

## **Work Zone Safety and Mobility Plan**

The intent of the Work Zone Safety and Mobility Plan is to implement a method for the systematic consideration and management of work zone impacts on all Federal-aid highway projects as required by 23 CFR Part 630 Subpart J. This plan addresses work zone impacts throughout the various stages of the project development and implementation process through the creation of a Transportation Management Plan (TMP). The plan may be utilized for non-Federal-aid projects as well.

### **Definitions**

#### **Transportation Management Plan (TMP):**

A TMP lays out a set of coordinated transportation management strategies and describes how they will be used to manage the work zone impacts of a road project. Transportation management strategies for work zones include temporary traffic control measures and devices; public information and outreach; and operational strategies such as travel demand management, signal retiming, and traffic incident management.

#### **Significant Project:**

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 engineering judgment. Projects that occupy a location for more than three days and are either Interstate system projects with intermittent or continuous lane closures or projects within the boundaries of a designated Transportation Management Area (TMA), will be considered significant projects.

#### **Transportation Management Area (TMA):**

The Federal Transit Administration (FTA) and the Federal Highway Administration (FHWA) announced in the Federal Register in 2002 that all urbanized areas with populations greater than 200,000 as determined by the 2000 Census were designated as Transportation Management Areas (TMAs). South Dakota did not have any urbanized areas meeting this population threshold and thus have no cities formally listed as TMAs in the Federal Register. For the purposes of determining significant projects in the development of TMPs, the SDDOT recognizes the urbanized areas of Sioux Falls, Rapid City, Aberdeen, Watertown, and Brookings as Transportation Management Areas.

#### **Mobility:**

For work zones, mobility pertains to moving road users efficiently through or around a work zone area with a minimum delay compared to baseline travel when no work zone is present, while not compromising the safety of highway workers or road users. The commonly used performance measures for the assessment of mobility include delay, speed, travel time, and queue lengths.

#### **Safety:**

For work zones, safety refers to minimizing potential hazards to travelers and highway workers in the vicinity of a work zone.

## **Development of a TMP**

Development of a TMP begins during the planning phases and progresses through the design of a project. As the TMP evolves, it is important to reassess the management strategies to confirm that the work zone impacts are addressed and the necessary funding is available. The TMP may be re-evaluated and revised prior to and during implementation and monitoring. Both project level and program level assessments of the TMP are recommended to evaluate the effectiveness of the management strategies and improve TMP development procedures.

Early TMP development can help with scheduling and coordinating projects to minimize the cumulative work zone impacts of multiple projects along a corridor or in a region. This includes examining the adequacy of detour routes or alternate routes and coordinating with the agencies responsible for those routes. Another strategy available in the early stages of project development is to consider work zone impacts in the evaluation and selection of design alternatives. For some projects, it may be possible to choose a design alternative that alleviates many work zone impacts.

The Senior Region Design Engineer, their designee, or the Consultant will be responsible for creating the TMP.

TMP development is intended to work in an iterative manner where the level of detail progressively increases from planning through preliminary engineering through design, as more project specific information becomes available.

The planning, scoping, and design personnel should work with traffic engineering and operations personnel and other relevant technical specialists (right-of-way, materials and surfacing, environmental, etc.) to obtain the project information and help identify potential issues or concerns. This collaboration can help in developing the best combination of design, construction phasing/sequencing, and work zone management strategies.

For TMPs on significant projects, a TMP team should be created and include the key stakeholders, both internal and external. The TMP team will vary depending on the project characteristics but may include SDDOT staff from planning, design, safety, construction, operations, maintenance, public information, transit, materials and surfacing, bridge, and other technical specialists. External stakeholders may include FHWA, public transportation providers, contractors, railroad agencies, enforcement agencies, utility providers, emergency services, local government, businesses, community groups, and schools. The TMP team is used to help the agency identify and consider a broader range of concerns in deciding what to include in the TMP.

The components of a TMP for a project are based on the expected work zone impacts of a project and whether the project is determined to be significant. Identification of significant projects should be determined as early as possible in the project planning and design process.

In addition to the definition given above, the following project characteristics should be examined in the determination of a significant project:

- Type of project (new construction, major reconstruction, major rehabilitation, or bridge/pavement replacement)
- Roadway ADT and the potential for backups in the work zone
- Impacts on safety and mobility
- Impacts to local businesses, communities, and pedestrian and bicycle traffic
- Impacts from or on special events (Sturgis rally, life light, etc.)
- Duration of construction and whether seasonal variations could affect the work zone (more than one construction season, for example)
- Whether considerable detour and alternate routing will be necessary or are available (including overwidth detours and overweight restrictions)

The three components of a TMP are:

1. Temporary Traffic Control
2. Transportation Operations
3. Public Information

Major TMPs are intended for significant projects and will consist of all three components. Basic TMPs, consisting solely of a Temporary Traffic Control plan, are typically applied on construction or maintenance projects with minimal disruption to the traveling public, adjacent businesses, and the community. Intermediate TMPs can be used for construction or maintenance projects that are anticipated to have more than minimal disruption, but have not been identified as significant projects. Intermediate TMPs could include more detailed work zone impact analysis and management strategy information than basic TMPs, including some elements of the Transportation Operations and Public Information components.

### 1. Temporary Traffic Control (TTC)

The TTC plan addresses traffic safety and control through the work zone. A TTC plan must be consistent with the provisions in Part 6 of the Manual on Uniform Traffic Control Devices (MUTCD) and with the work zone hardware recommendations in Chapter 9 of the American Association of State Highway and Transportation Officials (AASHTO) Roadside Design Guide. The TTC plan may be incorporated in the TMP by reference, such as reference to elements in the MUTCD or SDDOT standards, manuals, and policies. TTC plans may also be specifically developed for individual projects.

As part of the TTC plan, construction phasing and sequencing needs to be examined. Along with the planning, design, and construction elements to consider, the following should also be taken in to account:

- Coordination with other projects
- Coordination with other DOT Area Offices
- Utilities coordination
- Right-of-way coordination
- Innovative construction techniques

TTC strategies to consider include:

- Full roadway closures
- Lane shifts or closures
  - Per SDDOT policy, the maximum length of a lane closure on an Interstate highway or multilane highway with a posted speed limit greater than 45 mph is 5 miles. Lane closures up to 10 miles in length may be allowed for one day or less for construction work with very high production rates (i.e., shoulder chip seals); however, an exception must be granted by either the Director of Operations or the Construction and Maintenance Engineer to allow a lane closure greater than 5 miles in length.
  - This same policy specifies a minimum length of 3 miles between lane closures on these facilities, excluding tapers.
- Reduced lane widths to maintain a number of lanes
- Reduced shoulder widths to maintain number of lanes
- Shoulder closures to provide worker safety
- One-lane, two-way operation
  - Flaggers
    - Limit operations to a maximum delay of 15 minutes for vehicles at a flagger station. Certain locations or situations may require a maximum delay of less than 15 minutes.
  - Stop control
  - Portable temporary traffic signals
- Two-way traffic operation
  - Per SDDOT policy, the 5-mile maximum lane closure does not apply to work zones with two-way traffic operation.
- Ramp closures/relocation
- Work hour restrictions for peak travel times
- Off-site detours or use of alternative routes

Traffic control devices to be considered for inclusion in the TTC plan are:

- Temporary signs
  - Regulatory
    - Work zone speed limits
    - Parking restrictions
  - Warning
  - Guide/information
    - Detour route
    - Pedestrian access route
    - Temporary business access
- Temporary pavement markings
- Channelizing devices – vehicle and pedestrian
- Barricades
- Arrow boards
- Portable changeable message signs
- Radar speed feedback signs
- Advance queue detection systems
- Positive protection devices

## 2. Transportation Operations (TO)

The TO component addresses sustained operations and management of the work zone impact area. This may include a work zone traffic analysis. The need for traffic analysis within the TMP should be determined on a case-by-case basis.

A qualitative and/or quantitative assessment of business and community impacts could be incorporated into the TO component. This may include, but is not limited to, an assessment of impacts to resident and business access, pedestrian and bicyclist access, emergency services, and school bus and other transit operations.

The TO component may include demand management strategies, corridor/network management strategies, work zone safety management strategies, and traffic/incident management and enforcement strategies.

Demand management strategies may include:

- Shuttle services
- Work hour restrictions for peak travel times
- Night work

Corridor/network management strategies may include:

- Signal timing/coordination improvements
- Temporary traffic signals
- Turn restrictions
- Parking restrictions
- Truck/heavy vehicle restrictions
- Ramp closures
- Coordination with adjacent construction sites

Work zone safety management strategies may include:

- Work zone speed limits
- Temporary traffic barrier
- Crash cushions/attenuators
- Temporary portable rumble strips
- Automated flagger assistance devices
- TMP monitoring/project meetings

Traffic/incident management strategies may include:

- Contingency plans specifying activities that should be undertaken to minimize traffic impacts when unexpected events occur in the work zone, such as crashes, unexpected traffic demand, and inclement weather
- ITS for traffic monitoring/management
- Coordination with law enforcement and local agencies

Enforcement strategies may include:

- DOT Cop enforcement\*

\*Separate guidance in Chapter 15 – Work Zone Traffic Control of the SDDOT Construction Manual gives details on the use of DOT Cop enforcement and alternate strategies to consider.

### 3. Public Information (PI)

The PI component addresses communication with the public and concerned stakeholders. The SDDOT should coordinate with appropriate stakeholders in developing a TMP. The PI component may include public awareness strategies and motorist awareness strategies.

Most projects should incorporate some form of public information and outreach. For shorter projects causing minor traffic disruptions, this may be limited to a construction event on the 511 traveler information system. For longer, more disruptive work, more elaborate strategies may be warranted.

Public awareness strategies may include:

- Brochures and mailers
- Press releases and media alerts
- Public information center or postings along the project
- Radio ads, broadcasts, or interviews
- Telephone hotline
- Email or text message alerts
- Project web site
- Public meetings/hearings
- Community task forces
- Coordination with media/schools/businesses/emergency services
- Work zone education and safety campaigns

Motorist information strategies may include:

- Traffic radio
- Portable changeable message signs
- Radar speed feedback signs
- Highway advisory radio
- 511 traveler information systems
- Freight travel information (route restrictions)

Specific information is generally more useful to travelers. For example, “average delay is 10 minutes through the work zone” is preferable to “expect delays.” However, this requires travel time data and information that might not be available. When possible, try to include information on the number of lane closures, the duration of the closures, and estimated delay. At a minimum, the dates and times of work zone activity, and the routes, lanes, or ramps affected should be included. If these details are

changing, it is important to provide the most current information. Incorrect and out-of-date information compromise the effectiveness of a public information and outreach campaign.

### **TMP Deliverables**

The provisions for a TMP will be included in the project's plans, specifications, and estimates (PS&Es). The PS&Es will contain all the applicable elements of the TMP. The Senior Region Design Engineer or their designee will submit all TMP deliverables to the Designer or Consultant Management Engineer for insertion in the project plans.

For the TMP, work zone impact management strategies should be identified for both the mainline and detour routes for the selected construction phasing/sequencing. Where appropriate, the management strategies should be documented on plan sheets. This can be accomplished via plan notes, sequence of operations and phasing information, bid items, tables, special details, standard plates, and/or temporary traffic control layouts.

The TMP may require the Special Provision for Traffic Control Supervisor, which will be noted on the Special Provision checklist.

### **Evaluation**

Following construction completion, it is a good idea, particularly for significant projects, to hold a brief meeting to discuss and/or prepare a short report that contains an evaluation of the TMP. The post-project evaluation may include successes and failures, changes made to the TMP and results of those changes, any feedback received from the public, actual measurement of conditions versus what was predicted, cost for implementation of the strategies, and suggested improvements. Other information that would be useful for a TMP evaluation include the average delay time encountered; times and days of peak traffic, delay, or congestion; and any crashes that occurred. If elements such as radar speed feedback signs or advanced queue detection systems are used, then the data collected by such elements and their perceived effectiveness should also be included. The TMP team along with the Project Engineer and other field staff should participate in the evaluation.

The following TMP Evaluation form should be used to guide the discussion for the TMP evaluation. This form should be submitted to the Operations Traffic Engineer by the Project Engineer following project completion. Additional items or documents to go along with form may be submitted as well. Any items for improvement should be considered in future TMP development.

# TMP Evaluation

**Project/PCN:** \_\_\_\_\_

**Date of Evaluation:** \_\_\_\_\_

**Highway:** \_\_\_\_\_

**List People involved in the Evaluation:**

**Location:** \_\_\_\_\_

**Work:** \_\_\_\_\_

\_\_\_\_\_

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Was the TMP considered successful on this project?    Yes    No

Were any significant changes made to the plan TMP?    Yes    No

If yes, describe the significant changes briefly in the box below.

Indicate the Work Zone ITS Elements used and whether you thought they were effective at increasing safety for the workers and/or traffic during the project:

Radar Speed Feedback Signs    Effective    Not Effective    Comments: \_\_\_\_\_

Queue Warning Systems    Effective    Not Effective    Comments: \_\_\_\_\_

Portable Rumble Strips    Effective    Not Effective    Comments: \_\_\_\_\_

Other: \_\_\_\_\_    Effective    Not Effective    Comments: \_\_\_\_\_

Were work zone speed reductions used on the project?    Yes    No

If yes, give speed limit(s) & duration:    \_\_\_ MPH    24/7    Workers Present

\_\_\_ MPH    24/7    Workers Present



Were DOT Cop hours used on the project?    Yes    No

Was the Special Provision for Traffic Control Supervisor used on the project?    Yes    No

If yes, did the provision meet expectations?    Yes    No    Why or Why Not?

Indicate the type(s) of Public Information strategies used on the project to inform either the public or motorists of upcoming activities or impacts due to constructions?

Special Provision for Public Information Specialist    Effective    Not Effective    Comments: \_\_\_\_\_

Press Releases    Effective    Not Effective    Comments: \_\_\_\_\_

Other: \_\_\_\_\_    Effective    Not Effective    Comments: \_\_\_\_\_

Circle the pedestrian accommodations used on the project:

Longitudinal Pedestrian Barricade    Pedestrian Detours    Temporary Sidewalk

Longitudinal Pedestrian Barrier    Temporary Curb Ramps    Other: \_\_\_\_\_

Are there any changes that could be made in the plans for implementing temporary pedestrian access routes on construction? Were there any issues with the products used?

Please list any improvements that could be made for the Temporary Traffic Control and Transportation Operations components of the TMP. These include anything from the construction phasing/sequencing, coordination, lane closures, detours, devices, work hour restrictions, temporary signal timings, safety and incident management strategies, etc.