CHAPTER 19
Improving Work Zone Safety

KEY TOPICS

- design improvements
- flaggers
- operations
- *Manual on Uniform Traffic Control Devices* (MUTCD)
- workers' safety

GOALS

- Implement improved methods to reduce the number and duration of work activities.
- Adopt improved procedures to ensure more effective traffic control and routing management in work zones.
- Enhance and extend training for planning, implementing, and operating work zones to maximize safety.
- Enhance safe work zone driving through education and enforcement actions.

BACKGROUND

A work zone is defined as the span between the first sign identifying the zone—"Road Work Ahead"—to a sign indicating the end of the work zone—"End Road Work." Work zones may be either stationary or moving, depending on the work being done.

Work zone crashes and fatalities occur in every functional highway classification. Many crashes in work zones are caused by drivers who are inattentive, who are unsure of work zone traffic control directions, or who drive aggressively to minimize delay. Work zone situations require increased attention because motorists often face special situations and are required to take special care. Work zone activities may increase crash potential and disrupt traffic.

Highway safety officials are challenged to make a thorough review of maintenance and construction practices, design standards, and contracting procedures to find ways to reduce the number and duration of work zones and ways to improve safety. From a thorough review, guidelines can be improved, demonstrated, evaluated, and enhanced to create safer work zone planning and operation. Any guidelines developed should be supplemented with training and ongoing communication to ensure that the enhanced actions are incorporated in work zones.

Work zone goals for improving safety encompass several actions, including using the updated MUTCD, establishing more effective day and night work zone operation review procedures, developing more effective public information guidelines, and demonstrating more advanced technology applications for work zones.

Among the potential strategies are engineering designs for work zones and the development and implementation of enforcement guidelines. In addition, coordinated public information and education campaigns should be constantly updated and expanded to increase driver knowledge and awareness of work zone dangers and the actions they can take to reduce the likelihood of a crash.

NATIONWIDE

Highway travelers nationwide are frustrated with the number of work zones and the delays that they cause. Over the duration of the Transportation Equity Act for the 21st Century (TEA-21; 1998–2003), funding levels for highway construction will increase nearly 40%, while congestion has been projected to increase by 50% in the next 10 years. Further, as the nation's highway infrastructure ages, more rehabilitation is needed. Work zone mobility and safety have increasing importance as work zones become more of a daily condition on our roads.

National Facts

According to the Federal Highway Administration (FHWA), nearly 800 fatalities and 37,000 serious injuries occur annually from vehicle accidents in work zones.

Over the last five years the number of persons killed in motor vehicle crashes in work zones has gone from 789 in 1995 to 868 in 1999, with an average of 768 fatalities a year. As part of the National Work Zone Awareness Week sponsored by the FHWA, American Traffic Safety Services Association (ATSSA), and American Association of State Highway and Transportation Officials (AASHTO), the Iowa Department of Transportation (Iowa DOT) reported the following national data for 1999 (*National Work Zone Awareness Week Fact Sheet*):

- 868 work zone fatalities occurred.
- 225 of these work zone fatalities resulted from large trucks.
- 16% of the work zone fatalities were nonmotorist—including construction and maintenance workers, pedestrians, and bicyclists.
- 40,000 people per year are injured in work zone crashes.
- At least 70% of all fatal work zone crashes occurred on roads with speed limits of 55 miles per hour or greater.

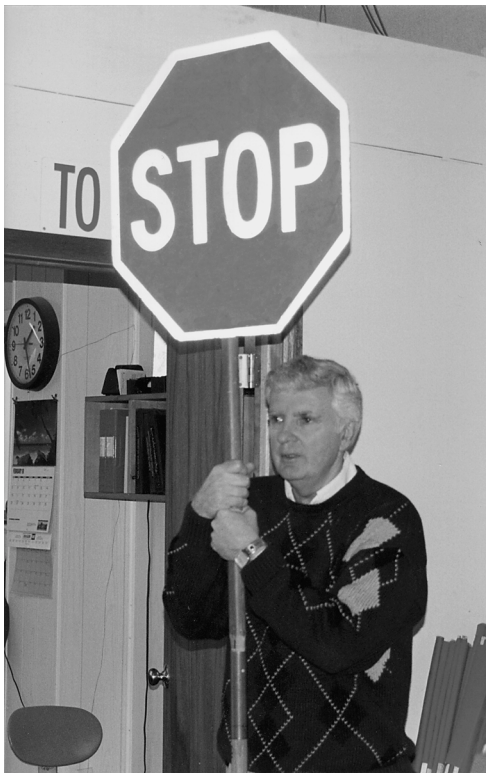
IOWA

In a typical year, Iowa motorists can expect to be inconvenienced by over 30,000 highway work zones on the interstate and primary highway system.

Ian MacGillivray, Director, Iowa DOT Research Division

Improving highway work zone safety is a high priority for the Iowa DOT. Annual traffic on Iowa highways has increased more than 32% during the past 10 years while annual construction has increased from $305 million in 1990 to $438 million in 2000. Increased traffic wears out roads faster and makes repairs necessary, and Iowa experiences more work zones and more work zone crashes.

Safety Circuit Rider Flagger Training



The Iowa DOT has one primary committee that reviews traffic control and traffic management processes in work zones. This Work Zone Traffic Safety Committee is responsible for the department's traffic control standards, specifications, policies, goals, and work zone philosophy. Since 1979 the Iowa DOT has conducted work zone safety training during the winter months. The Local Technical Assistance Program (LTAP) also offers flagger training to city and county agencies and others through its Safety Circuit Rider program (see photograph).

In addition to what the planners and builders can accomplish, motorists must respond appropriately to work zone driving conditions, and law enforcement can help provide incentives by enforcing existing laws. In Iowa roadwork zones, traffic fines are doubled for moving traffic violations as an extra incentive for drivers to exercise caution.

Iowa Facts

- 358 total work zone crashes occur per year in Iowa work zones.
- 40% of these crashes (about 140) cause injuries to the driver or passenger.
- 75% of Iowa work zone crashes are rear-end crashes.
- One-third of Iowa work zone crashes involve large trucks.
- 210 property damage crashes occur per year in Iowa work zones.
- Iowa work zone fatalities averaged eight per year from 1991 through 2000.
- 1999 Iowa work zone fatalities totaled 17; 2000 Iowa work zone fatalities totaled 6.
- 90% of Iowa work zone crash fatalities are motorists.
- 10% of Iowa work zone crash fatalities are public agency or contractor workers.

Iowa Public Opinion

When the public is asked about roadway construction processes, they usually request a common theme: "Get in, do the work, get out, and stay out." Motorists are more willing to put up with a delay knowing that the work will be done and no more work will need to be accomplished for a very long time.

Ian MacGillivray, Director, Iowa DOT Research Division

Iowa SMS Public Opinion Survey

The 1999 Iowa Safety Management System (Iowa SMS) *Iowa Strategic Highway Safety Plan* included a number of potential strategies for dealing with work zone safety issues. The Iowa SMS public opinion survey asked over 1,000 Iowans whether they would support these strategies.

Goals:

- 64% said that improving the design of construction sites should receive high priority over the next five years.

Strategies:

- 69% said they would support using videotape evidence to ticket motorists who speed through construction zones.
- 64% said they would support designing shorter length work zones.

POTENTIAL STRATEGIES

Legislation, Policy, and Enforcement

- Consider using automated speed enforcement in work zones.
- Implement a mandated regulatory reduced work zone speed limit reduction enforceable by ticket (see Successes and Strategies Implemented section in this chapter).
- Reduce the length of work zones to fewer miles where possible.
- Strengthen flagger and worker training requirements for all work zone employees (see Successes and Strategies Implemented section in this chapter).
- Enhance safe work zone driving through enforcement combined with public awareness actions.
- Promote law enforcement officer knowledge of MUTCD Part 6 regarding work zones.
- Consider 24-hour work schedules for road construction projects where appropriate.
- Consider "lane rental fees" to contractors as an incentive to reduce construction duration and the resulting motorist inconvenience and safety concerns.
- Include multidisciplinary involvement in work zone project planning and procedures to maintain consistent communication and preparedness for impacts on local jurisdictions (e.g., local SMS groups or incident management teams).
- Use the *Work Zone Best Practices Guidebook* (FHWA's Work Zone Mobility and Safety Program) in planning and maintaining work zones.
- Provide additional project funding to support additional speed enforcement in and near work zones (see Successes and Strategies Implemented section in this chapter).

Education and Public Awareness

- Enhance and extend comprehensive training programs for the planning, implementation, and maintenance of work zones for both government and industry at critical points in the work zone program.
- Enhance safe work zone driving through public awareness combined with enforcement actions.
- Produce more assertive public service and information announcements.
- Continue proactive announcements, brochures, press releases, and interviews regarding changes in major roadways.

- Continue web site postings of construction updates during the building season.
- Encourage use of daytime running lights in selected work zones.
- Encourage use of driver training source materials such as American Automobile Association's (AAA) video *Getting Safely Past the Orange Barrels* for driver education instructors and students.

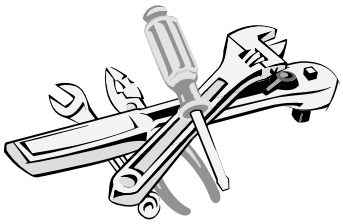
Design and Technology

- Implement improved methods to reduce the number and duration of work activities.
- Adopt improved procedures to ensure more effective practices, including traffic control devices for managing work zone operations.
- Investigate use of intelligent transportation systems (ITS) technology and other innovations, including changeable message signs, temporary rumble strips, and lighted signs.
- Review and apply the National Cooperative Highway Research Program (NCHRP) Synthesis 273 methodologies for traffic management.
- Study and implement improved signing for work zones and work zone vehicles (fluorescent yellow border on vehicle signs is being considered).
- Use speed display trailers, work zone rumble strips, and merge control systems where appropriate.

Other Initiatives

- Consider flagger and law enforcement International Municipal Signal Association (IMSA) certification cooperation (see Successes and Strategies Implemented section in this chapter).

SUCCESSES AND STRATEGIES IMPLEMENTED



- Improved crash data and analysis tools are available or under development (see Chapter 25, Improving Information and Decision Support Systems).
- The Iowa DOT sponsored a study of traffic safety improvement projects. The *Effectiveness of Roadway Safety Improvements* study (conducted by the Center for Transportation Research and Education) of 94 traffic safety projects concluded that there was a mean crash reduction rate of 23% on these hazard elimination and safety improvement fund projects.

- The *Traffic and Safety Informational Series* is sponsored by the Iowa DOT Office of Traffic and Safety. The goal of this project was to make available clear, concise, and consistent answers to 25 traffic and safety questions, commonly asked by local officials and the public. The information may be altered, distributed, and used as seen fit by area officials and/or transportation professionals. It is available in print, on disk, and on the web.
- The Iowa DOT Office of Traffic and Safety is developing the "TAS" manual for highway safety practitioners and engineers at the state and local levels (to be available in print and on the Office of Traffic and Safety web site in 2002).
- The Iowa DOT Office of Traffic and Safety sponsors the annual Traffic and Safety Forum each fall to help city, county, state, and consulting highway safety engineers stay up-to-date on recent developments in highway safety technology and practice.
- Beginning in the 2001 construction season, the Iowa DOT will post regulatory (enforceable) 55 mph speed limit signs in work zone lane closures on 65 mph expressways and interstates.
- Speed display sign trailers were purchased early in 2001 for use in maintenance and construction work zones.
- The Iowa DOT has a goal to have all work zone signs meet retro-reflectivity standards and be crashworthy; 6,000 signs plus hardware need to be purchased with a target completion of 2002, pending budget outcomes.
- Beginning in 2000, all Iowa DOT project flaggers must be trained. Beginning in 2001, all highway contractors working in Iowa will be required to have on staff their own ATSSA-certified traffic control technician to ensure quality control.
- Work zone safety workshops are sponsored by the Iowa DOT and the Iowa Division of FHWA each year. Over 700 Iowans representing state, city, and county highway agencies, contractors, utilities, and consultants gain current knowledge from Iowa's work zone safety experts.
- Iowa highway contracts require the use of contractor staff providing 24-hour traffic control monitoring and incident response on complex, high-traffic-volume projects.
- Iowa work zone safety public relations programs:
    - "Expect the Unexpected in the Work Zone" informs Iowa's motorists about work zone safety practices, including both media and educational components for children from grade school through high school.

  - o "Know Your Way Around" includes project-specific information and informs motorists of their travel options in and around high-volume, complex projects. Timely information is available to the public by radio and television releases, brochures, and on the Iowa DOT web site and links from news agency web sites.
  - o "Get the Picture, Listen to the Signs" is a national work zone safety campaign Iowa uses now.
- Iowa's Extra-Enforcement Program specifically funds law enforcement officers to patrol construction projects during peak travel periods. This and Iowa's Double Fine Law for moving operation violations (1993) encourage motorists to drive responsibly and safety through work zones.
- The Iowa DOT produces a pocket-sized *Flagger's Handbook* and a *Work Zone Safety Guidelines for Utilities* handbook.
- The Iowa DOT addresses work zone length and project duration through
  - o A progress-schedule-based incentive/disincentive specification to reward contractors who complete work before the end of the contract period and penalize those who complete work late
  - o A doubled pavement design life (from 20 years to 40 years) that lengthens the time between pavement reconstruction projects
- Iowa is one of five states collaborating in research and evaluation of innovative work zone devices and practices (other states include Kansas, Nebraska, Missouri, and Wisconsin).
- The Iowa DOT has adopted the national requirements regarding NCHRP 350 crashworthy traffic control signs.
- Iowa's award-winning Safety Circuit Rider program, part of LTAP, presents Principles of Flagging and Registered Flagger workshops to local agencies.

NOTE

The potential strategies in this chapter do not represent specific recommendations of the Iowa SMS Coordination Committee or any agency, group, or individual represented in Iowa SMS. The strategies represent a range of alternatives for legislators, department or agency directors, local governments, and citizen groups to consider when they elect to address a specific highway safety concern.

This toolbox is a living document that will continue to provide information, direction, and ideas for highway safety decision makers. Any strategies selected for implementation by Iowa SMS or any other entity will require further development through identifying potential partners, entities impacted, potential funding, steps for implementation, evaluation, and other pertinent tasks.

RESOURCES

Information in this chapter is drawn from many individuals and sources. Known sources are listed here. **Contributors:** Steve Gent (primary), Mark Bortle, Joyce Emery, Scott Falb, Susan Fultz, and Craig Markley.

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