

Evaluation and Preparation for Future Work Zone Safety Workshops

**Final Report
June 2021**



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| 16. Abstract <p>The research project documented in this report was initiated in response to the expected retirements and/or position redefinitions of instructors for work zone safety and/or flagger training in Iowa. It was proposed that a comprehensive evaluation of the training in these subject areas be completed and that recommendations for the future be developed. A significant portion of those trained in these subject areas occurs during the annual Iowa Department of Transportation (DOT) Work Zone Safety Workshop training series. This series includes instructors from Iowa DOT and its work zone safety and flagger training partners. Work zone safety and flagger trainings available on-site, and a sample of what is available online, are also summarized and documented in this report. This summary includes some of the content from an unpublished report (see Appendices A and B) recently completed that proposed a work zone safety training program for Minnesota. A needs assessment for work zone and flagger training in Iowa was also completed online and through various other methods. These activities generally showed that the training offered in Iowa was serving the needs of those who attend. The content of these trainings, it is believed, was likely developed in response to the information provided in the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD), Iowa DOT Standard Specifications, and audience need.</p> <p>In general, it is recommended that the audience, content, and learning outcomes/objectives of these existing trainings be defined and documented. In the short term (i.e., during the COVID-19 pandemic), it is also suggested that there is a need to adjust the content of the existing training to a virtual format. It is also recommended, among other things, that consideration be given to the certification of instructors that offer certain work zone safety and flagger training in Iowa and also those who attend particular classes. A need to teach from the same work zone safety and flagger training instructional materials, with additional modules used for different audiences as necessary, is also proposed. These considerations or proposals could lead to changes in Iowa DOT Standard Specifications and/or Iowa code in the long term. Additional information is also provided in Appendix C about potential subject of a flagger and/or basic work zone training course.</p> | | | |
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EVALUATION AND PREPARATION FOR FUTURE WORK ZONE SAFETY WORKSHOPS

**Final Report
June 2021**

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TABLE OF CONTENTS

| | |
|--|-----|
| ACKNOWLEDGMENTS | vii |
| EXECUTIVE SUMMARY | ix |
| CHAPTER 1. INTRODUCTION | 1 |
| Problem Addressed | 1 |
| Project Objectives | 1 |
| Report Content | 2 |
| CHAPTER 2. CURRENT MUTCD GUIDANCE AND DOT SPECIFICATIONS | 3 |
| MUTCD Work Zone Safety Training Guidance | 3 |
| Iowa DOT Work Zone Safety Training Specifications | 3 |
| Conclusions | 4 |
| CHAPTER 3. ON-SITE AND ONLINE TRAININGS | 5 |
| Regularly Offered On-Site Work Zone Safety and Flagger Trainings in Iowa | 5 |
| Sample of Online Work Zone and Flagger Trainings | 8 |
| Conclusions | 13 |
| CHAPTER 4. WORK ZONE SAFETY AND FLAGGER TRAINING NEEDS ASSESSMENTS | 15 |
| Online Needs Assessment Results | 16 |
| Iowa DOT Work Zone Safety Workshop Training Series Evaluations | 22 |
| Conclusions | 24 |
| CHAPTER 5. CONCLUSIONS AND RECOMMENDATIONS | 25 |
| Conclusions | 25 |
| Recommendations | 27 |
| REFERENCES | 31 |
| APPENDIX A. MNDOT PROJECT UNPUBLISHED REPORT SUMMARY | 33 |
| Needs Assessment | 33 |
| APPENDIX B. AVAILABLE TRAINING MATRIX | 39 |
| APPENDIX C. SUGGESTED SUBJECTS FOR FLAGGER AND/OR BASIC WORK ZONE TRAINING | 41 |
| Course Structure Content Suggestions | 42 |
| Technical Course Content Suggestions | 43 |

LIST OF FIGURES

| | |
|---|----|
| Figure 1. Employer type | 17 |
| Figure 2. Source of work zone safety training | 18 |
| Figure 3. Source of flagger training | 19 |
| Figure 4. Preferred type of work zone safety training instruction | 20 |
| Figure 5. Preferred type of flagger training instruction | 21 |

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EXECUTIVE SUMMARY

The Iowa Department of Transportation (DOT) and its training partners have offered the Work Zone Safety Workshop training series throughout the state for more than 40 years. However, the number and pace of retirements for the instructors for this training series are increasing. In addition, it is expected that some of the positions for these instructors may not be refilled and/or the tasks connected to their positions may be redefined. This situation could lead to a shortage in instructors and/or the need to approach the Work Zone Safety Workshop training series in a different manner.

The research project documented in this report was proposed in response to the situation described in the previous paragraph and a need to more comprehensively consider the characteristics of how work zone safety and flagger training is offered in Iowa. This report includes a summary of the guidance and standard specifications in Iowa related to work zone safety and flagger training. In general, this includes content from the national Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) followed in Iowa with just a few exceptions (none of which are related to work zone safety or flagger training) (<https://mutcd.fhwa.dot.gov/>). There are guidance statements in the MUTCD, for example, that indicate that all professionals who might impact work zone safety should be trained. In addition, the Iowa DOT has material in two standard specifications connected to work zone and/or flagger safety for Iowa DOT-let projects. The first specification requires contractors to have a traffic control technician (TCT) on staff. The second specification focuses on the content of flagger training and the operational requirements of that training.

Many of the work zone safety and flagger trainings offered on-site in Iowa are described in this report. In addition, a sample of online courses is identified. Each year, for example, the Iowa DOT Work Zone Safety Workshop training series is attended by between 650 and 850 people. These workshops include a general session followed by five concurrent sessions. The concurrent sessions have instructors and content that focus on the needs of city, county, utility, Iowa DOT construction/contractors, and Iowa DOT maintenance employees. The Iowa Local Technical Assistance Program (Iowa LTAP), Iowa Association of Municipal Utilities (IAMU), and several other organizations, through various means, also offer other work zone safety and/or flagger training throughout the year in Iowa. Some online trainings from the American Association of State Highway Transportation Officials (AASHTO), American Traffic Safety Services Association (ATSSA), and Iowa DOT U are also available and described in this report in addition to several other relevant resources. These online workshops and resources are generally available at any time.

A needs assessment was completed as part of this project through several methods. These methods included a seven-question online assessment, informal questioning during existing conference presentations, a review of the answers to a question about training within the Iowa Work Zone Sign Package Program application, and a summary of the 2017 through 2019 Iowa DOT Work Zone Safety Workshop training series course evaluations. The online needs assessment had 68 respondents. A total of 65% of these respondents were from counties and 25% from cities. Overall, approximately 50% of the respondents received their work zone safety

training from the Iowa DOT Work Zone Safety Workshop training series, and about 70% received their flagger training from Iowa LTAP. Overall, 75% to 80% of the respondents preferred an on-site instructor-led instruction approach for these trainings. The informal questioning during existing conference presentations was done in a very limited manner, but it generally produced results that agreed with the online needs assessment results. The review of the application question in the Iowa Work Zone Sign Package Program, on the other hand, indicated that many of the small city (i.e., a population of fewer than 10,000 people) personnel applying to the program had not had any work zone safety training. Finally, the summary of the 2017 through 2019 Iowa DOT Work Zone Safety Workshop training series course evaluations showed that most of the attendees appeared to be receiving what they needed for their position tasks from the workshops. The average rankings for the workshop characteristics evaluated by the attendees ranged from 4.31 to 4.63 on a 5.00 point scale. In fact, the characteristic “program met expectations” had an average ranking of 4.42.

Several conclusions, based on the project activities completed as part of this project, are also provided in this report. In general, it was concluded that work zone safety and flagger training is essential to the safety of those working in the field and also the traveling public. In addition, work zone safety and flagger professionals in Iowa can receive this type of training through various on-site and online opportunities. A large number of those trained, however, appear to receive it from the Iowa DOT Work Zone Safety Workshop training series and/or Iowa LTAP, IAMU, and several other organizations. These sources of training were confirmed during the needs assessment completed as part of this project and a preference for an on-site instructor-led approach was confirmed. About 88% of respondents to the online needs assessment also indicated they had reliable internet service, but it was unknown whether this result translates to reliable and consistent access to the internet by some of the audiences (e.g., field workers) for these training subjects.

There are some requirements for work zone safety and/or flagger training in Iowa, but they are limited and the work zone safety and/or flagger job competencies addressed by the training offered is generally undocumented. Approximately a year ago, the Minnesota Department of Transportation (MnDOT) was provided an unpublished report that documented a proposed work zone safety training program for their state. The content of this document is summarized in this report and its Appendices A and B. This unpublished report has been helpful in the development of the conclusions and recommendations documented in this report. Potential agenda subjects for flagger and basic work zone safety training courses are also suggested in Appendix C.

Short- and long-term recommendations are provided as part of this report. One of the recommendations included is the creation of an Iowa Work Zone Safety Stakeholder Group. It is suggested that this group could help implement, in a coordinated manner, some of the other recommendations documented. It is also recommended that the state of Iowa continue to offer work zone safety and/or flagger training during a particular time period of the year in which these subjects would be highlighted statewide by all the Iowa DOT partners.

In the short term (i.e., during the ongoing COVID-19 pandemic), it is also recommended that consideration be given to how existing work zone safety and/or flagger workshops in Iowa could

be offered within a virtual setting. It is also recommended that these updates take into account several generally accepted adult learning course components (e.g., the use of learning objectives). It is also noted that the proposed stakeholder group could help define the job competencies for various work zone safety and flagger positions and that the existing trainings and/or new workshops developed could be adjusted to address these competencies. Finally, it is recommended that instructor and attendee certifications be considered for both core work zone safety and flagger training and that the development of train-the-trainer course materials and common flagger and modular core basic work zone safety courses be investigated. It is recognized that some of these recommendations may be long term in nature due to the changes that would be required for them to be implemented.

CHAPTER 1. INTRODUCTION

For more than 40 years, the Iowa Department of Transportation (DOT) has sponsored, along with its training partners, an annual on-site Work Zone Safety Workshop training series throughout Iowa. These day-long workshops include guest speakers and a general session that focuses on various topics related to work zone crashes and fatalities. This general session is followed by five concurrent sessions that specifically address the work zone safety needs of the wide range of attendees at the workshop. Instructors from the work zone safety partner organizations each share materials during the five concurrent sessions that focus on the needs of city public works, county secondary roads, public and private utilities, Iowa DOT maintenance, and Iowa DOT construction and contractor employees. Overall, approximately 650 to 850 professionals typically attend the 6 to 8 work zone safety workshops offered each year.

Problem Addressed

The Iowa DOT Work Zone Safety Workshop training series has been conducted by a team of seasoned instructors for many years and a number of them have already retired or will soon be retiring. These positions may or may not be filled and/or the tasks related to these positions may be redefined. These retirements and the potential redefinition of positions may create a void in the professionals available for technical assistance and instruction in the work zone safety area.

It was proposed, due to this possibility, that a comprehensive identification of work zone safety trainings currently available in Iowa was needed. In addition, an assessment investigation of how Iowa work zone safety professionals were currently receiving this training, and their online capabilities, was also proposed. There are several different models available for delivery of this type of training (e.g., online, on-site instructor-led, self-paced, or some combination), and an investigation of respondent preference was included in the assessment. The last task of this project also included the general provision of training materials, and the project team responded to a request by the Iowa DOT for potential flagger training agenda subjects. The information gathered during all the tasks that were part of this project are documented in this report and used for the conclusions and recommendations it contains.

Project Objectives

The objective of the research project described in this report was to evaluate the work zone safety training available to Iowa work zone safety professionals and whether it is meeting their needs.

First, the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) guidelines and Iowa DOT specifications that apply to work zone safety training in Iowa were summarized. Second, information was gathered about the content of work zone safety trainings available to Iowa work zone safety professionals. The courses summarized included those typically available on-site and also a sample of those that are online. The information available about these courses are summarized in this report. Third, a needs assessment was done to

determine where Iowa work zone professionals acquire their training, their preferences for delivery of the training, and the internet capabilities of their agencies. These results were supplemented through a limited amount of large gathering (i.e., at conferences) questions and the results of a training-related question that was part of the Iowa small city Work Zone Sign Package Program application in 2019. The satisfaction of attendees at the current Work Zone Safety Workshop training series was also considered through a summary of the event evaluations from 2017 through 2019.

Overall, the goal of the project was to develop a series of conclusions and recommendations focused on how to effectively provide work zone safety and flagger training in the short and long term within Iowa.

Report Content

This report consists of five chapters as follows:

- Chapter 1 includes an introduction to the project, the problem addressed by the work documented in this report, and the objectives of the project.
- Chapter 2 includes a description of the guidance and Iowa DOT specifications related to work zone safety and flagger training in Iowa.
- Chapter 3 is a summary of the on-site work zone safety and flagger workshops generally available, along with a sample of online trainings that were found by the project team. Additional information about a proposed work zone safety and flagger training program in an unpublished report from Minnesota is also included in Appendices A and B.
- Chapter 4 includes information about the results from an online assessment and several other activities that were used to determine whether the current Iowa DOT Work Zone Safety Workshop series is meeting attendees' needs. The online assessment had questions focused on how respondents were receiving work zone safety and flagger trainings, their preferences for the instructional approach, and their agency technological capabilities (i.e., whether they have reliable internet access). The other needs assessment activities summarized in this report include some limited large group questioning, a work zone training question that was part of a small city Work Zone Sign Package Program application, and evaluations completed from 2017 through 2019 for the Iowa DOT Work Zone Safety Workshop training series.
- Chapter 5 includes conclusions and recommendations about what these activities showed the project team and how work zone safety and flagger training in Iowa might progress in the short and long term. In addition, a summary of some potential flagger and basic work zone training agenda items is included in Appendix C.

CHAPTER 2. CURRENT MUTCD GUIDANCE AND DOT SPECIFICATIONS

Training in the area of work zone safety and flagging is needed to protect the essential roadway workers in the field and the traveling public. The importance of this training is supported by guidance provided in the MUTCD (<https://mutcd.fhwa.dot.gov/>) (FHWA 2012). In addition, there are two specific instances of Iowa DOT specifications that require training related to work zone safety and flagging for those working on DOT-let projects. This guidance and the DOT specifications are described in this chapter.

MUTCD Work Zone Safety Training Guidance

The state of Iowa follows the national MUTCD with only a few exceptions. None of these exceptions are related to the work zone safety training guidance provided in Part 6 of the MUTCD. The national MUTCD, in Section 6B.01 (Paragraph 07), states the following for temporary traffic control (TTC) (i.e., work zone) safety training:

“Each person whose actions affect TTC zone safety, from the upper-level management through the field workers, should receive training appropriate to the job decisions each individual is required to make. Only those individuals who are trained in proper TTC practices and have a basic understanding of the principles (established by applicable standards and guidelines, including those of this Manual) should supervise the selection, placement, and maintenance of TTC devices used for TTC zones and for incident management.” (FHWA 2012)

The MUTCD also indicates the following in Section 6D.03 (Paragraph 03):

“Training – all workers should be trained on how to work next to motor vehicle traffic in a way that minimizes their vulnerability. Workers having specific TTC responsibilities should be trained in TTC techniques, device usage, and placement.” (FHWA 2012)

The previous text is considered “guidance” in the national MUTCD. This type of MUTCD statement is defined as recommended but not mandatory practice. Deviations from this type of statement is allowed if engineering judgment or an engineering study indicates it’s appropriate. The authors, however, found it difficult to envision a situation when the safety of roadway workers would allow a deviation from this training that could be defended.

Iowa DOT Work Zone Safety Training Specifications

As noted previously, there are also two Iowa DOT specifications that require work zone and flagger training (<https://www.iowadot.gov/erl/index.html>). Section 2528 of the Iowa DOT Standard Specifications for Highway and Bridge Construction includes Article 2528.01.C. This article requires contractors working on projects let through the Iowa DOT to have a trained traffic control technician (TCT) on staff. The TCT is responsible for the management of the contractor’s quality control program for project traffic control. The specification also includes a series of daily requirements for the TCT and the fact that the TCT shall supervise those who

install and remove traffic control signs and devices on projects (<https://www.iowadot.gov/erl/index.html>). The DOT specifications identify the following TCT training courses: American Traffic Safety Services Association (ATSSA) Traffic Control Technician, International Municipal Signal Association (IMSA) Work Zone Traffic Control, Iowa Associated General Contractors of America (AGC) Traffic Control Technician, Minnesota DOT (MnDOT) Traffic Control Supervisor, and the Texas Engineering Extension Service Work Zone Traffic Control. Starting in 2018, the TCTs working on DOT-let projects also needed to start retaking and passing the exam in one of these approved courses every five years.

The Iowa DOT specifications also require the flaggers used on projects let through the Iowa DOT to be trained in safe flagging operations (<https://www.iowadot.gov/erl/index.html>). Specification Article 2528.03.J does not require flaggers to be “certified,” but it does require that the training received complies with the Iowa DOT Flagger’s Handbook, Part 6 of the MUTCD, and the Iowa DOT Standard Specifications. The training must include the issuance and review of the Iowa DOT Flagger’s Handbook and a presentation of the current Iowa Professional Flagging video (i.e., When Luck Runs Out – Professional Flagging Techniques). There are also several other requirements in the specification that are related to flagger cards; maintaining a list of flaggers; training not being required for short time, emergency, or relief assignment of employees; nighttime flagging; and ensuring flagger operations, equipment, and apparel comply with the Iowa DOT Flagger’s Handbook. The flagger training in Iowa does not require a certified instructor, and a list of approved flagger training sources is not provided. The Iowa Local Technical Assistance Program (Iowa LTAP) and Iowa Association of Municipal Utilities (IAMU) both provide flagger training in Iowa, and this type of training is also done internally at organizations and through private training service contractors.

Conclusions

There is work zone training guidance and traffic control standards, guidance, and options in Part 6 of the national MUTCD. The training recommended in the MUTCD should be completed by those who have jobs related to work zones. The national MUTCD is followed in Iowa. While the training statements in the MUTCD are guidance, deviations are only allowed through the results of engineering judgment or an engineering study. Standard specifications related to work zone safety training for Iowa DOT-let projects include a requirement for contractors to have a TCT on staff. This specification also includes a list of training providers for TCT certification. There is also a specification for training flaggers. The content needed in the flagger training is listed within the specification for those that choose to offer it.

CHAPTER 3. ON-SITE AND ONLINE TRAININGS

The work zone safety and flagger training needs of Iowa professionals are currently being met by several different groups through both on-site and online offerings. The on-site offerings that are believed to be the primary sources of work zone and flagger training in the state are described in this chapter. Information supporting this belief was gathered through the needs assessment summarized in Chapter 4. A sample of online courses that might also be used by Iowa work zone professionals is also identified and summarized in this chapter. It is unknown how many Iowa work zone professionals are using these online offerings, but it is important to note that during the time this report was written, the COVID-19 pandemic was occurring and most of this type of training was only available online. A summary of the instructional approach preferences for work zone safety and flagger training in Iowa was also collected as part of the needs assessment is described in Chapter 4.

Regularly Offered On-Site Work Zone Safety and Flagger Trainings in Iowa

Iowa DOT Work Zone Safety Workshops

As noted previously, the Iowa DOT and its partners (e.g., LTAP and IAMU) work together to provide five to eight work zone safety workshops each year. These workshops serve between 650 and 850 participants. Regular attendance at these workshops is recommended for all Iowa roadway workers and their supervisors who have duties on or near the roadway. It has been suggested that these professionals attend the workshops at least once every three years. The objectives for these workshops are as follows:

- Introduce the principles and convey the importance of using proper methods for safe and efficient TTC at work sites
- Examine specific applications relevant to situations routinely encountered by city, county, contractor, Iowa DOT, and utility crews
- Reduce motor vehicle traffic crashes at road work sites, resulting in greater safety for highway users and workers alike

Each workshop includes a morning general session followed by five concurrent sessions that focus on the needs of county, city, utility, DOT maintenance, and DOT construction/contractor audiences. A partial summary of the evaluations from the last three years of these workshops is included in the next chapter. They show that attendees are generally satisfied with the workshop content and approach.

A brief summary of the focus and subjects discussed in the five concurrent sessions of the Iowa DOT Work Zone Safety Workshop training series is in the following list. The approach and information provided by the instructors for these sessions included the following:

- **County:** This session includes an explanation of how the MUTCD is applied in situations commonly encountered by county work crews. More specifically, the general background

section of the MUTCD and Part 6 (e.g., TTC devices, device placement, and markings) are covered in this session, along with worker safety considerations and detour signing examples. In addition, there are “walk throughs” of example typicals and group case study exercises. Secondary roads personnel and others who work on or adjacent to high-speed low-volume roadways typically attend.

- **City:** This session includes an explanation of how the MUTCD and the Iowa Temporary Traffic Control Handbook typically apply to multi-lane and two-way residential streets (Wiegand and Richards 2016). Situations commonly encountered by city work crews on commercial and urban streets are also discussed. Considerable time is spent on the advance warning, transition, activity, and termination areas of a work zone. Examples and classroom exercises are also used to give participants an opportunity to apply the knowledge gained during the course. Many aspects of safety and working safely on the job are emphasized (e.g., protective eyewear and hearing protection). Americans with Disabilities Act (ADA) requirements are also addressed. The people that typically attend this session include city street maintenance crews and their supervisors, personnel from city engineering offices, other city employees involved in public works or risk management, and consultants and contractors in the construction industry who work primarily with cities.
- **Utility:** In this session, the training focuses on utility work zones. This type of work usually occurs on or next to the roadway, which places utility employees and motorists in a potentially unsafe environment. Topics covered include the MUTCD and its requirements to create the safest roadway during temporary utility operations. These topics include traffic control setups, special and unique situations, devices, flagging, worker and equipment visibility, and ADA requirements. This session is specifically designed for employees working in electric, natural gas, communications, water, and wastewater utilities.
- **DOT Construction/Contractors:** During this session, Iowa DOT instructors review traffic control fundamentals in work zones, changes and updates to the MUTCD regarding work zones, and Iowa DOT traffic control plans and specification requirements. More specifically, they focus on the Iowa DOT Standard Specifications and Standard Road Plan updates and the field deployment of signs, channelizing devices, flagging, temporary barriers, arrow boards, portable dynamic message signs, and pavement markings. Setting up traffic control and nighttime work are also discussed. Practical observations and new innovations may also be provided. Attendance to this session is open to DOT construction personnel, roadway workers, and others working on Iowa DOT projects, including field supervisors and managers of companies performing roadway construction work.
- **DOT Maintenance:** During this session, Iowa DOT instructors cover traffic control fundamentals, updates in the MUTCD, and Iowa DOT traffic control plans and practices as applied to highway maintenance. More specifically, changes in the applications are discussed along with how to read traffic control plan sheets. Case studies are used to assist in a plan reading exercise. Attendance for this session is restricted to Iowa DOT maintenance personnel.

In addition to the Iowa DOT Work Zone Safety Workshop training series, alternatives for work zone and flagger training are also available from the Iowa LTAP, IAMU, and other organizations. The content of the relevant offerings from these two programs and some others are summarized in the next sections.

Iowa LTAP Work Zone Safety and Flagger Training

Iowa LTAP has offered an on-site on-call workshop for many years that focuses on basic work zone safety and flagger techniques. The audience for this workshop is local agency workers. This workshop is approximately two to three hours in length and includes a summary of Part 6 from the MUTCD and the basic principles of flagging traffic along typical county roadways and city streets. The class addresses proper work zone setups along higher speed county roadways and lower speed, higher volume city streets. Attendees are provided a copy of the Iowa Temporary Traffic Control Handbook, the Iowa DOT Flagger's Handbook, and if desired, a flagger card stating their completion of the class (Wiegand and Richards 2016, Iowa DOT 2015). Attendees typically include local operations personnel who perform flagging duties and those who are responsible for setting up work zones. Each year this workshop is typically conducted at approximately 25 locations across the state for about 700 participants.

IAMU Trainings

IAMU offers a number of different trainings to its 755 municipal broadband, electric, gas, and water utility members (these include city and county personnel). They offer a two-hour work zone safety course and a two-hour flagger training. The work zone safety or traffic control workshop focuses on protecting employees who work on or near the roadway. The flagger training addresses the rules these personnel should follow when working within the right-of-way. The focus of the workshops, given their audience, appears to be setups for relatively short-term stationary work on the shoulder and roadside along with partial lane closures.

Other Organizations

There are other organizations in Iowa that also provide work zone safety and/or flagger trainings. For example, in Iowa DOT Planning Region 3, the Safety Health Issues Employment Leadership Decisions (SHIELD) Safety Program exists. The objective of this program is to deliver comprehensive workplace safety training to the local governments in the region. One of trainings offered by the SHIELD Safety Program is highway work zone safety. There are currently 13 members of the SHIELD Safety Program. These members include the cities of Arnolds Park, Okoboji, Spirit Lake, Spencer, and Storm Lake; the counties of Buena Vista, Dickinson, Emmett, Osceola, Lyon, and O'Brien; and the Iowa Great Lakes Sanitary District.

There are also at least two national organizations that offer work zone and flagger training and are typically done on-site within Iowa. These training offerings are typically by request and generally require a payment for each attendee. ATSSA, under a federal safety grant, will provide several different work zone safety and/or flagger trainings by request. These courses, as long as

the program is in place, are free for public agencies. More information about the program is provided on the ATSSA website, and the courses it appears to be offering online during the current COVID-19 pandemic are described in the next section of this chapter.

Another national organization that offers on-site work zone and flagger-related training for a fee is the National Safety Council (NSC). The NSC (<https://www.nsc.org/>) offers the following courses:

- Work zone flagger training (novice)—once this course is completed, attendees should be able to provide vehicles a safe path through or around a work zone
- Flagger instructor training—this course is used by attendees to receive certification to teach flagging and work zone safety to work zone crews
- TTC: design and supervision—this course “...prepares work zone supervisors to interpret, change, evaluate, and implement traffic control plans”
- Work zone technician—this is an introductory course for roadway workers who place and maintain TTC devices and uses tabletop case studies to practice work zone setups

Lastly, there are also some private training service contractors that offer on-site work zone and/or flagger training in Iowa. In addition, some local agencies appear to do flagger training internally, and there are a few other organizations that some agencies use to receive training in one or both of these subject areas. Some of these sources of training are identified in the results of the needs assessment described in the next chapter.

Sample of Online Work Zone and Flagger Trainings

Online trainings are available to anyone who has the technology and funding (as needed) to attend. Of course, there are also some subjects that are easier to teach online than others. In addition, it has been shown that online training is not generally the preferred method of instruction for many of the attendees of work zone and/or flagger courses (see Chapter 4 of this report for the results of a needs assessment in Iowa). The unpublished MnDOT report entitled Proposed Work Zone Training, Phase 1 – Work Zone Training Plan, for example, described survey results that showed that the majority of the respondents preferred in-person training (Jackels and Kuehl 2019). A summary of the unpublished MnDOT report is included as Appendix A in this report.

A sample of online work zone and/or flagger safety training courses were identified as part of this project and are briefly described in the next sections. The three sources of training that are described include the American Association of State Highway Transportation Officials (AASHTO) Transportation Curriculum Coordination Council (TC3), ATSSA, and Iowa DOT U. In addition, other sources of training are listed in this chapter, and 25 work zone safety courses are identified in the unpublished MnDOT report noted previously. The work zone safety courses identified in the unpublished MnDOT report are listed and described in Appendix B (Jackels and Kuehl 2019). Of the 25 courses, 11 are provided by MnDOT, 3 are from the Minnesota LTAP, and 11 are from ATSSA (some of which are described in sections that follow).

AASHTO TC3

Recently, AASHTO, through an agreement with the Federal Highway Administration (FHWA), started offering free trainings to local agency staff in addition to their state DOT members (including Iowa). These trainings are offered through its TC3 service program. TC3 has more than 190 online trainings. Five of the work zone safety related courses on the TC3 website that seem most relevant to this project are summarized as follows:

1. **Maintenance: Basics of Work Zone Traffic Control.** This course is one hour long and includes an introduction to Part 6 of the MUTCD. It provides "...an overview of the manual structure and requirements regarding traffic control devices and their applications, flagging operations and procedures, and pedestrian and worker safety."
(<https://www.tc3.transportation.org/>) The course uses case study examples of work zones and focuses on the fundamentals of work zones. It is part of the TC3 maintenance training program. The learning outcomes declared for this course on the TC3 website (<https://www.tc3.transportation.org/>) include the ability of attendees to do the following:
 - Describe the content and use of Part 6 of the MUTCD
 - Use the MUTCD to correctly answer questions about the basics of work zone traffic control
 - Differentiate among standard, guidance, and option conditions in the MUTCD
 - Differentiate among standard, guidance, and option conditions in the MUTCD for work zone traffic control in rural and urban areas

2. **Maintenance of Traffic for Technicians.** This course is five hours long and focuses on the placement, maintenance, and inspection of traffic control devices. It also includes a discussion of work zone traffic control, plans, and flagger operations. The five modules in the course include general terms and procedures, traffic channelizing and control devices, traffic control zones, flagging operations, and traffic control zone operations. The targeted audience for this course is those responsible for the placement, maintenance, and inspection of work zone traffic control devices, along with those who develop work zone traffic control plans. The learning outcomes declared for this course on the TC3 website (<https://www.tc3.transportation.org/>) include the ability of attendees to do the following:
 - Identify the correct placement of work zone traffic control devices
 - Perform field maintenance of work zone traffic control devices
 - Inspect placement or operational functions of work zone traffic control devices
 - Generate work zone traffic control plans
 - Explain the basics of flagging

3. **Maintenance of Traffic for Supervisors.** This course is five hours long and includes content about the placement, maintenance, and inspection of traffic control devices. It also includes discussions about work zone traffic control plans and flagging. It emphasizes the design of these plans and why they are needed. It has five modules that include fundamental principles of TTC zones, TTC devices, traffic control zones, transportation management plans (TMPs), and flagger operations. Overall, its audience includes those responsible for the maintenance of traffic. The learning outcomes declared for this course on the TC3 website

(<https://www.tc3.transportation.org/>) include the ability of attendees to do the following:

- Describe how to create clear, organized traffic control plans
- Identify acceptable TTC devices
- Determine good and bad flagging techniques

4. **Flagger.** This course is one hour long and focuses on what is called “...the most important job on the work site” (<https://www.tc3.transportation.org/>). It provides the basics on flagger duties. The audience for the course is those who are planning to complete flagger duties on construction/maintenance projects. The learning outcomes declared for this course on the TC3 website (<https://www.tc3.transportation.org/>) include the ability of attendees to do the following:

- Identify the responsibilities of a flagger
- Describe the proper ways to place signs
- Describe the proper position for flagging
- Define the flagging procedures for stop, slow, and proceed
- Identify the correct procedures for various flagging situations
- Describe the proper conduct in flagging

5. **Construction Safety: Working Safely in Work Zones.** This course appears to be one hour long. It is part of a TC3 Construction Safety Awareness series about job site safety. It has an audience that includes those who work in highway infrastructure. The learning outcomes declared for this course on the TC3 website (<https://www.tc3.transportation.org/>) include the ability of attendees to do the following:

- List safety risks at a construction site
- Describe the three major types of injuries occurring in highway work zones
- Explain the components of TTC zones
- Describe the ANSI/ISEA 107-2015 types and classes of safety apparel

ATSSA Training

ATSSA has offered a number of on-site instructor-led work zone safety training courses for some time. These courses are described in the following list and additional information can be found on the ATSSA website and in Appendix B (information from Jackels and Kuehl 2019). During 2020, however, due to the COVID-19 pandemic, ATSSA has also begun to provide an online version of some of their work zone courses. A sample of some of the more relevant ATSSA courses is listed as follows, and the status of the courses (at the time this report was written) with regard to their availability on-site or online is noted:

1. **Traffic Control Technician (TCT).** This training is 1 day or 8 hours long. It is introductory in nature and provides a basic knowledge related to TTC devices. ATSSA, on its website, indicates this course provides “...concepts, techniques, and practice exercises in the installation and maintenance of traffic control devices” (<https://www.atssa.com/>). The course is currently being offered online. It is unknown whether this is temporary due to the COVID-19 pandemic or whether it will remain online as an option in the future.

2. **Traffic Control Supervisor (TCS).** This training is 2 days or 16 hours long. It is meant for those who design, install, or maintain TTC devices. The ATSSA website indicates that attendees leave the course with the knowledge to read TTC plans and specifications. They will also have the ability to be a supervisor in the field (<https://www.atssa.com/>). This course is currently being offered online and, similar to the TCT course noted previously, it is unknown whether this online option will continue after the COVID-19 pandemic time period.
3. **Traffic Control Design Specialist (TCDS).** This training is one or two days long. It is, according to the ATSSA website, intended for traffic engineers, engineering technicians, consultants, and others responsible for work zone design and plan approval (<https://www.atssa.com/>). It is an all-encompassing course that covers everything from work zone traffic control installation to evaluating traffic control in the field. At the time this report was written, the ATSSA website indicated that this course was currently being developed for an online offering.
4. **Flagger Certification Training.** This training is offered online and is a half day or four hours long. The course works to help attendees apply flagger control references and teaches them flagger control practices and procedures. This course has been offered online for some time, but it does not include Iowa-specific information as described in the Iowa DOT specifications for flagger training (<https://www.atssa.com/>). ATSSA also offers what appears to be an on-site Flagger Instructor Training (FIT).
5. **Developing and Implementing Successful Transportation Management Plans (TMP).** This course focuses on helping attendees and their agencies understand and develop effective TMPs. Among other things, it includes discussions of the work zone safety and mobility rule and the content of a TMP. The course audience includes technical and field staff as well as management. The ATSSA website indicates that attendees should be able do the following when they finish the course: identify why TMPs are important, understand and explain TMP basics, apply impact assessment findings in the TMP, list TMP strategies, identify key stakeholders for TMP coordination, and explain how to implement and monitor TMPs (<https://www.atssa.com/>). It appears that this course is currently offered only on-site, and it is unknown whether it is being considered for conversion to an online version.

The ATSSA website also includes various training modules, podcasts, and other documents and information that may be useful to work zone safety professionals. They also offer the following courses on a compact disc: Basic Traffic Control for Short Term Duration Activities and Basic Traffic Control for Utility Operations. Other courses it typically offers on-site also include Nighttime Temporary Traffic Control, Safe and Effective Use of Law Enforcement Personnel in Work Zones, Temporary Traffic Control Considerations for Urban Work Zones, and Temporary Traffic Control for Utility Operations.

Iowa DOT U

The Iowa DOT, through several methods, offers training in various areas (<https://iowadot.gov/training/>). It has a Technical Training and Certification Program that

focuses on construction and materials. Some of the courses it includes focus on aggregate, contract administration, erosion control, hot-mixed asphalt, and portland cement concrete. In addition to this construction and materials program, the Iowa DOT also offers Iowa DOT U.

Iowa DOT U includes on-site and online courses. There appear to be about 71 online courses in the program, and they include a wide range of subjects (e.g., 3D Engineered Models for Highway Design, Active Shooter Training V3, Bloodborne Pathogens, Bucket Truck Safety, Erosion Control, Iowa Basic Plan Reading, and Structures – Culvert Inspection). The online courses in this system that appeared to be relevant to work zone safety and flagging include Basics of Work Zone Traffic Control and Construction Safety Awareness – Personal Protective Equipment. Both of these courses are one hour long and come from the AASHTO TC3 program previously described and referenced. There are also two relevant videos within the online listing. These include the Iowa flagger video, Professional Flagging Techniques, and a video entitled Traffic Control Safety (Moving Operations/Maintenance Safety 1998). Overall, there were 98 courses available on the Iowa DOT U website at the time this report was written and the website was accessed (<https://iowadot.gov/training/>).

Other Online Training and Resources

There were several other entities discovered that also offer online trainings related to work zone safety and flagging. A sample of these websites is described as follows along with one site that includes a list of trainings and other resources. The robustness of these trainings is unknown, and there are likely many more online offerings available.

- **OSHAcademy:** There is a free online two-hour course entitled Work Zone Traffic Safety that is offered on this site that includes information about the following: roadway worker risks, equipment operator risk factors, TTC plans, working at night, protecting workers in work zones, blind spot hazards, backing safety solutions, and spotting hand signals (www.oshatrain.org).
- **OnlineFlagger.com:** This appears to be a website that offers flagger training that is approved by ATSSA and uses their certification curriculum. Currently, as noted previously, ATSSA’s online flagger training does not include information from Iowa that is required by the Iowa DOT Standard Specifications (<https://onlineflagger.com/> and <https://www.iowadot.gov/erl/index.html>).
- **Workzonesafety.org:** This is the National Work Zone Safety Information Clearinghouse. It is a “library of resources to improve roadway work zone safety for all roadway users.” It includes resources on crash information, flagger information (including flagging requirements by state, resources, classes, and videos), training (including courses and programs, videos, and toolbox talks), events and conferences, data resources, and hot topics (<https://www.workzonesafety.org/>).
Workzonesafety.org also points its website users to two additional resources. One is a Roadway Safety Training Program (i.e., ROADWAY SAFETY+: A Road Construction

Industry Consortium Program). This is a two-level modular training focused on a basic awareness of common work zone hazards and more advanced information that should be provided to supervisors (e.g., the design, setup, and control of work zones). The second resource is the online learning management system developed by the American Road & Transportation Builders Association (ARTBA) Work Zone Safety Consortium. This system provides free training to the transportation construction community. It has free training that includes, but is not limited to, sight distances for work zones, work zone access and egress, night work in work zones, work zone clear zones, and managing flagging on low-volume roads.

- **Clicksafety.com:** This website offers a 45-minute online intermediate-level course entitled Work Zone Traffic Control for Construction (<https://www.clicksafety.com/>). The audience for this course is all road construction workers and supervisors who work on the roadway and have a responsibility for work zone traffic control. Once completed, the attendees should be capable of providing a safe and smooth traffic flow on or near the work zone. Another 20-minute intermediate course is also offered and entitled Work Zone Traffic Safety Tips for Construction. This course includes traffic control devices, flagging, and other road hazards as topics. Clicksafety.com also offers a Road Construction Work Zone Safety packet. The courses in this packet include Work Zone Traffic Safety Tips for Construction (20 minutes), Work Zone Traffic Control for Construction (45 minutes), and Flagger in California (30 minutes) (<https://www.clicksafety.com/>).
- **Convergencetraining.com:** Convergencetraining.com is an online workplace safety training website. It offers online courses for worker safety, and one of its classes focuses on work zone safety (which can be purchased online). This 19-minute training focuses on policies, procedures, and guidelines related to work zone safety. It defines the term “work zone,” lists hazardous conditions, and describes the components of a TMP and the MUTCD. It also provides information on positive protection devices, exposure control measures, and other traffic control measures. In addition, the four areas of a work zone are described along with the elements of a plan for internal work zone movement. A list of safe behaviors when driving in and around work zones is also included. This website also offers a six-minute course on work zone driving hazards that describes why work zones are safety hazards and how to reduce the potential for being in a work zone crash (<https://www.convergencetraining.com/>).
- **FHWA Office of Operations Work Zone Management Program:** This website is a resource of nationally available trainings in various areas. It includes a compendium spreadsheet of training and guides. However, there is no year or date connected to this material (<https://ops.fhwa.dot.gov/wz/outreach/outreach.htm>).

Conclusions

The results of the project team literature and online investigation described in this chapter showed that there are a large number of on-site and online training options available for work zone safety and flagger professionals. Several organizations offer work zone safety and/or

flagger training to one or more audiences within Iowa. In addition, there is a long list of work zone safety and flagger trainings available online. Some of the advertisements for these trainings include their learning outcomes or objectives and many do not. Learning outcomes or objectives are connected to what the attendees are expected to be able to do once a course is completed. In some cases, the online trainings are free for some or all of their audience and others require a payment for access to the materials. Some work zone related websites also exist that list many of the resources and trainings available.

CHAPTER 4. WORK ZONE SAFETY AND FLAGGER TRAINING NEEDS ASSESSMENTS

Chapter 3 included a summary of the results from both a literature and online investigation that focused on the trainings available to work zone safety professionals in Iowa. As part of this project, it was also proposed that the project team approach Iowa work zone safety practitioners to determine where they were receiving their training, how they liked to receive their training, if they thought any additional training topics were needed, and their level of online capability. Several other activities were completed to accomplish this task and supplement and/or support the information summarized in Chapter 3. These activities included the following:

- **A seven-question online assessment.** The content and results of this assessment are described in more detail within this chapter.
- **Informal questioning of attendees during existing conference presentations.** This was accomplished in at least two large group settings with both city and county employees. They were informally asked about how they were receiving their work zone safety and flagger training. Very few verbal responses were provided, but those received (not surprisingly) were similar to those found with the online assessment described later in this chapter. Some of those questioned had attended the Iowa DOT Work Zone Safety Workshop training series and others had covered their needs internally or with other groups in Iowa (e.g., LTAP and IAMU). This informal questioning approach was planned to continue at the 2020 Iowa DOT Work Zone Safety Workshop training series (described in Chapter 3), but due to the COVID-19 pandemic, all but one of these workshops was canceled.
- **A review of the answers to the work zone safety training question that was part of the small city Iowa Work Zone Sign Package Program application.** This Iowa DOT-funded program, through a competitive application process, supplies a package of work zone traffic control and personal protective equipment to small cities (i.e., a population of fewer than 10,000 people). In 2019, the applicants were asked where they received their work zone safety training. Approximately 57% (n = 41) of the 72 applicants had not received any training in the last 3 years. The others received training from IAMU (n = 15), the Iowa DOT Work Zone Safety Workshop training series (n = 8), LTAP (n = 2), and “local” training, which was assumed to be in-house (n = 2). Others indicated they received this training from the Asphalt Paving Association of Iowa (APAI), their county, Iowa Municipalities Workers’ Compensation Association (IMWCA), and “MOST.”
- **A summary of the evaluations from the 2017 through 2019 Iowa DOT Work Zone Safety Workshop training series.** This information was used to determine the overall value of the training and any additional topics of interest the participants would like to hear about. The evaluation results from 2017 through 2019 that were relevant to the objectives of this project are summarized in this chapter.

Online Needs Assessment Results

As noted previously, an online needs assessment was completed as part of this project. This assessment was distributed through the American Public Works Association (APWA) – Iowa Chapter listserv, the Iowa DOT Local Systems Bureau listserv (which includes more than just local agencies), and through a posting on the Iowa County Engineers Association (ICEA) Service Bureau website. The assessment was completed by 68 people, but not all respondents answered all the questions. It included the seven questions listed as follows:

1. Who is your employer?
2. If completed, what is the source of your work zone safety training?
3. If completed, what is your source for flagger training?
4. What is your preferred type of work zone safety training?
5. What is your preferred type of flagger training?
6. Are there topics you think should be added to the work zone safety and/or flagger training that you currently are using?
7. Do you have regular and reliable access to the internet for online training?

Overall, the objective of the needs assessment was to better determine who the work zone safety and flagger professionals in Iowa were using for training, what their preferences were for a method of training, if they had any additional subjects they thought should be covered in the training, and whether they had the capability of doing this training online. The responses to the questions asked are summarized in the sections that follow.

Who is Your Employer?

For this question, the participants were given three options. These options included city, county, or other. All 68 participants who completed the assessment responded to this question, and approximately 64.7% (n = 44) were county employees, 23.5% (n = 16) were city employees, and 11.8% (n = 8) indicated they worked for another type of entity. Six of the eight answering “other” were private consultants or contractors and the other two worked for the Iowa DOT and Hawkeye Community College. These results are summarized in Figure 1.

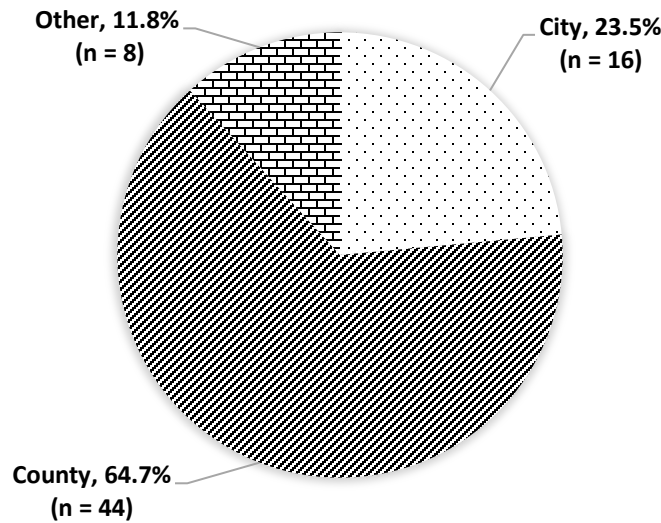


Figure 1. Employer type

If Completed, What is Your Source of Work Zone Safety Training?

Sixty-six of the 68 respondents to this online assessment responded to this question. It is assumed that the two respondents who did not answer this question were not receiving work zone safety in any manner. Five options were provided for an answer. The options included Iowa DOT Work Zone Safety Workshops, Iowa LTAP, IAMU, ATSSA, and other.

Approximately 51.5% (n = 34) of those responding received their work zone safety training at the Iowa DOT Work Zone Safety Workshop training series. In addition, about 33.3% (n = 22) used Iowa LTAP for this training, and another approximately 15.2% (n = 10) indicated “other;” of those answering “other,” the respondents specified that they used someone internally (n = 5), a training services contractor (n = 1), a college (n = 1), or an ATSSA-certified staff member (n = 1). The remaining two who answered “other” to this question indicated they used a combination of Iowa LTAP with the Iowa DOT or an outside training services contractor. Including the two respondents who used a combined provider approach, it appears that Iowa DOT and Iowa LTAP served all or some of the work zone safety training needs of approximately 87.9% of the respondents. A summary of the answers that were selected by the respondents is shown in Figure 2.

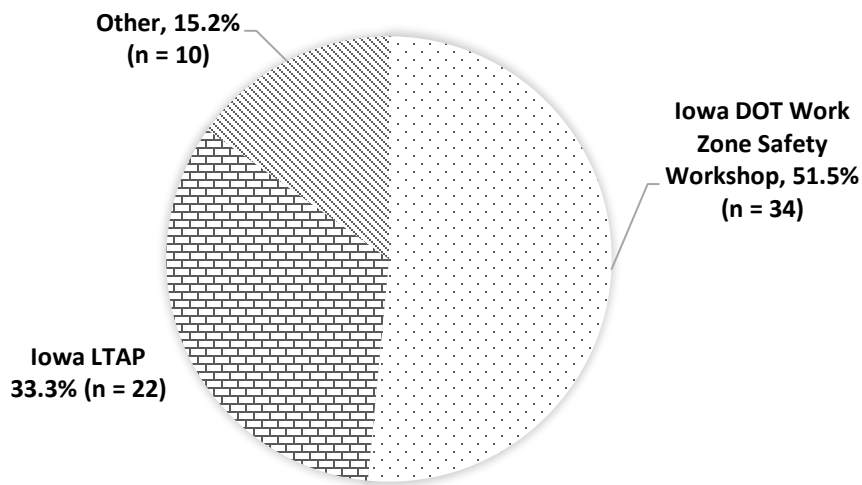


Figure 2. Source of work zone safety training

If Completed, What Is Your Source for Flagger Training?

A total of 59 respondents answered this question. It is assumed that the other nine participants answering other questions in this assessment who did not respond to this question was because they did not have any flagger training needs. Four options were provided as an answer to this question: Iowa LTAP, IAMU, ATSSA, and other.

Approximately 71.2% (n = 42) indicated they used Iowa LTAP for this training, and about 5.1% (n = 3) answered that they used IAMU. One respondent, about 1.7% of the participants answering this question, indicated they used ATSSA. There were 13 respondents, or 22.0% (more than 1/5 of the responses), however, who answered this question with “other.” Three of these 13 indicated they did not need flagger training. Another four stated they were using or were going to try to use internal resources (with one using videos from the Iowa Communities Assurance Pool). Once again, there was also one respondent who noted they used ATSSA-certified staff, which the project team assumed was internal to their agency. The other five respondents answering “other” used a training contractor (n = 1), Hawkeye Community College (n = 1), Mine Safety and Health Administration (MSHA) training (n = 2), and a combination of Iowa LTAP and a contractor (n = 1). Overall, almost 73% (n = 43) of the respondents used Iowa LTAP in some manner for their flagger training. A summary of the answers to this question is shown in Figure 3.

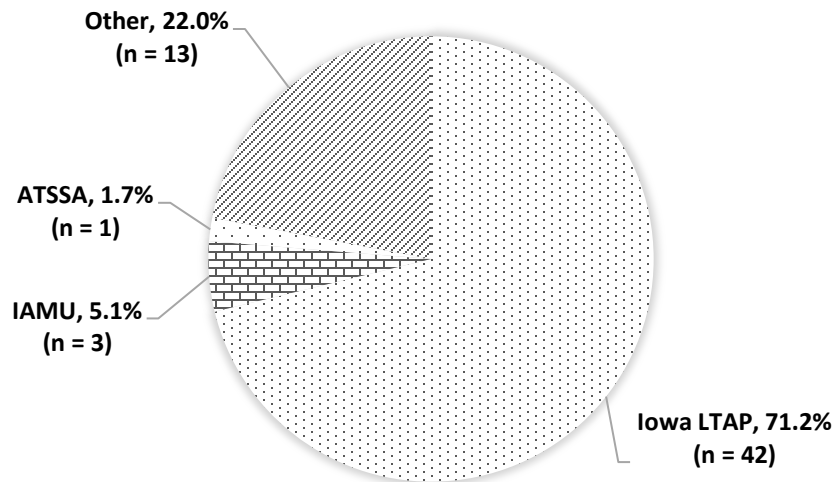


Figure 3. Source of flagger training

What Is Your Preferred Type of Work Zone Safety Training?

The next two questions in the online needs assessment focused on the type of instruction people preferred for work zone safety and flagger training. Five options were provided for an answer to this question: instructor-led face-to-face, recorded online, instructor-led online, blended approach (some combination of the previous three), and other.

All 68 of the needs assessment participants responded to this question. At the time (i.e., before the COVID-19 pandemic), none of the respondents indicated that they preferred this subject to be taught solely online and no one provided another method of instruction. More than $\frac{3}{4}$ of the respondents (i.e., 76.5% or $n = 52$), however, indicated their preferred approach was instructor-led face-to-face. Another approximately 5.9% ($n = 4$) preferred a recorded online approach and approximately 17.7% ($n = 12$) would be satisfied with some combination of instructor-led face-to-face, recorded online, and instructor-led online training. The instructor-led face-to-face training preference shown here is similar to the results found with other previous Iowa LTAP assessments. These percentages, however, may now have changed due to the COVID-19 pandemic. During this time, many people have become much more comfortable with some amount of online training. A summary of the answers provided to this question is shown in Figure 4 (the blended approach noted in the figure is some combination of instructor-led face-to-face, recorded online, and instructor-led online).

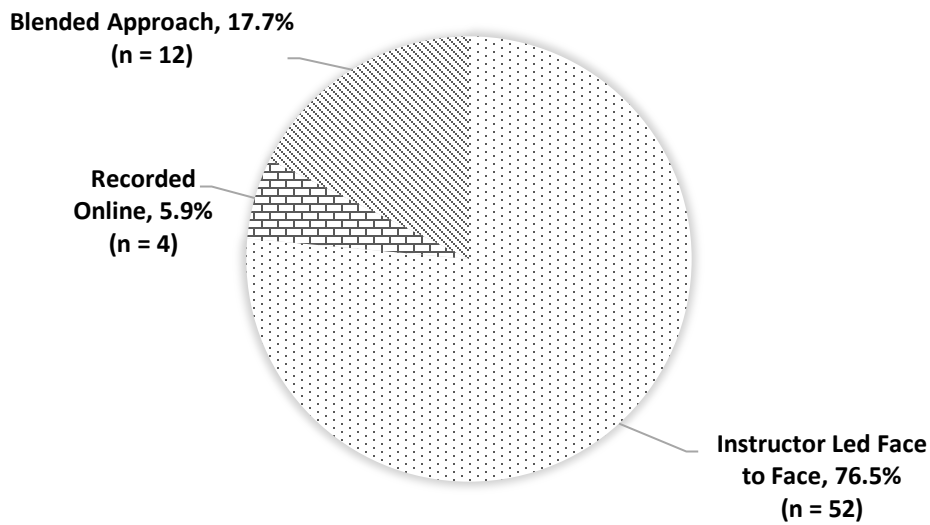


Figure 4. Preferred type of work zone safety training instruction

What Is Your Preferred Type of Flagger Training?

This assessment question, similar to previous question, investigated the type of instruction the respondents preferred. However, this question focused on flagger training. The same five options that were provided for the previous question were also provided here: instructor-led face-to-face, recorded online, instructor-led online, blended approach (some combination of the previous three), and other.

The results, not surprisingly, were almost identical to those from the previous questions. In this case, however, only 65 of the assessment respondents answered the question. Approximately 78.5% (n = 51) of the respondents preferred an instructor-led face-to-face approach. This is only two percentage points more than the previous question. Another 4.6% (n = 3) answered that they were satisfied with a recorded online approach and about 16.9% (n = 11) preferred some type of blended approach (i.e., some combination of instructor-led face-to-face, recorded online, and instructor-led online training). However, as noted previously, the answer to this question may have now shifted (at least temporarily) toward more acceptance of the online training experience due to the COVID-19 pandemic. A summary of the responses to this question are shown in Figure 5 (the blended approach noted in the figure is some combination of instructor-led face-to-face, recorded online, and instructor-led online).

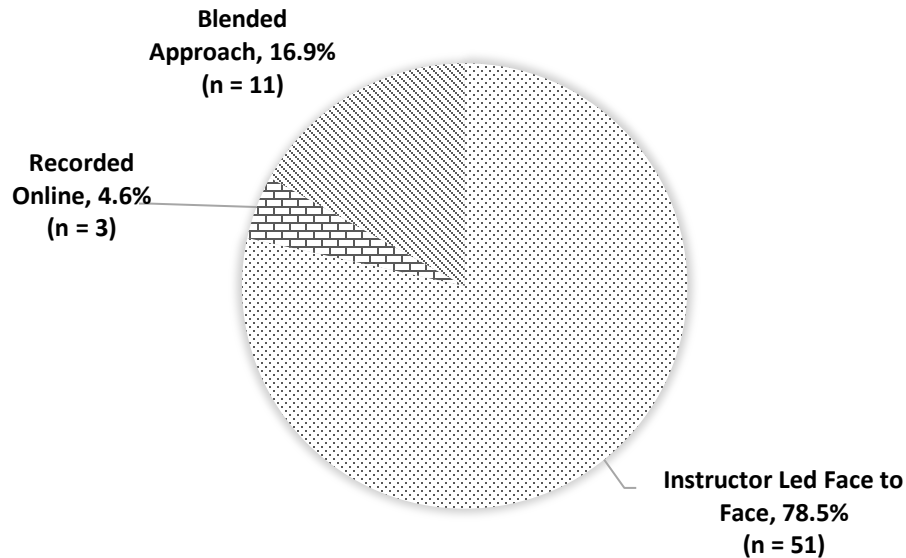


Figure 5. Preferred type of flagger training instruction

Are There Topics You Think Should be Added to the Work Zone Safety and/or Flagger Training?

This question was added to the assessment to determine whether the respondents were, from their point of view, receiving the information they needed from the work zone and flagger training they attended.

Only 25% (n = 17) of the 68 assessment participants responded to this question. In addition, of those who did respond, six (approximately 8.8%) had no additional suggestion for topics. One could assume from this response that approximately 83.8% (n = 57) of those participating in the needs assessment, therefore, are satisfied or do not have a suggestion for additional topics to the training they attend. In other words, they appear to be receiving the information they believe they need.

Some suggestions for other topics in work zone safety and/or flagger training that were provided by the needs assessment respondents included the following:

- Any general safety topics
- Placement of vehicles and equipment in work zones
- Low-volume road traffic control
- Distracted driving avoidance tips
- A combination with MUTCD signing guidelines for maintenance crews
- Discussion of different types of work durations
- Electronic message boards and how to use them properly
- Dealing with uncooperative motorists and situational training
- Incident reporting
- Work zone safety in residential areas

Some general comments were also received about the approach taken to work zone and/or flagger training. One respondent wanted more interaction during the training, and another believed the time for the training could be reduced by one half. A third respondent asked for new videos to be played, and a fourth thought a discussion of when to “bail out” should be added. It was also suggested that other times during the year should be explored for the training due to the potential need for some attendees to respond to snow plowing tasks on the day of the event (this training is usually held between February and April). There are also other activities (e.g., maintenance and construction) that might conflict during other months.

Do You Have Regular and Reliable Access to the Internet for Online Training?

This question explored a basic infrastructural need at a location for training to be done online. It asked respondents if they had regular and reliable access to the internet. Approximately 88.2% (n = 60) of the needs assessment participants indicated that they did have this level of access. Only approximately 11.8% (n = 8) of the respondents indicated that they did not. The answer to this question is also, in the opinion of the project team, dependent upon who is answering it and the job they do on a day-to-day basis. The answers in this assessment show that access to regular and reliable internet is available to most. We did not ask, however, whether all those needing this type of training (e.g., field workers or supervisors) also had regular access to an agency computer or device that would allow them to attend a virtual training during a typical day. Asking this additional question might have shown a different result with regard to access for some of the audience for this type of training.

Iowa DOT Work Zone Safety Workshop Training Series Evaluations

Ranking Averages

Another source of measuring the training satisfaction and needs of work zone safety professionals in Iowa are the annual evaluations completed as part of the Iowa DOT Work Zone Safety Workshop training series. A summary of the average rankings in these evaluation for the Iowa DOT Work Zone Safety Workshop training series from 2017 through 2019 is described in this section. In addition, a summary of additional training topics suggested in these evaluations are identified. This information can be used to determine if those being trained in this series are receiving what they believe they need to do their jobs and also what improvements they think could be made to the workshops.

The evaluations for the Iowa DOT Work Zone Safety Workshop training series were completed by 618, 589, and 495 attendees in 2017, 2018, and 2019, respectively (a total of 1,702 responses). The attendees at the workshop range from city and county local agency employees to Iowa DOT, contractor, and utility agency personnel. On average, however, Iowa DOT personnel and contractors represented about 46% of the attendees from 2017 through 2019. The evaluations provided to the workshop attendees included eight subjects the respondents could rank from one (needs improvement) to five (very good).

These subjects and the 2017 through 2019 average of the average rankings from each of the five groups of attendees (i.e., city, county, utility, Iowa DOT construction/contractor, and Iowa DOT maintenance) are listed as follows:

- Topics covered: 4.44/5.00
- General session: 4.31/5.00
- Instructor’s effectiveness: 4.51/5.00
- Visual aids: 4.42/5.00
- Handouts usefulness: 4.44/5.00
- Facilities were accommodating: 4.63/5.00
- Program met expectations: 4.42/5.00
- Overall worth to you personally: 4.39/5.00

Overall, it appears that the workshop series addresses the job needs of the work zone safety professionals in attendance at this work series. Of course, there is always some room for improvement. The overall average of all eight of the rankings listed above was 4.45 out of 5.00. In addition, the ranking for the “program met expectations” category was about the same as the overall average at 4.42 out of 5.00. More specifically, the average rankings for “program met expectations” from 2017 through 2019 for each of the five attendee concurrent tracks were 4.38 (county), 4.56 (city), 4.42 (utility), 4.32 (Iowa DOT construction/contractor), and 4.42 (Iowa DOT maintenance) out of 5.00. Similarly, for the “topics covered” ranking, the averages for the five different audiences or concurrent tracks were 4.42 (county), 4.51 (city), 4.43 (utility), 4.33 (Iowa DOT construction/contractor), and 4.52 (Iowa DOT maintenance) out of 5.00. The rankings for all eight of the subjects evaluated by attendees ranged from 4.31 out of 5.00 for the general session to 4.63 out of 5.00 for “facilities were accommodating.” Instructor effectiveness was ranked 4.51 out 5.00. All of the rankings from the evaluations are quite high.

Comments and Topic Suggestions

Overall, as noted previously, the instructors who provide the Iowa DOT Work Zone Safety Workshop training series appear to be well-liked and appreciated. A review of the comments made on the evaluations from 2017 through 2019 support the rankings given previously. There seemed to be a great appreciation for the hands-on approach and the informative nature of the workshops. The attendees also appreciated the presentations by the Iowa DOT Motor Vehicle Enforcement Officers and their focus on commercial driver’s license (CDL) information. The real-life experiences discussed, along with the provision of manuals/workbooks and traffic control information, and the breakout or concurrent sessions were also noted as positives. Some of the topics that were suggested for potential inclusion in future workshops included the following:

- Flagger training
- Liability and the ADA
- Equipment and pedestrian hazards
- Technologies from other states

- Parking attenuator trucks
- Gravel road setups
- Moving or mobile work zone operations
- New products and technologies
- More hands-on exercises
- Double rolling lane closures
- Crashes in works zones
- Rural closures
- Traffic Incident Management Systems (TIMS)
- Truck lighting (strobes)
- Intelligent work zones
- Traffic control plan reading
- Nighttime operations
- Roundabouts
- Detours

Conclusions

This chapter summarized the results from four activities related to assessing work zone safety and flagger training in Iowa. These four activities included an online needs assessment, informal large group questioning (which had limited value), information gathered from a training question on the small city Iowa Work Zone Sign Package Program application, and a summary of the evaluations from the 2017 through 2019 Iowa DOT Work Zone Safety Workshop training series.

Overall, there were 68 respondents to the online work zone safety and flagger needs assessment. Approximately 65% of the respondents were from counties and 25% from cities. Approximately 50% of the respondents received their work zone safety training from the Iowa DOT Work Zone Safety Workshop training series, and approximately 70% of the flagger training came from Iowa LTAP. Overall, approximately 75% and 80% of the respondents also preferred an on-site inspector-led instruction approach for work zone safety training and flagger training, respectively. Several subjects were also suggested by respondents in the needs assessment for inclusion within future work zone and/or flagger safety training. These subjects included, but were not limited to, low-volume road situations and dealing with uncooperative motorists. The small city Iowa Work Zone Sign Package Program application responses also showed that approximately 57% of the 72 small city applicants had not taken a work zone safety training. This is a gap in the work zone and flagger training provided in Iowa or in the advertising for the training available. Finally, the 2017 through 2019 evaluations from the Iowa DOT Work Zone Safety Workshop training series showed an average 4.42 out of 5.00 ranking for the characteristic measure “program met expectations.” The rankings for the other characteristics of the workshop series (given previously) also ranged from 4.31 to 4.63. The workshop series appears to meet the needs of those in attendance.

CHAPTER 5. CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are the result of the activities described in this report. Some of the recommendations are short term in nature (e.g., within the next year) and others will require more deliberation and may take several years if implemented.

Conclusions

- Work zone safety and flagger training is essential to the safety of field workers and supervisors on the roadway, along with that of the traveling public. Other positions that can also benefit from work zone safety and/or flagger training include those who design work zones and manage businesses or agencies that have staff who work along the roadway. The training needs of these work zone and/or flagger positions vary.
- Professionals who need work zone safety and/or flagger training are employed by various organizations in Iowa. These employers include, but are not limited to, the Iowa DOT, cities, counties, contractors, and public or private utilities. There are also those who work at some of these employers who could use some regular or ongoing work zone safety and/or flagger training but may not receive it. Some examples include program managers, designers, inspectors, those who visit the site periodically for particular tasks (e.g., mechanics), and law enforcement.
- Work zone safety and/or flagger trainings are offered in Iowa by a variety of organizations. These organizations include, but are not limited to, Iowa LTAP, IAMU, Iowa DOT, and several private contractors that offer training services. This type of training is also sometimes done internally by employers. It is assumed that the content of these trainings is guided by identified audience needs, MUTCD guidance, and/or Iowa DOT Standard Specifications.
- A large number of professionals in Iowa are trained each year in work zone safety and/or flagger skills. The Iowa DOT Work Zone Safety Workshop training series, for example, is attended by 650 to 850 people during a typical year. Those in attendance include city, county, Iowa DOT, contractor, and utility employees. Iowa LTAP and IAMU also train a similar number of work zone professionals throughout the year.
- The online needs assessment completed as part of this project showed that transportation professionals in Iowa mostly receive their work zone safety and/or flagger training from the Iowa DOT Work Zone Safety Workshop training series, Iowa LTAP, training contractors, and/or IAMU. The respondents to the assessment also showed a strong preference toward work zone safety and flagger training being provided in an instructor-led face-to-face format. The majority also indicated that they have reliable internet service. Reliable internet service by the respondents, however, may or may not translate to access to these services by all those who may need work zone safety and/or flagger training (e.g., field workers).

- Work zone and/or flagger training is available to Iowa transportation professionals both on-site and online. In addition, based on the investigations done as part of this project, those attending the Iowa DOT Work Zone Safety Workshop training series appear to be satisfied with its content. The average rankings provided in the evaluations for these workshops are between four and five on a five-point scale. Those who take the Iowa LTAPs work zone safety and flagger training have also anecdotally indicated a general satisfaction with the course material.
- Iowa follows the MUTCD guidance about work zone safety training. As is always the case with guidance in the MUTCD, deviations from its guidance statements are allowed if engineering judgment or a study supports it as appropriate (<https://mutcd.fhwa.dot.gov/>) (FHWA 2012). There is also some work zone safety and flagger training text in the Iowa DOT Standard Specifications for those who work on projects let through the Iowa DOT. There is a requirement for a TCT on staff for contractors and that specification includes a list of approved training providers (e.g., ATSSA). In addition, there is a specification for trained flaggers on projects let through the Iowa DOT. The material to be covered in this training is provided, but there is no list of approved training providers. These guidance and specification documents, along with specific audience need, are believed to form the basis of the training in Iowa.
- It is unknown whether the Iowa-based training provided results in the development of desirable work zone safety and/or flagger job competencies. The courses or sessions currently being used do not generally appear to have documented and measurable learning outcomes or objectives that respond to the general competencies to be achieved for particular work zone jobs. Consequently, the review, checking, testing, or demonstration of job competency learning cannot be completed. The use of measurable learning outcomes and objectives in training is a commonly expected practice (See the AASHTO TC3 descriptions in this report and on their website).
- The MnDOT has at least 11 work zone safety and/or flagger trainings that it offers and the Minnesota LTAP also offers another 3. Twenty-five work zone and flagger courses and resources relevant to Minnesota are listed in Appendix B. Those available in Iowa have been described in this report. A summary of an example unpublished work zone safety and flagger training program proposal for Minnesota is also included in Appendix A. This material is from an unpublished report and not yet finalized. In general, the proposed training program for Minnesota included the following:
 - A new basic or orientation-level course in work zone safety (a combination of two existing courses)
 - Flagger training instructor certification
 - Basic or core TTC training with a new course that is modular in format and can be tailored to the audience
 - A new course to certify the TTC instructors for the basic or core course noted above
 - Advanced TTC courses for TCTs including a new course development for MnDOT employees
 - TTC supervisor training (including recertification)

- TTC plan development skills training (including certification)
- A new TMP development course
- A new course for managers of public agencies and private companies

Recommendations

The COVID-19 pandemic started during this project, and it has impacted work zone and flagger training in a significant manner. Large group gatherings for training have either been shifted to an online format, are much smaller (e.g., 12 people or fewer), and/or might be a single agency on-site approach. All but the online trainings also have had additional pandemic-related restrictions applied. While the majority of the work zone safety and/or flagger training audience appears to prefer on-site instructor-led workshops, the online approaches due to the pandemic will likely remain (or become more or less strict) for an unknown period of time. The long-term impacts of the COVID-19 pandemic experience on the mode of training instruction and instructor retirements is currently unknown and cannot be taken into account. The following recommendations are proposed for completion during the COVID-19 pandemic and beyond:

- In general, a stakeholder group of Iowa partners interested in work zone safety and flagger training should be developed and meet on a regular basis to accomplish some or all of the suggested activities that follow. This Iowa Work Zone Safety and Flagger Stakeholder Group could consist of representatives from the Iowa DOT, Iowa LTAP, IAMU, ICEA, APWA, Iowa Governor’s Traffic Safety Bureau (GTSB), AGC, and other organizations that have an interest in improving work zone safety and flagger training and other activities in Iowa.
- The state of Iowa should continue to offer a time period (e.g., a week or a month) that highlights the statewide partnership focused on work zone safety and/or flagger training and education. The project team believes this approach has promotional, partnership, and attendee planning value that shows the importance of work zone safety and will likely increase attendance at any training that might occur or improve upon the consistency of outreach documents that might be distributed. There are many types of training and education that could be done during this time period and many methods or approaches that could be used to accomplish it. It is assumed that this training and education would be done in a virtual manner during the COVID-19 pandemic time period and that the approach used would be re-evaluated in the future as the preferred on-site instructor approach becomes more realistic. The value of having a wide range of work zone safety professionals gathered at a common location to hear a common message for all or part of a day should also be discussed. This might be, for example, an Iowa Work Zone Safety Summit that brings in state and national speakers regularly.
- For the duration of the COVID-19 pandemic, each of the work zone safety and/or flagger training partners in Iowa should consider the best method and approach to adjust their Work Zone Safety Workshop training session and/or other workshop content into a virtual or online environment. Workshops designed or altered for a virtual environment can be interactive and engaging if the appropriate tools available are used. Some examples include small group activities or discussions in breakout rooms, pre-session handouts and/or homework, case

study evaluation discussions, polling, and scavenger hunt learning method approaches. Iowa LTAP has explored many of these approaches and can help, as needed and possible, with this activity. It is also recommended that the audiences for these sessions be asked whether they have the ability to attend these redesigned sessions and whether they would attend if offered.

- The work zone and flagger training currently being offered in Iowa should be updated to incorporate some adult learning components. First, the audience for each of the training sessions needs to be specifically defined. Then, those expected to complete the training should be provided a description of what will be offered (e.g., an agenda), a list of measurable learning outcomes or objectives, and a method that will be used to determine if those outcomes/objectives are being met by the attendees. Learning outcomes or objectives help define training session content, and when they do not appear to have been met by most of the attendees, there should also be a method of returning to the material for additional discussion. The content of training sessions should be adjusted after the completion of this and the previous recommendation.
- In the longer term, the methods used to accomplish the Iowa DOT Work Zone Safety training series or something similar should be considered more closely. For example, is there a need for the Iowa DOT to train its staff and the staff of the contractors working on Iowa DOT projects together? Could or should the Iowa DOT train its staff through district meetings or virtually? Also, should city and county training in basic work zone safety always be combined in some manner with flagger training? Also, can the utilities being trained through the Iowa DOT Work Zone Safety Workshop training series be accommodated through other means? Finally, should there be coordination of training between the partners when they return to an on-site instructor-led format (e.g., a coordinated annual work zone safety awareness time period)? These are all questions to consider (along with others) as the Iowa DOT Work Zone Safety Workshop training series evolves after the COVID-19 pandemic time period.
- The stakeholder group mentioned previously should work together and use the content of this report (including the content of Appendices A to C), the results of the recommendations given herein, and their work zone safety and flagger expertise to agree on expected core competencies (e.g., what people need to learn for their position) for a variety of work zone safety professional positions. This task could be completed for, among others, field workers who occasionally flag and/or those who only do flagging; those who complete flagging and setup, adjustment, and removal of TTC devices; and field supervisors, work zone plan designers, work zone managers, and agency managers (similar to what was proposed in the unpublished MnDOT report). Other positions that may need a basic understanding of work zone safety and/or flagger concepts could also be addressed. The determination of the core competencies desired for different positions can then be used to adjust the learning outcomes/objectives mentioned in the previous recommendation for existing training workshops. They can also be used to identify the content of any new workshops that might need to be developed. Some of the courses recommended in the MnDOT unpublished report (Appendices A and B) might also be completed through a cooperative agreement between Iowa and Minnesota if the content is helpful to professionals of both states. The basic work

zone and flagger subjects described in Appendix C may also be of value to the stakeholder group.

- Iowa requires very little training in the area of work zone safety for the professionals who develop plans for and/or implement work zone TTC, and some of the ideas suggested in this report could be considered by the Iowa DOT to determine whether a potential adjustment to its Standard Specifications content is needed for work zone safety and flagger training. Changes to the codes and documents that apply to all those working on roadway projects might also be considered. First, the stakeholder group previously identified should discuss the need to have a certification process for work zone safety and flagger instructors, including what this certification might include and how often the certification would need to be renewed. Second, the stakeholder group should discuss and determine the need for certified flagger and/or work zone safety professionals in Iowa and the process it might entail. This would be a formalization of the current flagger training approach (including core competencies and learning objectives), something that possibly expands upon the limited TCT training requirements in Iowa, and/or the potential incorporation of recommendations for a TCS certification. This discussion would also need to include those who might be impacted by these new certifications and those who they might provide the certification training. This is a long-term recommendation.
- In general, some type of training should be provided and/or required on a regular basis for those who design, plan, and implement work zone TTC devices. In addition, training should be made available to all those who might find themselves within or around work zones (e.g., a basic overview for safety). Those who design or apply TMPs should also be trained. The content and the method of instruction for these trainings will depend on the audience and some of the results from the previous recommendations.
- The development of a common flagger training course should be considered. In addition, a modular work zone safety basic and/or core course (similar to the unpublished MnDOT proposal) could also be developed. The modules could be focused on the content of one or more of the audiences identified previously. The development of these would encourage consistency in the training and could be supplemented by work zone safety and flagger train-the-trainer courses. These courses could be completed separately or in advance of and in coordination with the certification of instructors and/or attendees noted previously. It is recommended that the instructors for these train-the-trainer courses be evaluated in some manner before they are able to offer them. This recommendation is similar to one from the unpublished MnDOT report (see Appendices A and B) that is focused on core TTC content and could be taught to agency personnel for internal training at their organization (and those who want to be professional trainers or train outside their organization).

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APPENDIX A. MNDOT PROJECT UNPUBLISHED REPORT SUMMARY

The Minnesota DOT (MnDOT) has received a report that proposed a work zone safety training program approach (Jackels and Kuehl 2019). This currently unpublished report was entitled Proposed Work Zone Training, Phase 1 – Work Zone Training Plan (Jackels and Kuehl 2019).

This concurrent project had a focus similar to this project in Iowa. However, while the objective of each project was similar, the starting point with regard to the training being completed in each state was different. The unpublished report for Phase 1 of the MnDOT project was provided to the project team and is summarized in this appendix and Appendix B. In addition, the report summarized is just Phase 1 of a proposed three-phase project.

In general, similar to this project, the unpublished MnDOT Phase 1 report was intended to provide additional guidance about serving the training needs of work zone safety and flagger professionals in Minnesota. The goals of the project included the following (Jackels and Kuehl 2019):

- Identify work zone training needs of key stakeholder audiences
- Search for and identify available national and local work zone training courses
- Assess each identified course to determine if it meets established stakeholder needs and identify gaps between needs and existing course curriculums
- Investigate and recommend as appropriate a single point of contact or one stop shop to search, navigate, and register for allowable courses

Needs Assessment

In order to determine the training needs of work zone safety professionals in Minnesota, the project team completed several activities (Jackels and Kuehl 2019). They did listening sessions with state and local agencies and consultants, held individual meetings with three private utility companies, and distributed an online survey to local agency and state DOT staff. Overall, these activities showed that Minnesota work zone safety professionals preferred on-site instructor-led workshops, although the small utilities would like the training incorporated into their association training. The utilities liked the idea of integrating the training into their existing programs, field workers wanted the training at their office or shop, field supervisors would like to have the training at a regional or district level, and designers were comfortable with statewide training or online on-demand options. Overall, most of the field people wanted training in the winter months, but seasonal workers needed to be trained in the spring. The needs assessment also produced a list of subjects or approaches that people wanted to be included in work zone safety training. A few of the suggested items are listed as follows (Jackels and Kuehl 2019):

- Training should not just focus on how to use the field manual
- Include explanations of why guidelines and standards should be used
- Outcomes and curriculum should be tailored to the agency
- Stress not to overuse TTC and take down when no longer necessary

- Effectively engaging law enforcement
- Short duration, mobile, and moving operations
- Use case studies and real-life experiences indicating how adjustments are made
- Planning escape routes
- A need for a short course for all workers called How to Survive Working on the Roadway
- Signalized intersection flagging procedures
- Proper speed control, including dynamic speed displays
- TTCs in and around roundabouts
- Accommodation of pedestrians and bicyclists
- Planning and design of closures and detours

There were also a series of other comments and observations that were provided to the Minnesota project team from their needs assessment activities. Some of these suggestions included the fact that designers are a different type of audience for work zone safety, the possible development of a work zone or TTC certification program, a need for TTC standards and guidelines, concerns about the change in driver behavior, and the need to more adequately advertise the training that was already available.

The Minnesota project team also investigated the work zone safety and flagger trainings that were available on-site and online. They identified more than 75 courses. However, they found that only 25 were applicable in Minnesota because they applied the state's own MUTCD. The 25 courses they identified as relevant in Minnesota are listed in Appendix B (some are applicable to Iowa). For the most part, these are courses that are available and, as needed, have been adjusted for the Minnesota MUTCD content and/or developed for use by MnDOT. There are also Minnesota LTAP and ATSSA courses in the list. It would appear that the courses offered in Iowa are likely similar in content to the Minnesota LTAP courses and also some of the more basic MnDOT courses in traffic control. This conclusion would need to be checked by documenting the content of Iowa courses (part of the recommendations in Chapter 5 of this report) and comparing them to the information in Appendix B and as needed, gathering additional information from Minnesota.

Based on their findings and background, the Minnesota project team developed a proposed training plan that included courses with various training achievement levels for field workers, TTC designers, project managers, and agency/company managers. For the field workers and field-level supervisors, the achievement levels of the courses were informed (i.e., no formal records kept), trained (i.e., a record of attendance is kept), and certified (i.e., attendance is kept and attendees demonstrate acceptable levels of understanding). The courses that were recommended for TTC designers and project managers in the training plan, on the other hand, were only at the "trained" achievement level, and those recommended for agency/company managers were at the "informed" achievement level.

In addition to the three training achievement levels noted previously, the Minnesota project team also defined eight different levels of training to address the duties and responsibilities of professionals who work along or near the roadway. Specific recommendations were made for courses within one or more of these training levels for field workers and supervisors (including

flaggers), designers, project managers, and agency/company managers. These positions were defined by the Minnesota project team as follows (Jackels and Kuehl 2019):

- Field worker or field supervisor – anyone who performs activities or duties on a public right of way intended for use of travel
- Flagger – anyone who is assigned the duties of flagging traffic on a road work project
- Designer – anyone who designs TTC plans to facilitate construction and maintenance activities on public roadways
- Project Manager – anyone who manages the development or implementation of projects conducted on public roadways
- Agency Manager – anyone who manages a public agency or private company or any portion thereof that conducts business on public roadway rights of way

The job duties of these positions were also addressed in the work zone safety training recommendations documented in the Minnesota project report (Jackels and Kuehl 2019). Each of these positions was addressed by course(s) in one or more of the eight levels of training that were defined previously. The title of each of the eight training levels and the position duties and responsibilities it addresses are as follows:

1. Fundamentals of Temporary Traffic Control (TTC) and Work Zone Safety: Work on public right-of-way intended for travel without the need for lane closures.
2. Flagging and Flagger Train-the-Trainer: Flag traffic and for those who provide training for flaggers.
3. Core TTC Knowledge: Supervise, lead, or install short- and intermediate-term work zones using the Minnesota Field Manual as a minor part of duties. Allowed to exercise adjustment and options contained in the Minnesota Field Manual (this Field Manual appears to be approximately equal to the Iowa Temporary Traffic Control Handbook, but it is a more comprehensive 202 page document.).
4. Advanced TTC Knowledge: Set up short-, intermediate-, and long-term work zones using the Minnesota Field Manual and/or TTC plans as a major part of duties. Allowed to exercise adjustment and options presented in the Field Manual and Minnesota MUTCD.
5. TTC Supervisor: Supervise and/or set up short-, intermediate-, and long-term work zones. Allowed to exercise adjustment and options contained in the Minnesota Field Manual and Minnesota MUTCD and to use engineering judgement to modify the Field Manual layouts, Minnesota MUTCD layouts, or work zone plans.
6. TTC Plan Development Skills: Designer, licensed engineer, or working under the supervision of a licensed engineer to develop work zone plans.
7. TMP Development: Project manager or planner responsible to plan and/or manage project development on public right-of-way that impacts transportation management and operations.
8. Work Zone Safety Information: Manager responsible to manage a company or agency or portion thereof whose work affects transportation facilities or operations.

The unpublished MnDOT report included training plan recommendations for field workers and field supervisors, TTC designers, project managers, and agency/company managers. These plans included existing (see Appendix B) and new proposed courses. The field workers and

supervisors plan included courses in training levels one to five (see definitions in the previous list). However, it was noted that the content of the level one workshops were also included in the courses they recommended for levels three, four, and five. The level two workshops, on the other hand, only focused on flagging competencies. It was proposed that the field workers who only do flagging in work zones finish both level one and two workshops. In addition, those who attended level three, four, or five workshops, but also flag traffic, would also need to attend the level two training. The workshops proposed for field workers and supervisors (along with their training achievement level) described in the unpublished MnDOT report (Jackels and Kuehl 2019) are as follows:

- Level 1: Orientation to Work Zone Safety (Informed). Two of these courses are currently available. It is proposed that a new combined course be developed. Recommended revisions appear to include bringing the content up to date, having the content be at a “higher level,” and restructuring the course into a 30- to 45-minute “video” of fundamentals supported by slides that can be adapted.
- Level 2: There are three courses proposed in this level. These courses include Flagger Train-the-Trainer and Trainer Recertification (certified), along with Flagger Training (trained) with certified instructors (from the train-the-trainer course).
- Level 3: Four courses are included in the proposed program for level three training. Three of these courses include Work Zone Safety, Temporary Traffic Control, and Flagging (trained) Work Zone Control Seminar (trained); and a new course entitled Basic Temporary Traffic Control course (trained). It is proposed that the new course be offered by certified instructors and the content be modular so it can be focused on the needs of the agency audience. The fourth course in level three is a new train-the-trainer workshop to certify the instructors noted previously. The Core Temporary Traffic Control Train-the-Trainer course (certified), as proposed, would be offered to certify level five TTC supervisors (see the TCS course) so that they can train workers in TTC basics.
- Level 4: The proposed level four training includes three courses. These courses include ATSSA Traffic Control Technician (a pre-requisite for the level five Traffic Control Supervisor course), MnDOT Traffic Control Overview, and a new Traffic Control Technician course offered by MnDOT. All these courses would be at a certification level of achievement. The new course is proposed for project-level engineers, maintenance supervisors, maintenance field workers, and traffic engineers from MnDOT, along with local agencies that do not need a MnDOT construction standard/guideline focus. It is unknown how this course would differ from the ATSSA course if it were adjusted for the Minnesota MUTCD and Field Manual.
- Level 5: Three courses are included in level five training. These workshops include ATSSA Traffic Control Supervisor (the level four Traffic Control Technician course noted previously is a pre-requisite for this course), MnDOT Traffic Control Supervisor (offered by MnDOT), and TTC Supervisor Recertification (offered by MnDOT). All of these courses are at the certified level of achievement.

A brief summary of the course descriptions is given in Appendix B, but their complete descriptions are in the unpublished MnDOT project report (Jackels and Kuehl 2019).

As noted previously, training programs for designers, project managers, and agency/company managers were also proposed in the unpublished MnDOT report (Jackels and Kuehl 2019). All three of these proposed programs are described in the following paragraphs. The training plan suggested for TTC designers in Minnesota consisted of two level six courses. One of the courses was the TTC Plan Development workshop currently offered by MnDOT. This course would provide attendees with a “trained” achievement level. The other course proposed as an option for designers was the Traffic Control Design Specialist workshop from ATSSA (which can be taken as a certification course). This course is intended for those who evaluate, develop, and implement traffic control plans. There is apparently a one-day version of this course that requires the completion of the Traffic Control Supervisor workshop noted previously in level five. However, the two-day version of the course apparently does not. The unpublished project report indicates that MnDOT is planning to pilot this course, which is offered through an FHWA grant, to determine its applicability in Minnesota.

The training plan proposed for project managers included one level seven course that focuses on the development of effective TMPs. This workshop would be new and developed for MnDOT. The workshop content would result in a “trained” level of achievement for the attendees, and the stated audience for this course is designers and planners. The unpublished MnDOT project report noted that an FHWA course does exist on TMP development, but it is not based on the Minnesota MUTCD or guidance for Minnesota. This training appears to be available on the FHWA Work Zone Management Program website but only in HTML format at this time. The content of this course is documented in the unpublished MnDOT report for potential consideration in the development of the new course proposed.

The training plan for agency/company managers in the unpublished MnDOT project report also included just one course. It would be a new course, and it was proposed that it would be entitled What Managers Need to Know About Work Zone Traffic Control and Safety. The audience for this course would be those who manage the operations of agencies or companies in the area of work zone control and safety. It would provide the attendees with an “informed” level of training achievement and it would be online. A description of the proposed content of this course is in the unpublished MnDOT project report, but its general objective is to provide content that helps managers develop effective work zone control and safety programs within their agency or company. Some of the subjects the workshop might include are applicable laws, rules, and standards; risks to workers and the traveling public; available training; tort liability and risk to company and agency; and the need to develop a comprehensive work zone traffic control and safety plan (loss prevention plan) (Jackels and Kuehl 2019).

Finally, the Minnesota project team also included the following additional recommendations in its unpublished report (Jackels and Kuehl 2019):

- **Establish a Work Zone Technical Expert for Local Agencies:** Many local agencies appear to have needs that are beyond work zone traffic control training. This recommendation would identify a technical expert to provide information and assistance.
- **MnDOT’s Policy on Mobility and Safety in Work Zones Background for Technical Experts:** This recommendation appears to be related to working toward the application of a

MnDOT policy that encourages the establishment of “work zone safety coordinators” in each district or local agency. The report includes a summary of tasks to be completed by these coordinators.

- **Provide a Work Experience Requirement for Certification:** This recommendation appears to be provided to address a concern that in some cases a person would only have to attend a class and pass the final exam to receive certification. However, some ATSSA courses also have an experience requirement, and this recommendation would provide some consistency with that for level four and five trainings.
- **Establish and Maintain a Work Zone Traffic Control Training Database:** This is a recommendation for the development of a database that tracks those who have taken the workshops in the proposed program. It would be similar to, but an expanded version of, the databases currently administered by ATSSA and MnDOT.
- **Expand the Availability of In-Person Training:** The Minnesota project team found that the preferred method of training by field workers and supervisors was in-person training. It was proposed that instructors for these courses can be expanded through the use of retired personnel with technical experience, industry experts, and those completing the train-the-trainer courses.
- **Improve Accessibility to TTC Tools and Training:** Through the course of the meetings held by the project team, it was determined that many attendees did not know of all the TTC tools and training available on the MnDOT website. It was recommended that MnDOT consolidate this information to make it easier to find (e.g., on one webpage).
- **Increase Work Zone Training Outreach to Local Agencies and Utilities:** Many of those attending the meetings held by the project team were not aware of the work zone training workshops and information already available. A series of actions are suggested in this recommendation to increase the knowledge level of this information.

APPENDIX B. AVAILABLE TRAINING MATRIX

| No. | Name of Course | Date of Latest Version | Sponsoring Organization | Training Format | Training Outcomes | Length of Training | Cost of Training | Availability of Training | Technical Content | Curriculum Flexibility | Achieved Training Level |
|-----|---|------------------------|-------------------------|--|--|------------------------|---|----------------------------|--|--|--|
| 1 | MnDOT Flagger Train the Trainer | N/A | MnDOT | In person, Instructor led; Interactive | 1. Qualify contractor's personnel to train employees to act as flaggers on MnDOT construction projects 2. Placed in the MnDOT Qualified Flagger Trainer database for five years | 4 hours | \$50 | Schedule: On demand/ State | Specific for MnDOT projects | Curriculum is modular and can easily be modified | Certification |
| 2 | MnDOT Flagger Train the Trainer Re-qualification Online | 2018 | MnDOT | Online e-Learning | 1. Re-qualify for the Flagger Train the Trainer class online | 15-20 mins | Free | Anytime | Specific for MnDOT projects | Curriculum is modular and can easily be modified | Certification |
| 3 | MnDOT Traffic Control Overview | N/A | MnDOT | In person, Instructor led | 1. Become acquainted with appropriate temporary traffic control reference materials and any changes to reference materials 2. Learn the value of cooperative efforts and key contacts in pre-planning of traffic control plans and specifications 3. Be aware of yearly changes in the MnDOT Traffic Control (2362) Special Provisions and updates on policies and requirements of traffic control devices 4. Become acquainted with alternate methods of traffic control contract specifications | 1 day | \$150 | Schedule: On demand/ State | Specific to Minnesota Standards including MN MUTCD | Instructor can alter content based on need | Certificate |
| 4 | MnDOT Traffic Control Supervisor | N/A | MnDOT | In person, Instructor led | 1. Become acquainted with appropriate temporary traffic control reference materials and any changes to reference materials 2. Obtain knowledge and reading of MnDOT contracts, plans and specification relating to traffic control 3. Gain knowledge of federal requirements contained in the Americans with Disabilities Act Understand requirements and guidelines for the use of Temporary Speed Limits and Portable Concrete Barrier 4. Be aware of yearly changes in the MnDOT Traffic Control (2362) Special Provisions and updates on policies and requirements of traffic control devices 5. Upon completion of the three-day course and passing a written exam, participants will receive certification and meet the qualifications of the MnDOT Traffic Control Supervisor special provision specification | 3 day | \$500 | Schedule: On demand/ State | Specific for MnDOT projects | Instructor can alter content based on need | Certification |
| 5 | MnDOT Traffic Control Supervisor Recertification | N/A | MnDOT | In person, Instructor led or Online e-Learning | 1. Focus on the latest changes in technology and specifications related to Traffic Control 2. Upon passing a written examination students will maintain their certification | 1 day | \$250 | Schedule: On demand/ State | Specific for MnDOT projects | Instructor can alter content based on need | Certification |
| 6 | MnDOT Temporary traffic control plan development | N/A | MnDOT | In person, Instructor led | 1. Fundamentals of Temporary Traffic Control - Available resources, plan sheet development, and field inspection strategies | 2 day | \$300 - MnDOT \$300 - Non-staff | Schedule: On demand/ State | Specific to Minnesota Standards including MN MUTCD | Instructor can alter content based on need | Certificate |
| 7 | MnDOT Speed Limits in Work Zones | 10/23/2014 | MnDOT | Online Video | 1. Better understanding speed limits in work zones 2. Legislation on speed limits in work zones | 40 mins | Free | Anytime (YouTube) | Specific to Minnesota Standards including MN MUTCD | Not easily | Trained |
| 8 | MnDOT TTC Field Manual Update - Significant Changes 2018 | 3/23/2018 | MnDOT | Online Video | 1. Understanding of updates to the Temporary Traffic Control Field manual | 60 mins | Free | Anytime (YouTube) | Specific to Minnesota Standards including MN MUTCD | Not easily | Trained |
| 9 | MnDOT Basic Road Work Safety - Temporary Traffic Control | 2014 | MnDOT | Online e-Learning | 1. Basic understanding of temporary traffic control | 30 mins | Free | Anytime | Specific to Minnesota Standards including MN MUTCD | Curriculum is modular and can easily be modified | Trained |
| 10 | MnDOT Changeable Message Signs Training | N/A | MnDOT | Online Video | 1. Define CMS 2. List types of CMS 3. Define CMS terminology 4. Define human factors terminology | 75 mins | Free | Anytime | Specific to Minnesota Standards including MN MUTCD | Not easily | Trained |
| 11 | MnDOT Truck Mounted Attenuator Training | N/A | MnDOT | Online e-Learning | 1. Basic understanding and use of truck mounted attenuators 2. Acceding and leaving work zone areas | 30 mins | Free | Anytime | Specific to Minnesota Standards including MN MUTCD | Curriculum is modular and can easily be modified | Trained |
| 12 | LTAP Orientation to Work Zone Safety | N/A | Minnesota LTAP | Online e-Learning | 1. Define "work zone" 2. Identify three things you need to know before working in traffic 3. Identify the component parts of a work zone 4. Explain how to safely exit traffic flow and enter the work zone 5. Identify safety techniques to use in the work zone 6. Explain how to safely exit the work zone and re-enter traffic flow | (30 powerpoint slides) | Free | Anytime | Specific to Minnesota Standards including MN MUTCD | Curriculum is modular and can easily be modified | Certification (credit for 0.5 Roads Scholar Program) |
| 13 | LTAP Work-Zone Traffic Control Seminar | N/A | Minnesota LTAP | In person, Instructor led | 1. Review 2018 Mn Field Manual 2. Installation of traffic control devices 3. Liability issues and risk | 3 hours | \$45 | Schedule: On demand/ State | Specific to Minnesota Standards including MN MUTCD | Instructor can alter content based on need | Certification (credit for 0.5 Roads Scholar Program) |
| 14 | LTAP Work-Zone Safety, Temporary Traffic Control, and Flagging (CTAP) | N/A | Minnesota LTAP | In person, Instructor led | 1. Overview of standards and specifications, including general responsibilities, liability, channelizing devices, and installation of traffic control zones 2. How to use the Minnesota Field Manual, including a review of stationary and mobile work zones, taper, device spacing, and reading charts 3. Key elements of flagging, including clothing, equipment, position, and flagging situations | 4 hours | \$150 (9-10 staff) \$350 (11-40 staff) | Self Scheduled | Specific to Minnesota Standards including MN MUTCD | Instructor can alter content based on need | Certification (credit for 0.5 Roads Scholar Program) |

Jackels and Kuehl 2019

| No. | Name of Course | Date of Latest Version | Sponsoring Organization | Training Format | Training Outcomes | Length of Training | Cost of Training | Availability of Training | Technical Content | Curriculum Flexibility | Achieved Training Level |
|-----|---|------------------------|-------------------------|---------------------------|---|--------------------|--|------------------------------|--|--|-------------------------|
| 15 | ATSSA Traffic Control Technician (TCT) course -MN State Specific | N/A | ATSSA | In person, instructor led | 1. The course provides concepts, techniques, and practice over class in the installation and maintenance of traffic control devices. | 1 day | \$180 (ATSSA Member) \$205 (Non-member) | Self Scheduled or Conference | Specific to Minnesota standards including MN MUTCD | Curriculum is modular and can easily be modified | Certification |
| 16 | ATSSA Traffic Control Supervisor (TCS) course -MN State Specific | N/A | ATSSA | In person, instructor led | 1. how to read and interpret plans and specifications and implement them in the field. 2. teaching students the skills necessary to become an effective supervisor, capable of leading a team in the field. | 2 day | \$335 (ATSSA Member) \$405 (Non-member) | Self Scheduled or Conference | Specific to Minnesota standards including MN MUTCD | Curriculum is modular and can easily be modified | Certification |
| 17 | ATSSA BASIC TRAFFIC CONTROL FOR SHORT DURATION ACTIVITIES | N/A | ATSSA | CD | 1. covers all aspects of traffic control applicable to short duration activities, including the fundamentals of temporary traffic control, component parts of a temporary traffic control zone, applicable national standards, typical applications common to short duration activities. 2. recommendations on applying simplified control procedures when performing utility and public works operations. | Self-paced | \$76.95 (ATSSA Member) \$69.95 (Non-member) | Anytime | Only national standards | Not easily | Trained |
| 18 | ATSSA BASIC TRAFFIC CONTROL FOR UTILITY OPERATIONS | N/A | ATSSA | In person, instructor led | 1. teaches concepts, techniques, and practices in the installation and maintenance of traffic control devices in accordance with the MUTCD. | 1 day | \$180 (ATSSA Member) \$205 (Non-member) | Self Scheduled or Conference | Only national standards | Instructor can alter content based on need | Certificate |
| 19 | ATSSA NIGHTTIME TEMPORARY TRAFFIC CONTROL | N/A | ATSSA | In person, instructor led | 1. feasibility of nighttime work zones, worker and equipment visibility, illumination requirements, glare avoidance, and nighttime adjustments, and is recommended for both work zone designers and work zone supervisors. | 1 day | \$190 (ATSSA Member) \$215 (Non-member) | Self Scheduled or Conference | Only national standards | Instructor can alter content based on need | Certificate |
| 20 | ATSSA SAFE AND EFFECTIVE USE OF LAW ENFORCEMENT PERSONNEL IN WORK ZONES | N/A | ATSSA | In person, instructor led | 1. Information regarding national standards and guidelines for uniform treatment of temporary traffic control in work zones, the roles and responsibilities of law enforcement officers in work zones, safe procedures for ramping out those roles, and the types of work zones as well as their configurations and component parts. | 4 hours | Classroom: \$115 (ATSSA Member) \$130 (Non-member) | Self Scheduled or Conference | Only national standards | Instructor can alter content based on need | Certificate |
| 21 | ATSSA TEMPORARY TRAFFIC CONTROL CONSIDERATIONS FOR URBAN WORK ZONES | N/A | ATSSA | In person, instructor led | 1. course addresses instances when standards cannot be met and how to address these situations in urban streets. | 2 days | Classroom: \$355 (ATSSA Member) \$405 (Non-member) | Self Scheduled or Conference | Only national standards | Instructor can alter content based on need | Certificate |
| 24 | ATSSA TEMPORARY TRAFFIC CONTROL FOR UTILITY OPERATIONS | N/A | ATSSA | In person, instructor led | 1. teaches concepts, techniques, and practices in the installation and maintenance of traffic control devices in accordance with the MUTCD. | 1 day | \$180 (ATSSA Member) \$205 (Non-member) | Self Scheduled or Conference | Only national standards | | Certificate |
| 22 | ATSSA TRAFFIC CONTROL DESIGN SPECIALIST (TCD) | N/A | ATSSA | In person, instructor led | 1. addresses the entire process for designing, installing, maintaining, and evaluating temporary traffic control in work zones 2. understand the engineering concepts necessary to properly design effective traffic control plans, as well as the fundamental principles of temporary traffic control, the sources of standards and guidelines, the proper processes and procedures for adjustments, and legal implications. | 1 or 2 day | 1 day: \$295 (ATSSA Member) \$335 (Non-member) 2 day: \$495 (ATSSA Member) \$565 (Non-member) | Self Scheduled or Conference | Only national standards | Instructor can alter content based on need | Certification |
| 23 | ATSSA TRAINING MODULES | 2009 - 2016 | ATSSA | PDFs; interactive | Modules include: Shuttle Vehicles for Work Zones; High-Mobility Safety Approval in Work Zones; Positive Protection Introduction (Interactive); Positive Protection Guidelines (PDF); Treating Potential "Back-of-Queue" Safety Hazards (Interactive or PDF); Work Zone Safety Performance Measures Training; Safe Installation and Removal of TTC Devices (Interactive or PDF); Pedestrian Safety and Accessibility in Work Zones; Pedestrians and Americans with Disabilities in Work Zones; Guidelines for Developing a Lighting Plan for Nighttime Work Zones; TTC for Building and Maintaining Roundabouts; Safe and Effective Work Zone Inspections | Self-paced | Free | Anytime | Only national standards | Not easily | Trained |
| 24 | ATSSA PODCASTS | 2008 - 2018 | ATSSA | Audio recordings | Podcasts include: Work Zone Data Collection & Analysis: What, Why, and How; Safety Considerations for Mobile Work Zone Operations; Rolling Roadbooks for Work Zone Applications; Americans with Disabilities Act Requirements for Accessibility in Temporary Traffic Control Zones; Automated Speed Enforcement in Work Zones; Work Zone Hazard Assessment: Identifying and Maintaining the Work Zone Clear Zone; Using Portable Changeable Message Signs to Control Speeding in Work Zones | 10-25 mins each | Free | Anytime | Only national standards | Not easily | Trained |

Jackels and Kuehl 2019

APPENDIX C. SUGGESTED SUBJECTS FOR FLAGGER AND/OR BASIC WORK ZONE TRAINING

There are a variety of methodologies that can be used to effectively offer training in which knowledge or facts are exchanged in a manner where learning occurs and can be confirmed. The range of methodologies can be planned into a training with the idea that people also have a preferred process of learning. Adult attendees, because of their experience, also tend to learn differently than children. Properly designed courses attempt to use a variety of tools that help people learn (e.g., presentations, discussions, small and large group exercises, activities, assignments). The amount of learning that does take place also needs to be assessed and evaluated to some extent, and there are various approaches to complete this task. One good resource that includes examples of how to teach, learn, assess, and evaluate is the Center for Excellence in Learning and Teaching (CELT) at Iowa State University (<https://www.celt.iastate.edu/>).

Two lists are provided in this appendix. The first list focuses on some of the content that could be included in response to the ideas described in the previous paragraph. The inclusion of this type of material in a training is generally taught to instructors, for example, within the National Highway Institute (NHI) Instructor Development Course. The items in the list are described in general terms because their specific content and application may change with regard to audience and the physical instructional mode used for the training (e.g., online, on-site, hybrid). However, it should also be possible to define an assumed audience and provide trainers both the goal(s) and learning outcomes/objectives of a particular training to be accomplished. Some of the recommendations in this report, if implemented, could help complete this task.

The second list in this appendix includes items of technical content that might be included in a flagger and/or basic work zone safety training. There are items/subjects that might be the focus of a flagger training and others that focus on some basic work zone training material that may be relevant to some audiences (either separately or in combination). Overall, it is very likely that there are other items that could be added to this list, and it should be considered something to potentially build upon. Technical training content in Iowa, for some, may also be defined by the Iowa DOT Standard Specifications. The specifics of training content (including the case studies used) should also change with the specific audience (e.g., city, Iowa DOT, county, and utility personnel).

It should be noted that the combination of the described lists requires design decisions related to the structure and content of a course. Lecturing or presenting to large groups of people about lots of technical information is considered to be time- or cost-efficient by many, but this approach may also not be effective from a learning point of view. The impacts of adding assessment and evaluation activities to a technical training, however, can vary depending on the structure applied. There are many methods to accomplish assessment and evaluation. Requiring certain aspects to a training approach (e.g., a written test), however, requires close consideration by those with decision-making responsibility.

Course Structure Content Suggestions

Three items are suggested for inclusion in the course structure of a properly constructed training. As noted previously, the descriptions are general in nature, but when specifically defined by those with decision-making control, could also just be provided to those wanting to create or offer a flagger and/or basic work zone safety course. The ability to assess and evaluate learning during/after a training include the following:

- **Course goal(s).** Goals are broad statements of what you expect attendees to learn. For example, a goal for a flagger training might be: when this training is completed, attendees will understand the critical nature of a flagger’s job and understand how to properly and safely apply the components of the flagger position.
- **Course learning outcomes or objectives.** These are specific statements that include what people should be able to do at the end of the training. They need to be observable and/or measurable. In fact, on a presentation slide, the learning outcomes or objectives might be a list that is included below the statement, “By the end of this workshop, attendees should be able to...”

These statements need to begin with an actionable verb connected to the cognitive process expected and an object related to what “...knowledge students are expected to acquire or construct” (<https://www.celt.iastate.edu/teaching/effective-teaching-practices/revISED-blooms-taxonomy/> from Anderson and Krathwohl 2001). There are lists of these verbs online that are split into different attendee cognition levels from lower-order to higher-level thinking skills. A revised version of these skills includes the following: remember, understand, apply, analyze, evaluate, and create. A verb for a learning outcome statement related to an attendee “remembering” something might be to “describe,” but a verb related to the “creation” of something could be to “formulate.” Examples for a flagger and/or basic work zone course might include some version of one or all of the following:

- Describe appropriate personal protective clothing to be used for day and night operations and other work zone safety actions flaggers should apply
 - Explain the best flagger station setup and positioning
 - Demonstrate the proper use of a stop/slow paddle
 - Design and/or analyze the three to five most frequently used work zone signing setups encountered (if applicable to the audience)
 - Define the four major elements of a work zone and the five categories of work zone duration and their meaning (if applicable to the audience)
- **Assessment and evaluation methodologies.** As the CELT website indicates, these terms are often used interchangeably, but they do have several different characteristics. In addition, the inclusion of these in a checklist to determine if a training is properly designed, particularly with regard to assessment, may be somewhat difficult to determine. There are a number of methods of assessment. Also, the inclusion of some types of evaluation of the learning is something that needs to be well considered, as the approach used could impact attendance and the time needed to complete a training.

Assessment methods are efforts that are generally completed to determine whether learning is happening so that adjustments may be made throughout a training. In other words, assessments tend to be “ongoing” and related to “how learning is going” and the wish to “identify areas for improvement” (<https://www.celt.iastate.edu/teaching/assessment-and->

[evaluation/](#)). For example, some training Iowa LTAP staff have done include assessment questions that might be connected to course outcomes/objectives. These questions are used at proper intervals to determine if the majority of the attendees understand the content being shared. Adjustments can then be made, if needed, in the training approach to address any confusion the results may show. This is a very general approach to assessment and does not specifically identify the individuals that may be struggling with the material. There are also several other classroom techniques that can be used to learn similar types of information about the active learning that may be occurring.

Evaluation techniques, on the other hand, have characteristics that are more “final” and “judgmental.” For example, in the case of a flagger and/or basic work zone training, an evaluation might include something that shows that each person has learned the critical content (typically connected to the stated learning outcomes/objectives of the training). This evaluation could also be combined with attendee demonstrations of flagging and/or basic work zone setup (or, similarly, the ability to identify an error in a setup). What and how evaluations might be implemented can also be changed for different audiences and/or individual attendees (e.g., an experienced attendee looking for a refresher versus a less experienced attendee learning flagging and/or basic work zones for the first time). Iowa LTAP has also found that formal written evaluations (e.g., tests) can sometimes reduce participation in this type of voluntary training. However, there are also less formal approaches that can also be used for particular audiences and/or attendees.

Technical Course Content Suggestions

The technical course content for flagger training in Iowa is likely defined, in many cases, with respect to the content of the Iowa DOT Standard Specifications. It is the project team’s understanding that these specifications apply to Iowa DOT projects and those completing them and any projects that are let through the Iowa DOT letting process. The Iowa DOT Standard Specifications include the following training related information from Division 25, Section 2528, Traffic Control, Part 2528.03, Construction, Paragraph J, Flaggers:

1. Prior to flagging operations, ensure the flaggers are trained in safe flagging operations that comply with Iowa DOT Flagger’s Handbook, Part 6 of the MUTCD, and the Iowa DOT Standard Specifications. Ensure training of flaggers includes the following:
 - a. Issuing and reviewing the current Iowa DOT Flagger’s Handbook.
 - b. Presentation of the current Iowa Professional Flagging Video.
 - c. Issuing flagger training cards including the information as follows:
 - i. Employee name.
 - ii. Date of training.
 - iii. Name of instructor.
 - iv. Expiration date of December 31 of the year following the training date
2. Maintain a list of the flaggers trained and the date of the training.
3. Training is not required for short time, emergency, or relief assignment of employees to flagging operations. Payment will not be made in accordance with Article 2528.05, I.
4. Ensure flagger operations, equipment, and apparel comply with the current Iowa DOT Flagger’s Handbook.
5. When nighttime flagging is required, provide auxiliary lighting to illuminate the flagging

stations according to the MUTCD Part 6 and current Iowa DOT Flagger's Handbook. Set up this lighting in such a manner to minimize glare to motorists. The cost of furnishing nighttime flagging station lighting is included in the lump sum price bid for traffic control.

6. Ensure flaggers always carry their flagger training card and show it upon request.

Based on the previous list, the technical content for a flagger training should include, but not be limited to, the information in the following:

- Flagging operations based on the Iowa DOT Flagger's Handbook
- Flagging operations based on Part 6 of the current MUTCD if different than the above
- The content of the Iowa DOT Standard Specifications related to flagging in Iowa
- The Iowa Professional Flagging video (or recording)

In Iowa, we also have a Temporary Traffic Control Handbook (Wiegand and Richards 2016). This handbook is a summary of relevant work zone information from the 2009 Edition of the MUTCD. In work zone classes, this handbook, the Iowa DOT Flagger's Handbook, and/or a version of Part 6 of the MUTCD are sometimes provided as handouts. Local agency attendees might do flagging and also basic work zone setups as part of their job.

More specifically, the content of the Iowa DOT Flagger's Handbook (2015) includes the following:

1. Introduction and the chief duties of a flagger
2. Before flagging
 - a. Rules of conduct
 - b. Flagger apparel and equipment (clothing, day/night, etc.)
 - c. Flagger position
3. Flagging operations
 - a. Two flagger operations
 - b. Single flagger options
 - c. Pilot car operations
4. Emergency flagging
5. Other situations
 - a. Equipment crossings
 - b. Intersection work
 - c. Mobile operations
 - d. Railroad crossings
6. Guidelines for the supervisor

Specifics within each of these subjects are included in the handbook and MUTCD and may sometimes need to be adjusted for a specific audience. Some other items that might be included in these specifics are what not to do, how duration impacts preparation, sign paddle use demonstrations, and basic relevant work zone setups (see the following paragraphs).

In some cases, those in attendance (particularly local agency staff) may also have to bring signs, set up work zones, and/or review or confirm a proper work zone setup when they arrive on site at a project. In these cases, some additional information from the Iowa Temporary Traffic Control Handbook (Wiegand and Richards 2016) and MUTCD Part 6 is appropriate. This approach is true for many of the local agency staff that Iowa LTAP trains (although some projects also have signing and/or flagging contractors), and it usually combines flagger training with some basic work zone subjects. Some things that might be discussed in this case include Part 1 of the MUTCD (e.g., basic sign information), work durations, elements of a work zone, and typical sign setups and spacing that the audience may encounter. There is a checklist at the end of the Iowa Temporary Traffic Control Handbook (2016 Edition) that may be of value in identifying some of this information.

The Temporary Traffic Control Handbook (Wiegand and Richards 2016) content, which is based on the 2009 MUTCD and at least partially used in some basic work zone courses, is listed as follows:

1. Introduction
2. Importance of quality traffic control
3. Applicable standards and references
4. Work duration
5. Work zone TTC - major elements
6. TTC devices (e.g., signs, sign dimensions and installation, sign spacing, channelizing devices, ballast, device spacing, channelizing devices, arrow boards, and portable changeable message signs)
7. Shadow vehicles
8. Inspection and documentation of TTC
9. Flagging in work zones (refers to the Iowa DOT Flagger's Handbook noted previously)
10. High visibility safety apparel
11. Nighttime operations
12. Accommodation of pedestrians and bicyclists
13. Road and street closures
14. General notes and legend for TTC examples
15. 23 TTC examples, including lane closure for short-term or moving operations using a single flagger and lane closure on two-lane road using two flaggers
16. TTC zone checklist (not in table of contents)

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