

Implementation of the Federal Highway Administration Final Rule on Work Zone Safety and Mobility

Final Report
December 2007

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Technical Report Documentation Page

1. Report No. CTRE Project 06-244		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle Implementation of the Federal Highway Administration Final Rule on Work Zone Safety and Mobility			5. Report Date December 2007		
			6. Performing Organization Code		
7. Author(s) Tom McDonald, Jon Wiegand, and Tom Maze			8. Performing Organization Report No.		
9. Performing Organization Name and Address Center for Transportation Research and Education Iowa State University 2711 South Loop Drive, Suite 4700 Ames, IA 50010-8664			10. Work Unit No. (TRAIS)		
			11. Contract or Grant No.		
12. Sponsoring Organization Name and Address Iowa Department of Transportation 800 Lincoln Way Ames, IA 50010			13. Type of Report and Period Covered Final Report		
			14. Sponsoring Agency Code		
15. Supplementary Notes Visit www.ctre.iastate.edu for color PDF files of this and other research reports.					
16. Abstract <p>The Federal Highway Administration published the final rule updating 23 CFR 630 Subpart J in September 2004. The revised rule requires agencies using federal funding to address both safety and mobility in planning and construction of roadway improvements. The Iowa Department of Transportation (Iowa DOT) requested the assistance of the Center for Transportation and Research in developing guidance for a policy and procedures to comply with the final rule.</p> <p>This report describes an in-depth examination of current Iowa DOT project development processes for all types of improvements, including maintenance, as well as a detailed characterization of work zone impact considerations throughout project completion.</p> <p>To comply with both the letter and perceived intent of the final rule on safety and mobility, the report features a suggested work zone policy statement and suggested revisions in the Iowa DOT project development processes, including a definition of the key element: significant projects.</p>					
17. Key Words work zone mobility—work zone safety			18. Distribution Statement No restrictions.		
19. Security Classification (of this report) Unclassified.		20. Security Classification (of this page) Unclassified.		21. No. of Pages 55	22. Price NA

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Preparation of this report was financed in part through funds provided by the Iowa Department of Transportation through its research management agreement with the Center for Transportation Research and Education, CTRE Project 06-244.

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ACKNOWLEDGMENTS

The authors express appreciation to the many Iowa Department of Transportation (Iowa DOT) staff who provided background, resources, and comments about current DOT practices and procedures. In addition, contribution and guidance from an advisory group was quite valuable. Finally, the authors would like to thank the Iowa DOT for sponsoring this research.

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INTRODUCTION

The Federal Highway Administration (FHWA) has amended the regulation that governs traffic safety and mobility in highway and street work zones. The updated regulation, or rule, establishes requirements and presents guidelines to systematically assess impacts to safety and mobility early in the development process and develop strategies to address these impacts on all federally funded highway improvements.

These provisions will help state departments of transportation (DOTs) meet current and future work zone safety and mobility challenges and serve the needs of road users and stakeholders.

The final rule was published in September 2004. All state and local governments that receive federal funding were required to comply with the provisions of the rule no later than October 12, 2007. A copy of the final rule is included in Appendix C.

Purpose of Rule Changes

According to the FHWA, the overarching goal of the updated rule is to reduce crashes and congestion due to work zones. The provisions of the updated rule encourage the following:

- Expanding planning beyond the project work zone itself to address corridor, network, and regional issues (e.g., alternate routes and/or modes, truck traffic, special events, etc.) while planning and designing road projects
- Expanding work zone management beyond traffic safety and control to also address mobility and issues of operations and public information
- Thinking innovatively about work zone planning, design, and management and thinking outside of the traditional traffic safety and management box
- Considering alternative/innovative design, construction, contracting, and transportation management strategies to bring additional solutions to light.

Therefore, the updated rule is intended to facilitate the systematic consideration of the safety and mobility impacts of work zones and the development of strategies and plans to reduce work zone impacts.

About This Report

To achieve compliance with both the spirit and letter of the new rule on safety and mobility, the Iowa Department of Transportation (Iowa DOT) contracted with the Center for Transportation Research and Education (CTRE) at Iowa State University to draft suggested policies and procedures for dealing with these important issues. Several major tasks were identified, as follows:

1. Review, summarize, and develop an executive presentation on the implications of the new regulations in Iowa.
2. Define the Iowa DOT project development process for the following:
 - a. New construction and capacity expansion projects
 - b. Reconstruction and preservation of multilane highways
 - c. Reconstruction and preservation of two-lane primary highways
 - d. Maintenance projects on multilane highways
 - e. Maintenance projects on two-lane highways
3. Inventory what is currently being done to accommodate traffic in work zones.
4. Develop recommended processes and procedures that may be incorporated in the project development process to meet the intent of the revised rule.
5. Assist the Iowa DOT with implementation as requested.

The Iowa DOT adopted Policy and Procedure No. 500.18, entitled “Work Zone Safety and Mobility,” on October 11, 2007. The policy was approved by the FHWA on November 9, 2007, finding substantial compliance with 23 U.S.C. #630.

LITERATURE REVIEW

Introduction

The increasing number of motor vehicle crashes in work zones across the nation, many resulting in deaths or serious injuries, has been a concern for transportation agencies for many years. In addition, higher traffic volumes and resultant delays from construction and maintenance work have adversely impacted travel and increased congestion in many areas. Many states, especially those with higher population and travel demands, have taken a proactive approach to reducing the impacts of travel from roadway improvements while focusing on methods to improve public and worker safety in work zones. This section presents a sampling of research studies, programs, and practices employed in several states to address work zone safety and mobility.

Work Zone Safety

Numerous studies have been undertaken to identify potential hazards and recommend improvements for safety in work zones. Zwalen and Oner (2006) completed a study in Ohio to review practices in Ohio and make recommendations for improvement. Through a multistate survey, the researchers identified enhancements to temporary traffic control devices, pavement markings, and practices for consideration by the Ohio Department of Transportation (ODOT). Recommendations included are work zone topics such as signing, channelizing devices, markings, worker apparel, illumination, speed control, and numerous other devices and practices.

Public Convenience and Delays

In an effort to address delays to drivers due to work zone activities, the Missouri Department of Transportation (MoDOT) (2004) updated guidelines for work zone strategies, including such initiatives as off-peak hour work and adjustable speed limits. Assigned staff at the state and district levels are responsible for coordinating lane closures resulting from construction, maintenance, and utility work. The guidelines describe lane capacities and include recommendations for determination of lane closure restrictions and use of traffic volume reduction strategies.

The Minnesota Department of Transportation (2003) developed a lane closure manual for application in metropolitan areas. This reference, along with others, is to be used to determine when a planned lane closure might be permissible without extraordinary actions such as diversion/detour of traffic and extensive advance notice to the public.

The Colorado Department of Transportation (CDOT) (2004) has also adopted lane closure criteria. The strategies are intended to strike a balance between minimizing public delay and project costs with the objectives of improving the quality of lane closure decisions, simplifying the process for decision makers, and reducing the uncertainty associated with traffic management during roadway improvements. This extensive resource addresses many types of highway systems and variations in traffic demand throughout the day and week.

Griffith and Lynde (2002) conducted a study for the Oregon Department of Transportation (Oregon DOT) to assess public perception of delay and inconvenience in work zones. Using a series of surveys, the researchers identified several areas for potential improvement, including nighttime visibility, speed enforcement, enhanced signing and markings, flaggers, public information, and complete versus partial closures.

Congestion and Traffic Impacts

As a follow-up to its lane closure initiative, CDOT (2005) issued a second edition of lane closure strategies that refined the analysis process by considering seasonal variation as well as other details. In addition, lane closure options were reduced from five to three: night closure only, midday and night closure, and unrestricted closure.

The Indiana Department of Transportation (2003) has adopted an interstate highway lane closure policy with the objective of minimizing the impacts of work zones on high volume roadways and improving safety and mobility. Criteria have been developed to assess lane closure impacts, including maximum allowable queue length and delay time. Exceptions for routine maintenance and emergencies are allowed. Several software programs are used for lane capacity analysis. The policy also includes description of traffic management plan components.

Edara (2006) performed a study for the Virginia Department of Transportation (VDOT) to determine what analysis tools and methods other state DOTs use to estimate traffic impacts at work zones. Through surveys and contacts, the study identified several models and simulation programs in use in other states, although none was concluded as superior to the others. The data were compiled to assist VDOT in compliance with the FHWA Final Rule on Work Zone Safety and Mobility.

Traffic Mobility

Thomas and Baldwin (2004) developed a statewide traffic mobility program for the Oregon DOT to facilitate movement of commercial traffic and other vehicles through work zones. Key components included a framework for coordination and communication within the ODOT, establishment of comprehensive mobility-related policies and procedures, minimizing size and weight restrictions, and collaboration with the trucking industry in development of project staging and scheduling. Important aspects of this program have been the creation of a statewide traffic mobility manager and development of a highway mobility operations manual. Transportation Management Plan (TMP) development addresses three levels of impact: (1) program, (2) corridor, and (3) project.

Transportation Management

The California (Caltrans) (2003) adopted version 1.0 of the Traffic Operations Lane Closure System (LCS) Users Guide, Sections I and II. This guide is for use by requesters of lane closures on high-volume roadways and inspectors of the ongoing work. Through this system, Caltrans can share lane closure information through the Internet to contractors, utilities, DOT staff, and the public. Within the LCS, requests for lane closures can be initiated, tracked, and several reports

can be created. The district traffic manager approves lane closure requests. The Office of Systems Management Operations at Caltrans (2004) developed TMP guidelines to maintain acceptable levels of service and safety on all levels of the state highway system. A policy statement is included in the guidelines and several definitions are listed. Also included are descriptions of responsibilities of key Caltrans staff, funding, and programming issues. The approval process for major lane closures is an important aspect of the guidelines, and threshold criteria for acceptable delays are presented.

ODOT (2000) developed a work zone traffic management policy with the intention of promoting continuous traffic flow through work zones by eliminating or reducing delays as much as possible. The policy contains a description of responsibilities of various key ODOT staff, common definitions, and a complete presentation of the traffic management process for high volume roadways. Helpful information in appendices includes minimum acceptable criteria for lane restrictions, a compendium of options to reduce work zone impacts and increase mobility, and a description of analysis programs, checklists, and communications guidance.

The FHWA (2005) issued “Developing and Implementing Transportation Management Plans for Work Zones” to guide states in adopting policies and procedures in compliance with the Final Rule on Work Zone Safety and Mobility. This reference provides valuable information on the intent of the rule and includes suggested components, strategies, and examples from agencies with effective current programs.

Public Information and Outreach

Intended as a resource for use in compliance with the Final Rule on Work Zone Safety and Mobility, “Work Zone Public Information and Outreach Strategies” (FHWA 2005) features a description of key steps in the development of a communication and public information plan for roadway improvements with potential major impacts to mobility. In addition, a checklist of suggested activities and listing of strategies are included in the document.

Work Zone Safety and Mobility

Maze et al. (2005) provide an overview of current state DOT activities to comply with the Final Rule on Work Zone Safety and Mobility. Through surveys, reviews of current literature, and detailed case studies, the research discovered examples close to compliance with the intent of the final rule. However, some consistent deficiencies were also discovered, including a lack of an agency policy, inadequate processes for work zone traffic management through project completion, and insufficient or nonexistent data collection and evaluation for improvement.

MoDOT (2006) developed and adopted a work zone safety and mobility policy to promote safe and efficient movement of traffic through temporary work zones, while providing protection for workers and equipment. Intended to comply with the FHWA Final Rule on Work Zone Safety and Mobility, the policy includes fundamental principles to enhance performance of temporary traffic controls and a description of responsibilities for all involved in work zone activities, including contractors, utilities, FHWA, law enforcement, and DOT staff. Tracking measures are described, training outlined, and key elements of the process are defined such as significant projects, transportation management plans, public information, and travel time data.

Scriba et al. (2005), from the FHWA, developed and distributed “Implementing the Rule on Work Zone Safety and Mobility” as a major guide to states and other agencies in adopting policies and procedures to comply with the rule. This document includes an overview of the new rule and key differences with the old requirements, possible work zone policy components, agency-level processes and procedures for consideration, significant project envisagement, suggestions for development of transportation management plans, as well as implementation of and compliance with the Final Rule.

EXECUTIVE PRESENTATION

CTRE prepared a presentation in Microsoft PowerPoint that summarizes the new rule and defines the implications for Iowa. The presentation suggests what the Iowa DOT might do to comply with the intent of the new rule. A copy of the presentation and the accompanying script is included in Appendix A.

CURRENT IOWA DOT PROJECT DEVELOPMENT PROCESS

Under the current development process, work zone traffic accommodation and temporary control for most projects is generally not considered in full detail until the concept has been developed. However, basic decisions for accommodating traffic such as lane closures, staging, or detour use are generally made during the planning and conceiving phase. The Office of Traffic and Safety, Design, Construction, and the district offices collaborate to select the most feasible and effective accommodation for traffic. Final temporary traffic control details are then developed in the Office of Design for inclusion in the plans, specifications, and estimates (PS & E).

The Iowa DOT uses a multifaceted approach to its project development process. It ranges from a formalized needs investigation by the Office of Systems Planning for long-range planning to an annual needs assessment by the Office of Design and the six district offices. The annual roadway improvement program in Iowa is approximately 460 million dollars, including federal funds.

Selecting Major Improvement Projects

The Office of Systems Planning periodically publishes a primary road sufficiency rating for all roads maintained by the Iowa DOT to evaluate structural adequacy, safety, and service of roadway segments. This document can be used as a reference in selecting major roadway improvements for programming. Most new construction, reconstruction, and capacity improvement projects are identified through this process. The Iowa DOT staff is investigating other innovative methods to identify needs.

New Construction, Reconstruction, and Capacity Improvement

Planning and initial development for many major projects begins in the Office of Location and Environment. The staff works closely with the appropriate district office(s), project management team, and other stakeholders to develop project concepts. Where appropriate, potential traffic congestion mitigation options are considered using various traffic analysis tools. Especially in high-volume urban areas, staging and detouring options are analyzed as part of the planning process. This planning process would also apply to major projects being developed by engineering consultants that are managed by the Office of Location and Environment. After project planning is completed and approved, the proposed concept is provided to the Office of Design. This activity would be associated with the event dates P00 and D00 in the production schedule, but the addition of more definitive events will be proposed in the future by the Iowa DOT.

Rehabilitation, Restoration, Resurfacing, and Reconstruction and Capacity Expansion on the Interstate System

On the interstate system, the various rehabilitation, restoration, resurfacing, and reconstruction needs (4R), including capacity expansion, are identified annually by a 4R review team composed of representatives from the design, materials, construction, and district offices. Using references

such as the pavement condition index and the international roughness index, as well as the pavement history, structural condition, and visual observations, the team prepares, updates, and prioritizes a five-year proposal for interstate rehabilitation. Input from the districts, various offices of the Iowa DOT, and the general public is also considered. The list of proposed improvement candidates is reviewed and, based on available funding, approved by the engineering bureau director. The Office of Design then develops projects for letting. Approximately 175 million dollars is invested annually in Iowa's 4R program.

Rehabilitation, Restoration, Resurfacing, and Preservation on the Primary (Non-Interstate) System

Rehabilitation, restoration, resurfacing, and preservation candidate improvements on the remaining primary system (3R) are initially identified by the districts that consider pavement conditions, safety features, operational functions, and other local factors. Approximately two years in advance, the Office of Design provides 3R target funding levels to the districts for each fiscal year. Those target levels are based on the condition of pavements as indicated by pavement condition indices. Each district is allotted a minimum of 10 million dollars. Using the target amount, each district prepares a 3R project list for that fiscal year. After the 3R list is prepared, the districts are responsible for developing project concepts and completing designs. Approximately 90 million dollars per year is devoted to the 3R improvement program, with district-recommended special needs projects receiving highest priority.

Significant Right-of-Way Acquisition

For all projects that require an environmental document and significant right-of-way acquisition, the Iowa DOT has adopted a specific process to expedite development from concept through contract letting stages. The Can-do process uses a multidisciplinary team approach in problem identification and solving and has proven quite effective in significantly reducing development time and improving the quality of major projects. Certain precepts of the Can-do process can also be used effectively in the evolution of projects that do not require right-of-way acquisition.

Special Contracts

Recently a process was initiated to identify projects that warrant consideration for special contract administration consideration. District offices are invited to nominate projects for this unique listing using criteria such as potential local impacts and unique interests. Special contract criteria might include any of several options outside standard Iowa DOT contracting procedures, including advanced late start dates, accelerated work periods, completion date contracts, work restrictions, incentive/disincentives, no-fault bonuses, and A+B bidding. The special contracts list is compiled by upper management in the Statewide Operations Bureau and transmitted to the Office of Contracts for consideration and implementation.

Other Improvements

Other categories of roadway improvements include the following:

- Traffic safety
- Revitalize Iowa's Sound Economy (RISE)
- Transfer of Jurisdiction (TJ)
- Iowa's Clean Air Attainment Program (ICAAP)
- Projects designated by Congress (earmarked projects)
- Cooperative State Traffic Engineering Program, Urban and County (U-STEP and C-STEP)

Although many of these projects are not located on high-volume/high-speed roadways, and are therefore not likely to result in significant work zone safety and mobility impacts, some improvements could possibly be considered significant projects, as defined later in this document.

Contract Maintenance

Contract maintenance projects are established annually by individual district offices and reviewed by the Office of Design. The Iowa DOT targets a specific annual funding level in the five-year program for this purpose, divided equally between the six districts. Annual contract maintenance totals approximately 16 million dollars, with 2 million dollars designated for bridges, 3 million dollars for rest areas, and approximately 11 million dollars for roadway maintenance projects and city maintenance agreements. The process of project development through letting is accomplished by the districts. These projects are generally on non-interstate routes, but in fiscal year 2007, an additional interstate contract maintenance program will be funded at 2 million dollars to target needed maintenance work exclusively on the interstate system. The districts will provide input on priorities and needs, but final project selection will be made by the Office of Design and the 4R review team.

Project Scheduling

All programmed roadway improvements funded through the Iowa DOT are listed in the Five Year Transportation Improvement Program, published annually by the Office of Program Management.

As all projects except contract maintenance enter the program, each is assigned a development schedule by the Office of Project Scheduling. Event codes and accomplishment dates are established by a predetermined formulation to guide each improvement from development through contract letting, beginning with "P00" for Planning Concept-Pre-Program and "D00" for Pre-Design Concept, to "L" dates for letting of various project types. All Iowa DOT offices involved in project development are included in the event code listing. The working document for this process is termed the Production Schedule and monthly reviews with all affected offices are conducted.

Public Involvement

The new FHWA rule requires public involvement for certain projects and recommends the practice for others. The Iowa DOT and the FHWA have recently approved a Project Development Public Involvement Plan. This document describes how to include appropriate public involvement in the project development process using such activities as public hearings and information meetings. Early coordination with resource agencies is also described. The public involvement policy applies to all primary projects, but the scope may vary based on anticipated impacts. Primary responsibilities for implementation of this plan are with the Office of Location and Environment and district offices. Coordination with the Office of Media and Marketing Services is maintained as needed. Training has been offered for the Public Involvement Plan and this policy is included in the Policies and Procedures Manual for the Iowa DOT.

Complying with New Rule

For compliance with the revised FHWA rule on safety and mobility, potential work zone impacts, significant projects in particular, will require consideration early in the development process, such as Event Codes “P00” and/or “D00,” as appropriate, to allow a complete array of mobility options to be analyzed and included in the project estimate if selected. Adopting revised procedures for safety and mobility may be particularly problematic for improvements that enter the program on an annual basis with a curtailed development schedule such as 4R, 3R, contract maintenance, specially funded projects listed earlier, and possibly federally funded improvements off the primary road system.

Note: Information about the project development process was obtained through interviews with several Iowa DOT staff members, including John Adam, Jon Ranney, Tammy Nicholson, Phil Mescher, Brian Morrissey, Mark Swenson, Francis Todey, Kevin Patel, Gary Hood, and Chris Brakke. In addition, the Iowa DOT website provided a great deal of valuable information.

CURRENT WORK ZONE IMPACTS CONSIDERED BY THE IOWA DOT

The Iowa DOT has historically invested substantial effort and funding in work zone traffic control. Several offices are responsible for planning and considering the impacts of work zones at various stages of project development and accomplishment.

Responsibilities by Office

District Offices

Staff in the six Iowa DOT district offices collaborate with central office departments from project planning through design, construction, and maintenance. District staff provide input in consultation with local agencies that might affect temporary traffic control, including staging, detours, and haul roads. District traffic technicians provide guidance and expertise for all signing work, including temporary traffic control.

Suggestion: As the Iowa DOT adopts policies and procedures for accommodating the FHWA rule on safety and mobility, district offices will necessarily assume a major role in guiding the process for individual, significant projects by leading the project management team, assuring compliance with the TMP throughout construction, and documenting the results following project completion.

Office of Design

Beginning in the project development phase, the Office of Design has major responsibilities for developing and preparing temporary traffic control plans for all interstate and primary roadway projects contracted by the Iowa DOT. All projects let by the Iowa DOT include a temporary traffic control plan to be included in the PS & E. The details and scope of traffic control plans varies by the complexity of a project and anticipated impact on traffic.

Chapter 9 of the Iowa DOT's *Design Manual* describes the preparation of traffic control plans, including general information, layouts, and notes. The manual also contains a checklist of proposed staging and temporary traffic control for use during field examinations of projects prior to final design. Guidance for new and reconstructed projects includes a review of proposed traffic management plans, but the field exam checklist for 3R and 4R projects does not. Guidance for including safety features in certain 3R projects has been drafted but not approved.

In addition, the Iowa DOT's *Standard Road Plans* contains a wide selection of applications for various work zone traffic control situations. The Iowa DOT's *Road Design Details* manual features standard notes and details of temporary traffic control for use by designers.

The Office of Design provides detour analysis as a part of the concept for bridge replacement projects. However, the process has not been formalized. Road user costs may not receive equal

consideration with actual construction cost estimates when deciding whether to close a road for construction or utilize staging techniques.

Suggestion: Adopt a more formalized process for detour analysis into the *Design Manual*. Define road user costs as a factor in making tradeoffs between more costly mitigation of work zone mobility impacts and the added cost of special procedures. Consider other innovations for reducing construction time, such as use of prefabricated elements, explosive demolition for old structures, etc. Include a review of traffic management plans in the field exam checklist for 3R and 4R projects.

Office of Traffic and Safety

The Office of Traffic and Safety provides expert advice and assistance with work zone traffic control training and analysis, especially with 4R projects. For concepts written in the Office of Design by the field exam engineer, the Office of Traffic and Safety staff makes recommendations for lane closures before the draft concept is distributed for review. The analysis may entail only a consideration of traffic volumes, concluding that no restrictions would be warranted, or using an analysis program such as QuickZone to assess the expected road user impacts. For certain projects, the program QUEWZ can be used to predict queue length. If excessive traffic mobility impacts are predicted, recommendations will include mitigation measures such as night work or work restrictions during high traffic periods.

The Office of Traffic and Safety has developed a map of certain Iowa interstate routes identifying locations where long-term lane closures might be problematic. This map could be updated for current traffic volumes and expanded to include other high-volume routes as a valuable asset for addressing safety and mobility concerns.

For larger projects other than 4R, the Office of Traffic and Safety provides a representative on the project management team who can offer comments and suggestions throughout the development process. For those projects developed with consultant services, the Office of Traffic and Safety reviews and comments on any traffic analysis performed by the consultant.

In addition to 4R projects, the Office of Traffic and Safety has provided analysis for some bridge replacement projects.

Suggestion: Develop basic minimum criteria for lane closures based on capacity analysis, delay time tolerance, and off-site detour establishment using road user costs as a major factor. Include these guidelines in the *Design Manual*. Expand the current partial interstate map to include all interstate routes and develop a similar map for high-volume primary roads. Make these maps available to Iowa DOT staff on the Iowa DOT internal internet protocol network (DOT Intranet).

Office of Location and Environment

The final planning and initial development of many major highway improvements is the responsibility of the Office of Location and Environment, in cooperation with the District Offices. Recommendations on staging, detours, and other traffic accommodations are made using a variety of analysis techniques and tools. For projects developed by consulting engineering firms, the Office of Location and Environment provides oversight and management of the preliminary development process. Final temporary traffic control recommendations are the responsibility of the Office of Design.

Suggestion: Coordinate lane capacity analysis techniques and tools with those used by the Office of Traffic and Safety to assure uniformity of results.

Office of Bridges and Structures

The Office of Bridges and Structures uses a plan review checklist, but no mention of traffic management or temporary traffic control is included in that resource.

Suggestion: Include a note in the checklist describing suggested staging and/or temporary traffic control, or simply note that those decisions will be made by others such as the Office of Design.

Office of Contracts

With input from the districts and designers, the Office of Contracts establishes allowable contract periods and assigns specifications to construction contracts. This includes determining construction start dates, allowable numbers of working days, liquidated damages, and assigning appropriate traffic control specifications. The innovative contracting methods described in the Special Contracts section of this report are implemented through the letting phase by this office.

Suggestion: The Office of Contracts staff should be invited to participate early in the development process as members of the transportation management team to assure that all innovative contracting measures are considered to facilitate reduced adverse impacts to traffic mobility and safety from significant projects. Sample measures are explained elsewhere in this report.

Office of Maintenance

The Office of Maintenance publishes a two-volume *Maintenance Manual* that includes extensive recommendations and guidance on temporary traffic control for maintenance operations.

I.M. 1.240 covers contract maintenance; however, traffic management is not addressed for those activities.

Suggestions: Add guidance to I.M. 1.240 that emphasizes avoiding excessive delays and long queues and, if necessary, adjusting the hours of permissible work. This will be particularly important if the contract maintenance program expands to the interstate system.

Office of Construction

The Office of Construction maintains a *Construction Manual* with instructions to resident construction engineers and staff on important issues for administering construction contracts, including temporary traffic control in work zones (Chapter 5). Included in these instructions is the required procedure for investigating and reporting crashes that occur in the work zone during construction.

Suggestion: Revise Chapter 5 (Safety) to explain monitoring of traffic management issues related to the work zone safety and mobility rule. For projects with substantial safety and mobility concerns (significant projects), resident construction engineers should provide appropriate monitoring to assure desired uniform performance on all such projects, including mobility measures such as delay and queue length. Resident construction engineers should be urged to prepare and submit reports with as much detail as possible of all traffic crashes that occur in work zones.

Research and Technology Bureau, Information Technology Systems

The Research and Technology Bureau staff are available to advise on work zone ITS solutions that could be applicable to improve work zone safety and mobility, including offering advice when purchasing special equipment to facilitate traffic movement.

Suggestion: Invite ITS staff to participate in transportation management team project planning for significant projects to gain expertise on new equipment and methods that might improve safety and mobility.

Office of Media and Marketing

The Office of Media and Marketing Services participates in the Iowa DOT work zone education and marketing team, which establishes the department's public education strategies. Contributions to the team include marketing research, development of educational plans and implementation of those plans. Implementation can include coordinating media buys, issuing news releases, planning news conferences, coordinating multiple agencies, arranging publicity events, and facilitating joint marketing efforts.

Suggestion: Staff from the Office of Media and Marketing should participate with the transportation management team for all significant projects to provide guidance and advice for the important public information component. For more detailed recommendations, see Major Transportation Management Plans for Significant Projects later in this report.

Resident Construction Offices

The 14 resident construction engineer offices are responsible for the administration of construction contracts let by the Iowa DOT, with oversight from the district offices. These responsibilities include oversight of the contractor's temporary traffic control and overall project management. Project contract documents include traffic control details such as closure times and restrictions. For many major projects, contractors are required to provide daily traffic control diaries that document the placement and maintenance of traffic control devices.

Suggestion: When the Iowa DOT adopts policies and procedures for accommodating the FHWA rule on safety and mobility, the resident construction offices will assume responsibilities for monitoring the implementation of the TMP by contractors, which will be particularly important for significant projects. In addition, resident offices should ensure that documentation of adopted measures for TMP impacts, such as delays, queue length, incidents, etc., is completed. For more detailed recommendations, see *Implementing and Monitoring the TMP (Project Level)* later in this report.

Work Zone Traffic Control Training

Work zone traffic control training is offered annually by the Iowa DOT at several convenient locations around the state. Approximately 1,000 supervisors and workers from Iowa DOT construction and maintenance, counties, cities, utilities, and contractors take advantage of this low-cost training each year. Instruction is provided by Iowa DOT staff and consultants.

Suggestion: Expand training to address traffic mobility needs in work zones, stressing the need to reduce delays and queue lengths. Training should be provided to staff in all departments that have an involvement with work zone development, including planning and design. Strategies that may be used to reduce delays should be included in the training.

Rules, Policies, Procedures

Iowa Code

Chapter 150 of the *Iowa Administrative Code* describes state and city responsibilities for construction and maintenance of freeway and primary extensions in urban areas. This administrative rule requires the Iowa DOT to consider pedestrian accommodations at all stages of project development, to review proposed plans, and to negotiate project agreements with cities. The rule does not address traffic congestion management or mitigation of safety impacts potentially affected by roadway improvements, particularly in urban areas.

Suggestion: Consider expanding this administrative rule to address potential congestion management and mitigation planning as part of project development for significant projects.

Policies and Procedures

The Iowa DOT has adopted several rules in the department's *Policies and Procedures Manual* that may have work zone impacts. However, traffic management in work zones is not specifically addressed in these current policies:

- PPM 500.02 Can-Do Process
- PPM 500.08 Constructability Review and Post-construction Review
- PPM 500.15 Process for New or Revised Interchanges
- PPM 500.16 Project Improvement Reviews
- PPM 510.02 Project Development Public Involvement Plan
- PPM 600.05 Temporary Closure of Primary Highways and Establishment and Revocation of Detours
- PPM 610.01 Closing Primary Road Extensions

The Project Development Public Involvement Plan, administered by the Office of Location and Environment and district offices, which is included in the *Policies and Procedures Manual* as PPM 510.02, will provide an excellent reference for accommodating the safety and mobility rule.

Suggestion: Modify several of these policies as needed such as PPM 500.02, 500.08, and 500.16, to include consideration of work zone safety and mobility. The procedures outlined in the Can-Do process could also be modified to accommodate safety and mobility in work zones. Modify PPM 510.02 to better describe the necessary recommended practices for development of a traffic management plan for significant projects.

Standard and Supplemental Specifications

The Iowa DOT publishes and maintains standard and supplemental specifications to govern the work of contractors on projects let by the Iowa DOT. Several articles of the specifications address work zone traffic control and accommodation include the following:

- Article 1107.08 (Public Convenience and Safety) requires a contractor to minimize access impacts for residents along projects and to conduct activities so as to delay or inconvenience traffic to the least possible extent. Length and depth of pavement edge drop-offs must also be minimized
- Article 1107.09 (Barricades and Warning Signs) describes responsibilities of the contracting authority and contractor in providing and maintaining temporary traffic control for a project.
- Article 1108.03 (Limitations of Operations) admonishes the contractor to conduct activities so as to create minimum inconvenience for traffic and allows the engineer to restrict contractor activities if necessary to achieve this end. Work on certain days without specific approval is prohibited by this article.
- Section 1111 (Incentive/Disincentive for Early Completion) describes provisions used on projects where accelerated procedures are warranted for critical projects.
- Section 2518 (Safety Closures) describes barricades and other devices used to close

- roadways to public travel and thus help protect contractor and agency staff from potential hazards within the project limits.
- Section 2527 (Pavement Markings) describes types and uses of permanent and temporary pavement markings. Also included are descriptions of raised pavement markers and post-mounted delineators used to supplement pavement markings.
 - Section 2528 (Traffic Control) is devoted entirely to temporary traffic control used on projects, including responsibilities, materials, equipment, staffing, and procedures. Provisions for continuous project monitoring with incident response and assurance of traffic control quality by the contractor are described in detail. Measurement and payment for work accomplished are detailed. Some specific items may be paid on a unit basis such as flagging, pilot car use, temporary signals, floodlights, attenuators, and barrier rail. For many projects, however, temporary traffic control is bid and compensated on a lump sum basis.
 - Division 41 (Construction Materials) describes the requirements for materials furnished on projects let by the Iowa DOT. Several sections are of interest for temporary traffic control, including Sections 4183 (Traffic Paints and Pavement Markings), 4184 (Reflectorizing Spheres for Traffic Paint), 4186 (Signing Materials), and 4188 (Traffic Control Devices).

General supplemental specifications are issued periodically to update standard specifications, and special provisions are created to address specific and unique project requirements.

Suggestion: Modify specifications to address safety and mobility concerns for project level activities. For example, Section 2528 should be modified to expand the requirements for traffic quality control and the duties of a traffic control technician to include implementing and adhering to the project TMP. Also, add stronger language for prompt removal of unnecessary temporary traffic control.

Manual on Uniform Traffic Control Devices, Part 6

The *Manual on Uniform Traffic Control Devices* (MUTCD) contains the basic requirements and guidance for all work zone traffic control. In addition to information regarding the design and use of traffic control devices, Part 6 includes typical applications for a variety of situations encountered in work zones. The Iowa DOT uses the information contained in the reference to develop standard drawings, specifications, and project-specific layouts that address the wide variety of work zone conditions encountered in construction and maintenance activities

Extra Law Enforcement in Work Zones

The Iowa DOT has applied extra law enforcement in work zones for several years using project funds for compensation. Criteria used to determine the need for extra enforcement include traffic volumes, potential congestion, capacity, type of work involved, and availability of law enforcement personnel. Candidate projects are submitted by the districts, and agreements are reached with law enforcement agencies, usually the Iowa State Patrol but also local agencies in some areas. Off-duty officers are provided on a voluntary basis. Minimal training is provided for these officers in advance. This program expenditure has ranged from approximately \$40,000 to

\$175,000 per year and has been judged quite effective in a recent evaluation conducted by CTRE.

Suggestion: Formally document and adopt this beneficial practice for more common application across the state. In accord with FHWA proposed rule changes to 23 CFR Part 630, develop criteria for guidance in use of extra law enforcement in work zones based on traffic volumes, speeds, and exposure of workers, especially hazardous conditions. Negotiate an agreement with the Iowa State Patrol to provide more uniform practice and performance. Provide training for officers as needed. Analyze the benefits of this program annually.

Annual Work Zone Traffic Control Reviews

The Iowa DOT conducts annual work zone traffic control reviews of a selected sample of projects around the state. The review team is composed of staff from the FHWA; the Iowa DOT Offices of Construction, Traffic and Safety, and Local Systems; and others, as deemed necessary. One or more field reviews are conducted each year to assess a wide variety of temporary traffic-control applications. Observations are documented and incorporated into a formal report; however, specific reviews and reports for individual projects are not conducted. Noticeable improvement in temporary traffic control has resulted from these reviews.

Suggestion: Develop and distribute an annual report describing the results of these reviews, as well as other pertinent information on safety and mobility to interested central and field offices. This report would then provide an annual assessment of temporary traffic control effectiveness and performance across the state. The schedule and scope of work zone traffic control reviews may be modified to meet the requirements of the revised rule.

SUGGESTED ACTIONS FOR IOWA DOT COMPLIANCE WITH FHWA RULE ON SAFETY AND MOBILITY

In compliance with the revised rule on safety and mobility, CTRE has developed the following suggested work zone policy to address all projects and procedures applying to those specifically designated as significant at the agency and project level. Figure 1 shows a flowchart of the process.

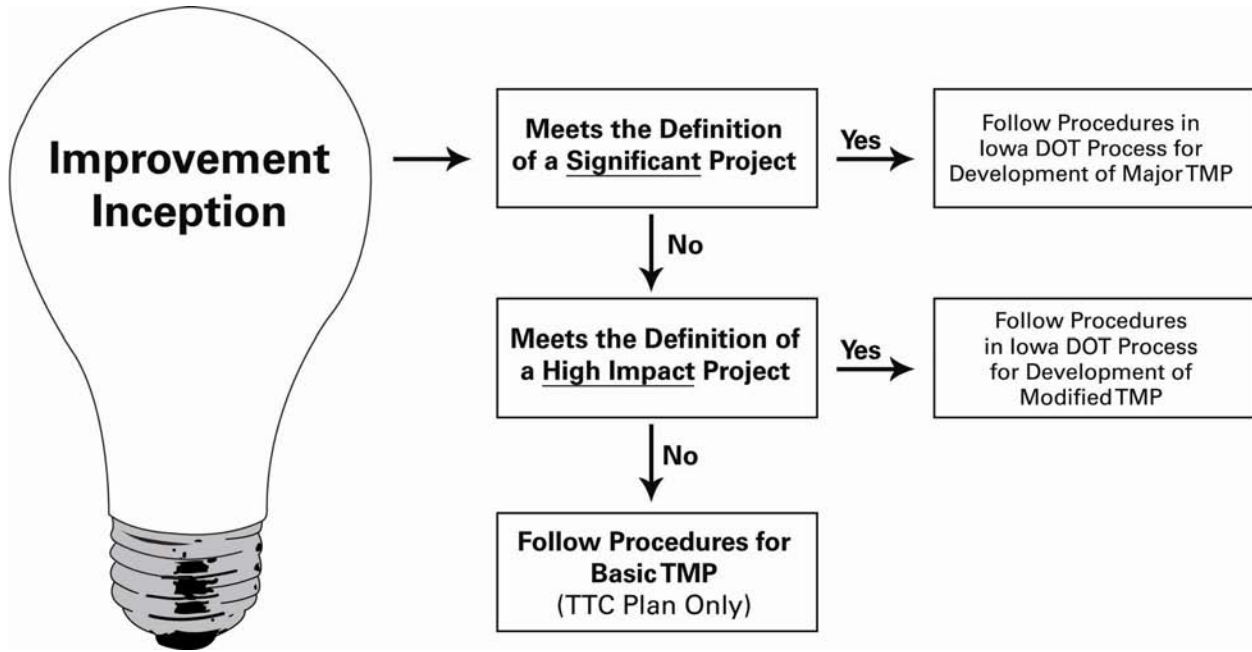


Figure 1. Iowa DOT process for addressing safety and mobility in work zones

Suggested Policy Statement (Agency Level)

It is the policy of the Iowa DOT to minimize traffic delay and inconvenience, safety hazards to road users and workers, and road user/stakeholder costs in all work zone activities. To effectively achieve these goals, planning for potential work zone impacts will be undertaken at the earliest opportunity in the project development process using a multidisciplinary approach, preferably during the concept stage when the widest range of options for accommodating road user needs is available.

Compliance with this policy will benefit all road users, the business community, and the contracting industry by assuring that safety in work zones and maximum mobility for road users are achieved at a reasonable cost.

All work activities that adversely affect road users will require the development and implementation of a TMP. The TMP will include a temporary traffic control plan and may or may not include traffic operations provisions and public information services.

However, for a significant project, as defined in this policy, a more extensive planning and operational process will be required. In addition to a temporary traffic control plan, the TMP will also include provisions for addressing traffic mobility during operations and informing the public throughout activities in advance. A significant project will also include an assessment of the effectiveness of the TMP subsequent to completion of the improvement. The TMP will be developed and implemented using a multidisciplinary approach in consultation with affected stakeholders.

Appropriate provision of the TMP should be included in the PS & Es for all projects on the interstate and primary road system.

Suggested Specific Goals and Measures

The Iowa DOT may wish to establish a goal of reducing total crashes in work zones by 10 percent over a five-year period.

The Iowa DOT may establish a goal for maximum allowable traffic delay in work zones of ~~is~~ 15 minutes, not including off-site detours.

Definitions

Can-Do Process

A process to develop highway projects from concept to project letting adopted by the Iowa DOT. Some key elements of the Can-Do process are as follows:

- Proactive involvement of the public, regulatory agencies and stakeholders early and throughout the project development process to build consensus among these parties
- Concurrent task development by various involved departments
- Establishment and empowerment of multidisciplinary project management teams to provide project ownership, continuity and communication among the various development disciplines throughout the project development process
- District oversight of projects
- Early problem identification
- Avoidance of environmental impacts and mitigation of those impacts that are unavoidable
- Merged compliance with the National Environmental Policy Act (NEPA) and Section 404 of the Clean Water Act
- Context-sensitive solutions (CSS), which is a collaborative, interdisciplinary approach that involves all stakeholders and strives to develop a transportation facility

that fits its physical setting and preserves scenic, aesthetic, historic and environmental resources while maintaining safety and mobility and our commitment to financial stewardship. CSS is an approach to transportation design that considers the total context within which a transportation improvement project will exist, and challenges design professionals to use flexibility to accomplish these objectives within accepted design guidelines.

Capacity Analysis

An analytical process for assessing the potential traffic carrying capabilities of roadway sections. The analysis considers several factors, including volumes, mix of vehicles, speed, and number of lanes. Analyses are commonly performed with a variety of software programs such as QUEWZ and QuickZone.

Contingency Plan

A documented scheme for specific activities to be undertaken to minimize traffic impacts when unexpected events occur in or near a work zone, such as crashes, extraordinary traffic demands, adverse weather, etc. Mitigation activities could be under primary control of a contractor or agency and would include contact information for responsible parties, emergency detours, standby equipment, emergency response, etc. A contingency plan should be included in all TMPs (see definition below).

Dedicated Enforcement

Project site services provided by state or local law enforcement officers, whether or not compensated by project funds, to reduce speeds, improve safety, and enforce traffic laws.

High-impact Project

A road or street improvement not meeting the Iowa DOT definition of a significant project but presenting acknowledged or potential road user safety and/or delay as well as adverse stakeholder impacts. Examples might include projects on lower volume interstate routes, arterials, and major collector routes where lane capacity analysis does not indicate extensive delays.

Public Information Component

The public information component of a transportation management plan will include communication strategies used to advise road users, businesses, residents, public agencies, schools, and the general public of potential impacts and delays expected from project activities and of changing conditions throughout construction. Both traveler information and general public strategies can be included. The range and details of public information strategies will vary by scope and complexity of the project and will follow the guidelines in the Iowa DOT Public Involvement Plan

Significant Project

A project that, alone or in combination with other concurrent projects nearby, is anticipated to cause sustained work zone impacts that are greater than what is considered tolerable based on state policy and/or engineering judgment. (See Criteria for Identifying Significant Projects below.)

Stakeholders

Any group or individual with an interest that may be adversely impacted by a roadway improvement, including, but not limited to, property owners, commercial vehicle owners and operators, businesses, schools, emergency responders, special event managers, advocacy groups, and non-typical road users.

Temporary Traffic Control Plan

A formally described procedure for accommodating road user needs and control through a work zone. These plans shall comply with the provisions of Part 6 of the MUTCD. All road users, including transit, pedestrians, persons with disabilities, and bicyclists, will be considered in development of a temporary traffic control (TTC) plan. The plan will require that preexisting roadside safety hardware be maintained at an equivalent of better level throughout project work.

Traffic Operations

The traffic operations component of a transportation management plan will describe strategies that will be used to mitigate impacts to traffic mobility resulting from work zone activities. The extent of the traffic operations component will vary by scope and characteristics of each project

Transportation Management Plan

A comprehensive set of coordinated strategies to manage and minimize work zone impacts of a project. The scope, content, and detail of a TMP will vary with type of project but will always include a temporary traffic control plan. For significant projects, a TMP will also include a traffic operations component and provisions for appropriate public involvement and information services.

Work Zone

An area of a street or roadway with construction, maintenance, or utility work activities. A work zone is typically marked by signs, channelizing devices, barriers, pavement markings, and/or work vehicles. It extends from the first warning sign or high-intensity rotating, flashing, oscillating, or strobe lights on a vehicle to an “End road work” sign or the last temporary traffic control device.

Work Zone Incident Management

The TTC plan for significant projects should include provisions for accommodating road user needs following the occurrence of an incident within the project area that adversely affects traffic safety and flow. An incident would include, but not be limited to, traffic crashes, worker accidents, hazardous spills, and severe weather. Alternate traffic routing, law enforcement assistance, and emergency response should be arranged in advance of project initiation and discussed at the Preconstruction Conference.

Suggested Criteria for Identifying Significant Projects

Based on the definition above, and FHWA guidance, the State of Iowa should consider adopting these criteria for identification of significant projects:

- Any work activities on or over the interstate system within a transportation management area that will result in continuous or intermittent travel lane restrictions in a given area for more than three consecutive days.
- Projects on the interstate system of more than three days outside a transportation management area that will adversely impact traffic flow as indicated by lane capacity or other analysis methods.
- Major reconstruction or rehabilitation projects on arterial or major collector routes within transportation management areas that will involve extensive right-of-way impacts and/or result in potential safety concerns, objectionable traffic delays, long queues, or diversions.
- Long-term closures for improvements, such as reconstruction or structure replacements, on any arterial or major collector roadway that could result in significant out-of-distance detours or unique local economic impacts.

A traffic backup exceeding one-half mile would be considered a long queue. An objectionable delay would be defined as 15 minutes beyond normal travel time through the project area.

While these criteria could apply to all work activities regardless of the funding source, exceptions to the provisions of this policy will be requested from the FHWA for federally funded improvements if, in the judgment of the contracting agency, sustained work zone impacts are not anticipated. In addition, categorical exclusions may be sought for such work as application of pavement markings and other routine maintenance activities.

Suggested Procedures for Accommodating Work Zone Traffic (Agency Level)

To effectively accommodate the safety and mobility of road users in work zone areas, the Iowa DOT should follow these procedures for all road and street improvements.

Developing and Implementing Transportation Management Plans

All projects on the interstate and primary road network in Iowa will require the development and implementation of a TMP. The basic components of a TMP are as follows:

- TTC plan
- Traffic operations plan
- Public information plan

For most projects, the TMP will only feature a TTC plan, although the traffic operations and public information components may be added at the discretion of the Iowa DOT or administering agency. For projects designated significant, as described in the Iowa DOT Work Zone Policy, the TMP will include all three components.

Types of TMPs

Three types of TMPs are available:

1. **Basic.** Basic TMPs will only require a TTC plan. A basic TMP will generally be used for construction or maintenance projects that cause minimal disruption to road users, adjacent businesses, and residents. This type of improvement would include most short term maintenance activities and construction not requiring lane closures.
2. **Modified.** Modified TMPs will require a TTC plan and may also include some elements of public information and traffic operations considerations. The TMP might be modified at the option of the Iowa DOT where impacts are anticipated to affect a higher number of road users with more severe travel disruptions. Examples of projects requiring a modified TMP are improvements of more than three days that require lane closures or traffic detours/diversions. A modified TMP might be applied to a high-impact project for example.
3. **Major.** Major TMPs will require a complete TTC plan, as well as detailed public information and traffic operations strategies. A major TMP will be required for all projects designated as significant by the Iowa DOT work zone policy and may be used for other projects at the discretion of the DOT. A major TMP will be developed using a multidisciplinary approach and be documented with a written report at the completion of the roadway improvement.

The respective district office, in cooperation with other Iowa DOT offices as appropriate (Design, Construction, Maintenance, etc.), will designate the type of TMP to be used for each project in accordance with Iowa DOT Work Zone Policy.

For roadway improvements not designated as significant, a TTC plan will be completed by the Office of Design and/or district office as soon as practical following the approval of the project concept. For modified TMPs, pertinent traffic operations and/or public information elements will

be selected by the district office as project development proceeds. Consultation and communication with the Offices of Design, Location and Environment, and Media and Marketing is recommended.

Temporary Traffic Control Plan

The TTC plan for a project will be developed and incorporated into the project plans by the Office of Design. The TTC plan shall comply with Part 6 of the MUTCD and Iowa DOT policies, standards, and guidelines. By reference, the TTC plan will be incorporated into the final TMP for the project. The following principles will be followed in developing the TTC plan for all work that impacts road users, including construction, maintenance, and utility activities. Maximum safety and mobility will be assured by adhering to the following principles:

- Provide training to all involved in the application of temporary traffic control.
- Minimize delays and disruptions for road users.
- Consider off-site detours when appropriate.
- Avoid frequent and/or abrupt geometric changes.
- Assure maximum safety for all road users and workers.
- Include needs of bicyclists and pedestrians, including pedestrians with disabilities, in work zone planning.
- Coordinate activities with other affected agencies, departments, and railroads.
- Ensure continuation of emergency services.
- Use reduced speed limits only where necessary for safety.
- Consider road user costs, including delays and out of distance travel, for any major work zone impacts to mobility.
- Provide communication and reasonable access for property owners and businesses.
- Remove or cover any potentially confusing or misleading permanent traffic control devices.
- Promptly remove or cover temporary traffic control devices when not needed.
- Use news media to disseminate work zone information.
- Maintain a record of all work zone crashes and incidents.
- Inspect, properly maintain, and document the effectiveness of temporary traffic control devices and procedures.
- Assure that all temporary traffic control devices are in good condition and in compliance with the MUTCD and traffic control plans.

To avoid a potential delay to other aspects of project development such as design and public involvement, selection of the preferred staging and temporary traffic control strategies must be accomplished in a timely manner by the TMP team.

Suggested Major Transportation Management Plans for Significant Projects

For significant projects, the district office will assume responsibility for developing the TMP. At the earliest opportunity following the project's inception, but prior to completing the final

concept, the district office should identify potential stakeholders and form a team to examine the proposed project intent, discuss potential impacts from work activities, consider options, and initiate development of a TMP. The team should consist of core representatives from the district (lead); the Offices of Systems Planning (if a P00 event), Design, Bridges and Structures (if involved), Location and Environment, Contracts, Traffic and Safety, and Construction; and the FHWA. In addition, representatives from the Office of Local Systems, Media and Marketing Services, Research and Technology-ITS, and Maintenance would be added as needed. Other team members could include law enforcement, emergency responders, local agencies, utilities, railroads, planning agencies, business groups, schools, and other potential stakeholders. Review and comments on the constructability of various options from contractor groups would also be beneficial.

A TMP manager should be selected to guide and monitor development, implementation, and assessment of the TMP. The TMP manager would generally be a representative of the district office, but another individual from the TMP team can also function in this capacity. The manager can divide the team into committees and/or individuals with specific responsibilities such as local agency liaison, capacity analysis, public involvement, incident management, and, during construction activities, a field monitor. The TMP manager would be responsible for producing a final report, including performance assessment of the TMP at project completion.

Following an initial meeting and sharing of data, the TMP team should discuss and select the most cost-effective options for addressing mobility and safety concerns for road users and other stakeholders during construction activities, considering road user costs as a key element. All feasible alternatives for traffic accommodation should be studied, including lane closure restrictions, full closures and detours, night time work, time of day restrictions and traffic control enhancements using both conventional technology and ITS innovations. Alternative traffic management strategies including public transportation and Transportation Management Associations should be studied to reduce traffic volumes. Use of dedicated enforcement and unique worker safety provisions should also be considered for the TMP. In addition, a full range of innovative contracting options should be studied, including incentive/disincentives, A + B bidding, accelerated construction, lane rental, etc.

Contents of a Major TMP

The team should begin developing a major TMP by collecting project information, including the following:

- Traffic volumes and mix, including peak period volumes. More data beyond the actual work area should be analyzed if traffic is diverted to parallel routes or impacts are created through an entire network.
- Potential traffic impacts:
 - For rural projects where diversion to alternate routes is unlikely, a simple capacity analysis, maximum queue length, and road user delay cost estimate are sufficient.

- For projects where diversion to parallel routes is likely, a network model should be used to estimate impacts on the work zone area, user costs, and maximum queue length, but also impacts on parallel routes.
- For projects in urban areas, where work zones are likely to create off-site impacts, models with trip distribution capabilities should be used to estimate network impacts from work zone capacity reductions.
- On pedestrian and bicycle traffic, especially disabled road/street users.
- Crash record history both in the work zone and in the area upstream from the work area that may be impacted by queuing.
- Preliminary project concept.
- Potential impacts to business and community.
- Special events during construction.
- Possible mitigation strategies, including innovative contracting and alternative project delivery strategies, traveler information, travel demand management strategies, restricted lane closure hours, etc.
- Pertinent environmental concerns.
- Other concurrent projects with potential road user impacts to determine if schedules should be adjusted to minimize simultaneous effects or if adjacent projects can be combined to reduce overall impact.
- Specific local issues of interest.

See Appendix B for a checklist to aid in preparing a TMP for a significant project.

Information Sources

Appropriate offices at the Iowa DOT will be responsible for providing the information described above, including the Offices of Design, Traffic and Safety, Contracts, Location and Environment, Systems Planning, Transportation Data, and district offices. The team should use current references developed by the FHWA to assist state DOTs in complying with the revised rule, as well as resources from other sources.

Traffic simulation modeling should be used to characterize and create schedules, phasing, and closure plans that minimize the estimated road user costs on the work zone-impacted facility, as well as along parallel routes and impacted networks. Delay time and queue length limitations for significant projects, as described in the work zone policy, should be used for guidance. All decisions should be data-driven as much as possible.

Other Issues

Other issues to be considered in the selection of work zone traffic accommodation include access to businesses and residences, school transportation, emergency response, transit services, pedestrians, bicyclists, and persons with disabilities. The TMP should consider contingency issues and describe any unique accommodations, including emergency detours for traffic if crashes or incidents occur in the work zone, availability of standby equipment, cessation of work activities for excessive delays, and responsibility assignment.

To fully assess the cost effectiveness of traffic management options, constructability issues should also be considered. Review and comment by construction experts and/or contractor representatives are advisable. Contract stipulations should allow maximum opportunity for contractor initiative and innovation in accelerating construction activities and reducing traffic exposure time.

Level of Detail

The level of detail for the selected traffic management options will vary with the complexity of the project. However, strategies should be thoroughly documented and list provisions such as night work only, lane closure restrictions, staging details, special contracting recommendations, etc. Estimated costs for all options should be calculated, including on- and off-site detour cost comparisons for road users. A detailed cost estimate for the selected options should be developed for inclusion in the PS & E for the project.

Public Information Strategies

Public information strategies should also be selected and documented by the TMP team. These might include use of news media, printed materials, dynamic message signs, and electronic communication methods. Both public awareness and traveler information strategies should be considered. A media and marketing services expert on the TMP team may guide this effort and follow-up with field staff during construction.

Following selection of traffic management options for a proposed improvement, these details from the TMP should be communicated to the public in accord with the Iowa DOT Project Development Public Involvement Plan.

Law Enforcement of Work Zone Traffic Control

The TMP should include consideration for law enforcement of the work zone traffic control. This should include any provisions for special enforcement efforts in and around the work areas. The TMP should also include guidance for the types of patrol and police activity that is most appropriate (circulating or stationary patrols, multiple patrols, etc.). The TTC plan should also be examined for provisions that may help accommodate enforcement (spaces for parking enforcement vehicles in the work zone and space for stopping drivers to issue citations).

Suggested Steps for Implementing and Monitoring the TMP (Project Level)

Provisions for monitoring the TMP through project completion should be decided by the TMP team and included in the construction contract as appropriate. The TMP manager should provide oversight for this activity. Included in monitoring requirements would be verification of temporary traffic control, assessment of TMP performance (queue lengths, delays, public complaints, etc.), tracking implementation costs, documentation of corrective action, TMP revision provisions, and responsibilities for each task. These data should be included in an evaluation report for the TMP.

After award of construction contracts, administration and monitoring of the project TMP would become the responsibility of the resident construction engineer for interstate and primary road projects, with oversight provided by the TMP manager. Duties of the resident construction engineer regarding the project TMP might include but not be limited to, the following:

- Review carefully the details of the TMP in the contract documents.
- Assure that all project staff are trained as needed in work zone transportation management and temporary traffic control.
- Assign monitoring responsibilities to trained field staff.
- Review TMP details with the contractor at the preconstruction conference.
- Record contact information of contractor's trained representative with TMP monitoring responsibilities.
- Maintain close liaison with the contractor to ascertain compliance with TMP provisions and assure that traffic restrictions, especially lane closures, are promptly removed when not in use.
- Assure that any utility adjustments and/or maintenance activities in or near the work area are coordinated with the contractor's activities and in compliance with the TMP.
- Request and use additional law enforcement to maintain safe speeds through the work area.
- Document use of dedicated enforcement on the project, including costs, impacts, and opinions of effectiveness.
- Consider, request, and employ public information dissemination where needed, such as timely news releases and changeable message signs.
- Document public involvement and information efforts.
- Document any modifications to the TMP during project activities.
- Maintain a log of performance related issues of the TMP, such as incident responses, extraordinary delays and long queues, and public complaints.
- Record and maintain a detailed description of all serious crashes that occur in the work zone.
- Assist the TMP manager as needed in preparation of the final TMP report.

Suggestions for Final TMP Report

The following elements should be addressed in the final report filed at completion of the significant project improvement to document activities and assess performance of the TMP.

- Cover page, table of contents, and introduction
- Short summary of contents
- TMP team and responsibilities
- Description of the project
- Project work zone performance measures (both safety and mobility), performance objectives, and performance measure collection
- Pertinent traffic data for project area
- Potential work zone impacts, including capacity and safety analysis

- Traffic management strategies, including temporary traffic control measures, public involvement strategies, traveler information, and traffic operation recommendations
- Monitoring implementation and post project review procedures
- Contingency plans
- Estimated implementation costs
- Miscellaneous provisions
- Attachments and addenda

Suggested Work Zone Traffic Control Training

The Iowa DOT should provide work zone traffic control training on an annual basis as needed for DOT staff in design, construction, and maintenance, as well as contractors, local agencies, and utility staffs as needed. This training should emphasize safety for both road users and workers, as well as maximum mobility for travelers. When significant projects are programmed, staff from all potentially involved departments should be trained prior to initiation of development activities. Guidance for this training could be obtained from FHWA resources and provided by a consultant or through the National Highway Institute if sufficient expertise is not available in the DOT.

Suggested Work Zone Reviews

Each year the Iowa DOT should conduct one or more field reviews of work zone traffic control to assess effectiveness and detect deficiencies. A team composed of representatives from the Offices of Construction and Traffic and Safety, as well as the FHWA Division Office, will conduct the review. Other team members could be added as needed, including representatives from the Office of Local Systems and districts. Particular interest should be shown to projects with major transportation management plans in effect.

On a biennial basis, the Iowa DOT should perform a process review of work zone safety and mobility procedures, including the training program. The process review should consist of an evaluation of agency-wide work zone data, including crash history and an in-depth review of selected projects that used a major transportation management plan. Representatives from all offices with interest in the project development process as it relates to work zone traffic control and safety should be involved in the assessment, including the Offices of Traffic and Safety (lead), Design, Contracts, Location and Environment, Construction, Media and Marketing Services, and appropriate district offices, as well as the FHWA. Other agency representatives could be added to the review process as needed, including the Iowa State Patrol and local agencies. Major areas of interest for process reviews are safety, mobility, construction efficiency and effectiveness, and public perception and reaction.

These reviews should be conducted to provide insight into the effectiveness of work zone safety and mobility procedures and to identify areas where improvements would be beneficial. A report should be prepared following these reviews and should contain recommendations for modification of the work zone safety and mobility policy and procedures as identified by the review team.

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APPENDIX A. EXECUTIVE PRESENTATION SCRIPT AND POWERPOINT SLIDES

Updated Rule on Safety and Mobility

23 CFR Part 630, Subpart J
Presentation Script
Iowa Department of Transportation

Slide 1: Title and Introduction

Slide 2: Overview of Revised Rule

- The Federal Highway Administration (FHWA) amended the regulation that governs traffic safety and mobility in roadway work zones. The updated regulation, or rule, establishes requirements and presents guidelines to do the following:
 - Systematically assess impacts to safety and mobility early in development process
 - Develop strategies to address these impacts on all federally funded highway improvements
- These provisions will help state departments of transportation (DOTs) meet current and future work zone safety and mobility challenges, and better serve the needs of road users and state holders.
- The Final Rule was published in September 2004.
- All state and local governments that receive federal funding are required to comply with the provisions of the rule no later than October 12, 2007.

Slide 3: Three Major Components of New Rule

The final rule was written to be flexible in application, according to the needs of individual agencies and various types of highway projects.

The three major components of the rule consist of policy, process, and project level components, including the following:

- Adoption of an overall work zone policy that considers and addresses impacts
- Development and implementation of agency procedures to implement and sustain the policy
- Development and implementation of project-level procedures to assess and manage work zone impacts of individual projects

For each of the components, the rule includes provisions and guidance intended to help transportation agencies address work zone considerations starting early in planning and progressing through project design, implementation, and performance assessment.

Slide 4: Comparison with Old Rule

The title was revised to include mobility considerations along with safety.

Slide 5: Comparison of Key Issues

Key changes include requirements to adopt a work zone policy as well as assessment and management procedures for work zone traffic. Data should be collected for both safety and mobility in work zones to be used in continuous improvement efforts.

Slide 6: More Comparison

The need for training has been expanded from temporary traffic control only to also include transportation management techniques. Process review guidelines were revised from annual to biannual. No report is requested, but FHWA involvement is expected. At the project level, significant projects will now require a transportation management plan containing transportation operations and public involvement strategies in addition to only a traffic control plan.

Slide 7: Finally...

The new rule also contains changes at the project level, including the need for a responsible person from both the agency and contractor to be responsible for compliance with the transportation management plan. Also the description of pay items to compensate for transportation management plan activities has been revised and expanded. Either method or performance based pay items may be used and examples are given.

Slide 8: Work Zone Safety Policy, 23 CFR Section 630.1006

Section 630.1006 introduces the work zone safety and mobility policy.

- Each state DOT should use a multidisciplinary approach to develop a policy in coordination with the FHWA.
- The policy is to address work zone impacts throughout all stages of project development and construction through the application of processes, procedures, and/or guidance. The policy may vary based on different project characteristics (classes of projects) and the expected work zone impacts.
- The policy is required for all federally funded projects and implementation is encouraged on non-federally funded projects as well.

Slide 9: State/Local Agency Procedures, Section 630.1008

Section 630.1008 addresses the development of standard processes and procedures for states and agencies to implement and sustain their respective work zone safety and mobility policies. These processes and procedures include the following:

- States/agencies should develop procedures to assess work zone impacts in project development and manage safety and mobility during project implementation. Because characteristics vary between projects, the scope of these procedures shall be based on project specific characteristics.
- States/agencies shall use field observations, available work zone crash data, and operational information to manage work zone impacts on ongoing projects. Data should be acquired from multiple projects in order to facilitate work zone safety and mobility process and procedure improvements.
- States/agencies shall provide training for all personnel involved in the development, design, implementation, operation, inspection, and enforcement of work zone related management and traffic control. Training should be appropriate for the job decisions each individual will make. Periodic training is also required to ensure personnel are familiar with current policy updates and industry practices.

- For continuous improvement of the overall process, a review shall be conducted by states every two years to assess the effectiveness of work zone safety and mobility procedures. Components of the review will include state-wide work zone data, input from staff involved in the project development and construction, FHWA comments, and possibly an analysis of randomly selected projects.

Slide 10: Project-Level Provisions, Sections 630.1010 and 630.1012

The Project-level Provisions section of the rule provides guidance and establishes procedures for States to manage the work zone impacts of individual projects.

Project level provisions begin with the identification of significant projects at the initiation of the development process.

- States must develop and implement Transportation Management Plans (TMPs) for all projects. However, TMP requirements may vary depending on whether or not a project is designated as significant.
- States shall include TMP provisions in the Plans, Specifications, and Estimates, PS&Es, for projects including the appropriate pay items in the contract. Pay item specifications may be either method-based, including individual pay items, lump sum payment or a combination thereof, or performance based where compliance is assessed on applicable performance criteria and standards.
- To monitor the TMP and other safety and mobility aspects of individual projects, both State and contractor shall designate a trained person with the responsibility and authority to implement and administer the TMP.

To assess the adequacy of the TMP in addressing work zone impacts, a performance review should be completed at project completion.

Slide 11: Transportation Management Plans

- A TMP is required for all federally funded projects and recommended for non-federally funded projects as well.
- A TMP for significant projects must consist of a temporary traffic control (TTC) plan but also include transportation operations (TO) and public information (PI) components. In development and implementation of a TMP for significant projects, States should establish and maintain consultation with all stakeholders.
 - A TTC plan describes temporary traffic control measures to be used for facilitating movement of road users through a work zone. The plan is created using the MUTCD and agency standards as major references. A TTC plan is required for all projects where road user impacts are anticipated.
 - The TO component of a TMP shall include the identification of strategies that will be used to mitigate impacts to the operation and management of the transportation system within the work zone impact area, including: travel demand management, signal retiming, use of intelligent transportation systems, speed enforcement, and mitigation of incidents.
 - The final element of a TMP is the PI factor. The PI component shall include communication strategies that seek to inform affected road users, the general public, area residents, businesses, and other appropriate public entities about the

project, the expected work zone impacts, and the changing conditions on the project. Possible strategies include brochures, web sites, radio and television spots, or variable message signs to provide current and pertinent information

- While the TO and PI components are required for significant projects, these initiatives can be valuable for other projects as well, regardless of funding source.

Slide 12: Significant Projects

Roadway improvement projects have varying effects on road users, including increased congestion, possibly reduced safety, or impacted business and event access. The updated Rule establishes a category of significant projects to recognize and reduce the potential effects of these work zone activities.

The rule's definition of a significant project is *“one that, alone or in combination with other concurrent projects nearby is anticipated to cause sustained work zone impacts that are greater than what is considered tolerable based on State policy and/or engineering judgment.”*

- States/agencies are to adopt the final definition and criteria required to identify a significant project. Criteria to consider are agency work zone policy, project characteristics, and expected magnitude of work zone impacts on safety and mobility.
- All projects on the interstate system within a Transportation Management Area (TMA) that occupy a location for more than three days through continuous or intermittent closures shall be considered significant projects under the rule.
- Other criteria to consider in determining if a proposed project might be significant include:
 - High public interest
 - Significant road user costs, out-of-distance travel, or delays
 - Moderate to long duration
 - Impact to high number of travelers

Analytical tools are encouraged to be used to assess impacts of projects. However, an exception process is provided for projects that may meet the adopted criteria but are not expected to cause sustained work zone impacts. A state may request a project exception from the FHWA if it can be shown that major work zone impacts will not occur.

Slide 13: Iowa DOT Approach to Compliance

- To achieve compliance with both the spirit and letter of the new Rule on Safety and Mobility, the Iowa DOT has contracted with the Center for Transportation Research and Education (CTRE) at Iowa State University to draft policies and procedures for dealing with these important issues.
- Work was initiated on this effort with the assembly of an advisory committee to guide the work and provide valuable information. The committee was made up of representatives from all departments with a direct or indirect interest in work zone impacts. Representatives from the FHWA Division Office as well as Iowa DOT district offices also provided necessary assistance.
- The initial meeting of the committee was conducted on May 1, 2006, and work began on drafting a policy and procedures for the Iowa DOT.

Slide 14: Key Tasks

Several major tasks are included in the CTRE/DOT plan for accommodation to the rule, including the following:

- Review and assessment of the current practices of the DOT in developing projects and providing temporary traffic control in work zones
- Perception of modifications of current practice necessary to meet rule requirements
- Review of practices of other states for practical reference and adoption in Iowa
- Establishment of a definition of a major and important task in Iowa for significant projects as this category will also establish the scope of impact of the rule on Iowa DOT project development
- Development of a work zone policy, as required by the rule
- Formulation of general procedures to follow in the planning, design, and construction of projects where substantial work zone impacts are anticipated
- Preparation of project level practices to describe activities necessary for individual projects to assure compliance with the established TMP for significant projects

It is planned that work on this effort will be completed at least to the draft stage by the end of 2006, allowing the Iowa DOT to meet the FHWA deadline of October 2007 to comply with the rule.

Early completion of Iowa DOT policy and procedures will permit including potentially significant projects currently in development to be included in the revised process.

Slide 15: For More Information

Considerable resource information and guidance for work zone safety and mobility activities can be found on the FHWA web site: http://www.ops.fhwa.dot.gov/wz/resources/final_rule.htm

The final rule web site contains the following available content:

- Implementation guide
- Brochure and fact sheets
- Rule language
- Presentations on the rule
- Examples of state implementation
- Frequently asked questions

The lead staff member at the Iowa DOT is Steve Gent, Director of the Office of Traffic and Safety. The CTRE contribution is led by Dr. Tom Maze and Tom McDonald.

APPENDIX B. TRANSPORTATION MANAGEMENT PLAN CHECK LIST

After a proposed roadway improvement has been designated significant, the following check list can be used in developing and implementing the Transportation Management Plan (TMP).

<u>ACTIVITY</u>	<u>STATUS</u>		
	<u>Yes</u>	<u>No</u>	<u>NA</u>
<u>TMP Roles and Responsibilities</u>			
TMP manager selected	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Probable stakeholders identified	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TMP team assembled	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TMP task leaders appointed (public information, operations, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>Project Detail Description</u>			
Preliminary concept developed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Constraints noted (local issues, potential conflicts, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Proposed staging available for review	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Anticipated schedule for accomplishment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Related and/or concurrent projects with potential conflicts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>Assessment of Current Conditions</u>			
Roadway characteristics known (classification, lanes, history, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Traffic volumes, speeds, mix, etc., data available	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
In-place traffic control reviewed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Crash and incident data available for consideration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Local agency and business concerns noted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Local events during construction known	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	<u>Yes</u>	<u>No</u>	<u>NA</u>
Capacity analyses completed (lane capacity, delays, queue prediction, detour analysis, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Diversion to alternate routes possible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>Development and Selection of Alternatives</u>			
Staging options developed and reviewed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Capacity analysis for all alternatives completed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Access for emergency response and schools reviewed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Incident management plan prepared <ul style="list-style-type: none"> • emergency detours • standby equipment • contractor/agency responsibilities 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Innovative contracting options considered <ul style="list-style-type: none"> • lane closure restrictions • accelerated work schedule • incentive/disincentive • A + B bidding 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use of dedicated enforcement recommended	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Special road users considered (transit, pedestrians, persons with disabilities, bicyclists, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Constructability reviewed by contractor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Adequacy of detour routes examined	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Public information plan developed <ul style="list-style-type: none"> • general public awareness • motorist information 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>TMP Implementation</u>			
TMP included in project PS & E	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Appropriate TMP provisions listed in contract documents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TMP monitor in the field selected	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	<u>Yes</u>	<u>No</u>	<u>NA</u>
TMP provisions discussed at pre-construction conference	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<ul style="list-style-type: none"> • agency responsibilities • contractor responsibilities 			
Pertinent data for final TMP report recorded	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<ul style="list-style-type: none"> • crashes and incidents in work zone • changes in TMP • Public information initiatives • Measures and comments on effectiveness <ul style="list-style-type: none"> ○ Queue length ○ Delay times • Suggestions for improvement • Public input • costs associated with TMP <ul style="list-style-type: none"> ○ Extra work orders ○ Use of dedicated enforcement 			

TMP Completion

Pertinent data assembled	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Draft report circulated to TMP team	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Final TMP report completed and distributed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>