

Montana Department Transportation

Work Zone Safety and Mobility

Goals and Objectives Procedures Guidelines

September 2007

Revised March 2009



REVISIONS

Date	Page Number	Comment
March 2009	ii	Inserted Revisions table
	2	Inserted table with contact names
	10	Added discussion on TMP Coordinator (Construction Operations Engineer) and included TMP coordinator in tasks to manage impacts
	11	Updated Training Plan discussion to reflect training that has already been provided and identify future training anticipated
	12	Added reference to Attachment 3
	13, 14, 16	Added references to TMP Coordinator and TMP Worksheet, help guide
	15	Revised bullet list to clarify and match TMP Process document; minor edit regarding traffic modeling (changed Run to Request); added reference to projects in High Crash Corridors
	17	Construction Staff – added bullets to enforce temporary traffic control device quality and monitor uniformed law enforcement presence and effectiveness; added references to appendices
	18	MDT/Law Enforcement Liaison – added bullets to invite law enforcement participation in Preconstruction meeting and construction reviews
	References	Updated hotlinks and added new references
	A-1	Added High Crash Corridor to item 3
	C-1-5	Revised Training Plan schedule and added new courses available
	D-1, 2	Added references to TMP Process, Worksheet, Help Guide, revised language for Level 3 projects
	G-1, 3	Revised language for review team and added a link to the Construction Zone Crash Report
	I-1-3	Added guidance for Temporary Traffic Control Device Quality
	J-1-2	Added guidance for Uniformed Law Enforcement
	K-1	Added work zone vs. construction zone guidance
	L-1-3	Added guidance for Pedestrian Traffic Control
	M-1	Added guidance for Lump Sum Traffic Control

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INTRODUCTION

In September 2004, the Federal Highway Administration (FHWA) published updates to the work zone regulations at 23 CFR 630 Subpart J. The updated rule is referred to as the Work Zone Safety and Mobility Rule (Rule) and applies to all State and local governments that receive Federal-aid highway funding. Transportation agencies are required to comply with the provisions of the Rule by October 12, 2007. The changes made to the regulations broaden the former rule to better address the work zone issues of today and the future.

The MDT Work Zone Safety and Mobility Policy provides an opportunity to increase safety for MDT employees, construction workers and the public while improving the mobility of the traveling public and our goods and services. A significant portion of the Guidelines and Procedures describes what we do now. This document expands on our processes and provides goals to measure how well we're providing for the safety and mobility through work zones. The Guidelines and Procedures are an opportunity to improve on our existing work. Many aspects of the procedures focus on safety, while other aspects focus on mobility. It is important to note that safety and mobility are integral; improved mobility through construction zones will improve safety.

Growing congestion on many roads, and an increasing need to perform rehabilitation and reconstruction work on existing roads already carrying traffic, are some of the issues that have led to additional, more complex challenges to maintaining work zone safety and mobility in Montana. Other issues that add to the complexity are an aging population and travelers with mobility and other impairments. To help address these issues, the Rule provides a decision-making framework that facilitates comprehensive consideration of the broader safety and mobility impacts of work zones across project development stages, and the adoption of additional strategies that help manage these impacts during project implementation. The Rule requires agencies to develop an agency-level work zone safety and mobility policy to support systematic consideration and management of work zone impacts across all stages of project development. Based on the policy, MDT has developed procedures and guidelines to support implementation of the policy, including project-level procedures to address the work zone impacts of individual projects.

A task force was set up within MDT to review the updated rule and develop a policy and guidance for implementation. Team members were:

Core team:

Mark Baum	Construction Traffic Control Engineer
Paul Jagoda	Construction Engineering Services Engineer
Justun Juelfs	Winter & Roadside Maintenance Specialist
Pierre Jomini	Safety Management Engineer
Lesly Tribelhorn	Highways Design Engineer
Bill Fogarty	Butte District Construction Reviewer
Lloyd Rue	Safety, Traffic, Design Engineer (FHWA)
Jim Skinner	Manager, Program & Policy Analysis

Oversight/ Review team:	Paul Ferry	Highways Engineer
	Duane Williams	Traffic and Safety Engineer
	Lisa Durbin	Construction Administration Services Engineer
	Dan Smith	Specification Engineer
	Kevin Christensen	Construction Engineer
	Stefan Streeter	Billings District Construction Engineer
	Doug Wilmot	Great Falls District Construction Engineer
	James Combs	Great Falls District Traffic Engineer
Jeff Patten	Operations Engineer – Butte (FHWA)	

For questions or comments regarding Work Zone Safety and Mobility, contact a member of the implementation team:

Headquarters Construction	Jim Wingerter Paul Jagoda	454-5897 or 461-4663 444-2413
District Construction	Bill Fogarty	494-9635
District Traffic	Jim Combs	455-8327
Preconstruction	Lesly Tribelhorn	444-6242
Maintenance	Mike Miller	444-6991
Training	Lynn Miller	444-6375
FHWA	Lloyd Rue	441-3906

GOALS AND OBJECTIVES

Goal 1: Reduce the number and severity of crashes, injuries and deaths in construction zones.

Objectives:

- Design a safe environment for the traveling public and workers
- Build and maintain a safe environment for the traveling public and workers
- Assess work zone crash trends and follow up for future project improvements
- Assess current practices and procedures and adjust as necessary
- Review and evaluate construction zone fatalities
- Assess crash management strategies for construction projects within identified high crash corridors

Performance Indicators:

- Number of construction zone traffic crashes
- Field evaluations of construction zone fatal crashes completed
- Number of traffic fatalities and injuries in construction zones
- Relative change in crash and severity rates during construction for selected significant projects

Goal 2: Improve on our current management practices of construction and maintenance operation road user impacts

Objectives:

- Minimize delays
- Maximize efficiency of Maintenance and Construction operations while minimizing hazards to road users and workers
- Coordinate with other projects and special events
- Develop an incident management plan when and where appropriate
- Manage queue lengths appropriate for location and project conditions

Performance Indicators:

- Travel time delay goals set for significant projects and corridor construction
- No queue impacts beyond defined limits
- Public comments

Goal 3: Assure appropriate level of knowledge, skills, and abilities for responsible parties to manage and evaluate construction zone safety and mobility.

Objectives:

- Develop, implement, and sustain a comprehensive work zone training program

Performance Indicators:

- Attainment of training milestones and goals (listed in Appendix C)

Goal 4: Minimize stakeholder impacts**Objectives:**

- Ensure early public involvement for significant projects
- Review design and construction options as early as possible in project development to minimize impacts to businesses and access requirements
- Keep stakeholders informed during project development and construction
- Minimize impacts to the immediate environment (such as noise, dust control, pedestrian and bicycle accommodation, wetlands, etc.)
- Public information and law enforcement elements are tailored to the project needs
- Assess selected significant projects with project advisory committee after substantial project completion

Performance Indicators:

- Public comments
- Project advisory committee feedback
- Responses to MDT public opinion surveys

Goal 5: Optimize construction zone traffic control design and implementation**Objectives:**

- Manage fiscal impacts of transportation management plan components
- Design and implement uniform construction zone traffic control
- Ensure statewide compliance with plans and specifications
- Develop transportation management plans
- Deploy practices and technologies that provide consistent and predictable speeds in the construction zone to minimize vehicular maneuvers.
- Establish detour and crossover speeds during design stage and use those speeds during construction
- Incorporate work zone safety and mobility requirements in impact assessment process for privately-funded work

- Inform other agencies about work zone safety and mobility
- Integration of STEP enforcement with district-wide enforcement agreements

Performance Indicators:

- Contract expenditures for work zone transportation management plan (TMP) components
- Speed-related construction zone crash characteristics
- Level of uniformity as determined by plan package and field reviews
- Traffic control change orders assessed
- Method of measurement and payment of traffic control evaluated

DEFINITIONS

Construction Zone

An area on a public highway or on the adjacent right-of-way where construction, repair, maintenance, or survey work is being performed by MDT, a local authority, a utility company, or a private contractor under contract with MDT or a local authority. A construction zone may include a work zone. The use of the phrase “construction zone” in Montana is analogous to “work zone” in the Rule. Construction zone is a broader term than work zone since a work zone is defined in Montana statute as an activity area within the construction zone.

Project Advisory Committee

Project-specific group that reviews and manages the project impacts on the stakeholders. Suggested committee members include the Project Design Manager, District Engineering Services Engineer, Engineering Project Manager, FHWA representative, District Construction Engineer, a public information representative (either MDT or consultant for construction project), and possibly a Chamber of Commerce or other local representative.

Public Information Plan

The Public Information (PI) component of the TMP includes communication strategies that seek to inform affected road users, the general public, area residences and businesses, and appropriate public entities about the project, the expected construction zone impacts, and the changing conditions on the project.

Significant Project

In general terms, a significant project is one that alone or in combination with other concurrent projects nearby is anticipated to cause sustained construction zone impacts greater than what is considered tolerable based on MDT guidelines and engineering judgment.

Specific criteria for determining the level of construction zone impacts for projects in Montana are listed in Appendix A of this policy.

Stakeholders

People who are affected by the construction project, including business owners, road users, government officials, regulators, tribal officials, etc.

Traffic Control Plan (TCP)

The Traffic Control Plan is considered equivalent to Temporary Traffic Control Plan (TTC).

A TCP describes measures within the contract (plans, specifications, etc) to facilitate road users through a construction zone, work zone or an incident area. The TCP addresses traffic safety and control through the construction and work

zone, and generally incorporates the specifications and details to control the operations within the construction zone.

Transportation Management Plan (TMP)

A TMP is comprised of strategies to manage project construction zone impacts. These strategies consist of a TCP. For significant projects, it also includes a Public Information (PI) plan and Transportation Operations (TO) plan. For all other projects, the TMP must consist of at least a TCP plan and may include TO and PI strategies as well.

A TCP describes measures to be used for facilitating road users through a work zone or an incident area. A TCP plan addresses traffic safety and control through the construction zone. The TO component addresses sustained operations and management of the construction zone impact area, and the PI component addresses communication with the public and concerned stakeholders.

Transportation Operations Plan

The Transportation Operations (TO) plan includes the identification of strategies used to mitigate impacts of the construction zone on the operation and management of the transportation system within the construction zone impact area. The construction zone impact area can extend to an area well beyond the immediate project area, and should cover such items as traffic signal timing on detour routes, signing requirements for detour routes, and road/intersection capacity issues created by detouring traffic.

Traveling Public

Users of the public transportation infrastructure, including highways, bridges, sidewalks, etc., for means of getting from one place to another. Traveling public refers to all users, and includes private and public cars, buses, trucks, bicyclists, and pedestrians.

Work Zone

The area where the construction, repair, maintenance, or survey work is actually taking place. The boundaries of the work zone must be clearly identified by the posting of signs.

Work Zone Mobility

In general terms, work zone mobility is the ability to move the traveling public efficiently through and around a work zone area with minimum delay compared to a baseline travel when no work zone is present.

Work Zone Safety

Safety refers to minimizing hazards to the traveling public and highway workers in a work zone.

PROCEDURES

Department Level Processes and Procedures

Managing Impacts

MDT will manage construction zone impacts by using various management strategies. Many of the strategies are listed in these guidelines, and were taken from FHWA's publication titled "Implementing the Rule on Work Zone Safety and Mobility" (pages 6-12 and 6-13).

Training Plan

Preconstruction, Construction, and Maintenance will evaluate their training plans regularly with their training coordinator to ensure employees are adequately trained in Work Zone Safety and Mobility. MDT personnel will be trained in temporary traffic control design, deployment, operation, and maintenance commensurate with their level of responsibility. Training may be either MDT provided courses or outside sources. MDT currently provides training on flagging, basic and advanced design, setup, maintenance, management and evaluation of construction zones. Potential training courses are listed in Appendix C.

Law enforcement, other governmental entities, and permittees (for utility and other maintenance work in the right-of-way) may obtain temporary traffic control training through local and national training providers, or through MDT sponsored training when approved by the training coordinator.

Process Reviews

1. Perform an annual assessment. Perform a process review at least every two years. The annual assessment determines the process review topic.
2. Evaluate construction zone data at the MDT level, or review randomly selected projects across jurisdictions. A combination of these approaches can also be used.
3. Include the appropriate personnel who will participate in the project development stages and the different functional areas within MDT, as well as the FHWA, to participate in the process review and annual assessment.
4. Encourage the participation of other non-MDT stakeholders, particularly Law Enforcement, in the process review and annual assessment, as appropriate.
5. The process review results are intended to lead to improvements in MDT construction zone processes and procedures, data and information resources, and training programs that ultimately enhance safety and mobility on current and future projects.

Project-Level Provisions

Nomination and Planning Stage

- Identify significant projects
- Identify potential corridor and regional impacts
- Assess budget and schedule implications

Design Stage

- Identify/confirm significant projects
- Develop TMP appropriate to project level
- Include TMP provisions in Plans, Specifications and Estimate (PS&E)
- Review and revise as necessary schedule and project cost estimates

Construction Stage

- Implement TMP
- Manage TMP
- Collect performance data
- Post-project assessment

Maintenance Work

- Implement TMP
- Manage TMP
- Collect performance data
- Post-project assessment

GUIDELINES

MDT Level Processes and Procedures

Managing Impacts

The best management practice is to minimize or reduce impacts before they occur. For MDT highway construction and maintenance projects, the tables in Appendix H (taken from the FHWA publication, "Implementing the Rule on Work Zone Safety and Mobility") can help determine the appropriate strategies to manage construction zone impacts most effectively. Some of the strategies will be applied at the planning or design stage to minimize or eliminate impacts, maximize project efficiency, and possibly reduce overall costs. Other strategies will be applied during project construction:

1. Project Level

The District Construction Operations Engineer has been assigned the duty of Transportation Management Plan Coordinator. It will be his/her responsibility to attend the design plan review meetings and participate in the decisions related to the project-specific transportation management plan components. This will ensure consistency between design and construction.

Prior to the start of construction, the Construction Operations Engineer (the Transportation Management Plan Coordinator) and the Engineering Project Manager (EPM) assess the contractor-developed traffic control plans and sequences and compare them to the TMP components included in the plan package. Approval of the contractor's plans is contingent upon the balancing of safety, mobility, construction efficiency, and stakeholder impacts and needs.

During construction, the project traffic control inspector is to observe traffic traveling through the construction zone to determine if the construction zone devices are providing for the safety and mobility of the traveling public, for both day and night. The frequency of observation is guided by the significance level of the project or the observed performance of the traffic control plan in meeting the MDT's safety and mobility objectives. Should the inspector note locations where safety and mobility might be improved, the inspector is to inform the EPM of the location and provide a recommended action.

The EPM will consider the recommendation, consult with the TMP Coordinator, and implement those actions that are practical given the circumstances.

Law enforcement officers traveling through or patrolling the construction zone who observe an opportunity to improve the safety and mobility of the construction zone should contact the EPM to arrange a joint review of the construction zone. Alternatively law enforcement should leave a message for the EPM explaining what was observed for possible action.

When an incident or crash occurs within the construction zone, the EPM will collect, to the extent practical, information related to the event. The information will be reviewed to determine if changes can be reasonably made to reduce the potential for future incidents or crashes.

2. Headquarters Level

The Construction Engineering Services Bureau will review information and analysis available on construction zone incidents and crashes. The review will provide a basis for recommendations to revise contract requirements and improve construction zone safety and mobility.

Training Plan

Training topics appropriate to MDT functions are listed below. Individual areas will be responsible to review and update their training plans regularly to ensure compliance with MDT policy. Potential training courses are listed in Appendix C.

1. Planning and Design:
 - Traffic Control/TMP Design Training
 - Follow-up training and additional course offerings as needed
2. Construction:
 - Traffic Control Supervisor and Inspector Training
 - Additional training courses as necessary
3. Maintenance:
 - Implementation of MDT Policy on Work Zone Safety & Mobility
 - Traffic Control Supervisor and Inspector Training
 - Additional training courses as necessary
4. Outside agencies:
 - Make outside agencies aware of the rule on Work Zone Safety and Mobility and Local Technical Assistance Program (LTAP) course availability

Process Reviews

Periodic evaluation of construction zone policies, processes and procedures will help assess the effectiveness of the program and enable improvements to be made. Process reviews will be conducted in accordance with Appendix B, "Process Reviews."

Construction Zone Data

MDT staff will use work zone data as follows:

- At the process-level, analyze construction zone crash and operational data from multiple projects to improve MDT processes and procedures, and in-turn, pursue the improvement of overall construction zone safety and mobility.
- At the project-level, use field observations, available construction zone crash data, and operational information to manage the construction zone impacts of individual projects while the projects are under construction.

- Maintain elements of the data and information resources that are necessary to support the use of construction zone data for the above two activities.

Construction zone crash data are necessary to make an informed assessment of the success of efforts to manage construction zones and their impacts. Available data and information provide the basis for assessing performance and taking appropriate actions to improve performance on individual projects as well as overall processes and procedures.

MDT will set up procedures to collect traffic delay data and traffic volume data in construction zones for significant projects. MDT staff and FHWA will analyze the data in relation to design projected delays and to established objectives.

Construction Zone Data use and analysis are described in Appendix G.

Project-Level Provisions

Planning Stage

1. Identify significant projects

Identify significant projects and assign appropriate costs (PE, CE, CN) as early as possible in project planning. District or Preconstruction Bureau staff responsible for project nominations should identify significant projects and associated costs at nomination time.

Staff will use the "Significant Project" checklist, definition and tables (Appendix A, Attachment 3) to determine level of significance. Significant projects will be identified in MDT's Program and Project Management System (PPMS) on the project Header and Nominations page.

Identify stakeholders that can help define strategies to develop and manage the TMP. Also identify the level of incident management needed. Suggested stakeholders would include:

- Law enforcement officials
- Emergency response teams
- Local government officials

Include additional costs associated with the TMP in the nomination. Developing and enforcing the TMP may add to Preliminary Engineering (PE), Construction Engineering (CE), and Construction (CN) costs. On the other hand, some strategies may be implemented during project design that could result in lower overall project costs.

2. Identify potential corridor and regional impacts

Project nominators and District staff will look for potential corridor or regional impacts of the proposed project. Rail, Transit, and Planning staff can be enlisted to help identify corridors that may warrant special consideration. Construction

projects can impact adjacent corridors and regions as well as the corridor in which the project is located. Some areas to consider:

- High-Crash Corridors (as listed in the Montana Comprehensive Highway Safety Plan)
- Corridors with active or proposed environmental or traffic studies
- Congestion management areas
- Safety management areas
- Regional or corridor-specific growth issues
- Local government or regional planning studies
- Project timing with respect to adjacent projects listed in the Statewide Transportation Improvement Plan (STIP)
- Impacts on critical highways, streets, and intersections nearby
- Impacts on business and residents

Design Stage

1. Identify/confirm significant projects

Project Design Manager and design team will discuss project construction zone safety and mobility level of significance during the preliminary field review (PFR). The level of significance will be documented in the PFR report. Use the "Significant Project" definition and tables (Appendix A), known site conditions, anticipated construction methods, projected traffic conditions, local official's knowledge, and engineering judgment to make the determination. Discuss traffic control issues and detour potentials. Discuss impacts on stakeholders and traveling public. Think about wide load restrictions, detour accommodation of wide loads and possible adjacent projects, other advisories, significant community events and other special events.

Fill out the TMP Work Sheet, using this guidance and the TMP Help Guide.

<http://mdtinfo.mdt.mt.gov/highways/workzone.shtml>

The work sheet will help identify strategies and costs appropriate to the project, and will help guide future discussion and design considerations related to Work Zone Safety and Mobility. The work sheet is a living document that should be updated regularly throughout project design.

For significant projects, create a TMP team. Suggested team members include:

- Project Design Manager
- Road plans designer (or consultant designer)
- Construction Operations Engineer (TMP Coordinator) – required
- Construction Traffic Control Engineer
- District Construction Engineer, Operations Engineer, or Engineering Project Manager
- District Engineering Services Engineer, Projects Engineer, or Traffic Engineer
- Traffic Project Engineer if necessary for capacity issues, safety accommodations such as traffic signals, or signing issues

- FHWA Operations Engineer or Safety/Traffic Design Engineer
- City official for urban projects

The TMP team will work together using the TMP Work Sheet to determine the appropriate strategies to minimize construction zone impacts and develop the components for the TMP.

2. Develop TMP's appropriate to project level

The Project Design Manager (PDM) will be responsible for making sure the TMP is developed along with the project plan package. Include costs for the TMP components in the project cost estimate (CN and CE) and reassess the TMP at each design stage. See Appendix D for additional guidance on TMP's.

Alignment and Grade review should include discussions about traffic control, sequencing operations, constructability issues. Discuss wide load restrictions and possible adjacent projects, as well as impacts on stakeholders and traveling public. Alignment and/or grades are adjusted as necessary to accommodate critical issues. If possible at this stage, recognize peak directional traffic. Enlist Traffic and Safety staff to run models if necessary (i.e., Quickzone) to determine the number of lanes needed to accommodate acceptable level of service during construction.

The TMP team will meet at Alignment and Grade time to determine the level of TCP needed and identify applicable strategies to manage the impacts of the construction zone by updating the TMP Work Sheet. The TMP Coordinator is a key member of this team and should be involved in all TMP discussions. This will ensure continuity through project construction. As the road plans develop, members of the team will meet as needed to develop the traffic control plans, details, and special provisions. The road plans designer will draft the plans and details and include the special provisions in the plan package. Include the TCP in the Plan-in-Hand package for discussion and refinement. Note that the level of detail for the TCP will vary depending on the complexity of a project. Pavement preservation projects, spot improvement projects, and bridge replacements will often include detailed TCP's because the sequencing of construction operations is well defined and not subject to differing contractor operations. In contrast, large reconstruction projects with major grading operations depend on the successful contractor's fleet size and types of equipment, the locations of material sources, etc. Attention should be placed on producing special provisions that manage the critical aspects of the operations. The TMP team should focus on the traffic management at specific stages:

- Specific treatments for addressing roadside construction hazards
- Sequencing activities for realistic and efficient construction schedules
- Signing and delineation during different stages of construction
- Hauling and roadway crossing operations
- Temporary advisory, regulatory, and warning signs
- Needs for requesting project level law enforcement (Appendix J)

- Pedestrian, bicycle, and ADA accommodations
- Traffic control and construction limitations during community events
- Acceptable Level of Service (LOS), travel time delay goals and the acceptable queue lengths

Public involvement meetings include solicitations from the public of all issues they perceive with the project. Include an explanation of what MDT thinks the traffic control and detours will include, and ask for feedback. Remember to talk about the temporary construction impacts of noise, dust, pedestrian and bike accommodations. Discuss the impacts of the proposed project and adjacent projects.

The Scope of Work report will document traffic control, sequencing, and detour proposals. Feedback from public involvement meetings and information gathered as a result of the environmental studies should be included in the report. If available, include information regarding projected construction impacts on level of service. Document the need for and anticipated components of the Traffic Operations (TO) and Public Information (PI) Plans. Appendix E has more guidance on PI plans and Appendix F further details the TO.

Plan-in-Hand review meetings include discussions on traffic control, sequencing, and detours, as well as constructability. Special provisions should be in the review plan set and be open for discussion. Wide load restrictions and impacts related to traffic control issues on adjacent projects should be discussed. Identify the locations for detour signing and other advisories. Include Special Provisions that specify the number of lanes to be maintained during peak hours. Define the peak hours and associated hourly volumes. If not done earlier in the design, recognize peak directional traffic. Request models if necessary (such as Quickzone) to determine the number of lanes needed to accommodate acceptable level of service during construction. Specify nighttime work requirements as necessary. Discuss and refine the TCP, TO, and PI.

For significant projects or projects within a High-Crash Corridor that entail significant detour work or major projected traffic diversion routes, the PDM will request a safety review update for the detour route(s) and/or diversion route(s). The Safety Management Section will provide the safety review with crash trend information. The PDM will analyze the safety review and the traffic volumes. PDM will coordinate with the TMP team for special traffic control on detours that may exhibit anticipated capacity or safety problems under construction traffic conditions. They will also look at critical intersections and interchanges (on- or off-site), where additional temporary traffic control may be justified. For projects, detours, or diversion routes at or near railroad tracks or at-grade highway railroad crossings, the PDM will coordinate design with the Railroad through the Utilities Section.

3. *Include TMP provisions in PS&E*

Final plan review provides an opportunity for District, Construction, Maintenance, FHWA, and Preconstruction personnel to look at the plan package before it goes to Contract Plans. Focus on construction zone issues, conditions that could aggravate safety or crash concerns, traffic control, and sequencing issues. Adjacent projects can be identified and the effect of cumulative traffic issues can be assessed for adequate construction measures.

The final plan review should answer the following questions:

- Are the Special Provisions adequate?
- Is adequate signing provided?
- Is the appropriate traffic control included?
- Is a public involvement plan included if necessary?
- Does project description include specific or unusual safety characteristics that were considered in the TMP design?
- Does the plan set incorporate all of the strategies identified in the TMP Work Sheet?

Construction Stage

1. *Headquarters Staff*

- Provide support to district and project level staff in understanding construction zone policies and guidelines, identifying and communicating issues related to the condition, design and usage of temporary traffic control devices, as well as the set up, maintenance, general appearance and functionality of construction zones.
- Perform quality assurance inspections of construction zones on a routine basis to promote consistency and compliance with policies and guidelines.
- Provide district staff with input on construction zone design modifications and operations.
- Ensure construction and work zone speed limits are appropriate in active and inactive construction zones.

2. *District Office Staff*

- Ensure field staff is implementing MDT policies and guidelines established in this policy. The TMP Coordinator (Construction Operations Engineer) is responsible for ensuring continuity between design and construction.
- Ensure project staff has attended training appropriate to the level for the job decisions each individual is required to make.
- Ensure there is a trained person at the project level who has the primary responsibility and sufficient authority to provide for the safety and mobility of the construction zone.
- Ensure field project construction zone inspections are being conducted.
- Provide field project staff with input on contractor proposed modifications to construction zone design and operation.

- Perform quality assurance inspections of construction zones to promote consistency and compliance with policies and guidelines.
- Ensure construction zone speed limits are appropriate in active and inactive construction zones.
- Determine whether or not project-specific law enforcement is needed (Appendix J).

3. Construction Project Staff

- For projects with potential for traffic delays, conduct a pre-construction timing of travel through the project.
- Conduct day and nighttime construction zone reviews to assure the construction zones are maintained in a neat, orderly and effective manner for the safety and mobility of highway workers and the traveling public.
- Collect construction zone data at the project level and provide to headquarters for statewide analysis.
- Monitor, and make adjustments to construction zone traffic control, as necessary, to improve worker and the traveling public's safety, with the least possible delay to the public. Discuss changes with design or other staff as appropriate. Enforce the quality of temporary traffic control devices (see guidance in Appendix I).
- Monitor the presence and effectiveness of uniformed law enforcement. See Appendix J for guidance.
- Compare travel times through construction to pre-construction travel time if there are a relatively high number of public complaints related to delays.
- When needed, enact project-specific law enforcement agreements.
- Establish a line of communication with law enforcement and obtain notification on construction zone incidents for future assessment of construction zone impacts and development of corrective measures.
- Evaluate contractor's proposed traffic control plans

4. Contractor

- Designate a person trained appropriately to their level of duties at the project level who has the primary responsibility, with sufficient authority, for implementing the TMP and other safety and mobility aspects of the project.
- Ensure all contractor personnel are trained in traffic control to a level commensurate with their responsibilities.
- Ensure construction zones are neat, orderly and effective for the safety of highway workers and motorists.
- Minimize delay and disruption experienced during construction.
- Perform quality control review of construction zones to promote consistency and ensure compliance with contract documents, policies and guidelines.

- Recommend traffic control improvements to the EPM to address field conditions pertaining to traffic flow, visibility and worker and motorist safety.

5. MDT/Law Enforcement Liaison

- Request active and ad-hoc enforcement of law, as requested and needed, to promote safety and mobility in the construction zone.
- Impart basic knowledge of construction zone components and operations and trained in traffic control to a level commensurate with their responsibilities.
- Ask law enforcement officers to help identify construction zone concerns and report back to the EPM.
- Request law enforcement officers to take appropriate measures to clear construction zone incidents as quickly as possible.
- Invite law enforcement to the Preconstruction Meeting.
- Invite law enforcement to assist during construction reviews.

Maintenance Work

The Maintenance Division or District Traffic Engineer will review and approve the Transportation Management Plan, typically consisting of a traffic control plan, to ensure that they are in compliance with the MUTCD and MDT's current detailed drawings.

Monitoring for compliance will be administered by a person or persons having the primary responsibility, with sufficient authority for reviewing the TMP and other safety and mobility aspects of the project. This individual and their authority will be identified during the pre-construction meeting.

Municipalities, Townships, Counties and Other Non-MDT Agencies or Corporations with Projects Utilizing Federal Funds

The Federal Register/Volume 69, No. 170, Section 630.1000, Subpart J - Work Zone Safety and Mobility requires that each entity with projects utilizing federal funds meet the new requirements regarding work zones by October 12, 2007. That subpart establishes requirements and provides guidance for systematically addressing the safety and mobility impacts of work zones, and developing strategies to help manage these impacts on all Federal-aid highway projects. Non-compliance with these requirements after October 12, 2007, may result in losing federal aid on existing projects and being ineligible for federal aid on highway projects after that date.

Municipalities, townships, counties and other non-MDT agencies or corporations with projects using Federal Funds in Montana are encouraged to follow MDT policy and guidance on work zone safety and mobility.

REFERENCES

Federal Highway Administration (FHWA). 2000. Work Zone Best Practices Guidebook. FHWA-OP-00-010. <http://www.ops.fhwa.dot.gov/wz/practices/best/bestpractices.htm>

FHWA. Best Practices Fact Sheets.
<http://www.ops.fhwa.dot.gov/wz/practices/factsheets/factsheets.htm>

FHWA. 2005. Implementing the Rule on Work Zone Safety and Mobility. FHWA-HOP-05-065. http://www.ops.fhwa.dot.gov/wz/rule_guide/index.htm or
http://www.ops.fhwa.dot.gov/wz/rule_guide/rule_guide.pdf

FHWA. 2005. Developing and Implementing Transportation Management Plans for Work Zones. FHWA-HOP-05-066.
http://www.ops.fhwa.dot.gov/wz/resources/publications/trans_mgmt_plans/trans_mgmt_plans.pdf or
http://www.ops.fhwa.dot.gov/wz/resources/publications/trans_mgmt_plans/index.htm

FHWA. 2005. Work Zone Public Information and Outreach Strategies. FHWA-HOP-05-067. http://www.ops.fhwa.dot.gov/wz/info_and_outreach/index.htm or
http://www.ops.fhwa.dot.gov/wz/info_and_outreach/public_outreach_guide.pdf

FHWA. 2006. Work Zone Impacts Assessment: *An Approach to Assess and Manage Work Zone Safety and Mobility Impacts of Road Projects*. FHWA-HOP-05-068.
http://www.ops.fhwa.dot.gov/wz/resources/final_rule/wzi_guide/index.htm or
http://www.ops.fhwa.dot.gov/wz/resources/final_rule/wzi_guide/wzi_guide.pdf

FHWA. 2007. Work Zone Safety and Mobility Website.
http://www.ops.fhwa.dot.gov/wz/resources/final_rule.htm

FHWA. 2003. Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD). <http://mutcd.fhwa.dot.gov/>

Montana Department Transportation (MDT) Website. <http://www.mdt.mt.gov/>

MDT Manuals Website. <http://www.mdt.mt.gov/publications/manuals.shtml>

MDT Construction Manual.

MDT. Detailed Drawings.
http://www.mdt.mt.gov/business/contracting/detailed_drawings_2005_eng.shtml

MDT. 2006. Standard Specifications for Road and Bridge Construction.
http://www.mdt.mt.gov/business/contracting/standard_specs.shtml

MDT. 2004. Local Agencies Guidelines.

<http://www.mdt.mt.gov/publications/manuals.shtml>

MDT. 2002. Maintenance Manual.

http://www.mdt.mt.gov/publications/manuals/maint_manual.shtml

MDT. 2007. Public Involvement Handbook.

<http://www.mdt.mt.gov/publications/docs/manuals/pubinvhb.pdf>

MDT. 2006. Road Design Manual.

<http://www.mdt.mt.gov/publications/manuals.shtml>

MDT. 2008. Traffic Engineering Manual.

<http://www.mdt.mt.gov/publications/manuals.shtml>

MDT. 2009. Transportation Management Plan Process, Worksheet, Help Guide.

<http://mdtinfo.mdt.mt.gov/highways/workzone.shtml>

Transportation Research Board (TRB) 2007. National Cooperative Highway Research Program (NCHRP) Report 581, Design of Construction Work Zones on High-Speed Highways.

TRB 2005. NCHRP Report 500, Volume 17: A Guide for Reducing Work Zone Collisions.

United States Access Board. 2002. ADA Accessibility Guidelines for Buildings and Facilities (ADAAG). <http://www.access-board.gov/adaag/html/adaag.htm>

APPENDIX A - Criteria for Defining Significant Projects

Significant Projects

A significant project is one that alone or in combination with other concurrent projects nearby is anticipated to cause sustained construction zone impacts greater than what is considered acceptable based on MDT guidelines and engineering judgment. Levels of impact are defined below. Projects with Level 1 impacts are considered significant.

The intent of the Work Zone Safety and Mobility Policy is to maintain flexibility for the project design team to determine project-specific impact levels. If project- or site-specific conditions indicate that a project could have a higher or lower level of significance, the design team is expected to develop the appropriate components of the TMP.

Impact Levels

Level 1

Work impacts the traveling public at the metropolitan, regional, or interstate level. The construction project has a high level of public interest. Construction work will directly impact a large number of travelers. Construction will have high user cost impacts and the duration is usually very long. Examples of this work type would be: major corridor reconstruction, high impact interchange improvements, full closures on high volume facilities, major bridge repair, repaving projects that require lane closures for more than three days and result in significant increases in congestion, etc.

Attachment 1 is a listing of the corridors in Montana that are of Level 1 significance. The following guidance defines the criteria used to decide if a project is Level 1:

1. Projects on non-Interstate principal arterials within urban areas that reduce the number of through travel lanes under any of the following conditions:
 - more than 3-consecutive days,
 - during the morning, lunch time or evening peak period, or
 - impair critical movements at a major intersection for more than a 3-consecutive day period.

An Urban area is defined as any land area within the boundaries of the designated urban areas (population over 5,000) as shown on the official urban-area maps.

2. Rural highway corridors that qualify for Level 1 significant projects are listed in Attachment 1.
3. Projects that meet other conditions as described on Attachment 3, Significant Project Checklist, including High Crash Corridors.

Other projects can be elevated to level 1 with a request through the District Administrator if contributing factors justify. Conversely, some projects do not have high levels of construction zone impacts and the Project Design Manager, with concurrence from the District Administrator, may apply for an exception to the Significant Project procedures that shall be documented and approved by the Preconstruction Engineer.

The TMP for Level 1 projects will consist of a Traffic Control Plan (TCP) as well as Transportation Operations (TO) and Public Information (PI) components. The TCP addresses traffic safety and control through the construction zone. The TO component addresses sustained operations and management of the construction zone impact area, and the PI component addresses communication with the public and concerned stakeholders.

Recent MDT projects that would exemplify Level 1, Significant Projects would include:

- The Highway 93 corridor reconstruction projects (N-5) between Evaro and Polson, with Average Annual Daily Traffic (AADT) ranging from 6,600 to 15,000, carrying heavy tourist traffic as well as serving the residents. The projects are located in an environmentally sensitive area within the Flathead Indian Reservation, confined by topographic and environmentally sensitive features. Detour options were limited, the traffic volumes and potential for significant delay and queuing were high, and the public, tribal, and political involvement were well above average.
- The shoulder and median mill/fill project on Highway 12 (NH-8) in Helena that shut down lanes during peak hours and backed traffic up to the railroad overpass, delaying morning traffic into Helena for more than three consecutive days.
- 10th Avenue South reconstruction in Great Falls (NH-60), which shut down multiple blocks of a principal arterial with a high commercial density to reconstruct the concrete pavement and widen the road.
- King Avenue Interchange reconstruction work in Billings (U-1010) which included involvement with the railroad, traffic volumes in excess of 30,000 AADT on four lanes, lane closures for extended periods of time, and the potential for major impacts on other intersections beyond the construction zone resulting from detouring traffic.
- Weeksville – West: 3.8 mile reconstruction project on MT 200 (P-6) that involved grading operations, blasting adjacent to the railroad, and paving operations. Although this section of highway is not on the Level 1 list, the nature of the project required Level 1 consideration. Blasting operations had the potential to delay traffic for up to 2 hours, so variable message signs and other public notification were used to minimize the impact on travelers.

Level 2

Work impacts the traveling public at the city or regional level. It has a moderate level of public interest. It will directly impact a moderate level of travelers. It will have low to moderate user cost impacts, and can include lane closures for a moderate duration if not during peak hours. Examples of this work type would be: Repaving work on roadways on

the National Highway System (NHS) with moderate AADT, minor bridge repair, shoulder repair and construction, minor interchange repairs, etc.

Attachment 2 is a listing of the corridors in Montana that are of Level 2 significance. The following guidance defines the criteria used to decide if a project is a non-significant, Level 2 project:

1. Projects on through roadways in any incorporated city/town.
2. Additional highway corridors that would qualify for Level 2 projects are listed in Attachment 2.

In addition, projects can be elevated to this level with a request through the District Administrator. Projects in high traffic areas or on secondary or off system routes may fall under level 2. Conversely, some projects do not have high levels of construction zone impacts and the Project Design Manager, with concurrence from the District Administrator, may apply for an exception to the Significant Project procedures that must be documented and approved by the Preconstruction Engineer.

For Level 2 Projects, the TMP may consist only of a TCP. Some of these Projects will require a limited TMP where the TCP and TO will be described briefly and where TCP and TO plans for critical phases may be developed. The level of public involvement will be assessed. Generally, a detailed and comprehensive PI component will not be necessary. However, public notification in newspapers and on the radio should be considered. See Appendix E for PI guidance and strategies.

Recent MDT projects that would exemplify Level 2 Projects would include:

- Milling and paving work on I-15 near Jefferson City that involved lane reduction without causing significant congestion,
- Reconstruction of US 287 (NH-8) to provide passing lanes and a wider roadway section that inconvenienced the traveling public, but didn't cause significant delay or congestion.
- Overlay projects east of Lincoln on MT 200 (NH-24) caused some inconvenience to the traveling public, but didn't involve significant delays.
- Nashua – East and West 10-mile reconstruction project on US 2 (NH-1) east of Glasgow that involved grading and structure work. Although this section of highway isn't on the Level 2 list, the proximity to Glasgow and the involvement with the Tribe elevated the project. Additional thought was given to traffic control to minimize the construction impacts to the traveling public.

Level 3

Work impacts the traveling public to a small degree. Public interest is low and AADT is low. Duration of work is short to moderate. Construction zones can be mobile, and typically this work is recurring. Examples of this work type would be: Certain low impact striping work, guardrail repair, minor shoulder repair, pothole patching, very minor joint sealing, minor bridge painting, sign repair, mowing, etc.

Typical, recent MDT work that would exemplify Level 3 Projects would include:

- Off system bridge reconstruction projects in rural areas with very low AADT, with single lane detours or road closures with alternative detour routes established.
- Routine Maintenance guardrail repair, mowing operations, striping, etc.
- Crack sealing projects where one short section of a through-lane may be closed for a day, then the operation moves on for the next day.

The TMP will consist of a TCP. TO and PI components are not necessary at this level.

Attachment 1.**LEVEL 1 CORRIDORS**

A. The following rural corridors:

<u>MDT Route*</u>	<u>Map Route</u>	<u>RP to RP</u>		<u>Description</u>
I-90	I-90	96	110	Missoula urban area – DeSmet to Bonner
I-90	I-90	297	331	Bozeman area - Belgrade to W. Livingston Interchange
I-90	I-90	434	457	Billings area – E. Laurel Int. to Pine Hills Interchange (Jct. I-94)
N-1	US 2	100	153	Marion to West Glacier
N-4	US 310	42	54	Rockvale to Laurel
N-5	US 93/MT 200	0	130	DeSmet (Jct. I-90) to Whitefish
P-6	MT 200	76	116	Plains – Ravalli
N-7	US 93	30	91	Darby to Missoula
N-50/P-50	US 191	20	91	Big Sky to Bozeman
N-85	MT 85	0	7	Four Corners to Belgrade

*Departmental route

B. Non-interstate principal arterials within the federally designated urban areas:

Anaconda	Bozeman	Havre	Laurel	Miles City
Belgrade	Butte	Helena	Lewistown	Missoula
Billings	Great Falls	Kalispell	Livingston	Whitefish

C. Projects on other corridors that are not listed may be considered significant; see the checklist (attachment 3) for additional guidance.

Attachment 2.**LEVEL 2 CORRIDORS**

A. All Interstate corridors and through-roads in incorporated towns not considered Level 1.

B. And the following corridors:

<u>MDT Route*</u>	<u>Map Route</u>	<u>RP to RP</u>		<u>Description</u>
N-1	US 2	0	100	Idaho border to Marion
N-1	US 2	153	280	West Glacier to Shelby
N-1	US 2	372	472	Havre to Malta
N-3	US 89	0	8	Vaughn to Sun River
N-5	US 93	130	187	Whitefish to Canada border
P-6	MT 200	0	76	Idaho border to Plains
N-7	US 93	0	30	Idaho border to Darby
N-8	US 12/US 287	0	108	Garrison to Three Forks
N-10	US 87	0	111	Great Falls to Havre
N-11	US 89	0	53	Gardiner to Livingston
N-12	US 20	0	9	Idaho border to West Yellowstone
P-13	US 287	48	65	Ennis to Norris
N-14	US 12/US 87	167	169	Roundup vicinity
N-16	US 87	0	48	Billings to Roundup
P-19	MT 1	0	17	Jct. I-90 to W. of Anaconda
N-20/P-20	MT 16/MT 200	0	64	Glendive to North Dakota border
N-24	MT 200	0	139	Bonner to Great Falls
P-28	US 212	45	72	Beartooth Highway
N-37	US 212	0	63	Crow Agency to Ashland
N-38	MT 40	0	4	Whitefish to Columbia Falls
P-49	MT 41	0	2	Dillon
N-50	US 191/US 287	0	20	West Yellowstone to Big Sky
N-52	MT 35	0	51	Polson to Kalispell
N-57	US 87/US 191/ MT 3/MT 200	0	83	Armington to Lewistown
N-60	US 87/US 89/ MT 3	71	96	Armington to Great Falls
P-78	MT 78	30	48	Absarokee to Columbus
P-82	MT 82	0	7	S. of Kalispell, Jct. US 93 to Jct. MT 83
P-84	MT 84	0	29	Norris to Four Corners
P-89	MT 41	0	3	Dillon
S-203	203	0	12	N. of Stevensville
S-205	205	15	27	Belgrade to Bozeman
S-206	206	0	10	Big Fork to Ferndale
S-269	269	0	6	Hamilton to Corvallis
S-269	269	15	21	Jct. 370 to Stevensville
S-411	411	0	3	N. of Belgrade
S-548	548	4	6.5	Jct. N-5 – East

*Departmental route

C. Some X-routes may qualify as Level 2 corridors; however, AADT counts are not available for most of these routes (but can be requested). In addition, small sections of Secondary routes that are not listed above may also qualify as Level 2. Consider traffic volumes, detour availability, and route confinement to determine whether or not the TMP should include a TO component.

Attachment 3.**SIGNIFICANT PROJECT CHECKLIST**

IF any of the following boxes are checked:

- Through-lane closures for more than 3 continuous days
- Through-lane closures during morning, lunch time or evening peak directional traffic flow periods for more than 3 continuous days
- Impair critical movements at a major intersection for more than a 3-consecutive day period

And one of the following:

- On Level 1 corridor list
- Principal arterial within an urban area

Or other triggers for significant projects apply:

- High level of public interest, political influences, or tribal involvement
- Critical movements at major intersections impaired for more than 3 continuous days (not necessarily within the construction zone).
- Impacts to adjacent roadways, intersections, or interchanges (outside the project limits) that increase delay by 15 or more minutes or will cause noticeable queues to form in new locations.
- In a confined setting with no room for detours (for example, a road corridor confined by a steep cut on one side and a river on the other)
- Major highway through an urban area with no alternate accesses for businesses
- Construction impacts are anticipated to be significant and justify all three TMP components
- Located within a High-Crash Corridor as described in the Montana Comprehensive Highway Safety Plan (Table VI-1 of CHSP)

THEN this project is considered a Significant Project for Work Zone Safety and Mobility purposes. The Traffic Management Plan (TMP) must include all three of the following:

- Traffic Control Plan (TCP)
- Transportation Operations (TO) component
- Public Information (PI) component

Note: Special considerations may be necessary for significant community events, but not for the rest of the construction period.

APPENDIX B – Process Review Guidelines

Process Reviews

Intent

Periodic evaluation of construction zone policies, processes, procedures, and construction zone impacts aids in the process of addressing and managing the safety and mobility impacts of construction zones. Reviews help assess the effectiveness of a program or a set of processes and procedures. They enable MDT and FHWA Division Office to make process or product improvements. Performance measures for the review will be documented and evaluated.

Scope

The review may be limited to specific procedures (e.g., review payment methods for traffic control devices) or may be broader in scope (e.g., review of overall performance measures of the construction zone safety and mobility goals and objectives).

Lead

Construction Traffic Control Engineer

Process Reviews may include the following actions:

- Assemble multi-disciplinary team.
- Develop review objectives.
- Determine review methods.
- Conduct review.
- Analyze and interpret results.
- Develop inferences, recommendations, and lessons learned.
- Prioritize recommendations and lessons learned.
- Develop implementation plan.
- Set performance objectives for next review.

Refine/Update the Policy and Guidelines

Use feedback from the different stages of program delivery to improve and refine the policy over time. Input and feedback may also be obtained from stakeholders, public and community outreach processes, contracting community, industry trade associations, law enforcement, and others.

Some considerations in refining or updating the policy include:

- Determining whether the policy and policy provisions serve the purpose of increasing safety, and minimizing the mobility impacts of construction zones;
- Determining whether the policy and policy provisions are relevant, practical, and easy to use for decision-making in real-world situations;
- Determining whether the goals, objectives, and performance requirements of MDT are being attained through the policy;

- Determining whether the policy and the policy provisions need to be updated or refined to reflect changing times, changing industry practices, or advances in technology;
- Capturing specific feedback from any of the program delivery areas that recommend refinement of the policy;
- Capturing specific feedback from non-MDT stakeholders, the public, business and community representatives, the contracting community, and industry trade associations or others that recommend refinement of the policy; and
- Analyzing policy implementation impacts on MDT resources.

The following are examples of questions that the process reviews may help answer:

- How are construction zones performing with respect to mobility and safety?
- Are the best possible decisions in planning, designing, and implementing our construction zones being made?
- Are customer expectations being met with respect to maintaining safety and mobility, minimizing business and community impacts?
- Can areas for improvement be identified?
- How have areas for improvement that were identified in the past been addressed?
- What has both worked and not worked – which strategies have proven to be either more or less effective in improving the safety and mobility of construction zones?
- What other strategies can be considered for implementation?
- Are there certain combinations of strategies that seem to work well?
- Can any construction zone safety and mobility trends be identified, at the national level or local level? What can be done to advocate characteristics associated with good trends? What can be done to remedy the problems associated with bad trends?
- How do construction zone performance, the effectiveness of strategies, or areas of improvement vary between day work and night work?
- Should policies or MDT procedures be adjusted based on what has been observed or measured?
- Can consistency be brought about in the identification of such trends, issues, and problems and in the standardization of tools and guidelines for application at the MDT, and/or national level?

APPENDIX C – Training Program

Training Program Planned Goals and Milestones

- All flaggers on MDT projects are certified through the Montana flagger training program, the ATSSA flagger program, or Idaho, Oregon, or Washington state flagger training programs
- All of MDT roadway designers assigned to design or review TMP's for MDT projects have successfully completed work zone designer training and TMP design process training by October 2010
- All MDT roadway designers will have successfully completed work zone designer training by October 2010
- Consultants providing design services to MDT will be encouraged to attend work zone designer training on a voluntary basis
- Consultants providing design services to MDT will be required to adhere to MDT's Work Zone Safety and Mobility Policy for new contracts
- MDT training plan is delivered and updated for multi-disciplinary roles based on training assessments
- Local Agency Guidelines Manual includes work zone safety and mobility policy requirements, including the training requirements
- New Local Agency agreements include work zone safety and mobility requirements
- Make local agencies aware of training course availability through Local Technical Assistance Program (LTAP) and other sources
- By October 2009 all EPM's, District Traffic Engineers, and Maintenance Superintendents will have successfully completed Traffic Control Supervisor (or demonstrated equivalent) training; employees new to these positions will successfully complete the training within 2 years of hire into new position

Potential Training Courses

1. Work Zone Traffic Control Design and Operations Courses (1 to 3-day classes)

Audience: Preconstruction and District design engineers and designers; District and Headquarters Construction personnel; Maintenance Chiefs and Superintendents

Course Objectives:

- Understand each step involved in providing work zone traffic controls.
- Identifying and applying workable concepts and techniques for designing; installing and maintaining controls in construction, maintenance, and utility operations.
- Demonstrate knowledge of the latest concepts as related to Parts 1, 5 and 6 of the MUTCD
- Analyze and evaluate operational, safety and mobility impacts of work zones, including scheduling, scope, phases and alternate routes
- Identify the principles in the design of traffic control plans.
- Able to apply traffic control plans to site conditions, monitor traffic control and make changes indicated by traffic incidents and crashes.

- Understand the legal consequences related to work zone traffic control.
- Understand Montana related specifications and Detailed Drawings.

Current courses available: NHI course # 380003, 380072; customized ATSSA Traffic Control Design Specialist 2-day course.

Instructor: Contracted Instructor

Delivery Frequency: Annually at first, then biennial

2. Certified Work Zone Traffic Control Supervisor Courses

Audience: Engineering Project Managers (EPMs); lead construction technicians; Construction Reviewers; Maintenance Chiefs; Maintenance Superintendents

Course Objectives: Provide training on:

- Part 6, Manual on Uniform Traffic Control Devices (MUTCD).
- Identifying and applying concepts and techniques to design; installation and maintenance of work zone plans and devices in construction, maintenance, and utility operations.
- Principles of designing traffic control plans.
- Applying traffic control plans to short and long duration work zones, monitoring traffic control effectiveness, and making revisions indicated by traffic incidents.
- Understanding the legal consequences related to work zone traffic control.
- Montana related specifications and Detailed Drawings.

Current courses available: MLTAP Work Zone Supervisor Workshop, ATSSA Traffic Control Supervisor.

Instructor: Contracted Instructor

Delivery Frequency: Biennial with two offerings: one presentation west (Helena); one east (Billings)

3. Construction Zone Safety Inspection (1 & 1.5 day courses)

Audience: Permanent Construction and Maintenance employees with previous training and responsible for traffic control contract administration.

Course Objectives: Provide training on:

- Part 6, MUTCD principles and standards.
- Understand the importance of work zone safety devices.
- Identify the contract requirements for work zone devices.
- Inspection of the installation and operation of work zone safety devices, including discrepancies and deficiencies in safety devices.
- Resolving discrepancies from the contract requirements and ensuring correction of those discrepancies.
- Maintenance of traffic control devices.

Current courses available: NHI course # 380063; NHI course # 380063A; FHWA-NHI-134055; ATSSA Traffic Control Technician Course

Instructor: Contracted Instructor

Delivery Frequency: Biennial. Present one course west (Helena); one east (Billings)

4. Traffic Control Basics (1-day)

Audience: Field Construction and Maintenance technicians, Preconstruction and District designers and technicians with no previous training.

Course Objectives: Provide training on:

- Part 6, MUTCD.
- Traffic control design and layout.
- Modifying traffic control plans based on traffic incidents.
- MDT record keeping requirements.
- Montana related specifications and Detailed Drawings.

Current courses available: WZTC training provided at the Maintenance Academy.

Instructor: MDT Instructor

Delivery Frequency: Annually, and as necessary.

5. Managing Traffic Incident and Roadway Emergencies. (1-day course)

Audience: Maintenance Chiefs, Maintenance Superintendents, Maintenance Reviewers, Construction EPMs, mid-level technicians, and Maintenance technicians.

Course Objectives: Provide training on:

- Program elements needed for a multi-agency program to manage traffic incidents and roadway emergencies.
- Techniques for effective onsite management of incidents.
- Identify solutions to facilitate the management of incidents.
- Develop a short-term list of “next step” actions to improve multi-agency response to both major and minor traffic incidents.

Current courses available: NHI course #133048A. This course should be modified to include MDT specifications and record keeping.

Instructor: Contracted Instructor

Delivery Frequency: Biennial with two presentations: one course west (Helena); one east (Billings)

Additional Courses in Traffic Control

6. On-line, CD or video self taught course for basic Traffic Control. Contact the Engineering/Maintenance Trainer for more information on these classes.
7. Flagger training for certification. (Maintenance, Core Drill, etc.) Scheduled by others; offered through the Local Technical Assistance Program (LTAP) or MDT Engineering/Maintenance Trainer.
8. Establish an annual statewide traffic control field reviews by FHWA, Construction; Maintenance headquarters staff, and District Construction and Traffic Engineers.
9. Develop in-house web-based courses based on WZTC reviews and refresher courses.
10. Regional Construction Conference:
 - Specifications/Detailed Drawing updates.
 - Construction memos.
 - Update on NCHRP 350 changes.

Local Training Offerings

11. Work Zone Training (LTAP); by request
12. ATSSA Software: SW0941: Basic Traffic Control for Short Duration Activities: A modular course; available through LTAP
13. Montana Flagger Training (LTAP)

NHI Certification Option

NHI now offers Certificates of Accomplishment to support transportation professionals as they learn, build, and refine their skills in a variety of topic areas. Launched in October 2006, the Certificates of Accomplishment represent “suites” of complementary NHI courses, bundled together, that enable participants to enhance their depth and breadth of knowledge and expertise in specific disciplines.

Work Zone Safety

The NHI certificate of accomplishment in Work Zone Safety covers best practices to help practitioners design, operate, and maintain highway work zones that improve safety for workers and the driving public. The following courses make up the suite in Work Zone Safety:

- FHWA-NHI-380003—Design and Operation of Work Zone Traffic Control
- FHWA-NHI-380060—Work Zone Traffic Control for Maintenance Operations
- FHWA-NHI-380063—Construction Zone Safety Inspection
- FHWA-NHI-380072—Advanced Work Zone Management and Design

Proposed Course Calendar – Refer to course numbers and descriptions listed above

Future Training:

2009	2010	2011	2012
ATSSA Traffic Control Design-completed	ATSSA Traffic Control Design	ATSSA Traffic Control Design	ATSSA Traffic Control Design
Flagger Training for Certification	Flagger Training for Certification	Flagger Training for Certification	Flagger Training for Certification
District WZTC Training on: 2008 Crash Reviews, Lessons Learned, new specifications & guidance	Regional Construction Conference	Regional Construction Conference	Regional Construction Conference
Work Zone Traffic Control Supervisor	Work Zone Traffic Control Supervisor	Work Zone Traffic Control Supervisor	Work Zone Traffic Control Supervisor
Traffic Control Basics	Traffic Control Basics		
TMP Design Process	Construction Zone Safety Inspection	Managing Traffic Incident & Roadway Emergencies	Construction Zone Safety Inspection

Completed Training:

2008	2009			
ATSSA Traffic Control Design	Work Zone Traffic Control Technician			
Construction Zone Safety Inspection				

Work Zone Traffic Control Technician	Work Zone Traffic Control Supervisor			
Work Zone Traffic Control Plan (TCP) Design				
Flagger Training for Certification				
Traffic Control Basics				
Regional Construction Conference				

APPENDIX D – Transportation Management Plan (TMP) Guidance

For additional details see FHWA’s manual titled “*Developing and Implementing Transportation Management Plans (TMPs) for Work Zones.*”

Developing TMPs for Projects

A TMP lays out a set of coordinated transportation management strategies and describes how they will be used to manage the construction zone impacts of a road project. The scope, content, and level of detail of a TMP may vary based on project impact level and the anticipated construction zone impacts of the project.

For **significant projects**, the TMP will consist of a Temporary Traffic Control plan (TCP) as well as transportation operations (TO) and public information (PI) A TCP addresses traffic safety and control through the construction zone. The TO component addresses sustained operations and management of the construction zone impact area, and the PI component addresses communication with the public and concerned stakeholders.

For projects that are **not classified as significant projects**, the TMP may consist only of a TCP. However, consider TO and PI strategies for these projects as well.

The TCP may be incorporated in the TMP by reference, such as reference to elements in the standard specifications, detailed drawings, plans or manuals. TCPs may also be specifically designed for individual projects.

Pay item provisions for implementing the TMP will be included in PS&Es, either through method-based (pay items, lump sum, or combination) or performance based specifications (performance criteria and standards).

MDT and the contractor shall each designate a trained person at the project level who has the primary responsibility and sufficient authority for implementing and managing the TMP.

Developing the TMP will involve identifying applicable strategies to manage the impacts of the construction zone. The costs for the management strategies need to be incorporated in early project estimates and the budgeting process to ensure that funding is available for TMP implementation.

TMP Development During Planning and Design

Two of the keys to a successful TMP are:

- Developing it as early as possible.
- Using a multidisciplinary approach.

The TMP Design Process is summarized in the WZSM TMP Design Process document. A TMP Worksheet and companion TMP Help Guide are available on the MDT intranet: <http://mdtinfo.mdt.mt.gov/highways/workzone.shtml>

Analyses during systems planning and preliminary engineering will help ensure adequate implementation costs are included in the project budget. At this early stage, more alternatives for addressing construction zone impacts are available, so a broader range of strategies can be chosen. For example, at this stage one available strategy is scheduling and coordinating projects to minimize the cumulative impacts of multiple projects in a corridor or region. Another strategy available in the earlier stages of project development is to consider construction zone impacts in the evaluation and selection design alternatives. For some projects it may be possible to choose a design alternative that alleviates many construction zone impacts. See Appendix H for strategies to minimize construction zone impacts.

Step 1 – Compile Project Material

The project design team begins by compiling available project materials such as:

- Project definition (project scope, roadway and traffic characteristics, other factors such as public outreach, community information, etc.).
- Construction phasing/staging approaches and plans.
- Preliminary construction zone management strategies.
- Preliminary cost estimates for strategy implementation (when available).
- Information from other projects in the corridor to evaluate the combined or cumulative impact of the projects.

Step 2 – Determine TMP Needs

The elements of a TMP needed for a project are based on whether the project is determined to be significant. If a project is expected to be significant, the TMP will consist of a TCP as well as a TO component and a PI component. For projects that are not classified as significant projects, the TMP needs to contain a TCP. While TO and PI components are optional for non-significant projects, you are encouraged to consider including them.

Level 3 Projects – Basic TMP (TCP)

Basic TMPs are typically applied on construction or maintenance projects that have a minimal disruption to the traveling public and adjacent businesses and community. These projects typically only involve the development of a TCP (same as Temporary Traffic Control Plan). Basic TMPs may consist of the combination of a sequencing special provision and referencing the detailed drawings.

Level 2 Projects – Intermediate TMP (TCP and some optional TO and/or PI)

Intermediate TMPs are likely to 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 provide more detailed mitigation strategies. In addition to a TCP, intermediate TMPs would also include some element of public information (PI) and/or traffic operations (TO) strategies, as well as cost estimates.

Level 1 (Significant) Projects – Major TMP (TCP/TO/PI)

Major TMPs are intended for significant projects. Major TMPs consist of a TCP plan, and also address PI and TO components. In addition, TMPs may also contain cost

estimates, coordination strategies between stakeholders, secondary mitigation strategy(s), analysis of potential impacts on detour routes, and analysis of the potential impacts of the management strategies. The consideration and incorporation of these additional items may help MDT develop and implement a TMP that effectively manages the construction zone impacts of the project, and serves the needs of MDT, the traveling public, workers, and other parties affected by the project.

Step 3 – Identify Stakeholders

This step involves the identification of stakeholders that can provide valuable input to MDT on what strategies to include in the TMP to help manage the construction zone impacts of a project. This is generally intended for the development of intermediate and major TMPs. Stakeholders should represent different perspectives and will vary depending on the nature of the project. Stakeholders may include internal MDT staff from planning, design, safety, construction, maintenance, public affairs, public transportation, pavement, bridge, and other technical specialists; and external stakeholders such as local government (county, city, regional), FHWA, public transportation providers, contractors, railroad agencies/operators, freight operators, enforcement agencies, utility providers, emergency services, local businesses, community groups, and schools.

It is recommended that a TMP team be developed early in design for significant projects to see the project through from design to final assessment.

Step 4 – Develop TMP

The essence of the TMP development process lies in developing and evaluating the best combination of construction sequencing/staging, project design, TCP plan, TO strategies, and PI strategies, hand-in-hand with each other. Construction zone management strategies should be identified based on the project constraints, construction sequencing/staging plan, type of construction zone, and anticipated construction zone impacts. Cost is often a constraint for the development of a TMP, particularly for significant projects. Finally, the TMP needs to include appropriate pay item provisions for implementation.

For basic TMPs, the TMP development process will largely consist of developing a TCP. The TCP can be either a reference to specific traffic control elements in the approved standard specifications, detailed drawings, or can be designed specifically for the project.

Step 5 – Update/Revise TMP

This step represents the iterative aspect of TMP development. The TMP is a ‘dynamic document’ that is maintained and revised by the TMP team as the project progresses and when more information becomes available. This step may include the possible reclassification of a project as significant or not significant.

Step 6 – Finalize Construction Phasing/Staging and TMP

The plans, specifications, and estimates (PS&E) will include all the applicable elements of a TMP. It is encouraged to begin TMP development early in the project development process.

TMP Implementation, Monitoring, and Revisions during Construction**Step 7 – Re-evaluate/Revise TMP**

If alternative construction phasing/staging plans or other management strategies have been suggested, MDT needs to review the TMP to see if changes are needed. TMPs developed or revised during construction must be approved by MDT prior to implementation (i.e. by change order).

Step 8 – Implement TMP

The TMP is implemented. Some components of the TMP may need to be implemented prior to construction (e.g., public information campaign, improvements to detour routes).

Step 9 – TMP Monitoring

Monitoring the performance of the construction zone and that of the TMP during the construction phase is important to see if the predicted impacts closely resemble the actual conditions in the field and if the TMP is working effectively. Examples of possible performance measures for TMP monitoring include volume, travel time, queue length, delay, number of incidents, incident response and clearance times, contractor incidents, community complaints, user costs, and cumulative impacts from adjacent construction activities. Performance monitoring requirements and measures should be based on MDT policies, standards, and procedures, and should be included in the project contract documents when appropriate. TMP monitoring and assessment are best written into the TMP during TMP development, rather than devised after the fact.

Step 10 – Update/Revise TMP Based on Monitoring

If performance requirements are not met, MDT should revisit the TMP and consider alternate management strategies and/or sequencing/staging approach(es) that meet the approval of MDT.

TMP Performance Assessment**Step 11 – Post-Project TMP Evaluation**

Following construction completion, it is a good idea, particularly for significant projects, to prepare a short report that contains an evaluation of the TMP. Elements to consider including in the post-project evaluation are successes and failures, changes made to the TMP and results of those changes, any feedback received from the public, actual measures of conditions versus what was predicted, cost for implementation of the strategies, and suggested improvements. The findings can be used to help in the development and implementation of future TMPs. TMP performance assessment can aid in addressing the following concerns:

- Which management strategies have proven to be either more or less effective in improving the safety and mobility of construction zones?
- Are there combinations of strategies that seem to work well?
- Should TMP policies, processes, procedures, standards, and/or costs be adjusted based on what has been observed or measured?
- Are the best decisions in planning, designing, implementing, monitoring, and assessing construction zones being made?

APPENDIX E – Public Information (PI) Guidance

A construction zone public information and outreach campaign involves communicating with road users, the general public, area residents and businesses, and appropriate public entities about a road construction project and its implications for safety and mobility. Developing and implementing a public information and outreach campaign should be started well before road construction begins and will require ongoing monitoring throughout the life of the project.

For additional details and examples see FHWA’s manual titled “*Work Zone Public Information and Outreach Strategies.*”

Planning and implementing a public information and outreach campaign involves a set of key steps that will be coordinated and outlined in a public information and outreach plan (PI). Work with the MDT Public Information Officer (PIO) when developing the PI component of the TMP.

1. Determine the appropriate size and nature of the public information and outreach campaign

The size and nature of a public information and outreach effort will be determined by the characteristics of a project, its location, and the anticipated impacts of a road construction project. Aspects to consider include size and duration of the project, the amount of delay anticipated, special traffic and safety conditions such as heavy truck traffic, and disruptions to other modes and key facilities such as airports, stadiums, and hospitals. Also consider the impact on business accesses.

2. Identify resources

In most cases, public information and outreach spending will need to be part of a road construction project budget (PE, CE, CN).

3. Identify partners

Working with a range of partners to design and implement an information and outreach campaign will strengthen the strategies employed and may reduce the costs to MDT. Partners include, among others, State and local agencies, major employers, business and neighborhood associations.

4. Identify target audiences

A key to any communication strategy is to identify the target audience(s). This will help to determine the types of messages that need to be conveyed and the best ways of communicating those messages.

5. Develop the message(s)

In general, the messages communicated by the campaign should provide project information to maintain safety and minimize delay, and should indicate that MDT cares about the driving public. More specific messages might include details of the

construction zone, travel times through the construction zone, and alternate routes and modes of transportation.

6. Determine communication strategies

How information is communicated will depend on the audiences, the messages to be conveyed, and the campaign budget.

7. Determine communication timing

Public information and outreach should not be limited to when a construction zone is up and running. Before work commences is the best time to begin developing partnerships and informing the public about the project, its anticipated impacts, and how to find out more information. Post-construction it is a good idea to publicize completion and to thank project partners.

8. Evaluate campaign effectiveness

Evaluating the effectiveness of a public information and outreach campaign should be part of a long-term effort to improve safety and mobility in and around construction zones. During a long road construction project it is advisable to periodically evaluate the effectiveness of the public information and outreach campaign with the aim of redirecting resources if necessary.

Determine the Appropriate Size and Nature of the Campaign

The size and nature of a public information and outreach effort should ideally be determined by the anticipated impacts of the road construction project. Refer to Impact Levels in Appendix A. For a short-lived, small project causing minor traffic disruption, public information and outreach may be limited to routine publication of details in newsletters, web sites, and/or other traveler information outlet. For projects deemed significant, as described in Appendix A of this guidance, a more elaborate public information and outreach campaign will be warranted. However, most planned and unplanned (emergency) construction zones should incorporate some form of public information and outreach.

A range of elements should be considered when determining the size and nature of a public information and outreach campaign. These include the effects of the project on:

- Traffic delay and safety at both the corridor and network levels, including the effects on parallel corridors and alternate routes.
- Traffic delay and safety at nearby intersections, interchanges, and railroad crossings.
- Special traffic and safety conditions such as heavy truck traffic, steep grades, and poor weather.
- Disruptions of other modes of transportation including public transportation, airports, and pedestrian access.
- Evacuation routes.
- Hazardous material transportation routes.
- Emergency responders (hospitals, fire stations, military installations).
- Other public and private entities (such as schools and universities).

- Planned special events (sporting events, holiday parades, concerts, etc.).
- Businesses and residences.

If a construction zone is relatively small and of short duration, determining its effects may require nothing more than an informal consideration of these factors. In other cases, determining the effects of a construction zone and the needs of a public information and outreach campaign may require some significant data gathering and analysis. In some cases, information will be available from research conducted in the planning stages of the project.

For long-term projects, determining needs may be an ongoing process. Information collected formally (traffic delay data, public opinion surveys, etc.) and informally (community meetings, letters of complaint, etc.) can be helpful in identifying when the plan for the campaign may need to be adjusted to address changing conditions or varying degrees of effectiveness.

Identify Partners

In both the planning and implementation stages of a public information and outreach campaign the lead agency should consider working with a range of partners. Partners in the public information and outreach process may include: (1) State and local agencies (including city/county governments and emergency responders); (2) elected and appointed public officials; (3) construction zone personnel (e.g., construction contractors, traffic control providers, law enforcement); (4) major employers and service providers (e.g. hospitals) in the affected area; (5) other groups such as the local chamber of commerce; (6) traveler information providers, including radio, TV, newspapers, and AAA; and (7) planned special event coordinators.

Identify Your Target Audiences

A key to any public information and outreach campaign is to identify the target audience(s). This will help to determine the types of messages that need to be conveyed and the best methods of communicating those messages. Ultimately, the target audiences are travelers or potential travelers

Determine Communication Strategies

After identifying the appropriate audience and messages for the construction zone project the next step is to determine the strategies that will be used to get the messages to the target audiences. There is a wide range of ways to communicate with the public about construction zones. The strategies used must be tailored to the project context, the message being conveyed, and funding limitations.

The following list provides a number of communication strategies for disseminating construction zone messages:

- Project web site
- MDT construction traveler information website
- Direct mail
- Brochures/flyers/factsheets
- Newsletter
- Highway advisory radio
- Montana Travel Info Phone: 511
- Email alerts
- Radio advertising and public service announcements
- Public meetings/workshops/events
- Newspaper articles, advertising
- TV advertising and feature stories
- Variable message signs
- Personal contacts

Communication strategies can be modified to fit the needs of the project for which they are being used. A combination of several of strategies may make sense for some projects, while only one or two of the strategies may be necessary for other projects. Typically there will be a significant amount of interaction between different means of communication. For example, informational materials such as brochures and fact sheets are often posted to project web sites, thereby making them more widely accessible. Similarly, information posted to project web sites or gained from project materials may be used by news media to provide information through newspapers, the radio, and television news. Furthermore, drivers are likely to use a variety of different means of communication, meaning that messages must be consistent across all communication strategies. A driver who reads something in the newspaper stating that road closures will be occurring over the weekend could potentially refer to the project web site for further information. It is important that the information on the web site is consistent with what was in the newspaper, and also expands on that information by providing more details.

Determine When to Communicate

Providing information to the public should not be limited to when a construction zone is up and running. A public information and outreach campaign should also consider strategies to be implemented before construction begins and after the project is complete. In the before phase, the campaign should concentrate on general information about the project, the problems it may cause, and how to find out more information. This might involve a range of outreach and communication methods such as working groups/planning advisory groups, public workshops, a project web site, print media, and branding. Near the commencement date of a construction zone, it may be appropriate to add other methods such as free media coverage and paid advertising, and the use of variable message signs.

After the completion of the project, an agency can provide information about successes and failures of the project and thank project partners. This is a chance to enhance the image of MDT as a government agency with a customer-driven focus.

The project web site may also be used to publicize information about project completion. Some people may only occasionally travel the area and may be checking to see what is happening. An old web site, if not updated or removed, can become an ambiguous source

of information and cause confusion about whether or not the construction zone is still in place. If the web site is removed, it is recommended that agencies retain ownership of the web site domain name for a period of time following completion of the project in order to prevent others from purchasing the domain name and using it for undesirable means.

Evaluate Effectiveness

Evaluating the effectiveness of a public information and outreach campaign can help improve safety and mobility in and around construction zones. During a long road construction project it is advisable to periodically evaluate the effectiveness of the public information and outreach campaign with the aim of redirecting resources if necessary. An evaluation might include:

- Documenting and reporting the impacts of the construction zone, such as the number of crashes and traffic delay.
- Documenting and reporting the questions, comments, compliments, and complaints received via hotline, web site, letter, etc.
- Assessing perceptions of successes and failures among the project partners.
- Surveying the public, businesses, or commercial truck drivers affected by the construction zone.
- Surveying tourism bureaus or other major facilities near the construction zone, such as rest stops.

One of the best ways of evaluating the effectiveness of a public information and outreach campaign is through a statistically valid telephone survey. Items assessed may include the following:

- Awareness of the project and project information resources.
- Changes in travel behavior including trip timing, routes, travel modes, and destinations.
- Employers' provision of incentives such as flexible schedules, transit payments, company vanpools, etc.
- Travel problems encountered.
- Levels of traveler dissatisfaction.
- Methods of accessing construction zone information.
- Usefulness of the information.
- Knowledge of the reasons for the construction project.

Formal post-construction reviews (PCR's) and informal reviews should include an evaluation of the effectiveness of the PI plan. Documentation and follow-up on the lessons learned will improve the process for future projects.

Communication Strategies

Table E.1 provides guidance on when to use the various communication strategies:

Table E.1 - MDT Public Information and Outreach Strategies for Significant Projects

Strategy	Who	Primary Target Audience	Benefit	Issues	Implementation Phase	Relative Cost to Project
Website www.mdt.mt.gov	- Public Information Office/ Hired Public Information Coordinator	- Pre-trip travelers - Most other audiences	- Access to real-time information. - Ability to access all project related materials in one place. - May be easy to update	- Target audience must be aware of the web site. - May not reach all of the target audience (excludes people without an Internet connection. - Information must be current and active. - Cost will vary dependent on complexity of web site. - Site should be updated daily.	- Pre-construction - Construction - Post-Construction	Low/ Medium
Brochures / flyers Fact sheets / newsletters	- Public Information Office/ Hired Public Information Coordinator	- Local travelers - Commuters - Commercial drivers - Residents	- Low cost - Easy to distribute	- Information can become stale quickly. - Often targets local motorists only. - Must be designed in a manner that makes drivers want to read the information.	- Construction - Post-Construction	Low/ Medium
Public meetings/ task forces / workshops / events	- Designer (preconstruction) - District (during construction)	- Local travelers - Major trip generators - Residents - Businesses - Public officials - Major employers - Local agencies	- Good exposure to the public. - Give agency a chance to raise credibility with the public. - Gives public a chance to voice their concerns. - Chance to solicit information related to construction zones.	- Need to make sure the right audience is at the events. - Need to be wary of making “empty” promises. - Need to be cautious of comments solely from the vocal minority.	- Pre-construction -Construction	Low
Paid newspaper advertising	- Public Information Office/ Hired Public Information Coordinator	- Local travelers (pre-trip) - Commercial drivers (pre-trip) - Major trip generators - Residents and small businesses	- Can reach many people at one time. - The same ad can be used in many different newspapers. - Agency controls the content and timing of the message.	- May not target non-local motorists. - Newspaper readers may skip over ads. - Requires targeted audience to receive the paper.	- Pre-construction - Construction - Post-Construction	Medium/ High

Table E.1 - MDT Public Information and Outreach Strategies for Significant Projects

Strategy	Who	Primary Target Audience	Benefit	Issues	Implementation Phase	Relative Cost to Project
Paid TV advertising	- Public Information Office/ Hired Public Information Coordinator	- Pre-trip travelers - Local travelers	- Can reach many people at one time. - Agency controls the content and timing of the message.	- May not target local motorists. - Time of broadcast	- Pre-construction - Construction - Post-Construction	High
Radio advertising, public service announcements (PSA's)	- Public Information Office/ Hired Public Information Coordinator/ District	- Pre-trip travelers - Local travelers	- Can reach many people at one time. - Little or no cost. - Target people who are likely to use the information.	- May only target local motorists. - Coverage more likely for major projects. - Don't have as much control of the message	- Construction	Low
Project hotline / 511 Montana Travel Info	- Maintenance and Engineering Services	- Pre-trip travelers - Drivers en route	- Information can be accessed whenever it is needed. - Can allow motorists to provide feedback via recorded message. - May be easy to update.	- Information must be current. - Audience needs to be aware of the hotline number.	- Construction	Low/ Medium
Variable message signs (DMS)	- Districts/ Contractor	- Drivers en route	- Provides information directly to motorists affected by the project. - Can provide detour information.	- Message must be easy to read. - Signs must be placed appropriately. - Information should be useful and accurate.	- Construction	Low/ Medium/ High
Emergency and Information Booklet	- Districts	- Construction Staff - Contractors - Emergency Services	- Make information easily available. - Possible faster response time	- Requires contacts to be made by district personnel. - Information needs to accurate	- Construction	Low
Web-connected traffic cameras	- Public Information Office/ Hired Public Information Coordinator/IT/MES D	- Pre-trip travelers - Most other audiences	- Allows users to view real-time traffic conditions. - Users find information credible because they can actually see the traffic conditions on the road	- May exclude users with a dial-up connection. - Cameras can be costly. - MDT doesn't have experience with this method yet.	- Construction	Medium

APPENDIX F – Transportation Operations (TO) Guidance

The TMP team will review and consider the following Transportation Operations strategy areas to mitigate construction zone impacts.

Demand Management

Work with local transit services to attempt to:

- Modify routes or schedules to reduce traffic volumes through the construction zone.
- Consider fare reduction to improve ridership and reduce traffic volumes.
- Identify other alternatives that could reduce traffic volumes using mass transit, such as adding shuttle services.

Other transportation demand management strategies include:

- Park and ride, carpooling promotion.
- Working with large employers to temporarily enact variable work hours, changed work shifts, strategically timed vacations or shutdowns, and telecommuting.
- Encouraging the use of alternate routes.

Corridor/Network Management

Consider the following to improve traffic flow through the construction zone.

- Signal Timing/ coordination improvements.
- Temporary traffic signals.
- Street/intersection improvements.
- Turn restrictions.
- Truck/heavy vehicle restrictions.
- Dynamic lane closures.
- Ramp closures.
- Coordination with adjacent construction zones.

Construction Zone Safety Management

Items to consider are:

- Speed limit reduction/variable speed limits.
- Temporary traffic signals.
- Temporary traffic barrier.
- Crash cushions.
- Temporary rumble strips.
- Construction Safety supervisors and inspectors.
- Road Safety Audits.
- Windshield Surveys.

Traffic/Incident Management and Enforcement

Items to consider are:

- Traffic screens.

- Coordination with media.
- Local detour routes.
- Incident management plan.
- Dedicated or cooperative law enforcement.

APPENDIX G – Construction Zone Data Guidance

Use of Construction Zone Data

MDT staff can use work zone data as follows:

- At the project-level, use field observations, available construction zone crash data, and operational information to manage the construction zone impacts of individual projects while the projects are under construction.
- At the process-level, analyze construction zone crash and operational data from multiple projects to improve MDT processes and procedures, and pursue the improvement of overall construction zone safety and mobility.
- Maintain elements of the data and information resources that are necessary to support the use of construction zone data for the above two activities.

Construction zone crash data are necessary to make an informed assessment of the success of efforts to manage construction zones and their impacts. Available data and information provide the basis for assessing performance and taking appropriate actions to improve performance on individual projects as well as overall processes and procedures.

Using Construction Zone Data at the Project-Level

At the project-level, use the available construction zone crash data and operational information to manage construction zone impacts for specific projects during implementation. Construction personnel will use the data to evaluate whether or not mitigation strategies are needed to correct deficiencies or to improve safety and/or mobility.

Both real-time and archived data from such systems can be used to identify safety and mobility issues and trends and take appropriate action as necessary. Police crash reports are useful tools for evaluating construction zone practices.

Work Zone Crash Assistance Team Process

A “Construction Zone Crash Assistance Team” will be created to review fatalities in construction zones. The team will consist of the Engineering Project Manager, Construction Traffic Control Engineer, and others may be needed, such as District Construction Engineer, Preconstruction Engineer (or representative), Legal, District Traffic Engineer, and Bridge representative (if a structure is hit). The goals of the response team will be to provide support and assistance to the project crew, documentation of the crash, determine if there are any immediate improvements that may be done to the construction zone, follow-up on any “lessons learned” for future construction zones, draft a summary of findings for Legal, and a resource for possible Tort Claims. Note: For MDT Maintenance projects or utility relocations, the team will consist of other personnel as appropriate.

This team should be contacted immediately by the Engineering Project Manager or District Construction Engineer when there is a fatality on their project.

The team will discuss the situation to determine the needed corrective measures and documentation.

This team will meet at the site as soon as reasonably possible, if necessary, and:

- Review the situation.
- Determine if there are any “must fix” issues in the construction zone. Work with the EPM on this item.
- Review, evaluate, and compile a summary of findings with any recommendations to improve temporary traffic control. This document must be directed to Legal Services so that it is “attorney-client privileged”.
- Determine if there are any “lessons learned” that should be communicated statewide. These will not be covered by any privilege.

Notes:

1. Create a phone tree to call this team at all hours. Have a backup person for each team member.
2. EPM or designee should video tape the site and construction zone in both directions as soon as possible. Any video made should have no sound (muted).
3. Determine what type of training these team members may need, i.e. Technical Crash Investigation.
4. Create a help guide, for the project staff, on what to do when a fatality or crash happens. This would be a quick reference to assist them in this stressful situation.

Using Construction Zone Data at the Process-Level

At the process-level, MDT will continually pursue improvements of construction zone safety and mobility by analyzing construction zone crash and operational data from multiple projects to improve MDT processes and procedures. The same project-level data and information from multiple projects may be compiled and analyzed to identify trends and determine if there are common problems that could be remedied by a change in policy or practices. Construction zone crash data may be used to conduct post-construction evaluations, support process reviews, develop lessons learned, and ultimately improve MDT policies and procedures. This data and information typically becomes available during project implementation and needs to be retained and maintained for post construction analysis.

Traditional analysis of construction zone crashes before, during, and after construction projects can be useful in highlighting which types of projects, work activities, traffic situations, or traffic control schemes result in the least crash risk. But crash record systems generally do not contain information about specific projects and construction zone attributes. The value of such analysis is enhanced when crash reports offer greater detail, operational data allows the computation of crash rates, or means exist to link crashes to construction zone features or construction phases.

Developing new data and information resources or modifying existing resources to support the effective use and analysis of construction zone data will likely be an

evolutionary process that occurs over time. As the data are used more to assess and improve construction zone procedures and practices, MDT may find better ways to store and manage data, or identify additional data elements that would be useful to incorporate into data systems. Systems may also need to be adapted or expanded as more data and data sources become available. While maintaining data and information resources for construction zones will entail some effort, these resources greatly increase the ability to identify construction zone issues, detect patterns or trends associated with recurring issues, and determine potential improvements.

Crash Data Analysis

Every two years, the Safety Management Section will perform a statewide construction zone safety engineering analysis, based on the statewide crash records from the Montana Highway Patrol. Construction zone crash trends will be identified with pertinent details. Trend changes will be noted and recommendations for corrective actions or process improvements will be presented to the Work Zone Safety & Mobility Core Team. This team will help finalize the analysis and recommendations for future improvements to construction zones. Any implemented recommendations will be reviewed at the next engineering crash analysis to determine if improvements have been made.

Every year the Work Zone Safety & Mobility Core Team will assess the past construction zone crashes to see if any immediate corrective action can be implemented. This may be completed using confidential crash investigator's reports or other available information/data. The Traffic and Safety Bureau can assist with this review.

Future Goals for the Use of Crash Data

The goal for improved crash data in construction zones is to recognize MDT's needs and strive to improve all types of data. The information and details of the construction zone crash data should be considered during this project development stages and during the traffic records strategic plan implementation plan. MDT should continue to work with the enforcement agencies with timely data and any additional information that may be useful.

Mobility Data Collection and Analysis

MDT will set up procedures to collect traffic delay data and traffic volume data in construction zones for significant projects. MDT staff and FHWA will analyze the data in relation to design projected delays and to established objectives.

Following is a link to the NCHRP report on reducing construction zone crashes:

http://www.trb.org/publications/nchrp/nchrp_rpt_500v17.pdf

The latest Construction Zone Crash Report is available on the Construction webpage:

<http://mdtinfo.mdt.mt.gov/const/workzone.shtml>

APPENDIX H – Strategies for Managing Construction zone Impacts

The following tables contain possible strategies that can be applied to projects during design or construction to minimize the impacts of construction zones.

TABLE H.1: Construction zone Management Strategies by Category, Part I

Temporary Traffic Control (TTC)		
Control Strategies	Traffic Control Devices *	Project Coordination, Contracting and Innovative Construction Strategies
<ul style="list-style-type: none"> • Construction phasing/ • Full roadway closures • Lane shifts or closures <ul style="list-style-type: none"> – Lane width reductions (constriction) – Lane closure – Reduced shoulder width – Shoulder closure – Lane shift to shoulder/median • One-lane, two-way operation • Two-way traffic on one side divided facility (crossover) • Reversible lanes • Ramp closures/relocation • Freeway-to-freeway interchange closures • Night work • Weekend work • Work hour restrictions for peak travel • Pedestrian/bicycle access improvements • Business access improvements • Off-site detours 	<ul style="list-style-type: none"> • Temporary signs <ul style="list-style-type: none"> – Warning – Regulatory – Guide/ information • Channelizing devices • Temporary pavement markings • Arrow panels • Changeable Message Signs (CMS) • Flaggers and uniformed traffic control officers • Temporary traffic signals • Lighting devices • Other safety devices 	<ul style="list-style-type: none"> • Project coordination <ul style="list-style-type: none"> – Coordination with other projects – Utilities coordination – Right-of-way coordination – Coordination with other transportation infrastructure • Contracting strategies <ul style="list-style-type: none"> – Design build – A+B bidding – Incentive/ disincentive clauses – Lane rental • Innovative construction techniques (precast members, rapid cure materials)

* This is intended to be a partial list. A wide range of safety devices are described in part 6 of the Manual on Uniform Traffic Control Devices (MUTCD) and are widely used to enhance safety and mobility in highway work zones.

TABLE H.2: Construction zone Management Strategies by Category, Part II

Transportation Operations (TO)			
Demand Management Strategies	Corridor/Network Management Strategies	Work Zone Safety Management Strategies	Incident Management and Enforcement Strategies
<ul style="list-style-type: none"> • Transit service improvements • Transit incentives • Park-and-ride promotion • Shuttle services • Parking supply management • Variable work hours • Telecommuting 	<ul style="list-style-type: none"> • Signal timing/coordination improvements • Temporary signals • Street/intersection improvements • Turn restrictions • Parking restrictions • Separate truck lanes • Truck/heavy vehicle restrictions • Ramp closures • Bus turnouts • Reversible lanes • Dynamic lane closure system • Railroad crossings controls • Speed limit reduction/variable speed limits • Coordination with adjacent projects 	<ul style="list-style-type: none"> • Changeable Message Signs (CMS) • Temporary traffic signals • Temporary traffic barrier • Crash-cushions • Temporary rumble strips • Intrusion alarms • Warning lights • Construction safety supervisor/inspectors • Project task force/committee • Team meetings • TMP monitor/inspection team • Windshield surveys • Project on-site safety training • Safety awards/incentives • Speed Radar Trailers • Traffic Control Review Team 	<ul style="list-style-type: none"> • ITS for traffic monitoring/management • Surveillance (Closed-Circuit Television (CCTV), loop detectors, lasers, probe vehicles) • Traffic Screens • Total station units • Photogrammetry • Changeable Message Signs (CMS) • Highway Advisory Radio (HAR) • Media briefings • Local detour routes • Transportation Management Center (TMC) • Contract support • Incident/emergency management coordinator • Incident/emergency response plan • Dedicated (paid) police enforcement • Cooperative police enforcement • Increased penalties for construction zone violations

APPENDIX I – Temporary Traffic Control Device Quality Guidance

Creation of this guideline is in accordance with and to satisfy the requirements of the Federal Work Zone Regulation Subpart K of 23 CFR part 630. The Montana Department of Transportation, in partnership with the FHWA, shall develop and implement quality guidelines for temporary traffic control devices. The purpose of this guideline is to help maintain the quality and adequacy of the temporary traffic control devices for the duration of the project. This guidance will also define a level of inspection necessary to provide ongoing compliance of the devices.

An effective temporary traffic control device must meet five basic requirements:

- Fulfill a need.
- Command attention.
- Convey a clear and simple meaning.
- Command respect from the road user.
- Give adequate time for a proper response.

Poorly maintained temporary traffic control devices that do not meet these requirements may not provide the intended purpose. Prudent and reasonable road users must be able to navigate a project in a reasonable safe and mobile manner.

Physical maintenance of temporary traffic control devices is necessary to retain the legibility and visibility requirements. Physical maintenance will also insure the proper functioning of the device. The quality of the work zone devices falls under three categories: acceptable, marginal, and unacceptable.

1. Acceptable: All devices must be new or in like new condition.
2. Marginal: Devices reaching the lower end of like new condition.
3. Unacceptable: Devices exceeding the like new condition. Removal of these devices from the jobsite will occur within 12 hours of notification.

For additional information, refer to the American Traffic Safety Services Association (ATSSA) “Quality Guidelines for Work Zone Traffic Control Devices”. Classifications and color pictures with written descriptions are included for each type of device.

Functional maintenance of traffic control devices is necessary to determine if the devices are performing satisfactorily, the reflectivity is adequate, they are clean, and if they have been moved, damaged, or otherwise rendered ineffective. All temporary traffic control devices must be in compliance with the approved traffic control plan and with the current editions of the MDT Standard Specifications for Road and Bridge Construction, MDT Detailed Drawings, and the Manual on Uniform Traffic Control Devices.

A comprehensive inspection program will include the following:

- Review of contract documents and preparation for inspection – review the traffic control plan to be familiar with the devices specified, the application, operation, and maintenance of each device specified, and what work will occur during each device setup.

- On-site yard inspection – Inspection of the devices before placement in the field is necessary to insure they are appropriate for the traffic control plan and are in acceptable condition. There must also be sufficient devices to meet the needs of the traffic control plan.
- Drive-through inspection – A drive-through inspection enables the inspector to see the traffic control devices and perform the maneuvers required by all drivers. This kind of inspection shall take place for all lanes in both directions and at all entry or exit points within the construction zone. Daytime and nighttime inspections are required to insure devices are functioning properly, are clean and legible, and are maintaining retro reflectivity.
- Stationary observations - A fixed observation point allows the traffic control inspector to view how drivers are reacting to a particular portion of the work zone. Locations with numerous skid marks and areas with new skid marks may indicate a location where drivers are having problems navigating the work zone.
- Walk-up inspections – Major devices such as crash cushions and portable changeable message boards require walk-up inspections. Inspectors must insure that the assembly and installation of the work zone devices comply with the plans, specifications, and manufacturer’s recommendations.
- Nighttime inspections – Work zones must appear on the road at night in the manner that designers and project engineers intended. Therefore, nighttime inspections will occur for both projects with daytime work and those with nighttime work.
 1. For projects with daytime work, nighttime inspections will occur at least twice monthly and when major project alignment changes occur. Along with the concerns previously discussed in this guidance, Inspectors will focus on retro reflectivity of signs and devices, legibility of signs, and verify all steady-burn warning lights are working. The inspector will evaluate ease of navigating the work zone according to the traffic control plan and the devices.
 2. For projects with nighttime work, inspections will occur each night. Inspectors will focus on the issues previously discussed in this guidance along with the following concerns. Workers and flaggers must wear approved retro reflectorized clothing, flagging stations must be appropriately lighted, work zones are appropriately lighted, and pilot cars must be easily identified. The inspector will evaluate ease of navigating the work zone according to the traffic control plan and the devices.
- Documentation – The primary purpose for documenting traffic control information is to evaluate the effectiveness of the traffic control plan and determine needed changes. A daily project diary shall be kept detailing the project traffic control activities and the information required for input into SiteManager. When the inspection process reveals a condition that requires correction, documentation should include the correction needed and the corrections made. The time and by whom the corrections were noted and made shall also be documented.

MDT Field, District, and Helena personnel may perform inspection of the temporary traffic control device quality. Field personnel will inspect the devices daily. District and Helena personnel may perform inspections when requested by the Field personnel or when deemed necessary. All inspection duties will comply with the guidelines of the Work Zone Safety and Mobility Policy. All inspectors shall be trained to assure the appropriate level of knowledge, skills, and abilities for responsible parties to manage and evaluate construction zone safety and mobility.

APPENDIX J – Uniformed Law Enforcement Guidance

(9-15-08)

Creation of this guidance is in accordance with and to satisfy the requirements of the Federal Work Zone Regulation Subpart K of 23 CFR 630. The Montana Department of Transportation, in partnership with the Federal Highway Administration, shall develop a guidance addressing the use of uniformed law enforcement on Federal-aid highway projects. The potential to reduce crashes resulting in fatalities or injuries to workers and road users is another consideration for implementing this strategy. Applying this strategy depends upon the extent that it is practical, possible, and adequate to manage work zone exposure.

In general, the need for law enforcement is greatest on projects with high traffic speeds and volumes. The use of law enforcement can also be used where substantial disruption to or changes in normal traffic patterns due to the work zone is expected. Examination of specific project conditions to determine the need for law enforcement includes but is not limited to the following:

- Frequent worker presence adjacent to high-speed traffic without positive protection devices.
- Traffic control setup or removal that presents significant risks to workers and road users.
- Complex or very short term changes in traffic patterns with considerable potential for road user confusion or worker risk from traffic exposure.
- Nighttime work operations that create substantial traffic safety risks for road users and workers.
- Existing traffic conditions and crash histories that indicate a potential for safety and congestion impacts related to the work zone activity.
- Work zone operations that require brief stoppage of all traffic in one or both directions.
- High speed roadways where unexpected or sudden traffic queuing is anticipated, especially if the queue forms a considerable distance in advance of the work zone or immediately adjacent to the work space.
- High crash corridors.
- Continual problems with road users obeying temporary traffic control signs.

MDT personnel, based upon this guidance, will determine if additional uniformed law enforcement is required beyond normal and routine patrols. When MDT chooses to use additional law enforcement, the appropriate law enforcement personnel should be contacted. Consultation with the local law enforcement personnel will enhance the working relationship between the law enforcement agency and MDT. Additionally, local law enforcement personnel may have useful traffic control ideas which are project specific.

Use of uniformed law enforcement can be determined in both the pre-construction phase

and once construction begins. The Work Zone Safety and Mobility Policy recognizes this strategy under the Transportation Management Plan (TMP). The TMP Team may choose to implement uniformed law enforcement according to the Transportation Operations Plan along with the Construction Zone Management Plan. Law enforcement personnel can be included during discussions to develop these two strategies. Inviting local law enforcement personnel to District pre-construction meetings will also improve interaction between MDT and the law enforcement agency. Project specific communication procedures can be established and discussed during the pre-construction meeting. A project drive-through with law enforcement personnel before construction begins can also result in identifying locations of traffic concerns.

The use of law enforcement personnel can occur in a number of ways once construction begins. The most visible and useful manner is having a uniformed officer in a marked patrol vehicle on-site beyond normal and routine patrols during construction operations. The procedure for obtaining this additional enforcement is as follows:

- MDT District personnel will make the determination to use additional law enforcement personnel. The District Administrator, District Construction Engineer, or District Operations Engineer can make this decision at the District Office level. The Engineering Project Manager may also make the decision at the field project level. Each District may develop a decision protocol to use the law enforcement personnel once the need has been established.
- A basic interagency agreement between MDT and the law enforcement agency is required to address the work zone enforcement needs. This agreement will detail the general nature of law enforcement services provided, procedures to determine project specific services, and reimbursement agreements and procedures for the law enforcement service. The agreement can be found at the following link:

Law enforcement personnel can accompany MDT personnel during construction traffic control reviews once construction is underway. MDT Field and Helena Staff may invite law enforcement personnel on these reviews.

In order for law enforcement personnel to be effective on MDT projects, they should be trained appropriately for the decisions each individual is required to make. The work zone safety and mobility training for law enforcement personnel must be consistent with the training requirements in 23 CFR 630.1008(d). A number of opportunities exist to satisfy this training. The law enforcement agency can offer in-house training. A number of agencies such as the National Highway Institute, the Federal Highway Administration, the American Traffic Safety Services Association, and the Local Technical Assistance Program offer training programs. The Montana Department of Transportation also has training programs available to assist law enforcement personnel.

The intent of this guidance is to offer assistance in obtaining additional uniformed law enforcement on MDT construction projects while still allowing the flexibility needed for the dynamics of construction operations. For further assistance, direct any questions or comments to Jim Wingerter, MDT Construction Traffic Control Engineer with the Construction Engineering Services Bureau.

APPENDIX K – Work Zone versus Construction Zone Guidance

ROAD WORK (Construction Zone) versus WORK ZONE

There has been some confusion recently on the signing of “Work Zones” and the misapplication of signs. The following definitions and appropriate sign descriptions may help to alleviate the problem.

Construction Zone

This is the entire area of a highway construction project. The project is signed at the beginning with a **Warning** sign either:

- G20-1 Road Work Next xx Miles (Rectangular, Black on Orange), or
- W20-1 Road Work Ahead (Diamond, Black on Orange).

The end of the project is signed with:

- G20-2 End Road Work (Rectangular, Black on Orange).

Work Zone

The “Work Zone” is defined by law (61-8-314 Montana Code Annotated). This is an area within the construction zone where work is actually occurring. The work zone must be signed with **Regulatory** signs:

- R97-1 Begin Work Zone (Rectangular, Black on White).
- R97-2 End Work Zone (Rectangular, Black on White).

These signs are unique to Montana based on our State Law, and are not in the MUTCD but are covered in the Detailed Drawings. Montana law further states that:

The boundaries of the work zone may not exceed 500 feet in advance of and beyond the actual construction activity, and

The department of transportation, the local authority, the utility company, or the private contractor shall remove or cover the signs when no work is in progress and no hazard exists.

The main problems observed with these signs are:

- The Work Zone signs are not kept within 500 feet of the work (persons and equipment actually working).
- The Work Zone signs are not removed or covered when there is no work in progress.
- Work Zone signs are confused with Road Work signs (example: the last sign on a project is a Warning sign (Black on Orange) with the legend “End Work Zone”).

Below is a link to the Montana Statute.

<http://data.opi.mt.gov/bills/mca/61/8/61-8-314.htm>

APPENDIX L – Pedestrian Traffic Control Concerns and Guidance

A project was visited on June 9, 2008 by MDT and FHWA officials and again on June 18, 2008 by MDT personnel. Numerous Pedestrian Traffic Control issues were observed during the first trip which resulted in the second visit by MDT Designers, Civil Rights (ADA), and Field Construction crew members. The purpose of the second visit was to observe the dynamics of urban construction and identify Pedestrian Traffic Control issues which could be incorporated in the Traffic Management Plan during the design phase of future projects. The issues of concern identified are as follows:

- Informing pedestrians with visual disabilities of sidewalk closures: The desired way to provide information such as notification of sidewalk closures to pedestrians with visual disabilities is a speech message provided by an audible information device. An audible information device activated by a motion detector is most desirable. Braille is not useful in conveying such information because it is difficult to find and not all visually impaired read Braille. If pedestrians with visual disabilities use a particular route it is best to maintain the route with detectable channelization to the extent possible. When the route has to be closed audible instruction should be provided, but the extra distance and additional street crossings add complexity to the trip.
- Detectable Edging: Detectable Edging is required when it is determined that a facility should be accessible to and detectable by pedestrians with visual disabilities. The detectable edging should be provided throughout the length of the facility such that it can be followed by pedestrians using long canes. The edging should protrude a minimum of 6 inches above the surface of the sidewalk with the bottom of the edging a maximum of 2.5 inches above the surface. A number of facilities and hazards were observed needing detectable edging.
- Pedestrian Channelization at Corners: Some corner locations had a drum with a sign attached indicating the sidewalk/crosswalk was closed. Some of the corners had candles with weighted bases for channelizing pedestrians into the crosswalk. Such locations need to have the detectable edging to prevent entrance or direct visual impaired pedestrians in the direction of safest travel.



- Pedestrian Channelization at Excavations: Small excavations were observed at curbside locations at a few corners and along curbs where the sidewalks extend to the curb without a boulevard. These excavations are being delineated by candles with caution tape attached to the top of the candles. Detectable edging needs to be installed at these locations so as to direct visual impaired pedestrians in the direction of safest travel.
- Pedestrian Channelization at Staging/Storage Areas: The contractor is using the boulevard area as a storage and staging area for construction supplies and equipment at a few locations along the construction zone. If the supplies and/or equipment are encroaching upon the sidewalk, then channelization with detectable edging is required for the flow of pedestrian traffic. When the supplies and equipment are kept back from the sidewalk so that the grassy areas can form a natural detectable edge, then the installed edging is not required. At locations where the sidewalk extends to the curb and if supplies and/or equipment encroaches the sidewalk, channelization with detectable edging is required for the flow of pedestrian traffic through these areas.
- Waterline Crossings: Temporary waterlines are being used to supply businesses and homes. The main temporary waterline was crossing the sidewalk and crosswalks at numerous locations. Individual waterlines to businesses and homes are crossing the sidewalk also. The contractor has provided “ramps” over the various waterlines as they cross the sidewalk and crosswalks. However, in many instances these ramps are skewed to the sidewalk and crosswalk or provide access to a crosswalk that is closed. The main waterline should be placed in the boulevard area as much as possible and any crossings need to be perpendicular to the travelled walkway. The ramp over a waterline leading to a closed crosswalk must be removed and the detectable edging installed as discussed above under the second bullet.
- Maintenance of Crosswalks: This project is dynamic and fluid that changes almost daily. Most all the crosswalks are being kept open with one or two intersections closed from time to time. The contractor must make a reasonable effort to maintain the open crosswalks to provide a smooth travelling surface.
- Because of the dynamic nature of the construction zone, consider the inclusion of a special provision to require, at a minimum, a daily inspection of the traffic control devices and locations, including those used for pedestrian traffic. Special attention should be given to closed sidewalks and detour routes, and the associated signing.
- Consider including a special provision regarding the treatment of pedestrian access to streets and sidewalks:
 - Channelize an ADA accessible pathway when crossing an active work zone.
 - When blocking a street because of active construction, continue the control devices across the sidewalks, and place “sidewalk closed ahead” signs at the intersection ahead of the closure.
 - Close sidewalks adjacent to the active work zones whenever possible if there is staging on the sidewalk or if the construction activity poses a safety threat to sidewalk users. If sidewalk traffic is detoured to another

sidewalk or pathway, maintain the same level of accessibility and accesses provided by the closed sidewalk. If this isn't possible, don't allow staging on that section of sidewalk and require positive separation or channelization between the construction activity and the sidewalk.

Addressing these issues will go a long way in complying with the Work Zone Safety and Mobility Policy, providing a proactive response to pedestrian traffic control concerns in the TMP for future projects, and presenting a construction zone which is pedestrian friendly on this and upcoming projects.

Submitted by:
Jim Wingerter, P.E.
Construction Traffic Control Engineer
June 24, 2008

APPENDIX M – Lump Sum Traffic Control Guidance

Guidance on the use of Lump Sum Traffic Control Bid Item (1-16-08)

This guidance includes general types of projects that are good candidates for using Lump Sum Traffic Control; flexibility in its use is essential. The department will determine on a case-by-case method what projects are appropriate for lump sum traffic control. Some items that will be reviewed in making this decision are:

- Well-defined scope of work.
- Low risk for major changes.
- Well-defined “sequence of work” special provision to include traffic control requirements.
- Well-defined use of detours.

Lump sum projects will have the traffic control rate schedule in the contract to cover additional traffic control for work that is outside the scope of the contract. Following is a list of project types included but not limited to, that are good candidates for the lump sum traffic control bid item:

1. Bridge projects where the cost of the bridge work is a substantial portion of the contract amount.
2. Urban projects that close a road section and have a detour in place that is defined by the sequence of the project and the traffic control for the detour is well defined.
3. Multiple small work area projects with defined work areas such as guardrail, sign or signal installation work.
4. Mobile operations such as rumble strip and pavement marking installation.
5. Phases or portions of a project that can be well defined. Following are some examples:
 - Crossovers
 - Intersections
 - Defined portions that have detours.
6. Interstate projects set up for 2-lane 2-way detours. Kilometer is the recommended measurement method.
7. Other projects determined justified for lump sum traffic control by the department.

Continuous improvement is essential on projects that include lump sum traffic control in the following areas:

- Detailed sequence of operations.
- Traffic control sequence of operation or details.
- Defining what is outside the scope of the lump sum bid item for specific projects.
- Defined use of detours.

As we gain experience in the use of lump sum traffic control, this guidance will be continually reviewed and updated