

**Transportation construction administration**

by

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A thesis submitted to the graduate faculty  
in partial fulfillment of the requirements for the degree of

**MASTER OF SCIENCE**

Major: Civil Engineering (Construction Engineering and Management)

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Ames, Iowa

2007

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## **CHAPTER 1. GENERAL INTRODUCTION**

### **Introduction**

The author of the following thesis document acted as a research assistant for three different research projects while pursuing a Masters of Science degree in Civil Engineering at Iowa State University. The three projects all dealt with transportation construction administration and offered a unique opportunity to research the topics of “temporary traffic control and enforcement of traffic laws in closed road sections,” “construction and testing of an accelerated bridge construction project in Bonne County, Iowa” and “scheduling specification for the rehabilitation and reconstruction of I-235.” For the projects mentioned the author of this thesis acted as both a co-author for the final report phases and as a research assistant during the research phases.

### **Thesis Organization**

The previously introduced research topics have been arranged hereafter chronologically by completion date of final report for each project. The first report was titled “temporary traffic control and enforcement of traffic laws in closed road sections,” and appears as CHAPTER 2 in this thesis. The author was tasked with conducting a state by state evaluation of temporary traffic control policy and law, including related law enforcement issues, for the state of Iowa and selected surrounding states. The evaluation included both state statute and state department of transportation (DOT) construction specifications and other documents that set policy. A literature review of existing studies was also conducted. In addition to the previously mentioned items, the author attended meetings with the project’s advisory board, prepared a presentation of the research findings and conclusions for the Mid-Continent Transportation Research Symposium 2007, authored the first draft of the final report, this draft was provided to the principal and co-principal investigators who then content and line edited the document before final editing by the Center for Transportation Research and Education, Iowa State University.

The second element of this thesis is a scheduling analysis to support an investigation that was documented in the modified proceeding paper entitled “construction and testing of an accelerated bridge construction project in Boone County, Iowa” and appears as CHAPTER 3 of this thesis. During the research phase of the project, the author analyzed the Iowa DOT’s *Weekly Report of Working Days* for the accelerated bridge construction. From the *Weekly Report* the author determined both an actual construction schedule that occurred and a theoretical schedule in which projects similar to the one in Boone County could be constructed. During this process the author worked with the Iowa DOT Bridge Design office to develop durations and schedule logic sequences for various construction activities on the bridge. It was requested by the Iowa DOT Bridge Design office that the author develop the theoretical schedule in terms of the number of days construction activities must occur, rather than calendar days or working days to allow for changes in design of future projects. The author was further informed that some of the construction activities performed on the Boone County accelerated bridge project would not be required on future projects, therefore these activities should be left out of the theoretical schedule. The theoretical schedule developed by the author represents a more closely sequenced chain of activities that would likely be more typical for future projects that are constructed in higher traffic situations.

The third and final project report included in this document, CHAPTER 4, is titled “scheduling specification for the rehabilitation and reconstruction of I-235.” During the research phase of the project the author performed tasks to document contractor schedule performance on the I-235 project. The tasks performed by the author were reviewing contractor-submitted schedules, comparing the schedules with actual progress in the field and attending regular meetings where scheduling issues were discussed. In addition to the tasks performed the author helped to create recommendations for developing an efficient schedule specification review system for use by others.



## **CHAPTER 2. TEMPORARY TRAFFIC CONTROL AND ENFORCEMENT OF TRAFFIC LAWS IN CLOSED ROAD SECTIONS**

Final Report for the Center for Transportation Research and Education, Iowa State University

Kelly Strong, Thomas McDonald and Cole Landau

### **Executive Summary**

Improvements, major repairs, and other events on transportation facilities often require temporary closure of the road or street to general public travel. However, locally originating traffic on these roadways is frequently permitted in order to provide access to homes, farms, and businesses. While the Manual on Uniform Traffic Control Devices (MUTCD) provides excellent guidance for temporary traffic control in sections of work zones open to traffic, this reference offers little advice for local traffic inside closed roadway sections. In addition, state laws and agency roadway specifications may not definitively address either the issue of temporary traffic control or traffic law enforcement on roads and streets closed to general public access. When a road or street is officially closed, even temporarily, some confusion may exist regarding the level of traffic law enforcement since the facility is not open for use by the general public. In addition, the Code of Iowa includes liability protection for both the agency and contractor in closed road sections (except in cases of gross negligence), which could further confuse the issues of responsibility and authority of an agency. Pertinent sections of the Iowa Code relating to temporary road closure are discussed in this report, along with relevant sections from the laws of surrounding states.

Based on the issues described above, this research study was conducted to investigate temporary traffic control and law enforcement practices and policies in temporarily closed road sections by various agencies. The three primary objectives of the study were as follows:

1. Provide a synthesis of current practices and policies regarding temporary traffic

- control and enforcement of traffic laws in temporarily closed road sections
- 2. Evaluate the needs of state and local transportation agencies relating to possible modifications in enforcement practices for closed road sections
- 3. Recommend changes in temporary traffic control and enforcement policies and procedures to improve safety in road closure areas

This report presents the results of state law reviews; surveys of DOT staff in Iowa and other states, Iowa law enforcement officers, and local agency personnel; and expert panel discussions. The findings suggest that application of temporary traffic control, enforcement of traffic laws and safety in closed road or street sections could be improved through possible code revisions, better communication of best practices, implementation of surveillance and control technologies, and development of an expanded driver education program.

## **Introduction**

Public travel by road users is often necessary in road and street sections that have been officially closed on a temporary basis for construction, repair, or other reasons. This authorization is necessary to provide access to homes, farms and businesses located beyond the point of closure. The Manual on Uniform Traffic Control Devices (MUTCD) does address appropriate use of specific regulatory signs at the entrance to closed sections; however, direct guidance for temporary traffic control (TTC) measures and enforcement of traffic laws within these areas is not included but may be needed. Interpretation and application of common practices may vary among transportation agencies. For example, some law enforcement officers in Iowa have indicated a reluctance to enforce traffic laws in these areas because the Code of Iowa appears to address only violations on roadways open to “public travel.” TTC and enforcement of traffic laws in closed road sections is desirable to maintain safety for workers and authorized road users. In addition, occasional unauthorized entry by motor vehicles is experienced in closed road areas, resulting in property damage and potential liability for agencies and contractors. Citations beyond simple trespass may be advisable to provide better security for construction sites, reduce economic losses from damage to completed work, and create safer work zones.

As part of this study, a literature review was performed to identify existing research and/or other references for guidance in applying TTC and enforcement in closed road sections; however, very few studies addressing these issues were identified. For example, Elias and Herbsman (2000) published the results of a study suggesting that legislation and programs at state and federal levels are emphasizing a need for increased study of work zone issues. This need is especially acute as it relates to road closures since many transportation agencies shift resources from new infrastructure development to rehabilitation and remediation of existing infrastructure.

In addition, the literature search also examined specific references in current adjacent state laws that might address TTC and/or law enforcement in road sections closed to public travel. The research examined state laws in Iowa as well as the surrounding states of Kansas, Minnesota, Missouri, Nebraska, South Dakota, and Wisconsin. The primary methodology used was to perform keyword searches of each state's legislative and Department of Transportation (DOT) web sites. The keyword method proved to be sufficient at locating most, if not all, state law/code provisions dealing with the topics of interest. A summary of the findings for each state is included in this report.

This study presents data collected directly from law enforcement officers, municipal and county engineers, and state DOT staff describing their opinions and personal experiences with TTC and law enforcement in closed road sections. The data was collected by use of surveys distributed both through the Internet and during a focus group interview session with county engineers and staff on December 5, 2006. A comprehensive breakdown of the survey results and interview session findings is included.

An advisory committee was invited to contribute to the study by sharing experiences and offering suggestions for possible Iowa DOT specification revisions and Code modifications. The Advisory Committee included staff from the Iowa DOT, the Iowa Governor's Traffic Safety Bureau, contractors, law enforcement officers, and city and county engineers. The committee met twice during the execution of the study—once near the initiation of research

to discuss potential sources of information and later to discuss and respond to survey results and make suggestions for possible Code enhancements and Iowa DOT specification revisions. The results from the committee meetings are summarized in this report.

For the purposes of this study, “closed road or street” refers to those sections temporarily closed to full or partial use by the public during construction, maintenance, or other activities by official action of the agency or official having jurisdiction. This term as used herein does not include facilities that may have been closed and vacated from future public use entirely.

### **Advisory Committee**

A panel of experienced and knowledgeable professionals was invited to participate in this project in order to assist the authors in identifying pertinent needs and valuable resources, provide guidance and opinions, and offer recommendations for mitigation of problems in closed road situations. Following is a listing of those professionals from a variety of disciplines and agencies.

- Mark Bortle                      Iowa Department of Transportation
- Dan Sprengeler                Iowa Department of Transportation
- Brenda Boell                    Iowa Department of Transportation
- Bob Rushing                    Governor’s Traffic Safety Bureau (retired)
- Larry Clark                     Cherokee County Engineer
- Steve Thomassen               Assistant Marshall County Engineer.
- Jody Rhone                      City of Newton
- Sgt. John Williams             Coralville Police Department
- Lt. Dru Toresdahl               Story County Deputy Sheriff
- Mark Bare                        Nuckolls Concrete Services
- Tom Busta                        NES Traffic Safety

## **Literature Review and Existing Research Studies**

The Manual on Uniform Traffic Control Devices (MUTCD) is the major guidance document for traffic control in the United States. All states are required to adhere to the precepts therein as minimum standards, although higher standards can be adopted. Part 6, Temporary Traffic Control, addresses many issues involved in guiding and controlling traffic in work zones, and several sections are pertinent to closed roads and streets. For example, Chapter 6A, General, includes the following requirements that could have pertinence in closed road sections:

The needs and control of all road users (motorists, bicyclists, and pedestrians, with the highway, including persons with disabilities in accordance with the Americans with Disabilities Act of 1990 (ADA), Title II, Paragraph 35.130) through a TTC zone shall be an essential part of highway construction, utility work, maintenance operations, and the management of traffic incidents.

TTC plans and devices shall be the responsibility of the authority of a public body or official having jurisdiction for guiding road users. There shall be adequate statutory authority for the implementation and enforcement of needed road user regulations, parking controls, speed zoning, and the management of traffic incidents. Such statutes shall provide sufficient flexibility in the application of TTC to meet the needs of changing conditions in the TTC zone. (MUTCD Chapter 6A)

Several recommendations in Chapter 6B, Fundamental Principles, should be considered in closed road situations, such as the need for developing general plans or guidelines to provide safety for all road users and workers in work zones, performing routine day and night inspections of TTC elements, and providing appropriate training for persons involved in work zone traffic control.

Chapter 6F, Temporary Traffic Control Zone Devices, describes and illustrates several signs that are commonly used for closed road situations, with some important stipulations. Section 6F.08, ROAD (STREET) CLOSED Sign (R-11-2), includes the following statement:

The ROAD (STREET) CLOSED sign shall not be used where road user flow is maintained or where the actual closure is some distance beyond the sign. (MUTCD Chapter 6F)

This chapter also describes other signs and applications for closed road situations in Section 6F.09, Local Traffic Only Signs (R-11-3a, R11-4). Advance warning signs for closures are described in Section 6F.19. Section 6F.63 describes and illustrates barricades that are recommended for use with road closures.

Chapter 6G, Type of Temporary Traffic Control Zone Activities, includes several recommendations and suggestions specific to traffic control in closed road sections, especially in Sections 6G.10, 6G.12, 6G.15, and 6G.16.

Chapter 6H, Typical Applications, presents illustrated recommendations for TTC in a wide variety of work zones, including road closures. Of particular note for this study are Figure 6H-7, Road Closure with Diversions (TA-7); Figure 6H-8, Road Closure with Off-Site Detour (TA-8); Figure 6H-9, Overlapping Routes with Detour (TA-9); Figure 6H-20, Detour for Closed Street (TA-20); Figure 6H-39, Median Crossover on Freeway (TA-39); and Figure 6H-40, Median Crossover for Entrance Ramp (TA-40). In addition, Figures 6H-28 and 6H-29 deal with sidewalk closures and special issues with pedestrians. All typical applications in the MUTCD include notes that must be considered.

Chapter 6I, Control of Traffic through Traffic Incident Management Areas, is a new addition to the MUTCD and includes several recommended procedures for dealing with traffic in these situations, which often can include temporary closure of roads and streets.

The issue of TTC and law enforcement in closed road sections has not been a highly researched topic. A review of the academic literature in the fields of civil engineering found no studies or existing research dealing with the topic specifically. However, some notable studies have been performed on the related topics of temporary traffic control, temporary road closures, and lane closures.

A field evaluation of late merge traffic control in work zones, which only dealt with two-to-one lane closure and not full road closure, was performed by Beacher (2005).

Zech (2005) performed an evaluation of rumble strips and police presence as speed control measures in highway work zones and concluded that police presence with rumble strips decreased vehicle speeds the most; however, the highway was open to full public travel during this study.

Pre-announced temporary closures were modeled by Tong (1998) to generate optimal routes for trips in road networks operating at capacity; however, the issue of traffic control enforcement was not mentioned.

A study of urban work zone traffic management by McGuinness (1997) in the City of Columbus, Ohio explored practices such as closing freeway ramps and approach roads to work areas to reduce excess demand, providing alternate routes, and using a traveler information program; however, the study did not address the issue of enforcement.

Interestingly, some studies might have relevance to TTC and enforcement in closed road sections because they primarily examined detection and surveillance on open roads. The subject of online object tracking for color video analysis was described by Lannizzotto (2002) as a possible use in traffic control because video sequences can track shapes, positions, and orientation of objects. Use of closed circuit television systems to monitor/detect urban traffic and as a control device was explored by Franklin (1999). Harrison and Lupton (1999) discussed the development of ARTEMIS (automatic road traffic event monitoring information system), a computer monitoring system that can detect traffic events and dispatch patrol cars.

However, no studies were found that specifically addressed the issue of temporary traffic control inside closed road sections and enforcement of traffic laws therein. Therefore, this current study will make an important first step in analyzing the issues of TTC and enforcement of traffic laws in closed road sections.

## **Current State Laws and DOT Specifications**

### *Research Methodology*

To identify current state laws and code provisions regarding TTC and enforcement in closed road sections, adjacent states' legislative and Department of Transportation web pages were searched systematically for keywords by utilizing the "search" function for those sites. The list of keywords was identified by the author as words, word arrangements, phrases, and acronyms having the most frequent appearances in TTC and law enforcement in closed road sections literature. The keywords utilized by the author are listed below.

- Tort liability
- Current road closure policies
- Current road closure practices
- TTC
- Temporary traffic control
- Temporary traffic control enforcement
- Closed road enforcement
- Enforcement of traffic laws
- Road closed to public
- No thru traffic
- Uniform traffic control devices
- Claims from road construction

Once a search returned a result or results, each code section was reviewed by a member of the research team to verify that it had relevance to the study. Useful results were copied and pasted into Word documents and the source was referenced. Each result was then categorized into one of the following topics: Access, Jurisdiction, Liability, Enforcement, Traffic Control, or Property Damage. The summary result of each state's web search follows, with full text code language included in Appendix A of this report.



*Iowa*

Permanent closing and vacation of a road or railroad crossing is addressed in Iowa Code Sections 306.10 and 306.11, where the procedure and responsibilities of agencies in control of the road are described.

Temporary closure for construction is addressed in Section 306.41 of the Iowa Code, stating in part, “Nothing herein shall be construed to prohibit or deny any person from gaining lawful access to the person's property or residence, nor shall it change or limit liability to such persons.” This provision implies that access must be provided to private property owners and that the agency and/or contractor should not consider responsibility toward such persons as reduced. However, this only allows for access to property or residences by use of the closed road section, and does not apply to people visiting or passing through.

Jurisdiction over closed road sections is outlined in the Iowa Code as well.

The agency having jurisdiction and control over any highway in the state, or the chief engineer of said agency when delegated by such agency, may temporarily close sections of a highway by formal resolution entered upon the minutes of such agency when reasonably necessary because of construction, reconstruction, maintenance or natural disaster. (Iowa Code, Section 306.41)

This provision grants an agency power to temporarily close road sections; however, it does not define responsibilities for enforcement of traffic laws therein when the section is closed to public travel.

The Iowa Code also states that

the agency having jurisdiction over a section of highway closed in accordance with the provisions of this section, or the persons or contractors employed to carry out the construction, reconstruction, or maintenance of the closed section of highway, shall not be liable for any damages to any vehicle that enters the closed section of highway

or the contents of such vehicle or for any injuries to any person that enters the closed section of highway, unless the damages are caused by gross negligence (emphasis ours) of the agency or contractor. (Iowa Code, Section 306.41)

This exemption from liability could result in some confusion regarding responsibilities toward authorized road users within a closed road area.

Enforcement of traffic laws in a closed roadway is not clearly stated. The Iowa Code Section 321.2 states,

The division of state patrol of the department of public safety shall enforce the provisions of this chapter relating to traffic on the public highways of the state, including those relating to the safe and legal operation of passenger cars, motorcycles, motor trucks and buses, and to see that proper safety rules are observed. (Iowa Code, Section 321.2)

This section, however, does not clearly state the application in temporarily closed road sections and might result in some confusion as to what authority exists for enforcement of traffic laws in closed road or street sections. This code section only addresses Iowa State Patrol responsibilities; additional code sections describe authority of other law enforcement agencies, including Section 321.6, Reciprocal Enforcement-Patrol Beats; Section 321.236, Powers of Local Authorities; and Section 801.4, Criminal Procedure and Definitions (peace officer).

Responsibility for temporary traffic control in closed road areas is not specifically addressed in the Code. Section 321.253 states that

the department shall place and maintain such traffic-control devices, conforming to its manual and specifications, upon all primary highways as it shall deem necessary to indicate and to carry out the provisions of this chapter or to regulate, warn, or guide traffic. (Iowa Code, Section 321.253)

This section also states that “the department shall post signs informing motorists that the scheduled fine for committing a moving traffic violation in a road work zone is doubled.” These provisions do not address closed road sections directly, however.

In Section 321.256, the Iowa Code states that

no driver of a vehicle shall disobey the instructions of any official traffic-control device placed in accordance with the provision of this chapter, unless at the time otherwise directed by a peace officer subject to the exceptions granted the driver of an authorized emergency vehicle. (Iowa Code, Section 321.256)

This provision could be interpreted to authorize enforcement of traffic laws in closed road sections, provided that proper temporary traffic control procedures have been followed for the closure.

While malicious damage to property is covered elsewhere in Iowa law, Section 321.260 of the Code extensively addresses interference with official traffic control devices. Provisions in this section address damages, vandalism, and unlawful possession of traffic control devices, including penalties upon conviction. This section can be applied to closed road sections, but it does not address damages to contractors’ finished work.

Iowa Code Section 668.10 provides agencies with immunity from claims for failure to place, erect, or install a stop sign, traffic control device, or other regulatory sign as defined in the MUTCD. This provision also applies to temporary traffic control in work zones, including closed road sections. However, claims are not barred for the following:

- Failure to maintain regulatory traffic control devices (Section 668.10(1)).
- Signs that might “mislead or endanger” motorists (See *Hershberger v. Buena Vista County*, 391 N.W. 2d 217, 218-220, Iowa 1986)
- Failure to warn by “other than inanimate devices” under exigent (critical) situations (See case cited above)

The maintenance exception found in Section 668.10(1) is narrowly drafted, providing,

However, once a regulatory device has been placed, created, or installed, the state or municipality may be assigned a percentage of fault for its failure to maintain the device. (Iowa Code, Section 668.10[1])

More on this issue is presented under Litigation History and Case Law in this report.

The Standard Specifications for Highway and Bridge Construction promulgated by the Iowa Department of Transportation contain several provisions directly dealing with temporary traffic control during project work and detailing responsibilities of contractors and contracting agencies. Specifically, Article 1107.07, Safety, Health, Pollution, and Sanitation; Article 1107.08, Public Convenience and Safety; and Article 1107.09, Barricades and Warning Signs, all contain an enumeration of responsibilities and requirements for public safety and convenience as well as worker safety. Section 2528, Traffic Control in the Standard Specification, describes numerous traffic control devices and applications that might be required on projects and details compensation methods for that work. Although closed road applications are covered in several of these articles, specific requirements for temporary traffic control within closed areas is not specifically addressed.

Standard Road Plan TC-252 addresses temporary traffic control measures required for road closures, but does not directly address any TTC responsibilities for potential safety concerns within the area where public travel is permitted, although the MUTCD and other TCs in the standard road plans would require traffic control similar to an open roadway since limited public access is allowed.

The Office of Construction at the Iowa DOT maintains a Construction Manual that contains instructions to field inspection staff on various areas of construction where guidance beyond the Standard Specifications is needed. Chapter 5 of that manual is entitled Safety; information therein is presented on many aspects of that topic, including temporary traffic

control and reporting of crashes that occur within work zones. However, temporary traffic control and law enforcement within closed road sections is not specifically addressed, although Section 5.41 does contain excellent advice for inspection staff regarding the use of Road Closed to Thru Traffic signs (R11-4).

### *Kansas*

Regarding access to closed road sections, the Kansas Standard Specifications for Highway Construction, published by the Kansas DOT, states,

When it is necessary for residents living along the road to use the road which is closed to through traffic, suitable means (including the use of temporary surface material) shall be provided for their entrance or exit, but the general traveling public shall be excluded. (Kansas Standard Specifications, Section 821.03)

This provision definitively states that access must be provided to private property, but does not apply to general public travel. Also stated in the Kansas Standard Specifications is the following:

The contractor shall designate someone from his work force at the project level who will have the responsibility for signing and traffic control on the project, which person shall be available 24 hours a day to repair, replace, remove, relocate, clean and maintain any traffic control device required or as directed by the Engineer...Unless approved otherwise, all work shall be performed during daylight hours. Whenever practical, all vehicle equipment, tools, and materials, except necessary barricades and lights, shall be parked and/or stored off the right-of-way or far enough from the edge of pavement to provide clearance of at least 30 feet. (Kansas Standard Specifications, Section 821.03)

This section requires that contractors be responsible for all aspects of temporary traffic control for a project, including perhaps closed road sections. It is further stated that

the Contractor may develop an alternative Traffic Control Plan to be submitted to the Engineer for approval prior to its use...Traffic control shall be in accordance with FHWA MUTCD and supplied by contractor. (Kansas Standard Specifications, Section 821.03)

### *Minnesota*

The Minnesota Traffic Engineering Manual (TEM) outlines information from the Minnesota Statutes (MSA) as it relates to traffic engineering. With regard to controlled access highways, the TEM states,

Section 169.305 of the [Minnesota] Statutes grants authority to the Mn/DOT and local authorities to prohibit incompatible traffic on controlled access highways under their respective jurisdictions. Such prohibitions and restrictions are effective only when appropriate signs are erected on the affected highway. (Minnesota Traffic Engineering Manual, Section 2-7.02)

This section may or may not apply to construction closures, however.

The Minnesota TEM also states,

Under MSA Section 169.06, Subd. 2, it is the sole responsibility of Mn/DOT to place and maintain all necessary traffic control devices on Trunk Highways although permission to do so may be granted to other authorities by Mn/DOT. (Minnesota Traffic Engineering Manual, Section 2-4.03.01)

Further, the TEM states,

Under MSA Section 169.06, Subd. 3, local authorities have both the right and the responsibility to place and maintain traffic control devices on streets and highways under their jurisdiction. (Minnesota Traffic Engineering Manual, Section 2-4.04.01)

Regarding liability, the Minnesota TEM says,

In order for Mn/DOT to be liable for a tort claim, three elements must be present:

- Mn/DOT must have a legal duty to the plaintiff to perform a particular task
- Mn/DOT must have been negligent in its duty to perform that task
- The damages incurred by the plaintiff were caused by the negligent performance of that duty (Minnesota Traffic Engineering Manual, Section 12-3.01)

Regarding property damage the Minnesota TEM states,

In order for Mn/DOT to have liability for damages, a claimant must prove:

- That Mn/DOT had a legal duty to use reasonable care towards the plaintiff,
- That the Mn/DOT breached that duty by falling below the standard of care thus committing an act of negligence,
- That damages (injuries, property damage, pain and suffering, loss of income, etc.) incurred by the plaintiff were caused by Mn/DOT negligence, and finally
- For the claimant to recover the damages suffered, the claimant must have had a percentage of fault that was less than or equal to the fault of the defendant (Minnesota Traffic Engineering Manual, Section 12-3.05)

Negligence is defined in Section 12-3.03 of the TEM as “the failure to do something which a ‘reasonable person’ would ordinarily do, or the doing of something which a reasonably prudent person would not do.”

Regarding enforcement, the Minnesota TEM states that “local authorities have virtually complete authority (with notable exceptions such as Speed Zoning and Experimental Devices) over all streets and highways under their jurisdiction” (Minnesota Traffic Engineering Manual, Section 2-3.02.01).

Minnesota law requires the development of Traffic Management Plans (TMP) for all work zones. The TEM describes TMPs as follows:

A Traffic Management Plan (TMP) is a plan of action which, when put into effect, details the procedures that Mn/DOT utilizes to assure that adequate provisions are made for the safety of motorists, pedestrians and workers...Mn/DOT needs a total commitment by all persons involved to insure that adequate consideration is given to proper traffic control for all operations. In order to assure that this commitment is met, it will require early involvement by all parties involved, such as pre-design, design, traffic, maintenance, and construction. Typical guidelines have been developed for the various stages...During the construction stage, the resident/project engineer will generally be the Mn/DOT person responsible for traffic control. The resident/project engineer may delegate this authority. This should be done at the pre-construction conference. (Minnesota Traffic Engineering Manual, Section 8-4.01.02)

According to the TEM, one of the goals of the pre-construction conference is to ensure that all affected agencies, such as state patrol, local police, fire departments, sheriff's office, hospital, ambulance service, local government, post office, school districts, etc., are informed of the scope of the project and how it may affect their individual needs and services (8-4.01.02).

Although closed road sections are not specifically mentioned, it could be assumed that the Traffic Management Plans would address those relevant perceived needs.

### *Missouri*

The Missouri General Construction Manual states,

When law enforcement is specified in a construction contract, the contractor is responsible for coordinating with local law enforcement. The contractor's working hours and work schedule should be furnished to the agency providing the law enforcement (highway patrol, county sheriff, city police) so that enforcement hours



can be coordinated. The engineer should review and approve the contractor's proposed law enforcement schedule. Supporting documentation should be provided by the enforcement agency. Verification will be performed by the contractor and MODOT prior to payment. (Missouri General Construction Manual, Section 616.4.4)

Similarly, as stated in the Missouri Standard Specifications for Highway Construction Manual,

When specified in the plans, law enforcement personnel and vehicles shall be provided within the work zone as directed by the engineer. Law enforcement personnel shall have jurisdiction to enforce all traffic laws in the area to be patrolled. (Missouri Standard Specifications for Highway Construction, Section 616.4.4)

Missouri law also requires that a Traffic Control Plan (TCP) be developed for every project. The Missouri DOT's Project Development Manual states,

The TCP is an integral part of the planning and design of a project. The scope of the TCP is determined by the complexity of the project and is developed by the designer in the district in cooperation with district construction, maintenance and traffic personnel. Typical traffic control set-ups shall be shown for each work activity within the work zone. A preliminary field check with district construction and traffic is recommended to ensure the TCP will be compatible with field conditions. (Missouri Project Development Manual, Section 8-04.1)

The Missouri General Construction Manual states,

The contractor shall provide written notice to the engineer of any pedestrian or vehicular accident when physical evidence or other information suggests an accident has occurred in the work zone. The contractor shall obtain and provide to the engineer copies of law enforcement accident reports for any accidents in the work zone. (Missouri General Construction Manual, Section 616.4.2.7)

Although not specifically stated, these provisions would presumably apply to closed road sections as well.

### *Nebraska*

According to the Access Control Policy to the State Highway System, published by the Nebraska Department of Roads (NDOR),

The method of controlling access to roadways [in Nebraska] may be through police power, to a limited degree, or by acquisition of access rights in full or in part. Police power regulation has universally been held valid as a proper exercise of governmental function. The universal test has required that such controls be reasonable. Therefore, any exercise of the police power, as in matters of access control, where no payment of compensation is required, may not ordinarily limit, restrict, or otherwise reduce access below a point where such access is deemed reasonably necessary and adaptable to serve the owners' lands. Beyond this point, police power controls may not be used. When police power no longer provides the degree of control considered necessary for safe and efficient operation, it is then necessary to acquire private property, in the form of access rights, for public use by payment of just compensation. (Nebraska Access Control Policy to the State Highway System, Section 002)

It is further stated in the Nebraska Standard Specifications for Highway Construction manual that “the Contractor shall insure the orderly movement of traffic through or around the work at all times” (Section 107.07).

Regarding temporary traffic control within closed road sections, the Nebraska Standard Specifications for Highway Construction manual states,

All traffic control devices shall be located according to and meet all requirements prescribed in the MUTCD...When more than one Contractor is working on the project or when consecutive projects require protection and control of traffic, the

Engineer shall determine and notify in writing the Contractor whose responsibility it shall be to provide the protection and control of traffic. (Nebraska Standard Specifications for Highway Construction, Section 422.01)

This provision makes it clear that the contractor is responsible for all TTC.

The Nebraska Standard Specifications manual further states,

The Contractor shall carry public liability insurance to indemnify the public for injuries or death sustained by reason of carrying on the work. In addition, the Contractor must also carry worker's compensation insurance in accordance with Nebraska statutory requirements. (Nebraska Standard Specifications for Highway Construction, Section 107.13)

Regarding property damage, the manual says, “The Contractor shall be responsible for all damage or injury to any property” (107.12). These Code sections may have application in closed road sections, but that intent is not clearly defined.

#### *South Dakota*

Regarding public access in work areas, the South Dakota Standard Specifications for Highway Construction manual states,

The Contractor shall conduct his work to minimize obstruction to traffic. The safety and convenience of the general public and the residents along the highway and the protection of persons and property shall be provided for by the Contractor. (South Dakota Standard Specifications for Highway Construction, Section 7.7)

Further, the Standard Specifications for Highway Construction manual states,

The Contractor shall bear the expense of maintaining traffic over the project undergoing improvement, constructing and maintaining approaches, crossings,

intersections, and other features as may be necessary, without direct compensation, except as provided below. (South Dakota Standard Specifications for Highway Construction, Section 7.12)

These two sections make it the responsibility of the contractor to provide and maintain access within a project, which may include a closed road section.

The South Dakota Standard Specifications manual also states that

the Contractor shall be responsible for all damage or injury to property, resulting from an act, omission, neglect, or misconduct in his manner or method of executing the work, or due to defective work or materials (South Dakota Standard Specifications for Highway Construction, Section 7.12)

The manual further declares that

the Contractor shall indemnify and save harmless the Department, its officers and employees, from all suits, actions, or claims of any character brought because of any injuries or damage received or sustained by any person, persons, or property on account of the operations of the said Contractor; or on account of or in consequence of any neglect in safeguarding the work; or through use of unacceptable materials in constructing the work; or because of any act or omission, neglect, or misconduct of said Contractor. (South Dakota Standard Specifications for Highway Construction, Section 7.14)

This section clearly identifies responsibility, but not specifically how enforcement of traffic laws is to be carried out in closed road sections.

### *Wisconsin*

The Wisconsin Department of Transportation (WisDOT) Facilities Development Manual states, “On any construction project, the method of construction the project and the method

of handling traffic should be resolved early in the project development process” (Section 11-50-30). Guidelines are provided in the manual for determining the amount of law enforcement involvement desirable for a given project.

Wisconsin Code Section 107.8 states that a contractor must “notify the responsible fire department and police department at least 24 hours before closing a road, street, or highway.” Furthermore, Section 62.15 (11) of the Wisconsin Statutes provides that “any obstruction of a street due to construction requires barriers and lights to be erected by the contractor.”

Additionally, as required in Section 104.6.4 of the Wisconsin Facilities Development Manual,

If the contract provides that the road or portions of the road be closed to through traffic, furnish, erect, and maintain the traffic control devices at the project termini and at intersecting roads along the project the contract specifies or the engineer directs. Also, furnish, erect, and maintain those traffic control devices within the project limits as may be required for the safe accommodation of local traffic as defined in 101.3. At all times conduct the work in a manner to provide safe, reasonably-direct, all-weather, 24-hour pedestrian and vehicular access to abutting properties along the highway being improved. (Wisconsin Facilities Development Manual, Section 104.6.4)

The contractor is responsible for furnishing and maintaining all TTC 24 hours a day. Regarding signage, Section 86.06 of the Wisconsin Statutes states

Any person who, without lawful authority, removes, takes down, alters the position of, destroys, passes over or beyond any barrier so erected, or travels with any vehicle upon any portion of a highway closed by barriers as in this section provided, or walks or travels in any manner upon the materials placed thereon as part of the repair or construction work, shall be liable to a fine of not less than \$10 nor more than \$100, or

to imprisonment not less than 10 nor more than 60 days, or both, and in addition thereto shall be liable for all damages done to the highway, said damages to be recovered by such governmental agency. (Wisconsin Statutes, Section 86.06)

This provision sets penalties for unauthorized entry and damages in a closed road or street section.

### **Litigation History and Case Law**

The Iowa Department of Transportation maintains records of tort claims and lawsuits filed against that agency for alleged damages. All claims are categorized, including those originating from work zone activities. The categories noted do not include closed road incidents specifically, but the number of claims from work zone activities is low in relation to the total number filed.

While the Iowa State Code and Administrative Law are a major guidance for public agency operations and practice, litigation experience and court decisions establish precedence that can affect policies and procedures. In Iowa, the history of litigation involving road closure issues is not extensive, but some examples do exist. *Hershberger v. Buena Vista County*, 341 N.W. 2d 217, 218-220 (Iowa 1986), involved a claim regarding the alleged misuse of a warning sign and was not work zone related. However, the case did define limits for the traffic control device immunity provision of Code Section 668.10 and thus could have implications for future claims from work zone incidents.

Another case involving immunity was *Messerschmidt v. City of Sioux City*, 654 N.W.2d 879, 883 (Iowa 2002), where it was found that “when a regulatory device has been set up the state or municipality may be assigned a percentage of fault for its failure to maintain the device.” This ruling only relates to “regulatory devices” as it is written. Another immunity case was *McLain v. State*, 563 N.W. 2d 600, 605 (Iowa 1997), which held that contractors and subcontractors, when complying with contract specifications, share in temporary traffic control device immunity with the state. In *Foster v. City of Council Bluffs*, 456 N.W. 2d 1,

2,(Iowa 1990), it was held that the city retained statutory immunity for failure to place, erect, or install traffic control devices. However, in *Kowalski v. State*, 447 N.W. 2d 146, 147-148 (Iowa Spp. 1989), the court found that the contractor can share liability of the highway authority for failure to place necessary traffic control devices for breach of duty of care imposed by common law, the contract, or the MUTCD. (Code Section 668.10(1) was not applicable in this case). Other cases where agency and/or contractor immunity was at issue included *Van Orsdall v. City of Des Moines*, 711 N.W. 2d 732 (Table), 2006 WL 126436 (Iowa App. 2006) and *Estate of Oswald v. Dubuque County*, 511 N.W. 2d 637, 639-640 (Iowa App. 1993).

Possibly the best example of a pertinent closed road case in Iowa was *Sechler v. State*, 340 N.W. 2d 759, 762-764 (Iowa 1983), which involved a motorcycle collision with an obstacle placed to reinforce a road closed barrier. The state did prevail in this case due to a finding of significant contributory negligence on the part of the plaintiff, but this case has legal significance because gross negligence was defined. This case might have significance should a claim be made for improper installation and/or maintenance of road closed signs and barricades by an agency and/or contractor.

Other court cases and Attorney General Opinions have found that agencies retain jurisdiction and have a responsibility to continue maintenance and enforcement on a roadway until it is “officially” permanently closed and vacated as described in Iowa Code Sections 306.10 and 306.11. These defined responsibilities would apply to temporarily closed roadways. See *Polk County v. Brown*, 149 N.W. 2d 314 (Iowa 1967) and 1980 Iowa Op. Atty. Gen. 639, 1980 WL 25953 (Iowa A.G.).

The Iowa DOT maintains a record of vehicle crashes that occur in work zones throughout each construction season—approximately 360 such crashes occur annually. Crashes are summarized by severity and location within the work area, but incidents in closed road sections are not noted specifically.

## **Survey Results and Interview Session Findings**

To determine the extent and severity of problems and issues associated with road closures, the research team created and distributed a survey at the Iowa County Engineers Association annual meeting and via the internet. Similar surveys were distributed to cities and selected Iowa DOT staff. The county engineers' survey consisted of 16 questions intended to help the team gain a more detailed understanding of the problems and issues that arise in closed road sections. The survey form is included in Appendix B of this report. A summary of the survey responses is provided below; the results have been divided into groups by responding agency (e.g., municipal, county, state). Details of all survey data can be found in Appendix C.

The survey results from 34 responding municipalities found that 61% of respondents had experienced enforcement and/or traffic control problems in closed street sections, and 41% reported property damage resulting from unauthorized entry into these sections. The most commonly reported problem was damages to finished surfaces and slopes. Methods used by cities for addressing closed road sections included delegation or independent contracting and/or discussion at preconstruction meetings. Most respondents reported that any law enforcement used was reactive, after damage had already occurred. Solutions or suggestions for improvements offered by municipalities included improved signing and traffic control maintenance and improving contractor procedures and personnel training.

Survey results from 75 responding county engineers and staff showed that 90% of respondents had experienced enforcement and/or traffic control problems in closed road sections, with 54% reporting property damage resulting from unauthorized entry into those sections. The most commonly cited problems included damage to finished surfaces and slopes, theft of signs and barricades, low public awareness of important road work issues, and worker safety exposure. Mitigation strategies offered by the county engineers and staff were similar to those of municipalities, with an additional suggestion for a program to raise public awareness of issues.



The survey results from Iowa DOT staff indicated that 80% of respondents have experienced enforcement and/or traffic control problems in closed road sections, with 60% reporting damages resulting from unauthorized entry. The most commonly reported problems included damage to local property, risk management issues, and worker safety. To address concerns, preconstruction meetings were the preferred method of mitigation.

Law enforcement officers were surveyed with different questions than municipalities and counties. The law enforcement survey asked officers to identify the Iowa Code sections they felt were most appropriate for enforcement in closed road sections as well as those that should be clarified for better understanding. Officers were also asked if they had answered a call in a closed road section and, if so, whether a serious accident had occurred. The officers were also asked if they were aware of any specific occurrences of court cases involving an interpretation of Iowa Code in closed road sections. The survey questions and response data collected has been included in Appendix D.

The results of 180 law enforcement officer surveys revealed that 87% had responded to a call in closed road sections one or more times, with 29% reporting that those calls involved a serious accident. Officers identified the most appropriate sections of the Iowa Code as 306.41, 321.1, 321 (.228, .232, .252, .256, .260, .285 and .288), all of which have been included in Appendix E. The survey results indicate that most officers feel there are few problems with interpretation of the current Iowa Code; however, some modifications could better clarify the intent in the sections listed above.

A focus group interview session with county engineers and staff occurred on December 5, 2006 on the Iowa State University campus. In attendance were seven county engineers, one assistant county engineer, one county technician, and one representative from the Office of Local Systems at the Iowa DOT. The session lasted approximately 90 minutes and was facilitated by Dr. Kelly Strong and Tom McDonald of the Center for Transportation Research and Education. The facilitators provided four questions to stimulate discussions among the group. The questions covered the following topics:

- Perceived liability exposure
- TTC and law enforcement for construction and their current levels of sufficiency
- Communication methods with and between contractors, enforcement agencies, emergency responders, local residents and businesses
- Opinions on modifying existing Iowa Code, Iowa DOT specifications, and MUTCD standards

The focus group questions, attendees and notes are included in Appendix F of this report.

The focus group consensus indicated that most concern for liability exposure or actual liability exposure involves signs and barricades. Barricades and protective fencing are often moved or vandalized, thus exposing finished work that may not be completely cured to vehicular traffic. Signs and warning lights that have been stolen, knocked down, or covered in dirt are sometimes not addressed in a timely manner, possibly exposing the agency to liability

Project communication methods for temporary road closures noted by the focus group included preconstruction conferences that involve local enforcement officers and the Iowa DOT. Advice for residents and businesses might be provided through letters, news media, and/or local radio segments; all have been utilized with success by the Iowa DOT and many local agencies. Coordination of postal delivery, school, or emergency routes must be planned in advance and implemented once the closure signs have been erected.

Suggested modifications to Iowa Code from the focus group included increasing fines and penalties for sign theft, removal, or damage. However, it was also stated that local magistrates and judges are often reluctant to impose the current penalties and fines. Another suggestion was to increase sign credibility by covering the road closure signs until the date of closure. Covering signs until needed improves message credibility. Road closed signs are sometimes installed before the route is actually impassible, which encourages drivers to ignore the signs and can later result in damages to newly constructed work from

unauthorized entry. One participant suggested that increased penalties for contractor non-compliance with temporary traffic control requirements may be necessary in the Iowa DOT specifications, although those penalties have been significantly increased in recent years. A minimum response time for sign repair by contractors with penalties for delays may improve speed of response time for needed repairs.

### **Advisory Committee Discussion and Suggestions**

Several experienced professionals from a variety of disciplines were invited to contribute to this research effort by sharing advice, opinions, and suggestions for needed improvement regarding the topic of closed road traffic control and enforcement. Committee members, who were listed previously in this report, met twice during the progress of this study.

Advisory committee members were provided with an overview of the project, summary of literature (including Code provisions), and survey summaries and were then asked to suggest ideas for possible Code, specification, and /or policy changes.

One member of the committee noted that road closure may not be a definitive issue and there may be “degrees of road closures” and varying types of risk depending on the location, service level of the road, etc. For instance, low volume roads may not need to be signed as extensively during construction as higher volume facilities. In addition to varying types of road closures, there are also instances where the situation may change during the project life cycle, and when drivers find that a road section is signed as closed but is usable (for example, paving complete but guardrail not yet installed), it becomes very difficult for the contractor and agency to restrict entry, which can increase potential liability exposure.

Technology solutions such as controlled access gates, surveillance cameras, and video logs can assist agencies and contractors in managing risk on closed road sections. Additionally, effective strategies used in some jurisdictions include specific assignment of a deputy to issue citations to unauthorized traffic; preconstruction conference planning; ongoing coordination and cooperation with law enforcement; working with contractors on best

practices for preventing, repairing, and recovering any damages; and use of proper MUTCD TTC.

In addition to road closures for construction and maintenance, similar issues may exist for special event road closures, such as the Register's Annual Great Bicycle Ride Across Iowa (RAGBRAI), street festivals, parades, etc. Because those in charge of special event closures may not have access to TTC expertise, good practice may be unknown, thereby increasing exposure to safety concerns liability.

Section 306.41 may be the most relevant section of the Iowa Code pertaining to road closures. The liability waivers described in that section provide risk mitigation for agencies and contractors except in the case of gross negligence. Gross negligence might occur when an agency or contractor fails to follow good practice and TTC prescribed in the MUTCD and project specifications.

When entry is allowed for property owners and businesses, the proper signs are "Road Closed to Through Traffic" or "Local Traffic Only". The definition of gross negligence is determined through the discretion of the court, but the requirement for agencies to follow the state manual is clearly stated in the Iowa Code. Liability exposure could occur if the proper signing is not utilized as described in the MUTCD and project specifications.

Committee members surmised that, in the case of property damage (including damage to completed work), it can be difficult to determine and/or locate the responsible individual. In addition, since fines are minimal and the Code does not provide definitive guidelines, it is often deemed not worthwhile to prosecute violators.

The most common process for initiating temporary road or street closures is for the city council to adopt an ordinance or board of supervisors to approve a resolution describing the closure. The Iowa DOT relies on project documents and staff actions to authorize temporary closures. Proper temporary traffic control is designed by agencies responsible for the work to be accomplished. The MUTCD recommends that TTC be inspected regularly, but there is

ambiguity on the exact frequency. Even so, frequent inspections are a common interpretation, especially for overnight closures.

Contractors or sub-contractors are generally required by the project documents to provide and maintain prescribed TTC, including timely inspections and repairs. This can be problematic at times, especially with frequent unauthorized entry and the need for weekend surveillance. Some contractors frequently hire local personnel to check signs and barricades typically after hours and on weekends to supplement their own inspections.

The committee noted that there is currently no standard form for documenting surveillance and some individuals have expressed opinions that logging requirements should be eliminated. The Iowa DOT has a documentation form, but not all contractors elect to use it. It is difficult to establish the credibility or performance effectiveness of a person hired to check signs and file logs. Also, the line of authority for needed sign repair is not always clear to everyone. A project contract involves the agency and prime contractor; however, it is common for sub-contractors to perform TTC, but the prime contractor is still responsible. Some county engineers want a minimum response time for needed sign repair and replacement, similar to that described in the Iowa DOT Standard Specifications, Article 2528.10A for incident response monitoring, applied to all temporary traffic control.

Remote sensing for damage to important signs may be another option for promoting more effective TTC. A sensor could send a signal to law enforcement dispatchers, who could contact the contractor's representative to replace or reset the device.

It was noted that a surveillance system may not be difficult to implement and may help solve some of the problems with TTC inspections, documentation, identification of trespassers and vandals, etc. Construction companies frequently make use of daily video logs to manage project risk for non-public projects, but privacy and other guidelines may be different for publicly funded improvements. Night vision cameras could be used to help identify unauthorized individuals or vehicles entering closed road sections or vandalizing signs and

barricades. For continuous surveillance, a stationary camera might be helpful as a complement to a video log of all of a project's TTC. For small projects (i.e. structure replacement), it may be possible to use entire scene cameras; for larger projects, the cameras could be focused on specific points of entry to the project.

The feasibility of a surveillance system should be further investigated. In spite of some legal issues needing resolution, the use of video surveillance is generally increasing. In Alaska, law enforcement must record all interviews and courts are increasingly accepting the use of video logs as evidence. Unless identification of violators can be ascertained with certainty, the use of surveillance camera images as evidence may be problematic. However, the known presence of video surveillance on a project may very well be a deterrent for unlawful activities.

Another area warranting further investigation is the penalty for citations in closed road sections. Stiffer penalties, enforcement, and consistent prosecution of perpetrators may help reduce the problems currently experienced in closed road sections.

Committee members noted several Iowa Code sections where clarification of application in temporarily closed road sections might be beneficial. Sections 321.260 and 321.285 were specifically mentioned. Language could be added to the Code clarifying that the statutes listed in Section 321.228 also apply to temporarily closed roadways. This would provide a clearer definition of "highway" that would include these closed sections. Clarification of certain Iowa Code sections could help improve consistency between jurisdictions. However, it was noted that even if infractions are provable, rulings are applied by a local judge or magistrate, and thus penalties for similar offenses vary widely across the state. Trespassing is a common citation and this can be applied to unauthorized entry whether on foot, in a car, or in an off-road vehicle. The process used in Linn County, described later, appears to be effective and could serve as a model for enforcement of authorized entry to closed road sections.

One county engineer on the committee estimated over \$1 million in costs due to vandalism over the years (not just in closed roads). A recommendation from this study is to gather information for the estimated cost of damages due to unauthorized entry in closed road sections. These data could be used in conjunction with a technology feasibility study mentioned earlier to compare costs and benefits.

The committee also suggested adding language to the Standard Specifications indicating that the contractor is responsible for communicating and coordinating access issues with the public. Performance in TTC compliance is included in the standard contractor evaluation criteria.

Another suggestion from the advisory committee was to include pertinent work zone traffic control issues, including closed road requirements, in driver education programs. Public awareness of these important issues could prove beneficial in reducing crashes and violations in work zones; better supported and more informative driver education may be an effective way of raising public awareness. The committee did conclude that increased contractor training and worker education might not be worthwhile in reducing loss and liability exposure.

The committee recognized that the ultimate responsibility for safety in closed road sections must rest with the agency in charge. However, contractors must fulfill their obligations to provide and maintain quality TTC for all work zones areas, including closed roads and streets. Communication and cooperation between agencies and contractors is mandatory in this effort.

## **Conclusions**

To conduct this research study, information was gathered from many sources using several different methods. A literature review identified the few existing studies or references with specific relevance to the subject topic of law enforcement and temporary traffic control for closed road/street sections. A review of state Codes and Department of Transportation

specifications from Iowa and selected surrounding states identified some useful information and this was supplemented with data and comments received from survey responses from various transportation and law enforcement agencies. Personal interviews with county engineers/staff as well as expert opinions and guidance from an advisory committee were also a part of this study and proved very beneficial. From these sources, the following conclusions can be drawn:

- Allowing limited public traffic on road or street sections that have been “officially” closed on a temporary basis for construction, maintenance, or other special events is not uncommon in most agencies. In general, state Codes prohibit denial of lawful access to property without just compensation.
- Many state laws and Department of Transportation specifications contain similar language describing contractor responsibilities for protecting public and worker safety and minimizing inconvenience, including maintaining acceptable access to property. However, among the states in this study, only Wisconsin specifically addresses installation and maintenance of TTC for public traffic allowed in closed road/street sections.
- Requirements and guidance for application of temporary traffic control (TTC) for public travel in closed road/street sections is minimal in state DOT specifications and the Manual on Uniform Traffic Control Devices (MUTCD).
- Many public agencies have experienced problems with unauthorized traffic in closed road/street sections, with the most serious commonly cited problems including damages to contractor work, theft, and vandalism. Significant and costly damages to finished work have occurred for many agencies.
- Most law enforcement officers do not feel the current Iowa Code reduces their authority to issue citations for traffic violations in temporarily closed road/street sections, but some modifications in certain sections to provide clarification would be beneficial.
- Many local agencies in particular would recommend strengthening current specifications to better clarify contractor responsibilities for TTC in closed road areas and increasing penalties for non-performance.



- Some counties receive good support from the sheriff's office in monitoring the security of closed road sections and issuance of citations for unlawful entry.
- Public awareness of temporary traffic control requirements and procedures for work zones in general and closed road sections in particular could be improved.
- The current Iowa Code contains several provisions and penalties for violations of established traffic control as well as theft/vandalism of traffic control devices, but enforcement and application of penalties vary widely across the state.
- Although the Code of Iowa provides liability protection to contractors and agencies for damages incurred in temporarily closed sections, potential liability may occur if provisions of the MUTCD and project specifications are not followed for TTC, particularly proper use of the Road Closed sign (R11-2).

### **Recommendations**

To address concerns and problems identified with law enforcement and temporary traffic control in closed road and street sections, the following recommendations are offered:

- Amend the Manual on Uniform Traffic Control Devices (MUTCD) Part 6, Temporary Traffic Control, to describe recommended TTC for closed road/street sections where only local public travel is allowed.
- All agencies should ascertain that staff are familiar and comply with MUTCD requirements for the use of Road (Street) Closed signs, especially as described in Section 6F.08.
- Add language to state DOT specifications to require adequate TTC and protection for equipment in temporarily closed road/street sections where public travel is allowed. The TTC should closely replicate the expectations for open roadways (e.g., obstacles and hazards should be adequately delineated and/or protected, especially for nighttime hours). Similar desired language is currently found in the Iowa DOT Construction Manual, Section 5.41.
- Agencies should strive to develop cooperative working relationships between transportation and law enforcement agencies to assure that temporary traffic control

(TTC) is properly designed, deployed, maintained, and enforced in work zones. This topic should be included in agenda issues for pre-construction conferences.

- Investigate the feasibility of technology solutions to control vandalism and unauthorized travel in closed road sections, including surveillance cameras.
- Provide information and data for driver education programs addressing safe travel through work zones, with a segment on authorized travel in closed road and street sections. This information could be furnished to driver education instructors or provided on a video for viewing at driver licensing stations.
- Revise appropriate sections of the Iowa Code to better clarify intent for enforcement in closed road/street sections, specifically Section 306.41 and 321.1 (78) to expand the definition of “Street” or “Highway” to include temporarily closed road/street sections open to local traffic only.
- Develop best practice guidelines for temporary traffic control in closed road/street sections for distribution to state, county, and municipal transportation and traffic managers. The guidelines should include a description of the regulatory process for official establishment of closures as well as suggestions for effective temporary control of authorized traffic during construction and maintenance activities or special events.
- For the purpose of future research, the Iowa DOT should consider characterizing crashes that occur in and tort claims arising from incidents that occur inside of closed road/street sections. Current databases do not include information with this specificity.
- Conduct a survey of state and local agencies to obtain an approximation of the actual cost of theft, vandalism and damages from both authorized and unauthorized traffic in closed road/street sections. Publish the results for better agency and public appreciation for the scope of concern.

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### **CHAPTER 3. CONSTRUCTION AND TESTING OF AN ACCELERATED BRIDGE CONSTRUCTION PROJECT IN BOONE COUNTY**

Modified from a paper accepted by The Mid-Continent Transportation Research Symposium

Ryan Bowers, Wayne Klaiber, Samantha Kevern, Cole Landau, Robert Kieffer, and  
James S. Nelson

#### **Abstract**

New bridge systems are needed that will allow components to be fabricated off-site and transported to the bridge site for quick assembly with minimal disruption to the traveling public. Depending on the specific site conditions, the use of prefabricated bridge systems can minimize traffic disruption, improve work zone safety, reduce the impact on the environment, improve constructability, increase quality, and lower life-cycle costs. This technology is applicable and needed for both the rehabilitation of existing bridges and the construction of new bridges. The Federal Highway Administration (FHWA) has recently developed a program to promote accelerated construction through the use of precast bridge elements.

This paper will present the construction process, construction schedule, and laboratory testing for one of the first applications of an accelerated bridge project utilizing precast components in the state of Iowa. Through the FHWA Innovative Bridge Research and Construction program, a bridge in Boone County, Iowa was constructed using several different precast, high-performance concrete elements.

Researchers from Iowa State University (ISU) performed laboratory testing on the precast components that were used in the Boone County bridge. Field instrumentation and testing was used to verify the post-tensioning operation and to verify several of the construction methods. The laboratory portion of this investigation was funded by the Iowa Department of Transportation (Iowa DOT) and the Iowa Highway Research Board. Also, a comparison of

the actual construction schedule with a theoretical schedule was completed. A discussion of the laboratory testing, structural instrumentation, monitoring, and scheduling of this innovative bridge is presented in this paper.

## **Introduction**

Constructing and rehabilitating bridges with minimal impact on traffic has become a transportation priority as traffic volumes nationwide increase. Renewal of the infrastructure in the United States is necessary for several reasons, including increases in population, projected increase in vehicle miles traveled, presence of obsolete or deficient structures, impact of road construction, and injuries and fatalities related to work zones (NCHRP 2003).

Rapid construction has several advantages over traditional construction methods. The six main advantages of rapid construction technology are:

- Minimized traffic disruption
- Improved work zone safety
- Minimized environmental impact
- Improved constructability
- Increased quality
- Lowered life-cycle cost (NCHRP, 2003)

There are several different types of rapid construction technologies currently used in the United States. One technology uses precast concrete bridge components that are fabricated offsite, allowed to cure, and then transported to the construction site for installation. This technology allows bridges to be constructed faster than traditional construction methods, reducing the amount of time the bridge and/or associated roads are closed to the public, and reducing the total construction time. For bridges above waterways, the construction time is also reduced; thus the amount of debris that falls from the construction site is reduced, which in turn reduces the environmental impact.

The importance of rapid construction technologies has been recognized by the FHWA and the Iowa DOT Office of Bridges and Structures. This paper presents some of the results from the construction of a new accelerated construction precast bridge system located in Boone County, Iowa and evaluation of bridge components tested in the laboratory. Funding for the design, construction, and evaluation of this project was provided by the FHWA-sponsored Innovative Bridge Research and Construction (IBRC) Program. Funding for the laboratory testing was provided by the Iowa DOT and the Iowa Highway Research Board; funding for the documentation and the post-tensioning monitoring and verification was provided by the FHWA and Boone County.

This research focused on the bridge constructed on 120<sup>th</sup> Street in Boone County over Squaw Creek; the bridge replaced an existing Marsh Arch bridge at the site. The new bridge is a continuous, four-girder, three-span bridge with a full-depth, precast deck. Bridge dimensions are 151 ft. and 4 in. long and 33 ft. and 2 in. wide with spans of 47 ft. and 5 in., 56 ft. and 6 in., and 47 ft. and 5 in. Deck panels (8 in. thick, 8 ft. and 1 in. wide, and half the width of the bridge (16 ft. and 1 in.) in length), were prestressed in the transverse direction. Each panel had two full-depth channels, located over the prestressed girders, for longitudinal post-tensioning. Once the panels were erected, the entire bridge deck was post-tensioned in the longitudinal direction, after which concrete was cast in the four post-tensioning channels. Although this exact design had not been previously constructed, a similar partial-depth deck system has been constructed and tested in Nebraska (Badie, Baishya, and Tadros 1998). Precast pier caps and precast abutments were used in the bridge substructure.

## **Bridge Construction**

### *Precast Fabrication*

The fabricator selected by the general contractor to produce the precast elements for the Boone IBRC Bridge project was Andrews Prestressed Concrete, Inc. located in Clear Lake, Iowa. Andrews is a PCI certified plant and commonly fabricates Pretensioned Prestressed Concrete (PPC) beams for Iowa DOT projects.

Andrews initially cast three test panels that were purchased by ISU for their laboratory testing program. Prior to shipment to ISU, one of the test panels was used by the contractor to conduct a leveling device test. This test was required by the contract documents for the leveling device that was designed by the contractor. The selected leveling device operates as a screw jack; the deck panel transverse reinforcing bears on a steel plate with a nut welded to the bottom of the plate and a screw passing through the plate and nut. A pipe wrench was used to turn the screw to raise and lower the deck panel. The contractor demonstrated that the device was stable while supporting the deck panel over the PPC beam and could be adjusted to the desired elevation and deck cross slope. Once the leveling device was accepted, the bridge deck panels were fabricated.

Three deck panels could be cast in one casting operation. Panels could be fabricated every other day with a maximum of nine panels cast per week. Andrews fabricated reusable steel forms shown in Figures 1 and 2; the panels were cast on a steel casting bed in the open.



**Figure 1. Panel forms and reinforcing**



**Figure 2. Panel form release**

The anchorage zone was very short for the development of the pretensioning strands. Thus, spiral reinforcing was used to reinforce the bursting zone. Use of spiral reinforcement also improved strand development (see Figure 3). At the longitudinal centerline of the bridge, a longitudinal joint was cast in place. Reinforcement of the longitudinal joint was provided with double hairpin bars projecting from the panels, shown in Figure 4, and straight reinforcing bars threaded longitudinally. One benefit of a cast-in-place longitudinal joint at



the centerline was to allow the panels to be cast flat and introduce the bridge crown in the longitudinal joint. The longitudinal joint at the centerline of the bridge did not add any construction time to the critical path because the longitudinal joint was cast concurrently with the open channels over the four beams after the post-tensioning.



**Figure 3. Spiral reinforcing**



**Figure 4. Longitudinal joint reinforcing**

For the vertical reinforcing connection in the coral style barrier rail, the contractor was given the option in the plans to project the reinforcing bars from the deck or use mechanical splicers; the contractor and fabricator chose the mechanical splicer option. End panels contained welded wire reinforcing and the post-tensioning anchorage zone. Concrete consolidation during panel concrete casting was closely monitored due to reinforcement congestion, especially due to the spiral reinforcing and welded wire reinforcing. No problems were detected in the consolidation and the concrete flowed well into the spiral reinforcing zone. A concrete strength of 4,000 psi was required for panel release which was easily achieved in 24 hours. The panels were released from the forms and stockpiled at the precast fabricator's yard to await shipment to the bridge site. Andrews was also the fabricator for the PPC beams, pier caps, and abutment caps for the project. Beams used were Iowa Standard "B" beams modified for a wider spacing than the typical standard beam spacing.

### *Substructure*

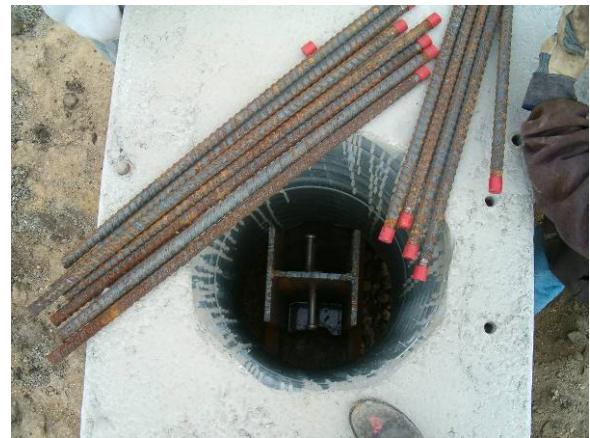
Precast abutment caps and precast pier caps founded on H-piling and pipe piling, respectively, comprised the substructure. The units were reinforced with mild reinforcing and

included blockouts for the piling that were created using corrugated metal pipe (CMP). During the design process, no research was found regarding the pile connection detail considering a bond or development of resistance between concrete and the CMP. A fairly conservative connection design was completed which was later validated by testing. The contractor had an end of driving tolerance of three in. in any direction for each H-piling in order to fit the precast abutment cap over the H-piling. Standard specifications typically only specify a start of driving tolerance for H-piling. Special plan notes were included to specify the end of driving tolerance. Care was taken during the pile driving operation, and the contractor had no problem meeting the end of pile driving tolerance or fitting the precast abutment cap over the H-piling shown in Figures 5 and 6; time required to set a single precast abutment cap was less than 30 minutes.

There were five H-piling supporting the abutment caps and nine 16 in. diameter pipe piling supporting the pier caps. The pier cap end of driving tolerance was 2 1/2 in. A driving template was fabricated that helped the contractor meet the end of driving tolerance so that the precast units fit over the piling. No problems were encountered, and the pipe piles were all well centered within the pier cap.



**Figure 5. Setting precast abutment**



**Figure 6. Abutment CMP blackout**

A high early strength concrete mix was used for filling the substructure blockouts. The concrete was cast with a maximum slump of two inches prior to adding a high-range water reducer (HRWR) to improve workability. With the HRWR the maximum slump allowed was

seven in. Prior to PPC beam placement the concrete was required to achieve a 3,500 psi compressive strength.

### *Superstructure*

The superstructure for the bridge utilized traditional PPC beams. Beams were modified from the standard design in order to eliminate a beam line. A standard bridge for the county would have a five-beam cross section and that was reduced to a four-beam cross section. To modify the beams, additional prestressing strands were added and the concrete release and 28-day strengths were increased.

Erection of the PPC beams was started early in the morning and completed shortly after noon. The day following the PPC beam erection the deck panel delivery (three per truck load) was scheduled. Panels were offloaded to a storage area and then erected. Half of the panels were scheduled for delivery the first day with the remainder scheduled for the following day. Panel delivery was divided in half because the contractor had not performed an operation like this before and did not know how long the panel erection would take.

The first half of the deck panel erection took the whole day. Panels were erected from the centerline of the bridge working outward (see Figure 7). Erection of the second half of the panels took half of the day. The primary difficulty erecting the deck panels is the alignment of the first deck panel erected. Once the first panel is properly positioned, the remaining panels were uniformly offset 3/8 in. and maintained the correct alignment. Panel leveling devices were installed the same day the deck panels were erected, as shown in Figure 8.

Transverse joints were cast in place with a high early strength concrete mix. Due to the tight deck panel spacing, a small aggregate size was used with a maximum top size of 3/8 in. Maximum water cement ratio was 0.38 and the slump was increased using a HRWR that allowed the slump to go to a maximum of eight in. A retarding admixture was used as well that seemed to extend the life of the HRWR for workability.



**Figure 7. Deck panel erection**



**Figure 8. Leveling device installation**

During the curing of concrete in the transverse joints, the post-tensioning strands were threaded through the end anchorages and down the channels for a total of 48 strands to post-tension. Each of the four channels contained twelve 0.6 in. diameter strands. The bridge was short enough to allow for post-tensioning from one end. Less than four hours was required to complete the entire post-tensioning operation. All the strands, except one, were post-tensioned with no problems. One strand became pinched between an adjacent strand and “extra” deck panel concrete. This strand was released and fully posttensioned by applying the post-tensioning force from the opposite end of the bridge. The correct posttensioning force application in that strand was doubly verified by gage pressure and summing the total strand elongation at each end.

Post-tensioning forces were verified by calibrated gage pressure. Strand elongation was checked as a final confirmation, shown in Figure 9. The jack stroke length was monitored during post-tensioning as a safety precaution against over tensioning.





**Figure 9. Strand elongation check**



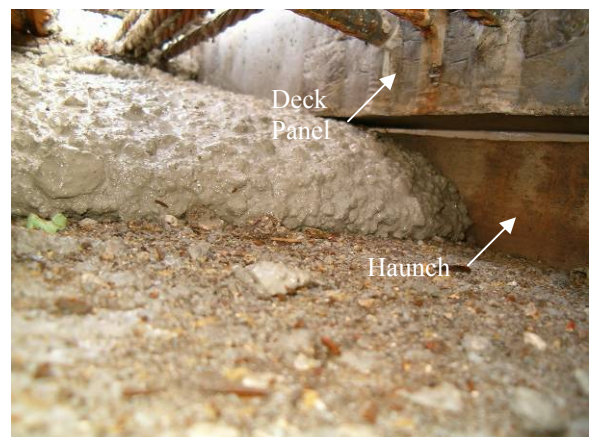
**Figure 10. Casting longitudinal joints**

Concrete was cast in the longitudinal joints on the same day the post-tensioning force was applied, shown in Figure 10. As shown in Figure 11, the same concrete mix used for the transverse joints was used for the longitudinal joints. The longitudinal joints were congested with post-tensioning strands, transverse mild reinforcing, transverse prestressing strands, stirrups, and leveling plates with leveling screws.

The HRWR was very effective in aiding in the placement of the concrete. Concrete consolidation observed in the longitudinal channel haunch area, shown in Figure 12, and between the strands and reinforcing was excellent. Following the curing of the longitudinal joint concrete the leveling screws were “backed out” and the hole was filled with a hydraulic cement grout.



**Figure 11. Channel congestion**



**Figure 12. Consolidation in haunch**

A cast-in-place concrete diaphragm and deck end section was constructed to complete the integral abutment. The cast-in-place end section also allowed for panel erection tolerance; the total length of the deck panel portion of the bridge was nine inches longer than anticipated in the plans because the panels were fabricated on the high end of the dimensional fabrication tolerances.

To complete the bridge, the corral style barrier rail was cast in place, and the deck was ground for smoothness and grooved for texture prior to opening the bridge to traffic. Figures 13 and 14 show the completed bridge.



**Figure 13. Bridge profile**



**Figure 14. Bridge approach**

### **Construction Schedule**

The author for the construction schedule portion of this paper, examined the Iowa DOT's *Weekly Report of Working Days* for the Boone County project, and has created both an actual and a theoretical schedule that reflects production rates observed during the project. Some activity durations were given directly to the author by the Iowa DOT Bridge Design office. The theoretical schedule created by the author reflects the minimum number of days a contractor would need to be on site performing constructing activities. Both schedules have been compared and comments have been provided.

### *Actual Work Schedule*

The Boone IBRC Bridge had a late project start date of July 5, 2006, and was specified 80 working days for contractual completion. September 8, 2006, is the date the contractor's bridge crew actually moved on site with 50 working days remaining for contractual completion. On December 28, 2006 the final task of the Boone IBRC Bridge construction was completed. A total of 90 working days were required for the project, 10 days beyond the contractual allowance. *The Weekly Report of Working Days* for the Boone IBRC Bridge from September 8, 2006 to December 28, 2006 revealed that there had been 2.5 days where the contractor was charged with a working day but did no work. Also revealed in the *Weekly Report* was that between the dates of July 5, 2006 and September 8, 2006 there had been four days the contractor was charged a working day but did no work. In total, the contractor was charged with 6.5 non-productive working days. Ultimately, the contractor was charged liquidated damages for the 10 working days over the contractual allowance of 80 days. Figure 15 below graphically shows the construction durations and time frame from September 8<sup>th</sup>, 2006 to project completion. The schedule was developed using Microsoft Project scheduling software and activities are represented by the dates that they were stated to occur in the *Weekly Report*.

### *Theoretical Work Schedule*

The theoretical schedule developed by the author was based on the assumption that the existing structure would have been previously removed and the abutment berms for the new structure would be in place. It was observed by the author that some of the activities of construction could occur parallel or begin before the commencement of onsite construction (logic was developed). After all of the factors taken into consideration the author determined that a similar structure to the Boone County bridge could be assembled in 12 days. For this paper's purposes the term "days" refers to the number of days when construction activities are necessary to occur and the contractor must be on site. Figure 16 provided below graphically displays the theoretical critical path method (CPM) schedule created for the Iowa DOT Bridge Design office. Cure times for any cast-in-place concrete elements is not included in arriving at the 12 day value as requested by the Iowa DOT Bridge Design office.

A list of the activities which occurred on the Boone County bridge but are not included in the theoretical schedule for future projects has been provided below:

- Demolition of existing bridge
- Excavation of berms
- Construction of pile driving template
- Substructure blockout concrete cure time (pile voids)
- Cure times for flowable mortar under abutment
- Painting pipe piles
- Material delivery/offload (crane time)
- Form pier cap voids
- Pour pier cap voids
- Strip pier cap void formwork
- Transverse & longitudinal formwork strip
- Leveling screw removal
- Hydraulic cement patch work on leveling screw holes
- Cast-in-place concrete diaphragm and end section formwork strip time
- Vehicle barrier rail (metal)

Durations of cure times as well as any other activities or constraints can be inserted into the theoretical schedule to develop an expedited practical schedule for future projects as shown in Figure 17. The author has provided Figure 17 as an expedited practical construction schedule that is similar to the theoretical schedule developed for future projects but includes some additional activities and cure time durations. The schedule shown in Figure 17 represents total estimated project duration of 33 days, approximately 20 of which, the contractor would be on site.



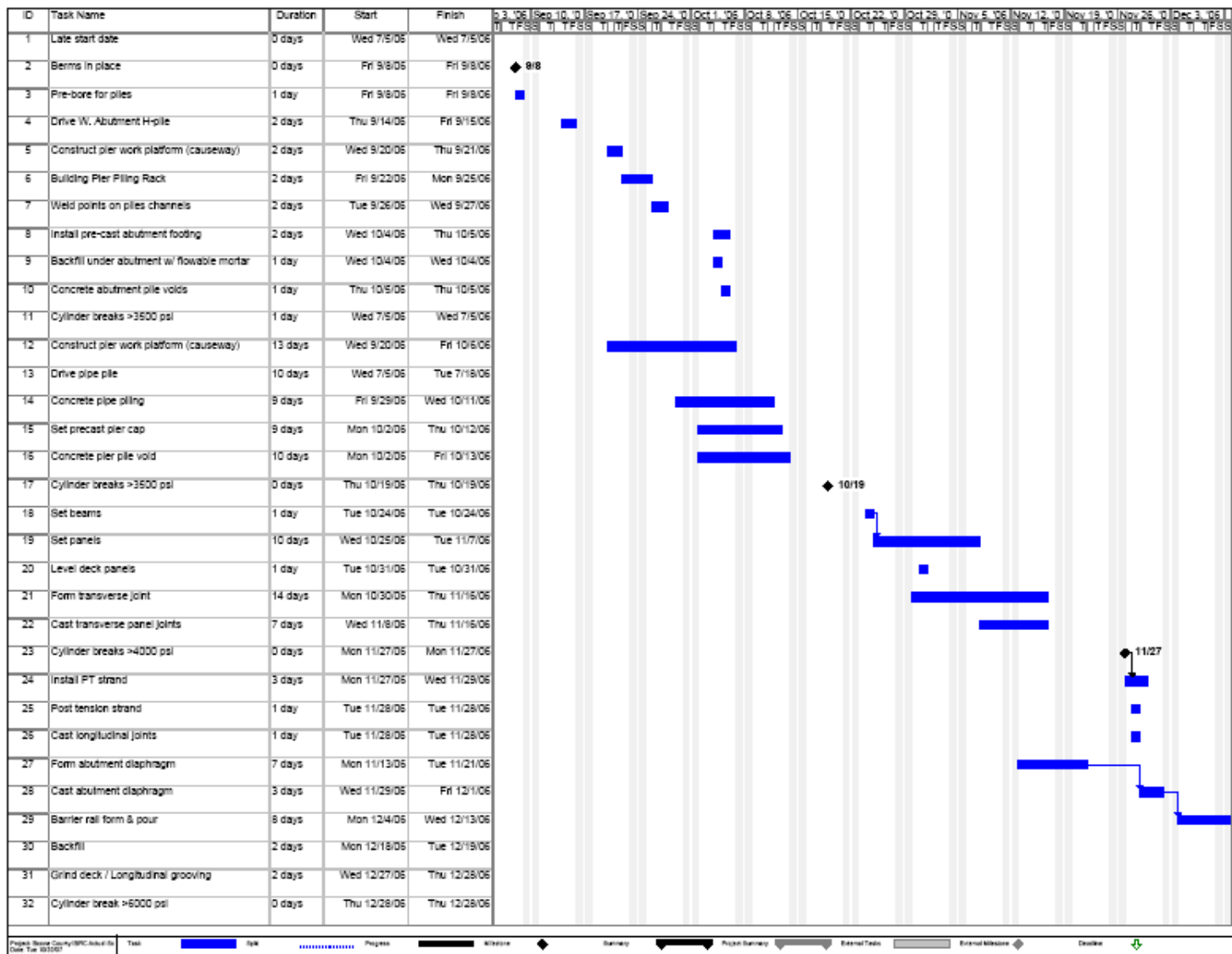


Figure 15. Boone County bridge actual schedule

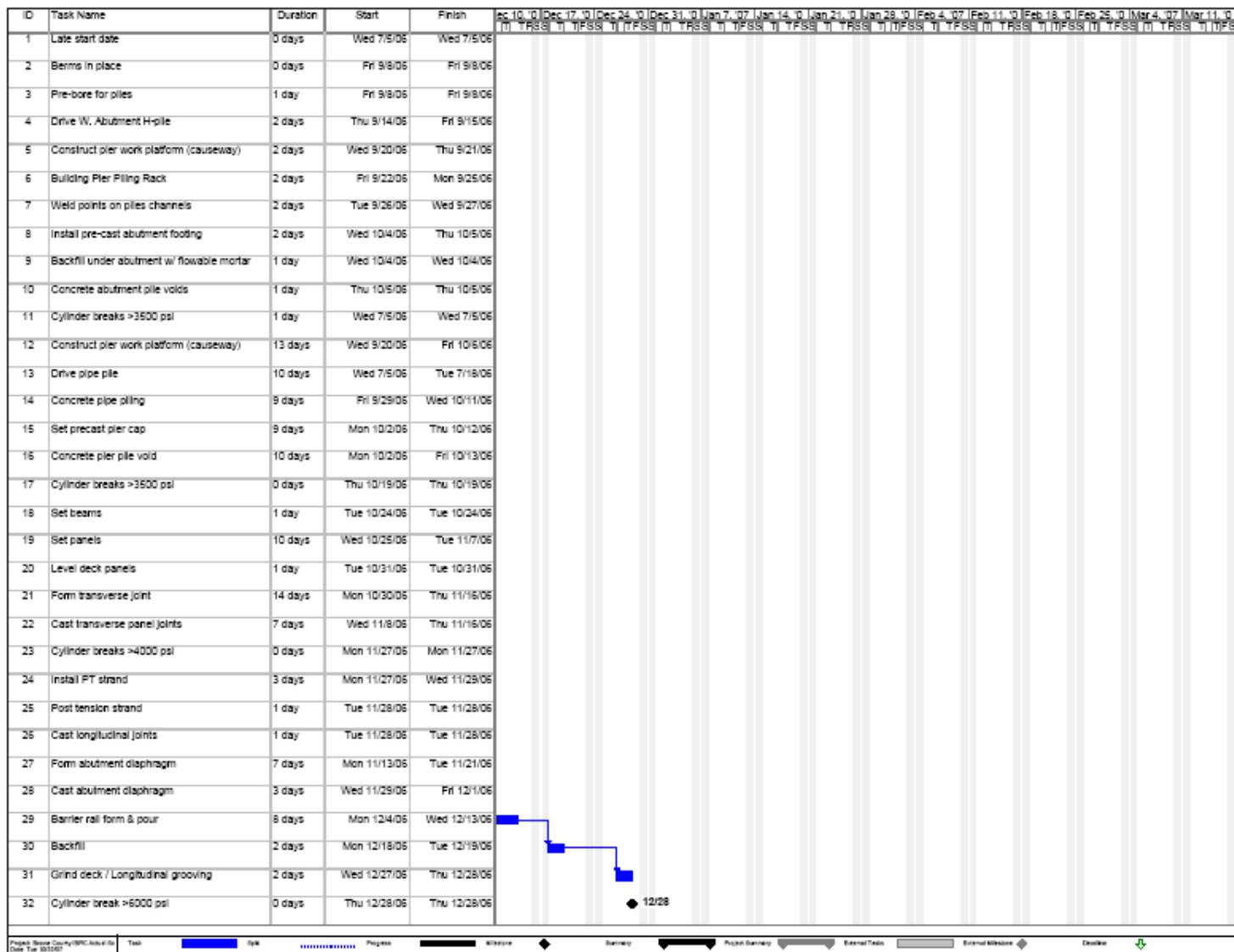


Figure 15. (Continued)

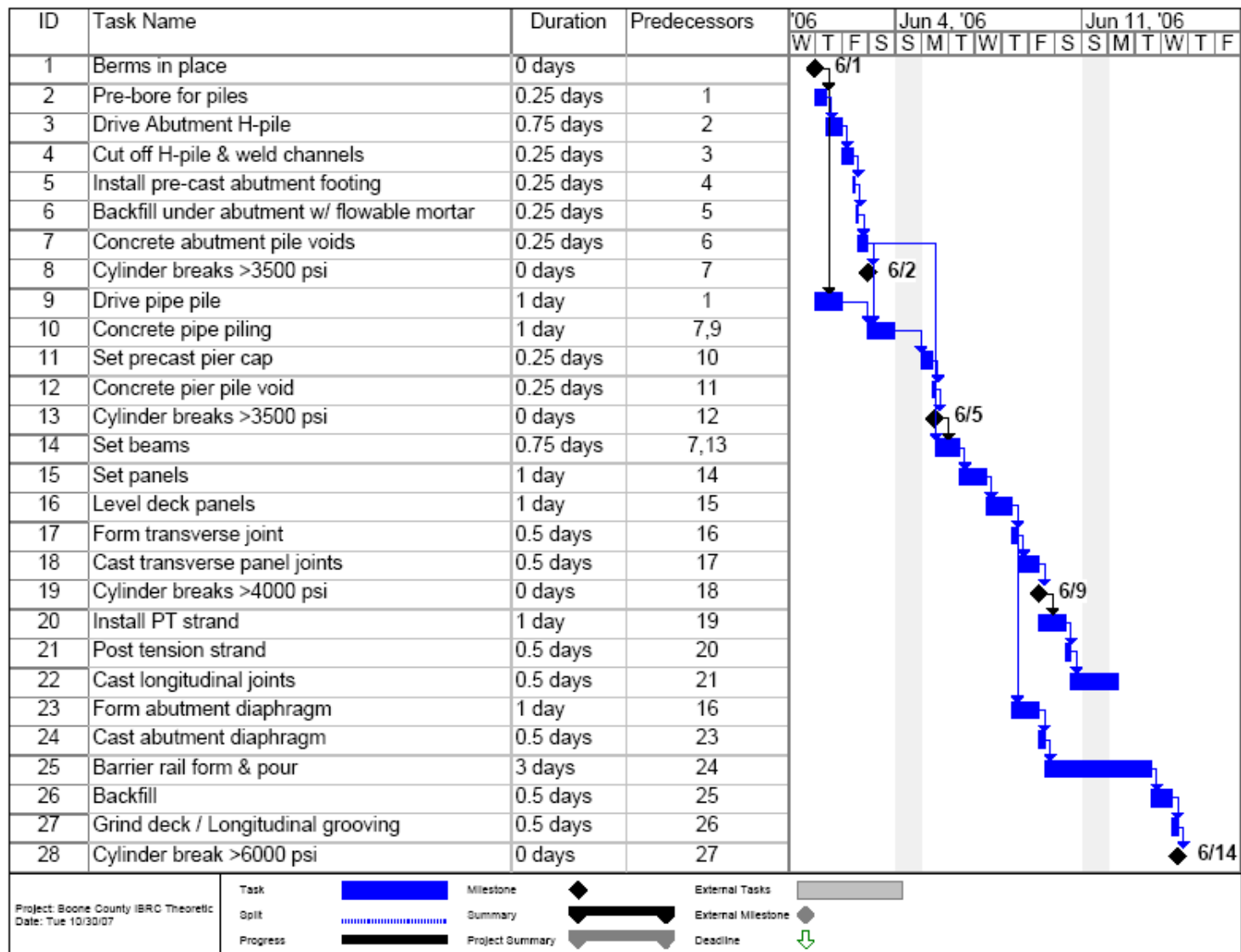


Figure 16. Boone County bridge theoretical schedule

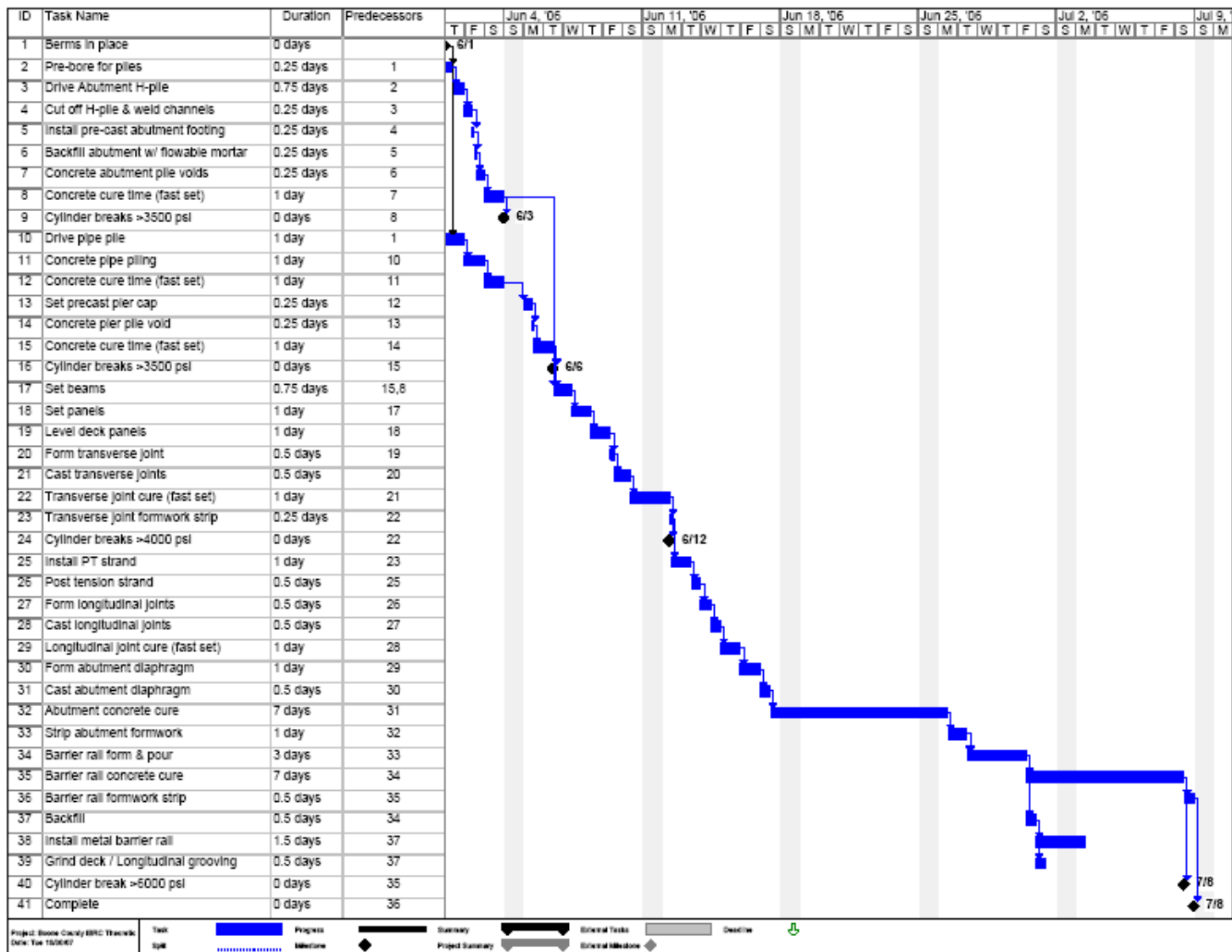


Figure 17. Boone County bridge theoretical schedule with cure times and formwork durations

### *Comparison of Actual vs. Theoretical Work Schedules*

A brief comparison of the actual work schedule to that of the theoretical schedule was performed. The author found that the structure could have been assembled 48 working days ahead of the actual schedule. When the structure was constructed in the summer and fall of 2006 it took 90 working days to complete. However, only 60 of those working days were directly related to assembly of the structure (i.e. after September 8, 2006). The other 30 working days had been utilized to construct portions of the project not directly associated with bridge assembly. Because the contractor, material suppliers and engineers had never constructed a project like the Boone IBRC Bridge, there were many Requests for Information (RFI) that required answers and, therefore, the construction took longer than predicted by the theoretical schedule. In future projects contractors, material suppliers, and engineers alike will be more adapt to the accelerated construction and delivery method used at the Boone IBRC Bridge. Table 1 has been provided below to compare the actual schedule durations to the theoretical activity durations.

**Table 1. Actual schedule duration verses theoretical schedule durations**

Activity	Actual Durations	Theoretical Durations
	Days	
Pre-bore for piles	1	0.25
Drive Abutment H-pile	2	0.75
Construct pier work platform (causeway)	2	N/A
Building Pier Piling Rack	2	N/A
Weld points on piles channels	2	0.25
Install pre-cast abutment footing	2	0.25
Backfill abutment w/ flowable mortar	1	0.25
Concrete abutment pile voids	1	0.25
Construct pier work platform (causeway)	13	N/A
Drive pipe pile	10	1
Concrete pipe piling	9	1
Set precast pier cap	9	0.25
Concrete pier pile void	10	0.25
Set beams	1	0.75
Set panels	10	1
Level deck panels	1	1
Form transverse joint	14	0.5
Cast transverse panel joints	7	0.5

**Table 1. (Continued)**

Install PT strand	3	1
Post tension strand	1	0.5
Cast longitudinal joints	1	0.5
Form abutment diaphragm	7	1
Cast abutment diaphragm	3	0.5
Barrier rail form & pour	8	3
Backfill	2	0.5
Grind deck / Longitudinal grooving	2	0.5

### **Laboratory Testing**

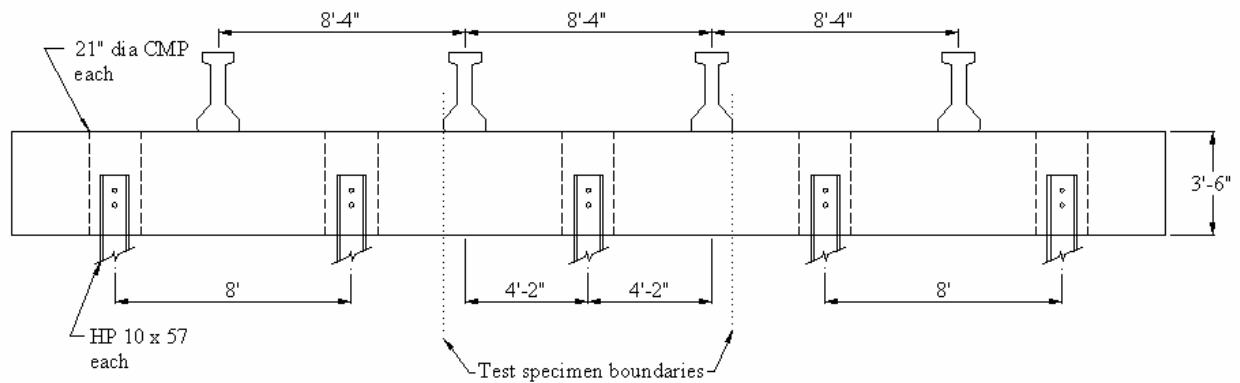
Laboratory tests were performed on several components of the bridge substructure and superstructure. The substructure tests were performed on sections of the abutments and pier caps, and isolated shear tests of the pile connection to the abutments. Superstructure testing included deck panel testing and testing of the flowability of the concrete used in the post-tensioning channels.

#### *Substructure Testing*

A series of laboratory tests were performed by ISU to verify the strength of the abutment section before bridge construction began. Tests were performed to ensure that punching shear failure would not occur in the abutment before the CIP cap was placed. In order to verify the design strength, a ten ft. section of the abutment and pier cap was tested in the laboratory; the section of the abutment the test specimen replicates can be seen in Figure 15.

Simulated beams were fabricated out of concrete and placed on the laboratory floor.

Neoprene bearing pads were placed on top of the simulated beams, and the specimens were placed on the bearing pads. In this configuration, the pile extended upwards and was loaded from above. One of the test specimens, situated under the load frame prior to loading, is shown in Figure 16. Note the specimens were inverted for stability when tested.



**Figure 18. Side view of the precast abutment and laboratory test section**

Similar tests were performed on the inverted pier cap specimen using a ten ft. section of the pier cap. Each specimen used the appropriate cross section and pipe pile for the pier caps, but otherwise used the same laboratory testing system as was used for the abutment testing.

In total, eight laboratory pile and abutment tests were performed. The average strength of the abutment specimens and pier cap specimens, along with the unfactored service loads for each is presented in Table 1. In addition to the described tests, shear tests were performed on four H-pile and CMP connections; each of the shear tests was loaded to 400 kip without cracking or appreciable differential movement. Based on the laboratory test results, punching shear failure was determined not to be of concern for the abutments or pier caps in the field.



**Figure 19. Laboratory testing system**

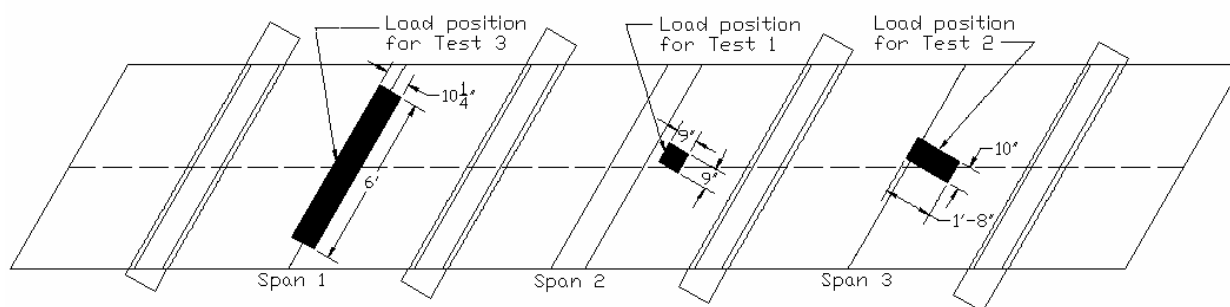
**Table 2. Service load and experimental specimen strengths**

<b>Specimen</b>	<b>Unfactored Service Load (kip)</b>	<b>Average Maximum Load (kip)</b>
Abutment	80	382
Pier Cap	72	384

### *Superstructure Testing*

Laboratory tests were conducted to determine the flexural and punching shear capacity of the deck panels. Panels were designed for HS-20 loading. Because of the localized failure for each test, multiple tests were conducted on the specimen since previous tests on the specimen had minimal influence on the additional tests. Setup of the deck panels and locations of the three loads are shown in Figure 17. Construction of the test setup included placing each panel on two beams, placing steel for the closure joint, and casting concrete for the longitudinal and closure joints.





**Figure 20. Load locations and footprints for bridge deck load tests**

Span 2 was the first span tested. A nine in. square footprint was chosen for this test to have consistency with the service load tests previously conducted. In order to introduce shear into the closure joint and increase the probability of a failure, the load was not centered over the joint. A punching shear failure occurred at 150 kips.

Span 3 was tested second. For this span, a tandem wheel footprint was chosen so the bridge would be subjected to the standard design footprint. Also, use of this footprint gave the opportunity to see if punching shear would control in the field for the actual bridge. At a load of 150 kips, concrete began spalling from the surface of the deck panel. When the load reached 157 kips, a combination of flexural and punching shear failure occurred.

In order to determine the flexural capacity of the deck panel, a beam was placed across the center of Span 1 to act as a line load. The beam was positioned to be parallel to the support beams for the deck panels. The load beam was 6 ft. long and 10.25 in. wide. A flexural failure occurred at a load of 196 kips.

## Conclusions

The following were concluded from this project:

- Placement of a single precast pier cap or abutment cap could be done in less than 30 minutes because piles were driven within tolerances.
- Deck panels for half the bridge could be erected in half of a day.
- Construction began on July 5 and was completed on December 28, requiring a total of 90

working days.

- A theoretical work schedule predicted that the Boone IBRC Bridge could be assembled in 12 working days.
- The abutment connection capacity is at least 4.5 times greater than the unfactored service load.
- The pier cap connection capacity is at least 5.3 times greater than the unfactored service load.
- Deck panels failed due to a combination of flexure and punching shear at a load of 157 kips applied by a tandem wheel footprint.

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## **CHAPTER 4. SCHEDULING SPECIFICATION FOR THE REHABILITATION AND RECONSTRUCTION OF I-235**

A paper accepted by The Mid-Continent Transportation Research Symposium

Charles Jahren, Cole Landau, and Elizabeth Thoma

### **Abstract**

On behalf of the Iowa Department of Transportation (Iowa DOT), Iowa State University has developed a review process to monitor contractor compliance with the Iowa DOT construction scheduling specification. The process also involved review of schedule updates in comparison to actual work performed. Records of the reviews and project progress photos have been retained using a redundant system of both hard copies and electronic backup files. Specifically, the system has been implemented on the I-235 corridor reconstruction project stretching from the downtown Des Moines area to the north I-35/I-80/I-235 system interchange. This paper provides a case study that focuses on a project having a contract value of approximately \$93 million and that is being constructed under an average traffic volume of between 115,000 and 120,000 vehicles per day in peak traffic areas. The paper presents a detailed description of the schedule review system, a discussion on the lessons learned from the implementation of the system, and recommendations for those who may need to institute a similar system in the future.

### **Introduction**

On October 25, 2005, the Iowa Department of Transportation (Iowa DOT) let its largest contract to date in the amount of \$93,118,005.65. It was let as several tied or combined projects, with IM-NHS-235-2(269)7 – 03-77 designated as the prime project. Herein, the project is referenced as (269), the short version of the project number used by most project participants. The objective of (269) was to reconstruct I-235 from Cottage Grove Avenue to East 16th Street in Des Moines, Iowa. The magnitude and visibility of the project prompted the Iowa DOT to develop Special Provision SP-010245 for Progress Schedule by Critical

Path Method (SPEC), which amends the Standard Specifications, Series 2001. The SPEC states, “The contractor shall submit a progress schedule of construction activities based on the critical path method (CPM) of scheduling....The CPM progress schedule shall be used for coordination and monitoring of all work under the contract, including all activities of subcontractors, vendors, and suppliers. The Engineer will review the CPM progress schedule and forward comments to the contractor” (Iowa DOT 2005).

The Iowa DOT contracted Iowa State University (ISU) to review contractor compliance with scheduling specification and to offer assistance. The SPEC states, “The Engineer’s review comments will neither bind the Contracting Authority nor constitute acceptance of any portion of the schedule” (Iowa DOT 2005). Throughout the duration of the contract, ISU has reviewed the contractor-submitted schedules, compared the schedules with actual progress in the field, and attended regular meetings where scheduling issues were discussed. ISU has developed recommendations for an efficient SPEC compliance review system.

### **The I-235 Corridor reconstruction project**

The (269) project was part of a multiyear, multiple contract effort to rebuild the entire I-235 corridor through the Des Moines metro area. The corridor includes 13.83 miles of freeway from the east system interchange of I-80/I-35/I-235 to the west system interchange of I-80/I-35/I-235 through the heart of Des Moines, Iowa (Figure 18). From 2002 to 2007, contracts for approximately \$429 million of construction will have been completed in this area (Iowa DOT 2007a). Work consisted of the rehabilitation and reconstruction of numerous utilities, bridges, and miles of interstate paving, all of which were constructed under traffic. Currently the estimated traffic count is 115,000 to 120,000 vehicles per day. The purpose of the corridor reconstruction project is to “improve safety, update the facility to current roadway design standards, reduce congestion, and improve mobility” (Iowa DOT 2007b).



**Figure 21. Map of I-235 corridor (Iowa DOT 2007c)**

### **Schedule Specification**

Formal scheduling efforts with the assistance of ISU started in 1999, when a program-level schedule was developed for the entire I-235 corridor (Chen, Jahren, and Canales 2003). The program-level schedule provided information on each construction contract and each major utility conflict as separate activities. Logical relationships between these activities and a schedule were also provided. This process was helpful because it identified projects that were critical for the timely completion of the entire corridor. When such projects were identified, the Iowa DOT took several actions to ensure that the project completion did not delay corridor completion. Possible actions included starting the project early in the corridor reconstruction process, budgeting to accommodate appropriate bids for a tightly scheduled project, and setting up incentive/disincentive schemes. From 2000 to 2005, project-level schedules for each contract were provided by the contractor and reviewed by the Iowa DOT according to Section 1110 of the Iowa DOT Standard Specifications (e.g., see GS 1101, 2006).

Currently, the Iowa DOT funds approximately \$400 million of highway construction per year. This is generally made up of small, rural, standardized projects that are familiar to the construction industry and the Iowa DOT. For routine projects such as these, the risk and consequences of a poor schedule is less in comparison to a large, urban, unique project. The (269) project was sufficiently large enough to possibly draw out-of-state contractors to bid

on the project. Therefore, (269) was going to be either constructed by an in-state contractor who had never taken on a project of this magnitude or an out-of-state contractor who was not familiar with Iowa DOT business practices. In either case, a higher degree of project-level scheduling in comparison to past projects was deemed appropriate to ensure smooth and timely progress on the schedule. In addition, (269) had an incentive of \$70,000 per calendar day, up to a maximum of \$2.1 million for 30 days prior to the final completion date, and a disincentive of \$30,000 per calendar day beyond the final completion date.

In addition to the (269) project, other projects were concurrently under construction along the I-235 corridor that had similar levels of importance and that were also conducted under the SPEC. In order to provide focus for this paper, the authors primarily refer to the (269) project. However, it is worth noting that other important projects existed, because concurrent execution of several critical projects was part of the rationale for using SPEC.

The SPEC states, “The contractor shall submit a progress schedule of construction activities based on the critical path method (CPM) of scheduling....The CPM progress schedule shall be used for coordination and monitoring of all work under the contract, including all activities of subcontractors, vendors, and suppliers. The CPM progress schedule shall include provisions for traffic control, staging, and other events necessary to complete all work involved in the contract. This schedule shall be the Contractor’s intended working schedule and shall be used to plan, organize, and execute the work; record and report actual performance and progress; and forecast remaining work” (Iowa DOT 2005).

After the contractor has turned in a progress schedule, “the engineer will review the CPM progress schedule and forward comments to the contractor within 7 calendar days” (Iowa DOT 2005). The contractor was thus required to develop a computer-generated schedule displaying the following: activity descriptions, durations, dollar values, major crews, and equipment for each activity. In addition, a cost curve showing cumulative expected progress payments vs. time was required.

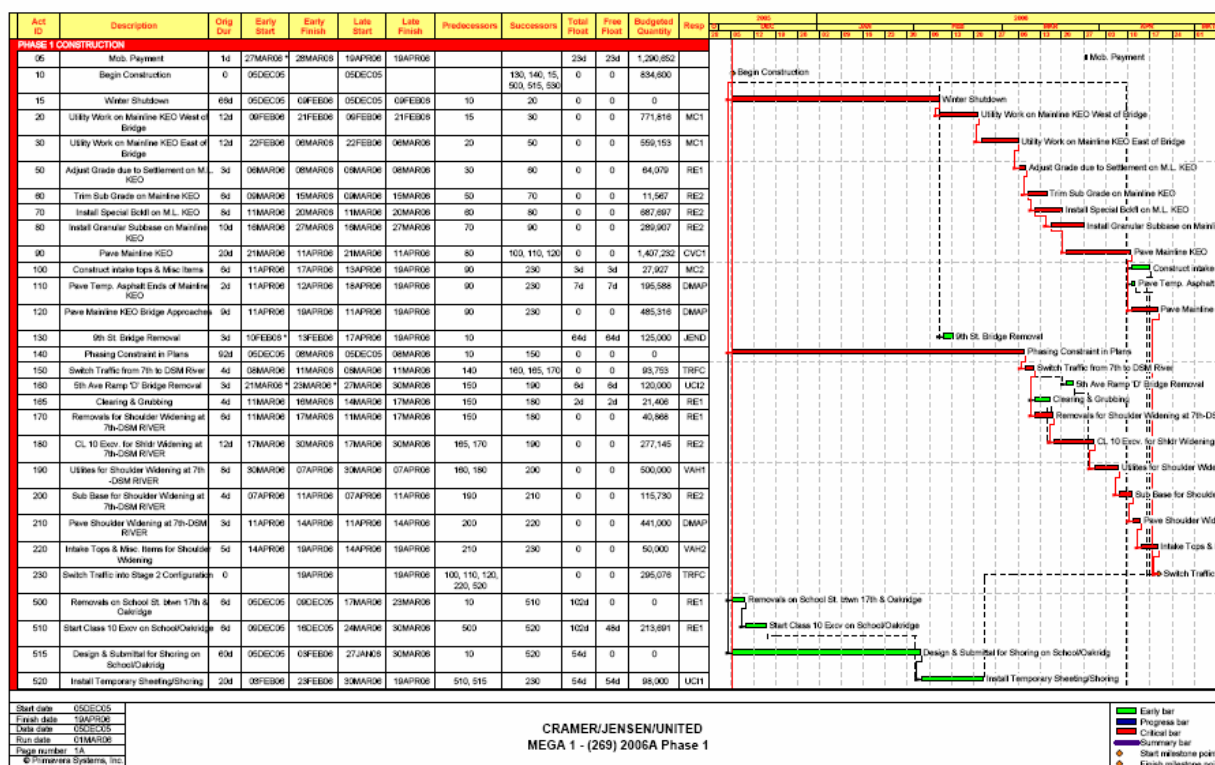
The CPM progress schedule was also used in construction operations. The contractor was required to “conduct weekly job site meetings with the Engineer to verify CPM progress schedule accuracy” (Iowa DOT 2005). Furthermore, the contractor was required to update the schedule as required, which was determined to be every other week, to reflect the actual progress of work.

### **Review System**

The duty of ISU was to develop a system to review contractor compliance with regard to the SPEC. This was accomplished by reviewing the schedule, conducting weekly field visits to compare actual progress with scheduled progress, and attending weekly meetings to coordinate activities. Other services included taking weekly progress photos, providing data backup, and maintaining a project website that was available to the contractor, subcontractor, and Iowa DOT.

### *Specification Compliance of Schedule*

During the initial stages of schedule development, ISU reviewed schedule submissions as the contractor worked to develop a baseline schedule (Figure 19). For each version of the pre-baseline schedule submitted, ISU completed a schedule review checklist (Figure 20). The completed schedule checklist was submitted to the Iowa DOT’s Resident Construction Engineer and the contractor’s project scheduler. In an iterative process, the schedule was revised until it reached compliance with the SPEC, at which point it was accepted as the “baseline” schedule. According to Hinze (2004), “The baseline schedule provides a measuring stick for comparing the as-built schedule. It is used not only as a management tool for determining the accuracy of planning efforts, but also as a basis for any construction delay claims.” The contractor’s project scheduler would then provide schedule updates, typically on a biweekly basis.



**Figure 22. Sample baseline schedule**

Contractors sometime submit post-bid value engineering (VE) proposals to the Iowa DOT in accordance with GS 1105.15 (Iowa DOT 2006). During the process of construction, delays and setbacks are very common. If a VE proposal was submitted, or if a delay or setback occurred, ISU would review the schedule impacts and provide comments. This was helpful for the Iowa DOT when it was necessary to obtain approvals for the changes.



I-235 Schedule Checklist		
Date Received: _____	Schedule: _____	
# of paper copies rec'd _____ <small>(# of copies required)</small>		
Computer schedule rec'd?	Program used	PDF rec'd?
Item	Y or N	Comments
Activity Node		
Activity Description		
Activity Duration		
Logic		
Shop drawing submittals & approvals		
Fabrication activity		
Responsibility		
Total Cost (within 2%)		
Total Float		
Early Start		
Predecessors		
Successors		
Expected Payment vs. Time curve		
Less than 10 days float		
Work Days, shifts & hours		
Major crews (equipment and # of workers)		
Reviewed by: _____ <small>(print name)</small>		
Date reviewed: _____		Signature: _____ <small>(signature of reviewer)</small>

**Figure 23. I-235 schedule checklist**

### *Weekly Field Visits*

After the “baseline” schedule was accepted and a schedule update was submitted, an ISU team member visited the construction site weekly to perform crew checks on critical activities. This was done to compare as-planned crew sizes to observed crew sizes. Additionally, the progress of the work was checked by comparing the updated schedule to

the observed progress. A field verification sheet was developed to streamline this process (Figure 21); it was submitted to the Iowa DOT's Resident Construction Engineer weekly.

<b>Project Number:</b>				
<b>Date:</b>				
<b>Observer Name:</b>				
On <i>(enter date here)</i> Iowa State University conducted a field visit to check on the progress of work at <i>(enter number of areas checked here)</i> areas of <i>(enter project number here)</i> ; <i>(enter areas visited here)</i> . The CPM schedule showed the following as planned activities:				
<b>Activity ID#:</b>	<b>As Planned Activity Description:</b>		<b>Observed Activity Description:</b>	
In addition to checking the progress of work Iowa State University performed crew checks at <i>(enter number of areas checked here)</i> areas of <i>(enter project number here)</i> ; <i>(enter areas visited here)</i> . The CPM schedule showed the following crews.				
<b>Activity ID#:</b>	<b>As Planned Activity:</b>	<b>Responsibility:</b>	<b>As Planned Crew:</b>	<b>Observed Crew:</b>
<b>Comments:</b>				
<b>Authored By:</b>				
	(print name here)			
	(sign name here)			

**Figure 24. Field verification sheet**

### *Weekly Progress Photos*

During the weekly field visits, digital progress photos of multiple areas of construction along I-235 were taken to document the progress of work in each area. These photos were submitted via CD-ROM to the Iowa DOT's Resident Construction Engineer on a monthly basis and were utilized on the project website. Photos were also taken prior to and at the end of each phase of construction, where disincentives might be assessed.

### *Weekly Progress Meetings*

The Iowa DOT conducted weekly progress meetings with contractors and subcontractors involved in the I-235 project. ISU attended each progress meeting and offered comments on

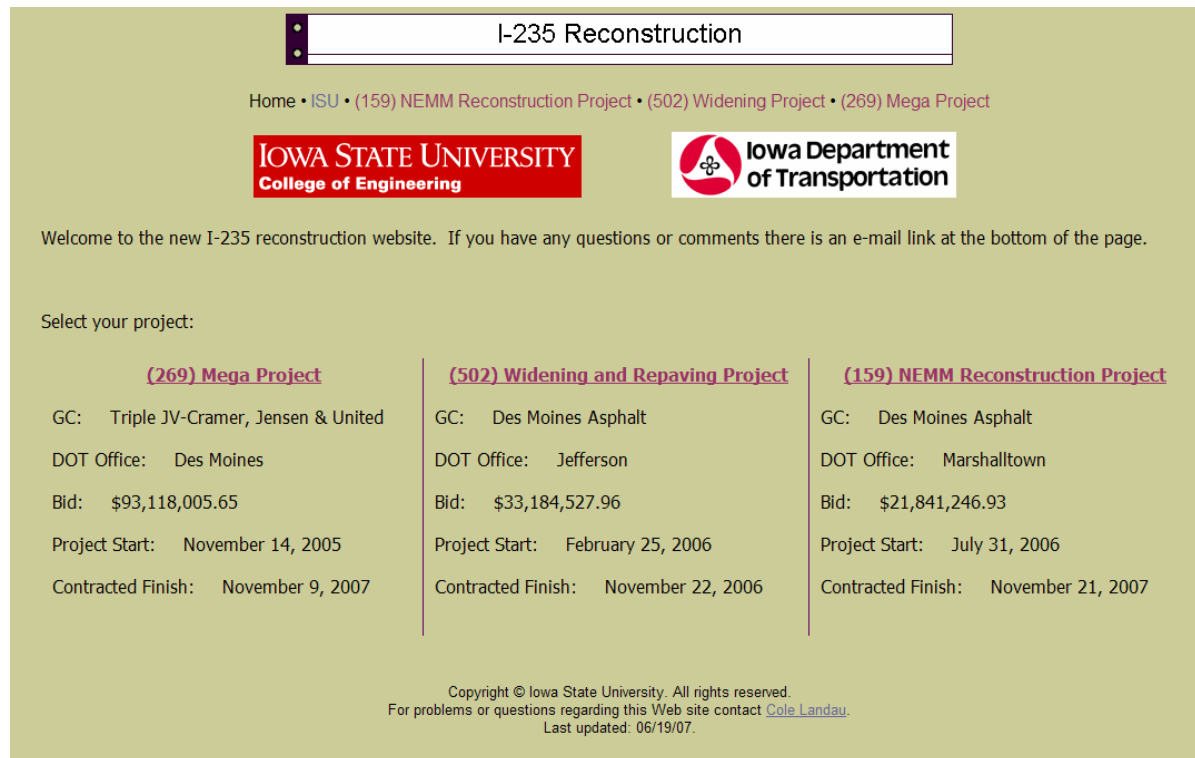
the schedule. The meeting served as a time for ISU to exchange compiled data with the Iowa DOT and receive schedule updates from the contractors. The weekly progress meetings allowed all participants to become better informed of the following: traffic, utility, and environmental impacts and any contract modifications, change orders, extra work, and activities happening in and around Des Moines that could impact the project.

#### *Data Backup*

All project information obtained by ISU including the following: plan sets, staging scrolls, specifications, schedules, meeting minutes, progress photos, schedule reviews, field reviews, and any correspondence between ISU, the Iowa DOT, or the contractors. This information was backed up electronically every week and was stored in hard copy format immediately. Hard copies and electronic copies are stored in separate areas of the building in case of fire. The redundant backup system has been in place since October of 2005.

#### *Project Website*

ISU has developed and maintained a secure website for multiple projects of the I-235 project (ISU 2007). The website was password-protected to allow access only to project personnel. The website has been updated on a weekly basis and contains the following information: preliminary schedules, baseline schedule, schedule updates, project contact information, plan sets, staging scrolls, specifications, addendum letters, progress photos, meeting minutes, and VE proposals. A screen shot of the project website is provided in Figure 22.



**Figure 25. Screen shot of project website**

### Stakeholder interviews

During June 2007, the second author conducted interviews with project participants to obtain information about how the schedules were used, what parts of the scheduling process went well, and what parts could be improved. The results are still being analyzed. However, the following preliminary observations can be shared at this writing:

- The schedule was used primarily by higher level managers for the Iowa DOT, prime contractors, and major subcontractors.
- Most respondents reported the following:
  - A more complete planning effort was undertaken with greater communication amongst stakeholders as a result of applying the SPEC to this project.
  - Including the schedule as an agenda item in the weekly progress meetings encouraged effective communication and problem solving on scheduling issues.

- Iowa DOT respondents indicated the following:
  - The schedules allowed them to quickly and confidently respond to questions on the schedule from public officials, utility companies, and concerned citizens. It was especially helpful for providing updates to and answering questions from upper level managers.
  - The process of schedule updating encouraged contractors to reexamine and refine their plans on a regular basis.
  - The information from the schedule provided justification in an efficient manner to obtain necessary approvals for contractor-generated VE proposals.
- Contractors reported that the schedule provided a basis for agreements amongst subcontractors on when to work overtime and extra shifts in order to meet schedule commitments.
- It was challenging to develop agreements regarding the amount of detail necessary and how to represent logical relationships, especially the first time that a contractor group submits a schedule to the Iowa DOT. Maintaining the balance between providing required information to the contracting agency and allowing the contractors to use their own means and methods for planning and scheduling required considerable effort.
- Some scheduling tasks that were perceived as useful to the Iowa DOT were not perceived as useful by the contractors
- Some scheduling tasks that were contemplated as necessary and useful at the beginning of the project turned out to have limited usefulness during the project.

### **Recommendations**

The knowledge gained by project participants in using this scheduling process may be used by others wishing to implement a similar system on future projects. Based on the experiences described in this paper, the following recommendations are made:

- Continue to use the SPEC on challenging projects where schedule compliance,

coordination, and stakeholder communications are deemed especially important.

- Prioritize tasks required by the specification in terms of benefits to project stakeholders and consider adding or deleting tasks. On future project, modify the specification according to the needs of the project.
- Plan to expend considerable effort at the beginning of the scheduling effort to communicate contracting agencies' needs and contractors' preferences regarding the scheduling effort.
- Develop standard procedures to monitor scheduling efforts and retain records or refine the ones described in this paper.

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## **CHAPTER 5. GENERAL CONCLUSIONS**

### **General Discussion**

The reports and papers presented in the preceding chapters of this document summarize the tasks performed and conclusions assembled, by the author during all phases of the projects. The projects all dealt with differing aspects of transportation construction administration and offered a unique opportunity to study the three topics presented above. The remainder of this thesis document is dedicated to portraying the major conclusions reached and lessons learned by the author during all phases of the projects, as well as provide the author's insight into future research on the topics.

In CHAPTER 4 the issue of scheduling during reconstruction and rehabilitation was described. During that construction project up to 120 hundred-thousand vehicles per day traveled through construction work zones. Scheduling played a vital role in the execution of construction tasks while maintaining traffic flow of the traveling public. It became extremely obvious to the author that numerous construction activities are dependent on one another's progress or completion. The schedule review process was significant to the timely completion of construction activities and assured the contractor to provide a reasonable construction schedule by allowing, or possibly forcing, the schedule to become a part of the Iowa DOT weekly I-235 meetings. At these meeting the schedule was always a topic of discussion and open conversation was held to explore what, if any, activities were driving the critical path of the schedule.

The construction and testing of an accelerated bridge construction project in Boone County was documented in CHAPTER 3. The author's primary contribution task during the project was to estimate a number of work days that might be required to complete the construction of a similar project under more stringent time constraints in the future. At the request of the Iowa DOT Bridge Design department the theoretical schedule was developed in terms of days where construction activities occur and did not include activities such as concrete cure times. This theoretical schedule was requested to allow the Iowa DOT Bridge Design office

to estimate durations of future projects that have different numbers and types of activities that are affected by concrete cure-times, weather constraints or other impacts to the construction schedule. This provided logical sequences for typical rapid bridge construction activities and estimate flexible method for estimating of the amount of time required for a contractor to be on site. The theoretical schedule created by the author can easily be modified to include additional constraints and activities so that a realistic schedule can be easily developed for future projects (for example, see Figure 17). As local bridge contractors and pre-cast suppliers alike, become more familiar with the materials and construction methods used on the Boone County project, extremely fast construction of bridges similar to this one will be possible.

The topic of temporary traffic control and enforcement of traffic laws for closed road sections was reported on in CHAPTER 2. It became apparent throughout the research phase of the project, that unauthorized vehicle entrance into closed road sections negatively impacts transportation-construction projects in a number of ways. Not only does the issue of driver and construction personnel safety arise, but factors such as property damage and liability concerns for the unauthorized vehicle and construction personnel also exist. The report concludes that current Iowa Statutes and MUTCD are sufficient, but clarification of statutes and policies would benefit law enforcement personnel as they work with closed road sections. Pre-construction planning efforts should involve local law enforcement personnel to ensure they are informed of the closed road section and proper patrol of the section can occur. In addition to increasing awareness of closed road sections, local law enforcement jurisdictions should consider increasing penalties for unauthorized entry into closed road sections. Through effective communication between law enforcement and contracting agencies and increased penalties for unauthorized closed road section entry, the issues presented that occur in these sections can be reduced.

### **Recommendations for Future Research**

Future research on the topic of transportation construction administration should include the use of advanced technologies to track and monitor construction work zones, collection and



comparison of crash and property damage data before and after clarification of related Statutes or specifications, and pre-construction planning collaboration between state DOT's and contractors.

Specifically the topic covered in CHAPTER 2 of this paper could expanded into a fifty-state review of state Statutes and DOT specifications involving temporary traffic control and enforcement of traffic laws in closed road sections. It may be possible to expand the topic to include international policies. Another possibility is to attempt to gather crash and property damage data from all of, or a specific regions states, as was done here. The end product could quite possibly result in a specific recommendation to the committee responsible for updating the MUTCD to include a section on the topic of "temporary traffic control and enforcement of traffic laws in closed road sections."

The subject of scheduling an accelerated bridge construction project, CHAPTER 3, could be researched further by gathering data from more projects such as this and historical data from other states or countries who have used the technique previously. A more inclusive construction schedule might be developed by utilizing historical weather impacts such as precipitation and temperature. The schedule could be developed to reflect the impacts of the events during various seasons of the year. Another possible direction to expand this topic area is to include new technologies that aid in pre-constructed assembly, such as bar code scanners for material inventory, design office to job site change orders via cell phones and internet and the use of pre-assembled steel sections in place of pre-cast concrete.

Further research could be conducted regarding the scheduling specification that was used for the reconstruction and rehabilitation of I-235 (CHAPTER 4). This could be accomplished by comparing similar projects that either use or do not use a review system that is similar to the one that was described in Chapter 4. The cost data from these projects could be used to compare contractor performance even if the projects differ in total cost and scale. The cost data could be manipulated to reflect the scale of the construction being undertaken. From this data manipulation a comparison could made between projects differing in schedule

review systems. Regardless of the methods used to compare the effectiveness of implementing a review system, the most up-to-date scheduling software and technological advances available to track contractor progress should be used.

## **APPENDIX A. FULL TEXT RESULTS OF KEYWORD SEARCHES FOR EACH STATE**

### **Iowa**

#### *Access*

Nothing herein shall be construed to prohibit or deny any person from gaining lawful access to the person's property or residence, nor shall it change or limit liability to such persons. (Iowa Code, Section 306.41)

#### *Jurisdiction*

The agency having jurisdiction and control over any highway in the state, or the chief engineer of said agency when delegated by such agency, may temporarily close sections of a highway by formal resolution entered upon the minutes of such agency when reasonably necessary because of construction, reconstruction, maintenance or natural disaster. (Iowa Code, Section 306.41)

#### *Liability*

No driver of a vehicle shall disobey the instructions of any official traffic-control device placed in accordance with the provisions of this chapter, unless at the time otherwise directed by a peace officer subject to the exceptions granted the driver of an authorized emergency vehicle. (Iowa Code, Section 321.256)

The agency having jurisdiction over a section of highway closed in accordance with the provisions of this section, or the persons or contractors employed to carry out the construction, reconstruction, or maintenance of the closed section of highway, shall not be liable for any damages to any vehicle that enters the closed section of highway or the contents of such vehicle or for any injuries to any person that enters the closed section of highway, unless the damages are caused by gross negligence of the agency or contractor. (Iowa Code, Section 306.41)

Nothing herein shall be construed to prohibit or deny any person from gaining lawful access to the person's property or residence, nor shall it change or limit liability to such persons. (Iowa Code, Section 306.41)

#### *Enforcement*

The division of state patrol of the department of public safety shall enforce the provisions of this chapter relating to traffic on the public highways of the state, including those relating to the safe and legal operation of passenger cars, motorcycles, motor trucks and buses, and to see that proper safety rules are observed. (Iowa Code, Section 321.2)

#### *Traffic Control*

The department shall place and maintain such traffic-control devices, conforming to its manual and specifications, upon all primary highways as it shall deem necessary to indicate and to carry out the provisions of this chapter or to regulate, warn, or guide traffic. (Iowa Code, Section 321.253)

The department shall post signs informing motorists that the scheduled fine for committing a moving traffic violation in a road work zone is doubled. (Iowa Code, Section 321.253)

#### *Property Damage*

[Nothing found under this topic]

## **Kansas**

### *Access*

When it is necessary for residents living along the road to use the road which is closed to through traffic, suitable means (including the use of temporary surface material) shall be provided for their entrance or exit, but the general traveling public shall be excluded. (Kansas Standard Specifications for Highway Construction, Section 821.03)

### *Jurisdiction*

The contractor shall designate someone from his work force at the project level who will have the responsibility for signing and traffic control on the project, which person shall be available 24 hours a day to repair, replace, remove, relocate, clean and maintain any traffic control device required or as directed by the Engineer. (Kansas Standard Specifications for Highway Construction, Section 821.03)

### *Liability*

Unless approved otherwise, all work shall be performed during daylight hours. Whenever practical, all vehicle equipment, tools, and materials, except necessary barricades and lights, shall be parked and/or stored off the right-of-way or far enough from the edge of pavement to provide clearance of at least 30 feet. (Kansas Standard Specifications for Highway Construction, Section 821.03)

### *Enforcement*

[Nothing under this topic]

### *Traffic Control*

The Contractor may develop an alternative Traffic Control Plan to be submitted to the Engineer for approval prior to its use...Traffic control shall be in accordance with FHWA MUTCD and supplied by contractor (Kansas Standard Specifications for Highway Construction, Section 821.03)

### *Property Damage*

[Nothing under this topic]

## **Minnesota**

### *Access*

Section 169.305 of the Statutes grants authority to Mn/DOT and local authorities to prohibit “incompatible” traffic on controlled access highways under their respective jurisdictions...Such prohibitions and restrictions are effective only when appropriate signs are erected on the affected highway. (Minnesota Traffic Engineering Manual, Section 2-7.02)

### *Jurisdiction*

Under MSA 169.06, Subd. 2, it is the sole responsibility of Mn/DOT to place and maintain all necessary traffic control devices on Trunk Highways although permission to do so may be granted to other authorities by Mn/DOT. (Minnesota Traffic Engineering Manual, Section 2-4.03.01).

Under MSA 169.06, Subd. 3, local authorities have both the right and the responsibility to place and maintain traffic control devices on streets and highways under their jurisdiction. (Minnesota Traffic Engineering Manual, Section 2-4.04.01)

### *Liability*

In order for Mn/DOT to be liable for a tort claim, three elements must be present:

- Mn/DOT must have a legal duty to the plaintiff to perform a particular task;

- Mn/DOT must have been negligent in its duty to perform that task;
- The damages incurred by the plaintiff were caused by the negligent performance of that duty. (Minnesota Traffic Engineering Manual, Section 12-3.01)

Negligence is defined as the failure to do something which a “reasonable person” would ordinarily do, or the doing of something which a reasonably prudent person would not do. (Minnesota Traffic Engineering Manual, Section 12-3.03)

### *Enforcement*

[L]ocal authorities have virtually complete authority (with notable exceptions such as Speed Zoning and Experimental Devices) over all streets and highways under their jurisdiction (county state-aid highways, county highways municipal state-aid streets and town roads). (Minnesota Traffic Engineering Manual, Section 2-3.02.01)

### *Traffic Control*

The Traffic Management Plan (TMP) is a plan of action which, when put into effect, details the procedures that Mn/DOT utilizes to assure that adequate provisions are made for the safety of motorists, pedestrians and workers...Mn/DOT needs a total commitment by all persons involved to insure that adequate consideration is given to proper traffic control for all operations. In order to assure that this commitment is met, it will require early involvement by all parties involved, such as pre-design, design, traffic, maintenance, and construction. Typical guidelines have been developed for the various stages. (Minnesota Traffic Engineering Manual, Section 8-4.01.02)

During the construction stage, the resident/project engineer will generally be the MN/DOT person responsible for traffic control. The resident/project engineer may delegate this authority. This should be done at the pre-construction conference...The responsible person should have the following duties:

1. Develop a familiarity with the MN MUTCD, the contract plans and special provisions, the current Minnesota Standard Specifications for Highway Construction and its supplements.
2. Coordinate Mn/DOT personnel assigned to the project relative to proper techniques of traffic safety and traffic operations prior to beginning construction and specifically how they relate to the TCP. The District Traffic Engineer and others shall be available to assist in this task.
3. Ensure that all affected agencies such as State Patrol, local Police, fire departments, sheriff's office, hospital, ambulance services, local government, post office, school districts, etc., are informed of the scope of the project and how it may affect their individual needs and services. This public relations work is extremely critical in the case of a total detouring of traffic. The District Public Affairs Coordinator and the Office of Communications may be of help in this responsibility. (Minnesota Traffic Engineering Manual, Section 8- 4.01.02)

### *Property Damage*

In order for Mn/DOT to have liability for damages, a claimant must prove:

- That MN/DOT had a legal duty to use reasonable care towards the plaintiff,

- That the MN/DOT breached that duty by failing below the standard of care thus committing an act of negligence,
- That damages (injuries, property damage, pain and suffering, loss of income, etc.) incurred by the plaintiff were caused by MN/DOT negligence, and finally
- For the claimant to recover the damages suffered, the claimant must have had a percentage of fault that was less than or equal to the fault of the defendant. (Minnesota Traffic Engineering Manual, Section 12-3.05)

## **Missouri**

### *Access*

[Nothing under this topic]

### *Jurisdiction*

[Nothing under this topic]

### *Liability*

Nothing under this topic

### *Enforcement*

When law enforcement is specified in the contract, the contractor is responsible for coordinating with local law enforcement. The contractor's working hours and work schedule should be furnished to the agency providing the law enforcement (highway patrol, county sheriff, city police) so that enforcement hours can be coordinated. The engineer should review and approve the contractor's proposed law enforcement schedule. Supporting documentation should be provided by the enforcement agency. Verification will be performed by the contractor and MoDOT prior to payment. (Missouri General Construction Manual, Section 616.4.4)

When specified in the plans, law enforcement personnel and vehicles shall be provided within the work zone as directed by the engineer. Law enforcement personnel shall have jurisdiction to enforce all traffic laws in the area to be patrolled. (Missouri Standard Specifications for Highway Construction, Section 616.4.4)

### *Traffic Control*

A Traffic Control Plan (TCP) is developed for every project. The TCP is an integral part of the planning and design of a project. The scope of the TCP is determined by the complexity of the project and is developed by the designer in the district in cooperation with district construction, maintenance and traffic personnel. Typical traffic control set-ups shall be shown for each work activity within the work zone. A preliminary field check with district construction and traffic is recommended to ensure the TCP will be compatible with field conditions. (Missouri Department of Transportation Project Development Manual, Section 8-04.1)

### *Property Damage*

The contractor shall provide written notice to the engineer of any pedestrian or vehicular accident when physical evidence or other information suggests an accident has occurred in the work zone. The contractor shall obtain and provide to the engineer copies of law enforcement accident reports for any accidents in the work zone. (Missouri Standard Specifications for Highway Construction, Section 616.4.2.7)

## **Nebraska**

### *Access*

The method of controlling access may be through police power, to a limited degree, or by acquisition of access rights in full or in part.

Police power regulation has universally been held valid as a proper exercise of governmental function. The universal test has required that such controls be reasonable. Therefore, any exercise of the police power, as in matters of access control, where no payment of compensation is required, may not ordinarily limit, restrict, or otherwise reduce access below a point where such access is deemed reasonably necessary and adaptable to serve the owners' lands. Beyond this point, police power controls may not be used.

When police power no longer provides the degree of control considered necessary for safe and efficient operation, it is then necessary to acquire private property, in the form of access rights, for public use by payment of just compensation. (Nebraska Department of Roads Access Control Policy to the State Highway System, Section 002)

### *Jurisdiction & Enforcement*

The Contractor shall keep fully informed of and observe and comply with all of the following which affect those engaged or employed on the work or affect the conduct of the work:

- (1) Federal and State laws.
- (2) Local laws and ordinances.
- (3) Orders and decrees of bodies or tribunals having any jurisdiction or authority. (Nebraska Standard Specifications for Highway Construction, Section 107.01.1.a)

### *Liability*

The Contractor shall insure the orderly movement of traffic through or around the work at all times. (Nebraska Standard Specifications for Highway Construction, Section 107.07.1)

The Contractor shall carry public liability insurance to indemnify the public for injuries or death sustained by reason of carrying on the work. In addition, the Contractor must also carry worker's compensation insurance in accordance with Nebraska statutory requirements. (Nebraska Standard Specifications for Highway Construction, Section 107.13.1.a)

### *Traffic Control*

#### 422 -- TEMPORARY TRAFFIC CONTROL DEVICES

All traffic control devices shall be located according to and meet all requirements prescribed in the MUTCD. Failure of the Contractor to erect and maintain traffic protective devices shall be reason to temporarily suspend their work in accordance with Subsection 108.06. (Nebraska Standard Specifications for Highway Construction, Section 422.01.2.a)

When more than one Contractor is working on the project or when consecutive projects require protection and control of traffic, the Engineer shall determine and notify in writing the Contractor whose responsibility it shall be to provide the protection and control of traffic. (Nebraska Standard Specifications for Highway Construction, Section 422.01.2.n)

### *Property Damage*

The Contractor shall indemnify and save harmless the Department and all of its representatives from any and all actions or claims brought because of injuries or damages to persons or property caused by the actions or omissions of the Contractor or the Contractor's employees or agents. (Nebraska Standard Specifications for Highway Construction, Section 107.12.1)

The Contractor shall be responsible for all damage or injury to any property during the prosecution of the work, resulting from any act, omission, neglect, or misconduct, in the manner or method of executing said work satisfactorily, or due to the non-execution of said work or at any time due to defective work or materials and said responsibility shall continue until the work shall have been completed and accepted. (Nebraska Standard Specifications for Highway Construction, Section 107.12.2)

Prior to beginning any work, the Contractor is required to meet with all involved local governmental entities and advise them of any intentions to use their local roads. The Contractor shall be responsible for resolving claims concerning damage to local roads caused by his/her operation. (Nebraska Standard Specifications for Highway Construction, Section 107.12.3)

## **South Dakota**

### *Access*

The Contractor shall conduct his work to minimize obstruction to traffic. The safety and convenience of the general public and the residents along the highway and the protection of persons and property shall be provided for by the Contractor as specified under Section 4.4. (South Dakota Standard Specifications for Roads and Bridges, Section 7.7)

### *Jurisdiction*

[Nothing under this topic]

### *Liability*

The Contractor shall keep fully informed of and comply with all Federal, State and local laws, ordinances and regulations, and all orders and decrees of bodies or tribunals having any jurisdiction or authority, which may affect those engaged or employed on the work, or which may affect the conduct of the work. The Contractor shall protect and indemnify the Department and its representatives against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by the Contractor, Subcontractors, Suppliers of materials or services or their employees. (South Dakota Standard Specifications for Roads and Bridges, Section 7.1)

The Contractor shall indemnify and save harmless the Department, its officers and employees, from all suits, actions, or claims of any character brought because of any injuries or damage received or sustained by any person, persons, or property on account of the operations of the said Contractor; or on account of or in consequence of any neglect in safeguarding the work; or through use of unacceptable materials in constructing the work; or because of any act or omission, neglect, or misconduct of said Contractor; or because of any claims or amounts recovered from any infringements of patent, trademark, or copyright; or from any claims or amounts arising or recovered under the "Workmen's Compensation Act", or any other law, ordinance, order, or decree; and so much of the money due the said Contractor under and by virtue of his contract as may be considered necessary by the Department for such purpose may be retained for the use of the State; or in case no money is due, his surety may be held until such suit or suits, action or actions, claim or claims for injuries or damages as aforesaid shall have been settled and suitable evidence to that effect furnished to the Department; money due the Contractor will not be withheld when the Contractor produces satisfactory evidence that adequate public liability and property damage insurance is in force. (South Dakota Standard Specifications for Roads and Bridges, Section 7.14)

The Contractor shall procure and maintain at the Contractor's own expense, during duration of the Contract, insurance liability for damages imposed by law with insurance companies authorized to do business in the State. The insurance shall cover all operations under the Contract, whether performed by the Contractor or by Subcontractors. Before commencing the work, the Contractor shall furnish certificates of insurance, certifying that the policies will not be changed or cancelled until 30 days written notice has been given to the Department.



The certificates of insurance shall provide evidence that sufficient liability insurance is carried to protect the public from injuries sustained by reason of pursuing the work, and that Worker's Compensation Insurance meets the requirements of the South Dakota Workmen's Compensation Law. (South Dakota Standard Specifications for Roads and Bridges, Section 7.15)

The Department of Transportation, or their authorized representatives are acting solely as agents and representatives of the Department when carrying out and exercising the power or authority granted to them under the Contract. There shall not be any liability on them either personally or as employees of the Department (South Dakota Standard Specifications for Roads and Bridges, Section 7.19)

### *Enforcement*

[Nothing under this topic]

### *Traffic Control*

The Contractor shall bear the expense of maintaining traffic over the project undergoing improvement, constructing and maintaining approaches, crossings, intersections, and other features as may be necessary, without direct compensation, except as provided below:

Prior to written suspension due to unfavorable weather or conditions not the fault of the Contractor, the Contractor shall prepare the project as directed by the Engineer to provide for the accommodation of traffic during the anticipated period of suspension.

During the suspension and until an order for resumption of construction operations is issued, the maintenance of the project for traffic, to the extent specified in writing by the Engineer, will be by and at the expense of the Department. (South Dakota Standard Specifications for Roads and Bridges, Section 4.4)

### *Property Damage*

The Contractor shall be responsible for the preservation of public and private property and shall not disturb, damage or move land monuments and property marks until the Engineer has witnessed or referenced their location.

The Contractor shall be responsible for all damage or injury to property, resulting from an act, omission, neglect, or misconduct in his manner or method of executing the work, or due to defective work or materials. The Contractor's responsibility will not be released until completion of the project and final acceptance by the Department.

The Contractor shall be responsible for any direct or indirect damage or injury to public or private property resulting from or on account of any act, omission, neglect, or misconduct in the execution of the work, or in consequence of the nonexecution of the work. The Contractor shall restore the property to a condition similar or equal to that existing before such damage or injury occurred by repairing, rebuilding, or restoring and making good such damage or injury as directed by the Engineer and at the expense of the Contractor (South Dakota Standard Specifications for Roads and Bridges, Section 7.12)

## **Wisconsin**

### *Access*

Notify the responsible fire department and police department at least 24 hours before closing a road, street, or highway. (Wisconsin Standard Specifications, Section 107.8(4))

All contractors doing any work which shall in any manner obstruct the streets or sidewalks shall put up and maintain barriers and lights to prevent accidents, and be liable for all damages caused by failure so to do. All contracts shall contain a provision covering this liability, and also a provision making the contractor liable for

all damages caused by the negligent digging up of streets, alleys or public grounds, or which may result from the contractor's carelessness in the prosecution of such work. (Wisconsin Statute 62.15[11])

When any portion of the state trunk highway system is impassable or dangerous to travel or when it shall be deemed necessary because of construction or maintenance work or for other reasons to suspend all or part of the travel thereon, the department may route such travel over a detour around such portion of the state trunk highway system. (Wisconsin Statute 84.02[10] [b])

### *Jurisdiction*

If the contract provides, or if the engineer orders, that the road or portions of the road be closed to all traffic, furnish, erect, and maintain the traffic control devices at the project termini and at intersecting roads along the project the contract specifies or as the engineer directs. (Wisconsin Standard Specifications, Section 104.6.3(1))

Never close a public road or portion of a public road without the engineer's specific written permission. If the contract specifies, or if the engineer orders, that a road or a portion of road is to be closed, notify the engineer at the earliest possible date of when the closure is needed so the department can make arrangements to close the road and provide detours. (Wisconsin Standard Specifications, Section 104.6.3(2))

If the contract provides that the road or portions of the road be closed to through traffic, furnish, erect, and maintain the traffic control devices at the project termini and at intersecting roads along the project the contract specifies or the engineer directs. Also, furnish, erect, and maintain those traffic control devices within the project limits as may be required for the safe accommodation of local traffic as defined in 101.3. At all times conduct the work in a manner to provide safe, reasonably-direct, all-weather, 24-hour pedestrian and vehicular access to abutting properties along the highway being improved. (Wisconsin Standard Specifications, Section 104.6.4(1))

### *Liability*

The contractor and the contractor's insurer shall defend, indemnify, and save harmless the following entities:

1. The state, its officers, agents, and employees. In this context, agents exclude consulting firms, Wisconsin counties and municipalities, and their respective officers and employees.
2. The county, town, or municipality in which the improvement is made, each of them separately or jointly, and their officers, agents, and employees. (Wisconsin Standard Specifications, Section 107.12(1))

Defend, indemnify, and save harmless all entities in 107.12 (1) from all suits, actions, or claims of any character brought because of one or more of the following:

1. Injuries or damages received or sustained by a person, persons, or property resulting from the contractor's operations
2. Neglect in safeguarding the work
3. Use of unacceptable materials in constructing the work
4. Acts or omissions, neglect, or misconduct of the contractor

5. Claims or amounts recovered for an infringement by the contractor of patent, trademark, or copyright
6. Claims or amounts arising or recovered under the workers compensation act, relating to the contractor's employees
7. The contractor's noncompliance with a law, ordinance, order, or decree relating to the contract (Wisconsin Standard Specifications, Section 107.12(2))

The contractor shall not bear the expense for damage to the work caused by abnormal and unforeseeable occurrences beyond the control of, and without the fault or negligence of, the contractor. These abnormal and unforeseeable occurrences include but are not limited to the following:

1. Cataclysmic phenomena of nature
2. Acts of the public enemy
3. Acts of government authorities

(Wisconsin Standard Specifications, Section 107.14(2))

### *Enforcement*

On any construction project, the method of constructing the project and the method of handling traffic should be resolved early in the project development process. The following guidelines are presented to assist the designer in identifying when specialized law enforcement techniques might be warranted. Use of law enforcement officials for periods of time greater than 1 day requires coordination with the enforcement agency and approval by Central Office Design.

1. Length of potential hazard. Relatively long projects (greater than 5 miles (8 km)) with continuous construction activities should be considered for law enforcement. Long projects with isolated construction sites (e.g. bridge deck repairs) or intermittent construction activities do not warrant this treatment. Construction should be over extended lengths of the project and for extended periods of time.

...Proposed use of law enforcement techniques shall be included in the Design Study Report and described in the project Plan Letter and Special Provisions. (Wisconsin Facilities Development Manual, Procedure 11-50-30)

### *Traffic Control*

Layout signs according to the FHWA Manual of Standard Highway Signs or the department's Sign Plate Book, unless the plans show otherwise. (Wisconsin Standard Specifications, Section 643.2.9(1))

Provide the sign size the contract specifies. If the contract does not specify the size, provide the size the MUTCD specifies for higher-speed locations or a larger size, except the engineer may allow smaller signs if space is limited and the MUTCD allows. (Wisconsin Standard Specifications, Section 643.2.9(2))

Under the Traffic Control Surveillance and Maintenance bid items, provide personnel to inspect and maintain the traffic control devices, furnished, and installed, in proper condition. (Wisconsin Standard Specifications, Section 643.3.2(1))

Inspection and maintenance includes all traffic control signs or devices included in the contract, including those on detour routes. Begin when the first traffic control sign or device is put into operation and end when the last traffic control sign or device is removed from operation. (Wisconsin Standard Specifications, Section 643.3.2(3))

Make the control specialist, or other contractor designated person, available 24 hours per day, 7 days per week to clean, repair, or replace traffic control devices not performing as intended throughout the period traffic control signs and devices are operating under this contract. Provide to the engineer, the County Sheriff, and the State Patrol Region Headquarters responsible for that county the telephone number to contact the control specialist or other contractor designated person. Ensure that the control specialist, or other designated person, is able to reach any location within the contract limits, or on detour routes, within 2 hours of being contacted, and can promptly accomplish the necessary cleaning, repair, or replacement. (Wisconsin Standard Specifications, Section 643.3.2(8))

Whenever any highway is impassable or unsafe for travel or during the construction or repair of any such highway and until it is ready for traffic the authorities in charge of the maintenance or construction thereof may keep it closed by maintaining barriers at each end of the closed portion. (Wisconsin Statue 86.06(1))

### *Property Damage*

Any person who, without lawful authority, removes, takes down, alters the position of, destroys, passes over or beyond any barrier so erected, or travels with any vehicle upon any portion of a highway closed by barriers as in this section provided, or walks or travels in any manner upon the materials placed thereon as part of the repair or construction work, shall be liable to a fine of not less than \$10 nor more than \$100, or to imprisonment not less than 10 nor more than 60 days, or both, and in addition thereto shall be liable for all damages done to the highway, said damages to be recovered by such governmental agency. (Wisconsin Statue 86.06(2))

**APPENDIX B. SURVEY: LOCAL ACCESS TO CLOSED ROADS AND STREETS  
(IOWA DOT, CITIES AND COUNTY ENGINEERS & STAFF)**

- 1) Have you experienced problems with traffic control and/or law enforcement on roads temporarily closed for construction or other activities but open for local access?
  - ☐ Yes
  - ☐ No
- 2) As part of project planning, how are access issues managed on temporary road/street closures?
  - ☐ Not considered
  - ☐ Contractual assignment or delegation
  - ☐ Permitting for authorized local traffic
  - ☐ Pre-construction meeting
  - ☐ Other: \_\_\_\_\_
  - ☐ Other: \_\_\_\_\_
- 3) As part of project planning, how are enforcement issues managed on temporary closures?
  - ☐ Not considered
  - ☐ Contractual assignment or delegation
  - ☐ Pre-construction meeting
  - ☐ Other: \_\_\_\_\_
  - ☐ Other: \_\_\_\_\_
- 4) What types of property damage have occurred on closed roads/streets in your jurisdiction due to inadequate traffic control or enforcement of closed road access?
  - ☐ None
  - ☐ Driver's property
  - ☐ Resident's property
  - ☐ Contractor's equipment or material
  - ☐ Completed work
  - ☐ Agency equipment
  - ☐ Construction work-in-progress
  - ☐ Other: \_\_\_\_\_
  - ☐ Other: \_\_\_\_\_

5) Are you aware of any damage in your jurisdiction to construction in place due to *authorized* local traffic on a road/street that is closed to public access?

☐ Yes

☐ No

If yes, what affect did it have on the project? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

6) Are you aware of any damage in your jurisdiction to construction in place due to *unauthorized* local traffic on a road/street that is closed to public access?

☐ Yes

☐ No

If yes, what affect did it have on the project? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

7) Which of the following at risk behaviors have occurred on closed road/street sections within your jurisdiction? Please check all that apply and provide comments if desired.

☐ Willful vandalism \_\_\_\_\_

☐ Drag racing \_\_\_\_\_

☐ 4-wheeling \_\_\_\_\_

☐ Dirt biking \_\_\_\_\_

☐ Hunting \_\_\_\_\_

☐ Other: \_\_\_\_\_

☐ Other: \_\_\_\_\_

☐ Other: \_\_\_\_\_

8) Have you ever temporarily closed roads/streets during winter due to two-season construction?

☐ Yes

☐ No

If so, have you encountered any road closure issues specific to 2-season closures?

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9a) In your opinion, is worker safety during construction on closed road/street sections compromised by the inability to effectively enforce traffic laws?

☐ Yes

☐ No

If so, what are the actions that compromise safety?

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9b) In your opinion, is worker safety during construction on closed road/street sections compromised by failure of contractor to follow standard practices for closures?

☐ Yes

☐ No

If so, what are the actions that compromise safety?

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9c) In your opinion, is worker safety during construction on closed road/street sections compromised by local access traffic for area residents and businesses?

☐ Yes

☐ No

If so, what actions compromise safety?

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10) In your opinion, are the standard agency procedures for temporarily closing roads/streets followed closely when a decision is made to close a road section for construction?

☐ Yes

☐ No

11) In your opinion, are the specifications for traffic control in temporarily closed road sections followed closely by the contractor or other construction site personnel?

☐ Yes

☐ No

12) In your opinion, do local residents and businesses put pressure on agency and/or construction site personnel to “bend the rules” for temporary road/street closures in order to improve local access conditions?

☐ Yes

☐ No

13) Do you use full closure for maintenance operations in your jurisdiction?

☐ Yes

☐ No

If so, what are the reasons for using full closure during maintenance?

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14) Are there any other problems that you have experienced within your jurisdiction relating to temporary road/street closures for construction?

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### APPENDIX C. SUMMARY RESULTS TO SURVEY: LOCAL ACCESS TO CLOSED ROADS/STREETS

		Municipalities n=34	Counties n=43	State n=7	Online County n=32	Online Out-of State n=2
Question	Answers	# or %	# or %	# or %	# or %	# or %
1	Yes	61%	93%	80%	84%	50%
	No	39%	7%	20%	16%	50%
2	Not considered		2		1	
	Contractual assignment or delegation	16	13	2	6	
	Permitting for authorized local traffic		11	1	5	
	Pre-construction meeting	28	21	2	25	1
	Other					
3	Not considered	10	11	2	16	
	Contractual assignment or delegation	5	7		3	
	Permitting for authorized local traffic					
	Pre-construction meeting	17	16	1	10	2
	Other					1
4	None	12	4		5	1
	Driver's property	11	18	2	12	1
	Residents property	7	11	1	3	
	Contractor's equipment or material	8	19	3	15	1
	Completed work	8	18	3	11	1
	Agency equipment	1	4	1	3	
	Construction work-in-progress	11	19	3	17	1
5	Yes	18%	14%	20%	6%	
	No	82%	86%	80%	94%	100%
6	Yes	41%	55%	60%	52%	
	No	59%	45%	40%	48%	100%

		Municipalities	Counties	State	Online County	Online Out-of State
Question	Answers	# or %	# or %	# or %	# or %	# or %
7	Willful vandalism	14	33	4	20	2
	Drag racing	2	7	1	3	1
	4 wheeling	5	17	4	11	1
	Dirt biking	4	3	1	4	1
	Hunting		3	1	3	1
	Other		7	1	4	1
8	Yes	12%	45%	60%	44%	100%
	No	88%	55%	40%	56%	
9a	Yes	30%	60%	100%	62%	50%
	No	70%	40%		38%	50%
9b	Yes	42%	44%	40%	32%	50%
	No	58%	56%	60%	68%	50%
9c	Yes	33%	40%	40%	38%	50%
	No	67%	60%	60%	62%	50%
10	Yes	85%	82%	100%	100%	100%
	No	15%	18%			
11	Yes	71%	65%	80%	80%	100%
	No	29%	35%	20%	20%	
12	Yes	68%	75%	80%	68%	100%
	No	32%	25%	20%	32%	
13	Yes	26%	51%		47%	100%
	No	74%	49%	100%	53%	

## **APPENDIX D. SURVEY: TEMPORARY TRAFFIC CONTROL AND LAW ENFORCEMENT IN CLOSED ROAD SECTIONS (LAW ENFORCEMENT SURVEY AND RESPONSE DATA)**

The Center for Transportation Research and Education (CTRE) and Iowa State University have undertaken a research study of temporary traffic control and law enforcement in road sections closed to traffic. Your opinions and recommendations would be a valuable asset to a meaningful conclusion of this project.

Please provide the following information based on your experience and knowledge as a law enforcement officer.

1. Do your responsibilities occasionally require you to work in road or street sections that have been officially or unofficially closed to through traffic?

YES \_\_\_\_

NO \_\_\_\_

2. Have you ever investigated a serious crash or incident in a closed road section?

YES \_\_\_\_

NO \_\_\_\_

3. Do you have concerns or challenges about your authority to issue citations, enforce moving violations or other laws in closed roadway sections?

YES \_\_\_\_

NO \_\_\_\_

4. Would modification or clarification of the Iowa Code make your job of enforcement in closed road sections more effective?

YES \_\_\_\_

NO \_\_\_\_

5. If you answered yes to question numbers 3 or 4, what Code section(s) should be modified?

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6. Have you had any experience or knowledge of a police enforcement action being negated or challenged due to the action having been taken on a road not open to normal traffic use.

YES \_\_\_\_

NO \_\_\_\_

If so, please explain

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<b><u>Summary of Responses to Law Enforcement Survey</u></b>		
Question	Yes	No
1: Do your responsibilities occasionally require you to work in road or street sections that have been officially or unofficially closed to through traffic?	157	23
2: Have you ever investigated a serious crash or incident in a closed road section?	52	128
3: Do you have concerns or challenges about your authority to issue citations, enforce moving violations or enforce other laws in closed roadway sections?	23	157
4: Would modification or clarification of the Iowa Code make your job of enforcement in closed road sections more effective?	45	135
5: If you answered yes to question numbers 3 or 4, what Code section(s) should be modified?	Question 5 (word document)	
6: Have you had experience of a police enforcement action be negated or challenged due to the action having been taken on a road not open to normal traffic use?	9	171
	Question 6 (word document)	

Total Number of Surveys: 180

## **APPENDIX E. SELECTED IOWA CODE ARTICLES WITH POSSIBLE RELEVANCE TO CLOSED ROAD/STREET ISSUES**

### **306.10 Power to Establish, Alter or Vacate.**

In the construction, improvement, operation or maintenance of any highway, or highway system, the agency which has control and jurisdiction over such highway or highway system, shall have power, on its own motion, to alter or vacate and close any such highway or railroad crossing thereon, and to establish new highways or railroad crossing thereon which are or are intended to become a part of the highway system over which said agency has jurisdiction and control.

[C73, § 937, 954; C97, § 1496, 1509; S13, § 1509; C24, § 4577, 4593, 4732; C27, 31, § 4577, 4593, 4755-b27, 4755-d2; C35, § 4577, 4593, 4631-e1, 4755-b27, 4755-d2; C39, § 4577, 4593, 4631.1, 4755.23, 4755.37; C46, 50, § 306.18, 306.34, 308.2, 313.25, 313.46; C54, 58, 62, 66, § 306.4; C71, 73, 75, 77, 79, 81, § 306.10]

### **306.11 Hearing--Place--Date.**

In proceeding to the vacation and closing of a road, part thereof, or railroad crossing, the agency in control of the road, or road system, shall fix a date for a hearing on the vacation and closing in the county where the road, or part thereof, or crossing, is located, and if located in more than one county, then in a county in which any part of the road or crossing is located. If the road to be vacated or changed is a secondary road located in more than one county, the boards of supervisors of the counties, acting jointly, shall fix a date for a hearing on the vacation or change in either or any of the counties where the road, or part thereof, is located. If the proposed vacation is of part of a road right-of-way held by easement and will not change the existing traveled portion of the road or deny access to the road by adjoining landowners, a hearing is not required.

[C31, 35, § 4755-d2, 4755-d3; C39, § 4755.37, 4755.38; C46, 50, § 313.46, 313.47; C54, 58, 62, 66, § 306.5; C71, 73, 75, 77, 79, 81, § 306.11]

2000 Acts, ch 1074, §1; 2000 Acts, ch 1232, §65

Referred to in § 306.12, 306A.6

### **306.41 Temporary Closings for Construction**

The agency having jurisdiction and control over any highway in the state, or the chief engineer of said agency when delegated by such agency, may temporarily close sections of a highway by formal resolution entered upon the minutes of such agency when reasonably necessary because of construction, reconstruction, maintenance or natural disaster and shall cause to be erected "road closed" signs and partial or total barricades in the roadway at each end of the closed highway section and on the closed highway where that highway is intersected by other highways if such intersection remains open. Any numbered road closed for over forty-eight hours shall have a designated detour route. The agency having jurisdiction over a section of highway closed in accordance with the provisions of this section, or the persons or contractors employed to carry out the construction, reconstruction, or maintenance of the closed section of highway, shall not be liable for any damages to any vehicle that enters the closed section of highway or the contents of such vehicle or for any injuries to any person that enters the closed section of highway, unless the damages are caused by gross negligence of the agency or contractor.

Nothing herein shall be construed to prohibit or deny any person from gaining lawful access to the person's property or residence, nor shall it change or limit liability to such persons.

[C71, 73, 75, 77, 79, 81, § 306.41]

### **321.1 Definitions of Words and Phrases**

The following words and phrases when used in this chapter shall, for the purpose of this chapter, have the meanings respectively ascribed to them.

46. "Official traffic-control devices" means all signs, signals, markings, and devices not inconsistent with this chapter placed or erected by authority of a public body or official having jurisdiction, for the purpose of regulating, warning, or guiding

traffic.

65. "Roadway" means that portion of a highway improved, designed, or ordinarily used for vehicular travel.

66. "Road work zone" means the portion of a highway which is identified by posted or moving signs as the site of construction, maintenance, survey, or utility work. The zone starts upon meeting the first sign identifying the zone and continues until a posted or moving sign indicates that the work zone has ended.

78. "Street" or "highway" means the entire width between property lines of every way or place of whatever nature when any part thereof is open to the use of the public, as a matter of right, for purposes of vehicular traffic.

84. "Traffic" means pedestrians, ridden or herded animals, vehicles, streetcars, and other conveyances either singly or together while using any highway for purposes of travel.

90. "Vehicle" means every device in, upon, or by which any person property is or may be transported or drawn upon a highway.

"Vehicle" does not include:

a. Any device moved by human power.

b. Any device used exclusively upon stationary rails or tracks.

c. Any integral part of a truck tractor or road tractor which is mounted on the frame of the truck tractor or road tractor immediately behind the cab and which may be used to transport persons and property but which cannot be drawn upon the highway by the truck tractor or another motor vehicle.

d. Any steering axle, dolly, auxiliary axle, or other integral part of another vehicle which in and of itself is incapable of commercially transporting any person or property but is used primarily to support another vehicle.

### **321.2 Department**

The state department of transportation shall administer and the provisions of this chapter. The division of state patrol of the department of public safety shall enforce the provisions of this chapter relating to traffic on the public highways of the state, including those relating to the safe and legal operation of passenger cars, motorcycles, motor trucks and buses, and to see that proper safety rules are observed.

The state department of transportation and the department of public safety shall cooperate to insure the proper and adequate enforcement of the provisions of this chapter.

[C24, 27, 31, 35, § 4863; C39, § 5000.02; C46, 50, 54, 58, 62, 66, 71, 73, 75, 77, 79, 81, § 321.2]

98 Acts, ch 1074, §20; 2005 Acts, ch 35, §31

### **321.228 Provisions Refer to Highways—Exceptions**

The provisions of this chapter relating to the operation of vehicles refer exclusively to the operation of vehicles upon highways except:

1. Where a different place is specifically referred to in a given section.
2. The provisions of sections 321.261 to 321.273 and sections 321.277 and 321.280 shall apply upon highways and elsewhere throughout the state.

[C39, § 5017.01; C46, 50, 54, 58, 62, 66, 71, 73, 75, 77, 79, 81, § 321.228]

86 Acts, ch 1220, § 35; 98 Acts, ch 1178, § 2

### **321.232 Radar Jamming Devices—Penalty**

1. A person shall not sell, operate or possess a radar jamming device, except as otherwise provided in this section, when the device is in a vehicle operated on the highways of this state or the device is held for sale in this state.
2. This section does not apply to radar speed measuring devices purchased by, held for purchase for, or operated by peace officers using the devices in their official duties.
3. A radar jamming device may be seized by a peace officer subject to forfeiture as provided by chapter 809 or 809A. 4. For the purposes of this section "radar jamming device" means any mechanism designed or used to transmit radio waves in the electromagnetic wave spectrum to interfere with the reception of those emitted from a device used by peace officers of this state to measure the speed of motor vehicles on the highways of this state and which is not designed for two-way transmission and cannot transmit in plain language.

[81 Acts, ch 109, § 1]

96 Acts, ch 1133, § 41 Referred to in § 805.8A(14g) For applicable scheduled fines, see §805.8A, subsection 14, paragraph g

### **321.233 Road Workers Exempted**

This chapter, except sections 321.277 and 321.280, does not apply to persons and motor vehicles and other equipment while actually engaged in work upon the surface of a highway officially closed to traffic but does apply to such persons and vehicles when traveling to or from such work. The minimum speed restriction of section 321.285, subsection 6, and the provisions of sections 321.297, 321.298, and 321.323 do not apply to road workers operating maintenance equipment on behalf of any state or local authority while engaged in road maintenance, road blading, snow and ice control and removal, and granular resurfacing work on a highway, whether or not the highway is closed to traffic.

[C39, § 5017.06; C46, 50, 54, 58, 62, 66, 71, 73, 75, 77, 79, 81, § 321.233; 82 Acts, ch 1154, § 1]

85 Acts, ch 167, § 1; 86 Acts, ch 1220, § 36; 90 Acts, ch 1230, §64; 97 Acts, ch 104, §18

### **321.252 Department to Adopt Sign Manual**

The department shall adopt a manual and specifications for a uniform system of traffic-control devices consistent with the provisions of this chapter for use upon highways within this state. Such uniform system shall correlate with and so far as possible conform to the system then current as approved by the American association of state highway and transportation officials. The department shall include in its manual of traffic-control devices, specifications for a uniform system of highway signs for the purpose of guiding traffic to organized off-highway permanent camps, and camp areas, operated by recognized and established civic, religious, and nonprofit charitable organizations and to for-profit campgrounds and ski areas. The department shall purchase, install, and maintain the signs upon the prepayment of the costs by the organization or owner.

The department shall also establish criteria for guiding traffic on all fully controlled-access, divided, multilaned highways including interstate highways to each tourist attraction which is located within thirty miles of the highway and receives fifteen thousand or more visitors annually. Nothing in this unnumbered paragraph shall be construed to prohibit the department from erecting signs to guide traffic on these highways to tourist attractions which are located more than thirty miles from the highway or which receive fewer than fifteen thousand visitors annually.

The department shall establish, by rule, in cooperation with a tourist signing committee, the standards for tourist-oriented directional signs and shall annually review the list of attractions for which signing is in place. The rules shall conform to national standards for tourist-oriented directional signs adopted under 23 U.S.C. § 131(q) and to the manual of uniform traffic-control devices. The tourist signing committee shall be made up of the directors or their designees of the departments of economic development, agriculture and land stewardship, natural resources, cultural affairs, and transportation, the chairperson or the chairperson's designee of the Iowa travel council, and a member of the outdoor advertising association of Iowa. The director or the director's designee of the department of economic development shall be the chairperson of the committee. The department of transportation shall be responsible for calling and setting the date of the meetings of the committee which meetings shall be based upon the amount of activity relating to signs. However, the committee shall meet at least once a month. However, a tourist attraction is not subject to a minimum number of visitors annually to qualify for tourist-oriented directional signing. The rules shall not be applicable to directional signs relating to historic sites on land owned or managed by state agencies, as provided in section 321.253A. The rules shall include but are not limited to the following:



1. Criteria for eligibility for signing.
2. Criteria for limiting or excluding businesses, activities, services, and sites that maintain signs that do not conform to the requirements of chapter 306B, chapter 306C, division II, or other statutes or administrative rules regulating outdoor advertising.
3. Provisions for a fee schedule to cover the direct and indirect costs of sign manufacture, erection, and maintenance, and related administrative costs.
4. Provisions specifying maximum distances to eligible businesses, activities, services, and sites. Tourist-oriented directional signs may be placed on highways within the maximum travel distance that have the greatest traffic count per day, if sufficient space is available. If an adjacent landowner complains to the department about the placement of a tourist-oriented directional sign, the department shall attempt to reach an agreement with the landowner for relocating the sign. If possible, the sign shall be relocated from the place of objection. If the sign must be located on an objectionable place, it shall be located on the least objectionable place possible.
5. Provisions for trailblazing to facilities that are not on the crossroad. Appropriate trailblazing shall be installed over the most desirable routes on lesser traveled primary highways, secondary roads, and city streets leading to the tourist attraction.
6. Criteria for determining when to permit advance signing.
7. Provisions specifying conditions under which the time of operation of a business, activity, service, or site is shown.
8. Provisions for masking or removing signs during off seasons for businesses, activities, services, and sites operated on a seasonal basis. Faded signs shall be replaced and the commercial vendor charged for the cost of replacement based upon the fee schedule adopted.
9. Provisions specifying the maximum number of signs permitted per intersection.
10. Provisions for determining what businesses, activities, services, or sites are signed when there are more applicants than the maximum number of signs permitted.
11. Provisions for removing signs when businesses, activities, services, or sites cease to meet minimum requirements for participation and related costs. Local authorities shall adhere to the specifications for such signs as established by the department, and shall purchase, install, and maintain such signs in their respective jurisdictions upon prepayment by the organization of the cost of such purchase, installation, and maintenance. The department shall include in its manual of traffic-control devices specifications for a uniform system of traffic-control devices in legally established school zones.

86 Acts, ch 1060, § 1, 2; 90 Acts, ch 1183, § 4 Referred to in § 321.342, 668.10

### **321.253 Department to Erect Signs**

The department shall place and maintain such traffic-control devices, conforming to its manual and specifications, upon all primary highways as it shall deem necessary to indicate and to carry out the provisions of this chapter or to regulate, warn, or guide traffic. Whenever practical, said devices or signs shall be purchased from the director of the Iowa department of corrections.

The department shall post signs informing motorists that the scheduled fine for committing a moving traffic violation in a road work zone is doubled.

[C24, 27, § 4627; C31, 35, § 4627, 5079-d7; C39, § 5019.02; C46, 50, 54, 58, 62, 66, 71, 73, 75, 77, 79, 81, § 321.253]

83 Acts, ch 96, § 157, 159, 160; 93 Acts, ch 114, § 2; 97 Acts, ch 104, §19

Analogous provisions, § 321.345

### **321.256 Obedience to Official Traffic-Control Devices**

No driver of a vehicle shall disobey the instructions of any official traffic-control device placed in accordance with the provisions of this chapter, unless at the time otherwise directed by a peace officer subject to the exceptions granted the driver of an authorized emergency vehicle.

[C39, § 5019.05; C46, 50, 54, 58, 62, 66, 71, 73, 75, 77, 79, 81, § 321.256] Referred to in § 805.8A(8) For applicable scheduled fine, see §805.8A, subsection 8.

### **321.260 Interference with Devices, Signs, or Signals—Unlawful Possession—Traffic Signal Preemption Devices**

1. a. A person who willfully and intentionally, without lawful authority, attempts to or in fact alters, defaces, injures, knocks down, or removes an official traffic-control device, an authorized warning sign or signal or barricade, whether temporary or permanent, a railroad sign or signal, an inscription, shield, or insignia on any of such devices, signs, signals, or barricades, or any other part thereof, shall, upon conviction, be guilty of a simple misdemeanor and shall be required to make restitution to the affected jurisdiction. In addition to any other penalties, the punishment imposed for a violation of this subsection shall include assessment of a fine of not less than two hundred fifty dollars.

b. A person who is convicted under paragraph "a" of an act relating to a stop sign or a yield sign may be required to complete community service in addition to making restitution to the affected jurisdiction.

2. It shall be unlawful for any person to have in the person's possession any official traffic-control device except by legal right or authority. Any person convicted of unauthorized possession of any official traffic-control device shall upon conviction be guilty of a simple

misdemeanor. In addition to any other penalties, the punishment imposed for a violation of this subsection shall include assessment of a fine of not less than two hundred fifty dollars.

3. a. A person shall not sell, own, possess, or use a traffic signal preemption device except as permitted in connection with the lawful operation of an authorized emergency vehicle as defined in section 321.1 or as otherwise authorized by the jurisdiction owning and operating an official traffic control signal. A person who is convicted of the unauthorized sale, ownership, possession, or use of a traffic signal preemption device is guilty of a simple misdemeanor. In addition to any other penalties, the punishment imposed for a violation under this subsection shall include assessment of a fine of not less than two hundred fifty dollars, and if the violation involves the unauthorized use of a traffic signal preemption device, the person may also be required to complete community service.

b. For purposes of this subsection, "traffic signal preemption device" means a device that, when activated, is capable of changing an official traffic control signal to green out of sequence.

[C39, § 5019.09; C46, 50, 54, 58, 62, 66, 71, 73, 75, 77, 79, 81, § 321.260]

90 Acts, ch 1064, §1; 91 Acts, ch 131, §1; 99 Acts, ch 153, §3, 4; 2005 Acts, ch 63, §1

### **321.285 Speed Restrictions**

Any person driving a motor vehicle on a highway shall drive the same at a careful and prudent speed not greater than nor less than is reasonable and proper, having due regard to the traffic, surface, and width of the highway and of any other conditions then existing, and no person shall drive any vehicle upon a highway at a speed greater than will permit the person to bring it to a stop within the assured clear distance ahead, such driver having the right to assume, however, that all persons using said highway will observe the law.

The following shall be the lawful speed except as provided by this section, or except as posted pursuant to sections 262.68, 321.236, subsection 5, section 321.288, subsection 6, sections 321.289, 321.290, 321.293, 321.295, and 461A.36, and any speed in excess thereof shall be unlawful:

1. Twenty miles per hour in any business district.
2. Twenty-five miles per hour in any residence or school district.
3. Forty-five miles per hour in any suburban district. Each school district as defined in subsection 70 of section 321.1 shall be marked by distinctive signs as provided by the current manual of uniform traffic control devices adopted by the department and placed on the highway at the limits of such school district.
4. Notwithstanding any other speed restrictions, the speed limit for all vehicular traffic shall be fifty-five miles per hour.
5. Reasonable and proper, but not greater than fifty-five miles per hour at any time between sunrise and sunset, and not greater than fifty miles per hour at any time between sunset and sunrise, on secondary roads unless such roads are surfaced with concrete or asphalt or a combination of both, in which case the speed limits shall be the same as provided in

subsection 4 of this section. When the board of supervisors of any county shall determine upon the basis of an engineering and traffic investigation that the speed limit on any secondary road is greater than is reasonable and proper under the conditions found to exist at any intersection or other place or upon any part of a secondary road, the board shall determine and declare a reasonable and proper speed limit at the intersection or other part of the secondary road. The speed limits as determined by the board of supervisors shall be effective when appropriate signs giving notice of the speed limits are erected by the board of supervisors at the intersection or other place or part of the highway.

6. a. Notwithstanding any other speed restrictions, the speed limit for all vehicular traffic on fully controlled-access, divided, multilaned highways is sixty-five miles per hour. However, the speed limit for all vehicular traffic on highways that are part of the interstate road system, as defined in section 306.3, is seventy miles per hour. The department may establish a speed limit of sixty-five miles per hour on certain divided, multilaned highways not otherwise described in this paragraph.

b. The department, on its own motion or in response to a recommendation of a metropolitan or regional planning commission or council of governments, may establish a lower speed limit on a highway described in this subsection.

c. For the purposes of this subsection, "fully controlled-access highway" means a highway that gives preference to through traffic by providing access connections with selected public roads only and by prohibiting crossings at grade or direct private driveway connections.

d. A minimum speed may be established by the department on the highways referred to in this subsection if warranted by engineering and traffic investigations.

e. Any kind of vehicle, implement, or conveyance incapable of attaining and maintaining a speed of forty miles per hour shall be prohibited from using the interstate road system.

[S13, § 1571-m19, -m20; C24, 27, 31, 35, § 5029, 5030; C39, § 5023.01; C46, 50, 54, 58, 62, 66, 71, 73, 75, 77, 79, 81, § 321.285]

87 Acts, ch 120, §2; 93 Acts, ch 47, § 3--7; 94 Acts, ch 1173, §15; 96 Acts, ch 1126, § 5; 96 Acts, ch 1191, § 1; 2005 Acts, ch 165, §1

Referred to in § 321.233, 321.236, 321.291, 321.292, 321.293, 331.362, 805.8A(5a, 10)

Speed limits at regents institutions, see § 262.68 For applicable scheduled fines, see §805.8A, subsections 5 and 10

### **321.288 Control of Vehicle—Reduced Speed**

A person operating a motor vehicle shall have the vehicle under control at all times and shall reduce the speed to a reasonable and proper rate:

1. When approaching and passing a person walking in the traveled portion of the public highway.

2. When approaching and passing an animal which is being led, ridden, or driven upon a public highway.
3. When approaching and traversing a crossing or intersection of public highways, or a bridge, sharp turn, curve, or steep descent, in a public highway.
4. When approaching and passing an emergency warning device displayed in accordance with rules adopted under section 321.449, or an emergency vehicle displaying a revolving or flashing light.
5. When approaching and passing a slow moving vehicle displaying a reflective device or alternative reflective device as provided by section 321.383.
6. When approaching and passing through a sign-posted road work zone upon the public highway.

[S13, § 1571-m18; C24, 27, 31, 35, § 5031; C39, § 5023.04; C46, 50, 54, 58, 62, 66, 71, 73, 75, 77, 79, 81, § 321.288]

85 Acts, ch 167, §2; 87 Acts, ch 170, §7; 89 Acts, ch 296, §33; 97 Acts, ch 104, §20; 99 Acts, ch 102, §1

Referred to in § 321.285, 805.8A(6c)

For applicable scheduled fine, see §805.8A, subsection 6, paragraph c

#### **668.10 Governmental Exemptions**

In any action brought pursuant to this chapter, the state or a municipality shall not be assigned a percentage of fault for any of the following:

1. The failure to place, erect, or install a stop sign, traffic control device, or other regulatory sign as defined in the uniform manual for traffic control devices adopted pursuant to section 321.252. However, once a regulatory device has been placed, created or installed, the state or municipality may be assigned a percentage of fault for its failure to maintain the device.
2. The failure to remove natural or unnatural accumulations of snow or ice, or to place sand, salt, or other abrasive material on a highway, road, or street if the state or municipality establishes that it has complied with its policy or level of service for snow and ice removal or placing sand, salt or other abrasive material on its highways, roads, or streets.
3. For contribution unless the party claiming contribution has given the state or municipality notice of the claim pursuant to sections 669.13 and 670.5.84 Acts, ch 1293, § 10

#### **670.4 Claims Exempted**

The liability imposed by section 670.2 shall have no application to any claim enumerated in this section. As to any such claim, a municipality shall be liable only to the extent liability may be imposed by the express statute dealing with such claims and, in the absence of such express statute, the municipality shall be immune from liability.

1. Any claim by an employee of the municipality which is covered by the Iowa workers' compensation law.
2. Any claim in connection with the assessment or collection of taxes.
3. Any claim based upon an act or omission of an officer or employee of the municipality, exercising due care, in the execution of a statute, ordinance, or regulation whether the statute, ordinance or regulation is valid, or based upon the exercise or performance or the failure to exercise or perform a discretionary function or duty on the part of the municipality or an officer or employee of the municipality, whether or not the discretion is abused.
4. Any claim against a municipality as to which the municipality is immune from liability by the provisions of any other statute or where the action based upon such claim has been barred or abated by operation of statute or rule of civil procedure.
5. Any claim for punitive damages.
6. Any claim for damages caused by a municipality's failure to discover a latent defect in the course of an inspection.
7. Any claim based upon or arising out of a claim of negligent design or specification, negligent adoption of design or specification, or negligent construction or reconstruction of a highway, secondary road, or street as defined in section 321.1, subsection 78, that was constructed or reconstructed in accordance with a generally recognized engineering or safety standard, criteria, or design theory in existence at the time of the construction or reconstruction. A claim under this chapter shall not be allowed for failure to upgrade, improve, or alter any aspect of an existing highway, secondary road, or street, to new, changed, or altered design standards. In respect to highways and roads, sealcoating, asphaltting, patching, resurfacing, ditching, draining, repairing, graveling, rocking, blading, or maintaining an existing highway or road does not constitute reconstruction. This subsection shall not apply to claims based upon gross negligence.
8. Any claim based upon or arising out of a claim of negligent design or specification, negligent adoption of design or specification, or negligent construction or reconstruction of a public improvement as defined in section 384.37, subsection 19, or other public facility that was constructed or reconstructed in accordance with a generally recognized engineering or safety standard, criteria, or design theory in existence at the time of the construction or reconstruction. A claim under this chapter shall not be allowed for failure to upgrade, improve, or alter any aspect of an existing public improvement or other public facility to new, changed, or altered design standards. This subsection shall not apply to claims based upon gross negligence. This subsection takes effect July 1, 1984, and applies to all cases tried or retried on or after July 1, 1984.

9. Any claim based upon an act or omission by an officer or employee of the municipality or the municipality's governing body, in the granting, suspension, or revocation of a license or permit, where the damage was caused by the person to whom the license or permit was issued, unless the act of the officer or employee constitutes actual malice or a criminal offense.

10. Any claim based upon an act or omission of an officer or employee of the municipality, whether by issuance of permit, inspection, investigation, or otherwise, and whether the statute, ordinance, or regulation is valid, if the damage was caused by a third party, event, or property not under the supervision or control of the municipality, unless the act or omission of the officer or employee constitutes actual malice or a criminal offense.

11. A claim based upon or arising out of an act or omission in connection with an emergency response including but not limited to acts or omissions in connection with emergency response communications services.

12. A claim relating to a swimming pool or spa as defined in section 135I.1 which has been inspected by a municipality or the state in accordance with chapter 135I, or a swimming pool or spa inspection program which has been certified by the state in accordance with that chapter, whether or not owned or operated by a municipality, unless the claim is based upon an act or omission of an officer or employee of the municipality and the act or omission constitutes actual malice or a criminal offense.

13. A claim based on an act or omission by a county or city pursuant to section 717.2A or chapter 717B relating to either of the following:

- a. Rescuing neglected livestock or another animal by a law enforcement officer.
- b. Maintaining or disposing of neglected livestock or another animal by a county or city.

14. Any claim based upon or arising out of a claim of negligent design or specification, negligent adoption of design or specification, or negligent construction or reconstruction of a public facility designed for purposes of skateboarding, in-line skating, bicycling, unicycling, scootering, river rafting, canoeing, or kayaking that was constructed or reconstructed, reasonably and in good faith, in accordance with generally recognized engineering or safety standards or design theories in existence at the time of the construction or reconstruction.

15. Any claim based upon or arising out of an act or omission of an officer or employee of the municipality or the municipality's governing body by a person skateboarding, in-line skating, bicycling, unicycling, scootering, river rafting, canoeing, or kayaking on public property when the person knew or reasonably should have known that the skateboarding, in-line skating, bicycling, unicycling, scootering, river rafting, canoeing, or kayaking created a substantial risk of injury to the person and was voluntarily in the place of risk. The exemption from liability contained in this subsection shall only apply to claims for injuries or damage resulting from the risks inherent in the activities of skateboarding, in-line skating, bicycling, unicycling, scootering, river rafting, canoeing, or kayaking.

The remedy against the municipality provided by section 670.2 shall hereafter be exclusive of any other civil action or proceeding by reason of the same subject matter against the officer, employee or agent whose act or omission gave rise to the claim, or the officer's, employee's, or agent's estate.

This section does not expand any existing cause of action or create any new cause of action against a municipality.

[C71, 73, 75, 77, 79, 81, § 613A.4; 82 Acts, ch 1018, § 4, 5]

83 Acts, ch 198, § 24--27, 29; 86 Acts, ch 1211, § 33; 88 Acts, ch 1177, §9, 10; 89 Acts, ch 291, §8 C93, § 670.4 94 Acts, ch 1103, §6; 98 Acts, ch 1159, § 1; 2003 Acts, ch 162, §2

Referred to in § 670.7, 670.12

Execution of chapter 89B exempt; see § 89B.6

Legislative intent that subsection 7 not apply to areas of litigation other than highway or road construction or reconstruction; applicability of rule of exclusion; see 83 Acts, ch 198, § 27

### **716.1 Criminal Mischief Defined**

Any damage, defacing, alteration, or destruction of property is criminal mischief when done intentionally by one who has no right to so act.

[C51, § 2679, 2681--2683, 2686--2688, 2690, 2715, 2753; R60, § 1766, 4319, 4321--4323, 4326--4328, 4330--4332, 4357, 4403; C73, § 1564, 3897--3899, 3978, 3980--3982, 3985--3987, 3989--3992, 4021, 4082; C97, § 588, 2466, 4800--4806, 4808, 4809, 4812, 4822--4828, 5054; S13, § 1989-a15, 4808, 4822, 4823, 4830-a, -b, -c; SS15, § 2900-e; C24, 27, 31, 35, 39, § 13080, 13082, 13083, 13085, 13088--13091, 13093--13099, 13102, 13107, 13112--13117, 13122, 13124; C46, 50, 54, 58, 62, 66, 71, 73, 75, 77, § 714.1, 714.3--714.5, 714.8--714.11, 714.14--714.20, 714.23, 714.28, 716.1--716.6, 716.9, 716.12; C79, 81, § 716.1]

2002 Acts, ch 1049, §1

Referred to in § 717A.3

### **716.5 Criminal Mischief in the Third Degree**

Criminal mischief is criminal mischief in the third degree if the cost of replacing, repairing, or restoring the property so damaged, defaced, altered, or destroyed exceeds five hundred dollars, but does not exceed one thousand dollars, or if the property is a deed, will, commercial paper or any civil or criminal process or other instrument having legal effect, or if the act consists of rendering substantially less effective than before any light, signal, obstruction, barricade, or guard which has been placed or erected for the purpose of enclosing any unsafe or dangerous place or of alerting persons to an unsafe or dangerous condition. Criminal mischief in the third degree is an aggravated misdemeanor.

A person commits criminal mischief in the third degree who does either of the following:



1. Intentionally disinters human remains from a burial site without lawful authority.
2. Intentionally disinters human remains that have state and national significance from an historical or scientific standpoint for the inspiration and benefit of the United States without the permission of the state archaeologist.

[C51, § 2638, 2714, 2746; R60, § 4265, 4356, 4396; C73, § 3929, 4017, 4075; C97, § 4865, 4945, 5043; C24, 27, 31, 35, 39, § 13050, 13100, 13148; C46, 50, 54, 58, 62, 66, 71, 73, 75, 77, § 713.5, 714.21, 718.10; C79, 81, § 716.5]

83 Acts, ch 99, § 1; 92 Acts, ch 1060, § 10

Referred to in § 716.6A, 717A.3

#### **718.4 Harassment of Public Officers and Employees**

Any person who willfully prevents or attempts to prevent any public officer or employee from performing the officer's or employee's duty commits a simple misdemeanor.

[C79, 81, § 718.4]

## **APPENDIX F. TEMPORARY TRAFFIC CONTROL AND LAW ENFORCEMENT IN CLOSED ROAD SECTIONS: FOCUS GROUP INTERVIEW QUESTIONS**

- 1) In your opinion, do you think traffic enforcement in temporary road closures for construction is sufficient?
- 2) Do you have concerns about liability exposure within temporary closed road sections during construction?
- 3) How do you communicate expectations for traffic control and risk mitigation to contractors, traffic enforcement agencies, local residents and businesses, and emergency service personnel during temporary road closures due to construction?
- 4) In your opinion, are the Iowa Code, Iowa DOT specifications (1107.08, 1107.09, 2518, 2528), and the MUTCD clear and effective in maintaining the safety of the public, workers, and property in temporary closed road sections?

### **Interview Session with County Engineers and Staff**

Focus Group Interview Report  
December 5, 2006 - Scheman Building

An approximate 90 minute interview was conducted on this date in advance of the annual County Engineers Conference. Kelly Strong and Tom McDonald conducted the question and answer session.

Participating were:

Brian Keierleber - Buchanan County Engineer  
Christy Van Buskirk - Keokuk County Engineer  
Mark Nahra - Delaware County Engineer  
Jon Ites - Buena Vista County Engineer  
Jerry Nusbaum - Mahaska County Engineer  
Dennis Clarke - Black Hawk County Assistant  
Brad Ketels - Linn County Assistant  
Jon Singelstad - Monona County Engineer  
Steve Thomassen - Assistant Marshall County Engineer  
Brenda Boell - Office of Local Systems, Iowa DOT

Dennis Clarke indicated that there is sometimes a problem with credibility of road closed signing with drivers, at least initially. He also stated that Black Hawk deputies issue citations for violators. They used to refer to Road Standard 26A for TTC, but it is no longer approved by the Iowa DOT.

Flaggers are an effective means of keeping traffic away from paving crews, and some projects (such as full width resurfacing and rubblizing) allow for full closure. Night guards and extra patrols would be needed for adequate enforcement, but there are not enough resources for this.

Linn County deputies also issue citations for unauthorized entry.

However, there are insufficient deputies to watch all construction areas, other priorities demand attention. Can use DOT weight enforcement officers occasionally. Black Hawk County invites DOT officers to pre-construction conferences.

Most counties indicated they invite the local sheriff to pre-construction conference, but many do not respond.

Marshall County places asphalt overlays full width but does not sign for the resultant drop-off along the pavement edge.

Marshall County has had problems with railroad company closures of local roads for crossing maintenance using inadequate closure signing and barricades.

Delaware County has experienced problems keeping vehicles out of closed road sections and suggested the use of Bridge Out signs when appropriate.

Several counties indicated problems with people removing barricades and fencing, entering the closed area, and not replacing the closure devices. Liability concerns were raised for subsequent entry if injury occurred.

Delaware County has used guards at the ends of new portland cement concrete pavement sections until cure time is completed, paid with local funding. This has proven effective at eliminating entry by unauthorized vehicles.

Local law enforcement is sometimes put in the difficult situation of trying to identify and determine which travelers are “local.”

Some counties opined that use of the FHWA “safety edge” could result in problems with maintenance of the granular shoulder in preventing future edge drop-off. Nothing in a manual of good practice on edge filler for new paving. Drop-offs can expose agency to liability. Bevels can help, but could be prone to edge rutting later.

Liability concerns and experience include:

- edge drop-off
- sign vandalism, stealing warning lights
- fence and barricade removal and/vandalism
- damage to work in place

Some participants advocate higher fines and penalties for sign theft, removal or damage. This creates a major liability and it can be hard to prove the signs were stolen or removed by third parties. Railroads don’t have very good signage systems for closures. Signs removed or stolen on weekends present a special problem because they can go undetected for 1-3 days.

Most of the participating counties indicated they meet with and/or advise local residents and businesses of upcoming road closures using letters, news media, local radio, etc. These contacts are sometimes facilitated through right of way negotiations. Mail routes, emergency access, and school transportation are all coordinated. If ROW issues are involved, the process is much more formal. Communication with large agri-businesses that are affected is virtually constant.

The County Engineer Service Bureau has a good check list reference for road closures. They may even provide notice to some affected parties and can help with re-routing for emergency call centers

Pedestrian and bicyclist safety can be compromised on closed road sections, and signage doesn’t always have the desired impact for them.

It was recommended that inappropriate signing be covered or removed, and that road closed signs be covered until actual closing date. Credible signing must be used at all times or public will learn to ignore the warnings. Traffic control logs are “worthless” and should be scrapped, or at least contractor should not be allowed to subcontract this work along with signage.

It was noted that response by contractors to vandalism or other signing/barricade damage is not always satisfactory and some counties are concerned with their resultant liability after notice has been given. It was suggested that stronger penalties in the specifications are needed.

Perhaps minimum response times for sign repair by contractors needs to be included in the specifications with penalties attached for delays. Some counties (Marshall) re-set the traffic control devices for short term until a contractor representative arrives.

Would video surveillance be effective at work sites? Some skepticism was offered due to possibility of vandalism to cameras and problems with secure installation.

The Iowa Code currently includes significant penalties for traffic control device theft and vandalism, but some local magistrates and judges are often reluctant to impose.

Damage to equipment and unfinished work from unauthorized entry is not uncommon in the counties. Assessing the “loss of useful life” to new pavement can be problematic.

An education and outreach program delivered to the schools may be effective in informing young people about the risks and penalties for sign theft and damage; however, some feel this activity may not be worthwhile in reducing potential loss or liability exposure. It may be more effective to provide support and information materials/data to driver education instructors.