

Identification of National Work Zone Safety Objectives and Activities: Summary Report

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16. Abstract This summary report documents the results of an effort to develop a list of needs, objectives, and activities for enhancing safety in and around work zones nationally. The report aims to assist potential stakeholders in prioritizing work zone safety activities and implementing targeted work zone safety strategies. The report presents 11 specific strategic objectives to enhance work zone safety nationally. Specific activities for each strategic objective are identified, as well as potential stakeholders who could help implement or have an interest in one or more of the activities listed.			
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SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
AREA				
in ²	square inches	645.2	square millimeters	mm ²
ft ²	square feet	0.093	square meters	m ²
yd ²	square yard	0.836	square meters	m ²
ac	acres	0.405	hectares	ha
mi ²	square miles	2.59	square kilometers	km ²
VOLUME				
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft ³	cubic feet	0.028	cubic meters	m ³
yd ³	cubic yards	0.765	cubic meters	m ³
NOTE: volumes greater than 1,000 L shall be shown in m ³				
MASS				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2,000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
TEMPERATURE (exact degrees)				
°F	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	°C
ILLUMINATION				
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	candela/m ²	cd/m ²
FORCE and PRESSURE or STRESS				
lbf	poundforce	4.45	newtons	N
lbf/in ²	poundforce per square inch	6.89	kilopascals	kPa

APPROXIMATE CONVERSIONS FROM SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
AREA				
mm ²	square millimeters	0.0016	square inches	in ²
m ²	square meters	10.764	square feet	ft ²
m ²	square meters	1.195	square yards	yd ²
ha	hectares	2.47	acres	ac
km ²	square kilometers	0.386	square miles	mi ²
VOLUME				
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m ³	cubic meters	35.314	cubic feet	ft ³
m ³	cubic meters	1.307	cubic yards	yd ³
MASS				
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2,000 lb)	T
TEMPERATURE (exact degrees)				
°C	Celsius	1.8C+32	Fahrenheit	°F
ILLUMINATION				
lx	lux	0.0929	foot-candles	fc
cd/m ²	candela/m ²	0.2919	foot-Lamberts	fl
FORCE and PRESSURE or STRESS				
N	newtons	2.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in ²

*SI is the symbol for International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380.
(Revised March 2003)

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LIST OF ABBREVIATIONS

AASHTO	American Association of State Highway and Transportation Officials
ADAS	advanced driver assistance systems
ARTBA	American Road and Transportation Builders Association
ASE	automated speed enforcement
ATSSA	American Traffic Safety Services Association
BLS	U.S. Bureau of Labor Statistics
CAV	connected and automated vehicle
CFR	Code of Federal Regulations
CMF	crash modification factor
CMV	commercial motor vehicle
CPWR	Center for Construction Training and Research
DOT	department of transportation
FARS	Fatality Analysis Reporting System
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
HSOs	highway safety offices
LTAP	Local Technical Assistance Program
MPO	Metropolitan Planning Organization
MUTCD	<i>Manual on Uniform Traffic Control Devices</i>
NHTSA	National Highway Traffic Safety Administration
NIOSH	National Institute for Occupational Safety and Health
NWZAW	National Work Zone Awareness Week
OSHA	Occupational Safety and Health Administration
RTPO	Regional Transportation Planning Organization
SSC	speed safety camera
TIM	traffic incident management
TMA's	truck-mounted attenuators
TMP	transportation management plan
TTC	temporary traffic control
USDOT	United States Department of Transportation
VSL	variable speed limit
WZDx	Work Zone Data Exchange

EXECUTIVE SUMMARY

This summary report presents the following 11 strategic objectives targeting national work zone safety-related issues:

1. Minimize driver behaviors that contribute to work zone crashes.
2. Reduce worker struck-by incidents and work zone activity area intrusions.
3. Reduce commercial motor vehicle involvement in fatal and injury work zone crashes.
4. Expand the availability of useful data-driven analyses and management processes to enhance work zone safety.
5. Improve safety and accommodation of other vulnerable road users (i.e., pedestrians, cyclists, and persons on other personal conveyances) through and around work zones.
6. Expand the availability, accuracy, and use of work zone event data.
7. Identify, evaluate, and implement cost-effective safety improvements to temporary traffic control.
8. Improve accommodation of traffic incident management needs in work zones.
9. Improve accommodation of motorcyclists through and around work zones.
10. Improve connected and autonomous vehicle abilities to more safely approach and traverse (or avoid) work zones.
11. Incorporate work zone safety into strategic workforce development efforts.

The report identifies specific activities for each strategic objective and potential stakeholders who could help implement or have an interest in one or more activities listed. The activities under each objective are organized along the following major categories:

- Research.
- Collaboration.
- Guideline/policy related.
- Training.
- Outreach.
- Technology development.

However, not all objectives have activities in all categories. Overall, 72 potential activities are identified. The report also presents performance measures for each of the strategic objectives.

CHAPTER 1. INTRODUCTION

The United States Department of Transportation *National Roadway Safety Strategy* (NRSS) outlines the Department’s comprehensive approach to significantly reducing serious injuries and deaths on our Nation’s highways, roads, and streets.¹ Safety is U.S. DOT’s top priority, and the NRSS represents a department-wide approach to working with stakeholders across the country to achieve this goal. At the core of this strategy is the adoption of the Safe System Approach focusing efforts on achieving safer people, safer roads, safer vehicles, safer speeds, and post-crash care. The strategy applies to all roadways, including work zones.

Work zone safety has been a priority at all levels of government and within the private sector for many years. The Federal Highway Administration (FHWA) has sponsored various initiatives to address work zone safety issues through the years. Other efforts, such as the American National Standards Institute’s development of the *A10.47-2021: Standard on Workzone Safety for Highway Construction*, the Center for Construction Research and Training (CPWR), and the Roadway Work Zone Safety and Health Partners Alliance also strive to improve work zone safety.^{2,3,4}

This document summarizes efforts to identify needs, objectives, and activities for enhancing safety in and around work zones nationally. It aims to assist all potential stakeholders in prioritizing work zone safety activities and implementing targeted work zone safety strategies.

The primary audiences for this report are agencies and associations that undertake initiatives and fund research to directly reduce work zone crashes and improve work zone safety. These agencies and associations include the Federal Motor Carrier Safety Administration (FMCSA); National Highway Traffic Safety Administration (NHTSA); Occupational Safety and Health Administration (OSHA); National Institute for Occupational Safety and Health (NIOSH); CPWR; State, local, and Tribal transportation agencies; metropolitan planning organizations (MPOs) and regional transportation planning organizations (RTPOs); pedestrian and bicyclist safety organizations; motorcycle safety organizations; and commercial motor vehicle (CMV) organizations. Secondary target audience members then implement and/or indirectly benefit from those initiatives, including contractors, employers, consultants, trade associations, labor unions, media, road users, utility agencies, academia, CMV driving schools, departments of motor vehicles, insurance companies, law enforcement, and emergency responders.

This report represents the results of the following efforts:

¹*National Roadway Safety Strategy*. United States Department of Transportation, Washington, DC, January 2022. Accessible at <https://www.transportation.gov/nrss/usdot-national-roadway-safety-strategy>.

²*Standard on Work Zone Safety for Highway Construction*. American National Standard ANSI/ASSE A10.47-2021. American National Standards Institute and American Society of Safety Engineers, Washington, DC. Accessible at <https://webstore.ansi.org/>.

³CPWR—The Center for Construction Research and Training. Accessible at <https://www.cpwr.com/>.

⁴Roadway Work Zone Safety and Health Partners. Accessible at <https://www.osha.gov/alliances/roadway/roadway>.

- An assessment of work zone crash trends.
- A review of literature to identify other key work zone safety challenges.
- Input from subject matter experts serving as an advisory panel.
- Feedback from stakeholders gathered through four virtual workshops held in 2021.

WORK ZONE CRASH TRENDS

In many places, the transportation community has embraced a Safe System Approach for improving roadway safety.⁵ The Safe System Approach focuses on establishing safer behaviors by people using or working on roads, safer road designs and operating conditions, safer vehicles, safer speeds, and post-crash care. Understanding where improvement needs exist in these areas is essential for determining how best to implement the Safe System Approach in all operational domains, including work zones.

A review of fatal and nonfatal injury traffic crash data from 2015 to 2019 points to several challenges that affect work zone safety nationally. These challenges are summarized as follows:

- Fatal work zone crashes have increased 16 percent from 2015 to 2019, from 658 fatal work zone crashes in 2015 to 765 fatal work zone crashes in 2019.⁶ For comparison, overall fatal crashes nationally during that time increased by just 2 percent. Nationally, the percentage of fatal crashes occurring in work zones has trended upward, from around 2 percent each year to 2.3 percent of all fatal crashes in 2019. Similar trends are evident for injury crashes over the same period, based on a review of crash data from a sample of targeted States.⁷ Meanwhile, a lack of accurate work zone exposure data makes it difficult to assess the influence of work zone safety initiatives on work zone crash risk over time.
- Fatal and injury work zone crashes nationally occur mostly on interstate facilities. Whereas 12 percent of non-work zone fatal crashes nationally occur on interstate facilities, 41 percent of fatal work zone crashes occur on interstate facilities. Although slight differences exist by State, overall trends indicate that work zone crashes on interstates tend to be more overrepresented during daytime hours in rural areas and during nighttime hours in urban areas relative to non-work zone fatal and injury interstate crashes during those periods. Fatal work zone crashes also tend to be slightly overrepresented during periods of no adverse weather conditions, which is when a greater amount of work zone activity typically occurs.
- Rear-end collisions comprise a significantly greater percentage of fatal and injury work zone crashes on interstate facilities than they do for non-work zone crashes. Nearly

⁵What is a Safe System Approach? U.S. Department of Transportation, Washington, DC. Accessible at <https://www.transportation.gov/NRSS/SafeSystem>.

⁶Fatality Analysis Reporting System (FARS). National Highway Traffic Safety Administration, U.S. Department of Transportation, Washington, DC. Accessible at <https://www-fars.nhtsa.dot.gov/Main/index.aspx>.

⁷Based on analyses of state-collected crash data from 2015 to 2019 provided by AL, AR, AZ, CA, FL, GA, IL, IN, MT, OH, OK, PA, TX, and WI.

42 percent of fatal work zone crashes on rural interstates involve a rear-end collision, compared to only 17 percent of non-work zone fatal crashes on rural interstates. Rear-end collisions are overrepresented in fatal and injury work zone crashes on other facility types as well.

- Driver distraction is slightly overrepresented in fatal and injury work zone crashes compared to non-work zone crashes, especially on rural facilities. In rural areas, 13–18 percent of fatal work zone crashes, depending on roadway functional classification, listed distraction as a contributing factor. Comparatively, only 8–11 percent of fatal non-work zone crashes on those roadway types listed distraction as a contributing factor. Identifying distraction as a contributing factor, however, is difficult for law enforcement personnel investigating a crash unless explicit evidence is readily apparent. As a result, distraction likely plays a bigger role in work zone crashes than is evident from the crash data analysis.
- Excessive speed (driving too fast for conditions, exceeding the posted speed limit) is also cited as a contributing factor in many work zone crashes, just as it is for non-work zone crashes. Up to 33 percent of fatal work zone crashes indicate speeding as a contributing factor, depending on facility type. States that track tailgating or following too closely as contributing factors also experienced an overrepresentation of those contributing factors in work zone crashes.
- CMVs (primarily large trucks), as defined in NHTSA’s Fatality Analysis Reporting System (FARS), are overrepresented in fatal work zone crashes compared to non-work zone fatal crashes. The overrepresentation occurs on all facility types in both urban and rural areas. On rural interstates, 53 percent of fatal work zone crashes involve a large truck compared to only 30 percent of those in non-work zone fatal crashes. Large trucks also tend to be overrepresented in work zone injury crashes, although the degree of overrepresentation is not as large as for fatal work zone crashes.
- Motorcycle involvement in fatal work zone crashes is only slightly overrepresented relative to non-work zone fatal crashes and occurs primarily on facilities in urban areas. While 19 percent of fatal urban principal arterial crashes and 21 percent of fatal urban

WORK ZONE CRASH CHALLENGE AREAS

- Interstates.
- Rear-end collisions.
- Distracted driving in rural areas.
- Excessive speed.
- Tailgating/following too closely.
- CMVs (primarily large trucks).
- Motorcycles in urban areas.
- Pedestrians (likely highway workers) on rural non-interstate roadways.
- Lane closures and shoulder/median closures.
- Work zone activity areas.
- Transition areas at lane closures and lane shifts or crossovers.

minor arterial crashes in work zones involved a motorcycle, only 17 and 18 percent of fatal non-work zone crashes on those facilities, respectively, involved a motorcycle.

- Pedestrian involvement in fatal work zone crashes overall does not appear to be overrepresented on facilities in urban areas but is on minor arterials and collectors/local roads in rural areas. Given the low pedestrian involvement in non-work zone crashes on these facilities in general, it is likely that the overrepresentation reflects collisions with highway workers on foot on these facilities. Based on U.S. Bureau of Labor Statistics (BLS) data, 45 percent of all worker fatalities at road construction sites involve a vehicle striking a worker on foot.⁸
- Work zones where fatal and injury crashes occur vary by State. Depending on the State, 52–82 percent of work zone crashes occur at lane and shoulder closures.⁶ The remaining work zone crashes occur at mobile work zones and work zones with lane shifts or crossovers.
- Fatal and injury crashes mostly occur in the activity area of the work zone. FHWA’s *Manual on Uniform Traffic Control Devices (MUTCD)* defines four main areas of a work zone: the advance warning area, transition area, activity area, and termination area.⁹ Depending on the State and type of work zone, 36–83 percent of fatal and injury crashes occur in the activity area. Also depending on the State, 11–32 percent of fatal and injury crashes occur in the transition area at work zones involving lane closures and lane shifts or crossovers.

OTHER WORK ZONE SAFETY CHALLENGE AREAS

In addition to the work zone safety challenges evident from a review of national and State crash databases, the following areas also challenge stakeholder efforts to improve work zone safety nationally.

Improving Prediction Capabilities Regarding Work Zone Conditions and Activities That Contribute to Crashes

An agency’s awareness of work zone conditions and activities routinely influences work zone scoping, design, and active project management decisions that contribute to crashes. For example, traffic queues have an adverse impact upon mobility and can also contribute to severe rear-end collisions. Consequently, agency decision-making processes regarding long-term maintenance-of-traffic alternatives and allowable times for short-term lane closures are often based on desires to avoid creating traffic queues on high-speed, high-volume facilities. Safety considerations drive decisions on when to use temporary barriers versus channelizing devices or what lane width and barrier offset to use through the work zone. The effects of work zones on crashes can vary significantly from one year to the next and from one project to the next. In

⁸Census of Fatal Occupational Injuries. U.S. Bureau of Labor Statistics, U.S. Department of Labor, Washington, DC. Accessible at <https://data.bls.gov/cgi-bin/dsrv?fw>.

⁹*Manual on Uniform Traffic Control Devices*. Federal Highway Administration, U.S. Department of Transportation, Washington, DC, 2009. Accessible at <https://mutcd.fhwa.dot.gov/>.

addition, the accuracy of work zone identification on crash reports varies from jurisdiction to jurisdiction and project to project. Efforts are needed for the following:

- Develop tools, technical assistance, and training on how to accurately identify all work zone crashes occurring in work zones and estimate the possible safety impacts of work zones.
- Support efforts to collect and utilize work zone event data to improve work zone safety performance measurement and use.
- Develop crash modification factors (CMFs) representing work zone design features and specific mitigation strategies.

Reducing Workspace Intrusions and Worker Struck-by Vehicle Crashes

The crash data analyses indicated that pedestrian-involved crashes were most overrepresented in work zones on rural facilities (primarily minor arterials, collectors, and local roads). The hypothesis drawn from the analyses was that most of those pedestrian fatalities were likely highway workers on foot who were struck by vehicles. However, highway worker struck-by vehicle crashes occur on all roadway types. In fact, BLS data suggest that 45 percent of all highway worker fatalities at road construction sites are due to struck-by incidents. Under the Federal aid highway program, agencies must base decisions regarding the need for a longitudinal traffic barriers and other positive protection devices on an engineering study (23 CFR 630.1108). Many agencies have adopted a generic definition of what constitutes an “engineering study,” with only a few instances of undertaking a systematic, benefit-cost analysis. One issue hampering analysis efforts in this area is a lack of quality data regarding the frequency of workspace intrusion events and the severity of their outcomes. Efforts are needed on the following:

- Support the use of data-driven engineering studies that incorporate consideration of the Safe System Approach on positive protection needs.
- Enhance driver awareness of worker presence and encourage safer driving behavior at work zones where it is not possible to separate workers from traffic.
- Develop, test, and quantify further the benefits of intrusion alarm technologies.
- Reduce impacts with mobile operation work vehicles and truck-mounted attenuators (TMAs).

Accommodating Connected Vehicles, Automated Vehicles, and Advanced Driver Assistance Technologies Through Work Zones

The potential safety benefits of widespread market penetration largely drive connected and automated vehicle (CAV) operations development. However, both the public and private sectors have acknowledged that work zones represent significant challenges to the advancement of CAV operations in the real world. Even individual advanced driver assistance systems (ADAS) that

support lane-keeping or lane-changing, advanced navigation, or pedestrian detection can struggle to accommodate travel through work zones with temporary pavement markings that contrast poorly with the roadway surface, involve temporary changes in lane use assignments, and have workers present near active travel lanes. Efforts are needed to accomplish the following:

- Identify and elevate awareness of work zone situations that create challenges for CAVs.
- Support agency efforts to determine how to modify existing policies and processes to mitigate those challenges.
- Assess the implications of feasible modifications upon other aspects of the agency's project development cycle (scoping, design, specifications, etc.).
- Assess how to modify existing temporary traffic control (TTC) and other work zone features to address vehicle and work-task connectivity and automation advances.

CHAPTER 2. DEVELOPING CONSENSUS-BASED NATIONAL WORK ZONE SAFETY OBJECTIVES AND ACTIVITIES

The research team took the following steps to develop the national work zone safety objectives and activities documented in this summary report:

- Developed an initial draft of the mission and vision of the document, possible objectives, and potential activities based on the analysis of work zone crash data and identification of other work zone safety issues from a literature review.
- Convened a multidisciplinary advisory panel to review and provide input on the initial draft.
- Held a series of virtual regional workshops to introduce stakeholders to the draft objectives and activities to gather additional feedback.
- Reconvened the advisory panel to review a revised draft of objectives and activities based on the feedback received during the regional workshops.
- Developed a final set of objectives and activities following the second review from the advisory panel.

COMPOSITION OF THE ADVISORY PANEL

The advisory panel consisted of representatives from stakeholders from the following national, State, and local agencies and organizations:

- FHWA.
- FMCSA.
- NHTSA.
- NIOSH.
- State departments of transportation (State DOTs).
- American Association of State Highway and Transportation Officials (AASHTO).
- Local Technical Assistance Program (LTAP) centers.
- American Road and Transportation Builders Association (ARTBA).
- American Traffic Safety Services Association (ATSSA).

REGIONAL STAKEHOLDER WORKSHOPS

A series of four virtual regional workshops were held in September, October, and November 2020 to review the draft national work zone safety objectives and activities and gather feedback from invited stakeholders. Each workshop consisted of two 1/2-day working sessions. The first part of the first session was devoted to reviewing the crash data findings, literature review results, and the list of work zone safety objectives and activities. The attendees were then divided

into smaller working groups to discuss and provide feedback on the mission, vision, objectives, and activities.

Overall, 197 individuals participated in the virtual regional workshops. As shown in table 1, most participants were from Federal agencies and State DOTs. However, representatives from local agencies and organizations, industries involved in or associated with work zone safety, academia, and nonprofit organizations also participated in the workshops and provided valuable ideas.

Table 1. Virtual 2021 regional workshop participants by category.

Category Type	Number	Percent
Federal agencies	89	45
State DOTs	74	37
Local agency/organization	5	3
Industry	21	10
Academia	6	3
Nonprofit	1	1
Other	1	1
Total	197	100

MISSION AND VISION OF THE CONSENSUS-BUILDING EFFORT

The research team developed an initial mission statement and vision statement that the advisory panel and workshop participants reviewed. These statements helped guide the review and feedback on the national work zone safety objectives and activities presented in chapter 3. Based on the feedback received, the mission of the national work zone safety objectives and activities is to guide transportation industry stakeholder efforts to optimize work zone safety and mobility, promote economic growth, and enhance the quality of life for all roadway users. Similarly, the vision for the consensus-building effort is to chart a roadmap for stakeholders to guide advances in work zone safety and mobility over the next 3-5 years.

CHAPTER 3. NATIONAL WORK ZONE SAFETY STRATEGIC OBJECTIVES AND ACTIVITIES

Based on the assessment of work zone safety needs, this plan presents 11 specific strategic objectives:

1. Minimize driver behaviors that contribute to work zone crashes.
2. Reduce worker struck-by incidents and work zone activity area intrusions.
3. Reduce CMV involvement in fatal and injury work zone crashes.
4. Expand the availability of useful data-driven analyses and management processes to enhance work zone safety.
5. Improve safety and accommodation of nonmotorized users through and around work zones.
6. Expand the availability, accuracy, and use of work zone event data.
7. Identify, evaluate, and implement cost-effective safety improvements to TTC.
8. Improve accommodation of traffic incident management (TIM) needs in work zones.
9. Improve accommodation of motorcyclists through and around work zones.
10. Improve CAV abilities to more safely approach and traverse (or avoid) work zones.
11. Incorporate work zone safety into strategic workforce development efforts.

This summary report identifies specific activities for each strategic objective and potential stakeholders who could help implement or have an interest in one or more activities listed. The activities under each objective are organized along the following major categories:

- Research.
- Collaboration.
- Guideline/policy related.
- Training.
- Outreach.
- Technology development.

However, not all objectives have activities in all of these categories. Overall, 72 activities are identified within this plan. The report also presents performance measures for each of the strategic objectives.

STRATEGIC OBJECTIVE 1: MINIMIZE DRIVER BEHAVIORS THAT CONTRIBUTE TO WORK ZONE CRASHES

Strategic Objective 1: Potential Stakeholders

Public-Sector Entities

- FHWA.
- FMCSA.
- NHTSA.

- NIOSH.
- State DOTs.
- State highway safety offices (HSOs).
- Local and Tribal agencies.
- MPOs and RTPOs.
- Enforcement agencies.
- Academic institutions.

Private-Sector Entities

- Trade associations.
- TTC manufacturers and vendors.
- Driver training organizations.

Advocacy Groups

- Highway worker advocacy groups.
- Motorist advocacy groups.
- CMV advocacy groups.
- Pedestrian/bicyclist advocacy groups (including disability advocacy).
- Other roadway user safety advocacy groups.

Strategic Objective 1: Activities (A1)

Research

A1.1—Conduct research to better understand factors contributing to adverse driver behaviors in work zones.

A1.2—Research the human factors-related effects of setting appropriate context-based work zone speed limits (e.g., reducing work zone speed limits only when and where they are truly needed, such as when workers are present, when work zone geometrics necessitate them); the inclusion of design features to passively manage speed; the effect of distracted driving in work zones; and the relationship of speed to work zone crash frequency, severity, and other characteristics. Develop best practices based on lessons learned.

A1.3—Evaluate the safety benefits of speed safety cameras (SSCs) (also called automated speed enforcement (ASE)) and variable speed limit (VSL) deployments in place nationally, support the development of outreach and educational materials that highlight the effectiveness of the SSC/ASE and VSL, and develop guidance on work zone criteria that are most likely to benefit from these SSC/ASE and VSL systems.

Collaboration

A1.4—Convene a stakeholder working group to evaluate the effectiveness of double-fine laws and how those funds are distributed.

A1.5—Encourage appropriate legal penalties as specified by work zone violation laws by educating law enforcement, legal professionals, and elected officials.

A1.6—Investigate the potential use of other federally funded programs to address contributory behavioral causes to work zone-specific areas of concern (distracted driving, tailgating, speeding, etc.).

Guideline/Policy Development

A1.7—Develop guidelines for deploying, protecting, and training law enforcement in work zones.

Training

A1.8—Encourage the development and implementation of work zone-specific driver training and outreach for various audiences (new drivers, traffic law violators, etc.).

Outreach

A1.9—Support National Work Zone Awareness Week (NWZAW), including outreach through social media platforms. Remind drivers of adverse behaviors (speeding, distraction, tailgating, etc.) associated with work zone crashes during NWZAW as well as periodically throughout the year.

Technology Deployment

A1.10—Encourage continued development and expanded use of in-vehicle technologies to reduce inattention and other adverse driving behaviors.

Strategic Objective 1: Performance Measures

The following identify potentially useful performance measures for strategic objective 1:

- Number of studies on applying context-based speed limit setting to work zones.
- Number of studies of the relationship between work zone speed limit setting and work zone crashes.
- Evaluation of SSC/ASE program effectiveness.
- Evaluation of VSL system effectiveness.
- Number of stakeholders implementing SSC/ASE and VSL systems in work zones.
- Number of outreach and educational materials about SSC/ASE and VSL applications in work zones.

STRATEGIC OBJECTIVE 2: REDUCE WORKER STRUCK-BY INCIDENTS AND WORK ZONE ACTIVITY AREA INTRUSIONS

Strategic Objective 2: Potential Stakeholders

Public-Sector Entities

- FHWA.
- NHTSA.
- OSHA.
- NIOSH.
- State DOTs.
- Local agencies.
- MPOs and RTPOs.
- Academic institutions.

Private-Sector Entities

- Contractors.
- TTC subcontractors.
- Design consultants.
- Trade associations.
- Manufacturers and vendors.
- Driver training organizations.

Advocacy Groups

- Highway worker advocacy groups.
- Motorist advocacy groups.
- CMV advocacy groups.

Strategic Objective 2: Activities (A2)

Research

A2.1—Develop and implement a Safe System Approach to quantify work zone intrusion risks as a function of TTC type, traffic volumes, and other factors through improved data collection and evaluation efforts to identify where intrusions occur.

A2.2 – Develop a Safe System hierarchy of controls to assist practitioners in identifying and selecting safety strategies and countermeasures that align with the Safe System Approach.

A2.3—Conduct research to correlate worker fatalities documented in the NHTSA FARS and the BLS Census of Fatal Occupational Injuries databases that will improve the accuracy of the data and develop a stronger understanding of roadway and workplace factors influencing worker fatalities and injuries in work zones.^{5,7}

A2.4—Continue to monitor, document, and research worker fatigue and distraction inside the work zone. Based on the findings, identify possible solutions to combat injuries related to night work, fatigue, and distraction.

A2.5—Research and advance strategies and technologies that enhance driver detection, perception, interpretation, and response to mobile work zones and/or TTC setup and removal tasks.

Collaboration

A2.6—Encourage accelerated or alternative construction techniques, innovative contracting, and other techniques to further reduce worker exposure time to traffic.

Guideline/Policy Development

A2.7—Emphasize and develop clear guidelines on using positive protection (barriers, TMAs, etc.) in work zones.

A2.8—Encourage other strategies that reduce risks of traffic collisions with workers (full road closures, median crossovers, etc.) in locations where positive protection cannot be used.

Training

A2.9—Implement worker situational awareness training efforts regarding potential struck-by risks and methods to reduce those risks, such as always using high-visibility apparel, using spotters when needed, etc.

A2.10—Develop training materials to support implementation of the 23 CFR 630.1108(a) requirements for developing and using data-driven engineering studies to determine positive protection needs.

A2.11—Encourage contractor training, development, and implementation of internal traffic control plans to reduce worker-construction vehicle conflicts.

Outreach

A2.12—Develop and implement educational and outreach efforts to enhance driver awareness and caution drivers about worker presence in work zones.

Technology Deployment

A2.13—Encourage development, testing, and evaluation of innovative intrusion alarm technologies to reduce intrusion likelihood by motorists and increase worker awareness of the intrusions.

A2.14—Support agency efforts to update specifications to allow newer positive protection methods and technologies to be used more quickly.

A2.15—Develop innovative worker communication technology to reduce runover and backover incidents in work zones.

A2.16—Support efforts to incorporate worker presence data into the Work Zone Data Exchange (WZDx) specification, collect that data, and use it to disseminate warning information to drivers.¹⁰

Strategic Objective 2: Performance Measures

The following identify potentially useful performance measures for strategic objective 2:

- Number of pedestrian-involved fatal work zone crashes where the pedestrian fatality was coded as being “at work” and/or was a “construction/maintenance/utility” worker.
- Number of stakeholders that establish requirements for data-driven engineering studies to determine positive protection needs in work zones.

STRATEGIC OBJECTIVE 3: REDUCE COMMERCIAL MOTOR VEHICLE INVOLVEMENT IN FATAL AND INJURY WORK ZONE CRASHES

Strategic Objective 3: Potential Stakeholders

Public-Sector Entities

- FHWA.
- FMCSA.
- NHTSA.
- OSHA.
- NIOSH.
- State DOTs.
- State HSOs.
- Local and Tribal agencies.
- MPOs and RTPOs.
- Enforcement agencies.
- Academic institutions.

Private-Sector Entities

- Contractors.
- TTC subcontractors.
- Design consultants.
- Driver training organizations.

¹⁰ Work Zone Data Exchange Specification. Accessible at <https://github.com/usdot-jpo-ode/wzdx>.

Advocacy Groups

- Trucking associations.
- Highway worker advocacy groups.
- Motorist advocacy groups.
- CMV advocacy groups.

Strategic Objective 3: Activities (A3)

Research

A3.1—Investigate issues with oversize/overweight vehicles in restricted-width work zones and identify best practices for mitigating those issues.

A3.2—Improve the quality of CMV crash reporting in work zones overall and develop a better understanding of work zone exposure conditions, CMV operational characteristics, driver behaviors, and other characteristics of CMV-involved work zone crashes. Develop design standards and implement mitigation strategies (e.g., back-of-queue crash warnings) where appropriate.

Collaboration

A3.3—Encourage the CMV industry to standardize the use of crash mitigating technologies.

Outreach

A3.4—Encourage outreach and education efforts to improve CMV driver behavior, especially for new drivers, in work zones.

Technology Deployment

A3.5—Develop and implement methods of warning CMV drivers about work zone conditions and features (including the presence of workers) that could affect CMV operations. This effort could involve the implementation of the WZDx specification and pilot testing of in-cab driver information systems to provide work zone warnings.

A3.6—Support efforts to aid the ability of connected and autonomous CMVs to safely navigate through work zones.

Strategic Objective 3: Performance Measures

The following identify potentially useful performance measures for strategic objective 3:

- Number of fatal and injury work zone crashes that involve a CMV.
- Number of pilot tests and demonstrations to get work zone information in-cab to the CMV driver.

- Number of stakeholders that develop and disseminate outreach and educational information to improve CMV driver behavior in work zones.

STRATEGIC OBJECTIVE 4: EXPAND THE AVAILABILITY OF USEFUL DATA-DRIVEN ANALYSES AND MANAGEMENT PROCESSES TO ENHANCE WORK ZONE SAFETY

Strategic Objective 4: Potential Stakeholders

Public-Sector Entities

- FHWA.
- NHTSA.
- NIOSH.
- State DOTs.
- State HSOs.
- Local and Tribal agencies.
- MPOs and RTPOs.
- Enforcement agencies.
- Academic institutions.

Private-Sector Entities

- Design consultants.

Advocacy Groups

- Highway worker advocacy groups.

Strategic Objective 4: Activities (A4)

Research

A4.1—Develop and improve predictive capabilities of work zone conditions that influence crash frequency and severity, including developing CMFs for work zone design features and mitigation strategies.

A4.2—Conduct research and share best practices for using alternative data sources (e.g., connected vehicle and infrastructure data, crowdsourced data) for work zone safety analyses, traffic performance monitoring, and other uses.

Collaboration

A4.3—Convene a multidisciplinary stakeholder working group to review current Federal work zone safety and mobility regulations and determine if any changes are needed.

Guideline/Policy Development

A4.4—Encourage the use of Safe System Approach principles and data-driven safety analysis methods for work zone management decisions during work zone design and transportation management plan (TMP) development, implementation, and evaluation. This effort would include developing analytical tools to make work zone data-driven safety analyses practical and more accurate.

A4.5—Develop national guidance on work zone safety and mobility performance measures for States to report as part of their required work zone process reviews, use in developing action plans for work zone management program improvements, and use in real time to improve work zone management activities.

Training

A4.6—Improve the consistency and accuracy of collecting and reporting work zone crash data by law enforcement investigating those crashes.

Technology Deployment

A4.7—Increase awareness, share outcomes and best practices, and encourage the use of smart work zone functionalities and other safety mitigation strategies as part of TMP development.

Strategic Objective 4: Performance Measures

The following identify potentially useful performance measures for strategic objective 4:

- Number of stakeholders that have incorporated work zone crash prediction methods into the TMP development process.
- Number of CMFs developed for work zone design features and countermeasures.
- Number of stakeholders that have developed and are following procedures for systematically considering the use of smart work zones.

STRATEGIC OBJECTIVE 5: IMPROVE SAFETY AND ACCOMMODATION OF PEDESTRIANS, CYCLISTS, AND PERSONS ON PERSONAL CONVEYANCES THROUGH AND AROUND WORK ZONES

Strategic Objective 5: Potential Stakeholders

Public-Sector Entities

- FHWA.
- NHTSA.
- State DOTs.
- State HSOs.
- Local and Tribal agencies.

- MPOs and RTPOs.

Private-Sector Entities

- Contractor.
- TTC subcontractors.
- Design consultants.
- Trade associations.
- Driver training organizations.

Advocacy Groups

- Highway worker advocacy groups.
- Pedestrian/bicyclist advocacy groups (including disability advocacy).
- Other roadway user safety advocacy groups.

Strategic Objective 5: Activities (A5)

Research

A5.1—Develop, test, evaluate, and deploy new approaches to assist other vulnerable road users (particularly those with disabilities) through work zones with accessible travel paths.

A5.2—Develop methods for identifying and tracking non-vehicle-related incidents involving other vulnerable road users in work zones.

Guideline/Policy Development

A5.3—Establish dedicated funding line items in construction contracts to provide other vulnerable road user accommodations through work zones.

Training

A5.4—Educate agency and contractor staff on Federal/State/local procedures and recommendations for providing safer passage of other vulnerable road users in work zones. Develop and implement methods for monitoring and enforcing compliance with those procedures.

Outreach

A5.5—Incorporate information on how to more safely navigate travel paths that are affected by work zones into behavioral modification efforts by agencies and other vulnerable road user advocacy groups emphasizing a safety culture.

Strategic Objective 5: Performance Measures

The following identify potentially useful performance measures for strategic objective 5:

- Number of work zone crashes involving other vulnerable road users.
- Number of stakeholders that establish specific business processes regarding the design and implementation of TTC for non-motorists where needed.
- Number of stakeholders that have incorporated information about work zones into their safer non-motorist behavior education and outreach programs.

STRATEGIC OBJECTIVE 6: EXPAND THE AVAILABILITY, ACCURACY, AND USE OF WORK ZONE EVENT DATA

Strategic Objective 6: Potential Stakeholders

Public-Sector Entities

- FHWA.
- NIOSH.
- State DOTs.
- Local and Tribal agencies.
- MPOs and RTPOs.
- Academic institutions.

Private-Sector Entities

- Design consultants.
- Trade associations.
- 3rd party traveler information providers.

Advocacy Groups

- Highway worker advocacy groups.

Strategic Objective 6: Activities (A6)

Research

A6.1—Support efforts to integrate WZDx data with available safety data.

Collaboration

A6.2—Support national efforts to further develop the WZDx specification.¹¹

A6.3—Encourage private-sector efforts to collect and disseminate work zone event data, such as improving the smart work zone device data feed as part of the WZDx specification for device manufacturers.

A6.4—Support efforts to improve the adoption of the WZDx specification for the production of work zone event data by both public- and private-sector stakeholders.

Guideline/Policy Development

A6.5—Encourage stakeholders to adopt operational procedures for identification of worker presence in the work zone that serve as a trigger to identify active work.

A6.6—Encourage each State’s office or committee responsible for its traffic records to identify work zone event data needs and methods of collecting and sharing traffic data.

A6.7—Encourage stakeholders to improve work zone management business processes by collecting work zone event data and using it throughout the work zone lifecycle (from planning to implementation).

Technology Development

A6.8—Support efforts to improve the accuracy of work zone event data by implementing automated work zone identification technologies and coordinating that information across jurisdictional boundaries.

Strategic Objective 6: Performance Measures

The following identify potentially useful performance measures for strategic objective 6:

- Number of stakeholders that are collecting, disseminating, and storing work zone event data for various purposes.
- Number of stakeholders that are allowing and/or encouraging the use of automated work zone identification technologies on their work zone projects.

STRATEGIC OBJECTIVE 7: IDENTIFY, EVALUATE, AND IMPLEMENT COST-EFFECTIVE SAFETY IMPROVEMENTS TO TEMPORARY TRAFFIC CONTROL

Strategic Objective 7: Potential Stakeholders

Public-Sector Entities

- FHWA.
- State DOTs.
- Local and Tribal agencies.
- MPOs and RTPOs.

Private-Sector Entities

- Trade associations.
- TTC manufacturers and vendors.

Advocacy Groups

- Highway worker advocacy groups.

Strategic Objective 7: Activities (A7)

Research

A7.1—Encourage the development and testing of innovative TTC devices and share findings with stakeholders to encourage the adoption of effective innovations.

A7.2—Encourage the streamlining of *MUTCD* experimentation processes.⁸

A7.3—Promote testing of generic TTC devices according to the latest *Manual for Assessing Safety Hardware* testing requirements.¹¹

Guideline/Policy Development

A7.4—Improve TTC effectiveness with road users through appropriate implementation, frequent inspection, and prompt maintenance of TTC devices.

Strategic Objective 7: Performance Measures

The following identify potentially useful performance measures for strategic objective 7:

- Number of new TTC devices developed and implemented.
- Number of requests to experiment with innovative work zone traffic control devices (and reports of such experiments).
- Number of work zone devices or installations determined to be inadequate.

STRATEGIC OBJECTIVE 8: IMPROVE ACCOMMODATION OF TRAFFIC INCIDENT MANAGEMENT NEEDS IN WORK ZONES

Strategic Objective 8: Potential Stakeholders

Public-Sector Entities

- FHWA.
- NHTSA.
- NIOSH.
- State DOTs.
- Local and Tribal agencies.

¹¹ Manual for Assessing Safety Hardware, Second Edition. American Association of State Highway and Transportation Officials, Washington, DC. 2016. Available at <https://store.transportation.org/>.

- MPOs and RTPOs.
- Enforcement agencies.
- Other emergency response providers.
- Academic institutions.

Private-Sector Entities

- TTC manufacturers and vendors.
- Vehicle manufacturers.

Advocacy Groups

- Highway worker advocacy groups.

Strategic Objective 8: Activities (A8)

Collaboration

A8.1—Enhance coordination and communication between TIM responders and work zone project staff at all phases of TMP development.

Guideline/Policy Development

A8.2—Gather work zone-specific common TIM responder issues through after-action meetings, identify best practices to mitigate those issues, and promote effective practices throughout the industry.

A8.3—Support efforts to align TIM strategic plans with work zone TMPs.

Training

A8.4—Develop and disseminate training for TMP designers on TIM needs to address during work zone TMP development, such as using pull-off areas for incident management in work zones on high-speed roadways where continuous shoulders are not available.

Strategic Objective 8: Performance Measures

A potentially useful performance measure for strategic objective 8 is the number of project staff trained in TIM needs and considerations during TMP development.

STRATEGIC OBJECTIVE 9: IMPROVE ACCOMMODATION OF MOTORCYCLISTS THROUGH AND AROUND WORK ZONES

Strategic Objective 9: Potential Stakeholders

Public-Sector Entities

- FHWA.

- NHTSA.
- State DOTs.
- State HSOs.
- Local and Tribal agencies.
- MPOs and RTPOs.

Private-Sector Entities

- TTC manufacturers and vendors.
- Driver training organizations.

Advocacy Groups

- Highway worker advocacy groups.
- Motorist advocacy groups.

Strategic Objective 9: Activities (A9)

Research

A9.1—Investigate the effects of laws pertaining to motorcycles (e.g., allowing lane splitting by motorcyclists, helmet use requirements) and motorcycle safety in work zones and determine best practices.

A9.2—Monitor the development of motorcycle-friendly barrier designs and assess their applicability and practicality as temporary barriers for use in work zones. This effort includes the addition of safety features, such as screening or netting on top of barriers that would specifically improve the safety of motorcyclists in work zones.

A9.3—Investigate the effects of pavement surface issues commonly created in work zones (grooved pavement, steel plates, uneven lanes, lateral bumps, etc.) upon motorcycle stability and safety. Determine improved recommendations for these conditions to accommodate motorcyclists.

Training

A9.3—Train work zone designers, project engineers, and contractors about the unique challenges that work zones can present to motorcyclists and strategies available to mitigate those challenges. For example, identify best practices/standards regarding milling and overlay lift height limitations relative to motorcycle stability in work zones.

Outreach

A9.4—Educate motorcyclists about potential work zone safety challenges and strategies that can mitigate those challenges.

Strategic Objective 9: Performance Measures

The following identify potentially useful performance measures for strategic objective 9:

- Number of motorcyclist crashes in work zones.
- Percentage of all work zone crashes that involve a motorcyclist.

STRATEGIC OBJECTIVE 10: IMPROVE CONNECTED AND AUTONOMOUS VEHICLE ABILITIES TO MORE SAFELY APPROACH AND TRAVERSE (OR AVOID) WORK ZONES

Strategic Objective 10: Potential Stakeholders

Public-Sector Entities

- FHWA.
- NHTSA.
- NIOSH.
- State DOTs.
- Local and Tribal agencies.
- MPOs and RTPOs.

Private-Sector Entities

- TTC manufacturers and vendors.
- Vehicle manufacturers.

Advocacy Groups

- Highway worker advocacy groups.

Strategic Objective 10: Activities (A10)

Research

A10.1—Evaluate how ADAS, driver monitoring systems, and other vehicle technologies may influence driver behavior in work zone environments and modify work zone design and management strategies if needed.

A10.2—Continue research of autonomous vehicles and automated driving systems (e.g., CARMASM) at U.S. DOT and testing efforts pertaining to work zone accommodations.

Collaboration

A10.3—Collaborate with State/local agencies, vehicle original equipment manufacturers, automated driving system developers, and third-party navigational data providers to understand the actionable work zone information these entities need for their systems. Similarly, collaborate

on what physical infrastructure (e.g., signing and striping) these entities need in the work zone to improve safer driving awareness and behavior.

Training

A10.4—Train work zone designers and project engineers about the challenges that work zones can present to CAV and strategies available to mitigate those challenges (e.g., signing, pavement markings, wireless communications).

Technology Development

A10.5—Use cellular and vehicle-to-everything applications, where available, to provide information to road users about work zone challenges.

A10.6—Monitor efforts to develop methods of updating and sharing roadway configuration and condition information that is temporarily modified by a work zone.

A10.7—Monitor the development and deployment of personal delivery devices and autonomous vehicles that share a travel path with nonmotorized users to understand their needs and how to accommodate them in work zones.

A10.8—Support efforts to further develop and test automated TMAs in work zones. Leverage the data that can be collected and shared from these vehicles to support travelers and connected/autonomous vehicles.

Strategic Objective 10: Performance Measures

The following identify potentially useful performance measures for strategic objective 10:

- Number of work zones that CAVs can navigate.
- Number of CAV crashes occurring in work zones.
- Number of automated truck-mounted attenuator deployments.

STRATEGIC OBJECTIVE 11: INCORPORATE WORK ZONE SAFETY INTO STRATEGIC WORKFORCE DEVELOPMENT EFFORTS

Strategic Objective 11: Potential Stakeholders

Public-Sector Entities

- FHWA.
- OSHA.
- NIOSH.
- State DOTs.
- Local and Tribal agencies.
- MPOs and RTPOs.
- Academic institutions.

Private-Sector Entities

- Contractors.
- TTC subcontractors.

Advocacy Groups

- Highway worker advocacy groups.

Strategic Objective 11: Activities (A11)

Training

A11.1—Promote efforts to identify, encourage, train, and place a skilled workforce for agency staff and contractors at field staff and management levels and include diverse representation during all work zone phases and in all geographic areas. Examples of possible efforts include the following:

- Identify and incorporate appropriate work zone safety and mobility topics into efforts being supported under the Highway Construction Workforce Partnership.¹²
- Promote work zone safety considerations in apprenticeship and training programs that strive to move women, minorities, and disadvantaged individuals into work zone-related jobs (journey level and above).
- Develop programs designed to provide a career path in highway construction and maintenance management and encourage incorporating work zone safety and mobility topics in those programs (such as the Highway Maintenance Management Degree at the Front Range Community College or the ARTBA Safety Certification for Transportation Project Professionals).^{13 14}
- Utilize the FHWA Summer Transportation Institute and Summer Transportation Internship Program for Diverse Groups to engage high school and university students in careers that benefit from having work zone safety expertise.¹⁵

A11.2—Promote law enforcement personnel training regarding work zone safety practices.

A11.3—Encourage the creation of a verified database of completed work zone training programs and certifications.

¹² FHWA-Highway Construction Workforce Partnership. Accessible at https://www.fhwa.dot.gov/innovativeprograms/centers/workforce_dev/hcwp/.

¹³ Highway Maintenance Management Degree. Front Range Community College, Westminster, CO. Accessible at <https://www.frontrange.edu/programs-and-courses/a-z-program-list/highway-maintenance-management>.

¹⁴ Safety Certificate for Transportation Project Professionals. American Road Transportation Builders of America, Washington, DC. Accessible at https://artbatdf.org/training_education/safety-certificate/.

¹⁵ FHWA Summer Transportation Institute and Summer Transportation Internship Program for Diverse Groups. Accessible at <https://www.fhwa.dot.gov/careers/stipdg.cfm>.

A11.4—Develop and implement virtual reality opportunities for work zone safety training.

Strategic Objective 11: Performance Measures

The following identify potentially useful performance measures for strategic objective 11:

- Number of initiatives that incorporate work zone safety topics into their curriculums.
- Number of individuals who successfully complete programs or training offerings.

CHAPTER 4. STAKEHOLDER–STRATEGIC OBJECTIVE INTEREST MATRIX

As was identified for each strategic objective in chapter 3, many stakeholders have an interest in work zone safety and will be vital to the successful completion or institutionalization of efforts identified in this plan. Not all strategic objectives will be relevant to each stakeholder. Table 2 presents a matrix of potential stakeholder interest or involvement in accomplishing each of the strategic objectives that have been identified. This matrix can assist stakeholders in further identifying synergies across strategic objective activities that could help guide their involvement in work zone safety improvement efforts.

Table 2. Stakeholder–strategic objective interest matrix based on virtual 2021 regional workshops.

Potential Stakeholders	Strategic Objective										
	1	2	3	4	5	6	7	8	9	10	11
FHWA	X	X	X	X	X	X	X	X	X	X	X
FMCSA	X	n/a	X	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
NHTSA	X	X	X	X	X	n/a	n/a	X	X	X	n/a
OSHA	n/a	X	X	n/a	n/a	n/a	n/a	n/a	n/a	n/a	X
NIOSH	X	X	X	X	n/a	X	n/a	X	n/a	X	X
State departments of transportation	X	X	X	X	X	X	X	X	X	X	X
State highway safety offices	X	n/a	X	X	X	n/a	n/a	n/a	X	n/a	n/a
Local agencies	X	X	X	X	X	X	X	X	X	X	X
Tribal governments	X	n/a	X	X	X	X	X	X	X	X	X
MPOs and RTPOs	X	X	X	X	X	X	X	X	X	X	X
Enforcement	X	n/a	X	X	n/a	n/a	n/a	X	n/a	n/a	n/a
Other emergency response providers	n/a	n/a	n/a	n/a	n/a	n/a	n/a	X	n/a	n/a	n/a
Academic institutions	X	n/a	X	X	n/a	X	n/a	X	n/a	n/a	X
Contractors (including utility and non-roadway contractors who work in right-of-way)	n/a	X	X	n/a	X	n/a	n/a	n/a	n/a	n/a	X
TTC subcontractors	n/a	X	X	n/a	X	n/a	n/a	n/a	n/a	n/a	X
Design consultants	n/a	X	X	X	X	X	n/a	n/a	n/a	n/a	n/a
Trade associations (ATSSA, ARTBA)	X	X	n/a	n/a	X	X	X	n/a	n/a	n/a	n/a
TTC manufacturers and vendors	X	n/a	n/a	n/a	n/a	n/a	X	X	X	X	n/a
Vehicle manufacturers	n/a	n/a	n/a	n/a	n/a	n/a	n/a	X	n/a	X	n/a
Driver training organizations	X	X	X	n/a	X	n/a	n/a	n/a	X	n/a	n/a
Highway work advocacy groups	X	X	X	X	X	X	X	X	X	X	X
Motorist advocacy groups	X	X	X	n/a	X	n/a	n/a	n/a	X	n/a	n/a
CMV advocacy groups	X	X	X	n/a	X	n/a	n/a	n/a	n/a	n/a	n/a
Pedestrian/bicyclist advocacy groups (including disability advocacy)	X	n/a	n/a	n/a	X	n/a	n/a	n/a	n/a	n/a	n/a
Other roadway user safety advocacy groups	X	n/a	n/a	n/a	X	n/a	n/a	n/a	n/a	n/a	n/a

ARTBA = American Road and Transportation Builders Association; ATSSA = American Traffic Safety Services Association; CMV = commercial motor vehicle; FHWA = Federal Highway Administration; FMCSA = Federal Motor Carrier Safety Administration; n/a = strategic objective not a significant interest to the stakeholder; MPO = metropolitan planning organization; NHTSA = National Highway Traffic Safety Administration; NIOSH = National Institute for Occupational Safety and Health; OSHA = Occupational Safety and Health Administration; RTPO = regional transportation planning organization; TTC = temporary traffic control; USDOT = U.S. Department of Transportation; X = strategic objective is a significant interest to the stakeholder.

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