Strips	Other
Tennessee	1	1	1	1	3	-	2	-	3	2	-	3	-
Texas	4	4	3	3	4	4	3	3	4	4	3	4	-
Utah	4	4	2	1	5	-	2	2	4	2	2	3	-
Vermont	-	4	3	4	4	-	-	3	3	-	-	3	-
Virginia	-	3	3	3	5	-	2	3	4	3	2	2	-
Washington	5	3	2	3	4	3	2	2	3	3	2	3	-
West Virginia	-	-	-	-	-	-	-	-	-	-	-	-	-
Wisconsin	-	-	-	1	-	2	-	2	2	2	-	3	-
Wyoming	-	-	-	-	-	-	-	-	-	-	-	-	-

1 = highly ineffective, 5 = highly effective
Other responses included pilot car and smart work zone systems

Table D-27. Survey comments for question 8 (effectiveness of work zone speed management strategies)

Comments:
Again, we don't have quantifiable data for this. Those who work within these construction and maintenance work zones will tell you that traffic is generally not abiding by these speed reductions or are traveling too fast through them, but we have not collected the data to know what vehicle speeds are in our work zones, with or without the above devices or treatments in place.
For lane reductions, we feel that whatever benefit you are getting from reducing the speed is offset by the increased hazard of reducing the lane width.
Automated Speed Enforcement has done very well for work zones in our state.
Many of these are much more effective in combination with enforcement. Randomization of enforcement is also critical, whether an officer or photo enforcement.

Table D-28. Individual survey responses for question 9 (definition of worker presence for setting work zone speed limits)

Respondent	Distance beyond traveled way	Absence of positive protection	Type of work activity	Other	My agency does not use worker presence for purposes of setting work zone speed limits
Alabama	O	O	O	-	-
Alaska	-	-	-	-	-
Arizona	-	O	-	-	O
Arkansas	-	-	O	-	-
California	-	-	-	-	-
Colorado	-	O	O	-	-
Connecticut	-	O	-	-	-
Delaware	-	-	-	-	-
District of Columbia	-	-	-	-	-
Florida	-	-	-	-	-
Georgia	-	-	-	-	O
Hawaii	-	-	-	-	-
Idaho	-	O	-	-	-
Illinois	-	O	-	-	-
Indiana	-	-	-	O	-
Iowa	O	O	-	-	-
Kansas	-	O	O	-	O
Kentucky	-	-	-	-	O
Louisiana	O	-	O	O	-
Maine	-	-	-	-	O
Maryland	-	-	-	-	O
Massachusetts	-	-	-	-	O
Michigan	-	O	-	O	-
Minnesota	O	O	-	O	-
Mississippi	-	O	O	-	-

Respondent	Distance beyond traveled way	Absence of positive protection	Type of work activity	Other	My agency does not use worker presence for purposes of setting work zone speed limits
Missouri	-	O	O	-	-
Montana	-	-	O	-	-
Nebraska	-	-	O	-	-
Nevada	O	-	O	-	-
New Hampshire	-	O	O	-	-
New Jersey	O	O	O	-	-
New Mexico	-	-	-	-	-
New York	-	-	-	-	-
North Carolina	-	O	O	-	-
North Dakota	-	O	O	-	O
Ohio	-	-	-	O	-
Oklahoma	-	-	-	-	O
Oregon	-	-	O	-	-
Pennsylvania	-	-	-	O	-
Rhode Island	-	-	-	-	O
South Carolina	O	O	-	-	-
South Dakota	-	-	-	O	-
Tennessee	-	-	-	-	O
Texas	-	-	-	-	O
Utah	-	-	-	-	O
Vermont	-	-	-	-	O
Virginia	O	O	O	-	-
Washington	-	O	O	-	-
West Virginia	-	-	-	-	-
Wisconsin	-	-	-	O	-
Wyoming	-	-	-	-	-

Table D-29. Distances beyond traveled way submitted for question 9 (definition of worker presence for setting work zone speed limits)

Distance beyond traveled way:
15 feet
Within 2 feet of Traveled Way
Just consider if the workers are adjacent to live traffic- no specific distance
Various options based on facility type and type of work/proximity to travel lanes
less than 30 feet
12 feet or more
If they are within the clear zone based on the posted speed limit. For Interstates it's normally within 30 ft.

Table D-30. Other text responses for question 9 (definition of worker presence for setting work zone speed limits)

Other (Please describe):
Contractor personnel within project limits
We require positive protection on every hazard in the work zone during non-working hours.
Duration, distance downstream of the workers present speed limit sign (1 mile)
Workers are considered as being present when on-site, working within the subject qualifying work zone condition. A work zone condition (for purposes of this topic) is defined as being a multi-lane highway of 55 mph or greater with a condition that is at least 0.5 mile in length with an expected duration of at least 3 hours and reduces the existing functionality of the travel lanes or shoulder (lane closure, lane shift, crossover, contraflow and/or shoulder closure). See TEM Part 12, Section 1203-2.9.6 for definitions of Work Zone Condition, Positive Protection and Worker Presence for use with Work Zone Speed Zones process.
Active Work Zone (Workers are present and work activities in progress regardless of location)
If workers are visible on the project, however, there is not a written or formal definition for this.
If workers are present without positive protection, we lower the speed to 55 mph. We do not have a worker presence law.

Table D-31. Survey comments for question 9 (definition of worker presence for setting work zone speed limits)

Comments:
We don't use distance. We do consider workers and try to have them behind positive barriers whenever possible.
It is left to the law enforcement personnel to determine whether the workers present condition applies, which is the condition that allows them to issue higher fines for speeding violations in work zones.
Worker presence should include double fines. Unfortunately, the definition of worker presence is often debated, and therefore rarely used or enforced.
https://www.legislature.mi.gov/documents/2021-2022/publicact/pdf/2022-PA-0052.pdf
See link for SOP: https://www.dot.state.al.us/publications/Design/pdf/SpeedLimitWorkZone.pdf

Table D-32. Individual survey responses for question 10 (most effective speed reduction method)

Respondent	No speed limit reduction for work zone	10 mph speed limit reduction for work zone	45 mph work zone speed limit when workers present	Other
Alabama	-	-	-	O
Alaska	-	-	-	-
Arizona	O	-	-	-
Arkansas	-	O	-	-
California	-	-	-	-
Colorado	O	-	-	-
Connecticut	-	-	-	O
Delaware	-	-	-	-
District of Columbia	-	-	-	-
Florida	-	-	-	-
Georgia	-	O	-	-
Hawaii	-	-	-	-
Idaho	O	-	-	-
Illinois	-	O	-	-
Indiana	-	O	-	-
Iowa	O	-	-	-
Kansas	-	O	-	-
Kentucky	-	O	-	-
Louisiana	-	-	-	O
Maine	-	-	O	-
Maryland	-	-	-	O
Massachusetts	-	O	-	-
Michigan	-	-	-	O
Minnesota	-	O	-	-
Mississippi	-	O	-	-
Missouri	O	-	-	-

Respondent	No speed limit reduction for work zone	10 mph speed limit reduction for work zone	45 mph work zone speed limit when workers present	Other
Montana	-	-	O	-
Nebraska	-	O	-	-
Nevada	-	-	-	-
New Hampshire	-	O	-	-
New Jersey	-	O	-	-
New Mexico	-	-	-	-
New York	-	-	-	-
North Carolina	-	-	-	O
North Dakota	-	-	O	-
Ohio	-	-	-	O
Oklahoma	-	-	-	O
Oregon	-	O	-	-
Pennsylvania	O	-	-	-
Rhode Island	-	-	-	O
South Carolina	-	-	O	-
South Dakota	-	O	-	-
Tennessee	-	O	-	-
Texas	-	O	-	-
Utah	-	-	-	O
Vermont	-	O	-	-
Virginia	-	O	-	-
Washington	-	-	-	O
West Virginia	-	-	-	-
Wisconsin	O	-	-	-
Wyoming	-	-	-	-

Table D-33. Other text responses for question 10 (most effective speed reduction method)

Other (Please describe):
It should be assessed on case-by-case basis using engineering judgement.
I think something along the lines of a drop to a speed that people are used to traveling or can expect to travel safely for the work taking place.
If drivers do not feel the need to slow down, a reduction is often not effective.
Deciding based on activity and impacts to the driver and/or worker/equipment.
55 mph for one or 2 open travel lanes, 60 mph for 3 open travel lanes, no speed reduction for 4+ open travel lanes, 60 mph for uneven lanes.
A balance of realistic reductions (not excessively reduced to the degree of unrealistic expectations for how we know traffic responds) and enhanced design properly accounting for speeds that are likely to be encountered regardless of speed that might be posted.
Law enforcement presence in addition to reduction works best.
Physical cues to reduce speeds (speed feedback signs, narrower lanes, etc.).
Defining when and where a reduction should take place to gain driver respect.
Higher than 10 mph reduction with high permanent speeds (65+ mph) but not down to 45 mph (i.e., 75 mph to 55 mph).
The presence of police performing active speed control in conjunction with ticketing and 45 mph work zone speed limit when workers present.

Table D-34. Survey comments for question 10 (most effective speed reduction method)

Comments:
I agree with our DOT's process of this being determined using a decision matrix based on activity and road type (2-lane, multi-lane highway, multi-lane divided highway (non-Interstate), and Interstate Highway) with a desirable speed reduction and then a minimum for the situations with additional factors such as geometry/location specifics/crash history/etc. I also think use of devices and lane widths helps with effectiveness.
10 mph reduction with feedback signs. Has to be the right situation.
Workers should not work exposed anymore. So, therefore, we don't need to worry about speed reduction. Not talking workers; In cases with no option,20-30 mph drops HAVE TO be done with multiple enforcement.
Data captured in our state including through Automated Work Zone Speed Enforcement, has shown that speeds will be reduced (regardless of posting) without positive protection (i.e., barrier) when workers are present and traffic cones are the deployed channelizing device.
We always try to implement a "step-down" speed limit of 65 mph even if the entire lane closure will have the workers present 45 mph speed limit in place; however, the effectiveness of a 35 mph reduction from a posted speed limit of 80 mph is questionable.
Our DOT policy is that once a construction speed limit is set, it stays at that speed limit until the end of the contract. So, towards the end of the construction contract, you have new pavement and striping and still have a construction speed limit that everyone is ignoring.
If work zone can be designed with positive protection of work area (concrete barrier) and without significant geometric impacts to available lanes.
Only reduce if needed.
No data to support any conclusion.
This depends on the roadway and closure type. Shoulder closures usually don't need a drop but if there is a deep cut or active work within 2 feet we reduce speed. We are trying out an advisory speed reduction speed plaque for shoulder closures.

Table D-35. Individual survey responses for question 11 (adjustment of speed limits on a regular basis for worker presence)

Respondent	Response Text
Alabama	Yes
Alaska	-
Arizona	No
Arkansas	No
California	-
Colorado	No
Connecticut	No
Delaware	-
District of Columbia	-
Florida	-
Georgia	No
Hawaii	-
Idaho	No
Illinois	No
Indiana	Yes
Iowa	No
Kansas	No
Kentucky	No
Louisiana	Yes
Maine	No
Maryland	No
Massachusetts	No
Michigan	No
Minnesota	Yes
Mississippi	No
Missouri	No
Montana	Yes
Nebraska	Yes
Nevada	No
New Hampshire	No
New Jersey	Yes
New Mexico	-

Respondent	Response Text
New York	-
North Carolina	Yes
North Dakota	No
Ohio	Yes
Oklahoma	No
Oregon	Yes
Pennsylvania	No
Rhode Island	No
South Carolina	Yes
South Dakota	Yes
Tennessee	Yes
Texas	No
Utah	No
Vermont	No
Virginia	No
Washington	No
West Virginia	-
Wisconsin	Yes
Wyoming	-

Table D-36. Survey comments for question 11 (adjustment of speed limits on a regular basis for worker presence)

Comments:
We have many zones with speed reductions and many that require dynamic speed reduction within lane closures.
In accordance with the preset table of speeds, when approved for the project.
We just post when present now on the sign 45 when workers present, we are testing with flashing lights and digital speed limits due to the new bill but not main stream at this time.
State law does not allow adjusting work zone speed limits. The contractor can cover the work zone speed limit sign if the current construction phase does not require a work zone speed limit reduction.
Contractors are required to take down 45 mph speed limit signs when no workers will be present (so at the end of the day), as well as move them within a lane closure as work progresses. However, there are often issues with signs being left in place when workers are no longer present.
Sometimes depending on the type of work zone set up such as daily set up.
Worker present speed limit is only to be in place when workers are present and should be adjusted daily, at a minimum. They are supposed to fill out a daily log of locations, times, and adjustments to the workers present speed limit.
They typically want to reduce speed for the duration of the project.
Yes and no. They are supposed to.
Usually nightly when lane closures are installed.
Many of our DOT's work zone speed limit reductions are only effective when a lane closure is in effect.

Table D-37. Individual survey responses for question 12 (factors considered when setting speed limits in work zones or determining which work zone speed strategies to implement)

Respondent	Area Type (Urban or Rural)	Availability of Law Enforcement	Crash History	Duration of Work Zone	Functional Classification	Length of Work Zone	Percent Trucks	Permanent Speed Limit	Presence of Positive Protection	Terrain	Traffic Volumes	Type of Work Activity	Worker Presence	Other
Alabama	A	S	A	A	A	A	S	A	U	A	A	A	A	-
Alaska	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arizona	S	N	S	N	S	N	S	N	N	N	S	S	S	-
Arkansas	A	S	A	A	A	A	A	A	A	A	A	A	A	-
California	A	A	A	A	A	A	A	A	A	A	A	A	A	-
Colorado	N	N	R	S	U	S	R	A	A	N	S	A	U	-
Connecticut	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Delaware	-	-	-	-	-	-	-	-	-	-	-	-	-	-
District of Columbia	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Florida	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Georgia	N	N	N	N	N	N	N	A	N	N	N	A	N	-
Hawaii	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Idaho	S	S	R	S	R	U	S	U	U	R	S	U	U	-
Illinois	S	S	S	R	S	R	R	U	U	S	R	S	U	-
Indiana	U	S	S	A	S	U	S	A	S	R	U	U	U	-
Iowa	R	R	R	R	R	R	R	A	A	R	R	A	A	-
Kansas	R	R	R	S	R	S	R	R	R	N	R	R	R	-
Kentucky	A	S	R	S	S	S	R	A	S	S	S	S	N	-
Louisiana	R	U	S	U	S	R	-	A	-	U	U	A	A	-
Maine	A	R	U	U	U	A	U	A	S	N	A	A	N	-
Maryland	A	S	A	U	S	U	R	S	A	R	A	A	U	U
Massachusetts	N	N	S	S	N	S	N	U	U	R	S	S	N	-
Michigan	R	R	R	S	R	R	R	A	U	R	R	A	A	-
Minnesota	A	A	A	A	A	A	A	A	A	R	A	A	A	-
Mississippi	A	R	A	A	U	U	A	A	A	U	A	A	A	-
Missouri	U	R	S	S	R	R	S	S	S	R	S	S	S	-

Respondent	Area Type (Urban or Rural)	Availability of Law Enforcement	Crash History	Duration of Work Zone	Functional Classification	Length of Work Zone	Percent Trucks	Permanent Speed Limit	Presence of Positive Protection	Terrain	Traffic Volumes	Type of Work Activity	Worker Presence	Other
Montana	S	N	S	A	U	U	R	U	U	U	U	U	U	-
Nebraska	A	R	R	A	R	A	R	A	A	U	U	A	A	-
Nevada	U	A	S	A	A	A	A	A	A	U	A	A	A	-
New Hampshire	S	R	S	S	S	U	S	U	U	S	U	U	S	-
New Jersey	S	S	R	S	N	S	S	U	S	R	S	S	U	-
New Mexico	-	-	-	-	-	-	-	-	-	-	-	-	-	-
New York	-	-	-	-	-	-	-	-	-	-	-	-	-	-
North Carolina	S	R	S	U	A	U	S	A	U	U	A	A	A	-
North Dakota	U	R	R	U	S	S	R	U	S	S	S	U	U	-
Ohio	R	N	R	A	R	A	R	A	A	R	R	R	A	-
Oklahoma	S	N	N	R	U	R	R	A	U	R	R	R	N	U
Oregon	U	R	U	U	U	U	U	U	U	U	U	U	U	-
Pennsylvania	U	N	U	S	S	S	U	U	U	S	U	U	U	-
Rhode Island	N	N	N	N	N	N	N	S	S	N	N	S	S	-
South Carolina	A	S	S	N	N	N	N	A	U	R	A	U	A	-
South Dakota	A	N	N	S	R	S	N	S	N	N	S	S	U	-
Tennessee	S	R	R	S	U	U	U	U	R	R	U	U	U	-
Texas	-	-	-	-	-	-	-	A	A	-	-	A	-	-
Utah	A	A	A	A	S	U	S	A	S	S	A	U	U	-
Vermont	U	S	A	U	A	A	A	U	U	U	A	A	U	-
Virginia	U	R	A	A	A	A	U	U	S	A	A	A	U	-
Washington	S	S	U	U	S	U	U	U	U	U	U	U	U	-
West Virginia	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wisconsin	S	N	U	U	A	U	S	A	A	S	S	A	-	-
Wyoming	-	-	-	-	-	-	-	-	-	-	-	-	-	-

A= Always, U = Usually, S = Sometimes, R = Rarely, N = Never
Other responses included: roadway geometry, number of lanes, traffic control configuration, and drop-off

Table D-38. Individual survey responses for question 13 (completion of evaluation studies for work zone speed limits or speed management strategies)

Respondent	Response Text
Alabama	No
Alaska	-
Arizona	No
Arkansas	No
California	-
Colorado	Yes
Connecticut	No
Delaware	-
District of Columbia	-
Florida	-
Georgia	No
Hawaii	-
Idaho	Yes
Illinois	No
Indiana	Yes
Iowa	Yes
Kansas	Yes
Kentucky	No
Louisiana	No
Maine	No
Maryland	No
Massachusetts	No
Michigan	No
Minnesota	Yes
Mississippi	No
Missouri	No
Montana	No
Nebraska	No
Nevada	No
New Hampshire	No
New Jersey	No
New Mexico	-

Respondent	Response Text
New York	-
North Carolina	No
North Dakota	No
Ohio	Yes
Oklahoma	No
Oregon	Yes
Pennsylvania	Yes
Rhode Island	No
South Carolina	No
South Dakota	No
Tennessee	No
Texas	Yes
Utah	No
Vermont	No
Virginia	No
Washington	No
West Virginia	-
Wisconsin	Yes
Wyoming	-

Table D-39. DOT resources submitted for question 13 (completion of evaluation studies for work zone speed limits or speed management strategies)

Respondent	Resource Description
Idaho	2019 Work Zone Safety and Mobility Process Review: Work Zone Speed Management
Indiana	Identifying Effects and Applications of Fixed and Variable Speed Limits
Iowa	Setting Work Zone Speed Limits
Ohio	Evaluation of Ohio Work Zone Speed Zones Process
Ohio	Work Zone Speed Zones Research Results Presentation (2015)
Oregon	Photo Radar Speed Enforcement in a State Highway Work Zone: Yeon Avenue Demonstration Project
Oregon	Safe and Effective Speed Reductions for Freeway Work Zones Phase 2
Oregon	Safe and Effective Speed Reductions for Freeway Work Zones Phase 3
Oregon	Speed Variation and Safety in Work Zones
Oregon	Use of Additional Lighting for Traffic Control and Speed Reduction in Work Zones
Wisconsin	Work Zone Speed Compliance Study

Table D-40. Individual survey responses for question 14 (ranking of challenges to management of work zone speeds)

Respondent	Agency Understaffed	Availability of Law Enforcement	Contracting Considerations	Distracted Drivers	Driver Indifference	Funding Constraints	Lack of Agency Buy-In	Lack of Evidence of Effectiveness of Strategies	Legislative Barriers	Other
Alabama	-	3	-	1	2	-	-	-	-	-
Alaska	-	-	-	-	-	-	-	-	-	-
Arizona	-	3	-	-	-	-	2	-	-	1
Arkansas	3	-	-	1	2	-	-	-	-	-
California	-	1	3	-	-	-	-	2	-	-
Colorado	-	1	-	-	3	-	-	-	2	-
Connecticut	-	-	-	2	3	-	-	-	1	-
Delaware	-	-	-	-	-	-	-	-	-	-
District of Columbia	-	-	-	-	-	-	-	-	-	-
Florida	-	-	-	-	-	-	-	-	-	-
Georgia	-	-	-	1	2	3	-	-	-	-
Hawaii	-	-	-	-	-	-	-	-	-	-
Idaho	-	3	-	-	-	-	1	-	2	-
Illinois	-	2	-	1	-	-	-	3	-	-
Indiana	-	2	-	-	3	-	-	-	1	-
Iowa	-	3	-	-	2	-	-	-	-	1
Kansas	-	-	-	1	3	-	-	2	-	-
Kentucky	-	3	-	2	1	-	-	-	-	-
Louisiana	2	-	-	1	-	-	-	-	3	-
Maine	-	2	-	1	3	-	-	-	-	-
Maryland	-	-	-	1	2	-	-	3	-	-
Massachusetts	-	3	-	-	2	-	-	-	1	-
Michigan	-	-	2	3	1	-	-	-	-	-
Minnesota	-	-	-	-	2	3	-	-	1	-
Mississippi	-	-	-	1	2	3	-	-	-	-

Respondent	Agency Understaffed	Availability of Law Enforcement	Contracting Considerations	Distracted Drivers	Driver Indifference	Funding Constraints	Lack of Agency Buy-In	Lack of Evidence of Effectiveness of Strategies	Legislative Barriers	Other
Missouri	1	2	-	-	3	-	-	-	-	-
Montana	-	1	-	2	3	-	-	-	-	-
Nebraska	-	-	-	2	1	-	-	3	-	-
Nevada	-	1	-	2	3	-	-	-	-	-
New Hampshire	-	-	-	-	1	-	-	3	-	2
New Jersey	-	2	-	-	3	-	-	-	1	-
New Mexico	-	-	-	-	-	-	-	-	-	-
New York	-	-	-	-	-	-	-	-	-	-
North Carolina	-	2	-	3	1	-	-	-	-	-
North Dakota	-	2	3	-	-	-	-	-	1	-
Ohio	-	2	-	-	1	-	-	-	3	-
Oklahoma	3	2	-	-	-	-	1	-	-	-
Oregon	-	1	-	3	-	2	-	-	-	-
Pennsylvania	-	-	-	-	-	-	-	-	-	-
Rhode Island	1	2	-	3	-	-	-	-	-	-
South Carolina	1	2	-	-	-	-	-	3	-	-
South Dakota	-	-	-	1	3	-	-	2	-	-
Tennessee	-	2	-	1	-	-	3	-	-	-
Texas	-	1	-	2	-	-	-	-	-	3
Utah	-	2	-	-	1	-	-	3	-	-
Vermont	-	1	-	2	-	3	-	-	-	-
Virginia	-	1	-	-	2	-	-	3	-	-
Washington	-	3	-	-	1	-	-	-	2	-
West Virginia	-	-	-	-	-	-	-	-	-	-
Wisconsin	-	-	-	1	-	-	-	2	3	-
Wyoming	-	-	-	-	-	-	-	-	-	-

Other responses included: cannot provide camera enforcement, inexperienced staff, staff disagreements

Table D-41. General survey comments (question 15)

Comments:
We're in the process of putting together a Work Zone Speed Management Guide for our Design/Construction group and would be interested in the results of this survey.
Our policy is based on region experience, traffic volumes, speeds, but doesn't provide a matrix or flowchart for suggestions both for the speed reduction and the enforcement. More evidence-based strategies need to be examined and encouraged.
Our DOT only has variable speed limits (based on set table). There are none that are permitted to be posted 24/7. When a work zone speed zone is approved for a project the posted speed limit will vary based on worker presence and positive protection presence. With variable speed limits it is critical that design speed elements are handled appropriately during design and construction. Some elements will need to use the more conservative of the two (higher for tapers/clear zone/etc.; lower for device spacing, etc.) or for short-term set ups can be set up based on what will be posted at the time of set up.
It seems that no matter what we do and how much thought we put into the speed limit we can't get drivers to slow down unless there is a law enforcement officer present.
The field staff needs to buy in along with the entire project.
Each project is evaluated here pre-bid for any type of restrictions (i.e., night work, outages, detours, lane closure maximums) and made part of the bid package. If a contractor or DOT Staff sees that there are adjustments that can be made due to a differing site condition, we do have the flexibility to change our approach and make appropriate adjustments.
Our DOT has speed reduction standard plan and specification per request.
Would be interested in what other states do and what kind of success they have, or don't have.
I think that too many agencies make an arbitrary choice for setting work zone speed limits without first gathering data. Drivers will not comply with speed limits that they deem to be not credible. Most often advisory speed signs are more effective at reducing speeds because there is always a condition associated with the advisory speed (i.e., a Warning Sign)
Minnesota recently submitted a work zone speed management report to the Minnesota Legislature in an effort to gain approval for piloting speed safety cameras in work zones. http://www.dot.state.mn.us/govrel/reports.html
I have heard from Agency employees working in urban settings that they would prefer the drivers just "maintain their speeds through work zones." This office felt that forcing the drivers in high volume, higher speed facilities to reduce speeds in construction zones forced them to change their driving methods, causing lane changes, impacting surrounding drivers and ultimately caused more disruption to the flow of traffic. Following the principles of speed limit establishment.
We believe that motorists will only reduce their speeds in work zones if they perceive a reason to do so, such as active law enforcement of the speed limit, complex work zone requiring a reduction of travel speed, or a constrictive travel pattern such as lane reduction due to paving operations. We are planning on implementing WZ photo speed enforcement this summer on long-term Interstate projects.

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