

# Minnesota Work Zone Safety and Mobility Policy

## October 9, 2007

### INTRODUCTION

Work zones directly impact the safety and mobility of road users and highway workers. These safety and mobility impacts are exacerbated by an aging highway infrastructure and growing congestion in many locations. Everyone involved in project development and delivery including field operations must be committed to providing safety and mobility for all operations. Addressing these safety and mobility issues requires considerations that start early in project development and continue through project completion.

### Purpose

The purpose of the policy contained in this document is to implement the requirements and guidelines contained in the Code of Federal Regulations, Title 23 Part 630, Subpart J, "Work Zone Safety and Mobility" for appropriate highway projects in Minnesota.

This document establishes requirements and provides guidance for systematically addressing the safety and mobility impacts of work zones, and developing strategies to help manage these impacts. The requirements and guidance are addressed at the following three (3) levels with associated procedures for each level and policies that should be developed ensure their uniformity and compliance statewide:

1. Project Level Procedures including:
  - a. Work Zone Mobility Impact Assessment
  - b. Transportation Management Plan (TMP)
  - c. Plans, Specifications and Estimates (PS&Es)
  - d. Project Temporary Traffic Control (TTC) Field Observations
2. District or Local Agency Level Process and Procedures
  - a. Establishment of a Work Zone Safety Coordinator
  - b. Operational Performance Information
  - c. Work Zone Crash Data Review
3. State Level Processes and Procedures
  - a. Statewide Work Zone Data
  - b. Statewide Field Reviews
  - c. Training
  - d. Process Feed-Back Discussions
  - e. Statewide Group Activities

### Scope

The provisions of these policies and procedures apply to federal and non-federal aid Mn/DOT and State-Aid Projects with federal-aid in the State of Minnesota. They should also be implemented on maintenance and utility operations to the extent practical and feasible.

## **PROJECT LEVEL PROCESSES AND PROCEDURES**

This section provides guidance and establishes procedures to manage the work zone impacts of individual projects.

For all construction and maintenance projects attention must be given to traffic mobility and safety from the early stages of development of the project, through the completion of the actual construction, including the preliminary layout studies, detailed design, and the drafting of the special provisions. It is considered essential that personnel of various technical expertise be involved in order to provide their specialty input so an appropriate transportation management plan can be developed.

During project planning and preliminary plan development, the Project Manager should review the scope of the project with traffic engineering, construction, design and maintenance personnel to establish traffic mobility and determine traffic control concepts for the proposed project. Project staging should be determined by the traffic carrying capacities of the roadway under construction, bypasses or detours. Consideration should be given for other construction/maintenance work in the proposed roadway corridor or general vicinity. Work zone mobility impact assessments should be done for all projects as detailed in the next section.

### **Work Zone Mobility Impact Assessment**

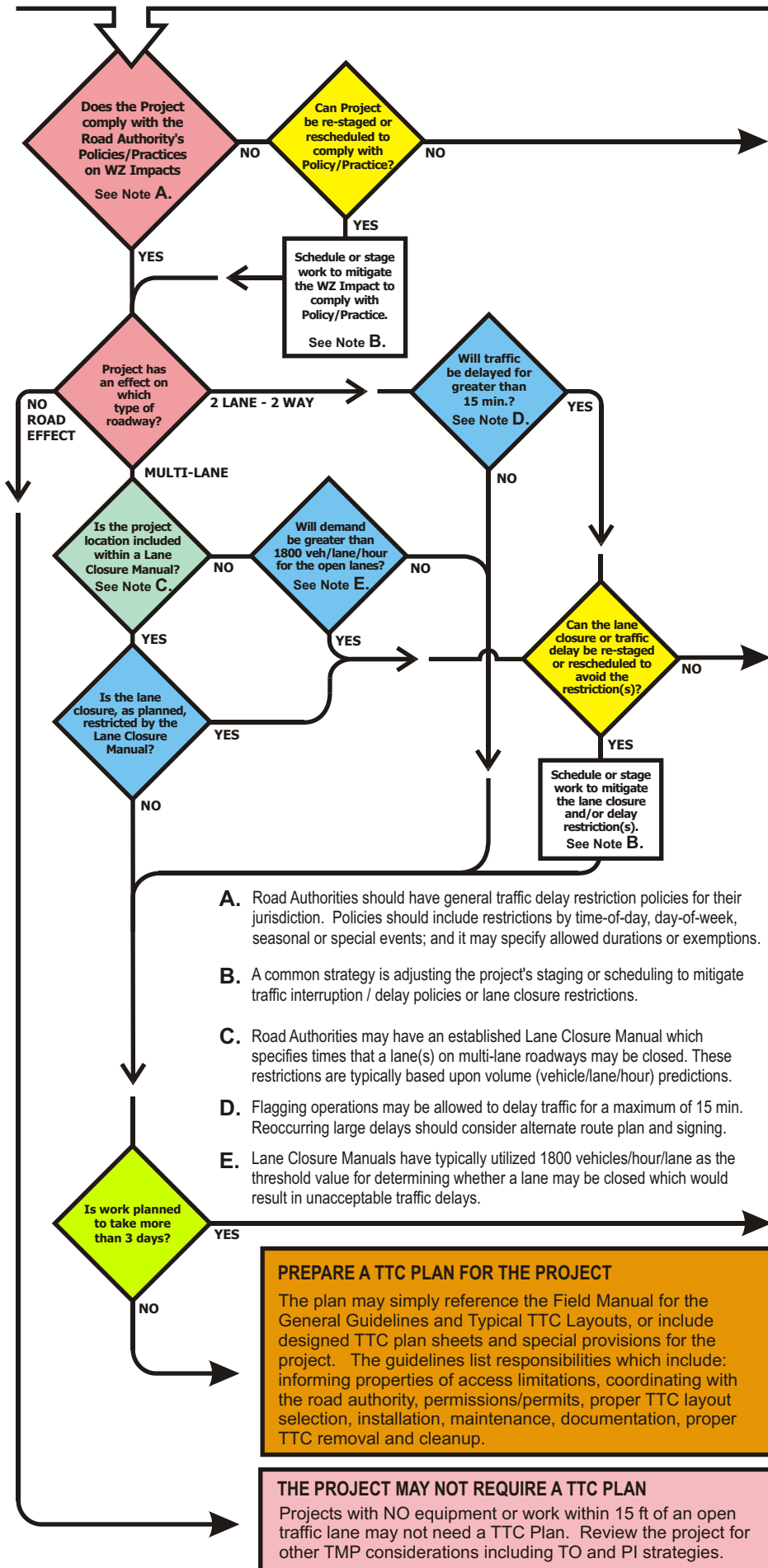
The Work Zone Mobility Impact Assessment Decision Tree shown in Figure 1 should be used for all projects to identify the potential impact the project will have on mobility through the work zone and provide guidelines for developing the strategies to mitigate the impact. When the impacts are identified, the documentation and management of the mitigation strategies are combined into an appropriate level of Transportation Management Plan for the project.

To facilitate the use of this decision tree each district or local road authority should develop and implement a general traffic delay restriction policy for their jurisdiction. This policy should include restrictions by time-of-day, day-of-week, seasonal or special events, and may specify allowed durations or exceptions. A simple example of a district/road authority traffic delay restriction policy would be: "There shall be no lane closures on holiday weekends between 12 noon the day preceding the weekend until 5 am the day after the weekend".

The district or local road authority may have an established "Lane Closure Manual" which specifies times that a lane may be closed. These restrictions are typically based upon hourly traffic volume predictions. In areas where roads are not covered by such a manual, the following guidelines should be used to identify a potential mobility impact due to a lane closure:

- On 2-lane 2-way roadways, traffic should not be stopped (such as a flagging operation) for greater than 15 minutes.
- On multi-lane roadways, traffic volumes should not exceed 1800 vehicles per hour per open lane.

The Work Zone Mobility Impact Assessment Decision Tree (Figure 1) also considers any project which will impact mobility for more than three (3) days as requiring at least a Basic TMP as explained below.



**PREPARE A TRANSPORTATION MANAGEMENT PLAN**

A **Transportation Management Plan (TMP)** should be prepared through the assistance of the road authority's Traffic Engineer. The scope of the TMP will range from minor to major depending upon the project's complexity. Also see "Basic TMP" below.

Tasks include listing all potential work zone impacted services, businesses, or specific traffic types, and the estimated volumes and durations. Refer to the worksheet of "**Work Zone Impact Considerations**" for examples of potentially work zone impacted services, businesses, and traffic types.

Mitigation strategies for each identified Work Zone Impact should be identified and incorporated into the TMP. Many work zone impact management strategies can be used to minimize traffic delays, improve mobility, maintain or improve motorist and worker safety, complete road work in a timely manner, and maintain access for businesses and residents. Refer to the listing of "**Work Zone Impact Management Strategies**" for examples of typical measures utilized to reduce work zone impacts.

Refer to FHWA publication titled "*Developing and Implementing Transportation Management Plans for Work Zones*" for complete descriptions of various work zone management strategies, grouped according to the following categories:

**Temporary traffic control (TTC):**

- ◆ Control strategies.
- ◆ Traffic control devices.
- ◆ Project coordination, contracting and innovative construction strategies.

**Public information (PI):**

- ◆ Public awareness strategies.
- ◆ Motorist information strategies.

**Transportation operations (TO):**

- ◆ Demand management strategies.
- ◆ Corridor/network management (traffic operations) strategies.
- ◆ Work zone safety management strategies.
- ◆ Traffic/incident management and enforcement strategies.

**PREPARE A BASIC TRANSPORTATION MANAGEMENT PLAN**

A **Basic Transportation Management Plan (TMP)** shall contain documentation of all anticipated Work Zone Impacts and associated mitigation strategies. The Basic TMP may vary in complexity as appropriate for the project, but as a minimum, it shall have provisions for a TTC Plan and include details on the required minimum mitigation strategies to avoid any restrictions and to provide public information.

For example, the **Basic TMP**, which is typically minimal in scope, should consist of the following:

- ◆ **TO:** a detour plan and/or access plan (if needed), with an appropriate work schedule for min. delay,
- ◆ **PI:** a process for contacting potentially affected services, businesses, and/or residents, and
- ◆ **TTC:** a selection of an appropriate combination of TTC plan layouts from the Long-term TTC Templates or plan sheets developed specifically for the project. Some projects may utilize modified layouts from the MN MUTCD Field Manual.

- A.** Road Authorities should have general traffic delay restriction policies for their jurisdiction. Policies should include restrictions by time-of-day, day-of-week, seasonal or special events; and it may specify allowed durations or exemptions.
- B.** A common strategy is adjusting the project's staging or scheduling to mitigate traffic interruption / delay policies or lane closure restrictions.
- C.** Road Authorities may have an established Lane Closure Manual which specifies times that a lane(s) on multi-lane roadways may be closed. These restrictions are typically based upon volume (vehicle/lane/hour) predictions.
- D.** Flagging operations may be allowed to delay traffic for a maximum of 15 min. Recurring large delays should consider alternate route plan and signing.
- E.** Lane Closure Manuals have typically utilized 1800 vehicles/hour/lane as the threshold value for determining whether a lane may be closed which would result in unacceptable traffic delays.

**PREPARE A TTC PLAN FOR THE PROJECT**

The plan may simply reference the Field Manual for the General Guidelines and Typical TTC Layouts, or include designed TTC plan sheets and special provisions for the project. The guidelines list responsibilities which include: informing properties of access limitations, coordinating with the road authority, permissions/permits, proper TTC layout selection, installation, maintenance, documentation, proper TTC removal and cleanup.

**THE PROJECT MAY NOT REQUIRE A TTC PLAN**

Projects with NO equipment or work within 15 ft of an open traffic lane may not need a TTC Plan. Review the project for other TMP considerations including TO and PI strategies.

## Transportation Management Plan (TMP)

A Transportation Management Plan (TMP) should be prepared through the assistance of the road authority's Traffic Engineer. The TMP should be developed and implemented in sustained consultation with stakeholders (e.g., other transportation agencies, railroad agencies/operators, transit providers, freight movers, utility suppliers, police, fire, emergency medical services, schools, business communities, and regional transportation management centers).

Tasks include listing all potential work zone impacted services, businesses or specific traffic types and the estimated volumes and durations. Refer to the Attachment "A" titled "Work Zone Impact Considerations Worksheet" for examples of potential work zone impacted services, businesses and traffic types. The FHWA document #2: "**Work Zone Impacts Assessment: An Approach to Assess and Manage Work Zone Safety and Mobility Impacts of Road Projects**" provides guidance on developing procedures to assess and manage work zone impacts of road projects, as well as examples and practices of how agencies are currently assessing and managing work zone impacts. The FHWA also requires that work zone impacts and mitigating strategies be discussed in the project's environmental document.

**ATTACHMENT A:** <http://www.dot.state.mn.us/trafficeng/workzone/wzmobility/AttachmentA-considerations.pdf>

**FHWA Doc #2:** <http://www.dot.state.mn.us/trafficeng/otepubl/fhwa/wzi-assessment.pdf>

Mitigation strategies for each identified work zone impact should be identified and incorporated into the TMP. Many work zone impact management strategies can be used to minimize traffic delays, improve mobility, maintain or improve motorist and worker safety, complete road work in a timely manner, and maintain access for businesses and residents. Attachment "B" titled "Work Zone Impact Management Strategies" contains a listing of examples of typical measures utilized to reduce work zone impacts. Refer to the FHWA document #3: "**Developing and Implementing Transportation Management Plans for Work Zones**" for information about developing and implementing Transportation Management Plans (TMP), including information on how and where a TMP fits into project-level processes and procedures, a list of components that can be considered for inclusion in a TMP, descriptions of work zone management strategies, and examples and practices of how agencies are currently using TMPs.

**ATTACHMENT B:** <http://www.dot.state.mn.us/trafficeng/workzone/wzmobility/AttachmentB-strategies.pdf>

**FHWA Doc #3:** <http://www.dot.state.mn.us/trafficeng/otepubl/fhwa/trans-mgmt-plans.pdf>

## Components of the TMP

Various work zone management strategies are found within a TMP. The three primary management components are listed below:

### Temporary Traffic Control (TTC)

- Control Strategies
- Traffic control devices
- Project coordination, contracting and innovative construction strategies

### Transportation Operations (TO)

- Demand management strategies
- Corridor/network management (traffic operations) strategies
- Traffic/incident management and enforcement strategies

### Public Information (PI)

- Public awareness strategies
- Motorist information strategies

#### Temporary Traffic Control (TTC) Plan:

The TTC plan is a component of the TMP which identifies the strategies for handling traffic through a specific highway or street, work zone or an incident area. The TTC plan plays a vital role in providing continuity of reasonably safe and efficient road user flow and highway worker safety when a work zone, incident, or other event temporarily disrupts normal road user flow. A TTC plan may range in scope from a simple reference to an appropriate layout in the MN MUTCD Field Manual (or the road authority's adopted TTC manual) up to a very detailed plan designed solely for a specific project with standard specifications. The degree of detail in the TTC plan will depend on the project complexity and traffic interference with construction or maintenance activity.

The TTC plan shall be consistent with the provisions under Part 6 of the MN MUTCD and with the work zone hardware recommendations in Chapter 9 of the **AASHTO Roadside Design Guide** titled: "Traffic Barriers, Traffic Control Devices, and Other Safety Features for Work Zones". In developing and implementing the TTC plan, pre-existing roadside safety hardware shall be maintained at an equivalent or better level than existed prior to project implementation. If there is no approved safety hardware to make extensions or additions to the existing safety hardware, experimental hardware may be used to accomplish roadside safety and project goals.

#### Traffic Operations (TO) Plan:

The TO plan is a component of the TMP that organizes the strategies that will be used to mitigate impacts on the operation and management of the transportation system within the work zone. Typical TO strategies may include, but are not limited to, demand management, corridor/network management, work zone safety management, and traffic/incident/enforcement management. The scope of the TO component should be determined by the project characteristics, and the transportation operations and safety strategies identified by the State.

#### Public Information (PI) Plan:

The PI plan is a component of the TMP which identifies the anticipated communications strategies that will be utilized to inform affected road users, the general public, area residences and businesses, and appropriate public entities about the project, the expected work zone impacts, and the changing conditions on the project. This may include motorist/traveler information strategies. The scope of the PI component should be determined by the project characteristics. Public information should be provided through methods best suited for the project, and may include, but not be limited to, information on the project characteristics, expected impacts, closure details, and commuter alternatives.

#### Scope of the TMP

Depending upon the project's impact assessment, the scope of the TMP may range from very minimal requirements on many projects to a very formal and complex on large projects, which attempts to mitigate significant mobility and safety impacts utilizing the components listed above. Although many projects will not create significant impacts, they may still require a basic level of TMP consideration due to the project duration. Shorter duration projects may not require any formal TMP.

A Basic TMP, which is minimal in scope, shall have provisions for a TTC plan. The Basic TMP shall contain documentation of the basic work zone mobility impacts, such as excessive delays and project duration. The Basic TMP shall include details on the required minimum mitigation strategies to avoid or reduce any mobility restrictions and to provide public information.

As an example, the Basic TMP should consist of the following:

- TTC – a selection of an appropriate combination of TTC plan layouts from the long-term TTC templates or plan sheets developed specifically for the project. Some projects may utilize modified layouts from the MN MUTCD Field Manual.
- 
- Traffic Operations – a detour plan and/or access plan as needed, with an appropriate work schedule to minimize delay
- Public Information – a process for contacting potentially affected services, businesses and/or residents

Projects having relatively insignificant work zone impacts, as detailed in the attached work zone mobility impact assessment decision tree, do not require a formal TMP beyond a TTC plan. This plan may simply reference the MN MUTCD Field Manual for the “TTC General Guidelines” and typical TTC layouts, or may include TTC plan sheets and special provisions designed for the project. The “TTC General Guidelines” list many responsibilities which include:

- informing adjacent property owners of access limitations
- coordinating with all the road authorities
- receiving permission or permits for the work
- selecting proper TTC layout
- installing, maintaining and documenting proper TTC devices
- removing TTC devices when they are no longer needed

### **Plans, Specifications, and Estimates (PS&Es)**

The Plans, Specifications, and Estimates (PS&Es) shall include the appropriate provisions of the TMP (the TTC plan, TO and/or PI components) or provisions for contractors to develop a TMP at the most appropriate project phase as applicable to the chosen contracting methodology for the project. Generally the agency develops the TMP. A contractor developed TMP shall be subject to the approval of the Road Authority, and shall not be implemented before it is approved.

Detailed final design should involve the traffic engineering, construction and maintenance personnel and appropriate FHWA personnel as the final detail plans are being developed so the necessary details for traffic control and mobility are included in the construction plan and proposal. If the complexity of a project warrants, a traffic control layout may be prepared and be included in the P.S. & E. On some projects it may be appropriate to provide broad TTC plan parameters in the P.S. & E., then permit the successful bidder to develop a detailed TTC plan and use it if the road authority and/or FHWA find it acceptable. Development of detailed time and traffic provisions should involve design, traffic engineering, and construction personnel. The pay items to be included in the plans must be determined during design.

### **Pay Items**

The PS&Es shall include appropriate pay item provisions for implementing the TMP. Designers are encouraged to use appropriate pay items to the fullest extent practical, either through end based or performance based specifications.

- (1) For end-based specifications individual pay items, lump sum payment, or a combination thereof may be used.
- (2) For performance based specifications, applicable performance criteria and standards may be used (e.g., safety performance criteria such as number of crashes within the work zone; mobility performance criteria such as travel time

through the work zone, delay, queue length, traffic volume; incident response and clearance criteria; work duration criteria).

### Responsible persons

The road authority and the contractor shall each designate a trained person, at the project level, who has the responsibility and sufficient authority for implementing the TMP and other safety and mobility aspects of the project.

The responsible persons should insure, among other things, that the following activities are completed:

- Appropriate project personnel are familiar with the MN MUTCD, the contract plans and special provisions, the current Minnesota Standard Specifications for Highway Construction and its supplements.
- Personnel assigned to the project implement proper techniques of traffic safety and traffic operations prior to beginning construction and specifically how they relate to the TTC plan.
- Ensure that all affected agencies such as State Patrol, local police, fire departments, sheriff's office, hospital, ambulance services, local government, post office, school districts, etc., are informed of the scope of the project and how it may affect their individual needs and services. This public relations work is extremely critical in the case of a total detouring of traffic.
- Notify the major local news media (TV, radio stations, newspapers, etc.), local tourism associations, AAA, local legislators, etc. of the scope of the project prior to beginning operations. Cooperation with the contractor and any involved local government agencies is advised. All items of interest should be included. These include:
  - Type of work to be performed.
  - Hours the highway will be fully opened to traffic.
  - Hours of restricted usage.
  - Type and place delays can be expected.
  - Duration of the project.
  - Location of the detour, if applicable.
  - Anticipated completion date of project.
  - A name and phone number the public can contact for information or to make comments about the project.
- Regularly review field observations, available work zone crash data, and operational information and use the data and information to manage work zone impacts for the project, including revising the TTC plan, during construction.
- Insure that traffic operations are reviewed through the project limits, including the condition of all traffic control devices on a regular basis. The frequency of these reviews should vary with the complexity of the projects. On some projects, it may be necessary to change the TTC plan during construction, depending on the contractor's schedule, progress of utility work, etc.
- Ensure that current documentation is maintained as to when deficiencies were noted in the implementation of the TTC plan and how and when they were corrected.

## **Project TTC Field Observations**

Field observations (generally regular drive through reviews) shall be made to assure that traveler information is accurate and up-to-date. This includes:

- Warning, Guide, and Information signing;
- Changeable Message Sign (portable and non-portable) messaging;
- Temporary Traffic Control devices; and
- Pavement Markings.

Revisions to the TTC plans shall be reviewed to determine if they comply with all standards in the MN MUTCD, Special Provisions and Specifications. For major revisions this review should include consultation with traffic engineering staff before the revision is implemented.

While adjustments to the temporary traffic controls are anticipated on all projects, a revision to the TTC Plan is less common. Revisions to the TTC plans shall be “properly” documented in the project file. Proper documentation may range from a daily diary entry to marked up TTC plan sheets.

## **DISTRICT OR LOCAL AGENCY LEVEL PROCESS AND PROCEDURES**

Each District or Local Agency is encouraged to establish a Work Zone Safety Coordinator. This Coordinator should be responsible for:

- Making periodic reviews of maintenance and construction projects to determine the adequacy of the TTC plan and to assist project and maintenance personnel with compliance to the plan.
- Ensuring proper documentation is maintained when deficiencies are noted and the corrective action that was taken.
- Regularly obtain and keep a record of all known crashes within a work zone. This record should include all available information, such as: time of day, probable cause, location, pictures, sketches, weather conditions, interferences to traffic, etc. These records should be sent to project personnel.
- Making recommendations to design, construction, maintenance and management regarding temporary traffic controls.
- Working with design and field personnel on the development of TMP and TTC plans for maintenance and construction projects.

If the District or Local Agency does not establish a Work Zone Safety Coordinator the above responsibilities should be delegated to the appropriate personnel.

## **Operational Information**

Operational information shall be used to determine if temporary traffic controls and traffic control schemes are meeting the safety and mobility goals for the project or field operation. This provision requires the use of available data and information to take action in a timely manner to correct potential safety or mobility issues in the field. This information may include:



- Incident Response Time. The time from notification to initial response and the time from notification to all lanes clear to determine if project level goals are being met.
- Delay Time. Total delay during construction or maintenance should be compared to the anticipated total delay estimated for the project. The anticipated total delay, due to construction activities and reduced capacity should be calculated for typical traffic patterns including peak periods.
- Traffic Measures. When Intelligent Work Zone (IWZ) systems are used, the traffic data collected should be compiled and analyzed to determine if project level goals are being met.

### **Work Zone Crash Data Reviews**

Work zone crash data shall be analyzed on a District or Local Agency level. Analysis includes:

- Reviewing all fatal and life-changing crashes. Take into account crashes that occur within a project or on the roadways immediately entering a project.
- Determine if improvements in District or Local Agency temporary traffic control practices are indicated.
- Report deficiencies within current statewide standards or guidelines that should be considered for modification.

## **STATE LEVEL PROCESSES AND PROCEDURES**

This section consists of processes and procedures to implement and sustain work zone safety and mobility policies. These processes and procedures, data and information resources, training, and periodic evaluation enable a systematic approach for addressing and managing the safety and mobility impacts of work zones.

### **Statewide Work Zone Data**

Field observations, available work zone crash data, and operational information to manage work zone impacts for specific projects during implementation shall be used. This data shall be used to continually pursue improvement of work zone safety and mobility by analyzing work zone crash and operational data from multiple projects to improve these processes and procedures. Each road authority should maintain elements of the data and information resources that are necessary to support these activities.

#### **Work Zone Crash Data:**

Statewide analysis is accomplished by reviewing work zone crash records contained in the TIS (Transportation Information System) data base. Annual reporting of these crashes on all road systems shall be conducted by the Office of Traffic, Safety and Operations.

## Statewide Field Reviews

The Office of Construction and Innovative Contracting (OCIC) and the Office of Maintenance and Security (OMS) will conduct regular field reviews of temporary traffic controls in each district. The purpose of these reviews is to:

- Determine adequacy of temporary traffic controls
- Identify areas that need improvement

## Training

Personnel involved in the development, design, implementation, operation, inspection, and enforcement of work zone related transportation management and traffic control shall be trained, appropriate to the job decisions each individual is required to make. Periodic training updates that reflect changing industry practices and State processes and procedures shall be required.

Available training can be found at <http://www.dot.state.mn.us/const/wzs/training.html>

## Process Feed-Back Discussions

To assess the effectiveness of work zone safety and mobility procedures annual process feed-back discussions will be conducted. This discussion may include the evaluation of work zone data at the State level, and/or results of OCIC/OMS field reviews.

Appropriate personnel (stakeholders) who represent the project development stages and the different offices within the State, and the FHWA should participate in these discussions. Other non-State stakeholders may also be included as appropriate. The discussion team members are listed below.

The primary purpose of these discussions is to identify best practices that facilitate improvements in work zone processes, procedures and data and information resources that enhance efforts to address safety and mobility on projects. Through an annual report to the team sponsor, these discovered best practices can then be shared with other stakeholders. The team should also consider making presentations to other groups (SWZSC, TEO, Resident Engineers, Design Engineers, etc.) as appropriate to share this information.

A secondary purpose of these discussions is to discover issues that should be addressed on a statewide basis. Another source that identifies these issues are the reviews conducted by OCIC and OMS during their normal field reviews. All of these observations and concerns discovered during these reviews and discussions will be used to make improvements in the statewide processes, procedures and training programs.

## Discussion Team

The discussion team will consist of the following team sponsor, team leader and team members:

Team Sponsor – Mn/DOT Division Director –	Bob Winter
Team Leader – Work Zone Safety Engineer –	Jon Jackels

Team Members:

- FHWA Safety Engineer – Dave Kopacz
- OCIC Representative – Bill Servatius

- OMS Representative – Ken Nelson
- OTSO Representative – Marv Sohlo

Primary stakeholders include:

- District Engineers
- District Construction
- District Maintenance
- District Planning
- District Design
- District Traffic Engineering
- Local Road Authorities
- Law Enforcement

### Discussion Schedule

It is anticipated these two day visits will be conducted in 2-3 Mn/DOT Districts per year resulting in completing statewide visits every three years. Each District visit will consist of:

- Initial meeting with all Stakeholders
- Individual interviews with Stakeholders
- Identification of Observations
- Closing report to all Stakeholders
- Final written report to District/Road Authority

### **Statewide Group Activities**

There are four statewide groups that are active in work zone traffic control and safety in Minnesota. They are:

- Statewide Work Zone Safety Committee
- Special Provisions Annual Update
- Traffic Engineering Organization Work Zone Safety Committee
- Resident Engineers Work Zone Safety Advisory Committee

They are included in this document to illustrate the level of commitment and ability of Mn/DOT to provide continual improvement in the area of work zone traffic control and safety. These groups are also involved with and responsible for implementing many of the recommendations of field observations and process reviews.

### Statewide Work Zone Safety Committee

The Mn/DOT Statewide Work Zone Safety Committee (SWZSC) includes key Mn/DOT employees and stakeholders external to Mn/DOT and focuses on Work Zone Safety issues. Its purpose is to provide a forum for:

- Identifying Work Zone Safety problems, safety areas, and help set priorities;
- Acting as a sounding board;
- Brainstorming ideas; and
- Recommending direction to the Office of Construction and Innovative Contracting, Office of Maintenance and Security and Office of Traffic, Safety and Operations.

The mission of the SWZSC is to influence the actions of those involved with Work Zones through the information that is shared and through the innovations and best practices that are identified so that we achieve safety Work Zones and fewer fatal and life changing crashes.

### Special Provisions Annual Update

Mn/DOT's Office of Construction and Innovative Contracting conducts an annual workshop to review and improve the Standard Special Provisions for time and traffic and traffic controls used for the development of construction projects. This workshop uses the results of observations detailed in these procedures to make improvements to these standard special provisions. Participants in this workshop include Central Office and District Construction and Traffic Engineering personnel and traffic control industry representatives.

### Traffic Engineering Organization Work Zone Safety Committee

Mn/DOT's Traffic Engineering Organization (TEO) has formed a Work Zone Safety Committee that reviews and approves traffic engineering standards and guidelines related to temporary traffic controls. Members of this committee include representatives from all District Traffic Offices, Resident Engineers group representative, OCIC, OMS, OTSO, and Metro District Maintenance.

### Resident Engineers Work Zone Safety Advisory Committee

Mn/DOT's Resident Engineers has formed a Work Zone Safety Advisory Committee that reviews and approves work zone safety and TTC special provisions and project related issues. Members of this committee include representatives from OCIC, OTSO and the Resident Engineers group.

## **Related Standards, Guidelines and Procedures**

There are many standards, guidelines and procedures that have been established to aid in providing safety and mobility in highway work zones. These include:

- Part 6 of the Minnesota Manual on Uniform Traffic Control Devices (MN MUTCD);
- The Standard Specifications for Construction;
- Time and Traffic sample special provisions;
- Work Zone Mobility Impact Assessment Decision Tree;
- Federal Highway Administration Guidance Documents:
  1. "Implementing the Rule on Work Zone Safety and Mobility" ([pdf](http://www.dot.state.mn.us/trafficeng/otepubl/fhwa/implement-rule.pdf))  
<http://www.dot.state.mn.us/trafficeng/otepubl/fhwa/implement-rule.pdf>
  2. "Work Zone Impacts Assessment: An Approach to Assess and Manage Work Zone Safety and Mobility Impacts of Road Projects" ([pdf](http://www.dot.state.mn.us/trafficeng/otepubl/fhwa/wzi-assessment.pdf))  
<http://www.dot.state.mn.us/trafficeng/otepubl/fhwa/wzi-assessment.pdf>
  3. "Developing and Implementing Transportation Management Plans for Work Zones" ([pdf](http://www.dot.state.mn.us/trafficeng/otepubl/fhwa/trans-mgmt-plans.pdf))  
<http://www.dot.state.mn.us/trafficeng/otepubl/fhwa/trans-mgmt-plans.pdf>
  4. "Work Zone Public Information and Outreach Strategies" ([pdf](http://www.dot.state.mn.us/trafficeng/otepubl/fhwa/public-outreach.pdf))  
<http://www.dot.state.mn.us/trafficeng/otepubl/fhwa/public-outreach.pdf>

# WORK ZONE IMPACT CONSIDERATIONS WORKSHEET

Work Zone Impacts Considerations	Project Design Notes
<b>Project Characteristics</b>	
<ul style="list-style-type: none"> <li>• Project type.</li> <li>• Project size, extent, duration, and complexity.</li> <li>• Roadway classification.</li> <li>• Area type (urban, suburban, rural).</li> </ul>	
<b>Travel and Traffic Characteristics</b>	
<ul style="list-style-type: none"> <li>• Traffic demand and volumes.</li> <li>• Seasonal and temporal variations in demand (hourly, daily, or weekly).</li> <li>• Occurrence of special events.</li> <li>• Percentages of different vehicular volumes (autos – Single-Occupancy Vehicle, High-Occupancy Vehicle; trucks; or buses).</li> <li>• Type of travel (commuter or tourist), freight corridor, transit corridor.</li> <li>• Public and private facility access issues.</li> <li>• Potential impacts of weather.</li> <li>• Other such similar characteristics.</li> </ul>	
<b>Corridor, Network, and Community Issues</b>	
<ul style="list-style-type: none"> <li>• Impacts of the project at both the corridor and network levels including parallel corridors, alternate routes, the transportation network, other modes of transportation, and impacts of other work zones in the vicinity of the project, either at the corridor level or the network level.</li> <li>• Impacts on nearby transportation infrastructure such as key intersections and interchanges, railroad crossings, public transit junctions, and other junctions in the transportation network.</li> <li>• Impacts on evacuation routes in the vicinity of critical transportation or other infrastructure.</li> <li>• Impacts on affected public properties, including parks, recreational facilities, fire stations, police stations, and hospitals.</li> <li>• Impacts of the project on affected private properties, including businesses and residences.</li> </ul>	

## WORK ZONE IMPACT CONSIDERATIONS WORKSHEET

Design, Procurement and Construction Options	
<ul style="list-style-type: none"> <li>• Temporal alternatives for work performance such as season, month, day of week (weekend versus weekday), and time of day (night time versus day, off-peak versus peak).</li> <li>• Alternative lane closure strategies such as full closure, partial closure, crossovers, multiple lane closure, single lane closure, and impact of alternative traffic management strategies on lane-closure decisions.</li> <li>• Alternative design solutions that address the durability and economy of maintenance of the roadway.</li> <li>• Alternative design solutions and strategies that impact decision-making on right-of-way (ROW) acquisition.</li> <li>• Alternative construction staging plans, and construction techniques and methodologies (e.g., accelerated construction techniques) that may have varying types and severity of work zone impacts.</li> <li>• Alternative contracting methodologies such as design-build, A+B bidding, and incentive/disincentive contracting.</li> </ul>	
Work Zone Design and Safety Issues	
<ul style="list-style-type: none"> <li>• Cross-sectional issues such as lane widths, shoulder availability and widths, and number of lanes available for travel.</li> <li>• Longitudinal issues such as taper widths, taper lengths, and stopping sight distance.</li> <li>• Horizontal and vertical sight distance.</li> <li>• Project signing and advance warning.</li> <li>• Roadside devices and safety.</li> <li>• Work area separation, channelization, and protection (e.g., positive separation, barrels, cones, clear zone considerations, construction zone intrusion detection).</li> <li>• Work area and worker delineation (visibility, retroreflectivity, etc.).</li> <li>• Work site access and access points.</li> <li>• Visibility issues (e.g., night-time work, lighting, fog).</li> <li>• Curvature and gradient – vertical and horizontal.</li> <li>• Speed – posted speed limits, speed zoning, etc.</li> <li>• Work zone enforcement (e.g., use of uniformed police officers and/or patrol cars, active enforcement using radar guns and/or automated enforcement).</li> </ul>	

## WORK ZONE IMPACT CONSIDERATIONS WORKSHEET

<p><b>T.T.C. Strategy Considerations</b></p> <ul style="list-style-type: none"> <li>• Traffic safety and capacity requirements.</li> <li>• Alternate route scenarios.</li> <li>• Potential impacts on other corridors, nearby intersections/interchanges, and the larger transportation network.</li> <li>• Lane closure types and strategies (full-closure, lane-width restrictions, cross-overs, positive separation, etc.).</li> <li>• Work zone and work area configurations.</li> <li>• Traffic safety and control checklists for developing a TMP.</li> </ul>	
<p><b>T.O. Strategy Considerations</b></p> <ul style="list-style-type: none"> <li>• Deployment of ITS technologies for work zone traffic monitoring and management.</li> <li>• Provision of real-time traveler information to the public, including web-based information.</li> <li>• Application of transportation systems management (TSM) and corridor management strategies, including mitigation treatments for alternate routes (e.g., traffic signal timing adjustment on affected corridors), and alternate modes (e.g., public transit subsidies, incentives, and special programs).</li> <li>• Coordination of transportation management with existing regional transportation management centers (TMCs).</li> <li>• Conduct of mobility and safety reviews and audits.</li> <li>• Speed enforcement and management in work zones using either police officers or automated techniques.</li> <li>• Traffic incident management plans for work zones.</li> <li>• Policies on work zone traffic management during emergencies (e.g., hurricane evacuations).</li> </ul>	
<p><b>P.I. Strategy Considerations</b></p> <ul style="list-style-type: none"> <li>• Provision of project and work zone information prior to the commencement of the work in order to make the public aware of the expected work zone impacts and the State's actions to mitigate the impacts.</li> <li>• Recommendations to the public on commuter alternatives, such as information on alternate routes and/or modes.</li> <li>• Provision of information on changing conditions on the project during implementation (e.g., changes in lane closure scenarios, construction staging, construction times, or alternate routing).</li> </ul>	

## WORK ZONE IMPACT CONSIDERATIONS WORKSHEET

<ul style="list-style-type: none"><li>• Obtaining public input for the development of appropriate work zone impacts management strategies during the planning and design phases of the project; refinement of work zone management strategies during project implementation; and feedback on performance of the work zone and the project following the completion of the project.</li><li>• Dissemination of information through brochures, pamphlets, and media sources including newspapers, television, radio channels, and web sites.</li><li>• Public meetings and hearings.</li><li>• Coordination and cooperation with affected public and private parties.</li></ul>	
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Work Zone Management Strategies		
I. Temporary Traffic Control (TTC)		
A. Control Strategies	B. Traffic Control Devices	C. Project Coordination, Contracting, and Innovative Construction Strategies
IA1. Construction phasing/staging	IB1. Temporary signs	IC1. Project coordination
IA2. Full roadway closures	<ul style="list-style-type: none"> <li>Warning</li> <li>Regulatory</li> <li>Guide/ information</li> </ul>	<ul style="list-style-type: none"> <li>Coordination with other projects</li> <li>Utilities coordination</li> <li>Right-of-way coordination</li> <li>Coordination with other transportation infrastructure</li> </ul>
IA3. Lane shifts or closures	IB2. Changeable message signs (CMS)	IC2. Contracting strategies
<ul style="list-style-type: none"> <li>Reduced lane widths to maintain number of lanes (constriction)</li> <li>Lane closures to provide worker safety</li> <li>Reduced shoulder width to maintain number of lanes</li> <li>Shoulder closures to provide worker safety</li> <li>Lane shift to shoulder/median to maintain number of lanes</li> </ul>	IB3. Arrow panels	<ul style="list-style-type: none"> <li>Design-build</li> <li>A+B bidding</li> <li>Incentive/disincentive clauses</li> <li>Lane rental</li> </ul>
IA4. One-lane, two-way operation	IB4. Channelizing devices	IC3. Innovative construction techniques (precast members, rapid cure materials)
IA5. Two-way traffic on one side of divided facility (crossover)	IB5. Temporary pavement markings	
IA6. Reversible lanes	IB6. Flaggers and uniformed traffic control officers	
IA7. Ramp closures/relocation	IB7. Temporary traffic signals	
IA8. Freeway-to-freeway interchange closures	IB8. Lighting devices	
IA9. Night work		
IA10. Weekend work		
IA11. Work hour restrictions for peak travel		
IA12. Pedestrian/bicycle access improvements		
IA13. Business access improvements		
IA14. Off-site detours/use of alternate routes		

Work Zone Management Strategies		II. Public Information (PI)	
A. Public Awareness Strategies		B. Motorist Information Strategies	
IIA1. Brochures and mailers		IIB1. Traffic radio	
IIA2. Press releases/media alerts		IIB2. Changeable message signs (CMS)	
IIA3. Paid advertisements		IIB3. Temporary motorist information signs	
IIA4. Public information center		IIB4. Dynamic speed message sign	
IIA5. Telephone hotline		IIB5. Highway advisory radio (HAR)	
IIA6. Planned lane closure web site		IIB6. Extinguishable signs	
IIA7. Project web site		IIB7. Highway information network (web-based)	
IIA8. Public meetings/hearings		IIB8. 511 traveler information systems (wireless, handhelds)	
IIA9. Community task forces		IIB9. Freight travel information	
IIA10. Coordination with media/schools/businesses/ emergency services		IIB10. Transportation management center (TMC)	
IIA11. Work zone education and safety campaigns			
IIA12. Work zone safety highway signs			
IIA13. Rideshare promotions			
IIA14. Visual information (videos, slides, presentations) for meetings and web			

REFER TO FHWA DOCUMENT TITLED: *“Developing and Implementing Transportation Management Plans for Work Zones”* ([pdf](#)) Chapter 4 for an explanation of each of the strategies.

**Work Zone Management Strategies**

**III. Transportation Operations (TO)**

<b>A. Demand Management Strategies</b>	<b>B. Corridor/Network Management Strategies</b>	<b>C. Work Zone Safety Management Strategies</b>	<b>D. Traffic/Incident Management and Enforcement Strategies</b>
IIIA1. Transit service improvements	IIIB1. Signal timing/coordination improvements	IIIC1. Speed limit reduction/variable speed limits	IIID1. ITS for traffic monitoring/management
IIIA2. Transit incentives	IIIB2. Temporary traffic signals	IIIC2. Temporary traffic signals	IIID2. Transportation management center (TMC)
IIIA3. Shuttle services	IIIB3. Street/intersection improvements	IIIC3. Temporary traffic barrier	IIID3. Surveillance [Closed-Circuit Television (CCTV), loop detectors, lasers, probe vehicles]
IIIA4. Ridesharing/carpooling incentives	IIIB4. Bus turnouts	IIIC4. Movable traffic barrier systems	IIID4. Helicopter for aerial surveillance
IIIA5. Park-and-ride promotion	IIIB5. Turn restrictions	IIIC5. Crash-cushions	IIID5. Traffic screens
IIIA6. High-occupancy vehicle (HOV) lanes	IIIB6. Parking restrictions	IIIC6. Temporary rumble strips	IIID6. Call boxes
IIIA7. Toll/congestion pricing	IIIB7. Truck/heavy vehicle restrictions	IIIC7. Intrusion alarms	IIID7. Mile-post markers
IIIA8. Ramp metering	IIIB8. Separate truck lanes	IIIC8. Warning lights	IIID8. Tow/freeway service patrol
IIIA9. Parking supply management	IIIB9. Reversible lanes	IIIC9. Automated Flagger Assistance Devices (AFADs)	IIID9. Total station units
IIIA10. Variable work hours	IIIB10. Dynamic lane closure system	IIIC10. Project task force/committee	IIID10. Photogrammetry
IIIA11. Telecommuting	IIIB11. Ramp metering	IIIC11. Construction safety supervisors/inspectors	IIID11. Coordination with media
	IIIB12. Temporary suspension of ramp metering	IIIC12. Road safety audits	IIID12. Local detour routes
	IIIB13. Ramp closures	IIIC13. TMP monitor/inspection team	IIID13. Contract support for incident management
	IIIB14. Railroad crossings controls	IIIC14. Team meetings	IIID14. Incident/emergency management coordinator
	IIIB15. Coordination with adjacent construction site(s)	IIIC15. Project on-site safety training	IIID15. Incident/emergency response plan
		IIIC16. Safety awards/incentives	IIID16. Dedicated (paid) police enforcement
		IIIC17. Windshield surveys	IIID17. Cooperative police enforcement
			IIID18. Automated enforcement
			IIID19. Increased penalties for work zone violations