



Safe and Effective Work Zone Inspections

2013



American Traffic Safety
Services Association



U.S. Department of Transportation
Federal Highway Administration

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ABBREVIATIONS USED IN THESE GUIDELINES

ADA	Americans with Disabilities Act
ADAAG	ADA Accessibility Guidelines
AFAD	Automated Flagging Assistance Device
ATSSA	American Traffic Safety Services Association
CMS	Changeable Message Sign
DOT	Department of Transportation (or other State road authority designation)
MUTCD	Manual on Uniform Traffic Control Devices
ITS	Intelligent Transportation Systems
PROWAG	Public Rights-of-Way Accessibility Guide
PPE	Personal Protective Equipment
TMA	Truck Mounted Attenuator
TMP	Transportation Management Plan
TTC	Temporary Traffic Control
TTCP	Temporary Traffic Control Plan
TTCD	Temporary Traffic Control Device
WZRSA	Work Zone Road Safety Audit

1. INTRODUCTION

A work zone inspection program provides a framework and resources for agency- and project- level assessments of construction and maintenance zone temporary traffic control planning, design, and deployment. Effective work zone inspection programs can improve safety, increase mobility, and reduce agency risk.

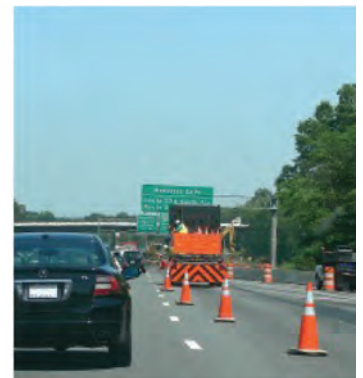
This document examines program elements, operational improvements, and the value of documentation behind the development of a comprehensive work zone traffic control inspection program. It may be used as a gauge of completeness for agencies with programs in place or as a roadmap for establishing a program if one does not presently exist.

The guidance is designed for State and local DOT leadership, engineers, policymakers, lead district engineers, and all staff charged with developing/maintaining the overall temporary traffic control inspection program as well as those tasked with regular inspections at the project level. Utility and contractor employees involved or interested in improving worker and motorist safety through proper work zone traffic control inspection may also benefit from this guidance, gaining a better understanding of the types of inspections that can take place.

The model work zone inspection program is driven by well-connected agency-level and project-level programmatic policies and consistent monitoring of the performance of these policies. Agency-level effectiveness of current policies is reflected in the outcomes of periodic work zone programmatic and project reviews, such as regional or statewide project inspections or program-wide assessments. Adjustments are made to the agency-wide work zone program impacting both strategic and tactical aspects based on this regular performance monitoring and evaluation.

These guidelines cover the following topics:

- The importance of a work zone inspection program
- Building a comprehensive work zone inspection program
- Risk management and documentation
- State forms, resources, and example reports



2. BACKGROUND AND OVERVIEW

2.1 Magnitude of the Problem Nationwide

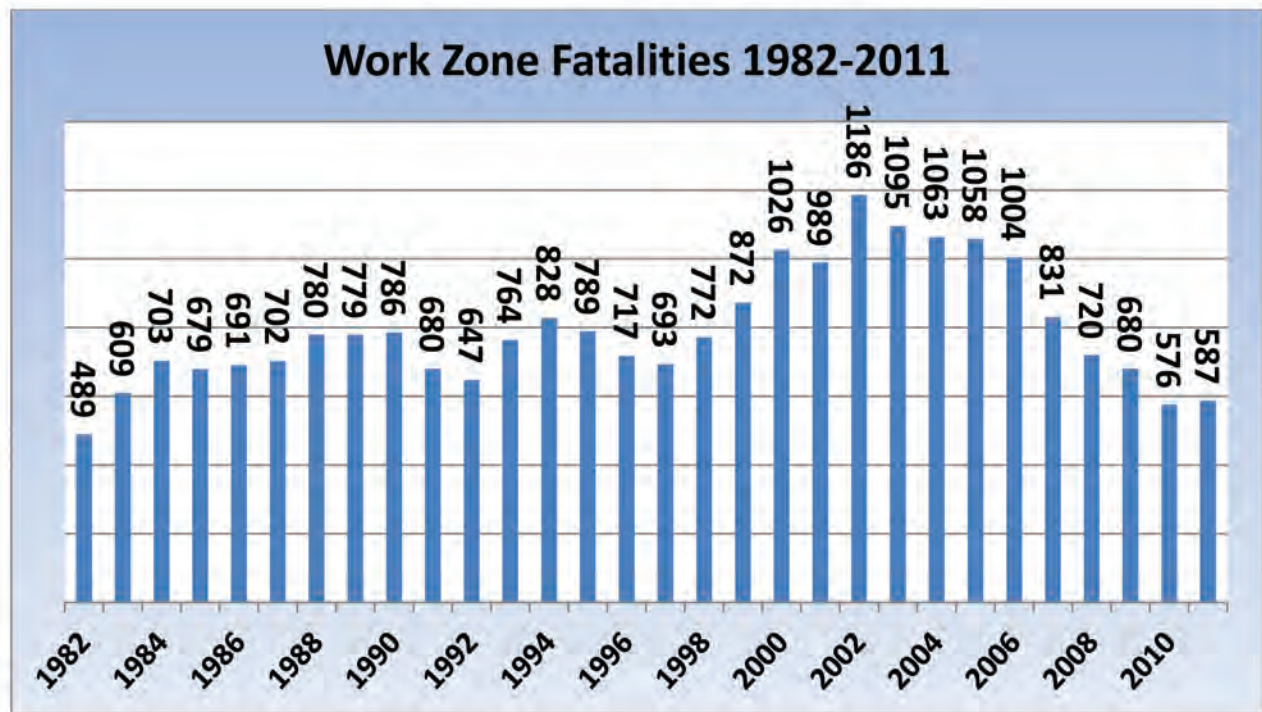


Figure 1 – Work Zone Fatalities, 1982-2011
Source: Fatality Analysis and Reporting System (FARS)



The graph above shows the dramatic escalation of work zone fatalities as maintenance and reconstruction of the Nation's roadway infrastructure began to ramp up in the early 1980s, and the dramatic reductions in fatalities as States began to implement the Final Work Zone Safety and Mobility Rule (23 CFR 630 Subparts J and K - http://ops.fhwa.dot.gov/wz/resources/final_rule.htm), published in 2004 and effective no later than October 12, 2007.

2.2 The Importance of a Work Zone Inspection Program

Newer, safer construction techniques as well as better, more comprehensive transportation management plans (TMP) and improved temporary traffic control devices (TTCD) have helped reduce the impacts of increased and more hazardous construction activity. Public information campaigns such as, "Give 'Em A Brake" and others increased driver awareness of potential hazards in work zones. Work zone inspection programs are adding safety benefits for both drivers and workers. Inspections provide feedback to agencies about the quality of their traffic control and work zone management practices and policies.

With these operational improvements and declining work zone fatalities as a backdrop, continued effort is necessary to secure these gains by institutionalizing noteworthy practices in work zone policies in general and work zone inspection strategies in particular.

Problems and ineffectiveness arise when an agency fails to monitor its work zones properly or applies guiding policies inconsistently. Policies, standards, procedures, processes and compliance with State and Federal regulations at the agency level should guide the day-to-day operations of all transportation agencies. This is true for all aspects of the organization, including the quality assurance function that governs project inspection activities.

The value of an agency-wide work zone inspection program is derived primarily from four benefit areas:

- **Improving safety for the worker and traveling public.** Proper inspection of the temporary traffic control and the transportation management plans helps assure a safer workplace and a safer trip through the work zone.
- **Maximizing mobility in the work zone.** Part of the mission of the transportation agency is moving people and goods efficiently and safely through their system. Monitoring traffic movement and adhering to the TMP helps accomplish that mission and improves the quality of the work zone trip for drivers and passengers.
- **Ensuring compliance with applicable plans, policies, and standards.** The purpose here is to affirm that the agency plans, policies, and standards are implemented in the field.
- **Reducing agency risk.** Proper implementation of TTC and TMP reduces agency risk.

The following sections outline the importance of instituting noteworthy practices and how to develop an effective work zone inspection program.

3. BUILDING A COMPREHENSIVE, SAFE AND EFFECTIVE WORK ZONE INSPECTION PROGRAM

An effective work zone inspection program involves two basic levels of inspection and reviews – agency level and project level. Agency-level review/inspection activities deal mainly with process-related elements over longer periods of time and involve review and response to policies and processes. Project-level activities involve a more ‘real-time’ look at conditions specifically within the project. Figure 2 below illustrates overall framework of an effective work zone inspection program, with the various components of an agency’s comprehensive inspection program divided into agency and project levels. Both levels of inspection result in outcomes that need to be evaluated and fed back into the respective processes.



Figure 2 – Schematic of Agency and Project Level Inspection Activities

3.1 Agency-Level Work Zone Inspection Program

In order to develop an effective program the agency should develop guiding principles, procedures, and resources that form the basis upon which the program operates. Once established these guiding principles are updated through broad process reviews and self-assessments performed at a regular basis. Imbedded within the program framework are agency level inspections that assess the application of program components and the overall results using available safety data.

3.1.1 Program Development

To be effective a program must have resources in place that provide a guiding framework for operation of the program overall. These resources include the following in some form:

- **Supportive Agency Policies** – Policies that direct and support development and operation of an inspection program at the agency level.
- **Program charter** – Identifies program goals, structure, roles, and resources. Codifies the inspection program within the organization.
- **Comprehensive Training Program** – Provides ongoing training resources and coordination for inspectors and engineers that are responsible for implementing components of the training program.
- **Program Information Database** – A platform for storing both agency and project level inspection results.
- **Feedback Mechanism** – Process by which inspectors, engineers, and others with roles in the program are able to provide feedback to improve the agency program and inspection processes overall.

3.1.1.1 Supportive Agency Policies

A comprehensive work zone inspection program cannot be effective without broad agency support and guidance in the form of policies, procedures, and specifications that manage work zone impacts and hold the agency to high standards of safety. At the very least, regular inspections at both the agency and project levels should be required in policy. A state example of higher level inspection elements from the Maryland State Highway Administration (MDSHA) follows:

Noteworthy State Practice

The MDSHA has an inspection oversight responsibility within its Office of Traffic and Safety with the following operating elements:

- Evaluating work zone safety by tracking the number of fatalities and injuries in work zones annually and presenting these findings in an annual report;
- Tracking the number of work zone inspections performed quarterly;
- Maintaining a database of work zone inspection results and summarizing this information in an annual report;
- Continually pursuing improvement of work zone safety and mobility processes and procedures;
- Providing training, as needed, to ensure all MDSHA personnel (designers, inspectors, flaggers, traffic managers, law enforcement officers, etc.) are knowledgeable to the appropriate level for the job decisions each individual is required to make;
- Updating training periodically to reflect changing industry practices and MDSHA processes and procedures; and
- Providing support and guidance for major projects, as requested.

In addition, the MDSHA uses an inspection form, checklist, and performance evaluation system specifically to grade a work zone based on the conditions found and whether corrective actions are taken or not. This system allows the inspector to be very precise about conditions found in the work zone while giving an at-a-glance sense of the overall state of project traffic control implementation and effectiveness. The full document may be found at <http://www.roads.maryland.gov/OOTS/14AppETTCInspectionFormmastercopyRev2.pdf>.

As an example, an excerpt from the page with comments leading to a "B" grade follows:

The Inspector has rated the work zone as a "B" based on actual traffic control meeting the following criteria:

- Traffic control devices are installed and maintained in accordance with the approved and applicable Traffic Control Plan, MDSHA Standards and Specifications, and/or Permits with the exception of the need for corrections as noted on the Temporary Traffic Control Inspection/Rating Report.
- Positive guidance is provided with the exception of the need for corrections as noted on the Temporary Traffic Control Inspection/Rating Report.
- Monitoring and maintenance of Traffic Control Devices is performed at regular intervals, appropriate to the location and type of work zone setup.
- Lane closures are installed at the prescribed times, are performed safely and efficiently, and create a minimum amount of disruption to traffic flow, by assuring that the number and duration of lane closures is only as needed.
- Etc.

MDSHA has included a performance measure related to work zone inspections in its Safety Business Plan.

Objective:

Reduce the annual number of traffic fatalities in temporary traffic control (TTC) zones from 7 in 2008 to 5 or fewer (29 percent reduction) by December 31, 2015, and reduce the annual number of persons injured in TTC zones from 1,067 in 2008 to fewer than 850 (20 percent reduction) by December 31, 2015.

Strategy:

Develop and implement a program to increase the percentage of work zones achieving a grade B or higher.

3.1.1.2 Program Charter

A “Charter” is a guiding document – a grounded reference point for the development and maintenance of the entire work zone inspection program. Elements of a charter might include identification of program goals, structure within the organization, specific roles of various players involved throughout the agency, and resources which are available to accomplish the goals. It may also contain a short and long-range plan for continual updating of the charter. Essentially, it codifies the inspection program within the organization.

3.1.1.3 A Comprehensive Training Program

There is a critical need for a training program that prepares agency staff for proper work zone design, management, and inspection and that also assures competency of contractor staff in carrying out duties required for implementing and maintaining the agency’s project specifications and traffic control plans.

Knowledge is the key for competent action and prudent decision making. Agencies must add a level of competency to the foundation of policy to help ensure an effective work zone management and inspection program.

Competency must be developed in several key areas in support of effective work zone traffic control plan development and project inspection. Key sources for these training topics can be found on the FHWA Training Compendium page (http://ops.fhwa.dot.gov/wz/outreach/wz_training/index.htm), NHI Training home page (<http://www.nhi.fhwa.dot.gov/default.aspx>), and the WZ Clearinghouse (http://www.workzonesafety.org/fhwa_wz_grant). The OSHA (Occupational Safety and Health Administration) has a document specifically addressing OSHA requirements for work zone inspection at https://www.osha.gov/OshDoc/Directive_pdf/CPL_02-01-054.pdf and general OSHA training information is available at <http://www.osha.gov/dte/oti/index.html>. Each has several inspection related courses listed. Some examples of training offerings include:

- “Inspection of Work Zones,” FHWA Training Compendium
- “Construction Zone Safety Inspection,” NHI 133114
- “Traffic Control Supervisor” and “Traffic Control Design Specialist,” ATSSA

Following is a listing of training elements to be considered for staff with responsibility for inspection of work zones at the project level. The agency will then decide if exposure to the material is sufficient, or if competency must be shown in any or all of the course topics.

- The MUTCD and any applicable state supplement;
- TMP and state-approved TCDs;
- TCD crash worthiness requirements;
- Corrective action process;
- Documentation requirements:
 - Responsibilities for agency and contractor;
 - Reporting forms, frequency of inspection; and
 - Deficiency notification/mitigation.
- The Americans with Disabilities Act (ADA), ADA Accessibility Guidelines (ADAAG) and the Public Rights-of-Way Accessibility Guidelines (PROWAG) as they may relate to the project;
- Agency and contractor staff critical points of contact;
- Interpretation of TCPs;
- Agency standard specifications;
- Project plans, specifications and special provisions;
- Transportation Management Plans (TMPs);
- Agency report forms, requirements and procedures;
- The concept of WZRSAs, whether one is in place for the project and who is responsible for it; and



- A trained project inspection staff competent in:
 - Use of agency's temporary Traffic Control policies/standards/specifications
 - TTCD condition quality assessment;
 - Communication skills in order to enforce agency and project policies, standards and specifications; and
 - Inspection program details, including necessary documentation, and use of inspection forms.

Noteworthy State Practice:

The Oregon DOT implemented a policy that requires inspectors that have oversight of Traffic Control Supervisor (TCS) activities to be trained themselves as a TCS.

In addition to training, Statewide Inspector Meetings should be held on a quarterly basis to keep inspectors well-coordinated and up-to-date with new policies, products, and specifications as well as providing a forum to discuss inspection program elements. Inspection findings are also analyzed to determine emphasis areas. The agency also needs to ensure that themes and trends discussed in these meetings are appropriately folded into agency work zone inspection policy adjustments.

The outcome of such meetings should be a scheduled report which informs policy and process adjustments at both the agency and project levels on a regular basis, perhaps annually.

Some questions that may be explored at these meetings:

- Are the same device quality assessment standards being used from project to project?
- Is there consistency in the inspection forms and documentation used?
- Do the daily (or regularly scheduled) reports get reviewed and used in the same manner?
- Are inspection practices and policies consistent throughout the organization?

The outcome of these meetings should inform adjustments to statewide policy where appropriate.

3.1.1.4 Program Information Database

Measurement of program effectiveness requires collection and analysis of specific data elements. Organization of and ease of access to the data base for evaluation of results is critical. The agency level inspections and reviews listed in Table 1 comprise the foundation of data elements a program should capture and analyze over time. As listed in column three of the table, frequencies of inspection functions may vary, but the outcomes of the inspection or review should be logged and evaluated in relation to the program goals.

3.1.1.5 Feedback Mechanism

Broader work zone safety reviews and other performance review sources may uncover issues that need to be addressed relating to work zone inspection policies, procedures, and specifications. Periodic analysis of the effectiveness and performance of current program elements allows the agency to identify weak points and strengths.

The agency level review/inspection activities mentioned below should each have a report generated. It is likely that these reviews of current practice, efficiencies and effectiveness will contain threads that, when examined closely, will suggest changes to policy or procedure. For example, a process review may reveal that certain procedures are not being followed per policy. The work zone self-assessment may have discovered a similar lack. The discussions among the inspectors may have identified a particular procedure as overly prescriptive, lacking detail, or completely out of touch with current practice. Seeing these types of threads requires a holistic view of the agency level work zone reviews. Identifying these common themes across multiple reviews and feeding a response back through the policy and procedure development process brings value to the overall review process.



3.2 Agency-Level Reviews/Inspections

Agency-level reviews provide a continuum of information on performance of work zone inspection-related policy. Agency level inspections drive compliance and as needed, changes to the project level inspection processes and procedures. Table 1 below shows agency level work zone inspection activities.

INSPECTION-RELATED ACTIVITY	FREQUENCY	PROGRAM COMPONENTS INSPECTED
Work Zone Process Review	Biennial	Work zone policies and procedures and work zone impacts to help assess program and or policy effectiveness.
Work Zone Self-Assessment	Annual	Work zone programs, policies, and procedures
Statewide Work Zone Crash Data Trend Analysis	Annual	Analyzed trends in WZ fatalities and serious injuries
Statewide/Regional Work Zone Review	Annual or semi-annual	Project Transportation Management Plans. Statewide project deficiencies in WZ TMP identified.

Table 1 – Agency-Level Review/Inspection Activities

Work Zone Process Review

“The Work Zone Safety and Mobility Rule” requires states to perform a process review at least every two years. The purpose is to enhance safety and mobility on current and future projects. The Process review and toolbox guides an agency through an assessment of the functionality and effectiveness of a program, practices, and procedures used to manage or inspect work zones. Process reviews can assess whether operational processes, within a work zone inspection program, are consistent with established standards and expectations, performing effectively and efficiently, and if the practices are adequately captured and applied within the program, or across other programs at an agency. Process reviews allow flexibility in terms of who should participate and whether agency-level and/or project-level data are reviewed concurrently. Below are two examples of State level Work Zone Process Reviews. The outcome should be a continuous improvement in the safety and mobility aspects of each work zone. See more information on Work Zone Process Reviews at the FHWA website: http://www.ops.fhwa.dot.gov/wz/prtoolbox/pr_toolbox.htm.

Noteworthy State Practice

The Minnesota DOT specified feedback in their work zone policy to better evaluate and understand work zone data and the results of field reviews.

To assess the effectiveness of work zone safety and mobility procedures annual process feedback discussions will be conducted. This discussion may include the evaluation of work zone data at the State level, and/or results of 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 as appropriate to share this information.

A secondary purpose of these discussions is to discover issues that should be addressed on a statewide basis. Other sources that identify 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.

Noteworthy State Practice

The Montana DOT (MDT) developed Process Review Guidelines as part of its Work Zone Safety and Mobility Guidelines. Information about MDT's process review guidelines can be found in Appendix B of MDT Work Zone Safety and Mobility: Goals and Objectives, Procedures, Guidelines (http://www.cf.fhwa.dot.gov/exit.cfm?link=http://www.mdt.mt.gov/other/const/external/manuals_guidelines/workzone_safety_mobility.pdf) (PDF 537KB).

Under its Process Review Guidelines, MDT conducts periodic evaluation of construction zone policies, processes, procedures, and construction zone impacts to aid in the process of addressing and managing the safety and mobility impacts of construction zones. Some reviews may be limited to specific procedures (e.g., review payment methods for traffic control devices), while other reviews will be broader in scope (e.g., review overall performance measures of the construction zone safety and mobility goals and objectives). The review is led by the MDT Construction Traffic Control Engineer and can answer some of the following questions:

- How are construction zones performing with respect to mobility and safety?
- Are the best possible decisions in planning, designing, and implementing construction zones being made?
- Are customer expectations being met with respect to maintaining safety and mobility and minimizing business and community impacts?
- Can areas for improvement be identified?
- How have areas for improvement that were identified in the past been addressed?
- Should policies or MDT procedures be adjusted based on what has been observed or measured?

3.2.1 Work Zone Self-Assessment

To aid states in determining the effectiveness of their work zone program as a whole, FHWA developed the "Work Zone Mobility and Safety Self-Assessment" (WZSA) tool to help states comprehensively manage their entire work zone program. In addition, the results of all states' assessments are aggregated annually for a higher level view of progress in work zone safety nationwide. The 2012 national report may be viewed at: http://www.ops.fhwa.dot.gov/wz/decision_support/2012/index.htm

The elements of the WZSA are a compilation of best practices currently in place in State departments of transportation (DOTs), metropolitan planning organizations, and local municipalities. Further information on WZSAs can be found at: http://www.ops.fhwa.dot.gov/wz/decision_support/self-assess.htm

Agency and project level inspection policies and procedures are part of this Self-Assessment and these can be strengthened as the assessment looks at the following areas:

- Leadership and Policy
- Project Planning and Programming
- Project Design
- Project Construction and Operation
- Communications and Education
- Program Evaluation

3.2.2 Statewide Work Zone Crash Data Trend Analysis

Performing statewide crash analysis is standard operating procedure for most transportation agencies. This review involves analysis of aggregated work zone crashes with an emphasis on crash cause and discussion of countermeasure solutions. If crash data is collected electronically, statewide trends may be determined in near real-time. In general, however, statewide crash data lags form 3-9 months due to review and analysis policy requirements. Data may be used to correct macro issues appearing as threads across data sets such as crash type, cause, weather conditions, time of day, day of week, project type, etc.

Inspection reports and findings help in understanding the types and causes of work zone crashes. Also, as a result of work zone crash analysis, emphasis areas for improvement can be identified.

3.2.3 Statewide/Regional Work Zone Reviews

A Statewide/Regional Work Zone Review is a higher level, multi-project assessment of inspection practices across the state or local agency. This review may take the form of quarterly meetings of project inspectors with notes being compared as to satisfaction with or issues related to inspection processes and their outcomes.

A regional or statewide overview of inspection program is essential in providing higher level accountability for and consistency of program processes through onsite review of a set of individual projects. These may be combined with the Work Zone RSA (WZ-RSA) concept. The format for these higher level inspections is a hybrid of office and project inspection and may range from policy and procedure review to unannounced visits to several construction projects in a region or across the state. If the inspection falls under the WZRSA umbrella, additional disciplines might be added. The outcome of such reviews or inspections should be a scheduled report which informs policy and process adjustments at both the agency and project levels on a regular basis, perhaps annually.

These reviews may be most effective if they are conducted without prior warning and include team members from a cross-section of disciplines. A regional/statewide team roster might include:

- FHWA Safety Engineer;
- Agency Safety Manager;
- Various Project Managers – these may change with the Region and project being visited;
- Traffic Control Plans Design Engineer;
- Project Inspectors – these may change with the region and project being visited; and
- District Traffic/Construction Staff.

Noteworthy State Practice

Oregon, Washington State, Minnesota and Maryland have developed different, but comprehensive and broader project review processes. The Oregon and Washington State processes are presented in Appendices C and D, respectively.

- The Oregon DOT selects a set of projects with either a regional or statewide focus. A core team reviews several projects in a selected region or section of the State. Work zones are scored, and scores are aggregated for a sense of the statewide or regional status of the work zone inspection program. Scoring is based on a set of pre-determined criteria. Each member of the evaluation team scores items individually on their sheet. These scores are then aggregated for each project to provide a more balanced and objective review.
- Washington State DOT in its 2011 Annual Report reviewed 21 projects across the state and provided an overview of common issues it called “improvement opportunities.” Photos in the report helped document the issues observed.
- The Maryland State Highway Administration (MSHA) convenes inspectors from various projects around the state on a quarterly basis to compare inspection processes and outcomes. The SHA also develops an annual comprehensive report on progress across the agency in making work zones safer. A sample report can be viewed at <http://www.roads.maryland.gov/OOTS/15AppFTCR2006Append.pdf>
- Minnesota conducts regular stakeholder meetings to review new specifications, new device application, implementation of crashworthiness, MUTCD and other manual and guidance changes. Work zone safety partners across many disciplines, internal and external to the DOT, are invited to participate.

3.3 Project Work Zone Inspection Program

While both an agency-level and project-level review are specific to certain aspects of an inspection program overall, a project level inspection differs in many ways from its agency level counterpart. For example the project level inspection focuses on areas pertaining to the operation of one project and deals with the real-time aspects of traffic flow, TTCD setup, device deficiencies, and work zone safety. An important aspect of the project level inspection program is an effective deficiency correction process, which will be discussed in detail in section 3.3. Table 2 below shows project level work zone inspection activities.

INSPECTION-RELATED ACTIVITY	FREQUENCY	PROGRAM COMPONENTS INSPECTED
WZ Road Safety Audits	As appropriate	Multi-disciplinary team inspects project elements at all phases from design through construction.
Project Crash and Mobility Data Analysis and Evaluation	As appropriate	Individual crash characteristics and effectiveness of traffic mobility plans
TMP/TTCP Implementation and Inspection	Daily/As appropriate	Traffic flow, TTCD placement and quality, Operations and Strategies, roadway/worker safety

Table 2 – Project-Level Inspection Activities

3.3.1 Work Zone Road Safety Audits

The ATSSA Work Zone RSA Guidebook defines a work zone safety audit as *“a formal safety performance evaluation which can be performed at any stage of a planned or existing work zone (project planning and design, or in active work zones) by an independent, multidisciplinary team, and considers methods of improving safety in a work zone.”* As can be seen from the guideline description, a WZRSA is project specific, but broader in scope than inspection of a TMP/TTCP. It is flexible as to elements inspected and is multidisciplinary, and can be a valuable component to inspecting project elements during various phases of development.

3.3.2 Project Crash and Mobility Data Analysis and Evaluation

This crash review and analysis is more micro in scope than aggregated statewide crash data in that it evaluates current or real-time crash events and mobility issues in an active work zone. This activity is conducted as soon as practical following a crash event or serious mobility issue within the project limits. Information on crash cause or serious mobility deficiency is important as it will result in immediate actions to reduce the chances of a recurrence. Sources of information on cause and situations that may have led up to the crash may be available from:

- Inspector logs;
- Police reports;
- Contractor reports; and
- Contractor or agency witnesses.

Remediation of any situation or condition that may have contributed to the event is the responsibility of the project owner – usually the transportation agency. Actions taken may be internal to the agency, e.g., correction of an agency procedure, or may take the form of direction to the contractor. How to handle correction of deficiencies is covered in subsequent sections.

If the project is large or extends over a long period of time, aggregation and analysis of project related incidents may lead to identification of thematic problems.

3.3.3 TMP/TTCP Implementation and Inspection

The TMP, which includes the TTCP, is designed to provide the clearest and safest navigation possible through the work zone to ensure an efficiently operating project free of hazards for workers and motorists. The key aim of a project-level work zone inspection program is to ensure the elements of the TMP/TTCP are accurately replicated in the field and maintained throughout the life of the project to keep motorist and worker safety at a maximum and to aid work zone operation and motorist mobility. To make sure the integrity of the TMP/TTCP are maintained, there are general processes which must be followed. Below we explore question of purposes behind inspection of the TMP/TTCP. Consider these responses as you review, build or modify your agency's field inspection program:



- Why inspect?
 - Ensure maximum work zone safety and mobility;
 - Help prevent traffic crashes;
 - Ensure the TTCP and TMP are implemented per the plans and any changes in the field are approved and documented; and
 - Increase available documentation for risk management.
- What to inspect?
 - Proper installation/removal of TTCDs;
 - TTCP layout;
 - TMP function and performance;
 - TTCD condition, type, design, and number, including NCHRP 350/MASH crashworthiness;
 - Motorist positive guidance through the work zone;
 - Function of any pedestrian, bicycle or ADA accommodations; and
 - Law enforcement position and activity (if applicable).
- When to inspect?
 - During TTCD set-up and removal;
 - Immediately after TTCDs are deployed;
 - Regularly – daily, if appropriate, but certainly as conditions and project progress warrant;
 - At various times – night as well as day, and during adverse weather conditions;
 - After modifications, corrective action, or stage change;
 - After incidents/crashes; and
 - As otherwise required by agency policy or procedures.

Agencies with an existing work zone inspection program may want to compare the elements of their project inspection program against the following list of elements. Agencies looking to develop or expand a program may want to use this as guidance to do so.

3.3.3.1 Pre-Project Considerations

A great deal of effort goes into the plan and design of the TMP/TTCP. These plans are developed considering an agency's policies, standards and specifications. An inspector must be trained and familiar with these agency and project related documents. Below is a list of documents and coordination activities that must be in place prior to undertaking project inspection.

- Document check:
 - The most current MUTCD (<http://mutcd.fhwa.dot.gov/>), including any State-specific supplement, as appropriate;
 - Up-to-date copy of project TTCP and TMP, if applicable, including all stages and phases and any ADA and/or pedestrian accommodations required;
 - Project plans, specifications and special provisions;
 - Qualified or approved products list;
 - Daily log sheets or comparable software/hardware;
 - Relevant guides or references, such as:
 - Pocket Guide of MUTCD Guidance on Temporary Traffic Control (www.workzonesafety.org/files/documents/training/fhwa_wz_grant/atssa_maintenance_wz_safety.pdf);
 - Quality Guidelines for Temporary Traffic Control Devices and Features (See ATSSA Online Store at <http://www.atssa.com/OnlineStore.aspx>); and
 - Guidelines on Use of Law Enforcement in Work Zones (<http://www.workzonesafety.org/research/record/10883>) (if applicable).
 - Project contact information – make sure you know who the key players are and how to contact them, e.g., contractor personnel – management, supervisory and field staff, and agency project engineer;
 - Emergency services – police, fire, ambulance, tow company;
 - Agency internal contacts – project manager, other inspectors, TCP designer;
 - Law enforcement representative (if applicable); and
 - WZRSA team liaison connection, if applicable – find out if the project has been assigned a WZRSA team. If so, make connection to see what guidance they may have regarding traffic control and inspection on the project.

3.3.3.2 Initial Project Activities

Having viewed the project traffic management plan, the project inspector may have an early opportunity to assess whether the condition, type and quantity of temporary traffic control devices is per TCP specifications. Discovering deficiencies prior to placement of devices has the potential to save time and money for the agency. In addition, the inspector has the opportunity to confirm contractor procedures for TTCD placement and retrieval. Unsafe practices discovered at this stage will increase project safety overall.

- Visit to contractor staging area or TTCD storage area to make sure all necessary devices are available and in good condition.
 - Number of devices on-hand adequate for initial stage of TCP;
 - Type of device per plan and/or MUTCD (or state supplement);
 - Size of devices per plan and/or MUTCD (or state supplement);
 - Design of device acceptable per TCP http://safety.fhwa.dot.gov/roadway_dept/policy_guide/road_hardware/wzd/;
 - Quality of devices per agency policy and standards;
 - Device on agency's approved or qualified product list; and
 - Compliance with crashworthiness requirements.
- Be sure TTCD set-up and removal process is conducted correctly and with appropriate safety measures
 - Contractor or agency staff outfitted with Class II or Class III high visibility apparel per MUTCD and/or State requirements;
 - All work zone staff are familiar with the project, TCP, and proper set-up/take-down techniques;

- Any vehicle involved in the placement of devices should be equipped with adequate warning lights. High-intensity rotating, flashing, oscillating, or strobe lights are recommended. Michigan DOT has developed a policy (www.workzonesafety.org/files/documents/database_documents/S&P2741-1.pdf) on vehicle lighting in work zones as does the Minnesota DOT (<http://www.dot.state.mn.us/const/wzs/lighting.html>). State and/or local vehicle standards must be followed;
- Assure placement and removal of devices is being done in a safe manner. Shadow vehicles, TMAs and CMSs/arrow boards may be of value during these portions of the operation;
- Be sure law enforcement personnel are aware of TTCD placement schedule; and
- When contractor or agency staff is sure of device locations, TTCD placement typically begins with the flow of traffic. Removal is typically done with appropriate safeguards against the flow of traffic and behind the devices being removed. However, there are States that suggest alternatives to these practices. More information is available in ATSSA's "Safe Installation and Removal of Temporary Traffic Control Devices" (http://www.workzonesafety.org/fhwa_wz_grant/atssa/atssa_safety_installation) training presentation.

3.3.3.3 Project Inspection Activities

A number of State agencies have created work zone project inspection checklists to varying degrees of complexity. The following list of inspection components and sub items was compiled using several agencies' lists. The list is fairly exhaustive and may be used to round out a State's current checklist of activities or to create one.

- Compare TCP to layout of TTCDs, paying particular attention to TTCD requirements related to pedestrian, bicycle, and ADA needs:
 - Are devices deployed per TCP, MUTCD and State supplement?
 - Are device type and design per TCP, MUTCD and State supplement?
 - Are any devices out of line or out of place?
- Be familiar with the TMP to ensure the safety and mobility needs of the public are being met. Detailed guidance is available at the FHWA TMP Home page (http://www.ops.fhwa.dot.gov/wz/resources/final_rule/tmp_examples.htm) :
 - Has a traffic impact analysis been completed? And is it being revisited regularly during work zone operation?
 - Are roles and responsibilities established for all involved in TMP implementation and monitoring? Has stakeholder buy-in been obtained?
 - Are regular stakeholder meetings considered in order to assure across-the-board acceptance of TMP performance before and during project activity?
 - Is law enforcement positioned and operating per plan, if applicable;
 - Is ITS being used per the plan, if applicable? Is it functional?
 - Has signage for and on alternate routes/detours been placed per plan, if applicable?
- Drive the project to make sure motorist guidance is effective:
 - Are daytime set-up and operation OK?
 - Are nighttime set-up and operation OK?
 - Is traffic flowing within expected parameters?
 - Are striping and other guidance instruments performing well in inclement weather, if applicable?
 - Is lighting adequate, properly aligned, and not providing excessive glare for motorists?
 - Are equipment and workers clearly visible during night operations?
 - Are signs and devices positioned properly?

- Are there any conflicting signs or markings?
- Are there any noticeable hazards?
- Are changeable message sign messages properly placed, displayed, appropriate, and approved?
- Are messages displayed on the proper number of panels?
- Are arrow panels configured and working properly?
- Do flagging operations meet MUTCD, TCP and project standards and specifications?
 - Is flagger attire appropriate?
 - Is the flagger's position safe and appropriate?
 - Have flaggers received MUTCD and agency-required training for hand signals?
 - Is training documentation available, where required?
 - If used, are AFADs properly attended and functioning properly?
- Are acceleration and deceleration lanes adequate? Are there any ramp back-ups?
- Is signal timing sufficient, where applicable?
- TCP effectiveness in terms of TMP performance:
 - Are drivers navigating smoothly through the work zone by both day and night?
 - Are there critical queue development times? If so, how long are the queues?
 - Is supplementary signing and notification readily available and/or in use?
 - Are there ingress/egress issues with businesses, side roads or construction equipment?
 - Are there traffic impacts (safety or mobility) on roads or ramps within or near the work zone?
 - Is law enforcement positioned per plan, if applicable
 - Is ITS being used per plan, if applicable, and is it functional?
 - Is signage for and on alternate routes/detours per plan, if applicable?
 - What quantitative measures are you using that might aid in determining the effectiveness of the TMP?
 - Number and types of crashes, injuries and fatalities;
 - Motorist delay;
 - Vehicle speeds over time;
 - Travel time;
 - Queue length; and
 - Number of TCP change orders.
 - What qualitative measures are you using that might aid in determining TMP effectiveness?
 - Motorist satisfaction surveys;
 - Field staff input, including law enforcement;
 - Calls from the public;
 - Newspaper editorials and letters to the editor; and
 - Discussions at public meetings.

- TTCD condition assessment for compliance with quality standards:
 - The 2009 MUTCD correctly states that devices in good condition draw respect from drivers. More importantly, devices in poor condition can be a safety hazard in that they may not provide the positive guidance or other protection that drivers need. Many State agencies have adopted quality assessment guidelines, such as the Maryland State Highway Administration's TTCD Quality Guide (www.roads.maryland.gov/oosts/ttcd_quality_guide.pdf). ATSSA's "Quality Guidelines for Temporary Traffic Control Devices and Features" are another example. Whether using these guideline examples, another, or your agency's standards for acceptable device and feature condition, be sure you have as objective a way as possible to gauge condition acceptability.
 - Walk the project, where appropriate. Ensure that:
 - Barriers are not cracked or damaged in other ways;
 - Signing is properly sized, sheeting is appropriate, is clean and properly reflective;
 - Pavement markers are clean and properly reflective;
 - Sand/water-filled barriers, if applicable, are properly filled;
 - Ballast type and quantity used are per specification;
 - Cones, barrels, barricades and tubular markers are clearly visible, especially at night;
 - TMAs and other crash attenuators are in proper condition;
 - Arrow and CMS panels are functioning properly; and
 - Other devices are in good shape and functional.



3.4 Deficiency Documentation and Follow-Up

Some of the deficiencies noted in inspections of temporary traffic control devices by agency staff taking the NHI course: "Construction Zone Safety Inspection" include:

- Improperly used device type or design;
- Unsatisfactory device condition or operation;
- Improper device placement; and
- Excessive queue length and motorist delay.

Notify the party responsible for corrective action. Ensure that a timeframe for correction is established and acknowledged. Once corrective action has been taken, completion must be documented. Even if a deficiency is corrected immediately, the event and response must be noted. All must be documented in sufficient detail to provide adequate defense if needed due to tort or claim action against an agency and/or individual. Demonstrating a priority list of actions on deficient conditions is very important if fiscal restraints prevent immediate action.

Insist on replacement of worn or damaged devices within the timeframe set by your agency policy in order to maintain the integrity of the traffic control setup as it was designed. Industry guidance suggests a maximum of 12 hours. Some deficiencies may require immediate action.

- For notification and mitigation of device condition deficiencies:
 - Have a process in place, including an acceptable time frame for reporting and rectifying a sub-standard condition. The acceptable response time will vary according to the seriousness of the hazard:
 - Deficiencies immediately impacting safety such as improper flagging or safety apparel;
 - Deficiencies impacting performance such as missing or damaged TTCDs; and
 - Aesthetic deficiencies such as dirty or leaning signs.

- Provide notifications, responses, and statements of completion in writing to document the remediation process.

Some deficiencies are more critical than others, but all situations or events that depart from plans, standards, or policies must be noted and addressed. Below is a matrix taken from the Missouri DOT's "Advanced Work Zone Training" guidebook illustrating the various levels of response that may be required for certain deficiencies.

	PRIORITY 1	PRIORITY 2	PRIORITY 3	PRIORITY 4
PRIORITIES ARE GUIDELINES AND MAY BE UPGRADED IF PRIMARY CONTACT DEEMS NECESSARY	May represent immediate hazard to the public. Respond immediately	Repair should be done as soon as practical.	Repair should be done with more urgency than routine work	Not urgent. Normally considered routine maintenance.
SAFETY DEFICIENCIES (e.g., improper flagging position and procedure, missing PPEs and devices, faulty devices and safety appurtenances, hazards, glare, improper tapers, etc.)	X			
PERFORMANCE DEFICIENCIES (e.g., missing pavement markings, improper device spacing, marking, and dimension, traffic congestion, inappropriate speed limits, displaced and damaged devices, etc.)	X	X		
AESTHETIC DEFICIENCIES (e.g., leaning signs, dirty devices, bad sign covering, improper storage, CMS messaging, etc.)	X		X	
Note: Categories of deficiency with more than one box checked indicate a greater potential for judgment on the part of the person(s) responsible. Source: Missouri DOT "Advanced Work Zone Training Manual." Available at: http://www.modot.org/safety/WorkZoneSafetyandMobilityPolicy.htm				

Table 3 – Sample Work Zone Priority Action Table

Noteworthy State Practice

– Michigan DOT - 12SP812(C) TRAFFIC CONTROL QUALITY AND COMPLIANCE

b. As Designed Traffic Control. If at any time during the project, including the time during the seasonal suspension, the Engineer documents that the traffic control is deficient, inadequate or improperly placed, the Engineer will provide written notification with instructions for corrective action to the Contractor and traffic control supplier. Upon receipt of the notification of corrective action, the Contractor has 4 hours to correct the traffic control. If the traffic control cannot be corrected within the 4 hour time period, the Contractor will develop a written implementation schedule for the corrective action and submit the schedule to the Engineer for approval within 1 hour of receiving the written notification. If the schedule is not approved, or if the schedule is approved but is not followed, the Department will adjust the contract according to subsection 812.03.C.1.c.iii. If the implementation schedule is not followed, the Engineer will notify the Contractor and traffic control supplier in writing that they are in violation of this subsection.

c. Corrective Action. The Engineer will give written notification to the Contractor as identified above. Failure to make corrections within the timeframe required may result in the following actions by the Engineer:

- i. Stop work on the project until the Contractor completes corrective action,
- ii. Order corrective action by others in accordance with subsection 107.07, subsection 108.02, subsection 812.03.B, and in the interest of public safety.
- iii. A contract price adjustment will be made in the amount of \$100 per hour for every hour or portion thereof the improvements or corrective action remains incomplete as described herein. If improvements or corrections have not been made to the satisfaction of the Department, the contract will be adjusted until the traffic control is acceptable.

The full document can be found at [http://mdotwas1.mdot.state.mi.us/public/dessssp/spss_source/12SP812\(C\)v1.pdf](http://mdotwas1.mdot.state.mi.us/public/dessssp/spss_source/12SP812(C)v1.pdf).

The following graphic is one suggested process for following up on deficiencies found on a project:

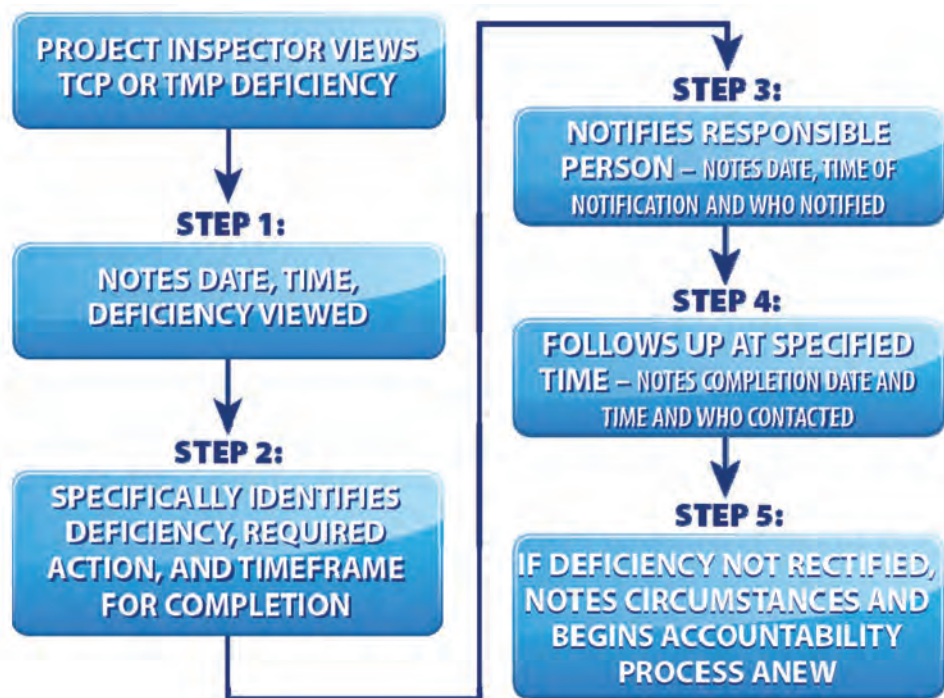


Figure 3 – Steps from Deficiency Observation to Resolution

4. RISK MANAGEMENT AND THE IMPORTANCE OF DOCUMENTATION

4.1 Documentation

As already mentioned, the amount of detail included in inspections reports is very important for agency/contractor defense in case of a claim. Let's consider an example scenario.



Scenario: The project ended two years ago, but today the inspector was advised that the agency and the contractor are being held liable for damages stemming from a crash in that work zone. Inspection log reports are needed to find out the TTCP-related details and any actions taken during the project. These details may help build an adequate defense.

Following is an expanded discussion of the Figure 3 graphic as a summary of general documentation requirements across all levels of inspection and review activities:

- The standard, practice, or specification in place at the time the deficiency was noted or observed;
- The situation or condition that was not met and the nature of the deficiency;
- When and where the deficiency was noted and by whom;
- Who was notified, by whom, and in what manner (in person, email, letter, etc.);
- A description of exactly what action was recommended to resolve the deficiency;
- The timeframe required for resolution and consequences if resolution is not reached within that timeframe;
- When, from whom, and in what manner status of resolution was received;
- Time, date, and location resolution was inspected and accepted and by whom;
- If deficiency was not mitigated within the required timeframe, timeframe for implementation of consequences previously mentioned; and
- Steps repeated until satisfactory resolution was achieved.

Detailed documentation of all relevant aspects of the process, program or project being inspected is critical.

When you inspect a work zone, be prepared to respond to future questions about agency policy and whether it was followed. Be sure to think ahead and anticipate any questions that might arise about deficiencies and the steps taken to resolve them.

Clearly, the emphasis is on documentation of all events, situations, deficiencies, and follow-up. Reading your inspection log, you may be able to recall all of the pertinent facts the day after the event. But a week, a month, or a year or two can greatly diminish your ability to recall the facts accurately.

If all devices and features are properly placed and all devices are in acceptable condition, this does not mean no documentation is required. If all has been done according to plan, policies, standards, and specification, your report needs to reflect that fact.

The key to good documentation is detail. The more detail you add, the more defense of your actions you will have at any point in the future. Facts are much more critical than impressions.



4.2 Inspection Log Items

Typical topics to be included are:

- General information such as project type, duration, location, contact information;
- Traffic mobility;
- Signing;
- Arrow board/message signs/AFAD/temporary signal;
- Channelizing devices;
- Positive protection;

- Pavement markers and striping;
- Flagging (PPE, position, motorist direction, escape, etc.);
- Work area traffic conditions and hazards;
- Device condition;
- Law enforcement positions and activities (if applicable); and
- Corrective actions needed.

Pictures and video are an excellent way to document and validate your observations. If you make a habit of adding more factual information than thought necessary at the moment, it may serve you well in the future. Make sure all observations noted are founded in fact. Personal impressions and opinions are generally not helpful.

See Appendix A for a more detailed listing.

4.3 Actions That Lead to Good Risk Management

Managing risk requires a proactive approach. Below is a set of actions that an agency may take to improve their risk management position.

- Requiring and implementing regular work zone traffic control inspections as a matter of policy;
- Moving in a timely manner to resolve any deficiencies in a reasonable and timely fashion, which may include notifying others and following up on their response;
- Installing signing or other notifications for a hazardous condition if an immediate resolution is not possible or is too expensive, and documenting how and why this decision was reached; and
- Demonstrating a priority list of actions on deficient conditions if fiscal constraints prevent immediate action.

5. CONCLUSION

The key to a successful work zone inspection program can be summed up with four critical elements. The agency must have:

- Overarching policies that clearly spell out responsibilities and competencies for individuals involved in the work zone inspection program from agency to project levels;
- A monitoring program that regularly evaluates the effectiveness of agency policies and project-level actions;
- A standardized procedure for program and project deficiency identification and follow-up; and
- A process that folds feedback on performance back into the program as a whole.

These guidelines should provide the practitioner with the necessary knowledge to accomplish the following objectives:

- Recognize the value of work zone inspections to:
 - Increase safety for workers and motorists;
 - Increase compliance with applicable design standards and agency/Federal requirements;
 - Improve mobility through the work zone; and
 - Serve as an agency risk management tool.
- Set up a program – by establishing inspection program elements at both the agency and project levels to help develop a comprehensive, proactive, and effective work zone inspection program, or confirm and enhance elements currently in place.
- Make a program successful and maximize benefits – this is accomplished by proper training, effective policies, making the inspection program an integral part of doing business for the agency, and ensuring there is a feedback mechanism to fold performance analyses back into the inspection program.
- See the big picture – seeing how the various components of agency- and project-level inspections interrelate.

APPENDIX A

PROJECT INSPECTION FORM ESSENTIALS

Following is an extensive list of possible project work zone inspection elements. The agency may opt to include fewer items, but must ensure that the items listed are appropriate for the project being inspected. Maintenance work areas typically contain fewer elements.

General information

- Inspector name;
- Responsible contractor business name and primary contact information;
- Project ID, route/intersection, Federal aid status;
- Weather and visibility;
- Date/time/location;
- Type of highway/number of lanes;
- Work type and duration;
- Number of workers, types of equipment onsite;
- Posted speed limit with speed reduction order on file, if appropriate;
- Worker/contractor parking is safe and adequate and/or per plan requirements;
- Staging area safely located and per Special Provisions and TMP/TTCP;
- Communications procedures such as equipment required, personnel involved, hierarchy of oversight and interaction established; and
- Ingress/egress points have been carefully selected to help ensure the safety of the motoring public and project vehicles and staff.

Traffic mobility

- Selected strategies for handling traffic are meeting goals in terms of delay or length of queue;
- Traffic Incident Management (TIM) on file;
- CMS placement and messages are reflecting actual traffic demand and conditions;
- Traffic is flowing within parameters established, including on alternate routes, if applicable. Any problems have been noted, responsible parties notified, and desired corrective action and time frame given;
- Law enforcement, if applicable, has been contacted and is positioned safely;
- Bicycle, ADA and pedestrian accommodations are adequate and per plan;
- Any crashes have been noted and prevention measures determined and in place; and
- ITS systems are functioning properly, if applicable.

Signs

- Conditions meet agency-adopted quality guidelines;
- Placement/spacing/orientation/message are correct and per plan;
- Sign type;
- Sign support is per specification;
- Sequencing is per TMP/TTCP
- Height;

- Sheeting grade with passing retro-reflectivity rating;
- Ballasting; and
- Nighttime visibility.

Arrow board/changeable message signs/AFAD/temporary signal

- Placement;
- Delineation;
- Proper function and message per State standards and Special Provisions;
- Message readability;
- Cycle length for multiple panels;
- Cycle length for signal (where appropriate);
- Bulb, pixel or placard condition;
- Nighttime settings; and
- Units are aligned with driver line of vision.

Channelizing devices

- Correctly placed per TMP/TTCP and not used as a substitute for positive protection;
- Placement/spacing;
- Condition per agency-adopted quality guidelines;
- Flasher and ballasting are properly placed; and
- Flashing beacons working properly.

Positive protection

- Flare rates;
- Crash cushions;
- Connections/pinning; and
- Visibility.

Pavement markers and striping

- Placement/spacing is consistent with the TCP;
- Condition; and
- Ability to guide motorists day and night.

Flagging

- Flagger station advance warning;
- Flagger visibility is per specification – day and/or night;
- Nighttime illumination (if appropriate);
- Flagger position is per MUTCD, TCP and other applicable project specifications;
- Flagger escape route is established;
- Signaling device;
- Personal protective equipment;

- Flagger signaling and motorist interaction;
- Flagger-to-flagger communication (where appropriate); and
- If AFADs are in use, the device(s) and back-up flagger(s) are positioned properly.

Work area traffic conditions and hazards

- Inspect for unprotected devices and situations:
 - Drop-offs;
 - Barrier and other ends; or
 - Equipment/materials.
- Loose gravel;
- Material storage;
- Vertical and horizontal sight distance;
- Presence of queues and delays and their length;
- Barrier delineation;
- Work zone speed limit suitability;
- Position and use of the TMA/shadow vehicle;
- Detour length and function, if applicable;
- Nighttime project lighting, if applicable;
- Equipment/vehicle movement in same direction as traffic;
- Traffic signal compliance/modifications, if appropriate.

Device condition

- Barriers are not cracked, or damaged in other ways;
- Signing is properly sized, sheeting is appropriate, is clean and properly reflective;
- Pavement markers are clean and properly reflective;
- Sand/water-filled barrier, if applicable, are properly filled;
- Ballast type and quantity per specification;
- Cones, barrels, barricades and tubular markers are clearly visible, especially at night;
- TMAs and other crash attenuators are in proper condition;
- Arrow and CMS panels are functioning properly; and
- Other devices are in good shape and functional.

Enforcement

- Position in work zone if stationary;
- Communication with project staff; and
- Trained per specification, if applicable.

Corrective action

- Date/time of observation;
- Specific condition needing correction;
- Recommended corrective action;
- Responsible staff person;
- Date/time notified;
- Time frame for correction;
- Date/time inspector notified of completion of corrective action;
- Inspector date/time of sign-off on corrective action;
- Notification of additional corrective action needed (where appropriate with repeated verification steps).

APPENDIX B

LINKS TO STATE, LOCAL AND FEDERAL EXAMPLE INSPECTION FORMS

National Highway Institute (NHI) "Construction Zone Safety Inspection" Course 133114

http://www.nhi.fhwa.dot.gov/training/course_search.aspx?tab=0&key=133114133114&course_no=133114&res=1

New Mexico best practice: Traffic Control Logbook

http://www.ops.fhwa.dot.gov/wz/practices/best/view_document.asp?ID=270&from=search

Dallas Area Road Construction Work Zone Task Force

http://www.workzonesafety.org/files/documents/database_documents/WZ_Checklist.pdf

Central Federal Lands Highway Division

<http://www.cflhd.gov/resources/safety/documents/work-zone-checklist.pdf>

Missouri DOT Work Zone Inspection Form

<http://www.modot.org/workzones/documents/WorkZone-Inspection-Form.pdf>

New York State DOT Inspection form

http://www.workzonesafety.org/files/documents/database_documents/nyform.pdf

Maryland State Highway Administration Inspection form

<http://sha.md.gov/OOTS/14AppETTCInspectionFormmastercopyRev2.pdf>

APPENDIX C

This is Oregon's current regional and statewide work zone evaluation spreadsheet. It is typically used annually for the statewide inspection sampling of four to five current projects. The form is also used on a regional basis where a more localized review of several projects is done. It is a Microsoft Excel based spreadsheet that helps the Oregon DOT keep track of major work zone implementation issues.

PROJECT NAME:				DATE:			
HIGHWAY:		MILEPOST:		REGION:		REVIEWED BY:	
PROJECT MANAGER:		OTHER CONTACTS:					
CONTRACTOR:				TCS			
GENERAL NOTES							
Only score Devices you witnessed on the Project. If a certain device was not present, do not score it.							
SCORING							
Notify PM or Field Project Representative!				BELOW AVG	AVERAGE	ABOVE AVG	GOOD
1	2	3	4	5	6	7	8
CATEGORIES				SCORE	NOTES		
TEMPORARY SIGNING (Signs, Flags, Supports)				QUALITY			
				PLACEMENT			
				SPACING			
CHANNELIZATION DEVICES (Tubular Markers, Cones, Drums, Barricades)				Tubes/Cones			
				DRUMS			
				BARRICADES			
PAVEMENT MARKINGS (Paint, Tape, Reflective & Flexible Markers)				CONDITION			
				PLACEMENT			
CONCRETE BARRIER				CONDITION			
Reflective Barrier Panels? Y or N				PLACEMENT			
				CONDITION			
IMPACT ATTENUATORS (Drum Arrays, Narrow-Site & TMA)				CONDITION			
				PLACEMENT			
PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS)				MESSAGE			Capture message, if possible
				PLACEMENT			
				CONDITION			
SEQUENTIAL ARROW PANEL (Arrow Board)				PLACEMENT			
				CONDITION			
TEMP. TRAFFIC SIGNALS				SET-UP			
				CONDITION			
BICYCLE, PEDESTRIAN & ADA FACILITIES (Score if existing facilities affected by construction)				SIGNING:			
				Continuous Route?			
				ADA Compliance			
FLAGGERS				VISIBILITY			
				Performance			
PILOT CARS				Equipment			
				Performance			
MOBILITY				Overall Flow			
Time Stopped At Flagger or Signal (if applicable)				min			
Approx. Travel Speed thru the work zone?				mph			
WORKER GARMENTS & EQUIPMENT				GARMENTS			
				EQUIPMENT			
SITE HOUSEKEEPING				CLEAN, ORDERLY			
POLICE ENFORCEMENT				ON-SITE?	Y or N		
				PAYING OT?	Y or N		
DRIVER-FRIENDLY WORK ZONE				Ease of Navigation	This category for information only. Do not include in Page Total.		
				Consistency			
GRAND TOTAL =				N *		FINAL SCORE	
* N = The Number of Scored Categories							

Oregon DOT Statewide Work Zone audit scoring sheet

APPENDIX D

2011 WSDOT Work Zone Report Summary (EXCERPT) Statewide Construction Project Reviews

The 2011 Work zone reviews were conducted on sixteen region selected projects across the state. They are listed below. Review teams were assembled from region headquarters and Project Engineer staff, FHWA and the HQ Traffic Office as part of the FHWA process review requirement of the federal work zone rule.

The purpose of the statewide work zone reviews is to:

1. Confirm that design standards and construction specifications are being implemented in the field consistently and uniformly.
2. Verify that standards and practices are effective at providing a satisfactory level of safety to workers and the traveling public.
3. Identify any gaps in guidance, specifications or training.
4. Discover any new innovations, solutions or best practices that are being used and to share them with the rest of the state.
5. Provide an objective review in an effort to gauge the overall effectiveness of the work zone measures in place while providing for project constructability efforts, identifying improvement opportunities and recognizing innovations and best practices.
6. Coordinate region action item issues.

The consistency, uniformity, safety and mobility performance of WSDOT projects were evaluated and those findings are summarized within this report. Specific details of the work zone reviews along with digital photos of specific action items are contained in the individual project reports for each region; these were distributed to the region after the review was completed.



Projects Reviewed:

(List of projects and dates visited)

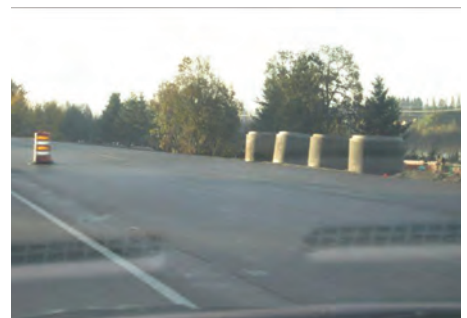
Overview

The projects selected by the regions to be included in the statewide review range from multi-stage urban projects to interchange replacements and straight forward pavers. The selected projects may not represent the overall condition of work zones for the region. Scheduling can be difficult to coordinate the most opportune time for the statewide review in relation to the project schedule.

It is important to recognize that every project represents a somewhat unique set of circumstances and challenges especially with the diverse level of complexity between the projects. It is not the intent of this report to compare or rate projects and region performance, but to focus on the overall effectiveness of the work zones on an individual project level and compare how this measures the region program as a whole in coordination as well as consistency in enforcing standards. While all of the work zones reviewed provide overall adequate levels of work zone safety and mobility there may be certain elements within the project that require adjustments or changes to improve the condition. Conversely, in some cases a project may provide an effective solution to an operation that deserves sharing with other regions. Critical comments contained in the report are only intended to present the issue and recommend solutions. The information contained in the report is intended to be educational based on statewide project observations.

Summary of Significant Issues

This report has been broken down into seven sections in an effort to capture the significant issues extracted from the individual statewide review project reports, discussions, field observations and statewide objectives.



1) Improvement Opportunities

Even the best work zones or most basic projects often contain one or two improvement opportunities. It is reasonable to expect more issues to materialize on complex or high traffic demand projects but even the smallest jobs are not immune to having an item overlooked during design or construction phases. The Project Engineer and staff are typically very responsive to these issues and work to develop solutions with the contractor. We unfortunately continue to see many of the improvement opportunities are recurring issues. The Work Zone Safety Task Force will determine the next steps to resolve recurring issues.

The summarized improvement opportunities as taken from the array of project reports and review observations are as follows. These items are not intended to highlight a specific project or region but are examples of common items across the state that do not meet specifications, MUTCD requirements or contract plans. Many of these items reoccur from year to year without resolution even with our increased training effort, specifications and guidance. The addition of the region action plans as part of the 2010 report summary was an effort to resolve this trend but as the following information indicates, as a department we are not there yet so the continued emphasis on region action plans to develop solutions will continue.

The following improvement opportunities were noted during the reviews:

1.1. Shoulder closure signs and traffic control devices placed in advance of temporary impact attenuator installations are routinely either being left out of the plans or not being implemented in the field. Forgetting to install an object marker sign on the nose of the temporary attenuator has also been observed. These items are MUTCD and Design Manual requirements. Designers and inspectors need to be aware of the issue to ensure this area is being appropriately addressed in both contract plans and in the field.



1.2. Incorrect or inappropriate use of regulatory speed reductions in work zones and incorrect signing of speed zones. We observed an increase in the use of regulatory speed reductions in many projects but unfortunately several of the reductions did not comply with WSDOT policy as outlined in Traffic Manual Appendix 5.B or did not use the appropriate signing for the operation

1.3. Temporary pavement marking and removal performance continue to be a statewide issue. This includes poor removal of existing conflicting pavement markings, ghost stripes and conflicting markings left in place, as well as improper or non-standard installation of temporary markings and missing markings at gores and intersections. The pavement marking issue can be a problematic issue for drivers for understanding where to drive, especially in night time or wet weather conditions

1.4. Non-standard signal head and pedestrian head covering. Standard Specification 1-10.3(3)K establishes the requirement. This example combined with inadequate signing led to both driver and pedestrian confusion and was an issue that required immediate attention to resolve.

1.5. Stockpiling of construction material or parking equipment within the work zone clear zone during non-working hours continues to routinely occur, which is a violation of the work zone clear zone general special provisions included in all projects. Also, there were occurrences of roadside slopes, ditches and other obstacles that were of a non-standard nature.



Notes

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Developed by:

The American Traffic Safety Services Association

15 Riverside Parkway Suite 100

Fredericksburg, VA 22406-1022

800-272-8772

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U.S. Department of Transportation
Federal Highway Administration