



# Work Zone Operations

Best Practices Guidebook



U.S. Department  
of Transportation  
**Federal Highway  
Administration**

Publication No. FHWA-HOP-07-131

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**Federal Highway  
Administration**

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<b>16. Abstract</b>  This Work Zone Best Practices Guidebook provides an easily accessible compilation of work zone operations practices used and recommended by various States and localities around the country. The Guidebook is a reference document that can be updated with new approaches, technologies, and practices for effectively managing work zones and reducing the impacts of work zones on mobility and safety as they are identified. The best practices are descriptive not prescriptive. They describe approaches that have been successfully used by transportation agencies, along with contact information to find out more from the agency using the practice. Each organization must determine which of these practices are best suited for its particular situation, considering all the site-specific factors that affect work zone operations.  The best practices are grouped into 11 major categories to help practitioners easily find practices that deal with a particular topic. Practices can also be found via 7 cross-references that enable users to find best practices in several different ways, and a subject index that offers 50 topics and subtopics for more specific searches.  The Guidebook is available in three formats: hardcopy, CD-ROM, and a web-based version. The CD-ROM and web-based versions of the Guidebook provide added electronic search capabilities.			
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## Foreword

This Guidebook is the second release of a resource designed to give State and local transportation agencies, construction contractors, transportation planners, trainers, and others with interest in work zone operations access to information and points of contact about current best practices for improving work zone mobility and safety. The Guidebook is available in three formats: hardcopy, CD-ROM, and a web-based version. The CD-ROM and web-based versions of the Guidebook provide added search capabilities and facilitate widespread distribution and use of the Guidebook. The web-based version of the Guidebook is available via the Federal Highway Administration Office of Operations work zone website: <http://www.fhwa.dot.gov/workzones>. Printed copies and CD-ROMs of the Guidebook can be obtained by sending an email with the name of the publication you are requesting, number of copies needed, and shipping directions, to [workzonepubs@dot.gov](mailto:workzonepubs@dot.gov).

In addition to the collection of work zone best practices and associated cross-references, the Guidebook includes three forms designed to make the Guidebook more useful to current and future users. These are 1) a registration form, 2) a best practices submission form, and 3) a best practices review and comment form. Please complete the registration form so that you can be included in distributions of future editions of this document and notified when updated information is available.

## Acknowledgments

The Guidebook's origins date back to the June 1999 American Association of State Highway and Transportation Officials (AASHTO) Meeting of the Subcommittee on Traffic Engineering. At that meeting, the Director of FHWA's Office of Transportation Operations and the Chairman of the AASHTO Subcommittee's Best Practices in Work Zones Task Force, agreed to collaborate on the development, publication, and distribution of a Work Zones Best Practices Guidebook that would give practitioners easy access to these best practices. Figure 1 provides an overview of how the AASHTO Task Force and FHWA have worked together in the development of the Guidebook.

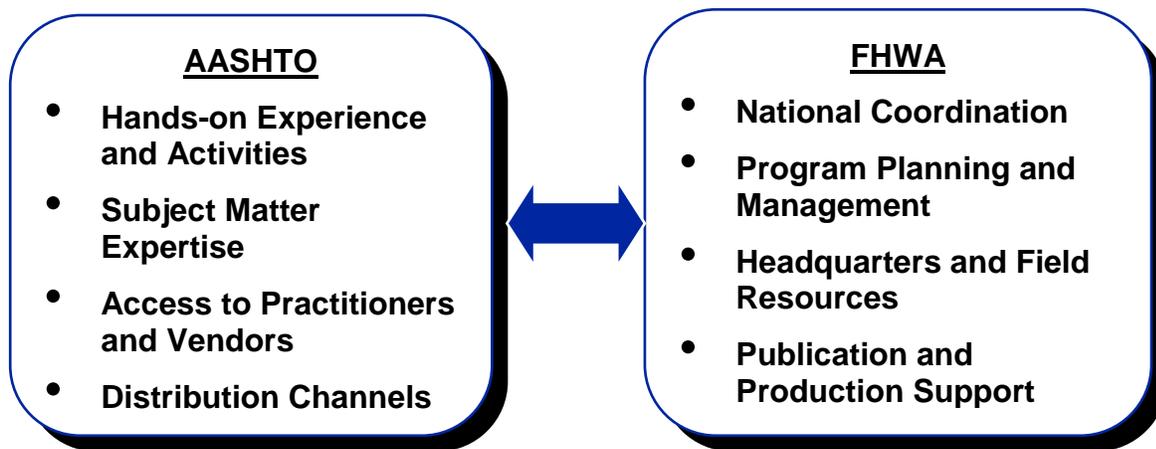


Figure 1. AASHTO and FHWA Collaboration

The AASHTO work zone task force has continued to collaborate with FHWA on the Guidebook. In preparation for this version of the Guidebook, the Task Force provided a review of the practices in the existing Guidebook and provided recommendations for adding, deleting, revising, and combining best practices. Figure 2 provides an overview of the Guidebook development and revision process used by FHWA.



Figure 2. Guidebook Development and Revision Process

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## Work Zone Best Practices Guidebook Registration

Please take a few moments to complete the following registration form. By submitting the form you will be notified when addendums are available on the web site, and included in any distributions of future paper or CD-ROM editions of the Guidebook. After completing the registration form either mail or fax it to: Federal Highway Administration, HOTO-1, Rm E86-206, 1200 New Jersey Avenue, S.E., Washington, D.C. 20590, Fax: (202) 366-3225.

Name:	
Title/Position:	
Organization/Agency:	
Address (include country if other than USA):	
Phone: (    )	Fax: (    )
Email Address:	
Primary Responsibility (especially note responsibilities related to work zone operations):	
Do you want to be notified of additions/changes to the Guidebook? <input type="checkbox"/> yes <input type="checkbox"/> no	
Would you like to receive a paper copy or CD copy of the Guidebook when available? <input type="checkbox"/> yes <input type="checkbox"/> no	
Suggestions for improving the Guidebook:	
Based on your initial impressions, do you feel that this Guidebook will be useful to you in identifying practices that will improve work zone operations? Assign 1 to 4 stars.	
(Not useful)   *                      **                      ***                      ****                      (Very Useful)	

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## Work Zone Best Practice Submission Form

Is your organization using innovative approaches that result in reduced congestion and crashes in work zones? Use the form below to describe what you do to improve work zone operations, whether in policy, planning, public outreach, or during construction and maintenance activities. Reproduce the form as necessary and submit to: Federal Highway Administration, HOTO-1, Rm E86-206, 1200 New Jersey Avenue, S.E., Washington, D.C. 20590, Fax: (202) 366-3225.

State where the practice is employed:												
Title of the best practice/policy:												
Description of the best practice/policy:												
Reason(s) for adopting the best practice/policy:												
Biggest benefit(s) being realized from this best practice/policy:												
Location and type(s) of projects where this practice/policy is most applicable/effective:												
Contact(s) (include name, title, office/agency, phone/fax, and email address):												
Select the one most applicable category from the following list:												
<table> <tr> <td><input type="checkbox"/> Policy and Procedures</td> <td><input type="checkbox"/> Contracting and Bidding Procedures</td> </tr> <tr> <td><input type="checkbox"/> Public Relations, Education, and Outreach (General Public, Driver, and Elected Officials)</td> <td><input type="checkbox"/> Construction/Maintenance Materials, Methods, Practices, and Specifications</td> </tr> <tr> <td><input type="checkbox"/> Prediction Modeling and Impact Analysis: Congestion and Crashes</td> <td><input type="checkbox"/> Traveler and Traffic Information (Project Related)</td> </tr> <tr> <td><input type="checkbox"/> Planning and Programming</td> <td><input type="checkbox"/> Enforcement</td> </tr> <tr> <td><input type="checkbox"/> Project Development/Design</td> <td><input type="checkbox"/> ITS and Innovative Technology</td> </tr> <tr> <td></td> <td><input type="checkbox"/> Evaluation and Feedback</td> </tr> </table>	<input type="checkbox"/> Policy and Procedures	<input type="checkbox"/> Contracting and Bidding Procedures	<input type="checkbox"/> Public Relations, Education, and Outreach (General Public, Driver, and Elected Officials)	<input type="checkbox"/> Construction/Maintenance Materials, Methods, Practices, and Specifications	<input type="checkbox"/> Prediction Modeling and Impact Analysis: Congestion and Crashes	<input type="checkbox"/> Traveler and Traffic Information (Project Related)	<input type="checkbox"/> Planning and Programming	<input type="checkbox"/> Enforcement	<input type="checkbox"/> Project Development/Design	<input type="checkbox"/> ITS and Innovative Technology		<input type="checkbox"/> Evaluation and Feedback
<input type="checkbox"/> Policy and Procedures	<input type="checkbox"/> Contracting and Bidding Procedures											
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	<input type="checkbox"/> Evaluation and Feedback											

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# Table of Contents

Foreword .....	iii
Acknowledgments .....	iv
Work Zone Best Practices Registration Form .....	vii
Work Zone Best Practices Submission Form .....	ix
Work Zone Best Practices Comment Form .....	xi
Table of Contents .....	xiii
Overview of the Guidebook .....	1
Best Practices Cross-References	
By State/FHWA .....	3
By Project Life Cycle Stage .....	4
By Nature of the Work .....	5
By Traffic Conditions .....	5
By Geographic/Demographic Characteristics .....	5
By Roadway Characteristics .....	6
Best Practices Descriptions	
A - Policy and Procedures .....	7
B - Public Relations, Education, and Outreach (General Public, Driver, and Elected Officials) .....	53
C - Prediction Modeling and Impact Analysis: Congestion and Crashes .....	83
D - Planning and Programming .....	91
E - Project Development/Design .....	109
F - Contracting and Bidding Procedures .....	139
G - Construction/Maintenance Materials, Methods, Practices, and Specifications .....	151
H -Traveler and Traffic Information (Project Related) .....	199
I - Enforcement .....	231
J - ITS and Innovative Technology .....	241
K - Evaluation and Feedback .....	269
Best Practices Subject Index .....	291

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## Overview of the Guidebook

This Work Zone Best Practices Guidebook provides an easily accessible compilation of work zone operations best practices used by various States and localities around the country. The Guidebook is a reference document that can be updated with new approaches, technologies, and practices for effectively managing work zones and reducing the impacts of work zones on mobility and safety as they are identified. The best practices are *descriptive* not *prescriptive*. That is, they describe approaches that have been successfully used by transportation agencies, along with contact information to find out more from the agency using the practice. Each organization must determine which of these practices are best suited for its particular situation, considering all the site-specific factors that affect work zone operations.

The best practices are grouped into 11 major categories to help practitioners easily find practices that deal with a particular topic. Practices can also be found via 7 cross-references that enable users to find best practices in several different ways, and a subject index that offers 50 topics and subtopics for more specific searches. The online version also has a search function for searching on a particular word or term of interest.

Each of the 11 sections begins with a description of the work zone practice category and a brief summary of the types of activities implemented. Following this overview of the category, each of the work zone best practices is described in the section. The descriptions include:

- A Best Practice Reference Number
- The Best Practice Title
- Description of the Best Practice
- Reason(s) the Agency Used the Best Practice
- Primary Benefit(s) Being Realized from this Best Practice
- Most Applicable Location and Type(s) of Projects Where this Practice Is Most Effective
- Contact(s).

The cross-reference section of the Guidebook provides a variety of cross-references that allow practitioners to identify best practices based on where they were observed, project life cycle stage, nature of the work zone activity, traffic conditions in the work zone, geographic or demographic characteristics, and the type of roadway involved.

The reference numbers identify each practice by category and subcategory, so that as new best practices are added, they can be added to the appropriate section of the Guidebook and the cross-reference listings. Figure 3 provides an illustration of how the Guidebook is organized.

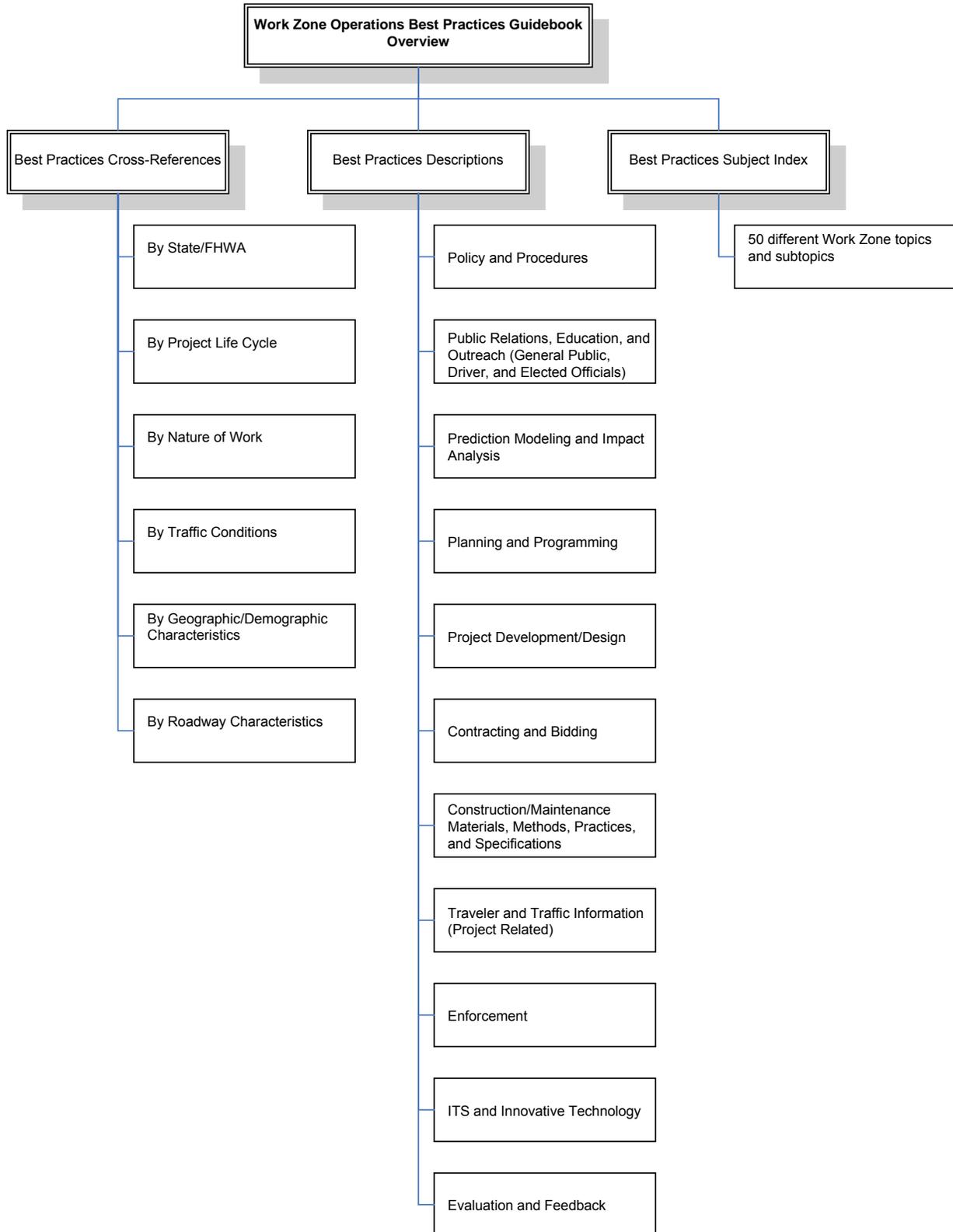


Figure 3. Guidebook Organization

## Best Practices by State and Federal Highway Administration

Arizona	A1-1, A1-2, E1-1, E1-2, H1-1, H2-1, H3-1, H3-7, J1-1, K4-1, K4-2, K5-1
Arkansas	G1-6
California	A2-3, A5-2, D1-1, D3-2, D3-3, E1-3, G1-1, G2-1, G4-1, G4-2, G5-3, H2-2, I1-1, J1-2, J1-3, J3-1
Colorado	A7-2, B4-1, E1-4, K4-3
Florida	A1-3, C1-1, E1-13, F1-1, F3-1, G1-2, G1-3, H1-2, I2-1, K4-4
Georgia	F3-2, H3-6
Illinois	A2-1, A2-5, A6-6, B4-9, E1-5, E2-1, E2-11, G2-1, G4-5, G4-6, G4-13, G4-14, G4-16, G4-17, G4-18, G4-19, H1-3, H1-4, H1-12, H3-2, J2-2, K2-1
Iowa	B1-4, B2-1, B2-2, G2-1, G5-3, H3-6, H3-8
Indiana	C2-1, D1-2, D3-1, E1-6, E1-7, E2-2, E2-3, F4-1, G4-7, H1-5, J1-4, J1-7, J2-1
Kansas	D2-3, K5-3
Massachusetts	A4-1, A6-2, C2-2, E2-4, H2-3, I2-3
Maryland	A2-7, C2-6, G3-1, H3-6, I1-2, I2-2, J1-3, K4-4
Michigan	D1-3, E2-5, F4-2, G4-20
Minnesota	A4-2, B2-2, G5-3, J1-6, J3-2, K4-5, K4-6
Missouri	A5-5, D2-1, F4-1, J1-5, J1-10
Mississippi	B2-3, E3-2, G1-4, G2-1, H3-3
New Jersey	A3-1, C2-3, G3-2, G5-4, I2-2
New Mexico	A2-6
New York	B2-4, G1-5, H3-4, K1-2, K4-7
North Carolina	A1-4, A2-7, A6-4, B1-2, B1-3, B2-5, C2-6, E1-8, E2-6, F4-1, G2-2, G4-21, G5-4, J2-4
Ohio	A1-6, A1-7, A2-7, A3-2, A3-4, A5-3, A6-3, A6-5, C2-6, D1-4, E1-9, F2-1, G4-3, G4-8, G4-9, G4-10, H1-6, H2-4, J1-11, J2-2, J3-3
Oklahoma	A1-5, A2-2, D2-2, E1-10, E2-7, F4-1, F4-3
Oregon	A4-1, A4-3, A5-4, A7-1, B2-6, B3-1, F3-3, G2-1, H1-11
Pennsylvania	A2-4, A2-7, A6-1, B1-4, B1-5, B1-6, C2-4, C2-6, G2-1, G4-15, G5-3, H1-7, H1-8, J1-8
Texas	E2-8, H3-9, I2-4, K3-1
Utah	A2-7, B1-1, C2-5, C2-6, D1-5, E1-11, G2-1, H1-9, H1-10, K2-2
Vermont	G4-12
Virginia	A1-8, B2-7, B2-8, B4-2, B4-3, E1-12, E2-9, G4-4, G4-11, G5-1, G5-2, K5-2
Washington	A2-7, C2-6, E2-10, E3-1, G5-4, H3-5, K4-5
Wisconsin	A2-7, C2-6, D3-4, G4-11, G4-20
Wyoming	A4-1, B2-9, K1-1, K5-4
FHWA	A1-9, A3-3, A4-1, A4-4, A5-1, A5-4, A6-1, A6-2, A7-2, B2-10, B2-11, B4-4, B4-5, B4-6, B4-7, B4-8, D2-4, H1-11, J1-9, J2-3

## Best Practices by Project Life Cycle Stage

Planning	A1-4, A1-7, A1-8, A2-1, A2-2, A4-2, A7-1, C2-1, C2-4, C2-6, D1-5, D2-4, D3-2, F1-1
Project Definition	A1-9, A5-2, C2-2, C2-3, C2-4, D1-3, D2-1, E1-13, E2-1, G4-13, G4-17, G4-18
Concept Plan Development	A5-3, A5-4, D1-2, E1-2, E1-9, E3-1
Interagency Coordination	A2-4, A2-5, A3-3, A3-4, B2-4, B4-5, D1-1, D2-2, D2-3, E1-1, E1-11, H3-9, G2-2, J1-1, K4-1, K4-4, K4-5
Design	A4-1, A2-3, A4-2, A4-3, A6-3, C1-1, E2-11, G4-10, K1-1, K4-4
Preliminary Design	A6-2, E1-2, E1-8, E1-13, E2-5, E2-8, E2-9, E3-1
Design Criteria/Parameters	A1-3, A1-5, A4-2, A5-4, D3-1, D3-4, E2-3, G1-1, G1-4
PS&E Development	A4-3, A5-3, E1-3, E1-7, E2-2, E2-6
Traffic Control/Management Plans	A1-1, A1-2, A1-6, A1-9, A2-1, A2-5, A2-7, A3-3, A4-1, A4-2, A6-1, A6-2, A6-5, A7-2, C2-1, C2-4, C2-5, D1-2, D1-4, D1-5, D2-4, D3-1, D3-2, D3-3, E1-6, E2-4, E2-5, E3-1, E3-2, G4-5, H2-2, H3-5
Final Design	E1-3, E1-4, E1-10, G3-1
Pre-Construction	B4-6, E2-7
Construction	A5-1, G1-2, G1-3, G1-5, G4-13, G5-2, J3-1
Traffic Control	A2-6, A3-2, A6-2, A6-6, A7-1, C2-3, E1-1, E2-3, E2-4, G4-3, G4-7, G4-9, G4-10, G4-11, G4-12, G4-13, J1-6, J1-5, J1-11, K4-4
Enforcement	I1-1, I1-2, I2-1, I2-2, I2-4
Traveler Information	B1-4, B2-4, B2-9, G4-5, H1-1, H1-2, H1-7, H1-9, H1-10, H3-3, H3-4, J1-1, J1-7, J1-9, J2-1, J2-2, J2-3, J2-4
Incident Management	A3-4, E1-11, E3-2, G2-1, G2-2, H1-5
Public Information and Outreach	B1-1, B1-2, B1-3, B1-5, B1-6, B2-1, B2-2, B2-3, B2-5, B2-6, B2-7, B2-11, B4-9, E1-3, E1-5, H1-1, H1-3, H1-4, H1-6, H1-8, H3-3
Post-Construction	A3-1, H3-5, K1-1, K1-2, K2-1, K2-2, K4-2
Inspection/Material Testing	B4-4, K4-6, K4-7, K5-3
Contracting	B4-6, B4-7, E2-8, F1-1, F2-1, F3-1, F4-1, F4-2, F4-3, G4-1, G4-3, G4-6, H2-1

### Best Practices by Nature of Work

Utility Work	A1-2, A1-8, A2-4, C2-2, D2-2, H2-3, H3-6
Resurfacing	A2-5, A5-1, A5-2, A5-3, A6-1, C2-2, F3-1, F3-3, G1-5, H1-6, H2-3, H3-5, H3-6, J1-5, J3-1, K4-1, K5-1, G4-13, G4-14
Markings/Signs	A6-4, G1-3, G4-2, H3-1, H3-2
Maintenance	A2-3, A3-4, B2-10, B4-3, B4-4, B4-8, D1-1, D2-2, G4-11, J3-1, K4-5, K4-6, K4-7, A6-4
Interchange Upgrade	A2-4, D2-1, E3-2
Construction	A1-6, A4-2, B2-5, D1-1, E1-1, G1-2, D2-2, G3-2, G4-16
Bridge Repair	C2-2, D2-1, D3-4, E1-12, E2-11, F3-2, G1-3, G3-1, G2-2, J1-5, H2-3
Bridge Maintenance	A2-5, D1-3
Night Work	A5-4, G1-5, G4-20, G5-3, G5-4, K3-1

### Best Practices by Special Traffic Conditions

High Traffic Volume	A1-3, A1-4, A1-5, A1-7, A4-1, A4-3, A5-2, A7-1, A7-2, B4-6, C2-4, D1-4, D3-4, E1-6, E1-8, E1-12, F4-1, F4-3, H3-6, J2-2
Low Traffic Volume	A4-2, B2-10, D2-2, F3-2, H3-6
High Posted Speeds	A1-3, A1-4, A1-5, A4-3, A6-1, C2-4, E3-2, F4-3, G4-21, H3-6, J2-4, K5-1, K5-2, K5-4
Large Trucks Present	A2-4, A3-3, A5-4, B1-1, B1-3, B1-4, B1-5, B2-9, G4-19, H1-8, H1-10, H3-8, K2-1

### Best Practices by Geographic/Demographic Characteristics

Urban Areas	A2-1, A5-2, A7-1, B2-4, B2-8, B4-6, D1-3, D2-1, D2-2, D3-2, D3-3, E1-1, E1-5, E1-6, E1-7, E1-8, E2-5, E3-1, F4-1, F4-2, G1-2, G4-1, H1-1, H1-3, H1-5, H1-9, H2-3, H2-4, H3-5, H3-6, J1-2, J1-4, J1-7, J2-1, K2-2, K5-2, G1-5
Rural Areas	A4-1, A7-2, B2-8, B2-10, B4-3, C2-2, D2-1, E3-1, F3-3, G1-1, H1-5, H2-3, I2-4, J1-2, J1-4, J1-7, J2-1, J2-4, K5-2
Both Urban and Rural Areas	A1-1, A1-3, A3-3, B1-3, B2-8, B2-10, B4-3, C2-2, D2-1, D3-1, E3-1, F3-2, G1-3, G2-1, G2-2, G5-3, H1-1, H1-3, H1-5, H2-3, H3-6, I2-1, J1-2, J1-3, J1-4, J1-5, J2-1, K4-6, K5-2

## Best Practices by Roadway Characteristics

Any Road	A1-2, A1-6, A2-1, A2-6, A3-2, A4-2, A4-3, A5-1, A5-3, A5-4, A6-3, B1-1, B1-2, B1-4, B2-1, B2-3, B2-5, B2-7, B2-11, B3-1, B4-2, B4-5, B4-7, B4-8, B4-9, C2-1, D1-1, D2-3, D2-4, E31-3, E1-9, E1-13, E2-1, E2-2, E2-3, E2-4, E2-6, E3-1, F2-1, G2-1, G4-9, G4-10, G5-3, G5-4, H1-2, H1-6, H1-7, H1-8, H2-1, H2-2, H2-4, H3-1, H3-7, H3-9, I1-1, I2-2, J1-9, J1-10, J2-3, K1-1, K2-1, K2-2, K4-2, K4-3, K4-4, K4-5, K5-3
Major Arterials	A1-8, A2-4, A2-5, D1-2, D2-2, D3-1, G4-18, G4-19, H1-9, H3-4
Divided Facilities	A1-4, A5-5, D2-2, D3-4, K5-1
Expressways	A1-8, A2-5, A2-4, D2-1, G4-18, I2-1, J1-8, K5-1, G4-19
Freeway Ramps	A1-5, G4-8, A6-6, J1-2
Freeways	A1-3, A1-5, A1-7, A1-8, A2-2, A2-3, A2-4, A4-2, A5-2, A6-5, A7-1, B1-5, B1-6, B2-8, C2-1, C2-2, C2-5, D1-2, D2-1, D3-2, D3-3, E1-1, E1-7, E1-8, E2-5, G1-1, G1-3, G2-1, G4-1, G4-8, G4-15, G4-16, G4-19, G4-21, H1-5, H1-9, H1-11, H2-3, H3-6, I2-1, J1-2, J1-3, J1-4, J1-5, J1-7, J2-1, J3-1, K3-1, K5-2, K5-4
Major Corridors	A3-3, A7-2, B1-3, B2-4, D1-1, D1-2, D1-3, D1-4, D2-2, E1-6
Multi-Lane	A1-3, A6-6, A7-1, B4-3, B4-6, E3-1, F4-1, F4-3, G4-1, G4-3, G4-5, G4-13, G4-15, G4-18, G4-19, J1-3
Surface Streets	B2-10, G3-2, G4-5, G4-13, H2-1, H3-2, J1-8
Toll Roads	C1-1, G4-5, G4-6, H1-4
Two-Lane	A7-2, B4-3, F3-3, G2-2, G4-13, H3-6

## **Best Practices Category A - Policy and Procedures**

Best practices in this section encourage customer driven comprehensive work zone traffic management policies that focus on reducing the exposure of the road user and worker. Policies and practices include high-quality design, construction, and maintenance operations, minimizing disruption to the highway user and maintaining a safe, efficient roadway environment for the traveling public and the highway worker.

Examples of practices include:

- Road and lane closure policies that reduce the period of time that work zones are present on the roadway.
- Committees and task forces that collaborate to minimize project impacts.
- Organizational strategies, structures, policies, and positions to examine work zone issues and impacts.
- Establishing performance goals and measures for work zones, such as maximum delay and/or queue lengths.
- Technical guidance that provides specifications, geometric standards, and life-cycle costing analysis to ensure quality work, materials, and design.
- Traffic management principles that focus on reducing the exposure of road-users and workers.
- Commuter incentives and services to reduce volume and minimize congestion through work zones.

The following best practice entries relate to work zone policy and procedures:

<b>Subcategory</b>	<b>Ref. #</b>	<b>POLICY AND PROCEDURES Best Practices</b>
A1 Closure Policy	A1-1	Road Closure Program
	A1-2	Street Closure Program
	A1-3	Maintain Existing Number of Travel Lanes
	A1-4	Limited Length of Lane Closure
	A1-5	Ramp Closures During Reconstruction
	A1-6	Weekend and Total Closures to Accelerate Work and Minimize Delay
	A1-7	Lane Closure Policy/Map
	A1-8	Lane Closure Coordinator
	A1-9	Narrowing Lanes and/or Reinforcing Shoulders to Maintain the Existing Number of Travel Lanes
A2 Collaboration	A2-1	Roundtable Discussions on Project Issues
	A2-2	Public-Private Partnership Incentives for Early Completion
	A2-3	“Design for Safety” Partnership
	A2-4	Multi-agency Work Zone Safety Committee
	A2-5	Mayor’s Transportation Management Task Force
	A2-6	Traffic Control Logbook
	A2-7	QuickZone Partnership Program
A3 Organizational Strategy	A3-1	Office of Capital Project Safety
	A3-2	Full-Time Work Zone Traffic Control Engineer
	A3-3	I-95 Corridor Coalition
	A3-4	General Operations Information and Incident Management Guidelines
A4 Performance Goals and Measures	A4-1	Work Zone Performance Goal – Maximum Delay Specification
	A4-2	Guide to Establishing Speed Limits in Highway Work Zones
	A4-3	Work Zones Designed at the Posted Speed
	A4-4	Performance Goals in Work Zones

<b>Subcategory</b>	<b>Ref. #</b>	<b>POLICY AND PROCEDURES Best Practices</b>
A5 Technical Guidance	A5-1	Region 4 Guidance – Uneven Pavement and Edge Drop-Off
	A5-2	Long Life Pavement Rehabilitation Program for Urban Freeways
	A5-3	Life-cycle Costing to Select Longer-Lasting Materials and Products
	A5-4	Minimum Geometric Standards for Work Zones
	A5-5	Improved Warning Lights on Vehicles
A6 Traffic Management Planning	A6-1	Removal of Traffic Control Pattern if Not Working Multiple Shifts
	A6-2	Guidelines for Use of Flaggers in Highway Work Zones
	A6-3	“Compendium of Options” (Construction Traffic Maintenance Strategies)
	A6-4	Policy/Standards for Slow Moving Maintenance Operations
	A6-5	Traffic Management in Work Zones
	A6-6	Modified Lane Closure Setup
A7 User Services/ Incentives	A7-1	Commuter Incentives to Minimize Congestion in Work Zones
	A7-2	Transit Vehicles to Reduce Traffic Volume through Construction Work Zones

Policy and Procedures → Closure Policy

A1-1

**BEST PRACTICE:  
Road Closure Program**

**DESCRIPTION:**

Each project is analyzed and a determination is made, prior to construction, concerning road closures that will be permitted during construction. The county has used this process for over 5 years. The county performs a benefit/cost (B/C) study utilizing the traffic volumes, duration of the project, and length of detour that will be required. If the B/C study indicates it is advantageous to close the roadway during construction it will be noted in the contract special provisions. Occasionally, on projects where closure is not so noted in the contract, the contractor may propose a schedule for a lesser duration of road closure that will result in an acceptable B/C rate and the contractor will be permitted to close the roadway. Local traffic access for affected residents and businesses is still maintained during road closures.

**REASON(S) FOR ADOPTING:**

The county is aware of the cost of the project to both the county as well as the traveling public. Road closures are expected to permit the construction to be completed quicker, at lower cost, and with greater safety to both the contract workers and the motorist.

**PRIMARY BENEFIT(S):**

Lower cost, safer project, and construction completed earlier.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Any county road, urban and rural.

**STATE(S) WHERE UTILIZED:**

Arizona

**SOURCE/CONTACT(S):**

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Telephone: (602) 506-4618

Policy and Procedures → Closure Policy

A1-2

**BEST PRACTICE:**  
**Street Closure Program**

**DESCRIPTION:**

This program has been in effect within the city of Phoenix for many years. The program permits the closure of minor city streets for utility and construction work. Local traffic is normally permitted. Through traffic is detoured to adjacent streets. The contractor or utility needing to close the street must obtain a permit from the city prior to starting work. The program is used mainly for overlay and slurry seal type of projects that are normally for short duration.

**REASON(S) FOR ADOPTING:**

It was determined to be much safer for work crews as well as local residents if the amount of traffic through the project was reduced. Construction time can be reduced if the contractor does not have to contend with through traffic.

**PRIMARY BENEFIT(S):**

An increase in safety for both workers and residents. Less conflict between traffic and for construction work results in projects being completed quicker.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All streets and highways.

**STATE(S) WHERE UTILIZED:**

Arizona

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Jim Sparks, Traffic Engineer, City of Phoenix

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Policy and Procedures → Closure Policy

A1-3

**BEST PRACTICE:****Maintain Existing Number of Travel Lanes****DESCRIPTION:**

For Interstate construction the Florida Department of Transportation policy is that the work zone design plans maintain the existing number of lanes for the various work phases. No lane closures will be permitted on Interstate construction where only two travel lanes normally exist. In all cases, traffic volumes will be analyzed to determine if any lane closures can be permitted for short durations. This policy has been in effect since December 1995.

**REASON(S) FOR ADOPTING:**

Public criticism of unnecessary lane closures on existing facilities. This awareness was heightened due to several hurricane evacuations where less than all lanes were available.

**PRIMARY BENEFIT(S):**

Reduced driver delay and frustration and improved public relations.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Type of facility: High-volume/high-speed, urban or rural freeways and other multi-lane access controlled roadways. All types of work.

**STATE(S) WHERE UTILIZED:**

Florida

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Policy and Procedures → Closure Policy	A1-4
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**BEST PRACTICE:****Limited Length of Lane Closure****DESCRIPTION:**

Work zone lane closures are limited to four to five miles within a project. Lane closure length is based on traffic volumes, percent grade, and directional travel demand. The restriction based on roadway grade is applied in the mountainous region of western North Carolina. Directional restrictions are applied in urban areas where rush hour traffic predominates. Lane closure restrictions have been used by the North Carolina Department of Transportation since the early 1990s and have been increasingly used in recent years.

**REASON(S) FOR ADOPTING:**

Controlling the work of the contractor by setting limits on lane closures reduces the opportunity for vehicles to become involved in a collision.

**PRIMARY BENEFIT(S):**

Congestion is reduced and safety of motorists is increased.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This policy applies to high-volume/high-speed divided facilities with major construction projects.

**STATE(S) WHERE UTILIZED:**

North Carolina

**SOURCE/CONTACT(S):**

Stuart Bourne, P.E. Traffic Control Marking and Delineation Engineer,  
North Carolina DOT  
Telephone: (919) 250-4151  
Fax: (919) 250-4195

Policy and Procedures → Closure Policy

A1-5

**BEST PRACTICE:**  
**Ramp Closures during Reconstruction**

**DESCRIPTION:**

The Oklahoma Department of Transportation (ODOT) considers implementing ramp closures on all projects during reconstruction efforts on Interstates and freeways.

ODOT conducts a public hearing for the surrounding neighborhoods to notify the public of the upcoming closures and to address the concerns expressed by the public. Typically, this is done just prior to closing the ramps.

In the future, ODOT plans to conduct the public hearings during the planning and design phases to ensure that all local concerns are addressed and that no local economic hardship will result from the ramp closures. ODOT plans to distribute questionnaires after completion of the construction project to determine how the local population was affected and what improvements can be made to the ramp closure process.

**REASON(S) FOR ADOPTING:**

This policy was initiated to facilitate the reconstruction and improve public relations when existing ramps must be closed for rehabilitation projects.

**PRIMARY BENEFIT(S):**

The primary benefits are facilitating and accelerating the reconstruction. These in turn reduce the motorist delay and improve safety. The secondary benefits derived from this practice are increased public awareness of the construction projects and work zones, less confusion on the local citizens seeking alternate routes, and occasionally, new ideas on different approaches to closing the ramps.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This practice mainly affects the high-speed/high-volume, access-controlled interstates, and freeways during rehabilitation and reconstruction.

**STATE(S) WHERE UTILIZED:**

Oklahoma

**SOURCE/CONTACT(S):**

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Policy and Procedures → Closure Policy	A1-6
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**BEST PRACTICE:**

**Weekend and Total Closures to Accelerate Work and Minimize Delay**

**DESCRIPTION:**

The best practice is the closure of a section of road for a period of time to complete construction. This practice is being used extensively in the reconstruction of the Spring-Sandusky interchange.

**REASON(S) FOR ADOPTING:**

The main reason to adopt the practice is to accelerate the completion of construction projects and to minimize delays.

**PRIMARY BENEFIT(S):**

The contractor can work without worrying about traffic in the work zone. The total time to construct a project and the cost of the project are reduced.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All locations. All types of work.

**STATE(S) WHERE UTILIZED:**

Ohio

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Policy and Procedures → Closure Policy

A1-7

**BEST PRACTICE:****Lane Closure Policy/Map****DESCRIPTION:**

Using the *Highway Capacity Manual* formulas the freeways in the Cleveland area were analyzed using hourly traffic counts. The map shows the times of permitted lane closures that will not cause back ups on either weekdays or weekends. This practice has been in use in its respective Ohio Department of Transportation (ODOT) district for over 5 years.

**REASON(S) FOR ADOPTING:**

Too many lane closures by contractors and ODOT forces caused major back-ups.

**PRIMARY BENEFIT(S):**

Reduced delays for short-term work zones; increased night work; and increased customer satisfaction (happier motorists).

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All freeways. All types of work.

**STATE(S) WHERE UTILIZED:**

Ohio

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Policy and Procedures → Closure Policy	A1-8
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**BEST PRACTICE:  
Lane Closure Coordinator**

**DESCRIPTION:**

The lane closure coordinator serves as a single point of contact for compilation and distribution of information related to planned lanes closures each week. This practice began in 1997 in the Northern Virginia District.

**REASON(S) FOR ADOPTING:**

To avoid concurrent lane closures during maintenance, construction, or utility work on nearby sections of roadway and to avoid conflicts in operations.

**PRIMARY BENEFIT(S):**

Reduce traffic delay and congestion due to multiple operations in nearby areas.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Freeways, arterials and major and minor collectors. All types of work. All locations.

**STATE(S) WHERE UTILIZED:**

Virginia

**SOURCE/CONTACT(S):**

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Policy and Procedures → Closure Policy	A1-9
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**BEST PRACTICE:****Narrowing Lanes and/or Reinforcing Shoulders to Maintain the Existing Number of Travel Lanes****DESCRIPTION:**

The travel lanes are narrowed and shoulder lanes are reinforced (if not built strong enough initially to support traffic) in order to maintain the same number of travel lanes during a work zone. Typically at least one lane is wider than the others and trucks are restricted to the wider lane(s).

**REASON(S) FOR ADOPTING:**

To maintain the overall number of travel lanes in a work zone to the number available for travel without a work zone. To better accommodate future maintenance needs by building or rebuilding shoulders to a higher strength.

**PRIMARY BENEFIT(S):**

Maintaining the same number of lanes helps minimize congestion. Reduced lane widths can have the effect of slowing motorists, increasing the rate of attention thereby improving safety.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All highways.

**STATE(S) WHERE UTILIZED:**

FHWA

**SOURCE/CONTACT(S):**

Methods and Procedures to Reduce Motorist Delay in European Work Zones  
FHWA-PL-01-001 [www.international.fhwa.dot.gov](http://www.international.fhwa.dot.gov) October, 2000

Policy and Procedures → Collaboration

A2-1

**BEST PRACTICE:****Roundtable Discussions on Project Issues****DESCRIPTION:**

Roundtable discussions are held in relatively small groups (i.e., 10 to 12 subject experts) on issues, experiences, and potential solutions to reduce the impacts of urban freeway rehabilitation projects. Project issues are divided into four categories: community outreach, project development process, corridor planning and management, and construction methods/materials.

The first roundtable on construction methods and material was conducted in April 1998. Due to recent Illinois Department of Transportation emphasis/policies on minimizing delay and disruption on construction projects, the need to conduct remaining roundtables is being evaluated.

**REASON(S) FOR ADOPTING:**

Develop new strategies for the rehabilitation and reconstruction of freeways through the generation of new ideas and concepts and the sharing of “best practices.”

**PRIMARY BENEFIT(S):**

Discussions facilitate the exchange of ideas and experience along with an understanding of the issues from the perspective of others such as industry.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Although geared towards high-volume urban rehabilitation projects, the concept has application to any project, especially those with high user impacts.

**STATE(S) WHERE UTILIZED:**

Illinois

**SOURCE/CONTACT(S):**

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Policy and Procedures → Collaboration

A2-2

**BEST PRACTICE:****Public-Private Partnership Incentives for Early Completion****DESCRIPTION:**

The Oklahoma Department of Transportation (ODOT) created a public-private partnership to facilitate early completion of a project. A food chain offered ODOT \$300,000 if the project was completed prior to the grand opening of the new store. ODOT chose to offer the \$300,000 to the contractor as an incentive for early completion of the project.

**REASON(S) FOR ADOPTING:**

This practice was originally begun when a large food chain was building a new store near an existing Interstate interchange that was being rehabilitated and expanded. This practice was received so well by the state government and public that ODOT decided to seek similar public-private partnerships in the future.

**PRIMARY BENEFIT(S):**

Besides reducing user delay, this practice encourages similar public-private partnerships, with the private sector realizing that they receive economic benefits from improved transportation facilities and that they can facilitate similar partnering arrangements at relatively minor expense to themselves and the Department of Transportation can offer these types of incentives with no additional risk or expenditure to themselves.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This type of public-private partnership will be used on a case-by-case basis.

**STATE(S) WHERE UTILIZED:**

Oklahoma

**SOURCE/CONTACT(S):**

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Policy and Procedures → Collaboration

A2-3

**BEST PRACTICE:****“Design for Safety” Partnership****DESCRIPTION:**

This one-time effort was intended to identify 20 or so safety related items for opportunities to develop worker safety practices for designers to consider when designing projects. An example of an item is the design of project access for maintenance workers from off the Right-of-Way (ROW). Some practical considerations were to purchase additional ROW, or to round slopes to provide easier access.

**REASON(S) FOR ADOPTING:**

The California Department of Transportation (Caltrans) Director wanted to look at cross-functional safety improvements. The Director formed a cross-functional task force consisting of design, construction, and maintenance. This effort is currently going through revitalization and the information developed as best practices are being incorporated into the Caltrans Project Engineer Academy curriculum.

**PRIMARY BENEFIT(S):**

Caltrans now has maintenance forces come into the Project Engineer Academy to discuss designing for worker safety. Designers have at their disposal a number of best practices to consider in design.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Reconstruction of freeways.

**STATE(S) WHERE UTILIZED:**

California

**SOURCE/CONTACT(S):**

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Policy and Procedures → Collaboration

A2-4

**BEST PRACTICE:****Multi-agency Work Zone Safety Committee****DESCRIPTION:**

In 1993, the Pennsylvania Department of Transportation (Penn DOT) established a high-level steering committee composed of Department officials, the Pennsylvania State Police, the Pennsylvania Motor Trucking Association, and the construction contracting industry to develop mitigation strategies to reduce the number of fatalities occurring in work zones. The committee was reconvened in 2001.

**REASON(S) FOR ADOPTING:**

This was in response to a dramatic increase in the number of fatal crashes, which occurred in long-term freeway construction work areas even though the work zone traffic control exceeded the requirements described in Part 6 of the MUTCD and PennDOT's policies and regulations.

**PRIMARY BENEFIT(S):**

The number of fatalities in long-term freeway construction projects dropped from a high of 27 in 1993, to 11 in 1994, 5 in 1995, 0 in 1996, and 4 in 1997.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Freeways, expressways, major arterials. Restoration/rehabilitation, utility, etc.

**STATE(S) WHERE UTILIZED:**

Pennsylvania

**SOURCE/CONTACT(S):**

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Policy and Procedures → Collaboration

A2-5

**BEST PRACTICE:****Mayor's Transportation Management Task Force****DESCRIPTION:**

The multi-agency task force meets once a week to review city-wide construction and maintenance activities, which extend beyond roadway projects to include sewer, utility, maintenance, building construction, and other kinds of construction that impact traffic flow. The task force also takes into account up-coming special events. The projects considered by the task force to have the greatest impact to traffic are those included in a weekly bulletin. Moreover, all Aldermanic Offices and a multitude of other agencies, such as police and community organizations, also regularly receive the weekly "Mayor's Bulletin" and task force meeting minutes. By meeting and formulating coordinated traffic flow mitigation efforts, the task force can provide the motoring public advance notice of construction projects and events for the weekend and following week. This enables the public to plan ahead and even avoid, all together, areas where construction activities are going to occur. The task force and bulletin have been in-place since 1982.

**REASON(S) FOR ADOPTING:**

Initially started in response to office building construction and infrastructure projects that were occurring simultaneously throughout the Central Business District, the city surveyed all such activities which might adversely impact traffic flow and began coordinating efforts to help motorists drive through construction work zones of all kinds.

**PRIMARY BENEFIT(S):**

The task force routinely compiles a list of projects and special events that have the potential to significantly impact traffic throughout the City of Chicago. Items are grouped according to geographic location, with the exception of new or priority projects/events, which are grouped at the beginning of the "Mayor's Weekly Traffic Bulletin."

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Types of facilities include all of Chicago's freeways, streets, 2-lane/2-way highways, bridges, and even major building construction sites. The locations throughout the City are broken down in the bulletin by downtown, expressways/major arterials such as the Eisenhower or Chicago Skyway, the Central Area of Chicago, Chicago's North/Northwest areas, the West/Southwest areas and by the South/Southeast areas. The bulletins also indicate basic information relative to the type of work, such as resurfacing, reconstruction, restoration/rehabilitation, utility, etc.

**STATE(S) WHERE UTILIZED:**

Illinois

**SOURCE/CONTACT(S):**

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Policy and Procedures → Collaboration

A2-6

**BEST PRACTICE:**  
**Traffic Control Logbook**

**DESCRIPTION:**

This logbook is used by contractors and Department of Transportation (DOT) employees as an all encompassing traffic control diary and accident record. A format and checklists are provided to ensure similar record keeping by all. Contractor and DOT diaries are compared on a daily basis to determine if entries are compatible. Signature blocks are provided so that each agency can sign off on, or concur with the acceptable entries.

**REASON(S) FOR ADOPTING:**

To provide for uniformity in record keeping.

**PRIMARY BENEFIT(S):**

Uniformity. Since check lists provide prompts, the record keeping process is simplified and more complete.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All work zones.

**STATE(S) WHERE UTILIZED:**

New Mexico

**SOURCE/CONTACT(S):**

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Joe Kinnikin, Association of General Contractors of New Mexico

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Fax: (505) 344-1554

Policy and Procedures → Collaboration

A2-7

**BEST PRACTICE:****QuickZone Partnership Program****DESCRIPTION:**

QuickZone is a work zone delay impact analysis spreadsheet tool developed by FHWA. QuickZone is an open-source, Excel-based application able to quantify corridor delay resulting from the reduced capacity in work zones. QuickZone is able to estimate the impacts of alternative construction phasing plans, assess the impacts of delay mitigation strategies, and support the accurate calculation of incentive/disincentives based on user delay.

The QuickZone Partnership Program is a partnership between a State or local transportation agency and the FHWA. State and local agencies receive a free copy of QuickZone and are able to customize the software to meet specific needs. Partners receive technical support, can attend periodic workshops, and are able to access information via a website to ask questions, receive technical support, and upload or download QuickZone computer code. At the end of 2002, seven States were QuickZone partners.

**REASON(S) FOR ADOPTING:**

The Maryland State Highway Association (MDSHA) was interested in building upon the existing code available in QuickZone, particularly when assessing the impacts of alternative construction phasing. MDSHA customized the software with a State-specific capacity estimation model.

**PRIMARY BENEFIT(S):**

The partnership gives engineers access to the program code and ability to build upon it and customize it to specific work zone situations. Ease of use.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Any State or locality interested in quantifying delay resulting from work zones and adding State-specific functions or values to QuickZone.

**STATE(S) WHERE UTILIZED:**

Maryland, North Carolina, Wisconsin, Ohio, Utah, Washington, Pennsylvania.

**SOURCE/CONTACT(S):**

Jawad Paracha, Maryland State Highway Administration

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Policy and Procedures → Organizational Strategy

A3-1

**BEST PRACTICE:**  
**Office of Capital Project Safety (OCPS)**

**DESCRIPTION:**

The goal of OCPS is to improve and enhance safety awareness in construction work zones for the contractor, construction worker, motorists, and New Jersey Department of Transportation employees. As problem areas are identified in work zones, it will be the responsibility of the OCPS to evaluate and resolve the problem, and then develop a process to prevent it from reoccurring. A recent accomplishment of the OCPS was the development of a new “Safety Program” specification that requires all contractors to have a written safety program prior to starting work on a project. The OCPS will also issue “Safety Alert Bulletins” when needed, develop an employee safety program, and gather and analyze work zone injury data to provide feedback to the construction industry for safety improvement purposes. Work zone safety awareness is also being implemented via revisions to the State’s Motor Vehicle and Commercial Vehicle Driver’s Manuals to include a section on work zone safety. Other areas of public outreach are also being explored, such as requiring driver’s education and defensive driving courses to include a section describing motorist’s responsibilities when passing through work zones.

**REASON(S) FOR ADOPTING:**

The purpose of the OCPS is to reduce injuries and fatalities in work zones, reduce projects costs, and provide uniformity in work zone safety issues and requirements in New Jersey.

**PRIMARY BENEFIT(S):**

Expected benefits include: reduction in injuries and deaths in work zones, reduced insurance rates for contractors, reduction of project costs, and the enhancement of work zone safety awareness on a statewide basis.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Efforts from the OCPS will affect all construction projects in New Jersey.

**STATE(S) WHERE UTILIZED:**

New Jersey

**SOURCE/CONTACT(S):**

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Policy and Procedures → Organizational Strategy

A3-2

**BEST PRACTICE:****Full-Time Work Zone Traffic Control Engineer****DESCRIPTION:**

The Work Zone Traffic Control Engineer is charged with making sure motorists have a safe and efficient means of travel through work zones. The Engineer will also take measures to reduce delays and work zone crashes, and to improve communication with the motorists. Ohio Department of Transportation (ODOT) District 12 (Cleveland area) has used this position for more than 6 years. Similar positions are also used in the Columbus and Cincinnati areas.

**REASON(S) FOR ADOPTING:**

To address increasing delays caused by construction projects. Also to reduce liability from lawsuits in construction zones.

**PRIMARY BENEFIT(S):**

Having a person dedicated to traffic flow and capacity in work zones who does not have to worry about other concerns normally associated with project inspection. Reduced delays in work zones. More informed motorists by using highway advisory radio and portable changeable message signs.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All locations. All types of work.

**STATE(S) WHERE UTILIZED:**

Ohio

**SOURCE/CONTACT(S):**

Dennis O'Neil, Work Zone Traffic Control Engineer, Ohio DOT  
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**BEST PRACTICE/POLICY:  
I-95 Corridor Coalition**

**DESCRIPTION:**

The I-95 Corridor Coalition is a partnership of major public and private transportation agencies, toll authorities, and industry associations, serving the northeastern corridor of the United States from Maine to Virginia. Built on a foundation of cooperation, consensus, and coordination, the Coalition's programs add value to the transportation systems of its member agencies to provide "seamless" travel by well-informed travelers. A number of activities are underway to minimize motorist delays in work zones and coordinate system preservation projects between States:

- Information Exchange Network
- Highway Operations Working Group
- Construction Advisories
- Northeast Travelers Alert Map
- Information Exchange Forums
- Variable Message Signs/Highway Advisory Radio Deployment
- Information Clearinghouse.

Information Exchange Network (IEN) – The IEN provides a sophisticated communications network between all state transportation/highway operations agencies throughout the Corridor. It facilitates the sharing of real-time incident, traffic condition, and construction information among state agencies so that regional diversions can be implemented and/or planned for, as necessary. Currently 52 IEN workstations have been deployed throughout the Corridor.

Highway Operations Working Group (HOGS) – The focus of the HOGS is to improve incident management and highway operations, particularly in multi-jurisdictional situations. HOGS members include operational and law enforcement representatives from member agencies, most of who are responsible for some aspect of facility operations. The HOGS are split into four regional groups and meet several times a years.

Construction Advisories – Bi-weekly construction advisories that summarize construction activity on major facilities throughout the Corridor are produced and distributed by the Coalition for member agencies, the private sector, and the traveling public.

Northeast Travelers Alert Map – This map identifies major construction activities, upcoming events, and typical holiday weekend bottlenecks. It is produced twice

a year (summer and fall) and is made available to the general public free-of-charge at welcome centers and rest areas along the major roadways in the Corridor. It is also available at regional Automobile Association of America (AAA) offices, some truck stops, convention and visitor bureaus, chambers of commerce, and on the Coalitions web page ([www.i95coalition.org](http://www.i95coalition.org)).

Information Exchange Forums – Several exchange forums have been held to facilitate increased knowledge and understanding of activities and technology advancements within the Coalition.

Variable Message Signs/Highway Advisory Radio Deployment – Guidelines have been prepared to ensure that variable message signs have been installed at critical junctures throughout the Corridor, where diverting traffic will assist in mitigating regional congestion.

Information Clearinghouse – Clearinghouse for Coalition members through which information of procurement, operations and maintenance practices, ongoing projects, and other related information is made available.

**REASON(S) FOR ADOPTING:**

Information Exchange Network – To interconnect the corridor agencies into a single dedicated information exchange network for improved communications, coordination, and enhanced regional strategies to manage transportation facilities, and provide tracking information.

Construction Advisories, Northeast Travelers Alert Map, and Variable Message Signs/Highway Advisory Radio deployment – To provide traveler information to motorist in a timely and cost-effective manner for pre-trip and real-time planning purposes.

Highway Operations working Group, and Information Exchange Forums – To provide structured communications among the agencies to coordinate Coalition activities.

Information Clearinghouse – To improve the flow of important information among Coalition member agencies.

**PRIMARY BENEFIT(S):**

The mission of the I-95 Corridor Coalition is to bring the technology and benefit of ITS to the Northeast. More specifically, the Coalition promotes coordination and cooperation among its members to ensure that the latest technologies and systems are applied and implemented in order to create a seamless, multi-modal, and state-of-the-art transportation system from Maine to Virginia.

Improvements in mobility through the implementation of ITS and the Coalition's initiatives will enhance business profitability. For example, a timesaving of as little as 10 minutes per trip for the 14 million eastbound trucks entering New York City each year would translate into a direct cost savings of nearly \$50 million per year.

ITS and related Coalition programs would help to lower infrastructure costs. The capital costs for new highway construction are approaching \$18 million per lane mile in some parts of the region. Over 380 new lane miles would need to be constructed each year in the principle I-95 Corridor urban areas just to maintain traffic flow at current levels of congestion. The total estimated cost for this construction could reach almost \$6.9 billion annually. The annual cost of construction related delays exceeds several hundred million dollars in the Maine to Virginia corridor.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

The Coalition focuses on major high-volume routes in the Maine to Virginia corridor. Any type of construction project that has region-wide implications would be applicable. It is most applicable where long distance auto travelers and commercial vehicle operators need real-time traveler information on construction areas, traffic conditions, and alternate routes.

**STATE(S) WHERE UTILIZED:**

Northeastern States.

**SOURCE/CONTACT(S):**

Dean Larsen, Safety Liaison, National Highway Traffic Safety Administration  
Telephone: (410) 962-2372

Policy and Procedures → Organizational Strategy

A3-4

**BEST PRACTICE:****General Operations Information and Incident Management Guidelines****DESCRIPTION:**

The document outlines Ohio Department of Transportation (ODOT) District 3 practices for handling short-term and long-term activities that impact traffic, including work zone traffic control for construction and maintenance activities. The guidelines provide general construction project information including contractor and ODOT contact names and numbers both during and after hours, a project description, and start date/completion dates. The Guidebook also provides detour routes and procedures for various road segments in District 3.

**REASON(S) FOR ADOPTING:**

To offer a single source to identify what has to be done and who to coordinate with for any type of construction project issues or road closure information.

**PRIMARY BENEFIT(S):**

The Guidebook provides a single, definitive source for contact and project information that can be widely distributed and easily updated.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

The Guidebook is useful during maintenance and construction operations or incidents that involve the State highway system or off-system detours for construction and maintenance projects.

**STATE(S) WHERE UTILIZED:**

Ohio

**SOURCE/CONTACT(S):**

Larry Stormer, Ohio DOT  
 Telephone: (800) 276-4188, ext. 341  
 Email: [larry.stormer@odot.state.oh.us](mailto:larry.stormer@odot.state.oh.us)

Policy and Procedures → Performance Goals and Measures

A4-1

**BEST PRACTICE:****Work Zone Performance Goal – Maximum Delay Specification****DESCRIPTION:**

Analyses are performed, during design, based on volume and reduced capacity due to work zone operations. If the expected delay approaches or exceeds a specified time-period, alternative traffic management plans or work hours are considered.

- Massachusetts Highway Department has had a 12-minute work zone delay rule in effect for over 5 years.
- Wyoming and Oregon Departments of Transportation have a 20-minute maximum delay rule in effect for work zones.

**REASON(S) FOR ADOPTING:**

This specification was adopted in order to minimize delay to motorists. A design practice was needed to give insight into the reduction of congestion through work zones. It helps in preparing and understanding such issues as stage construction and allowable work hours.

**PRIMARY BENEFIT(S):**

This type of approach can be beneficial for both the motorist and the contractor. It allows the contractor to perform work that delays the public, but limits this delay to a managed amount. Allowing some delay can make the contractor's approach to their work somewhat easier than if no delay were allowed. It allows motorists to continue to use existing routes without unreasonable delays or detours.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This practice is applicable to major construction activities. It is especially applicable to environmentally sensitive or remote rural locations in which major construction activities are performed under traffic because no reasonable detours exist.

**STATE(S) WHERE UTILIZED:**

Massachusetts, Oregon, Wyoming

**SOURCE/CONTACT(S):**

Charles F. Sterling, P.E.; Traffic Engineer; Massachusetts Highway Department  
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Mike Gostovich, State Traffic Engineer, Wyoming DOT  
Telephone: (307) 777-4491

Policy and Procedures → Performance Goals and Measures

A4-2

**BEST PRACTICE:****Guide to Establishing Speed Limits in Highway Work Zones****DESCRIPTION:**

The Minnesota Department of Transportation (Mn/DOT) has produced a document entitled, "A Guide to Establishing Speed Limits in Highway Work Zones." This document outlines the guidelines, proper layouts, and procedures for implementing work zone speed limits. Mn/DOT used the guide in a training class that they presented throughout the State of Minnesota in 1997-98. Through this training class Mn/DOT has trained over 500 people.

**REASON(S) FOR ADOPTING:**

Mn/DOT developed this document to provide uniform guidelines for the proper application of speed limits in highway work zones. Work zone safety is enhanced with proper use of speed limits throughout the length of a work zone. Proper practice also aids in speed limit enforcement efforts.

**PRIMARY BENEFIT(S):**

Work zone speed limits in Minnesota are now being implemented and signed more uniformly. This should be effective in making work zones safer for the highway worker and the traveling public.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

The use of this guide is applicable to all highway work zones.

**STATE(S) WHERE UTILIZED:**

Minnesota

**SOURCE/CONTACT(S):**

Craig Mittelstadt, Work Zone Safety, Minnesota DOT  
 Telephone: (651) 296-5714  
 Email: [craig.mittelstadt@dot.state.mn.us](mailto:craig.mittelstadt@dot.state.mn.us)

Bill Servatius, Construction Programs Coordinator, Minnesota DOT  
 Telephone: (651) 296-2721

Mitch Wibee, Work Zone Safety, Minnesota DOT  
 Telephone: (651) 284-3464

Policy and Procedures → Performance Goals and Measures

A4-3

**BEST PRACTICE:****Work Zones Designed at the Posted Speed****DESCRIPTION:**

In instances where traffic realignment is required through the work zone, the realignment (e.g., reversing curves and super elevations) is designed for the posted speed rather than the reduced work zone speed. This practice has been in effect for over 12 years.

**REASON(S) FOR ADOPTING:**

Simply posting signs with a lower speed through a work zone, without any enforcement, often does not result in reduced speeds.

**PRIMARY BENEFIT(S):**

The biggest benefit is that safety is enhanced through the project. Without the unexpected curves, the traffic flow is maintained and rear-end accidents are reduced. The elimination of sharp curves also reduces the amount of truck rollover crashes and the number of vehicles running off the road.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Any type of work requiring the realignment of traffic. This practice is considered for every project. It is most effective for high-volume/high-speed locations.

**STATE(S) WHERE UTILIZED:**

Oregon

**SOURCE/CONTACT(S):**

Nick Fortey, Transportation Safety Engineer, FHWA Oregon Division Office

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Policy and Procedures → Performance Goals and Measures

A4-4

**BEST PRACTICE:**  
**Performance Goals in Work Zones**

**DESCRIPTION:**

Road agencies set goals, such as reducing motorist delays by maintaining the same number of lanes in work zones. Agencies coordinate with members of the project team to ensure that goals are met.

- Germany uses a computer model to determine traffic flows during the work period, and if volumes are greater than a specified amount, no lane closures are allowed for that time period. Other goals used by Germany include limits on the number of roadway projects allowed on holidays and limiting roadway projects to a certain length.
- The Netherlands has three equal goals: minimize delay, maximize safety of road users, and maximize safety of road workers. The Netherlands hopes to reduce the amount of work zone delays to 6% of all traffic delays. Based on these goals, the Netherlands has found it is often cost-effective to use road closures for maintenance or reconstruction.
- France is working to keep delays caused by construction and maintenance work to no more than a 6% loss of time over a 100-km stretch of roadway.

**REASON(S) FOR ADOPTING:**

To maximize overall performance in work zones, and better meet customer needs.

**PRIMARY BENEFIT(S):**

Reduced customer delay.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Any work zone.

**STATE(S) WHERE UTILIZED:**

FHWA

**SOURCE/CONTACT(S):**

Methods and Procedures to Reduce Motorist Delay in European Work Zones  
 FHWA-PL-01-001 [www.international.fhwa.dot.gov](http://www.international.fhwa.dot.gov) October, 2000

Policy and Procedures → Technical Guidance

A5-1

**BEST PRACTICE:****Region 4 Guidance – Uneven Pavement and Edge Drop-Off****DESCRIPTION:**

The guidance was issued October 31, 1997. The guidance is contained in two tables: one for low speed (<50 km/hr), and one for high speed (>50 km/hr) by type of drop-off (all surfaces, centerline for opposing traffic, edge line, and outside of edge line). The values given were based on review of the January 1996 American Association of State Highway and Transportation Officials (AASHTO) Roadside Design Guide; 1988 Manual for Uniform Traffic Control Devices (MUTCD), Part 6, Revision 3 (September 1993); and National Center for Asphalt Technology (NCAT) Research Report 96-3, "A Study of Longitudinal Joint Construction Techniques in Hot Mix Asphalt (HMA) Pavements."

**REASON(S) FOR ADOPTING:**

The guidance replaced Region 4 guidelines issued February 27, 1989. Recommended construction practices for Superpave mixes suggest using thicker lifts than generally used in the past. The thicker lifts used in Superpave construction can result in drop-offs that exceed the recommendations of the 1989 guidelines. The revised guidance permits more flexibility in making decisions concerning drop-offs and appropriate mitigation measures.

**PRIMARY BENEFIT(S):**

The revised guidance explains in more detail mitigation measures for various drop-off conditions. The suggested mitigation measures are based on field experience and research conducted since 1989 and serves to implement the Superpave program.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All types of projects.

**STATE(S) WHERE UTILIZED:**

Southern States

**SOURCE/CONTACT:**

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Policy and Procedures → Technical Guidance

A5-2

**BEST PRACTICE:****Long Life Pavement Rehabilitation Program for Urban Freeways****DESCRIPTION:**

The Long Life Pavement Rehabilitation Program (LLPRP) for Urban Freeways began in April of 1997. It grew out of the California Department of Transportation (Caltrans) Headquarters, Office of Maintenance, specifically Pavement Managers, as they developed proposals for multi-year funding of 4R work on the State system. All pavement rehabilitated under the LLPRP will have 30–40 year design life. Thus the program will pay dividends to the highway users and Caltrans in reducing the frequency of maintenance and rehabilitation treatments, thereby reducing the number of work zones, number of maintenance activities, and therefore worker exposure.

**REASON(S) FOR ADOPTING:**

The driving force behind long life pavement rehabilitation strategies is user costs. The most significant factor in driving up user costs are delays due to congestion, something freeway users clearly do not want. An extra benefit of this strategy is to reduce the number and duration of lane closures during pavement reconstruction, rehabilitation, or maintenance.

**BIGGEST BENEFIT(S):**

Long life pavement rehabilitation strategies are developed to meet highway users' demands (i.e., safe, smooth freeways, with minimal disruptions to traffic and minimum delays for road work). Since construction windows are confined to off-peak hours, the disruption to traffic is minimized. Innovative materials, such as FSHC with higher compressive and flexural strengths, have been developed to maximize productivity within the narrow work windows.

LLPRP treatment is intended to reduce the frequency of highway work. The extra dollars paid up front for the longer design life will pay dividends by extending the time between required periodic maintenance and rehabilitation, and reduce the related traffic delays, additional operating costs, and pollution. Reducing the frequency of highway work will enhance the safety of users and highway workers.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Urban high-volume freeway rehabilitation.

**STATE(S) WHERE UTILIZED:**

California

**SOURCE/CONTACT(S):**

Steve Healow, Transportation Engineer, FHWA California Division Office

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Policy and Procedures → Technical Guidance

A5-3

**BEST PRACTICE:****Life-Cycle Costing to Select Longer Lasting Materials and Products****DESCRIPTION:**

When selecting the type of pavement to be used, a life cycle cost analysis is performed to determine what type of pavement would be the best choice.

**REASON(S) FOR ADOPTING:**

In the past, pavements were selected for a variety of reasons: supply, personal choice, maintenance, etc. These reasons were never quantified; instead they were generally subjective. In many instances the decisions were correct, but sometimes they were not and did not result in a long pavement life.

**PRIMARY BENEFIT(S):**

A life cycle cost analysis provides quantitative information about which pavement type you should use on a project. Longer lasting pavement will drastically reduce the frequency of work zone activity in the future.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All types of projects. All locations.

**STATE(S) WHERE UTILIZED:**

Ohio

**SOURCE/CONTACT(S):**

Dave Miller, Pavement Designer, Ohio DOT  
Telephone: (614) 995-5991

Policy and Procedures → Technical Guidance

A5-4

**BEST PRACTICE:****Minimum Geometric Standards for Work Zones****DESCRIPTION:**

It is Oregon's policy that work zone lane and shoulder widths will meet the minimum geometric standards specified in the Oregon Department of Transportation (ODOT) Highway Design Manual. Internal policy also calls for 300 foot minimum acceleration lanes. This policy has been in effect for over 12 years.

**REASON(S) FOR ADOPTING:**

Wider lanes and shoulders increase work zone safety by reducing the potential for sideswipe accidents and truck off-tracking. The safety of the construction personnel is also improved because they are farther away from moving traffic.

**PRIMARY BENEFIT(S):**

Safety is enhanced through the project by reducing the number of potential conflicts often associated with narrow lanes and shoulders.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Any type of work. This practice is considered for every project. It is most effective for high-volume/high-speed locations.

**STATE(S) WHERE UTILIZED:**

Oregon

**SOURCE/CONTACT(S):**

Nick Fortey, Transportation Safety Engineer, FHWA Oregon Division Office

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Policy and Procedures → Technical Guidance

A5-5

**BEST PRACTICE:  
Improved Warning Lights on Vehicles****DESCRIPTION:**

The Missouri Department of Transportation (MoDOT) outfits trucks with a more visible type of warning light. The new strobe type light utilizes a 180 watt output controller to increase the power and visibility of the lights on MoDOT vehicles, compared to standard 50 watt bulbs. The strobe light system regulates each output at a constant rate, and is able to power up to eight outputs with equal intensity. Through field tests travelers indicated that the light was more visible with better recognition, even up to 1 mile away.

**REASON(S) FOR ADOPTING:**

To increase the visibility of MoDOT vehicles by upgrading the warning lights on MoDOT equipment. To increase the safety of employees.

**PRIMARY BENEFIT(S):**

Benefits anticipated are achieving better motorist recognition and better operator visibility. Accidents should be reduced and productivity should be improved.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Any State vehicle.

**STATE(S) WHERE UTILIZED:**

Missouri

**SOURCE/CONTACT(S):**

Nelson Cook, Missouri DOT

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Email: [cookn@mail.modot.state.mo.us](mailto:cookn@mail.modot.state.mo.us)

Policy and Procedures → Traffic Management Planning

A6-1

**BEST PRACTICE:****Removal of Traffic Control Pattern if Not Working Multiple Shifts****DESCRIPTION:**

This practice requires the contractor to remove a lane closure if not working multiple shifts. This practice is used on milling and paving projects.

**REASON(S) FOR ADOPTING:**

This practice is used to encourage the contractor to work multiple shifts and improves driver expectations by only having lane closures during work periods.

**PRIMARY BENEFIT(S):**

Improved customer service, safety, and driver expectation.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This is used on mill and pave projects on high-speed/high-volume roads.

**STATE(S) WHERE UTILIZED:**

Pennsylvania

**SOURCE/CONTACT(S):**

Timothy M. Scanlon, Traffic Engineering Manager, Pennsylvania Turnpike Commission

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Policy and Procedures → Traffic Management Planning

A6-2

**BEST PRACTICE:****Guidelines for Use of Flaggers in Highway Work Zones****DESCRIPTION:**

This guideline/regional policy identifies the type of work zone situation which warrants the use of a civilian flagger and which situations warrant the use of uniformed police officers. This guideline was prepared particularly for use by the Massachusetts Division Office in working with the Massachusetts Highway Department on assigning police details to Federal-aid construction projects. The guideline has been shared with the other Divisions in the northeast, and may have application for all States using uniformed police officers in highway work zones.

**REASON(S) FOR ADOPTING:**

Concern had been raised by the media, legislative representatives, and the general public, that uniform police details were being used on construction projects in some States in the northeast, particularly in Massachusetts, where their presence was not necessary. A review was made by the FHWA of existing practices to determine where the use of police details and of flaggers would be most appropriate and then develop guidelines for implementing their recommended use.

**PRIMARY BENEFIT(S):**

This guideline has been used by the FHWA Massachusetts Division in determining Federal-aid participation in police details on Federal-aid construction projects. The guideline also provides a basis for a work zone designer to make initial assignments and estimates of uniformed officers and of flaggers on a construction project under design.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All Federal-aid projects.

**STATE(S) WHERE UTILIZED:**

Massachusetts

**SOURCE/CONTACT(S):**

Dean Larsen, Safety Liaison, National Highway Traffic Safety Administration  
Telephone: (410) 962-2372

Policy and Procedures → Traffic Management Planning

A6-3

**BEST PRACTICE:****“Compendium of Options” (Construction Traffic Maintenance Strategies)****DESCRIPTION:**

The “Compendium” is a listing of strategies and options that should be considered by designers for maximizing capacity while maintaining traffic through work zones. It is broken down into 6 areas: 1) construction/traffic maintenance strategies, 2) options outside the work zone, 3) options inside the work zone, 4) time limitations with liquidated damages, 5) contracting procedures, and 6) administrative options. This guidance has been in use since 1996.

**REASON(S) FOR ADOPTING:**

The Ohio Department of Transportation’s (ODOT) goal is to reduce delay and improve safety for both workers and motorists through work zones. It was also one of ODOT’s first efforts to identify and disseminate best practices throughout its districts.

**PRIMARY BENEFIT(S):**

Improved capacity and safety through work zones.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All types. All locations.

**STATE(S) WHERE UTILIZED:**

Ohio

**SOURCE/CONTACT(S):**

Ken Linger, Safety Program Engineer, Ohio DOT

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**BEST PRACTICE:****Policy/Standards for Slow Moving Maintenance Operations****DESCRIPTION:**

First, a determination is made if an operation is continuously moving (e.g., striping) or if it is a mobile operation that will stop periodically (e.g., pot-hole patching). Standard drawings are provided for both types of slow moving (3 MPH or faster) maintenance operation caravans. The number of advance vehicles with signs, arrow panels, and a truck-mounted attenuator at the approach to the application vehicle will vary based on the type of facility where the operation will take place.

**REASON(S) FOR ADOPTING:**

The increase in volume and speed along the highway-type facilities in North Carolina led to an increase in collisions between motorists and maintenance vehicles. Before these standards were introduced, there was no clear differentiation in traffic control required between 2-lane/2-way facilities, and high-speed/high-volume divided highways.

**PRIMARY BENEFIT(S):**

There has been a significant reduction in serious collisions between motorists and maintenance vehicles since the introduction of the Moving Operation Caravan standard drawings.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This procedure applies to all routes where a moving maintenance operation occurs.

**STATE(S) WHERE UTILIZED:**

North Carolina

**SOURCE/CONTACT(S):**

Stuart Bourne, P.E. Traffic Control Marking and Delineation Engineer  
North Carolina DOT  
Telephone: (919) 250-4151  
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Bradley Hibbs, Traffic Operations & Safety Engineer, FHWA North Carolina  
Division Office  
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Policy and Procedures → Traffic Management Planning

A6-5

**BEST PRACTICE:****Traffic Management in Work Zones****DESCRIPTION:**

The Ohio Department of Transportation (ODOT) has developed a policy to move traffic through all work zones on interstates and other freeways by the elimination or reduction of delays. The policy moves the determination and analysis of options for maintenance of traffic to the beginning of the project development process, and contains queue thresholds and time limits to aid designers in choosing the proper strategies. For example, projects on interstate highways must maintain two open lanes in each direction at all times, queues must not exceed 1.5 miles at anytime, or 0.75 mile for more than 2 hours. If analysis modeling during project development shows that thresholds will be exceeded, other strategies for traffic management and project phasing must be used or a waiver must be requested.

**REASON(S) FOR ADOPTING:**

ODOT's goal is to minimize the impacts on the traveling public resulting from the implementation of the work zone.

**PRIMARY BENEFIT(S):**

Reduced travel delay associated with work zones, along with reduced work zone related crashes.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Interstates and other freeways.

**STATE(S) WHERE UTILIZED:**

Ohio

**SOURCE/CONTACT(S):**

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Policy and Procedures → Traffic Management Planning

A6-6

**BEST PRACTICE:**  
**Modified Lane Closure Setup**

**DESCRIPTION:**

Advanced signing is used to separate exiting traffic from through traffic. Exiting traffic is directed to the right lane, while through traffic is directed to the left lane. The right lane traffic can smoothly exit without queuing. The right lane is then closed beyond the exit. The through traffic (now in a single lane) travels in the left lane past the exit, then weaves back to the right as it approaches a work zone which is in the left lane.

**REASON(S) FOR ADOPTING:**

Closing the right lane forces through traffic to the left lane leaving the right lane open for traffic trying to reach the exit ramps which are in the area of the queue.

**PRIMARY BENEFIT(S):**

Improved traffic flow for exiting traffic and for through traffic.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Lane closures which begin near interchange ramps.

**STATE(S) WHERE UTILIZED:**

Illinois

**SOURCE/CONTACT(S):**

Charleen Boudreau, Construction Field Engineer, Illinois DOT

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Policy and Procedures → User Services/Incentives

A7-1

**BEST PRACTICE:****Commuter Incentives to Minimize Congestion in Work Zones****DESCRIPTION:**

Techniques such as incident management and an aggressive lane rental specification are used to preserve existing freeway capacity on Oregon Department of Transportation (ODOT) projects. To minimize congestion ODOT also implemented demand reduction measures to reduce the number trips made in the corridor during peak commute periods. Demand reduction measures included:

- Providing transit incentives such as free Amtrak commuter rail service.
- Providing carpool incentives such as free carpool parking.
- Implementing guaranteed ride home program.
- Temporarily converting general purpose travel lanes to HOV lanes.
- Increasing transit service coverage and frequency.
- Constructing additional or expanding existing park and ride lots so that transit connections are more convenient.
- Marketing and promoting telecommuting, job-sharing, and employee flextime programs with employers in the affected area.

**REASON(S) FOR ADOPTING:**

In anticipation of traffic congestion resulting from reduced freeway capacity due to highway construction-related impacts, ODOT and local transit providers worked together to implement travel demand reduction measures in order to maintain acceptable levels of service through the work zone.

**PRIMARY BENEFIT(S):**

Benefits include reduced traffic congestion in the work zone and less traffic diverted onto neighborhood streets; attracting drivers from single-occupant vehicles during construction with the additional benefit of retaining some ridership beyond the project completion; and improving air quality due to fewer vehicles in the traffic stream.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Projects in urban areas with established transit systems in operation would be applicable. Projects on facilities with HOV lanes or general-purpose lanes that could be converted to HOV in locations with established carpool programs in operation can also benefit from commuter incentive programs.

**STATE(S) WHERE UTILIZED:**

Oregon

**SOURCE/CONTACT(S):**

Jeff Graham, Operations Engineer, FHWA Oregon Division Office

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**BEST PRACTICE:**

**Transit Vehicles to Reduce Traffic Volume through Construction Work Zones**

**DESCRIPTION:**

This practice involves the purchase of transit vehicles and provision of temporary transit priorities during construction to attract transit ridership (and reduce auto use) during construction.

**REASON(S) FOR ADOPTING:**

Full reconstruction and expansion of a highly congested (but rural) corridor was anticipated to cause significant delays to commuter-users. Reducing the number of cars would improve the situation, so increased transit use was encouraged through the purchase of additional transit buses and providing transit queue bypass opportunities. Construction included improvement of existing shoulders for bus-bypass use.

**PRIMARY BENEFIT(S):**

Provision of priority bypass for transit buses results in less delay for transit users. Encouraging transit use results in reduction in the number of cars in use during highly congested periods, which reduces delay for all travelers.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Two-lane rural NHS corridor undergoing reconstruction and expansion.

**STATE(S) WHERE UTILIZED:**

Colorado

**SOURCE/CONTACT(S):**

Ralph Trapani, Colorado DOT  
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## Best Practices Category B - Public Relations, Education, and Outreach (General Public, Driver, and Elected Officials)

Public relations, education, and outreach are activities performed to inform, notify, and educate the general public about work zone activities, safety, and impact mitigation. Best practices in this section help keep the driving community and elected officials informed, involved, and sensitive to the highway worker and work site safety needs. These practices emphasize strategies to provide detailed project information to the public including type of work being completed, expected duration, delay, and strategies to avoid delay.

Examples of practices include:

- Public relations campaigns and materials for the general public and elected officials.
- Public relations campaigns directed to trucking groups and commercial drivers.
- Strategies for developing partnerships with the media.
- Reference and training materials for contractors and State and local transportation agency employees.

The following best practice entries relate to public relations, education, and outreach:

Subcategory	Ref. #	PUBLIC RELATIONS AND OUTREACH Best Practices
B1 Drivers (Psngr/Truck)	B1-1	Motor Carrier Initiative to Prevent Work Zone Crashes
	B1-2	Work Zone Safety Campaign: "Work Zone – Stay Alert"
	B1-3	Work Zone Safety Video for Truckers
	B1-4	"Wizard" CB Radio Transmissions Providing Work Zone Safety Messages to Truckers
	B1-5	Partnership with Motor Truck Association
	B1-6	Work Zone Safety Materials Distributed at Rest Areas, Welcome Stations, and Truck Stops

<b>Subcategory</b>	<b>Ref. #</b>	<b>PUBLIC RELATIONS AND OUTREACH Best Practices</b>
B2 General Public	B2-1	Public Information Campaign
	B2-2	Circuit Rider Van Program
	B2-3	Media Outreach Program for Construction and Maintenance Work Zones
	B2-4	TRANSCOM Transmits to User Groups
	B2-5	“IMPACT” – Public Information Program
	B2-6	Public Outreach Efforts to Increase Participation in Traffic Management Plan (TMP) Strategies
	B2-7	Work Zone Safety Week
	B2-8	Joint Training with Contractor and DOT Construction/Maintenance Personnel
	B2-9	Dissemination of Work Zone Information
	B2-10	“You Show Us How” Contests
	B2-11	Calendars on Scheduled Roadway Projects and Roadmaps of Alternate Routes
B3 Media	B3-1	Develop Media Partnerships
B4 State/ Contractors/ Workers	B4-1	“Constructing Your Image” – A Public Relations Handbook for Contractors
	B4-2	Work Zone Safety Round Tables
	B4-3	“What’s Wrong With This Work Zone” – Training Video
	B4-4	Quality Management Workshop
	B4-5	Regional Work Zone Workshops
	B4-6	Promotion of A+B Bidding; Lane Rentals; Incentives/Disincentives; PR Campaign
	B4-7	Satellite Video Conference on Work Zone Safety
	B4-8	Annual Maintenance Tour
	B4-9	Reference Manual for Public Awareness

Public Relations, Education, and Outreach → Drivers

B1-1

**BEST PRACTICE:****Motor Carrier Initiative to Prevent Work Zone Crashes****DESCRIPTION:**

Focus public campaigns and outreach efforts to help prevent work zone crashes. This is accomplished through the following methods: 1) Monthly meetings to discuss and identify where work zones are located, 2) Distribution of educational materials during compliance reviews and public meetings, and 3) Mass mailings of educational materials to area motor carriers identifying work zone hazards and how to minimize the chances of having crashes.

**REASON(S) FOR ADOPTING:**

The reason for implementing the policy was to maintain a level of zero work zone fatalities and curb any potential increase of crashes by our proactive outreach efforts.

**PRIMARY BENEFIT(S):**

The effort is expected to result in a decrease in overall work zone crashes.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All projects, but particularly those where high motor carrier user volume could occur.

**STATE(S) WHERE UTILIZED:**

Utah

**SOURCE/CONTACT(S):**

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Public Relations, Education, and Outreach → Drivers

B1-2

**BEST PRACTICE:**

**Work Zone Safety Campaign: “Work Zone – Stay Alert”**

**DESCRIPTION:**

A logo and theme were developed for the “Work Zone – Stay Alert” campaign in 1990 and are still in use today. All print materials: public service announcements, radio spots, maps, etc. utilize this theme. Construction advance warning signs also utilize this theme.

**REASON(S) FOR ADOPTING:**

The campaign was developed to promote a heightened sense of awareness in work zones. This heightened awareness allows motorists to react faster and be more cautious when traveling in work zones.

**PRIMARY BENEFIT(S):**

Safer work zones and more alert drivers. Speed differentials are minimized, thus reducing the severity of accidents.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This practice is available for all facilities and all projects.

**STATE(S) WHERE UTILIZED:**

North Carolina

**SOURCE/CONTACT(S):**

Jimmy Travis, P.E. Construction Programs Engineer, North Carolina DOT  
Telephone: (919) 733-2210  
Fax: (919) 733-8441

Public Relations, Education, and Outreach → Drivers
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B1-3
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**BEST PRACTICE:**

**Work Zone Safety Video for Truckers**

**DESCRIPTION:**

The North Carolina Department of Transportation (NCDOT) developed, produced, and distributed a 7½-minute video geared towards truckers and the trucking industry. This video is produced from the truckers’ perspective on North Carolina’s highways. The video was distributed to more than 600 members of the North Carolina Trucking Association for truck safety training in 1992 and is still in use today.

**REASON(S) FOR ADOPTING:**

The work zone safety video was developed to educate and inform a specific target audience—truckers—because of the large number that utilize North Carolina’s highways and the potential effect this group of motorists have on others traveling through work zones.

**PRIMARY BENEFIT(S):**

The NCDOT has safer work zones and a more informed trucking industry. The trucking industry realizes that they have a significant effect on speeds in the work zone.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

The video applies to truckers in all types of work zones on the Interstate, US routes, and North Carolina routes in both rural and urban areas.

**STATE(S) WHERE UTILIZED:**

North Carolina

**SOURCE/CONTACT(S):**

Jimmy Travis, P.E. Construction Programs Engineer, North Carolina DOT  
 Telephone: (919) 733-2210  
 Fax: (919) 733-8441

Public Relations, Education, and Outreach → Drivers

B1-4

**BEST PRACTICE:****“Wizard” CB Radio Transmissions Providing Work Zone Safety Messages to Truckers****DESCRIPTION:**

The Wizard Work Zone Alert Radio is a portable system, which broadcasts traffic safety and work zone information on citizens band radio channels, primarily aimed at long-haul truckers. The system can record and store up to three different messages and transmit over two different CB channels. Messages are seven to ten seconds, and can be pre-recorded or recorded on site. The user has the option of transmitting a message every 30, 60, or 90 seconds. The Wizard monitors CB transmissions on one or more pre-selected frequencies. When it detects a lull, the Wizard will broadcast a safety message. The Wizard uses a standard CB antenna and a 12-volt power source, and can broadcast over approximately four miles. Under development since 1994 the system was approved for use in Pennsylvania in 1998, and was tested in several States under the Midwest States Smart Work Zone Initiative with favorable results.

**REASON(S) FOR ADOPTING:**

The Department was looking for a unique way of targeting long-haul truckers with safety information as they approached work areas.

**PRIMARY BENEFIT(S):**

Truck drivers are alerted to the work zone and any new traffic patterns.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All types of facilities. All types of work.

**STATE(S) WHERE UTILIZED:**

Iowa, Pennsylvania

**SOURCE/CONTACT(S):**

Steve Gent, Office of Traffic and Safety, Iowa DOT  
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Mike Castellano, FHWA Pennsylvania Division Office  
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Public Relations, Education, and Outreach → Drivers

B1-5

**BEST PRACTICE:**

**Partnership with Motor Truck Association**

**DESCRIPTION:**

Involvement of representatives from State Motor Truck Association in the identification, development, and implementation of actions to reduce crashes associated with work zones. Practice was initiated in 1995.

**REASON(S) FOR ADOPTING:**

Practice was initiated due to a high number of fatal crashes involving commercial vehicles in or near work zones. The Motor Truck Association was contacted to provide a trucking industry perspective on how to address the problem, and to serve as a direct conduit to provide information to industry.

**PRIMARY BENEFIT(S):**

Provides State agency personnel with a better perspective on how proposed actions will impact commercial vehicles. Partnership creates a direct conduit to industry on problems and potential solutions.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Freeways, all types of work.

**STATE(S) WHERE UTILIZED:**

Pennsylvania

**SOURCE/CONTACT(S):**

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Public Relations, Education, and Outreach → Drivers

B1-6

**BEST PRACTICE:****Work Zone Safety Materials Distributed at Rest Areas, Welcome Stations, and Truck Stops****DESCRIPTION:**

A brochure titled “Highway Construction Advisory” has been printed and disseminated since the 1970's. The brochure includes a map and detailed information on the routes under construction and safe driving tips. The brochure is disseminated through the Department’s welcome centers, rest areas, drivers license centers, and District Offices.

**REASON(S) FOR ADOPTING:**

This brochure was developed in the 1970's as a public service to the motoring public. Safety information was included to educate the public on how to drive safely when traveling in construction areas. For a copy of the brochure, call (717) 787-6746.

**PRIMARY BENEFIT(S):**

Motorists are informed where construction is occurring and are better educated on how to drive safely in work zones.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Freeways, all types of work.

**STATE(S) WHERE UTILIZED:**

Pennsylvania

**SOURCE/CONTACT(S):**

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Public Relations, Education, and Outreach → General Public

B2-1

**BEST PRACTICE:**  
**Public Information Campaign**

**DESCRIPTION:**

The Iowa Department of Transportation has contracted with a public relations firm to raise awareness and educate drivers of the dangers of work zones. Each year thousands of TV, radio, and billboard spots are used to “get the word out.” Information related to specific projects is also developed and distributed.

**REASON(S) FOR ADOPTING:**

To increase work zone awareness and improve safety.

**PRIMARY BENEFIT(S):**

Improved public image and increased driver awareness in work zones.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All work zones.

**STATE(S) WHERE UTILIZED:**

Iowa

**SOURCE/CONTACT(S):**

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Public Relations, Education, and Outreach → General Public

B2-2

**BEST PRACTICE:****Circuit Rider Van Program****DESCRIPTION:**

Minnesota Department of Transportation (Mn/DOT) and the Iowa Department of Transportation operate a Circuit Rider Van Program which is a mobile outreach effort providing face-to-face transfer of the latest technologies and information on a variety of topics such as work zone safety.

**REASON(S) FOR ADOPTING:**

The Circuit Rider Van Program was instituted to bring new technologies to field personnel and to gather information on new methods and technologies used at a particular field site to share with others throughout the State.

**PRIMARY BENEFIT(S):**

The Circuit Rider Van Program has proven to be a very effective technology transfer mechanism. It is an excellent way to give field personnel hands on experience with both common and “state-of-the-art” work zone traffic control devices.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

The Circuit Rider Van Program is used throughout the States of Minnesota and Iowa.

**STATE(S) WHERE UTILIZED:**

Iowa, Minnesota

**SOURCE/CONTACT(S):**

Tom McDonald, Safety Circuit Rider, Iowa LTAP/CTRE

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Donna Allen, Director of Transit Program, Minnesota DOT

Telephone: (612) 296-7052

Public Relations, Education, and Outreach → General Public
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B2-3
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**BEST PRACTICE:**

**Media Outreach Program for Construction and Maintenance Work Zones**

**DESCRIPTION:**

The Mississippi Department of Transportation (MDOT) has implemented a practice of using the media (faxes, radio, TV, newspapers) to notify the public of upcoming and ongoing construction and maintenance projects. This media campaign informs the public of road closures and other ongoing construction or research activities that are expected to cause traffic delays.

**REASON(S) FOR ADOPTING:**

This practice was the result of a comprehensive traffic management effort on a major Interstate project in the State. Keeping the public informed of construction activities resulted in less complaints and inquiries by the media and public. It also helped to build good will for the Department. It is believed that the information provided also increased safety for the travelers as well as workers.

**PRIMARY BENEFIT(S):**

By adopting this practice, MDOT has realized a decrease in negative comments from the media and complaints from the traveling public. The traveling public did not mind waiting in a traffic delay as much if the specific activity causing the delay was known. This information was verified through public surveys on active construction projects.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

The practice is used for all projects. For more complex projects, and for projects located in high population areas or heavily traveled areas, the media campaign effort is increased.

**STATE(S) WHERE UTILIZED:**

Mississippi

**SOURCE/CONTACT(S):**

Donna Lum, Public Affairs Director, Mississippi DOT  
Telephone: (601) 359-7017

Public Relations, Education, and Outreach → General Public
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B2-4
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**BEST PRACTICE:**

**TRANSCOM Transmits to User Groups**

**DESCRIPTION:**

TRANSCOM was formed as a regional transportation coalition, which would serve as a clearinghouse for transportation incident and construction information in the States of New York, New Jersey, and Connecticut. It transmits information to hundreds of transportation agencies, media outlets, and major employers throughout the day informing them of incidents and delays.

**REASON(S) FOR ADOPTING:**

Fourteen major transportation agencies and the Federal Highway Administration saw the need for some type of regional clearinghouse for this type of information that would transcend the normal transportation agency’s boundaries and would include all transportation modes in the greater New York City area.

**PRIMARY BENEFIT(S):**

Transportation providers are able to provide better service to their customers in either responding to incidents or having the users avoid the incidents by detour routing, delaying trips, etc. The users benefit by spending less time unnecessarily sitting in congestion due to road construction and transportation incidents.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This information applies to every major road, bridge, tunnel, and transit facility in the greater New York City area.

**STATE(S) WHERE UTILIZED:**

New York

**SOURCE/CONTACT(S):**

Emmett McDevitt, Safety Engineer, FHWA New York Division Office  
 Telephone: (518) 431-4125, ext. 231

Ed Roberts, New York State DOT  
 Telephone: (518) 457-1232

Public Relations, Education, and Outreach → General Public
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B2-5
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**BEST PRACTICE:  
“IMPACT” – Public Information Program**

**DESCRIPTION:**

The Information Management Public Affairs Construction Traffic “IMPACT” effort is a public information program that is housed within the Central Construction Unit. The IMPACT strives to promote safety in the work zone and provide exceptional customer service. This program began in 1987 and has continued to grow.

**REASON(S) FOR ADOPTING:**

The North Carolina Department of Transportation felt it was important to inform motorists, businesses, and residents of upcoming construction activity and possible impacts. Encouraging motorists to use alternate routes and avoid congestion associated with work zones helps to ease traffic volumes and educate the drivers.

**PRIMARY BENEFIT(S):**

Surveys conducted show that motorists, businesses, and residents are being informed of construction activities. This aids in the reduction of congestion and increases safety to the motorist and construction workers.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This program targets and is effective on any type of construction project.

**STATE(S) WHERE UTILIZED:**

North Carolina

**SOURCE/CONTACT(S):**

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 Fax: (919) 733-8441

Public Relations, Education, and Outreach → General Public

B2-6

**BEST PRACTICE:****Public Outreach Efforts to Increase Participation in Traffic Management Plan (TMP) Strategies****DESCRIPTION:**

A multi-jurisdictional, bi-state Traffic Management Team worked together to develop a TMP to lessen the traffic impacts anticipated with the closure of the northbound I-5 Interstate Bridge crossing of the Columbia River. As a strategy identified in the TMP, the Oregon and Washington State DOT undertook a public outreach effort to advise commuters in Portland, Oregon, and Vancouver, Washington of travel alternatives that would help relieve severe traffic congestion. A common theme in the outreach effort was that commuters need to share in some responsibility for the “problem,” and are encouraged to take the initiative to change their commute habits during the closure.

It was recognized that employers would be key in allowing commuters to utilize commute options and to promote and disseminate options for how people can get to work. An employer outreach program was established targeting employers with 50 or more employees crossing the Columbia River. Three types of contact were used with employers. Telephone contacts were made initially, followed by mailings which included information packets, followed by company presentations to provide an overview of the project and explain commute alternatives to employees.

It was also recognized that a news media partnership would be necessary to communicate traffic management strategies to the public. A series of press releases were issued through the summer to provide periodic updates on the project with a final advertising campaign three weeks prior to closure. This advertising campaign promoted commuter options by distributing maps and brochures from displays in retail centers and placement of advertisements in print and radio mediums.

**REASON(S) FOR ADOPTING:**

A TMP was adopted for this project and it contained 13 strategies, one of which was a public outreach program that was crafted to provide information to commuters and employers. It was recognized that public participation would be integral in achieving the targeted 26 percent reduction in trips.

**PRIMARY BENEFIT(S):**

Benefits included a high level of community awareness of the project. A trip reduction of 19 percent was realized. Other benefits were an increased level of awareness of transit alternatives in the corridor and a renewed interest in HOV

lanes in the metropolitan area. Future projects on the Interstate Bridge will have a “roadmap” in the TMP to follow in order to stage projects without gridlock.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Use of public outreach efforts to inform the public is most effective in urban areas with good radio, newspaper, and television broadcast coverage.

**STATE(S) WHERE UTILIZED:**

Oregon

**SOURCE/CONTACT(S):**

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Public Relations, Education, and Outreach → General Public

B2-7

**BEST PRACTICE:**  
**Work Zone Safety Week**

**DESCRIPTION:**

In 1998, the Virginia Department of Transportation (VDOT) conducted the first statewide work zone safety awareness campaign for both VDOT employees and the general public the week following the implementation of daylight savings time. Press conferences with the Virginia State Police were held across the state, with the dangers of working in, and driving through work zones emphasized. The State Police increased their presence in work zones during the week, and VDOT employees drove with their headlights on and displayed orange ribbons and **“GIVE 'EM A BREAK”** bumper stickers on their vehicles. Daily activities focusing on work zone safety were conducted, and give-a-ways such as key chains, penlights, and rain ponchos were distributed to all VDOT employees.

**REASON(S) FOR ADOPTING:**

To increase the awareness of both VDOT employees and the general public to the dangers and hazards of working in and driving through work zones.

**PRIMARY BENEFIT(S):**

Encourage employees to pay closer attention when performing work zone activities, encourage motorists to drive with caution and obey the posted speed limits when traveling through work zones, and demonstrate to employees VDOT's top value, to put “Safety in Everything We Do”.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All roads. All locations.

**STATE(S) WHERE UTILIZED:**

Virginia

**SOURCE/CONTACT(S):**

David Rush, Senior Transportation Engineer, Virginia DOT

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Public Relations, Education, and Outreach → General Public

B2-8

**BEST PRACTICE:****Joint Training with Contractor and DOT Construction/Maintenance Personnel****DESCRIPTION:**

The Virginia Department of Transportation (VDOT), in conjunction with the Virginia Road and Transportation Builders Association (VRTBA), conducts joint VDOT/contractor Work Zone Safety training statewide in a series of training sessions held every winter. The one-day courses are generally split 50/50 between department and contractor personnel. VDOT work zone safety personnel along with traffic control experts from the contracting department conduct joint training sessions. The course consists of a review of state standards and guidelines for work zone traffic control, participation in a mock tort liability trial, and interaction between attendees in solving a work zone safety exercise. The one-day course allows interaction and builds teamwork between the contracting industry and VDOT personnel.

**REASON(S) FOR ADOPTING:**

To provide the necessary training to both VDOT and contracting personnel, to review changes and new requirements, and to develop teamwork and improve communication between the Department and the contracting industry.

**PRIMARY BENEFIT(S):**

Better trained personnel, increased awareness to and focus on work zone safety requirements, improved communication between the Department and the contracting industry, and the development of teamwork to solve work zone safety challenges.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Urban and rural freeways statewide.

**STATE(S) WHERE UTILIZED:**

Virginia

**SOURCE/CONTACT(S):**

David Rush, Senior Transportation Engineer, Virginia DOT  
 Telephone: (804) 371-6672  
 Email: [rush\\_db@vdot.state.va.us](mailto:rush_db@vdot.state.va.us)

Public Relations, Education, and Outreach → General Public

B2-9

**BEST PRACTICE:**  
**Dissemination of Work Zone Information**

**DESCRIPTION:**

Dissemination of work zone information through the Wyoming Trucking Association, use of low powered radio, and posting of notices at truck stops, ports-of entry, motels, and restaurants is made for projects involving possible lengthy closures. In addition, normal news media is used including newspaper, radio, and television.

**REASON(S) FOR ADOPTING:**

During the construction of a major project on I-80, the contractor was permitted to close the road for up to 1 hour at a time for blasting operations.

**PRIMARY BENEFIT(S):**

Motorists were able to plan their trips around the construction closure schedule. The contractor was required to determine the closure schedule 3 days in advance so proper notification could be made throughout Wyoming, western Nebraska, and northern Colorado.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Highly visible projects involving complete road closures or major delays.

**STATE(S) WHERE UTILIZED:**

Wyoming

**SOURCE/CONTACT(S):**

Mike Gostovich, Wyoming DOT

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Public Relations, Education, and Outreach → General Public

B2-10

**BEST PRACTICE:**  
**“You Show Us How” Contests**

**DESCRIPTION:**

A contest has been conducted annually since 1994 to solicit new ideas. One category is “enhancement of safety in daily roadway or roadside maintenance operations.” The participating counties submit entries for novel concepts they are using to meet the goal of the category. Entries are published in an annual report to all counties. Winning entries are selected and presented with plaques during the annual County Road Advisor’s meeting.

**REASON(S) FOR ADOPTING:**

Most counties are very short on resources. They continually develop new concepts and techniques to accomplish their objectives, but they are not shared with other jurisdictions that might well benefit from the same idea.

**PRIMARY BENEFIT(S):**

Publishing novel concepts, as well as recognition of the best ideas, transfers technology and creates energy for trying new and better ways of conducting business.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Type of Facility: Local roads.

Location: Primarily rural, some urban.

Volume/Speed: Primarily low-volume, low-speed, but includes others.

Type of Work: Primarily maintenance.

**STATE(S) WHERE UTILIZED:**

Former FHWA Region 8 States

**SOURCE/CONTACT(S):**

Bill Hakala, FHWA Central Federal Lands Division

Telephone: (720) 963-3418

Public Relations, Education, and Outreach → General Public

B2-11

**BEST PRACTICE:**

**Calendars on Scheduled Roadway Projects and Roadmaps of Alternate Routes**

**DESCRIPTION:**

Calendars are printed showing when and where roadway projects are scheduled for the coming year. Roadmaps are also created showing recommended alternate routes for use during those roadway projects. These are distributed free of charge. France has used this practice for more than 20 years.

**REASON(S) FOR ADOPTING:**

To provide information to drivers to help them plan their travel routes and anticipate work zones.

**PRIMARY BENEFIT(S):**

Better informed drivers.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All roadway projects.

**STATE(S) WHERE UTILIZED:**

FHWA

**SOURCE/CONTACT(S):**

Methods and Procedures to Reduce Motorist Delay in European Work Zones  
FHWA-PL-01-001 [www.international.fhwa.dot.gov](http://www.international.fhwa.dot.gov) October, 2000

Public Relations, Education, and Outreach →Media	B3-1
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**BEST PRACTICE:  
Develop Media Partnerships**

**DESCRIPTION:**

Establish regular contact with State and/or local media (radio, TV, and cable) to provide an on-going dialogue on work zone safety issues. This practice has been used since 1994 when 20 people were killed in Oregon roadway work zones.

**REASON(S) FOR ADOPTING:**

- The media become confident in the value of the information to their customers.
- The likelihood of coverage of work zone safety in the media is increased.
- There is a known contact at the State DOT.

**PRIMARY BENEFIT(S):**

The likelihood of coverage of work zone safety in the media is increased, motorists are better informed, and a reduction in work zone worker deaths results.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All projects.

**STATE(S) WHERE UTILIZED:**

Oregon

**SOURCE/CONTACT(S):**

Anne Holder, Roadway Safety, Work Zone & Safety Corridors Transportation Safety Division, Oregon DOT  
Telephone: (503) 986-4195

**BEST PRACTICE:****“Constructing Your Image” – A Public Relations Handbook for Contractors****DESCRIPTION:**

Concerned about their image in general, Colorado contractors undertook an effort to produce guidance for construction site managers that can improve image and public relations. Hard-copy guidance was produced by contractors associated with the Colorado Contractor’s Association (CCA). The guidance provides templates for sample letters, notifications, thank you letters, media releases, press tips, crisis management strategies, and a checklist for public relations.

**REASON(S) FOR ADOPTING:**

Various representatives of industry were concerned about the image projected as an industry, as an employer, and as part of the communities in which they operate.

**PRIMARY BENEFIT(S):**

Project personnel have guidance that should enhance the image of their company and industry as a whole. “Constructing Your Image” is a tool for providing visibility and improving industry’s image with the public.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All types of projects, but generally higher impact type projects and facilities, and more complex projects.

**STATE(S) WHERE UTILIZED:**

Colorado

**SOURCE/CONTACT(S):**

Eldon Strong, Colorado Contractor’s Association  
 Telephone: (303) 290-6611  
 Fax: (303) 290-9141

Dan Hopkins, Colorado Department of Transportation  
 Telephone: (303) 757-9469

Peter Eun, FHWA Resource Center  
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**BEST PRACTICE:**

**Work Zone Safety Round Tables**

**DESCRIPTION:**

Twice a year work zone safety representatives from Virginia Department of Transportation's nine districts meet with work zone safety personnel from the Department's Central Office to review and discuss the Department's Work Zone Safety Program. The format allows each district to discuss and share general or specific work zone problems and concerns, as well as best practices and/or solutions to problems encountered in their district. The day-and-a-half to two-day meetings have been conducted since the spring of 1990.

**REASON(S) FOR ADOPTING:**

To share information and successful practices statewide; to develop consistent work zone safety practices statewide; to interpret and discuss federal and state work zone safety requirements, standards and guidelines; and to review and discuss the latest in work zone traffic control devices.

**PRIMARY BENEFIT(S):**

Statewide consistency in the work zone safety program; increased participation and input in the development and implementation of work zone safety standards and guidelines; greater focus and compliance to the work zone safety program; and improved communication and cooperation between districts and Central Office Work Zone Safety personnel.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All roads statewide. All locations.

**STATE(S) WHERE UTILIZED:**

Virginia

**SOURCE/CONTACT(S):**

David Rush, Senior Transportation Engineer, Virginia DOT

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Public Relations, Education, and Outreach → State/Contractors/Workers

B4-3

**BEST PRACTICE:****“What’s Wrong with This Work Zone” – Training Video****DESCRIPTION:**

In the spring of 1998, the Virginia Department of Transportation (VDOT) developed and distributed a work zone training video which displays two improperly setup work zones, a lane closure operation on a four-lane roadway, and a flagging operation on a two-lane roadway. From a motorist’s perspective, viewers are driven through the work zones and asked to find the deficiencies in each. The video then shows and discusses each deficiency. The corrections are made and the work zones are viewed again to show the improvement over the improperly setup work zones.

**REASON(S) FOR ADOPTING:**

To provide a training tool to increase the awareness to common work zone installation deficiencies found on Virginia roadways, and show the differences and dangers between incorrectly and correctly installed work zone traffic control.

**PRIMARY BENEFIT(S):**

Increasing the awareness of VDOT and contractor field personnel in the importance in following established standards and guidelines as they relate to work zone traffic control.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Two-lane and multi-lane urban and rural roadways with various volumes and speeds for all types of construction/maintenance activities.

**STATE(S) WHERE UTILIZED:**

Virginia

**SOURCE/CONTACT(S):**

David Rush, Senior Transportation Engineer, Virginia DOT  
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Public Relations, Education, and Outreach → State/Contractors/Workers

B4-4

**BEST PRACTICE:**

**Quality Management Workshop (QMW)**

**DESCRIPTION:**

The QMW is an annual event that has been sponsored by the former Region 4 Office Engineering Services Team as an outgrowth of the National Quality Initiative (NQI). The 3-day format changes regularly due to the variety of subjects covered under the umbrella of quality. The effects of durability and constructability are the principal focus. Management practices aimed at producing quality construction and materials, and allowing a reduction of traffic exposure to work zone activities, are a key consideration in this workshop. Construction, Maintenance, and Materials personnel from State Departments of Transportation (DOTs) and private industry are the targeted audience.

**REASON(S) FOR ADOPTING:**

The former FHWA Region 4 recognized a need for more uniform application of technological advances and lessons learned across the south. Disparity in the range of applied technology was very broad and this was a method to bring lagging States up to speed.

**PRIMARY BENEFIT(S):**

FHWA, State DOT, and industry personnel are better networked so that information is shared across State lines on a routine basis. The annual conference allows hot topics to be discussed at the regional level so that experiences and potential solutions can be applied in all the States in the Region quickly. This has also provided a good opportunity to introduce new issues to all the States at once.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All types of projects, design through maintenance activities. The annual conference is attended by DOT and FHWA management and technical programs specialists.

**STATE(S) WHERE UTILIZED:**

Southeastern States

**SOURCE/CONTACT(S):**

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Public Relations, Education, and Outreach → State/Contractors/Workers

B4-5

**BEST PRACTICE:****Regional Work Zone Workshops****DESCRIPTION:**

In 1995 and 1997, the former FHWA Region 5 held Work Zone Workshops in conjunction with ATSSA How-To Conferences. Participation in these workshops included FHWA and State, local, and industry representatives. In 1998, a State/Federal only Work Zone Workshop was held. Workshops were also held annually from 1999-2002. The Midwestern States have continued the practice by holding an annual work zone roundtable for States to discuss common work zone issues and new practices and devices.

**REASON(S) FOR ADOPTING:**

Work zone safety was identified as one of our strategic objectives. The workshops were developed, so that the State personnel involved in the administration of the work zone safety programs could get together and share practices and discuss common concerns.

**PRIMARY BENEFIT(S):**

The ability of the States to share best practices with each other and discuss common concerns. In the last workshop, time was set aside for the States to compare specifications.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All facilities. All types of work.

**STATE(S) WHERE UTILIZED:**

Former FHWA Region 5 States

**SOURCE/CONTACT(S):**

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**BEST PRACTICE:****Promotion of A+B Bidding; Lane Rentals; Incentives/Disincentives; PR Campaign****DESCRIPTION:**

The former Region 4 strongly promoted A+B Bidding, Lane Rentals and Incentives/Disincentives for projects on an elevated section of I-45 through downtown Houston and on I-40 through Albuquerque.

The Region also promoted use of Public Relations Campaigns on both projects. The Region consulted with the Division and State and provided information and assistance on the extensive public relations/media blitz that was used on these projects to keep the public informed. The campaigns included TV, radio, newspapers, and handout flyers to provide advance information on upcoming street closures, etc. so drivers could plan alternate routes. In Houston a separate public information contract, as well as a high mast lighting contract for better night operations, was let in advance of the main reconstruction contract.

**REASON(S) FOR ADOPTING:**

Contracting methods to accelerate construction had not been used before in these areas. These methods allowed for the expedited completion of the work, reducing the time the projects were actually under construction. I-45 through Houston is one of the primary hurricane evacuation routes during hurricane season creating the need for minimal disruption.

**PRIMARY BENEFIT(S):**

Promotion of these concepts increased the utilization and consideration of innovative contracting for accelerated construction. These efforts greatly shortened the time for project completions, compared to what it would have been under usual procedures. This reduced the length of time the public was inconvenienced and delayed.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

High-volume, urban type facilities and other critical sections of highways.

**STATE(S) WHERE UTILIZED:**

Former FHWA Region 4 States

**SOURCE/CONTACT(S)**

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Public Relations, Education, and Outreach → State/Contractors/Workers

B4-7

**BEST PRACTICE:**

**Satellite Video Conference on Work Zone Safety**

**DESCRIPTION:**

FHWA personnel participated as speakers and panelists at an American Public Works Association (APWA) Work Zone Safety video conference held at Oklahoma State University, and explained/promoted streamlined contract procedures such as A+B bidding.

**REASON(S) FOR ADOPTING:**

The forum reached many highway and other public works professionals and a high degree of interest was shown, especially in A+B bidding.

**PRIMARY BENEFIT(S):**

Streamlined contracting procedures, with emphasis on reduced time required to complete the work once started, benefits the traveling public. This use of satellite telecommunications video conferences spread the word faster to a diverse audience.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All types of projects and locations.

**STATE(S) WHERE UTILIZED:**

Former FHWA Region 4 States

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**BEST PRACTICE:**

**Annual Maintenance Tour**

**DESCRIPTION:**

A State maintenance engineers' tour of innovative maintenance activities is conducted annually, beginning in 1996. Participants in the tour include each of the former Region 8 State's maintenance engineer, as well as participants from each Division Office, the Resource Center, and Headquarters. The tour provides a forum to meet and discuss maintenance ideas and technology of common interest, including temporary traffic control. Each State takes a turn hosting the event.

**REASON(S) FOR ADOPTING:**

Many States utilize new technology and/or practices in their maintenance activities. Unfortunately, there is not a good mechanism for routinely sharing the ideas with other States. The tour provides for the exchange of information.

**PRIMARY BENEFIT(S):**

The benefit being realized from this annual tour is the increased use of new technology and practices in neighboring States.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Type of Facility: all.

Location: all.

Volume/Speed: all.

Type of Work: all.

**STATE(S) WHERE UTILIZED:**

Former FHWA Region 8 States

**SOURCE/CONTACT(S):**

Bill Hakala, Central Federal Lands Division

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**BEST PRACTICE:****Reference Manual for Public Awareness****DESCRIPTION:**

The Illinois Department of Transportation (IDOT) developed a reference manual called the *Public Awareness Campaign* that consists of guidelines for dealing with the public during construction projects. The manual contains information on how one could go about implementing a public awareness campaign: type of information to disseminate, suggestions for communication tools, advice on listening to the public, guidance in effectively dealing with the public, dispute resolution, and gaining credibility. Using the manual IDOT personnel distribute news releases, produce newsletters, and hold public information meetings, among other things.

**REASON(S) FOR ADOPTING:**

The district wanted to become more available to the public and improve communication with the public to reduce complaints and resolve problems promptly.

**PRIMARY BENEFIT(S):**

Improved image of IDOT. Public appreciates being informed and knowing who to contact with concerns.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All construction work zones.

**STATE(S) WHERE UTILIZED:**

Illinois

**SOURCE/CONTACT(S):**

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## Best Practices Category C - Prediction Modeling and Impact Analysis: Congestion and Crashes

Prediction modeling and impact analysis includes mathematical equations, software, and analysis used to estimate the impact of work zones prior to and during implementation. Best practices in this section encourage the use of prediction/analysis tools which are user-friendly and readily adapted to the local construction site and situation. These tools enable accurate analysis and reliable prediction of congestion situations including travel times, queue length, travel speed, total delay, crash rates, severity levels, and interactive feedback to both the design and construction team.

Examples of practices include:

- Lane closure analysis strategies used during project planning.
- Impact reports used to identify/understand actual construction impacts on traffic.
- User-friendly project specific computer software (PC based) that can predict capacity breakdown on freeways before it occurs.

The following best practices relate to prediction modeling and impact analysis: congestion and crashes:

Subcategory	Ref. #	PREDICTION MODELING AND IMPACT ANALYSIS Best Practices
C1 Closure Effects	C1-1	Lane Closure Analysis for Toll Roads
C2 Delays	C2-1	QUEWZ Software to Predict Congestion and Associated User Costs
	C2-2	Modeling Projected Traffic Delay
	C2-3	Traffic Impact Report
	C2-4	Traffic Impact Analysis
	C2-5	DELAY Enhanced 2.0 Software to Estimate User Delay Impacts and Costs for Freeway Capacity Restrictions
	C2-6	QuickZone Impact Analysis Spreadsheet Tool

**BEST PRACTICE:**  
**Lane Closure Analysis for Toll Roads**

**DESCRIPTION OF BEST PRACTICE:**

The Florida Turnpike performs a lane closure analysis in the design phase and again during construction to assess the traffic impacts due to construction. To help ensure the accuracy of the level of service analysis, quarterly traffic counts are used.

**REASON(S) FOR ADOPTING:**

Since the Turnpike has patrons who pay to use their services, they are very sensitive to their customers' needs. The Turnpike strives to minimize disruption and lessen the inconvenience to their customers due to highway construction.

**PRIMARY BENEFIT(S):**

The analysis is used as a planning tool to help determine the scheduling of work for the project (i.e., day or night operations, number of lane closures allowed, etc.). It also allows for fine-tuning of work hours during construction if there are any changes due to field conditions.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Used on all Turnpike projects.

**STATE(S) WHERE UTILIZED:**

Florida

**SOURCE/CONTACT(S):**

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Kimberlee Poulton, Director of Public Information, Florida DOT

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Ingrid Birenbaum, Turnpike District, Florida DOT

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**BEST PRACTICE:**

**QUEWZ Software to Predict Congestion and Associated User Costs**

**DESCRIPTION:**

The user cost information is used to establish incentives on A+B Contracts and as criteria to determine the best alternative for maintaining traffic.

**REASON(S) FOR ADOPTING:**

A method was needed to estimate user costs. The version of QUEWZ used by Indiana Department of Transportation (INDOT) has the ability to take into account the traffic that will divert from the route. It has been calibrated by INDOT and found to be reasonably accurate.

**PRIMARY BENEFIT(S):**

The biggest benefits being realized are accurate user cost and delay information that have resulted in more efficient construction phasing and maintenance of traffic planning.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This version of QUEWZ is primarily applicable to freeways for any type of project.

**STATE(S) WHERE UTILIZED:**

Indiana

**SOURCE/CONTACT(S):**

David Boruff, Design, Indiana DOT  
Telephone: (317) 232-5222

**BEST PRACTICE:**

**Modeling Projected Traffic Delay**

**DESCRIPTION:**

A computerized traffic model (TRANPLAN) was developed during preparation of a project’s environmental impact statement. This model has been upgraded and refined to support final design and construction.

**REASON(S) FOR ADOPTING:**

Project construction required changes and impacts to I-93, I-90, and five separate geographic neighborhoods in the City of Boston. Many of these traffic impacts involved complex redistribution of vehicles. The TRANPLAN model helped clarify potential traffic impacts.

**PRIMARY BENEFIT(S):**

Complex traffic redistributions are made more comprehensible in planning for traffic changes required by project construction.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Type of Facility: Freeways, streets, 2-lane/2-way highway, and bridge.

Location: Urban, rural, and recreational.

Volume/Speed: High-volume/high-speed, high-volume/low-speed, low-volume/high-speed, low-volume/low-speed.

Type of Work: Resurfacing, reconstruction, restoration/rehabilitation, and utility.

**STATE(S) WHERE UTILIZED:**

Massachusetts

**SOURCE/CONTACT(S):**

Glen Berkowitz, Traffic Manager, Central Artery Tunnel Project

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**BEST PRACTICE:**  
**Traffic Impact Report (TIR)**

**DESCRIPTION:**

On certain projects, the TIR is used to identify construction impacts on traffic. It contains recommendations for traffic mitigation to be utilized by the designer of the traffic control plan (TCP). The decision to develop a TIR is a mutually reached decision of the Project Manager, Design Coordinator, and the Regional Traffic Operations Manager. This practice was initiated in 1994, and is now part of the New Jersey Roadway Design Manual.

**REASON(S) FOR ADOPTING:**

To help with coordinating the required mitigation and timing of the project with other construction projects, both local government and private. This caused conflicting detours and overlapping traffic impacts.

**PRIMARY BENEFIT(S):**

The designer has the benefit of the TIR which recommends mitigation such as night work, restricted hours, number of lanes available for traffic, staging requirements, public information program, and transportation strategies (Park and Ride, Shuttle Buses, etc.). The designer utilizes the TIR in the preparation of the traffic control plans and staging plans. This approach has proven to result in a better overall TCP and reduction of the inconvenience of the motorist.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This practice is applicable to all facility types where significant impacts to traffic are expected due to construction activities.

**STATE(S) WHERE UTILIZED:**

New Jersey

**SOURCE/CONTACT(S):**

Timothy J. Szvedo, Traffic Signal and Safety Engineer, New Jersey DOT  
 Telephone: (609) 530-2600

James Paral, Traffic Signal and Safety Engineer, New Jersey DOT  
 Telephone: (609) 530-2488

New Jersey Department of Transportation Engineering web page containing Policy, Procedures, Manuals & Guidelines, CADD drawings, and Specifications involved in their design: <http://www.state.nj.us/transportation/eng/>.

Prediction Modeling and Impact Analysis → Delays

C2-4

**BEST PRACTICE:****Traffic Impact Analysis****DESCRIPTION:**

Prior to designing a project, detailed traffic capacity analysis is completed to determine how many lanes must be maintained and when. The capacity analysis is completed for a typical weekday, Friday, Saturday, and Sunday for each month of the year. This practice has been used for more than 10 years.

**REASON(S) FOR ADOPTING:**

This practice was adopted to limit any possible delays in the work area.

**PRIMARY BENEFIT(S):**

This practice has improved customer service and safety.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This practice has been used on high-speed/high-volume facilities.

**STATE(S) WHERE UTILIZED:**

Pennsylvania

**SOURCE/CONTACT(S):**

Timothy M. Scanlon, Traffic Engineering Manager, Pennsylvania Turnpike Commission

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**BEST PRACTICE:****DELAY Enhanced 2.0 Software to Estimate User Delay Impacts and Costs for Freeway Capacity Restrictions****DESCRIPTION:**

The DELAY Enhanced software was developed in 1997 by Martin Knopp of the FHWA, Utah Division. It is in initial stages of deployment. The Utah Department of Transportation (UDOT) has used the program for incident management, evaluating maintenance striping alternatives, and limited Intelligent Transportation Systems (ITS) evaluations.

**REASON(S) FOR ADOPTING:**

The program was created to improve the quantification of user delay costs caused by freeway restrictions to traffic flow in an easy-to-use interface for quick estimations. The program was initiated more for incident management, but can be used for simple work zones.

**PRIMARY BENEFIT(S):**

The model quickly provides estimates of: Total Delay, Time-to-Normal Flow, Maximum Queue of Vehicles, Maximum Queue Length, Maximum Individual Vehicle Delay, Average Individual Vehicle Delay, Excess Fuel Use, Vehicle Emissions, and Financial Loss. This information can be used to estimate program benefits or compare alternatives very quickly.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This tool is applicable to freeways.

**STATE(S) WHERE UTILIZED:**

Utah

**SOURCE/CONTACT(S):**

Martin Knopp, FHWA Resource Center  
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Prediction Modeling and Impact Analysis → Delays

C2-6

**BEST PRACTICE:**

**QuickZone Impact Analysis Spreadsheet Tool**

**DESCRIPTION:**

QuickZone is a Work Zone Delay Impact Analysis Spreadsheet tool developed by FHWA. QuickZone is an open-source, Excel-based application able to quantify corridor delay resulting from the reduced capacity in work zones; identify impacts of alternative construction phasing; assess the impacts of delay mitigation strategies; and support the calculation of work zone completion incentives.

**REASON(S) FOR ADOPTING:**

To assess the impacts of alternative construction phasing.

**PRIMARY BENEFIT(S):**

Allows users to calculate the “soft cost” of traveler delay on a corridor level.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Any State or locality interested in quantifying delay resulting from work zones.

**STATE(S) WHERE UTILIZED:**

Maryland, North Carolina, Ohio, Pennsylvania, Utah, Washington, Wisconsin

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## Best Practices Category D - Planning and Programming

Planning and programming involves defining issues and opportunities, evaluating alternative solutions, gathering public input, and deciding when projects should be funded or programmed within existing budgetary constraints. These best practices emphasize a corridor approach to evaluating, planning, and programming. State DOTs are encouraged to give full consideration to long-range corridor needs, traffic demands, road-user costs, potential business community impacts, use of extended designs and high-performance materials, and overall evaluation of total costs for the life of the improvement.

Examples of practices include:

- Corridor planning strategies to minimize traffic delays, reduce the exposure to motorists and workers, as well as provide for the safe, efficient travel needs of today and for future generations.
- Organizational strategies to coordinate high impact projects to minimize motorist delay.
- Traffic management planning to maintain acceptable levels of traffic flow during periods of construction activities.
- Conduct public relations campaigns that inform the public and involve them in the selection of corridor TMPs.

The following best practice entries relate to work zone planning and programming:

<b>Subcategory</b>	<b>Ref. #</b>	<b>PLANNING AND PROGRAMMING Best Practices</b>
D1 Corridor Planning	D1-1	Corridor Management Approach for Maintenance and Construction Operations
	D1-2	Corridor Planning to Minimize Delays and Enhance Safety in Work Zones
	D1-3	Corridor Planning
	D1-4	Corridor Traffic Management Plans Versus Project Traffic Control Plans
	D1-5	Corridor Modeling for Construction Closure and Restriction Alternatives
D2 Organizational Strategy	D2-1	High Impact Project Task Forces
	D2-2	Coordination of all State DOT, Local Government, and Utility Construction and Maintenance Work to Minimize Motorist Delays
	D2-3	Partnering to Improve Work Zone Design and Traffic Control
	D2-4	Use of a Computerized Planning System for Road Work and Lane Closures
D3 Traffic Management Planning	D3-1	Traffic Management Plans
	D3-2	Caltrans Traffic Management Plan
	D3-3	Traffic Management Plan on Major Urban Projects
	D3-4	Super-Wide Bridge Shoulders

Planning and Programming → Corridor Planning	D1-1
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**BEST PRACTICE:****Corridor Management Approach for Maintenance and Construction Operations****DESCRIPTION:**

The California Department of Transportation (Caltrans) coordinates multiple construction/maintenance projects within a corridor. For maintenance projects a complete corridor will be closed off during the night with a “maintenance gang” performing the work. Construction projects are much longer in duration and entail coordination among different projects to be tied into one corridor project.

**REASON(S) FOR ADOPTING:**

An effort of Caltrans trying to be sensitive to the traveling public and to make the most of taxpayer money.

**PRIMARY BENEFIT(S):**

Reduction in the overall congestion and delay to the traveling public as well as the improved perception by the public through coordination and planning efforts by Caltrans.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All types. All locations.

**STATE(S) WHERE UTILIZED:**

California

**SOURCE/CONTACT(S):**

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Bob Pieplow, Program Manager, Construction, Caltrans

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**BEST PRACTICE:****Corridor Planning to Minimize Delays and Enhance Safety in Work Zones****DESCRIPTION:**

The Indiana Department of Transportation (INDOT) collects data on current traffic and determines the amount of traffic the road can carry while being reconstructed. They conduct an analysis on the likely routes to be used in the corridor by traffic that cannot be accommodated on roads under construction. Improvements are made on alternate routes as needed to have sufficient capacity. This practice has been used for more than 10 years.

**REASON(S) FOR ADOPTING:**

This practice of reviewing an entire corridor and upgrading its traffic carrying capacity, prior to beginning the heaviest construction, was implemented to improve safety and mobility. Also, it helped to reduce the number of complaints received by INDOT about construction zone delays.

**PRIMARY BENEFIT(S):**

Safety on the construction project is increased and motorist delay is decreased substantially.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Normally applied to freeway and other high-volume arterials.

**STATE(S) WHERE UTILIZED:**

Indiana

**SOURCE/CONTACT(S):**

David Boruff, Design, Indiana DOT  
Telephone: (317) 232-5222

Mark Newland, ITS Program Engineer Operations Support, Indiana DOT  
Telephone: (317) 232-5523

**BEST PRACTICE:  
Corridor Planning**

**DESCRIPTION:**

The Michigan Department of Transportation (MDOT) is attempting to identify all needed construction work in a corridor and then let a contract to deal with it all, especially in the Detroit area. The principle they are applying is “get in, get out, and stay out”. A typical example of this new approach was bridgework performed on I-94 where all crossroad bridges were packaged into the contract.

Also, MDOT has applied the corridor approach to short term roadwork from a variety of sources. A typical implementation is for MDOT to allow a total weekend closure within a long-term contract project, and invite road maintenance, utility, and survey forces to also work on their road interests during that time period.

**REASON(S) FOR ADOPTING:**

MDOT was looking for ways to reduce the seemingly constant road closures on freeway corridors. In the past it was not uncommon for the State to be working on a given stretch of highway, year after year, doing different elements of work.

**PRIMARY BENEFIT(S):**

Traffic inconvenience is minimized by this approach. It is also expected that MDOT credibility with the public is enhanced.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This concept is being used primarily on high-volume urban freeway projects where traffic distribution is a major issue.

**STATE(S) WHERE UTILIZED:**

Michigan

**SOURCE/CONTACT(S):**

Tom Fudaly, FHWA, Michigan Division Office  
Telephone: (517) 702-1831

Ernie Savas, Regional Director, Michigan DOT  
Telephone: (248) 483-5142

Planning and Programming → Corridor Planning	D1-4
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**BEST PRACTICE:****Corridor Traffic Management Plans Versus Project Traffic Control Plans****DESCRIPTION:**

The entire I-71 corridor needed to be reconstructed from Columbus to Cleveland over a 10 year period. Plans were made on how to best manage the traffic for the entire corridor during construction.

**REASON(S) FOR ADOPTING:**

With multiple highway construction projects occurring in the metropolitan area by a variety of jurisdictions, there needed to be coordination between projects as far as work zones, closures, etc. This coordination would lead to minimal impacts on the public.

**PRIMARY BENEFIT(S):**

By conducting traffic management for the metropolitan area, the Ohio Department of Transportation is able to coordinate work zones whenever possible to improve traffic flow for the public.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All high volume corridors.

**STATE(S) WHERE UTILIZED:**

Ohio

**SOURCE/CONTACT(S):**

Mack Braxton, Transportation Work Zone Specialist, Ohio DOT

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**BEST PRACTICE:****Corridor Modeling for Construction Closure and Restriction Alternatives****DESCRIPTION:**

The MINUTP program is a travel demand-forecasting model commonly used for transportation planning utilizing traffic assignment capabilities, thus allowing planners to evaluate closure scenarios and model the changes in volume on alternate routes. The Utah Department of Transportation (UDOT) utilized the Wasatch Front Regional Council (WFRC) database to compare alternatives for the I-15 closure and restriction options. The analysis was used to fund capacity changes on alternate routes and to help determine the optimum construction strategies and sequencing.

**REASON(S) FOR ADOPTING:**

The analysis was performed as part of a comprehensive construction and procurement plan performed because of the magnitude of impact from reconstructing I-15 through the Salt Lake Valley. I-15 is the major route in the valley and the scope of work (\$1.6 billion) necessitated increased analysis not typical for construction projects.

**PRIMARY BENEFIT(S):**

Detailed analysis data provided for decision-making. The planner is better enabled to evaluate impacts on a corridor level, not just on one route.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Not typical for routine projects. The model is highly complex and data intensive. The model is mostly used in planning long-term improvements and is most appropriate for projects of regional impact with sufficient time to undertake long-term analysis.

**STATE(S) WHERE UTILIZED:**

Utah

**SOURCE/CONTACT(S):**

John Leonard, Operations Oversight Manager, Utah DOT  
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 Email: [jleonard@dot.state.ut.us](mailto:jleonard@dot.state.ut.us)

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**BEST PRACTICE:  
High Impact Project Task Forces**

**DESCRIPTION:**

A “High Impact Project Task Force” is a task force formed during the project development phase. The members of the task force are from the various disciplines within the Missouri Department of Transportation (MoDOT) and are charged to examine and review all aspects of the project which may impact the traveling public (motorists). This practice has been utilized for more than 5 years and has been integrated with MoDOT’s utilization of project managers.

The members of the task force employ various methods for examining the impacts, such as value engineering targeted to reduce contract time and motorist impacts and input from the public and road user groups along with local businesses, communities and elected officials on traffic management plans.

**REASON(S) FOR ADOPTING:**

Examples of success: 1) formation of a multi agency partnership to reduce traffic on I-70 bridge rehabilitation in St. Louis—public and private agencies working together promoting and implementing traffic demand management strategies; 2) major bridge rehabilitation project requiring revised traffic routing. Impacted businesses and the public provided input on the traffic management plan that revealed an operational problem. A solution was identified and included in the construction project proposal.

**PRIMARY BENEFIT(S):**

Formation of the high impact project task force has resulted in reduced construction time, less impact to the traveling public through recommended revisions to the traffic management plan, better understanding and buy in of the traffic management plan by the users, and the use of new techniques to monitor traffic through construction.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Type of Facility: Freeways, major bridges, expressways, complex interchanges.

Location: Urban or rural, over major rivers.

Volume/Speed: High-volume/high-speed, high-volume/low-speed.

Type of Work: Reconstruction, restoration/rehabilitation.

**STATE(S) WHERE UTILIZED:**

Missouri

**SOURCE/CONTACT(S):**

Diane Heckemeyer, State Design Division Engineer, Missouri DOT  
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Ken Fryer, Construction Division Engineer, Missouri DOT  
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**BEST PRACTICE:****Coordination of all State DOT, Local Government, and Utility Construction and Maintenance Work to Minimize Motorist Delays****DESCRIPTION:**

The State Department of Transportation coordinates its projects and activities with the road work of local governments, utility contractors, and maintenance forces, during the project planning phase, to minimize motorist delays. The effort began in 1998.

**REASON(S) FOR ADOPTING:**

The Oklahoma Department of Transportation found that many adjacent and alternate routes were being rehabilitated at the same time causing motorist delays. In addition, many instances were found where an overlay/rehabilitation job was completed, then shortly thereafter, a new utility crossing was installed effectively ruining the recent improvements.

**PRIMARY BENEFIT(S):**

The primary benefit is the reduction of motorist delay. The secondary benefits included providing an open forum to discuss formal agreements to detour traffic from the State routes to local routes or visa versa; discussing funding arrangements to improve a local highway facility to act as an alternate route for detouring traffic through and around a State highway project; and managing traffic through partnerships and networking. Although it was recognized early that not all projects could be effectively coordinated because of funding limitations or politics, the majority of projects could be coordinated to provide the least amount of delay to the motoring public.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Currently, all types of urban projects are being considered for coordination. Major arterials are the focus at this time with the expectation that eventually residential streets will be considered once the methods of coordination are improved.

**STATE(S) WHERE UTILIZED:**

Oklahoma

**SOURCE/CONTACT(S):**

Christine Senkowski, Roadway Design Engineer, Oklahoma DOT

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**BEST PRACTICE:****Partnering to Improve Work Zone Design and Traffic Control****DESCRIPTION:**

Traffic control contractors, the American Traffic Safety Services Association (ATSSA), vendors, the Kansas Department of Transportation (KDOT), and FHWA partner to improve work zone design and traffic control. KDOT and FHWA meet quarterly with the ATSSA local chapter to discuss the functionality of existing work zone traffic control practices. The traffic control contractors and vendors will travel around the State to meet with KDOT field personnel and/or contractors to determine what is and is not working in work zones.

**REASON FOR ADOPTING:**

KDOT is interested in developing efficient and practical work zones, creating safer conditions for the driving public. This effort also helped KDOT to establish contacts with all parties involved in work zones.

**PRIMARY BENEFIT(S):**

Partnering has enhanced communication between KDOT and contractors. Work zone issues are looked at from two perspectives and policy is developed that all stakeholders can agree on. Headquarters personnel are able to determine first hand what does and does not work in the field, improving work zone design in the future. This has been very successful in achieving uniform work zone practices throughout the State and eliminating awkward or outdated practices or procedures.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Partnering has been beneficial to all work zones through out the State.

**STATE(S) WHERE UTILIZED:**

Kansas

**SOURCE/CONTACT(S):**

Mike Crow, Traffic Engineering, Kansas DOT

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Mike Herzog, Construction/Maintenance Bureau, Kansas DOT

Telephone: (785) 296-3576

Planning and Programming → Organizational Strategy	D2-4
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**BEST PRACTICE:****Use of a Computerized Planning System for Road Work and Lane Closures****DESCRIPTION:**

The national computerized planning system, called the MELDWERK system or "report works", contains information on more than 2,000 road projects planned for each month across the country. Daily maintenance projects are included in the system. The system is used by more than 40 local road authority planners and 30 consulting companies, as well as traffic operators and highway agencies. This practice provides a uniform way to collect traffic information, assists in traffic management, and helps determine signage and optimal alternate routes. The system enables localities to coordinate their projects so that adjacent routes are not under construction simultaneously.

**REASON(S) FOR ADOPTING:**

To ensure that all road maintenance and construction projects are coordinated among the various highway and public works agencies in the country.

**PRIMARY BENEFIT(S):**

Avoiding simultaneous construction on adjacent routes as much as possible, thereby enhancing systemwide mobility.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All work zones nationwide.

**STATE(S) WHERE UTILIZED:**

FHWA

**SOURCE / CONTACT(S):**

Methods and Procedures to Reduce Motorist Delay in European Work Zones  
FHWA-PL-01-001 [www.international.fhwa.dot.gov](http://www.international.fhwa.dot.gov) October, 2000

**BEST PRACTICE:**  
**Traffic Management Plans**

**DESCRIPTION:**

A traffic management plan is an overall strategy for accommodating traffic during construction on a project or corridor. Traffic management plans have been used consistently since June 1997.

**REASON(S) FOR ADOPTING:**

Indiana Department of Transportation personnel realized that construction on a specific project could impact traffic flow along the entire highway corridor as well as many other facilities (hospitals, schools, shopping centers, etc.). The traffic management plan is necessary to lessen the impact.

**PRIMARY BENEFIT(S):**

Increased safety and reduced delay and congestion. Fewer complaints from motorists and affected facilities.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Applicable to major projects with high volumes of traffic mainly in urban, suburban, or rural areas.

**STATE(S) WHERE UTILIZED:**

Indiana

**SOURCE/CONTACT(S):**

David Boruff, Design, Indiana DOT  
Telephone: (317) 232-5222

**BEST PRACTICE:****Caltrans Traffic Management Plan****DESCRIPTION:**

The Caltrans Traffic Management Plan is a cohesive program of operational and demand management strategies designed to maintain acceptable levels of traffic flow during periods of construction activities. A major consideration in developing and implementing the plans is the interaction with the planning, design, construction, and funding phases of the transportation project.

**REASON(S) FOR ADOPTING:**

The plan coordinates the efforts of planners, engineers, and construction workers, law enforcement agencies, and local government with two goals in mind:

- Minimizing congestion and delays caused by construction.
- Making construction zones safer for motorists and workers alike.

**PRIMARY BENEFIT(S):**

Congestion through the construction zone is minimized; construction zones are safer and construction duration and cost are reduced.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Primarily reconstruction, restoration/rehabilitation for urban freeways.

**STATE(S) WHERE UTILIZED:**

California

**SOURCE/CONTACT(S):**

Jaqui Ghezzi, Branch Chief-Transportation Management Plans, Office of System Management and Operations, Caltrans

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**BEST PRACTICE:****Traffic Management Plan on Major Urban Projects****DESCRIPTION:**

In anticipation of a project, activities and products include a traffic control plan, highway advisory radio message, and public information/media campaign. Project personnel assess the potential impact to the region before construction, and determine potential solutions in a larger sense rather than localized remedies (e.g., signing) within the project limits.

**REASON(S) FOR ADOPTING:**

A comprehensive effort is made to accommodate traffic during construction.

**PRIMARY BENEFIT(S):**

Thinking beyond the project limits allows for non-traditional remedies to traffic impacts.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Reconstruction, restoration/rehabilitation on urban freeways.

**STATE(S) WHERE UTILIZED:**

California

**SOURCE/CONTACT(S):**

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Greg Edwards, Traffic Operations, Caltrans

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**BEST PRACTICE:**  
**Super-Wide Bridge Shoulders**

**DESCRIPTION:**

The Wisconsin Department of Transportation (WisDOT) has begun to widen some bridges to 56 feet during rehabilitation in order to accommodate four lanes of traffic during future reconstruction. According to the procedure set forth in the Facilities Development Manual the widening decision depends on several factors:

- Projected traffic volumes for the year when the adjoining highway will be reconstructed or rehabilitated (not when the bridge will be overlaid or re-decked);
- The proposed project improvement type for the adjoining highway;
- The hours during which highway reconstruction will cause lane restrictions.

Bridge widening is warranted if:

- Projected Annual Average Daily Traffic (AADT) is between 20,000 and 25,000 with high seasonal peaking characteristics present.
- Projected AADT is less than 20,000 and high summer weekend traffic is present.
- Reconstruction of the adjoining highway is anticipated within 20 years.

**REASON(S) FOR ADOPTING:**

To allow additional capacity as needed during future rehabilitation activities.

**PRIMARY BENEFIT(S):**

This practice enables four lanes to be maintained during roadway rehabilitation. As lanes are closed traffic is shifted to the shoulder as needed.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Four lane divided corridors.

**STATE(S) WHERE UTILIZED:**

Wisconsin

**SOURCE/CONTACT(S):**

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John Corbin, State Traffic Engineer, Wisconsin DOT  
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## Best Practices Category E - Project Development/Design

Project development and design entails developing alternatives and selecting the preferred design that minimizes present and future exposure to road users and workers. Best practices in this area encourage assessing motorist delay, road user and worker safety, and impacts to adjacent communities on all major urban and other high-volume corridors.

Examples of practices include:

- Constructability review processes and strategies to ensure adequate pre-project analysis.
- Task forces, committees, and groups to review project plans and recommend appropriate mitigation strategies.
- Tools and practices implemented during project development and design to assess project impact, and minimize construction times, and road user costs.
- Traffic control plans that provide for shared risk and benefits for owners, contractors, and the traveling public.
- Project specific traffic management plans and strategies.
- Contract times and motorist delays are minimized through the use of CPM scheduling and accelerated contracting procedures.

The following best practice entries relate to project development and design:

Subcategory	Ref. #	PROJECT DEVELOPMENT AND DESIGN Best Practices
E1 Constructability Review Process	E1-1	Traffic System Management Committee
	E1-2	Involvement of Affected Communities and Businesses in the Project Development Process
	E1-3	Formal Constructability Review Process
	E1-4	Constructability Reviews by Construction Industry Representatives During Project Design
	E1-5	Utilizing Video to Enhance Public Involvement
	E1-6	Multi-disciplinary Teams to Design, Evaluate, and Select Traffic Management Plans
	E1-7	Constructability Reviews on High Visibility Projects in Design Phase

Subcategory	Ref. #	PROJECT DEVELOPMENT AND DESIGN Best Practices
E1 Constructability Review Process	E1-8	North Carolina Contractor's Association Participation in Constructability Reviews
	E1-9	Community Advisory Councils
	E1-10	Contractor Participation in Constructability Reviews
	E1-11	Emergency Response Team and Trucking Association Involved in the Design/Evaluation of the Traffic Control Plan
	E1-12	Contractor Hired by the Design Consultant to Perform Constructability Review
	E1-13	Constructability Practices for Reducing the Impact to Motorists and Businesses
E2 Tools and Practice	E2-1	Sequence, Coordinate, and Schedule Projects to Minimize Motorist Delay and Interference to Business/Residential Community
	E2-2	Comparisons of the Estimated Construction Time Required to Maintain Traffic Versus Diverting Traffic
	E2-3	Traffic Control Plan Checklist
	E2-4	Routine Comparison Made of the Estimated Construction Time to Maintain Traffic Versus Diverting Traffic
	E2-5	Total Road Closure
	E2-6	Coordination of Road Closure/Detours During Construction
	E2-7	Critical Path Method (CPM) Scheduling to Set Contract Time
	E2-8	Value Engineering Studies Conducted on Major Projects
	E2-9	Value Engineering Performed on All Projects Over \$5 Million
	E2-10	Use of Total Road Closures for Rehabilitation Projects
	E2-11	Quick Change Moveable Barrier™
E3 Project Specific Traffic Management Planning	E3-1	Construction Work Zone Traffic Control Strategy
	E3-2	Comprehensive Traffic Management Plan

**BEST PRACTICE:****Traffic System Management Committee****DESCRIPTION:**

Traffic System Management Committees emphasize a working team environment and have been utilized on major projects for more than 12 years. These groups meet on a monthly basis to discuss work zone issues as well as those problems affecting the local community and especially nearby residents. The workgroup makeup generally includes construction and contractor personnel, police agencies, fire departments, local city engineering, traffic engineering departments, and design consultants. Frequently local businesses, schools, shopping centers, and neighborhood associations are invited to the workgroup meetings.

**REASON(S) FOR ADOPTING:**

These meetings increase awareness of the current construction efforts being focused on for the coming month as well as resolving any neighborhood traffic, safety, noise, or other concerns. Problem areas are discussed and solutions determined where possible. Newsletters that are being proposed for release to the neighborhood are reviewed and modified if necessary. Traffic management studies have been initiated through this group.

**PRIMARY BENEFIT(S):**

The Traffic System Management Committees promote: contractor coordination, project administration, and open communication. Local agencies, businesses, and neighborhoods know where they can go to get reliable answers to their questions. State and contractor personnel are able to better understand community needs and resolve conflicts more easily.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Type of facility: Generally freeways or large dollar projects.

Location: Generally urban projects.

Volume/Speed: High-volume/high-speed.

Type of work: New construction or major reconstruction.

**STATE(S) WHERE UTILIZED:**

Arizona

**SOURCE/CONTACT(S):**

Mark Bonan, Public Relations, District Construction, Valley Project Information  
Telephone: (602) 712-8965

**BEST PRACTICE:****Involvement of Affected Communities and Businesses in the Project Development Process****DESCRIPTION:**

This practice is used on an individual project basis and has been in effect for several years. The county holds a number of meetings with the local neighborhood and business groups to obtain their input into the design of projects. In some of these meetings workgroups are organized to discuss specific issues and develop recommendations that are proposed to the entire group. These meetings give local citizens a feeling of ownership in the project.

**REASON(S) FOR ADOPTING:**

The purpose of these meetings was to get the communities' feel for the project and better understand their needs. Information is obtained early and eliminates surprises that may otherwise not be brought out until the end of the design process or even during construction. Improved community relations are also one of the reasons for adopting the process.

**PRIMARY BENEFIT(S):**

At these meetings some citizens find it easier to bring out and discuss their opposition and at the same time come to an understanding as to the desires of their neighbors. In a sense, they are brought on board as decision makers. It makes the county's job easier and reduces conflict.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All major new and reconstruction roadway projects.

**STATE(S) WHERE UTILIZED:**

Arizona

**SOURCE/CONTACT(S):**

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Kent Hamm, Assistant County Engineer, Maricopa County  
 Telephone: (602) 506-4618

**BEST PRACTICE:**  
**Formal Constructability Review Process (CRP)**

**DESCRIPTION:**

CRP is an iterative, multi-disciplinary review of the Plans, Specifications, and Estimates documents (PS&Es) at various defined stages of the project development process. This review will include all functional areas including, but not limited to: traffic, design, construction, and maintenance. The CRP has been implemented on all projects greater than \$25 million since July 1997 and implemented for all major projects (>\$750,000) since July 1998.

**REASON(S) FOR ADOPTING:**

To improve overall constructability in an effort to reduce contract time extensions and delay claims and the overall cost/duration of construction.

**PRIMARY BENEFIT(S):**

The CRP would address many of the root causes leading to constructability problems, contract change orders, and delay claims. Constructing a project right the first time would not only minimize contract time, but also reduce or eliminate some future maintenance problems. All of this adds up to less inconvenience to the traveling public and a better perception by the public of the State Department of Transportation.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All types. All locations.

**STATE(S) WHERE UTILIZED:**

California

**SOURCE/CONTACT(S):**

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Ken Kochevar, Transportation Engineer, FHWA California Division Office

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**BEST PRACTICE:****Constructability Reviews by Construction Industry Representatives During Project Design****DESCRIPTION:**

Working with the Colorado Contractor's Association, a construction contractor is selected to review and critique plans under development at about 30 percent complete stage.

**REASON(S) FOR ADOPTING:**

To eliminate problems with plans that could have been identified by those more familiar with construction or work phasing. Review by contractors allows correction prior to advertisement and start of construction.

**PRIMARY BENEFIT(S):**

Fewer costly changes during construction. Some savings in delay and congestion due to revisions to work sequencing or traffic control that affects users.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All types of projects, but generally higher impact projects and facilities, and more complex projects.

**STATE(S) WHERE UTILIZED:**

Colorado

**SOURCE/CONTACT(S):**

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Peter Eun, FHWA, Resource Center

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**BEST PRACTICE:****Utilizing Video to Enhance Public Involvement****DESCRIPTION:**

The Illinois Department of Transportation, District 4, has utilized videos on several projects to give interested stakeholders insight into project specifics. One example is the video utilized for the rehabilitation of the Havana Bridge over the Illinois River. The bridge was closed for the rehabilitation and a ferryboat system and a park and ride facility were used.

**REASON(S) FOR ADOPTING:**

The people of Havana stated early in the preliminary engineering stage that closure of the bridge was unacceptable due to the perceived impacts to the area. It was determined that the rehabilitation work would require closure of the bridge at least during the floor beam replacement. Three alternatives were developed, each requiring a different degree of closure. To convey this information to the public, a video was developed that described the different alternatives and their impacts.

**PRIMARY BENEFIT(S):**

Benefits of the use of video include educating the public on alternative methods of construction. Public sentiment in Havana went from, "You can't do that!" to "Close the bridge and get it fixed as quickly as possible!" Much of this change in sentiment is attributed to the video.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Enhanced public involvement, including the use of video, should be utilized on complex urban projects and other projects that involve major impacts to the traveling public. Video is an efficient medium for conveying information on complicated projects.

**STATE(S) WHERE UTILIZED:**

Illinois

**SOURCE/CONTACT(S):**

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**BEST PRACTICE:**

**Multi-Disciplinary Teams to Design, Evaluate, and Select Traffic Management Plans**

**DESCRIPTION:**

The development of traffic management plans by multi-disciplinary teams began in June 1997, after the issuance of the Indiana Department of Transportation's (INDOT) new design manual that has an entire chapter devoted to the subject of traffic management plans.

**REASON(S) FOR ADOPTING:**

The reason for adopting constructability reviews is to ensure that a reasonable transportation management strategy has been incorporated into the traffic control plans.

**PRIMARY BENEFIT(S):**

The biggest benefit gained is that it provides a team approach with a variety of disciplines. This approach looks outside the box for potential solutions. Evaluation of TCPs by the team reduced the chance of errors being repeated.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Applicable to major projects with high volumes of traffic, mainly in urban and suburban areas.

**STATE(S) WHERE UTILIZED:**

Indiana

**SOURCE/CONTACT(S):**

David Boruff, Design, Operations Support Pre-Engineer/Environment,  
Indiana DOT  
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Greg Pankow, Contracts and Construction, Indiana DOT  
Telephone: (317) 232-5081  
Email: [gpankow@indot.state.in.us](mailto:gpankow@indot.state.in.us)

**BEST PRACTICE:****Constructability Reviews on High Visibility Projects in Design Phase****DESCRIPTION:**

Constructability reviews would fall under the traffic management plans process, which is included in the Indiana Department of Transportation (INDOT) Design Manual. Constructability reviews include reviewing construction phasing and scheduling, reviewing design alternates, reviewing traffic control alternates, reviewing the adequacy of alternate routes, coordinating the design with other plans in the region, and coordinating funding and timing with other projects within the corridor. INDOT formally began the practice of traffic management plans in 1997.

**REASON(S) FOR ADOPTING:**

INDOT realized that major projects on high-volume routes could impact an entire corridor and many other facilities such as hospitals, schools, recreational facilities, and shopping centers. The traffic management plan is necessary to lessen the impact on all facilities.

**PRIMARY BENEFIT(S):**

Increased safety, reduced delay, and congestion. Fewer complaints from affected facilities such as shopping centers and motorists.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This type of practice is most applicable on any type of facility of high visibility (primarily urban freeways).

**STATE(S) WHERE UTILIZED:**

Indiana

**SOURCE/CONTACT(S):**

Gary Mroczka, Chief of Contracts and Constructions, Indiana DOT  
Telephone: (317) 232-5226

**BEST PRACTICE:****North Carolina Contractor's Association Participation in Constructability Reviews****DESCRIPTION:**

The North Carolina Contractor's Association is actively involved in constructability reviews early in the design process. The reviews have been conducted since 1996.

**REASON(S) FOR ADOPTING:**

The process has been developed to provide a more constructible design by using contractor input early in the design process. Historically, there have been many projects delayed in North Carolina due to lack of contractor input in the design process.

**PRIMARY BENEFIT(S):**

The greatest benefit to date is reduction in contract time—sometimes dramatic decreases. There have also been reductions in contract costs, reduction in user costs, and better traffic control designs.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Projects selected for review are typically on high-volume, urban freeways. The projects are major rehabilitation and new construction projects with special environmental mitigation concerns.

**STATE(S) WHERE UTILIZED:**

North Carolina

**SOURCE/CONTACT(S):**

Steve DeWitt, P.E., State Construction Engineer, North Carolina DOT

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**BEST PRACTICE:**  
**Community Advisory Councils**

**DESCRIPTION:**

The community advisory councils are comprised of businesses, neighborhood associations, Paving the Way, and other interested parties. They provide a forum for complaints and issues to be discussed and aid in developing the communication plan for the projects.

**REASON(S) FOR ADOPTING:**

The size of the projects and the number of individuals that would be impacted by the projects were such that it was believed that they needed a voice in the design and construction process. With projects of large magnitude, public relation problems could be minimized with the establishment of the councils.

**PRIMARY BENEFIT(S):**

Buy-in to the project by those individuals represented by the advisory council. Individuals have a forum to hear their complaints.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All public roads.

**STATE(S) WHERE UTILIZED:**

Ohio

**SOURCE/CONTACT(S):**

JP Blackwood, City of Columbus

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**BEST PRACTICE:**

**Contractor Participation in Constructability Reviews**

**DESCRIPTION:**

This practice allows all of the contractors to review the plans in advance of advertisement to ensure that the best, most economical, and quickest design and construction methods are incorporated prior to advertisement. This practice was begun in 1997.

**REASON(S) FOR ADOPTING:**

The constructability reviews were begun largely because there was an untapped wealth of experience of contractors who know how to construct projects in the most economical and expedient manner.

**PRIMARY BENEFIT(S):**

Besides incorporating better, more economical, and expeditious methods of construction, having the contractors review the plans early provides a way to detect errors overlooked in the design phase and allows the contractors additional time to become more familiar with the project, and therefore, enabling them to submit more accurate bids.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This is done on projects over \$5 million.

**STATE(S) WHERE UTILIZED:**

Oklahoma

**SOURCE/CONTACT(S):**

Jack Stewart, Office/Specifications Engineer, Oklahoma DOT

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Email: [jack.stewart@odot.org](mailto:jack.stewart@odot.org)

**BEST PRACTICE:****Emergency Response Team and Trucking Association Involved in the Design/Evaluation of the Traffic Control Plan****DESCRIPTION:**

All emergency response agencies, private sector companies, and media cooperate to institute a limited access contingency plan and a proactive response to emergency situations. This response plan was submitted and incorporated within a traffic control plan. This practice also allowed emergency response agencies and private sector companies to have input into the overall traffic control plan.

**REASON(S) FOR ADOPTING:**

The reason for implementing the practice was to provide a limited access contingency plan and a proactive response to emergency situations within a work zone. The practice was implemented to improve the efficiency and effectiveness of the use of resources to deliver emergency response.

**PRIMARY BENEFIT(S):**

The coordination of the parties involved has brought no major problems in delivering emergency response to the work zone.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All projects.

**STATE(S) WHERE UTILIZED:**

Utah

**SOURCE/CONTACT(S):**

Roland Stanger, Safety Engineer, FHWA Utah Division Office

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Sgt. Danny Catlin, Utah Highway Patrol

Telephone: (801) 965-4676

**BEST PRACTICE:****Contractor Hired by Design Consultant to Perform Constructability Review****DESCRIPTION:**

In January 1997, the Virginia Department of Transportation (VDOT) awarded a consultant contract to provide design services for the reconstruction of the James River Bridge carrying I-95 through downtown Richmond. As part of this contract a local construction contractor was hired to review construction alternatives for feasibility, cost, and timing.

**REASON(S) FOR ADOPTING:**

The replacement of the James River Bridge was a high visibility project with high traffic volumes. Involving a representative of the construction industry at the design phase helped eliminate problems during the construction phase.

**PRIMARY BENEFIT(S):**

This construction contract included several uncommon provisions including strict limits on impacts to traffic requiring innovative construction practices, staged construction with completion dates for each phase and A+B bidding. Having a construction contractor on-board has assisted the design consultant and VDOT in developing a project that was feasible to construct and financially responsible.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Any project requiring innovative construction techniques or major traffic impacts.

**STATE(S) WHERE UTILIZED:**

Virginia

**SOURCE/CONTACT(S):**

Frank Gee, State Construction Engineer, Virginia DOT

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Email: [gee\\_cf@vdot.state.va.us](mailto:gee_cf@vdot.state.va.us)

**BEST PRACTICE:****Constructability Practices for Reducing the Impact to Motorists and Businesses****DESCRIPTION OF BEST PRACTICE:**

In 1996, as part of their statewide Quality Control/Enhancement Plans, the Florida Department of Transportation (FDOT) instituted constructability reviews into the project development process. In general, this involves active participation by FDOT Construction personnel early in the design stages of a project, possibly even during planning for large or complex groups of projects. Constructability reviews early in the process ensures the scope of the project addresses construction issues, preventing conflicts and reducing contract time.

**REASON(S) FOR ADOPTING:**

By implementing constructability practices, FDOT hopes to better anticipate field oriented issues and conflicts which have typically plagued projects (e.g., utility conflicts, maintenance of traffic which cannot be implemented, etc.) and to encourage use of new construction methods (administrative and technical) which increase the quality and reduce time on the job.

**PRIMARY BENEFIT(S):**

- Reducing the time the public is exposed to construction conditions.
- Reducing costly construction supplemental agreements and claims.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This practice is applicable for all construction projects, but especially those with more complex maintenance of traffic or which have a high impact to adjacent property owners.

**STATE(S) WHERE UTILIZED:**

Florida

**SOURCE/CONTACT(S):**

Donald Davis, FHWA Florida Division Office

Telephone: (850) 942-9650, ext. 3035

Email: [donald.davis@fhwa.dot.gov](mailto:donald.davis@fhwa.dot.gov)

John Shriner, State Scheduling Engineer, Florida DOT

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Email: [john.shriner@dot.state.fl.us](mailto:john.shriner@dot.state.fl.us)

**BEST PRACTICE:****Sequence, Coordinate, and Schedule Projects to Minimize Motorist Delay and Interference to Business/Residential Community****DESCRIPTION:**

Internal coordination meetings are routinely held to discuss various projects from the Bureaus of Traffic, Highways, and Bridges that have the greatest impact on traffic. Specifically, Chicago Department of Transportation (CDOT) internally discusses the upcoming construction season's major projects and proceeds to map out coordinated project letting schedules in order to minimize motorist delay and interference to effected business/residential communities.

**REASON(S) FOR ADOPTING:**

To enhance the sequencing, coordinating, and scheduling of projects during each year's construction season, which has the greatest potential to impact traffic in order to minimize delay and maintain an acceptable level of mobility and safety.

**PRIMARY BENEFIT(S):**

Construction cost savings related to enhanced project coordination. Travel time improvements and motorists/pedestrian safety improvements within construction and maintenance work zones.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All locations. All types of work.

**STATE(S) WHERE UTILIZED:**

Illinois

**SOURCE/CONTACT(S):**

Donald Grabowski, Deputy Commissioner, Bureau of Traffic, Chicago DOT  
Telephone: (312) 744-4684

Bruce Worthington, Chief Highway Engineer, Bureau of Highways, Chicago DOT  
Telephone: (312) 744-3520

**BEST PRACTICE:**

**Comparisons of the Estimated Construction Time Required to Maintain Traffic Versus Diverting Traffic**

**DESCRIPTION:**

This practice is covered under the traffic management plans component of the Indiana Department of Transportation's (INDOT) design manual. It is considered specifically when reviewing traffic control alternates. INDOT formally began the practice of traffic management plans in 1997.

**REASON(S) FOR ADOPTING:**

The reason for adopting this practice is determined after reviewing various aspects, including cost effectiveness, of traffic control alternates.

**PRIMARY BENEFIT(S):**

The biggest benefit realized is easier construction for the contractor and increased safety of the traveling public, and it is usually cost effective.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This type of practice may be cost effective on various types of facilities. Each project is site specific.

**STATE(S) WHERE UTILIZED:**

Indiana

**SOURCE/CONTACT(S):**

Gary Mroczka, Chief of Contracts and Construction, Indiana DOT  
Telephone: (317) 232-5226

**BEST PRACTICE:**  
**Traffic Control Plan Checklist**

**DESCRIPTION:**

This checklist has been in use for more than 15 years by designers to insure that they have considered all necessary factors in developing traffic management plans and traffic control plans (TCPs). The checklist is part of the Indiana Department of Transportation (INDOT) design manual.

**REASON(S) FOR ADOPTING:**

This list was developed by INDOT Traffic Control Review Committee, which annually reviews work zones on a sample of projects. The list includes items that should have been considered on projects, but were not, resulting in problems.

**PRIMARY BENEFIT(S):**

Use of this list helps to insure that all necessary items are considered in the development of traffic management plans and TCPs.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All types of projects on all types of facilities.

**STATE(S) WHERE UTILIZED:**

Indiana

**SOURCE/CONTACT(S):**

Bob Cales, Contracts and Constructions, Indiana DOT

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**BEST PRACTICE:**

**Routine Comparisons Made of the Estimated Construction Time to Maintain Traffic Versus Diverting Traffic**

**DESCRIPTION:**

Impacts to traffic from construction are closely monitored by the local press, business oversight groups, and concerned citizens. The credibility of the project rests in large part upon making reasonable tradeoffs between traffic flow and construction.

**REASON(S) FOR ADOPTING:**

- To maintain pre-existing levels of vehicular and pedestrian mobility.
- To minimize construction cost and schedule.

**PRIMARY BENEFIT(S):**

The project obtains a high-degree of trust and confidence from external agencies and organizations that allows construction to proceed as desired.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All types. All locations.

**STATE(S) WHERE UTILIZED:**

Massachusetts

**SOURCE/CONTACT(S):**

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**BEST PRACTICE:  
Total Road Closure**

**DESCRIPTION:**

The highway is closed to allow unrestricted contractor access to the roadway.

**REASON(S) FOR ADOPTING:**

This practice, when combined with incentive/disincentives, significantly reduces the time to complete work.

**PRIMARY BENEFIT(S):**

Significant reductions in project construction time, which results in less delay to motorists. Also, as a result of shorter construction time, less total traffic is exposed to work zone hazards and the challenges of changing work zone traffic control.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

The Michigan Department of Transportation has applied total closures to urban or suburban freeways, in areas where local street system or other freeway segments exist to handle the diverted traffic.

**STATE(S) WHERE UTILIZED:**

Michigan

**SOURCE/CONTACT(S):**

Dave Morena, FHWA Michigan Division Office  
Telephone: (517) 702-1836

Bob Lariviere, Michigan DOT  
Telephone: (248) 483-5100, ext. 120

**BEST PRACTICE:**

**Coordination of Road Closure/Detours During Construction**

**DESCRIPTION:**

The North Carolina Department of Transportation (NCDOT) Traffic Control Unit works with the NCDOT Permits Unit to inform and direct over-sized, over-weight, and over-height vehicles around restricted work zones. The criteria for detouring traffic is provided to the NCDOT Division Office for careful prescription of signing, number of lanes provided, maximum length, etc. The coordination procedures have been in existence since 1995.

**REASON(S) FOR ADOPTING:**

The NCDOT is responsible for providing consistent detours that will not mislead or endanger the motorist.

**PRIMARY BENEFIT(S):**

The coordinated effort between NCDOT, other agencies, and local citizens ensures safe, efficient, and necessary detours for the motorist in or around work zones.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This procedure applies to all work zones and all roadways.

**STATE(S) WHERE UTILIZED:**

North Carolina

**SOURCE/CONTACT(S):**

Stuart Bourne, P.E. Traffic Control Marking, Delineation Engineer,  
North Carolina DOT  
Telephone: (919) 250-4151  
Fax: (919) 250-4195

**BEST PRACTICE:****Critical Path Method (CPM) Scheduling to Set Contract Time****DESCRIPTION:**

The Oklahoma Department of Transportation sets a maximum allowable contract time using the CPM scheduling method, reducing the maximum allowable amount of time that contractors can bid on A+B contracts.

**REASON(S) FOR ADOPTING:**

When the Oklahoma Department of Transportation began A+B bidding projects, the contractors who were unfamiliar with the processes involved tended to bid the time part very conservatively. Setting the maximum allowable contract time by use of the more accurate CPM scheduling method reduced the maximum allowable amount of time the contractor can bid, and thereby encourages the contractors to be more aggressive in bidding the time part of the contract.

**PRIMARY BENEFIT(S):**

Accelerated contract completion and reduced motorist delays.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Projects where the potential exists for significant motorist delays, and when projects need to be completed by a certain time (e.g., before a planned special event).

**STATE(S) WHERE UTILIZED:**

Oklahoma

**SOURCE/CONTACT(S):**

Christine Senkowski, Roadway Design, Oklahoma DOT

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**BEST PRACTICE:****Value Engineering (VE) Studies Conducted on Major Projects****DESCRIPTION:**

The Texas Department of Transportation (TxDOT) began conducting voluntary VE studies in 1991. One of the elements of their designs was to focus on traffic management as it relates to constructability and traffic management through work zones. VE studies are performed in the early phases of design and focus on traffic management.

**REASON(S) FOR ADOPTING:**

The VE provides benefits to project development and the potential constructability of the projects. The VE was also used to analyze processes, such as the utility accommodation and local agency projects.

**PRIMARY BENEFIT(S):**

Improved early communications between design, construction, and maintenance personnel.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

The VE is conducted on major projects or processes.

**STATE(S) WHERE UTILIZED:**

Texas

**SOURCE/CONTACT(S):**

Mark Marek, Director, Roadway Design Division, Texas DOT  
Telephone: (512) 416-2653

Robert R. Kovar, Deputy Director, Design Division, Texas DOT  
Telephone: (512) 416-2242  
Email: [rkovar@dot.state.tx.us](mailto:rkovar@dot.state.tx.us)

**BEST PRACTICE:****Value Engineering Performed on All Projects Over \$5 Million****DESCRIPTION:**

Value Engineering (VE) is a systematic, creative approach to obtaining optimum value for every dollar spent. A VE review is conducted by a multi-disciplined team of experienced engineers and technicians during the design and development phase of the project. The Virginia Department of Transportation (VDOT) has the option of performing a review at some other point during the project. VDOT began performing VE studies in the mid-1970s.

**REASON(S) FOR ADOPTING:**

By identifying the most cost-effective use of funds, the program assists management in providing the best transportation system possible. In 1990, the Virginia General Assembly legislated that a VE study be performed on all construction and maintenance projects exceeding \$5 million.

**PRIMARY BENEFIT(S):**

VE can reduce construction time and road user cost without sacrificing quality or operation and maintenance capabilities. VE achieves one of the highest returns on investment the Citizens of the Commonwealth make in their transportation system. VE team members gain increased familiarity with other disciplines by participating in VE studies.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All projects except repetitive routine maintenance.

**STATE(S) WHERE UTILIZED:**

Virginia

**SOURCE/CONTACT(S):**

Larry Jones, Division Administrator, Administrative Services, Virginia DOT

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Email: [jones\\_ld@vdot.state.va.us](mailto:jones_ld@vdot.state.va.us)

**BEST PRACTICE:****Use of Total Road Closures for Rehabilitation Projects****DESCRIPTION:**

Several State Departments of Transportation (DOTs) have begun using this practice. Washington State DOT has conducted a study to evaluate the cost versus benefits of closing a heavily congested section of high speed freeway for a continuous weekend of construction with those of closing such a road more frequently but not continuously for nighttime construction. The study indicated that pavement quality was good, and costs were lower because of the need for less traffic control and set-time. Motorists responded favorably to the method, and local businesses in the area were generally unaffected.

**REASON(S) FOR ADOPTING:**

Washington State DOT is looking for ways to be more cost effective, better serve the public, create safe conditions for both workers and motorists, and improve the quality of pavement and paving methods.

**PRIMARY BENEFIT(S):**

Greatly reduced time for construction/work zone, increased safety, may decrease public uncertainty.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Areas where alternate routes are available and significant portions of a roadway are affected.

**STATE(S) WHERE UTILIZED:**

Washington

**SOURCE/CONTACT(S):**

Phillip S. Dunston, Department of Civil and Environmental Engineering,  
University of Washington  
Telephone: (206) 685-1795  
Email: [pdunston@ce.washington.edu](mailto:pdunston@ce.washington.edu)

Tom Nelson, Construction Engineer, Washington DOT  
Telephone: (360) 357-2648

**BEST PRACTICE:****Quick Change Moveable Barrier™****DESCRIPTION:**

A concrete barrier wall used to separate opposing traffic is shifted laterally 12 ft, twice daily, to reverse the direction of travel on that 12 ft lane. A transport vehicle moves 6,000 ft of barrier in 25 minutes. The barrier system enables the agency to open and close lanes or reverse the direction of travel in a lane to accommodate peak traffic volumes and protect workers.

Successful completion of an aggressive project, the Hyperfix project, to completely rebuild Interstate 70 near Indianapolis in one construction season required directional closure of the roadway. INDOT opened three inbound lanes during the morning rush hour and two outbound lanes. In the evening rush, the flow was reversed, with three outbound lanes and two inbound. INDOT used movable barrier wall to accomplish the daily lane shifts.

**REASON(S) FOR ADOPTING:**

Bridge rehabilitation closed a 2-lane bridge. The adjacent bridge was reconfigured to 3 lanes, carrying 2-way traffic. The movable barrier allows reversing the center lane so that 2 lanes are provided for peak rush hour traffic.

**PRIMARY BENEFIT(S):**

Reduced traffic delay, improved traffic flow.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Areas where the peak traffic tends to be high in one direction in the morning and another later in the day.

**STATE(S) WHERE UTILIZED:**

Illinois, Indiana

**SOURCE / CONTACT(S):**

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Indiana DOT

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Project Development and Design → Project Specific Traffic Management Planning	E3-1
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**BEST PRACTICE:  
Construction Work Zone Traffic Control Strategy**

**DESCRIPTION:**

Early in project development a work zone traffic control strategy is identified. The traffic control strategy is developed during a required project design conference that is attended by traffic engineers, law enforcement officials, and construction engineers. It may constrain the number of lanes that can be closed, hours of the day and days of the week that work can occur. Also discussed is the level of service to be provided to motorists during construction, and the need for night operations.

**REASON(S) FOR ADOPTING:**

To ensure that the strategies are considered in design and later in developing the traffic control plan for the Plans, Specifications, and Estimates documents (PS&Es).

**PRIMARY BENEFIT(S):**

Provides adequate safety and minimizes travel time delays. A checklist has been developed to alert people to the various strategies available. Early in the project design phase funds are earmarked to cover the costs.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Any project, urban or rural, which will need a work zone on the roadway.

**STATE(S) WHERE UTILIZED:**

Washington

**SOURCE/CONTACT(S):**

Frank Newboles, Assistant Traffic Engineer, Washington DOT  
Telephone: (360) 705-7282

Project Development and Design → Project Specific Traffic Management Planning	E3-2
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**BEST PRACTICE:****Comprehensive Traffic Management Plan****DESCRIPTION:**

Mississippi Department of Transportation (MDOT) implemented a comprehensive traffic management plan for the reduction of traffic delays and for providing emergency vehicles access. A team composed of MDOT, FHWA, contractors, and local authorities covering police, fire, emergency medical, and road services were responsible for the plans and provisions for the access to incident sites for emergency vehicle personnel and other necessary personnel for all stages of construction. This team approach was used to reduce traffic delay and decrease the emergency response time. Practices adopted included contractor supplied service patrols, using a professional advertising agency to keep the public informed of construction activities, using emergency medical services, establishing continuous police presence, establishing a staging area, using portable changeable message signs, establishing a “hotline,” and establishing a detour and alternate route signing. Some of these practices have been incorporated by MDOT for use on other projects.

**REASON(S) FOR ADOPTING:**

The I-55/I-20 interchange handles over 100,000 vehicles a day and is the major East-West and North-South route through the State and the City of Jackson. The innovative practices for reducing delays and improving emergency response time were considered vital for increasing safety.

**PRIMARY BENEFIT(S):**

There were significant reductions in traffic delays for the traveling public and emergency response time was decreased. The use of radio, TV, and facsimiles to inform the traveling public of upcoming road closures and delays greatly enhanced the public perception of the construction project and MDOT as a whole. By keeping the public involved and informed of the status of construction activities, a good working relationship developed between the Department, contractors, and the public. The public was much more willing to tolerate delays and soon began to find alternate routes without complaining. Safety was also seen to increase.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This practice is applicable where the traffic demand and public perception would warrant its use. Any type of construction activity on a high-speed roadway or major roadway with high volumes of traffic could implement this practice.

**STATE(S) WHERE UTILIZED:**

Mississippi

**SOURCE/CONTACT(S):**

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## Best Practices Category F - Contracting and Bidding Procedures

Contracting and bidding includes developing effective contracts and obtaining appropriate financial bids for reconstruction efforts. Best practices in this section emphasize the application of contracting and bidding procedures to reward contractors for quality work, innovation, accelerated early completions, minimizing motorist delays, and enhancing the safety of road-users and workers.

Examples of practices include:

- Time-based bidding and flexible Notice to Proceed dates on projects that adversely affect the existing level of service.
- Pre-qualification procedures used to identify quality and excellence in past performance when working on high-risk, high-visibility, and complex projects.
- Computer software to calculate road-user costs that is user-friendly with realistic outputs.

The following best practice entries relate to work zone contracting and bidding procedures:

Subcategory	Ref. #	CONTRACTING AND BIDDING PROCEDURES Best Practices
F1 Contracting Practices	F1-1	Alternative Contracting Practices
F2 Contractor Qualifications	F2-1	Restricted Bidding Capacity of Contractors who were Behind Schedule or Consistently Unable to Complete DOT Contracts
F3 Flexible Timing	F3-1	Flexible Start Times
	F3-2	Summertime Bridge Reconstruction Program
	F3-3	Narrow Window for On-Site Construction
F4 Incentives/Disincentives	F4-1	A+B Bidding with Incentive/Disincentive Clauses
	F4-2	A+B and Incentive/Disincentive Clauses
	F4-3	Lane Rental

Contracting and Bidding Procedures → Contracting Practices

F1-1

**BEST PRACTICE:****Alternative Contracting Practices****DESCRIPTION:**

In 1996, the Florida Legislature authorized the Florida Department of Transportation (FDOT) to use accelerated contracting techniques on construction projects, and limits innovative contracting to \$60 million in contracts annually. Alternative contracting techniques include the following: A+B, Lane Rental, Design/Build, Warranty Clauses, No Excuse Bonus, Lump Sum, Liquidated Savings, and Incentive/Disincentive.

**REASON(S) FOR ADOPTING:**

To accelerate contract completion and to control cost overruns on construction projects.

**PRIMARY BENEFIT(S):**

Early project completion results in reduced disruption and inconvenience to motorists and abutting businesses and homeowners.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Alternative contracting practices are used on many different types of projects. FDOT specifically evaluates which method may be most suitable for a particular project. More than one alternative contracting technique may be used on the same project (e.g., lane rental/no excuse bonus). Incentive/Disincentive is used on all critical projects on the Florida Turnpike.

**STATE(S) WHERE UTILIZED:**

Florida

**SOURCE/CONTACT(S):**

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David Sumner, Technical Specialist, Florida DOT

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**BEST PRACTICE:**

**Restricted Bidding Capacity of Contractors who were Behind Schedule or Consistently Unable to Complete DOT Contracts**

**DESCRIPTION:**

The Ohio Department of Transportation pre-qualifies contractors two different ways: 1) By type of work to be accomplished in the contract (can the contractor build this type of bridge, etc?), and 2) the contractor's ability to manage a certain dollar value of projects (can the contractor manage 4 projects worth \$250 million?).

**REASON(S) FOR ADOPTING:**

Contractors were being awarded projects that they could not finish because they were not professionally qualified or able to manage projects of that size. This leads to continued disruptions of traffic because a new contractor must be hired or the work is inferior and will not last as long.

**PRIMARY BENEFIT(S):**

When a contractor is awarded a project, there is no question as to his ability to complete the project. The responsibility issue of the contractor is eliminated. Projects are not delayed due to the inability of a contractor to complete a project.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All types of work. All locations.

**STATE(S) WHERE UTILIZED:**

Ohio

**SOURCE/CONTACT(S):**

Mark Kelsey, Administrator, Office of Contracts, Ohio DOT  
Telephone: (614) 466-3778

**BEST PRACTICE:**  
**Flexible Start Times**

**DESCRIPTION:**

In 1987, after endorsement by the Florida Legislature, the Florida Department of Transportation began using flexible start times on construction projects. Normally, after award of a project, the “Notice to Proceed” is issued and the contractor is to begin work within 15 days. However, with flexible starting provisions, the contractor is allowed to extend this period of time (usually up to 100 days) to start construction.

**REASON(S) FOR ADOPTING:**

Flexible start times are used for two primary reasons:

- To reduce the time period the public is exposed to construction conditions.
- To increase the frequency of completing contracts within the authorized contract time.

**PRIMARY BENEFIT(S):**

Flexible start time encourages competition in the bidding process and enables a contractor to have more flexibility in scheduling use of equipment and manpower. By having additional flexibility in scheduling resources, the contractor should have less scheduling problems that may cause delay to completion of a contract. Therefore, contracts using flexible start time are expected to finish on time.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This provision is being used on State funded projects and projects not on the National Highway System. In addition, it is primarily used on smaller, less complex projects such as resurfacing contracts.

**STATE(S) WHERE UTILIZED:**

Florida

**SOURCE/CONTACT(S):**

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Contracting and Bidding Procedures → Flexible Timing

F3-2

**BEST PRACTICE:****Summertime Bridge Reconstruction Program****DESCRIPTION:**

The Summertime Bridge Reconstruction Program is a program to let bridge replacement projects to contract with beginning construction dates coinciding with the day after the last day of the school year and completion dates coinciding with the day before the first day of the following school year.

**REASON(S) FOR ADOPTING:**

To replace deficient bridges on school bus routes while minimizing inconvenience to schoolchildren being transported over these routes.

**PRIMARY BENEFIT(S):**

A number of bridge replacement projects can be let to contract throughout the year. Contractors then have time to schedule work to begin construction on the day after school lets out for the summer break. The construction must be complete before school begins at the end of the summer break, which encourages contractors to schedule work in the most efficient manner.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Type of work: Bridge replacement, urban and rural, low volume.

**STATE(S) WHERE UTILIZED:**

Georgia

**SOURCE/CONTACT(S):**

Edward Parker, Structural Engineer, FHWA Georgia Office

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Dan Dobry Jr., Director, Cobb County DOT

Telephone: (770) 528-1645

Contracting and Bidding Procedures → Flexible Timing

F3-3

**BEST PRACTICE:****Narrow Window for On-Site Construction****DESCRIPTION:**

On selected projects, the Oregon Department of Transportation specifies a restricted time frame for on-site construction within the allowable contract time. For example, on-site work on an overlay project might be limited to 30 consecutive calendar days although the contractor may have 100 calendar days to complete the entire project.

**REASON(S) FOR ADOPTING:**

This practice was adopted to minimize the length of time traffic is disrupted and to present a more positive image to the public.

**PRIMARY BENEFIT(S):**

Projects are completed in a more timely manner with minimal disruption.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This policy is most applicable to overlay projects on 2-lane rural highways, but can be applied to other work.

**STATE(S) WHERE UTILIZED:**

Oregon

**SOURCE/CONTACT(S):**

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**BEST PRACTICE:****A+B Bidding with Incentive/Disincentive Clauses****DESCRIPTION:**

A+B bidding is cost plus time bidding. A is the traditional bid for contract items, and the work to be done under the contract. B is time, with an associated cost per time unit set by the agency and used in low bid determination. Time is typically bid in number of days/periods required to complete the contract or identified parts of the contract (phases), as estimated by the bidder. The value of the day/period is established by the owner and is based on user costs. Therefore, B equals number of days/periods estimated multiplied by the user costs per day/period. The low bid is determined by the sum of the A and B values.

Many A+B contracts have an incentive/disincentive (I/D) provision in them. The disincentive provision is incorporated into the contract to discourage the contractor from overrunning the time bid for work. The incentive provision is included to reward the contractor if work is completed earlier than the time bid. The DOT's estimate of days or hours of closure time is critical in this practice to provide a basis for comparison of the bids. This practice may add to project cost, thus the decision to use the I/D clause should be project specific.

- Indiana has used A+B bidding since 1996.
- Missouri has used A+B with I/D clauses extensively since 1988.
- North Carolina has used this process significantly since 1989.
- Oklahoma looks at each project on an individual basis and utilizes the best method of contract bidding.

**REASON(S) FOR ADOPTING:**

This method is used to minimize the time required to complete work thereby reducing the amount of traffic inconvenience. This practice also encourages contractor innovation relating to efficient construction methods.

**PRIMARY BENEFIT(S):**

The A+B and I/D process has been shown to decrease construction time, keeping user costs to a minimum.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

High volume urban rehabilitation projects. Can be applied to all types of facilities, all types of work.

**RELATED BEST PRACTICE(S):**

A+B and Incentive/Disincentive Clauses (Practice F4-2)

**STATE(S) WHERE UTILIZED:**

Indiana, Missouri, North Carolina, Oklahoma

**SOURCE/CONTACT(S):**

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Jack Stewart, Office/Specification Engineer, Oklahoma DOT  
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**BEST PRACTICE:****A+B and Incentive/Disincentive Clauses****DESCRIPTION OF THE BEST PRACTICE/POLICY:**

- A+B bidding – The contractor is asked to factor in the estimated time for the job, along with the cost of the work.
- I/D – The contractor is assigned a cost value for time that rewards or costs him money during execution of the contract depending on how efficient the contractor's operations are.
- Disincentive only – In some cases the Michigan Department of Transportation (MDOT) will assign a disincentive cost to lane closures, and assess the contractor in 15-minute intervals. This type of contract provision is used to assure that certain lanes will be opened by the contractor to accommodate rush hour or weekend directional traffic patterns. On this type of clause, there is no incentive money awarded for opening a lane ahead of the rush hour; this is a disincentive only.

**REASON(S) FOR ADOPTING:**

MDOT wanted to minimize the time required to complete work thereby reducing the amount of traffic inconvenience. By utilizing the A+B technique along with an I/D clause, MDOT has been able to tap contractor ingenuity as to how to get the work done in the least time possible.

**PRIMARY BENEFIT(S):**

- A+B bidding – Reduced overall contract time, with resultant reduced motorist delay.
- I/D and Disincentive only – Reduced delay during critical high-traffic periods.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

These particular techniques have been reserved for those projects in which the construction has a major impact on traffic. Generally these projects have been on major urban freeways.

**RELATED BEST PRACTICE(S):**

A+B Bidding with Incentive/Disincentive Clauses (Practice F4-1)

**STATE(S) WHERE UTILIZED:**

Michigan

**SOURCE/CONTACT(S):**

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**BEST PRACTICE:**  
**Lane Rental**

**DESCRIPTION:**

Lane rental is a process whereby the roadway user cost, generated by user delays due to lane closures, is transferred to the contractor performing work. The contractor is required to pay the Oklahoma State Department of Transportation (ODOT) in order to close a lane.

**REASON(S) FOR ADOPTING:**

This practice was started to minimize motorist delay by encouraging the contractor to work during non-peak hours. It provides a fair and equitable means to allow the construction contractor to choose its own methods of construction. The lane rental costs for peak volume hours are relatively high (up to \$60,000 per hour per lane), are reduced for non-peak daylight hours, and are generally free for nighttime construction operations.

**PRIMARY BENEFIT(S):**

Reduced motorist delay and accelerated construction times on the work requiring a lane closure. Because the rentals charges are based on conservative, real numbers—changes in highway capacity, minimum wages, average gasoline prices in the area, etc.—the charges reflect the actual, measurable costs experienced by the motoring public and make the contractor aware of and responsible for the costs.

One of the problems associated with bidding a project with lane rentals is that it is generally perceived to be a large risk to the smaller contractors and therefore may limit competition.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This technique is used mainly on the high-volume/high-speed Interstates and highways for rehabilitation and reconstruction projects.

**STATE(S) WHERE UTILIZED:**

Oklahoma

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## **Best Practices Category G - Construction/Maintenance Materials, Methods, Practices, and Specifications**

Construction/maintenance materials, methods, practices, and specifications includes practices related to construction techniques, innovative materials, and specifications established to improve quality and product life spans. These best practices encourage maintaining level of service and safety in the work zone.

Examples of practices include:

- Revising prescriptive-type specifications to performance-based specifications.
- Specifications rewarding contractors for innovation, quality, and exceeding expectations.
- Requiring positive barriers to physically separate the workers from the traffic.
- Specifications that require adequate lighting for all nighttime operations, lane shifts, lane drops, and temporary gores.
- Quality work and timely completion of the work.
- Short-term testing and modeling for newly constructed highway components to reasonably predict long-term performance and remaining life.
- Design specifications, guidelines, and testing methods for composite materials.
- Standardized details to encourage greater use of precast materials.
- Real time work zone traffic information for road users and workers to make timely informed decisions.

The following best practice entries relate to specifications and construction materials, methods, and practices:

Subcategory	Ref. #	CONSTRUCTION/MAINTENANCE MATERIALS, METHODS, PRACTICES, AND SPECIFICATIONS Best Practices
G1 Construction Methods	G1-1	Portable Concrete Barrier (K-rail) Connection
	G1-2	“Train” Method of Construction
	G1-3	“Rolling Roadblock” Method for Total Road Closure
	G1-4	Restricting the Length of Active Work Zones
	G1-5	Nighttime Construction Operations
	G1-6	Rubbilization
G2 Incident Management	G2-1	Incident Management in Work Zones
	G2-2	Incident Management Inter-agency Teams
G3 Oversight/ Control	G3-1	Employ a Contractor to Assist Designers and to Perform Constructability Reviews
	G3-2	“Safety Program” Specification
G4 Traffic Control	G4-1	Disincentive Specification for Failure to Remove Lane Closures
	G4-2	Reducing Worker Exposure by Using a Quick Change Sign Post
	G4-3	Certified Worksite Traffic Control Supervisors Required
	G4-4	Constructability Reviews to Minimize Construction Contract Time and User Delays
	G4-5	All Lane Closures are Approved by the Authority
	G4-6	Standard Specification that Requires the Contractor to Correct Deficient Traffic Control
	G4-7	45 mph Posted Speed When Flashing

Subcategory	Ref. #	<b>CONSTRUCTION/MAINTENANCE MATERIALS, METHODS, PRACTICES, AND SPECIFICATIONS Best Practices</b>
G4 Traffic Control	G4-8	Closure of Entrance Ramps During Construction
	G4-9	Drone Radar on Changeable Message Signs
	G4-10	Rumble Strips at the Beginning of Work Zones
	G4-11	Pocket Size “Guidelines For Temporary Traffic Control”
	G4-12	Portable Speed Control Rumble Mat
	G4-13	Construction Practices to Minimize Motorists’ Delays and Inconveniences
	G4-14	Fast Setting Mixes
	G4-15	Points of Merge When Closing a Lane
	G4-16	Moving Lane Closures and Tapers at Mid-Day
	G4-17	Procedural Guidance to Minimize Motorists’ Costs and Inconvenience
	G4-18	Extra Shoulder Repairs
	G4-19	Additional Shoulder Thickness
	G4-20	Halogen Stop/Slow Paddle
G4-21	Water Filled Barrier in High Speed Freeway Work Zones	
G5 Worker Safety/ Productivity	G5-1	Flagger Certification Program
	G5-2	Work Zone Safety Checklist Form
	G5-3	High Visibility Reflective Apparel
	G5-4	Nighttime Lighting Specification

Construction/Maintenance Materials, Methods, Practices, and Specifications → Construction Methods	G1-1
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**BEST PRACTICE:  
Portable Concrete Barrier (K-rail) Connection**

**DESCRIPTION:**

Connection from existing concrete barrier or metal beam guard rail (MBGR) to K-rail.

**REASON(S) FOR ADOPTING:**

Typically, a protected work zone includes K-rail butted up against existing concrete barrier or MBGR and flared out to the required width of the work zone. The transition from existing barrier to the K-rail is not a smooth one; rather, it leaves the “blunt-end” of the first K-rail section exposed. The traditional solution is to shield the blunt-end with a sand-barrel array. The standard sand-barrel array used on high-speed facilities includes two rows, leaving very little horizontal clearance.

**PRIMARY BENEFIT(S):**

The K-rail connection eliminates the need to shield the blunt-end of a sand-barrel array. The result is greater horizontal clear distance between traffic and the highway safety feature, as well as improved sight distance. Also, the maintenance/replacement of damaged sand barrels no longer exists, reducing worker exposure and saving time and money.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Reconstruction, restoration/rehabilitation of rural freeways.

**STATE(S) WHERE UTILIZED:**

California

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Illustration of K-rail application in California

Construction/Maintenance Materials, Methods, Practices, and Specifications → Construction Methods	G1-2
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**BEST PRACTICE:  
“Train” Method of Construction**

**DESCRIPTION:**

The train special provision is essentially a method of phase construction. It specifies to the contractor the sequence of construction operations while restricting the limits of construction for the operation. In other words, the contractor must complete a certain item of work within a section of the project limits before being allowed to start work on the next section.

**REASON(S) FOR ADOPTING:**

With attention to business impacts becoming an increasingly sensitive and political issue, the train method of construction provides for an orderly and expedient sequence of construction to minimize inconvenience to adjacent business establishments.

**PRIMARY BENEFIT(S):**

The proper phasing of construction lessens the business owner’s impacts since it prevents the whole length of the project from being under heavy construction during the entire contract time. By doing this, it minimizes the property access impacts to businesses.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Usually involves larger or more complex urban projects with lengthy contract times where businesses will be impacted by construction.

**STATE(S) WHERE UTILIZED:**

Florida

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Construction/Maintenance Materials, Methods, Practices, and Specifications → Construction Methods	G1-3
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**BEST PRACTICE:  
“Rolling Roadblock” Method for Total Road Closure**

**DESCRIPTION:**

This method is used when roadway construction activities (e.g., placing bridge beams, overhead sign structures, etc.) are taking place in or above all lanes of the roadway, thus requiring traffic to be temporarily slowed rather than completely stopped. Traffic is paced at a safe speed (desirably not less than 20 mph on the Interstate) to provide a gap in traffic and allow the work activities to be performed. The pacing of traffic is controlled by pilot vehicles (i.e., law enforcement vehicles with blue lights flashing) driven by uniformed law enforcement personnel. Any on-ramps between the beginning point of the pacing area and the work area are blocked until the pilot vehicle has passed. Two-way radio provides constant communication to pilot vehicles, contractor’s workers, flaggers stationed at on-ramps, and the project engineer. Advance signing warning motorists of the traffic pacing area is also provided. Florida has successfully used this technique on several projects in the past 2 or 3 years.

**REASON(S) FOR ADOPTING:**

To increase safety and reduce the number of crashes caused by roadway construction activities by allowing traffic to continue moving at a reduced speed rather than coming to a complete stop. This method is much less expensive and more convenient than building detours.

**PRIMARY BENEFIT(S):**

Increased safety by reducing the risk of crashes due to stationary vehicles on the roadway and reduced project costs.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

High-volume/high-speed urban and rural freeways and other multi-lane access controlled facilities. Type of work: Overhead work (e.g., bridges and overhead signs, etc.) requiring total roadway closure.

**STATE(S) WHERE UTILIZED:**

Florida

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Construction/Maintenance Materials, Methods, Practices, and Specifications → Construction Methods	G1-4
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**BEST PRACTICE:  
Restricting the Length of Active Work Zones**

**DESCRIPTION:**

The Mississippi Department of Transportation (MDOT) has developed a policy that restricts the length of active work zones within a project. This policy limits the length of road closures on a project to one mile on Interstate and two miles on primary routes. This policy does not allow the contractor to be working on the entire section of the project with little or no progress being made. The contractor is allowed to have more than one operation working at one time, but the distance between operations must meet the active work zone length as stated above.

**REASON(S) FOR ADOPTING:**

MDOT adopted this policy to prohibit lengthy road closures on construction projects. With restricted lengths of road closures on construction projects, the delay to the traveling public is reduced.

**PRIMARY BENEFIT(S):**

The primary benefit is travel delays are reduced because the length of road closure is reduced.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This policy is applicable to all types of facilities and all types of projects, but is typically applied to those on major arteries. There have been a few exceptions granted to extend the length to three miles on a few projects throughout the State, based on engineering judgment.

**STATE(S) WHERE UTILIZED:**

Mississippi

**SOURCE/CONTACT(S):**

Joy Portera, State Construction Engineer, Mississippi DOT  
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Construction/Maintenance Materials, Methods, Practices, and Specifications → Construction Methods	G1-5
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**BEST PRACTICE:  
Nighttime Construction Operations**

**DESCRIPTION:**

Nighttime operations have been part of the project development consideration and departmental specifications in New York since early 1995. The Governor signed legislation requiring the New York State Department of Transportation (NYSDOT) to evaluate the feasibility of nighttime construction on many projects in the urbanized areas of downstate New York. The NYSDOT has taken the legislation one step further and made nighttime construction part of the consideration and evaluation process of project development on all urbanized, high-speed/high-volume arterials. Other departmental guidance and requirements for nighttime construction are included in the following Engineering Instructions:

- Requirements for Maintenance and Protection of Traffic During Nighttime Construction.
- Maintenance and Protection of Traffic During Nighttime Operations – Revision to Section 619 of the Standard Specifications.
- Lighting for Nighttime Operations.

**REASON(S) FOR ADOPTING:**

- To increase safety.
- To reduce construction related congestion.

**PRIMARY BENEFIT(S):**

- Safety.
- Minimizing congestion.

**RELATED BEST PRACTICE(S):**

Nighttime Lighting Specification (Practice G5-4)

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All types of work on high-volume/high-speed facilities at night.

**STATE(S) WHERE UTILIZED:**

New York

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Construction/Maintenance Materials, Methods, Practices, and Specifications → Construction Methods	G1-6
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**BEST PRACTICE:  
Rubbilization**

**DESCRIPTION:**

Rubbilization is a technique in which deteriorating Portland cement concrete pavement (PCCP) is broken into small pieces. Through rubbilization, existing concrete pavement panels are converted into coarse granular material. The coarse granular material is not hauled away; rather unused material is left to form a sub-base. Hot-mix asphalt is then used as an overlay. The purpose of rubbilization is to eliminate joint problems caused by excess movement between adjacent panels or the hinging of larger pieces of concrete, which can result in reflective cracking on asphalt overlays.

**REASON(S) FOR ADOPTING:**

With constrained resources the Arkansas Highway and Transportation Department felt the process could offer the greatest benefits, with low costs.

**PRIMARY BENEFIT(S):**

The process saves time and money, and produces quality results. It is not necessary to haul unused material away from a project site. Crushed PCCP base reduces the chance that cracks, joints, and other defects will reflect through the asphalt overlay.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Interstate highway or other sites formerly made of Portland cement.

**STATE(S) WHERE UTILIZED:**

Arkansas

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Construction/Maintenance Materials, Methods, Practices, and Specifications → Incident Management	G2-1
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**BEST PRACTICE:**  
**Incident Management in Work Zones**

**DESCRIPTION:**

This policy consists of services designated to respond to incidents in work zones, keeping them free of disabled vehicles. Incidents are identified through various sources: traffic patrols, maintenance patrols, State Police, CB radios, cell phones, and traffic flow irregularities identified at a Traffic Management Center. Services can include: general assistance, towing and towing arrangements, emergency fuel, tire changing, placement of cones and flares, and updated motorist information systems such as advisory signs and local media contacts. Many States employ an onsite traffic control supervisor for large projects.

- Pennsylvania requires an Incident Management Plan for long-term construction projects; freeway projects normally require a preconstruction meeting with emergency responders.
- Mississippi and Utah include provisions in contracts requiring contractors to provide incident management.
- Illinois identifies incidents in work zones through multiple methods and deploys Minutemen vehicles to get stranded vehicles moving or remove them from the roadway.
- Iowa contracts services to provide 24-hour per day continuous monitoring of traffic control devices and incident response.
- Oregon employees a full-time traffic control supervisor whose duties include patrolling the project at least once every 4 hours to maintain work zone traffic control devices and to be on call 24 hours.

**REASON(S) FOR ADOPTING:**

Traffic incidents, even those located off of the travel lanes, can have a significant negative impact on traffic flow. Rapid response to such incidents is essential to minimize their impact on traffic flow. During rush hour periods, incident response delays of minutes can impact congestion for hours. Contractors can be a key part of a maintaining traffic flow, and are becoming more willing to be responsible for improving traffic control and emergency vehicle access, as part of a successful Incident Management team.

**PRIMARY BENEFIT(S):**

- Reduced delay.
- Improved public image.
- Enhanced safety.
- Responsive Contractors.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All freeways. All types of work.

**STATE(S) WHERE UTILIZED:**

California, Illinois, Iowa, Mississippi, Pennsylvania, Oregon, Utah

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Construction/Maintenance Materials, Methods, Practices, and Specifications → Incident Management	G2-2
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**BEST PRACTICE:****Incident Management Inter-Agency Teams****DESCRIPTION:**

Since 1991 representatives from emergency response agencies have met periodically to improve the response and clearance of incidents on North Carolina highways. During team meetings, agencies are informed about construction projects by North Carolina Department of Transportation resident engineers, and by city engineers about special events that will have an effect on traffic flow.

**REASON(S) FOR ADOPTING:**

This practice was adopted to improve coordination, communication, and cooperation when incidents occur on North Carolina highways.

**PRIMARY BENEFIT(S):**

Through pre-planning and preparation for incidents, emergency response agencies are able to access the scene and care for the injured quickly. The quick response and clearance of incidents by predetermined alternate route detours helps maintain traffic flow.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This program applies to high-volume/high-speed freeways, 2-lane/2-way highways, and bridges in rural and urban settings. The incident management teams consider major construction projects that will affect traffic flow.

**STATE(S) WHERE UTILIZED:**

North Carolina

**SOURCE/CONTACT(S):**

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Construction/Maintenance Materials, Methods, Practices, and Specifications → Oversight / Control	G3-1
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**BEST PRACTICE:**  
**Employ a Contractor to Assist Designers and to Perform Constructability Reviews**

**DESCRIPTION:**

An engineer with 35 years experience in construction, retired from a local contracting company with extensive bridge building experience in the region, is available on a part-time basis (approx. 20 hours per week) to review plans; discuss economical design and detailing; recommend methods of repairs, construction staging, scheduling, and traffic control phasing; estimate costs; provide time schedules; and assist in resolving field problems. The State has used this practice for over 10 years.

**REASON(S) FOR ADOPTING:**

To provide the SHA Office of Bridge Development the benefit of an individual experienced in the construction industry, in general, and bridge construction, in particular. Frequently, designers, especially young engineers, do not have the benefit of actual construction experience and may not be aware of the implications of their design decisions on the contractors who have to build them. Prior to the employment of this retired contractor, SHA design engineers had to rely on their own, sometimes limited experience or had to seek advice from active contractors willing to assist. This practice was not always in the best interest of the State.

**PRIMARY BENEFIT(S):**

The benefits being realized include: the avoidance of design details which are difficult and expensive to build; development of economical methods to build, rehabilitate or repair structures; valuable assistance in the more efficient and economical resolution of field problems; reduction in the number of field problems and construction claims; having insight into the contractor's point of view regarding methods and sequences of construction; and the development of the importance of the concept of design constructability in the minds of bridge design engineers. An added benefit is the reduction of inconvenience to the traveling public.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This practice can be used on all structure projects, regardless of size or location.

**STATE(S) WHERE UTILIZED:**

Maryland

**SOURCE/CONTACT(S):**

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Construction/Maintenance Materials, Methods, Practices, and Specifications → Oversight / Control	G3-2
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**BEST PRACTICE:**  
**“Safety Program” Specification**

**DESCRIPTION:**

This specification has been recently developed by the New Jersey Department of Transportation and accepted by the construction industry. It requires a contractor to have a written safety program prior to starting work on a project.

**REASON(S) FOR ADOPTING:**

The purpose of the program is to increase the level of safety in work zones. The “Safety Program” is required to be written by a qualified safety professional and is not a contract pay item. The contractor is wholly responsible for the program. Elements of the program include safety responsibilities, emergency plans, training, implementation, and discipline procedures.

**PRIMARY BENEFIT(S):**

Expected benefits include: reduction in injuries and deaths in work zones, reduced insurance rates for contractors, reduction of project costs, and the enhancement of work zone safety awareness on a statewide basis.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This specification is applicable to all construction projects throughout the State.

**STATE(S) WHERE UTILIZED:**

New Jersey

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Construction/Maintenance Materials, Methods, Practices, and Specifications → Traffic Control	G4-1
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**BEST PRACTICE:  
Disincentive Specification for Failure to Remove Lane Closures**

**DESCRIPTION:**

The contractor provides to the California Department of Transportation (Caltrans), prior to establishing a lane closure, a contingency plan in the event of an equipment breakdown or materials failure that delays opening the lane or lanes within the time limits specified. A specified dollar amount is set for each 10 minutes after the prescribed time each day that all lanes are not available for use by public traffic. This practice has been in operation since the middle of 1995.

**REASON(S) FOR ADOPTING:**

Concerns for delays to the traveling public on very sensitive major commuter routes.

**PRIMARY BENEFIT(S):**

Eliminated or reduced delay while taking a lane(s). Also, the requirement of the contractor to submit a plan for the work that has contingencies for equipment and material failures, which was not required prior to this specification.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All urban freeways.

**STATE(S) WHERE UTILIZED:**

California

**SOURCE/CONTACT(S):**

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Construction/Maintenance Materials, Methods, Practices, and Specifications → Traffic Control	G4-2
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**BEST PRACTICE:****Reducing Worker Exposure by Using Quick Change Sign Post****DESCRIPTION:**

A pre-cast concrete base with metal sleeve is placed in an augured hole, leveled, backfilled, and compacted. The signpost is placed into the metal sleeve and held in place by two rubber wedges. When the sign is hit, the rubber wedges are popped out, a new signpost replaces broken post, and rubber wedges are replaced. This practice is currently implemented as signs in high hit locations are damaged.

**REASON(S) FOR ADOPTING:**

The California Department of Transportation (Caltrans) has had an increased awareness of worker exposure and was looking at ways to improve safety and reduce worker exposure.

**PRIMARY BENEFIT(S):**

Reduced worker exposure in high hit locations. A maintenance operation that otherwise might have taken hours to replace the sign posts, now takes minutes and requires less equipment and workers.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Quick change sign posts are currently being implemented at locations where signs are routinely hit and require frequent replacement.

**STATE(S) WHERE UTILIZED:**

California

**SOURCE/CONTACT(S):**

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Ken Kochavar, Safety/ITS Engineer, FHWA California Division Office  
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See next page for illustrations of quick change past installation.



**Installing the quick change post in ground receptacle**

Construction/Maintenance Materials, Methods, Practices, and Specifications → Traffic Control	G4-3
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**BEST PRACTICE:**

**Certified Worksite Traffic Control Supervisors Required**

**DESCRIPTION:**

Contractors on large freeway projects must have a certified worksite traffic control supervisor on the job when lanes are closed, etc.

**REASON(S) FOR ADOPTING:**

Poor quality of traffic control and operations was evident in work zones. Contractor personnel were not adequately trained on the basics of the Manual on Uniform Traffic Control Devices (MUTCD).

**PRIMARY BENEFIT(S):**

Improved quality of work zone operations. The work zone traffic supervisor must document daily, and perform weekend, inspections of the work zone.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Large freeways projects. All types of work.

**STATE(S) WHERE UTILIZED:**

Ohio

**SOURCE/CONTACT(S):**

Dennis O’Neil, Work Zone Traffic Control Engineer, Ohio DOT  
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Construction/Maintenance Materials, Methods, Practices, and Specifications → Traffic Control

G4-4

**BEST PRACTICE:**

**Constructability Reviews to Minimize Construction Contract Time and User Delays**

**DESCRIPTION:**

On major projects the Virginia Department of Transportation uses an independent consultant, and in some instances contractor(s), to review the plans for a project to develop the best sequencing of work and to establish an optimum construction period to minimize exposure and impact on traffic.

**REASON(S) FOR ADOPTING:**

To shorten construction time and minimize traffic delays.

**PRIMARY BENEFIT(S):**

Less user delay and public compliant.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All major facilities. All types of work.

**STATE(S) WHERE UTILIZED:**

Virginia

**SOURCE/CONTACT(S):**

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Construction/Maintenance Materials, Methods, Practices, and Specifications → Traffic Control

G4-5

**BEST PRACTICE:**

**All Lane Closures are Approved by the Authority**

**DESCRIPTION:**

The Tollway Authority keeps close track of all lane closures on the tollways. Within the Tollway Authority, one person maintains a list of all lane closures and coordinates these lane closures with the State police, public relations, construction, and project development.

**REASON(S) FOR ADOPTING:**

This practice was developed to better coordinate work zones for safer travel, better communicate with the public and the police, and to have a record for incidents within work zones.

**PRIMARY BENEFIT(S):**

An updated list of lane closures is always available to public relations, the Authority, and the police. This also provides for better record keeping and analysis for incidents in work zones. The Authority has a better handle on where lanes are being closed and is able to coordinate projects so as to provide the minimum impact to motorists.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This practice is involved any time a work zone contains a lane closure.

**STATE(S) WHERE UTILIZED:**

Illinois

**SOURCE/CONTACT(S):**

John Wagner, Manager of Construction, Illinois State Toll Highway Authority  
Telephone: (630) 241-6800, ext. 3934

Construction/Maintenance Materials, Methods, Practices, and Specifications → Traffic Control	G4-6
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**BEST PRACTICE:  
Standard Specification that Requires the Contractor to Correct Deficient Traffic Control**

**DESCRIPTION:**

The contractor will be subject to a penalty of \$500 per incident per day for each occurrence when the agency engineer determines that the contractor is not in full compliance with the Maintenance of Traffic Specifications. The contractor is required to respond within 30-minutes to any request from the engineer for re-aligning, replacing, or moving traffic control devices, or moveable concrete barrier, or otherwise re-establishing compliance with the Maintenance of Traffic Specifications.

**REASON(S) FOR ADOPTING:**

The tollways are located in urban areas and it is imperative to have proper traffic control to maintain traffic flow and safety to the public. This specification puts a time frame on which the contractor must respond to the engineer’s request and the penalty gives the engineer an instrument to further enforce the specification.

**PRIMARY BENEFIT(S):**

The traffic control is better maintained even without the engineer requesting the contractor to correct any deficiencies. Ultimately, this specification helps provide a safer work zone for the public with both the engineer and the contractor attentive to traffic control deficiencies.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This practice is a standard specification and is incorporated into every tollway project.

**STATE(S) WHERE UTILIZED:**

Illinois

**SOURCE/CONTACT(S):**

John Wagner, Manager of Construction, Illinois State Toll Highway Authority  
Telephone: (630) 241-6800, ext. 3934

Construction/Maintenance Materials, Methods, Practices, and Specifications → Traffic Control	G4-7
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**BEST PRACTICE:  
45 mph Posted Speed When Flashing**

**DESCRIPTION:**

Used since 1989-90, this practice allows for normal speed driving when actual construction is not in progress. A reduced speed limit (45 mph when flashing) is only activated when in the vicinity of actual construction activity. Other areas within the contract limits are permitted to travel at a greater speed.

**REASON(S) FOR ADOPTING:**

This practice was initially developed for lengthy interstate construction (4R and maintenance) projects. Previously the only (practical) way to obtain a reduced speed through the construction zone was to post the entire length. However, the Indiana Department of Transportation received several complaints about reduced speed for a 10 mile section of road, when actual visible construction was only occurring in a 2 mile section. Motorists tended to disregard the speed restriction when they did not see workers present.

**PRIMARY BENEFIT(S):**

Vehicular traffic does slow down in work areas where construction workers and activities are present, which provides for increased worker and motorist safety. In areas where activities are not taking place, motorists can travel at a higher rate of speed thus improving efficiency and mobility.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All types of facilities with speed limits greater than 45 mph. All types of work.

**STATE(S) WHERE UTILIZED:**

Indiana

**SOURCE/CONTACT(S):**

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Indiana DOT

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Construction/Maintenance Materials, Methods, Practices, and Specifications → Traffic Control	G4-8
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**BEST PRACTICE:  
Closure of Entrance Ramps During Construction**

**DESCRIPTION:**

The best practice is the closure of entrance ramps during construction. Ramps are closed within a work zone, and possibly preceding a work zone if it is deemed necessary.

**REASON(S) FOR ADOPTING:**

The primary reason for closing entrance ramps is to reduce accidents in the construction work zone. Because of a reduced weaving area and increased congestion, the ramps are closed.

**PRIMARY BENEFIT(S):**

A reduction in the number of crashes and less congestion in the work zone.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All high-volume freeway projects.

**STATE(S) WHERE UTILIZED:**

Ohio

**SOURCE/CONTACT(S):**

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Construction/Maintenance Materials, Methods, Practices, and Specifications → Traffic Control	G4-9
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**BEST PRACTICE:  
Drone Radar on Changeable Message Signs**

**DESCRIPTION:**  
Drone radar has been placed on portable changeable message signs (PCMS) used on freeway construction projects to get the attention of drivers. Since the PCMS have power and are generally in advance of the work zone it serves as an advance warning device.

**REASON(S) FOR ADOPTING:**  
The drone radar is intended to alert drivers that something is unusual on or near the road ahead (road work). It is especially intended for long haul commercial motor vehicle drivers not familiar with the area.

**PRIMARY BENEFIT(S):**  
Drivers entering the work zone are more alert, especially at night.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**  
All locations. All types of work.

**STATE(S) WHERE UTILIZED:**  
Ohio

**SOURCE/CONTACT(S):**  
Dennis O’Neil, Work Zone Traffic Control Engineer, Ohio DOT  
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Construction/Maintenance Materials, Methods, Practices, and Specifications → Traffic Control

G4-10

**BEST PRACTICE:  
Rumble Strips at the Beginning of Work Zones**

**DESCRIPTION:**

Thermoplastic rumble strips are placed transversely across the travel lane(s) heading into a long-term work zone in order to get the attention of drivers. They are 4 inches wide, 250 mil thick with the following spacing: 2 sections – 10 transverse strips, 6 feet apart, then 90 feet away the next section starts with 10 transverse strips, 4½ feet apart.

**REASON(S) FOR ADOPTING:**

To alert motorists of the construction zone and to slow motorists down.

**PRIMARY BENEFIT(S):**

Drivers are more alert going into the work zone.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All locations. All types of work.

**STATE(S) WHERE UTILIZED:**

Ohio

**SOURCE/CONTACT(S):**

Dennis O’Neil, Work Zone Traffic Control Engineer, Ohio DOT  
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Joe Glinski, Safety Program Engineer, FHWA Ohio Division  
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Email: [joseph.glinski@fhwa.dot.gov](mailto:joseph.glinski@fhwa.dot.gov)



Rumble strip for work zone speed control

Construction/Maintenance Materials, Methods, Practices, and Specifications → Traffic Control	G4-11
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**BEST PRACTICE:**

**Pocket Size “Guidelines for Temporary Traffic Control”**

**DESCRIPTION:**

In 1997, the Virginia Department of Transportation (VDOT) produced a 70-page, color laminated work zone safety pocket guide and began distribution/sale of it to field personnel responsible for the installation, inspection, and removal of temporary traffic control measures. The guide contains standards for traffic control devices and displays 23 of the most used typical traffic control layouts for maintenance/utility/permit operations.

Wisconsin has distributed over 25,000 copies of a work zone safety pocket size handbook guideline for construction, maintenance, and utility operations. The handbook presents information and guidelines for temporary traffic control, including approximately 30 typical traffic control application drawings. The handbook and a one-day basic work zone traffic control training course were developed with the University of Madison-Wisconsin.

**REASON(S) FOR ADOPTING:**

To make work zone safety information more readily available in an easy-to-read and understandable format for field personnel.

**PRIMARY BENEFIT(S):**

Ensuring that more people possess the standards and guidelines for traffic control in work zones, and improving the installation of traffic control devices and the flow of traffic through work zones.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Primarily for rural and urban primary and secondary roadways and streets. The guide can also be used for many freeway and limited access highway applications.

**STATE(S) WHERE UTILIZED:**

Virginia, Wisconsin

**SOURCE/CONTACT(S):**

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Tom Notbohm, Bureau of Highway Operations, Wisconsin DOT

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Fax: (608) 261-6295

Construction/Maintenance Materials, Methods, Practices, and Specifications → Traffic Control
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G4-12
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**BEST PRACTICE:  
Portable Speed Control Rumble Mat**

**DESCRIPTION:**

*Speedblocker* is a fabric and metal reinforced rubber mat of 8 ft by 7 ft, with a surface containing a group of ridges of alternating heights 1 3/16 inches maximum, used to alert drivers. When a vehicle is driven over the mat, the ridges cause resonance oscillation in the vehicle that are perceived as a very loud tone to the driver. On the mat there is a reflective traffic sign with the posted speed limit that is visible day or night. The elastic material ensures that vehicles driving over it are not damaged and the angled ridges allow cyclists to drive over it safely. Another feature is that the mat can be moved from place to place as the need warrants.

**REASON(S) FOR ADOPTING:**

The portable rumble mat is effective in slowing down traffic in problem areas.

**PRIMARY BENEFIT(S):**

Reduction of car speed and an increase in driver awareness to reduce urban traffic accidents.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

The system was designed to be installed in front of day care centers, schools, and in residential areas. Germany has used it to slow traffic in problem areas, including parking garages. Vermont uses the system in temporary, short-term work zones.

**STATE(S) WHERE UTILIZED:**

Vermont

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Construction/Maintenance Materials, Methods, Practices, and Specifications → Traffic Control	G4-13
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**BEST PRACTICE:  
Construction Practices to Minimize Motorists’ Delays and Inconveniences**

**DESCRIPTION:**

The Illinois Department of Transportation (IDOT) completed a resurfacing and bridge seismic retrofit/overlay project during the summer of 1999 that incorporated several innovations for minimizing delays and inconveniences to motorists. Many innovations were later adopted into IDOT’s Bureau of Design and Environment (BDE) Procedure Memorandum 99-35 *Procedures to Minimize Motorists’ Costs and Inconvenience* (November 1, 1999). Innovations used on this I-57 project in Franklin County include:

- Providing “realtime” information on work zone delays to motorists.
- Consolidation of several projects into one combined project.
- Moving lane closures and tapers to the mid-day production point.
- Use of fast setting mixes for bridge work and pavement patching.
- Contractor’s multiple uses of lane closures and sponsoring of a road report.
- Use of lane rental and incentive/disincentive contracting.

**REASON FOR ADOPTING:**

IDOT chose to meet the needs of its customers by minimizing disruptions to the traveling public while ensuring the timely completion of projects.

**PRIMARY BENEFIT(S):**

For the I-57 project the biggest benefit was a reduced construction time from four seasons to one season. Additional benefits to the public include reduced delays for motorists and reduced inconveniences to local communities and businesses.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All construction and reconstruction projects on the State system.

**STATE(S) WHERE UTILIZED:**

Illinois

**SOURCE/CONTACT(S):**

Tim Kell, Bureau of Construction, Illinois DOT  
Telephone: (217) 782-6667

Construction/Maintenance Materials, Methods, Practices, and Specifications → Traffic Control
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G4-14
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**BEST PRACTICE:  
Fast Setting Mixes**

**DESCRIPTION:**

A special patch mix was used during the Illinois Department of Transportation (IDOT) I-57 project. The concrete pavement cured in only 5 hours. The thin lift polymer overlay used on the project’s four bridge decks reduced the deck curing time from 3 days for a typical micro-silica overlay to just 1 day.

**REASON FOR ADOPTING:**

IDOT customers had emphasized the need for construction crews “to get in, get the work done, and get out.” This procedure reduced construction time considerably.

**PRIMARY BENEFIT(S):**

This practice enabled IDOT to open up traffic lanes to motorists quicker than when using conventional patch mixes. It also allowed the contractor to move ahead to new sections of roadway sooner, reducing the overall construction time and motorists delay.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

The continued use of special patch mixes is recommended for major projects and projects with lane-closure restrictions.

**STATE(S) WHERE UTILIZED:**

Illinois

**SOURCE/CONTACT(S):**

Tim Kell, Bureau of Construction, Illinois DOT  
Telephone: (217) 782-6667

Construction/Maintenance Materials, Methods, Practices, and Specifications → Traffic Control
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G4-15
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**BEST PRACTICE:  
Points of Merge When Closing a Lane**

**DESCRIPTION:**

By having traffic use all lanes to a particular point before making the lane reduction merge under congested conditions, throughput is improved. At the merge point a sign indicates for motorists to: “MERGE HERE – TAKE YOUR TURN”.

**REASON FOR ADOPTING:**

To alleviate backups through nearby interchanges and reduce delays for entering and exiting traffic.

**PRIMARY BENEFIT(S):**

The late merge concept reduces queue length when demand exceeds capacity. By using two lanes for stacking queued vehicles, the length of the queue should only be about 50 percent as long. Studies also suggest that the capacity of a lane reduction may be more than 15 percent greater when using the late merge concept than when using the conventional approach. This approach also reduces road rage caused by some motorists running up around queued traffic and cutting in front of other vehicles, or truckers straddling both lanes.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Freeway projects where queues are anticipated.

**STATE(S) WHERE UTILIZED:**

Pennsylvania

**SOURCE/CONTACT(S):**

Arthur Breneman, Traffic Engineering & Operations Division, Pennsylvania DOT  
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Construction/Maintenance Materials, Methods, Practices, and Specifications → Traffic Control
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G4-16
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**BEST PRACTICE:  
Moving Lane Closures and Tapers at Mid-Day**

**DESCRIPTION:**

A typical project lane closure includes the contractor closing as much lane as is anticipated to be constructed that day. With this practice, lane closures and tapers were moved at mid-day to where the contractor had completed operations up to that time. The length of lane closure remaining was that amount the contractor anticipated needing to complete the day's operations. This reduced lane closure distances by up to 4 km (2.5 miles).

**REASON FOR ADOPTING:**

To eliminate delay during peak travel times and direction.

**PRIMARY BENEFIT(S):**

Moving up the lane closures decreased the length of traffic backups and the amount of time it took motorists to get through the work zone. The contractors realized increased production benefits by having their asphalt trucks arrive on the project quicker since trucks did not wait as long in traffic backups.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This practice of moving lane closures and tapers up to the mid-day production point is recommended to be included on all future Interstate and major freeway type projects. This practice is recommended for inclusion into the Illinois Department of Transportation standard specifications.

**STATE(S) WHERE UTILIZED:**

Illinois

**SOURCE/CONTACT(S):**

Tim Kell, Bureau of Construction, Illinois DOT  
Telephone: (217) 782-6667

Construction/Maintenance Materials, Methods, Practices, and Specifications → Traffic Control	G4-17
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**BEST PRACTICE:  
Procedural Guidance to Minimize Motorists' Costs and Inconvenience**

**DESCRIPTION:**

The Illinois Department of Transportation (IDOT) Bureau of Design and Environment (BDE) issued BDE Procedure Memorandum 99-35 *Procedures to Minimize Motorists Costs and Inconvenience* (November 1, 1999). The memorandum provides information on the required procedures for IDOT construction and reconstruction projects on the State highway system. Areas covered by the memorandum include:

- Additional shoulder thickness
- Shoulder resurfacing
- Expanded use of lane rental contracts
- Increased use of completion date contracts
- Consolidation of projects
- Prohibition on weekend lane closures
- Additional signing/public notification
- Night/Non – peak hour construction
- Required lane closure meetings.

**REASON FOR ADOPTING:**

IDOT decided that a new direction was necessary in order to meet the demands of increasing traffic congestion. IDOT's goal is to ensure the timely completion of projects while minimizing disruptions to the traveling public.

**PRIMARY BENEFIT(S):**

The initial benefit is a renewed interest and commitment by construction personnel to address the issues covered by BDE Procedure Memorandum 99-35.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All construction and reconstruction projects on the State system.

**STATE(S) WHERE UTILIZED:**

Illinois

**SOURCE/CONTACT(S):**

Roger Driskell, Bureau of Design and Environment Policies and Procedures,  
Illinois DOT

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Construction/Maintenance Materials, Methods, Practices, and Specifications → Traffic Control	G4-18
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**BEST PRACTICE:  
Extra Shoulder Repairs**

**DESCRIPTION:**

Prior to beginning major projects, the mainline shoulders should be of sufficient structural integrity to withstand all anticipated construction operations. This may require reinforcing the shoulders prior to beginning regular construction operations. This practice is especially vital if the shoulder is expected to be used as a travel lane during construction operations.

**REASON FOR ADOPTING:**

There was approximately \$225,000 spent on mainline shoulder repairs on the Illinois Department of Transportation I-57 project. This came to around \$200,000 over plan quantity. There appeared to be two main sources of the cost overrun: First, whenever the flagger stood next to the paving machine and consequently pushed traffic over onto the shoulder, there was a shoulder repair to complete at that location. A second cause was damage that occurred during full-depth patching operations due to work being performed on the roadway centerline. The contractor was informed that traffic was to be unhindered; however, the contractor's flagman continually directed traffic onto the shoulder.

**PRIMARY BENEFIT(S):**

Traffic using the shoulder is minimized. When shoulders are made thicker in anticipation of construction operations, they can be used in the future to reduce the effects of incident management.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

2-lane major principal arterials, 4-lane highways, Interstates, and expressways.

**RELATED BEST PRACTICES:**

Additional Shoulder Thickness (Practice G4-19)

**STATE(S) WHERE UTILIZED:**

Illinois

**SOURCE/CONTACT(S):**

Tim Kell, Bureau of Construction, Illinois DOT  
Telephone: (217) 782-6667

Construction/Maintenance Materials, Methods, Practices, and Specifications → Traffic Control
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G4-19
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**BEST PRACTICE:  
Additional Shoulder Thickness**

**DESCRIPTION:**

All new construction or reconstruction projects on the State system that involve the construction of new shoulders shall meet thickness requirements.

- 2-lane major principal arterials – These highways should normally have 8’ to 10’ paved shoulders. If the 20-year projected traffic exceeds 2,000 multiple unit trucks (MU) per day or 10,000 Average Daily Traffic (ADT) the shoulders shall be constructed to the same thickness as the pavement. The 2,000 MU threshold is based on the traffic that would require a shoulder thickness greater than 200 mm to handle the occasional load.
- 4-lane highways – When the 20 year projected traffic exceeds 3,000 MU’s per day or 25,000 ADT, shoulders shall be built to the same thickness as the adjoining pavement. If the expected Vehicles Per Hour (VPH) exceeds 1,700 the shoulder shall match the thickness of the pavement. When anticipated that the shoulder will be used for an extended period of time (greater than 3 years) during the design life of the pavement, the shoulder shall be designed to pavement standards, utilizing the same pavement design, details, and materials as the mainline pavement.

**REASON(S) FOR ADOPTING:**

Additional shoulder thickness is intended to allow the shoulders to be used, if necessary, to carry traffic during construction improvements and incident management.

**PRIMARY BENEFIT(S):**

The shoulder is utilized during construction projects and incidents. Traffic can be shifted to maintain the number of lanes and minimize the effects of work zone activity.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

2-lane major principal arterials, 4-lane highways, Interstates, and expressways.

**RELATED BEST PRACTICES:**

Extra Shoulder Thickness (Practice G4-18)

**STATE(S) WHERE UTILIZED:**

Illinois

**SOURCE/CONTACT(S):**

Tim Kell, Bureau of Construction, Illinois DOT

Telephone: (217) 782-6667

Construction/Maintenance Materials, Methods, Practices, and Specifications → Traffic Control

G4-20

**BEST PRACTICE:  
Halogen Stop/Slow Paddle**

**DESCRIPTION:**

The halogen stop/slow paddle is used to control traffic through work zones and is equipped with halogen lights, which can be illuminated by the operator of the sign. The halogen paddle is visible from distances beyond 285 feet, and is especially useful during daytime operations. The Michigan Department of Transportation has tested and began supplying them to road crews.

**REASON FOR ADOPTING:**

Paddles were adopted to improve the visibility and safety of road crews in low visibility situations.

**PRIMARY BENEFIT(S):**

Protection for road crews, improved visibility, and safety.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Any work zone situation requiring a flagger.

**STATE(S) WHERE UTILIZED:**

Michigan

**SOURCE/CONTACT(S):**

Dave Morena, FHWA Michigan Division Office  
Telephone: (517) 702-1836

Construction/Maintenance Materials, Methods, Practices, and Specifications → Traffic Control

G4-21

**BEST PRACTICE:**

**Water Filled Barrier in High Speed Freeway Work Zones**

**DESCRIPTION:**

The North Carolina Department of Transportation typically uses water filled barriers on projects with traffic speeds less than 45 mph; however occasionally water filled barriers are used in work zones with high traffic speeds.

**REASON(S) FOR ADOPTING:**

Water filled drums are used in place of temporary precast concrete barriers and as a substitute for nonmetallic drums on projects to protect travelers from concrete barriers.

**PRIMARY BENEFIT(S):**

Increased safety for travelers in the event of a crash.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

High speed facilities.

**STATE(S) WHERE UTILIZED:**

North Carolina

**SOURCE / CONTACT(S):**

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Construction/Maintenance Materials, Methods, Practices, and Specifications → Worker Safety / Productivity	G5-1
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**BEST PRACTICE:  
Flagger Certification Program**

**DESCRIPTION:**

In 1990, the Virginia Department of Transportation (VDOT) began requiring certified flaggers in work zones. The flagger applicant must watch a VDOT-produced basic flagging informational video and take and pass a written test based on the video and other training material. The successful candidate then receives a flagger certification card that must be in his possession while performing flagging duties. The flagger must be re-certified every 2 years.

**REASON(S) FOR ADOPTING:**

To improve basic flagging techniques of flag persons by training them in the required standards, guidelines, and best practices.

**PRIMARY BENEFIT(S):**

Improved flagging operations over those who received little to no training.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All roadways statewide.

**STATE(S) WHERE UTILIZED:**

Virginia

**SOURCE/CONTACT(S):**

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Construction/Maintenance Materials, Methods, Practices, and Specifications → Worker Safety / Productivity	G5-2
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**BEST PRACTICE:  
Work Zone Safety Checklist Form**

**DESCRIPTION:**

In 1997, the Virginia Department of Transportation (VDOT) developed and implemented a two page, four copy carbon-less work zone safety checklist form for reviewing and documenting the status/condition of work zones for construction/maintenance/utility/permit operations. The form is required to be filled out a minimum of once a week by construction inspectors, with every other review performed at night. The contractor is given a copy for correcting work zone deficiencies, and a copy is filed with the project records.

**REASON(S) FOR ADOPTING:**

To develop a statewide standardized form for use in conducting and documenting work zone safety reviews, to provide contractors, in writing, a list of work zone deficiencies, and to improve the appearance and function of work zone traffic control.

**PRIMARY BENEFIT(S):**

Consistent reviews of work zones by construction inspectors and district work zone safety personnel, improved documentation of work zone conditions, and improved response time to work zone deficiencies by contractors.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All roadways statewide.

**STATE(S) WHERE UTILIZED:**

Virginia

**SOURCE/CONTACT(S):**

David Rush, Senior Transportation Engineer, Virginia DOT  
Telephone: (804) 371-6672  
Email: [rush\\_db@vdot.state.va.us](mailto:rush_db@vdot.state.va.us)

Construction/Maintenance Materials, Methods, Practices, and Specifications → Worker Safety / Productivity	G5-3
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**BEST PRACTICE:  
High Visibility Reflective Apparel**

**DESCRIPTION:**

The California Department of Transportation (Caltrans) has adopted the use of full body suits for nighttime inspection purposes. The prototype suits have reflectorized material that outlines the full body and a strip that goes around the torso. The use of the full body reflectorized suits was implemented in 1997. The Iowa and Pennsylvania Departments of Transportation have both been using highly visible reflectorized gear for some time. The Minnesota Department of Transportation requires that full-length-high-visibility reflective clothing (tops and bottoms) be worn by all workers during night work.

**REASON(S) FOR ADOPTING:**

To improve safety in work zones by making workers more visible in various lighting and working conditions.

**PRIMARY BENEFIT(S):**

Requiring full-length high-visibility clothing improves worker safety. Motorists can see that the reflecting object is a human and they generally tend to be more cautious and slow down.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Any work area.

**STATE(S) WHERE UTILIZED:**

California, Iowa, Minnesota, Pennsylvania

**SOURCE/CONTACT(S):**

Joy Pinne, Construction, Caltrans  
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Email: [joy\\_pinne@dot.ca.gov](mailto:joy_pinne@dot.ca.gov)

Barb Mallon, Safety Coordinator, Iowa DOT  
Telephone: (515) 239-1594

Bill Servatius, Construction Programs Coordinator, Minnesota DOT  
Telephone: (651) 296-2721

Mike Castellano, FHWA Pennsylvania Division Office  
Telephone: (717) 221-4517  
Email: [mike.castellano@fhwa.dot.gov](mailto:mike.castellano@fhwa.dot.gov)

Construction/Maintenance Materials, Methods, Practices, and Specifications → Worker Safety / Productivity	G5-4
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**BEST PRACTICE:**

**Nighttime Lighting Specification**

**DESCRIPTION:**

To mitigate the impact of construction activities to the traveling public and to maximize the duration of construction operations for contractors, many States are turning to nighttime work on major roadways. To improve safety for both workers and travelers nighttime lighting specifications are typically necessary.

- In New Jersey a multi-discipline task force evaluated the existing specification in an effort to determine the required levels of illumination to enhance work zone safety and provide quality workmanship for specific work elements. A final specification was developed and recently incorporated into the New Jersey Department of Transportation standard specifications.
- Washington utilizes 100-foot timbers placed in non-conflict areas to provide a consistent, high level of lighting for long term construction projects.
- In North Carolina portable lighting is provided in areas of night work activities by the contractor. Temporary lighting is also provided in rural areas with little or no ambient lighting at traffic shift locations.

**REASON(S) FOR ADOPTING:**

To mitigate the impact of construction activities to the traveling public, enhance work zone safety, and maximize duration of contractors operations.

**PRIMARY BENEFIT(S):**

Enhancement of work zone safety for travelers and workers during night work, and increased quality level of workmanship.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

The night lighting specification is applicable to all projects that specify or allow night work, typically high volume areas.

**RELATED BEST PRACTICES:**

Nighttime Construction Operations (Practice G1-5)

**STATE(S) WHERE UTILIZED:**

New Jersey, North Carolina, Washington

**SOURCE/CONTACT(S):**

Michael W. Gross, Manager, Bureau of Construction Services, New Jersey DOT  
Telephone: (609) 530-5500

Stuart Bourne, P.E. Traffic Control Marking and Delineation Engineer, North  
Carolina DOT  
Telephone: (919) 250-4151  
Fax: (919) 250-4195

Martin Weed, Regional Traffic Control Engineer, Washington DOT, Olympic  
Region  
Telephone: (360) 357-2766

## Best Practices Category H - Traveler and Traffic Information (Project Related)

Traveler and traffic information includes methods, technologies, and equipment to identify work zone traffic conditions and properly inform the traveling public. These best practices emphasize the provision of accurate real-time work zone (construction/maintenance/utility operations) information to road users in a sufficient time that engenders informed travel decisions.



HAR notice to drivers



Pole mounted HAR Antenna

Examples of practices include:

- Monitoring of work zone traffic conditions on projects on a statewide/area-wide basis through fixed traffic management systems, portable traffic management systems, and/or cameras tied into a statewide/area-wide communications system.
- Real-time work zone traffic conditions that are accessible on the Internet.
- Changeable message signs, traffic advisory radio, and early warning systems to warn motorists approaching congested work zones.
- ITS to guide motorists through the work zone.
- Real-time work zone information that is provided to the public through the development of media and private sector partnerships.

The following best practice entries relate to work zone traveler and traffic information:

<b>Subcategory</b>	<b>Ref. #</b>	<b>TRAVELER AND TRAFFIC INFORMATION Best Practices</b>
H1 PR/Media Campaigns	H1-1	Public Information/Public Relations Program (Newsletters)
	H1-2	Dissemination of Work Zone Project Information
	H1-3	Public Relation Campaigns and the Use of Public Relation Firms
	H1-4	Public Relations Campaign for Illinois State Toll Highway Authority Construction and Maintenance Projects
	H1-5	Hoosier Helper
	H1-6	Paving the Way
	H1-7	Work Zone Advisory Brochure
	H1-8	Place Mats with Work Zone Safety Information
	H1-9	Media Campaign for I-15 Project – Real-Time Traffic Information to Public
	H1-10	Dissemination of Information on Current Work Zones
	H1-11	Traffic Safety Information Center
	H1-12	Contractor Sponsored Road Report
H2 Traffic Information Management	H2-1	Bid Item in the Construction Contract for Public Relations
	H2-2	District Work Zone Traffic Management Coordinator
	H2-3	Joint Approval Form (CA/T and City of Boston ) for Traffic Advisories and Alerts
	H2-4	Contractor Involvement in Public Information Meetings and Lane Closure Notifications
H3 Traveler Information	H3-1	Signing for Businesses Affected by the Construction of City Streets
	H3-2	Provide Real-Time Traffic Information to the Public
	H3-3	Traveler Information Kiosks in Rest Areas – Work Zones
	H3-4	Use of INFORM to Advise Motorists of Work Zone Delays
	H3-5	Weekend Closure of I-405 for Resurfacing
	H3-6	Website for Traffic Information, Advisories, and Alerts
	H3-7	Arizona's Privatized Advanced Traveler Information System
	H3-8	CB Wizard
	H3-9	Construction Database and Website

Traveler and Traffic Information → PR/Media Campaigns	H1-1
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**BEST PRACTICE:****Public Information/Public Relations Program (Newsletters)****DESCRIPTION:**

This program is directed at the project level. The program involves making the status of local construction projects known to the community and local businesses through the issuance of weekly newsletters or construction alerts, as they are frequently called. In addition, pre-construction public information meetings and monthly traffic management meetings may be held. The newsletters are sent to the media, business, local residents, and others who request to be included. The newsletters normally give the project status, lane restrictions, ramp closures, recommended detour routes, access to area businesses, and any other work zone traffic restrictions in effect.

**REASON(S) FOR ADOPTING:**

A need exists to provide current information to a wide range of people. In addition to providing roadway closure information, the newsletters include a list of several places people can call for additional information. The names and phone numbers are listed of the resident engineer, community relations firm, and Arizona Department of Transportation (ADOT) district office.

**PRIMARY BENEFIT(S):**

Local citizens are kept informed and made aware of where they can call for additional information. This promotes direct communication between the contractor and residents. Motorists can plan trips to avoid the work areas affected and reduce congestion. The high quality of the newsletters gives them “reach” when copies are shared among friends.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Generally freeways or very large projects in urban areas, although some rural uses have been tried.

**STATE(S) WHERE UTILIZED:**

Arizona

**SOURCE/CONTACT(S):**

Karen King, Transportation Safety Engineer, FHWA Arizona Division Office

Telephone: (602) 379-3645, ext. 125

Email: [karen.king@fhwa.dot.gov](mailto:karen.king@fhwa.dot.gov)

Mark Bonan, District Construction, Public Relations, Valley Project Information

Telephone: (602) 712-8965

Dennis Alvarez, Asst. District Engineer, Arizona DOT  
Telephone: (520) 620-5412

Traveler and Traffic Information → PR/Media Campaigns

H1-2

**BEST PRACTICE:**  
**Dissemination of Work Zone Project Information**

**DESCRIPTION:**

The public information office in each of the State's 8 Districts provides information on the location and duration of construction work zones to the public and the news media. In addition, for larger projects, the civil engineering inspection (CEI) staff includes a project level public information position. On some major projects a toll-free hot line has been established for project information. These practices have been followed for many years.

**REASON(S) FOR ADOPTING:**

Better public awareness of the location and duration of work zones so as to lessen the impacts by encouraging the use of alternate routes.

**PRIMARY BENEFIT(S):**

Better public relations and a lessening of the traffic impacts due to public's ability to better avoid construction delays.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This practice is applicable to all types of construction projects on all types of facilities.

**STATE(S) WHERE UTILIZED:**

Florida

**SOURCE/CONTACT(S):**

Norbert Munoz, Safety Engineer, FHWA Florida Division Office

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Gregg Xanders, State Construction Engineer, Florida DOT

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Email: [gregg.xanders@dot.state.fl.us](mailto:gregg.xanders@dot.state.fl.us)

Traveler and Traffic Information → PR/Media Campaigns	H1-3
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**BEST PRACTICE:**

**Public Relation Campaigns and the Use of Public Relation Firms**

**DESCRIPTION:**

The Illinois Department of Transportation (IDOT) hires public relations firms to communicate project information to the traveling public regarding high-volume urban freeway reconstruction projects. The services include, but are not limited to, advance information campaigns to encourage the use of alternate routes, assistance with press releases and conferences, presentations to neighborhoods and other groups, and preparation of newspaper and radio advertisements. Public relations firms are required to submit a proposal and make a presentation on their proposal as part of the selection process.

**REASON(S) FOR ADOPTING:**

IDOT recognizes the need to utilize specialists in the area of public relations. In the past, efforts were conducted by IDOT personnel whom were not trained, nor did they have the background, in communicating effectively with the public.

**PRIMARY BENEFIT(S):**

The presentation of information to motorists in an easily understood and interesting format increases the effectiveness of alerting commuters to traffic impacts. Public relations firms have the resources to develop professional publications (e.g., brochures, maps, fliers). The distribution of publications, in conjunction with professionally produced presentations and multi-media advertisements, effectively communicates information regarding projects. In addition, another advantage that public relation firms have over transportation agencies is their established contacts with news media personnel.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Although geared towards high-volume urban rehabilitation projects, the concept has application to any project, especially those with high user impacts.

**STATE(S) WHERE UTILIZED:**

Illinois

**SOURCE/CONTACT(S):**

Dick Adorjan, Director, Office of Public Affairs, Illinois DOT  
Telephone: (217) 782-6953

Traveler and Traffic Information → PR/Media Campaigns	H1-4
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**BEST PRACTICE:****Public Relations Campaign for Illinois State Toll Highway Authority (ISTHA) Construction and Maintenance Projects****DESCRIPTION:**

ISTHA has a public relations department that informs the media of all construction and maintenance activities that impact traffic in the Chicago metro area. The construction manager and a public relations representative fly over all the work zones regularly throughout the construction season. This allows the public relations department to see the work zones and discuss any issues with the construction department.

**REASON(S) FOR ADOPTING:**

In large urban areas, it is very important to inform the public of traffic delays. Especially on the tollway where the public pays a user fee, if the public becomes dissatisfied with unexpected delays they will choose alternate routes and the tollway will lose revenues.

**PRIMARY BENEFIT(S):**

The public is more aware of construction and maintenance activity and this will help alleviate traffic congestion and reduce the public's dissatisfaction.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Projects that have an impact on the flow of traffic such as lane closures.

**STATE(S) WHERE UTILIZED:**

Illinois

**SOURCE/CONTACT(S):**

Kesti Susinskas, Chief Engineer, Illinois State Toll Highway Authority (ISTHA)  
Telephone: (630) 241-6800, ext. 3901

Traveler and Traffic Information → PR/Media Campaigns	H1-5
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**BEST PRACTICE:**  
**Hoosier Helper**

**DESCRIPTION:**

Hoosier Helper is a program consisting of incident response vehicles to assist stranded motorists and remove disabled vehicles. Hoosier Helpers are able to advise motorists of crash-related congestion by sending messages to highway advisory radio, variable message signs, and pagers from the scene of the crash.

**REASON(S) FOR ADOPTING:**

The primary reason for adopting the Hoosier Helper program was to quickly remove disabled vehicles from the freeway and reduce congestion.

**PRIMARY BENEFIT(S):**

The biggest benefit is to restore capacity.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

The Hoosier Helper program is most applicable on high-volume freeways in both urban and rural environments and can be used in congested work zones.

**STATE(S) WHERE UTILIZED:**

Indiana

**SOURCE/CONTACT(S):**

Mark Newland, ITS Program Engineer, Operations Support, Indiana DOT  
 Telephone: (317) 232-5523  
 Email: [mnewland@indot.state.in.us](mailto:mnewland@indot.state.in.us)

Traveler and Traffic Information → PR/Media Campaigns

H1-6

**BEST PRACTICE:  
Paving the Way**

**DESCRIPTION:**

Paving the Way is a comprehensive traffic management program that provides public information and commuter-assistance services to Columbus area motorists. Paving the Way maintains a web site, produces a 10-minute television segment responding to emails during the busy construction season, and provides an automated email system informing over 3,000 subscribers of upcoming projects. It is a cooperative partnership between the Federal Highway Administration, the Ohio Department of Transportation, and the City of Columbus.

**REASON(S) FOR ADOPTING:**

To provide one source for all information pertaining to highway construction projects in the Columbus metropolitan area and to coordinate traffic control between projects.

**PRIMARY BENEFIT(S):**

Paving the Way keeps motorists informed on work zone traffic control with one point of contact for information. The organization conducts safety campaigns and monitors projects to improve traffic control.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

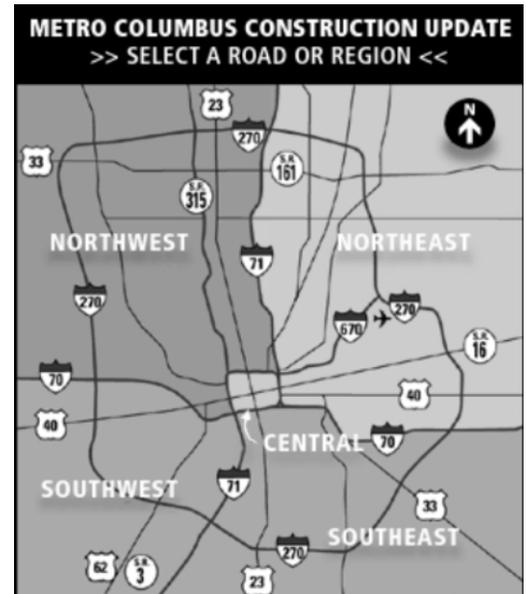
All public roads.

**STATE(S) WHERE UTILIZED:**

Ohio

**SOURCE/CONTACT(S):**

J.P. Blackwood, City of Columbus  
Telephone: (614) 645-3970  
Email: [jblackwood@cmhmetro.net](mailto:jblackwood@cmhmetro.net)



City of Columbus Construction Map

Traveler and Traffic Information → PR/Media Campaigns

H1-7

**BEST PRACTICE:**  
**Work Zone Advisory Brochure**

**DESCRIPTION:**

Since 1994, a brochure titled *A Map and Guide for Driving in Pennsylvania's Work Zones* has been printed and disseminated. The brochure includes a map of Pennsylvania's roads and major routes under construction and safe driving tips. Brochures are disseminated through Pennsylvania Department of Transportation (PennDOT) welcome centers, rest areas, driver license centers, and District offices. The brochure is also available on the PennDOT website.

**REASON(S) FOR ADOPTING:**

Analysis of past work zone crashes showed that many of the crashes in construction zones were due to driver error. This brochure was developed to inform and educate the public on how to drive safely when traveling in construction areas.

**PRIMARY BENEFIT(S):**

Better educated motorists resulting in less work zone crashes.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All types of facilities. All types of work.

**STATE(S) WHERE UTILIZED:**

Pennsylvania

**SOURCE/CONTACT(S):**

Mike Castellano, FHWA Pennsylvania Division Office

Telephone: (717) 221-4517

Email: [mike.castellano@fhwa.dot.gov](mailto:mike.castellano@fhwa.dot.gov)

Traveler and Traffic Information → PR/Media Campaigns	H1-8
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**BEST PRACTICE:****Place Mats with Work Zone Safety Information****DESCRIPTION:**

Since 1994, a placemat entitled *Construction Ahead – a Map and Guide for Driving in Pennsylvania’s Work Zones* has been printed and disseminated. The placemat includes a map of Pennsylvania’s roads and major routes under construction and safe driving tips. Place mats are disseminated through District offices to restaurants and truck stops along Interstate routes.

**REASON(S) FOR ADOPTING:**

Analysis of past work zone crashes showed that many of the crashes in construction zones were due to driver error. This placemat was developed to inform and educate the public on how to drive safely when traveling in construction areas.

**PRIMARY BENEFIT(S):**

Better educated motorists resulting in less work zone crashes.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All types of facilities. All types of work.

**STATE(S) WHERE UTILIZED:**

Pennsylvania

**SOURCE/CONTACT(S):**

Mike Castellano, FHWA Pennsylvania Division Office

Telephone: (717) 221-4517

Email: [mike.castellano@fhwa.dot.gov](mailto:mike.castellano@fhwa.dot.gov)

Traveler and Traffic Information → PR/Media Campaigns	H1-9
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**BEST PRACTICE:****Media Campaign for I-15 Project – Real-Time Traffic Information to Public****DESCRIPTION:**

This extensive public information campaign for the I-15 project began before construction started through the use of 800 telephone lines, websites, faxes, mailings, and public meetings. It included a “hotline” for real-time information on closures, and/or planned closures. The website also contained this real-time information. Quarterly, glossy brochures were mailed to residents in the corridor describing activities and the progress of the reconstruction.

**REASON(S) FOR ADOPTING:**

The goal of the campaign was to provide as much information as possible to the traveling public so that they could make informed decisions on which route to use and/or which mode. Depending on the information (and motorist flexibility), they may even decide to make the trip at another time.

**PRIMARY BENEFIT(S):**

- Accident reductions, congestion reduction in the work zone.
- Travel behavior modification (i.e., using alternate routes, postponing, or rescheduling trips, etc.).

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

High-volume urban arterials or freeways.

**STATE(S) WHERE UTILIZED:**

Utah

**SOURCE/CONTACT(S):**

John Leonard, Operations Oversight Manager, Utah DOT  
 Telephone: (801) 594-6236  
 Email: [jleonard@dot.state.ut.us](mailto:jleonard@dot.state.ut.us)

Traveler and Traffic Information → PR/Media Campaigns	H1-10
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**BEST PRACTICE:****Dissemination of Information on Current Work Zones****DESCRIPTION:**

This is an outreach effort to help prevent work zone crashes. It is accomplished through the distribution of a weekly news document *Trucking Hot News* through the trucking associations, which discusses and identifies: where work zones are located, hazards, and how to minimize the chances of having crashes. The creation and distribution of the news document is performed by the Utah Motor Transport Association.

**REASON(S) FOR ADOPTING:**

The reason for implementing the practice was to maintain a level of zero crash zone fatalities and curb any potential increase of crashes by our increased proactive outreach efforts.

**PRIMARY BENEFIT(S):**

The benefits are still being realized. However, it is expected to result in a decrease in overall work zone crashes, and to allow motor carriers to act proactively to help reduce delays in transportation.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All projects, but particularly those where motor carrier user volume could occur.

**STATE(S) WHERE UTILIZED:**

Utah

**SOURCE/CONTACT(S):**

Roland Stanger, Safety Engineer, FHWA Utah Division Office

Telephone: (801) 963-0078, ext. 254

Email: [roland.stanger@fhwa.dot.gov](mailto:roland.stanger@fhwa.dot.gov)

Terry Smith, Utah Motor Transport Association

Telephone: (801) 973-9370

Traveler and Traffic Information → PR/Media Campaigns	H1-11
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**BEST PRACTICE:**  
**Traffic Safety Information Center**

**DESCRIPTION:**

The FHWA Region 10 Office of Motor Carriers, the Oregon Department of Transportation, and the Oregon State Police, established a traffic safety information center. A trailer was set up at the Baldock rest area and is used by the agencies to provide educational materials to the motoring public.

**REASON(S) FOR ADOPTING:**

This safety center was established as a means for the agencies to jointly work together in sending out safety information. It is a cooperative effort on working together to reduce injuries and fatalities.

**PRIMARY BENEFIT(S):**

The biggest benefits are the pooled resources and the large number of contacts the group can make. The public can go to one location and get information on the *Give 'em a Brake, No-Zone*, and drunk driving campaigns, in addition to many other topics covered by the agencies.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Freeway rest areas/welcome stations.

**STATE(S) WHERE UTILIZED:**

Oregon

**SOURCE/CONTACT(S):**

Nick Fortey, Transportation Safety Engineer, FHWA Oregon Division Office

Telephone: (503) 587-4721

Email: [nick.fortey@fhwa.dot.gov](mailto:nick.fortey@fhwa.dot.gov)

Traveler and Traffic Information → PR/Media Campaigns

H1-12

**BEST PRACTICE:**

**Contractor Sponsored Road Report**

**DESCRIPTION:**

This public information effort was a joint venture between two major contractors. Each day the contractors would contact a local radio station and describe the direction and mile marker to mile marker location of construction work to be completed that day. This information could then be broadcast to local commuting traffic and Interstate through traffic.

**REASON FOR ADOPTING:**

Road reports were implemented to increase awareness of construction activity and reduce the risk of accidents and injuries occurring in highway work zones.

**PRIMARY BENEFIT(S):**

The broadcasting of detailed work zone location information to motorists is a valuable tool in aiding motorists in deciding whether to travel on the Interstate, take an alternate route, or to avoid the area altogether.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Large, complex projects.

**STATE(S) WHERE UTILIZED:**

Illinois

**SOURCE/CONTACT(S):**

Tim Kell, Bureau of Construction, Illinois DOT  
Telephone: (217) 782-6667

**BEST PRACTICE:**

**Bid Item in the Construction Contract for Public Relations**

**DESCRIPTION:**

Maricopa County includes a bid item in many of its construction contracts to handle public relations on the project. The contract will spell out how many public meetings will be required, the number of newsletters (these may be weekly or monthly) that are to be issued which cover the contractors anticipated schedule and other pertinent information, the operation of a 24-hour hotline to receive complaints or to answer questions about the project, and meetings with businesses or local residents as the need arises.

**REASON(S) FOR ADOPTING:**

The county is aware that construction is a disruption to residents, and feels that they are due an explanation of what is going on and how it affects them. The newsletters give the telephone numbers where the public can obtain information.

**PRIMARY BENEFIT(S):**

The benefits to this type of program are a vast reduction in the number of complaints that are received. Residents will alter their trips to safer routes and to reduce congestion when they understand the construction schedule. Sometimes information is provided by the citizens that the county was unaware of and should have taken into consideration. Adjustments can be made when necessary.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All types of projects.

**STATE(S) WHERE UTILIZED:**

Arizona

**SOURCE/CONTACT(S):**

Kent Hamm, Assistant County Engineer, Maricopa County  
Telephone: (602) 506-4618

Traveler and Traffic Information → Traveler Information Management
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H2-2
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**BEST PRACTICE:**

**District Work Zone Traffic Management Coordinator**

**DESCRIPTION:**

A single person in each of the 12 Caltrans Districts has authority to halt lane closures, temporary signals, etc.

**REASON(S) FOR ADOPTING:**

The cumulative effect of projects in close proximity can sometimes lead to poor, inefficient operations. Also, travel volumes tend to be dynamic in nature and fluctuate due to incidents or recreational/holiday demand.

**PRIMARY BENEFIT(S):**

The Coordinator is able to see the “bigger picture” and make decisions that provide relief to an area affected by construction. The Coordinator stays abreast of the regional traffic situation whereas the Resident Engineer tends to focus only on the happenings within the project limits of his/her contract.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All locations. All types of work.

**STATE(S) WHERE UTILIZED:**

California

**SOURCE/CONTACT(S):**

Joy Pinne, Construction, Caltrans

Telephone: (916) 654-5627

Email: [joy\\_pinne@dot.ca.gov](mailto:joy_pinne@dot.ca.gov)

David Saia, Freeway Operations, Caltrans

Telephone: (916) 654-7312

Traveler and Traffic Information → Traveler Information Management

H2-3

**BEST PRACTICE:****Joint Approval Form (CA/T and City of Boston) for Traffic Advisories and Alerts****DESCRIPTION:**

All major changes to existing traffic patterns caused by project construction must be approved by the project's senior traffic manager and the city of Boston's chief liaison to the project prior to implementation.

**REASON(S) FOR ADOPTING:**

The project has 50 different construction contracts, most of which require traffic and pedestrian routing and detours. A team of project and city traffic staff are assigned to each contract. Project and city managers sign off on the plans and recommend actions.

**PRIMARY BENEFIT(S):**

Senior project and city managers ensure that each separate construction team coordinates its work and traffic impacts with adjacent and/or related construction activities.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Type of Facility: Freeways, streets, 2-lane/2-way highway, and bridges.

Location: Urban, rural, and recreational.

Volume/Speed: High-volume/high-speed, high-volume/low-speed, low-volume/high-speed, low-volume/low-speed.

Type of Work: Resurfacing, reconstruction, restoration/rehabilitation, and utility.

Most locations.

**STATE(S) WHERE UTILIZED:**

Massachusetts

**SOURCE/CONTACT(S):**

Glen Berkowitz, Traffic Manager, Massachusetts Highway Department

Telephone: (617) 951-6131

Email: [glenberk@aol.com](mailto:glenberk@aol.com)

**BEST PRACTICE:**

**Contractor Involvement in Public Information Meetings and Lane Closure Notifications**

**DESCRIPTION:**

The best practice is the contractor keeping the public informed on lane closures and status of construction. A plan note is in the contract that requires the contractor to inform a specified number of days in advance of any planned lane closures. Project meetings are attended by Paving the Way staff.

**REASON(S) FOR ADOPTING:**

The reason for adopting the policy was to give advance notice and to keep the public notified of lane closures and the status of construction.

**PRIMARY BENEFIT(S):**

The public is kept informed of lane closures and Paving the Way has advance notice to properly prepare notification of closures.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All types of work. All facilities.

**STATE(S) WHERE UTILIZED:**

Ohio

**SOURCE/CONTACT(S):**

JP Blackwood, City of Columbus

Telephone: (614) 645-6016

Email: [jblackwood@cmhmetro.net](mailto:jblackwood@cmhmetro.net)

**BEST PRACTICE:**

**Signing for Businesses Affected by the Construction of City Streets**

**DESCRIPTION:**

The city of Phoenix has recognized that construction, reconstruction, or resurfacing of their city has a negative effect on local business. In order to aid the business customer in finding access into local businesses, the city has elected to install small signs delineating the access route.

**REASON(S) FOR ADOPTING:**

The city of Phoenix recognizes that businesses pay a large percentage of the revenue that the city receives. It is the city’s intent to keep them in operation and not unduly affect their business during construction. Fewer complaints are received as the business community sees that the city is trying to mitigate the effects on them due to construction.

**PRIMARY BENEFIT(S):**

Friendlier communication with business owners, with fewer complaints. Businesses are better able to survive the construction project.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All streets and highways.

**STATE(S) WHERE UTILIZED:**

Arizona

**SOURCE/CONTACT(S):**

Jim Sparks, Traffic Engineer, City of Phoenix  
Telephone: (602) 262-4435

**BEST PRACTICE:****Provide Real-Time Traffic Information to the Public****DESCRIPTION:**

The Illinois Department of Transportation (IDOT) Communications Center for the Chicago metropolitan area collects and distributes real-time traffic information for a portion of their Interstate routes. The traffic information is generated by their Traffic Management Center. In addition, construction and maintenance work zone lane closure information is updated on at least a daily basis. The real-time information is broadcast on highway advisory radio and is continuously sent to the media and traffic information service providers via automatic direct feed. The information is also available by toll-free telephone and over the Internet.

**REASON(S) FOR ADOPTING:**

While free-flow traffic cannot always be attained, the traveling public does want to minimize their travel time. By obtaining accurate real-time traffic information, motorists can make informed route decisions and help to balance the demand on the system.

**PRIMARY BENEFIT(S):**

Informed motorists can select the route(s) that will provide the best travel time. Because the information is real-time, motorists can adjust their routes even while en route, to avoid traffic-delaying incidents. In addition to providing improved travel times, such route adjustments help to alleviate demand and assist in traffic flow recovery from incident-related congestion.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Most applicable on a systematic basis to larger urban areas that have several route choices. However, to a lesser degree, the concept may have application in other areas or for a specific project.

**STATE(S) WHERE UTILIZED:**

Illinois

**SOURCE/CONTACT(S):**

John Koziol, Bureau of Electrical Operations, Illinois DOT District One  
Telephone: (847) 705-4561

Tony Cioffi, Bureau of Traffic, Illinois DOT District One  
Telephone: (708) 524-2145

Traveler and Traffic Information → Traveler Information	H3-3
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**BEST PRACTICE:****Traveler Information Kiosks in Rest Areas – Work Zones****DESCRIPTION:**

The Mississippi Department of Transportation (MDOT) had a contractor install and maintain public information kiosks at the Interstate rest areas in Mississippi. The kiosks will provide the traveling public with information on construction activities, motel/hotel accommodations, service stations, restaurants, etc. MDOT will be connected to the kiosks via Internet and will have the ability to override the system to put emergency information (e.g. hurricane evacuation routes) directly into the systems.

**REASON(S) FOR ADOPTING:**

MDOT adopted this practice to provide the traveling public with up to date travel information on work zone locations throughout the State-maintained highway system in addition to providing them with public service information.

**PRIMARY BENEFIT(S):**

This service will be provided free of charge. All persons who travel and use the rest areas in Mississippi can benefit by being more informed about highway conditions, laws, and services that are provided for those traveling through the State. However, the biggest benefit will be seen in an increase in safety. Motorists will have up-to-date information during times of emergencies such as hurricane evacuation of the coast.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

The kiosk facilities are only being installed at rest areas where there is a 24-hour security guard on duty. There are approximately 12 rest areas of this type in the State.

**STATE(S) WHERE UTILIZED:**

Mississippi

**SOURCE/CONTACT(S):**

Donna Lum, Public Affairs Director, Mississippi DOT  
Telephone: (601) 359-7017

Traveler and Traffic Information → Traveler Information	H3-4
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**BEST PRACTICE:**

**Use of INFORM to Advise Motorists of Work Zone Delays**

**DESCRIPTION:**

Approximately 10 years ago, the New York State Department of Transportation (NYSDOT) and FHWA created a traffic management system and center on Long Island. It covered most of the Long Island Expressway (I-495), Northern State Parkway, and State Route 25. Loop detectors, ramp meters, a computerized signal system, cameras, and variable message signs were placed throughout this 35 mile corridor, to provide traffic information such as work zone delays, with an ability to manage congestion and provide motorist information on incidents.

**REASON(S) FOR ADOPTING:**

The NYSDOT and FHWA realized that traffic was increasing such that there could be no building a way out of congestion. Therefore, it was decided to try and manage the facilities to minimize the delays due to congestion and to provide detour alternatives in case of major incidents.

**PRIMARY BENEFIT(S):**

The NYSDOT was able to gain greater information on a real-time basis of traffic flows and to react quicker to incidences. Motorists benefited by spending less time in congestion unnecessarily.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Urban and suburban. Freeway, parkway, and suburban arterial.

**STATE(S) WHERE UTILIZED:**

New York

**SOURCE/CONTACT(S):**

Emmett McDevitt, Safety Engineer, FHWA New York Division Office  
 Telephone: (518) 431-4125, ext. 231

Ed Roberts, New York State DOT  
 Telephone: (518) 457-1232

**BEST PRACTICE:****Weekend Closure of I-405 for Resurfacing****DESCRIPTION:**

This was Washington State's first experience with closing a north/south Interstate facility over entire weekends to accommodate resurfacing operations. In the past, various closure operations had been used on the east/west I-90 corridor in the vicinity of Seattle. The more common practice has been to require nighttime paving operations, allowing the contractor to close only partial widths of the Interstate facility. Complete closures usually require natural detour routes and are a more common practice on minor roadways where these detours can be accommodated. The practice is encouraged and still occasionally used, depending on the evaluation of alternative routes.

**REASON(S) FOR ADOPTING:**

The primary reason the State chose to completely close the facility was to deal with noise ordinances and best mitigate (by shortening the exposure period) the noise impacts. Secondary reasons included: minimizing the disruption to daily commuters; increasing the quality and safety of the paving operation due to the absence of traffic through the work zone; and providing the opportunity to research and measure the various impacts on commuters, trucking, and businesses, as well as safety characteristics and quality of the finished product.

**PRIMARY BENEFIT(S):**

- Weekday traffic disruption is eliminated.
- The public tolerates weekend traffic disruption, as it is known to be of short duration and they can plan accordingly. Positive public relations were a win-win solution.
- Safety to the motoring public and paving crew were greatly improved.
- Positive feedback from the public—again a winning public relations effort.
- Unimpeded access of equipment and materials to the job site.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Resurfacing of an urban Interstate.

**STATE(S) WHERE UTILIZED:**

Washington

**SOURCE/CONTACT(S):**

Matt Preedy, Project Engineer, Washington DOT

Telephone: (425) 649-4436

Email: [henryk@wsdot.wa.gov](mailto:henryk@wsdot.wa.gov)

Jim Spacys, Roadway Construction Engineer, Washington DOT

Telephone: (360) 705-7824

**BEST PRACTICE:****Website for Traffic Information, Advisories, and Alerts****DESCRIPTION:**

Websites are becoming an important source of highway construction project information to travelers and others. Some websites are project specific, while others are statewide or regional.

- The Georgia Department of Transportation maintains an internet website called the Georgia NAVIGATOR: [www.georgia-navigator.com](http://www.georgia-navigator.com) which provides travelers access to real-time traffic information. This site is not project specific; rather it provides information for the entire State. First created during the 1996 Olympics and enhanced in 1998, the NAVIGATOR site enables users to view traffic conditions on the interstates and arterials in the city of Atlanta and surrounding counties via 60 color camera snapshots that are refreshed every four minutes. The NAVIGATOR website also provides information on current and upcoming construction projects, highlighting any implications on travelers. The website averages more than 100,000 hits per weekday.
- The CHART program is directed by a board, consisting of senior technical and operational personnel from The Maryland State Highway Administration, Maryland Transportation Authority, Maryland State Police, Federal Highway Administration, University of Maryland Center for Advanced Transportation Technology, and various local governments. CHART is a multi-jurisdictional and multi-disciplinary program that provides real-time traffic information, incident response, lane closure reports, and general traveler information via a website: [www.chart.state.md.us](http://www.chart.state.md.us). A statewide operations center serves as the 'hub' of the CHART system with satellite traffic operations centers (TOCs) across the State to handle peak-period traffic.
- The Iowa Department of Transportation maintains a website dedicated to work zone activities. The website features updates on current and planned road construction projects, real-time traffic reports, construction expenditure information, and work zone safety tips. The website can be viewed at: <http://www.dot.state.ia.us/roadcons.htm>.

**REASON(S) FOR ADOPTING:**

Web technology provides the ability to distribute traffic information to concerned audiences directly, in real time. Websites give travelers the ability to pre-plan their trips including when to leave, what routes to take, and what mode of transportation to use.

**PRIMARY BENEFIT(S):**

Easy, quick, comprehensive communication for concerned audiences underscores the agency's commitment to complete public information on road project(s). Providing real-time traffic and lane closure information can enable drivers to choose alternate routes and transportation modes, thereby reducing travel times and delays due to incidents. Congestion is reduced and travel speeds increase.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Type of Facility: Freeways, streets, 2-lane/2-way highway, and bridge.

Location: Urban, rural, and recreational.

Volume/Speed: High-volume/high-speed, high-volume/low-speed, low-volume/high-speed, low-volume/low-speed.

Type of Work: Resurfacing, reconstruction, restoration/rehabilitation, and utility.

**STATE(S) WHERE UTILIZED:**

Georgia, Iowa, Maryland (and others)

**SOURCE/CONTACT(S):**

Kimberly Law, Public Relations Specialist, Georgia DOT

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Email: [kim.law@dot.state.ga.us](mailto:kim.law@dot.state.ga.us)

Jerry Dickinson, Iowa DOT

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Mike Zezeski, Maryland State Highway Administration

Telephone: (410) 582-5605

Traveler and Traffic Information → Traveler Information	H3-7
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**BEST PRACTICE:**

**Arizona's Privatized Advanced Traveler Information System**

**DESCRIPTION:**

A "real-time" traveler information system, developed by ETAK/Metro Networks, Fastline, and TouchVision, gathers and combines multimodal traveler information from a variety of existing private and public sector sources and passes the information to various governmental agencies, commercial establishments, and individual travelers. As a result, up-to-the-minute traffic information is available from radio and TV traffic reporters, via cities through Traffic Check Cable TV traffic channels, *On Touch Arizona* kiosks developed by TouchVision, and from the Internet.

**REASON(S) FOR ADOPTING:**

To provide motorists with up-to-the-minute traffic information through a wide variety of sources.

**PRIMARY BENEFIT(S):**

To allow motorists information on traffic conditions prior to their commute.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Any area where work zones cause delays.

**STATE(S) WHERE UTILIZED:**

Arizona

**SOURCE / CONTACT(S):**

Arizona Transportation Research Center  
 Telephone: (602) 712-3130

Traveler and Traffic Information → Traveler Information	H3-8
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**BEST PRACTICE:  
CB Wizard**

**DESCRIPTION:**

The Wizard unit automatically broadcasts an alert message over any CB channel (usually channel 19) to notify truck drivers that traffic is stopped up ahead approaching a work zone, and caution should be taken. The system can record and store up to three different messages and transmit over two different CB channels. Messages are typically seven to 10 seconds, and can be prerecorded or recorded on site. The user has the option of transmitting a message every 30, 60, or 90 seconds. In order to avoid breaking in over another CB user, the equipment monitors the selected station and will only broadcast a message when no other activity is detected. The Wizard uses a standard CB antenna and a 12-volt power source, and can broadcast over approximately four miles. The system has been used since June 1999 in Iowa.

**REASON(S) FOR ADOPTING:**

It is designed to give drivers of heavy trucks enough advance warning of upcoming delays at construction sites or incidents to enable them to stop safely before encountering lines of halted vehicles.

**PRIMARY BENEFIT(S):**

Safer commercial vehicle travel.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Any location with substantial commercial vehicle traffic.

**STATE(S) WHERE UTILIZED:**

Iowa

**SOURCE / CONTACT(S):**

Steve Gent, Office of Traffic and Safety, Iowa DOT  
Telephone: (515) 239-1129

Traveler and Traffic Information → Traveler Information

H3-9

**BEST PRACTICE:**  
**Construction Database and Website**

**DESCRIPTION:**

Houston TranStar is a multi-modal transportation and emergency management center serving Houston, Texas and the surrounding region. TranStar was developed with the cooperation of four transportation agencies: Texas Department of Transportation (TXDOT), Metro Transit Authority, Harris County, and the City of Houston. The function of the center is to plan, design, operate, and maintain 15,000 miles of roads in the Greater Houston area. TranStar includes a website, called *Roadworks*, that allows engineers, planners, and concerned citizens to determine the status of current and planned road construction projects in the Greater Houston area. Information posted on the website includes:

- Project name and number
- Contact phone number
- Planned start and finish dates
- Multiple project search capabilities
- Interactive maps
- Access to construction data
- Project description
- Planned project length
- Graphical representation of projects
- Real-Time traffic information
- Real-Time freeway accidents
- Motorists assistance information
- TXDOT lane closures
- Contractor contact information.

**REASON(S) FOR ADOPTING:**

During a period of economic prosperity in Houston during the early 1990s, many construction projects were implemented simultaneously. Motorists and transportation agencies became concerned that mobility was being restricted and resources could be better utilized through coordinated efforts.

**PRIMARY BENEFIT(S):**

*Roadworks* is a construction management product that shares project information among engineers and planners in different agencies. Using *Roadworks* agencies are able to coordinate activities, minimizing the impacts of construction to road users and maximizing available resources. The general public is able to use the website to gain advanced information on project status.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All streets and highways.

**STATE(S) WHERE UTILIZED:**

Texas

**SOURCE/CONTACT(S):**

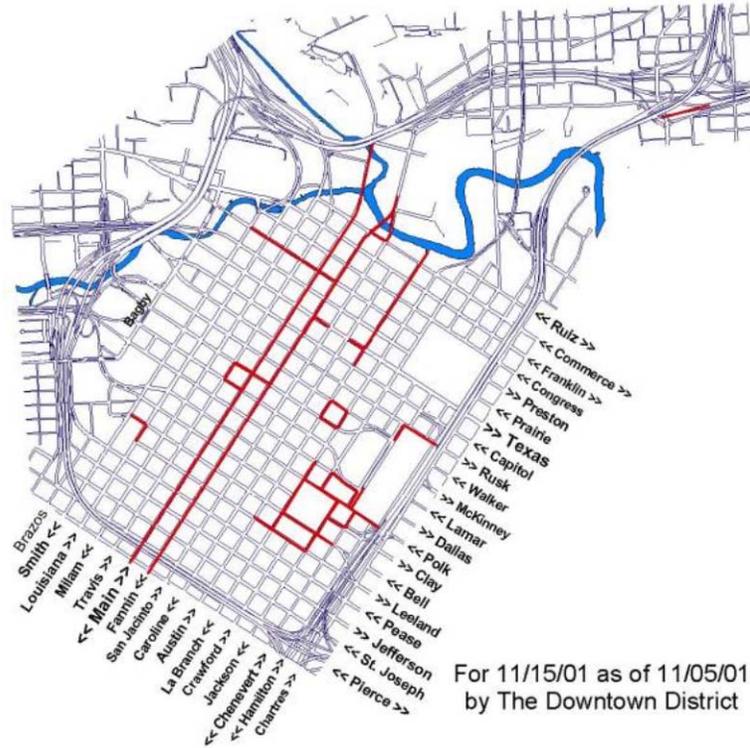
Maria Cristela Vera, Houston TranStar

Telephone: (713) 881-3278

Email: [mvera@houstontranstar.org](mailto:mvera@houstontranstar.org)

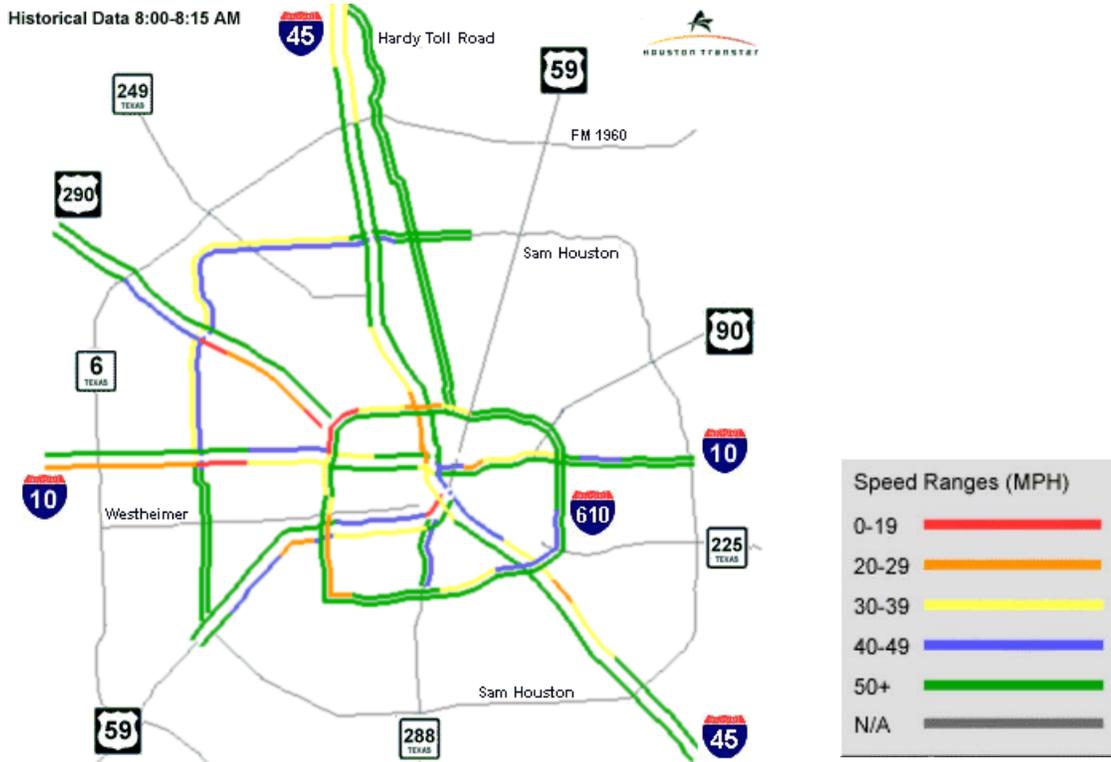
Jack Whaley, Houston TranStar

Telephone: (713) 881-3000



For 11/15/01 as of 11/05/01 by The Downtown District

Graphical interface identifies areas where work zones are present



Real-time traffic conditions can be viewed, allowing travelers to anticipate congestion and plan alternate routes

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## Best Practices Category I - Enforcement

Enforcement includes activities undertaken by law enforcement officers to enforce laws and encourage safe conditions in work zones. These best practices involve using work zone trained and qualified, full-time uniformed police officers that are readily available for construction and maintenance operations.

Examples of practices include:

- Uniformed police officers participating in all work zones on high-speed/high-volume facilities, as well as, those involving lane and ramp closures, severely restricted areas, and where major changes to existing traffic patterns result.
- Uniformed police officers that are given training in work zone traffic control, completing work zone data on State accident/crash report forms, the MUTCD, and incident management.
- Full-time dedicated uniformed police officers to enforce work zone activities.
- Automated speed enforcement in confined and high-speed work zones.
- Uniformed police officers equipped with state-of-the-art equipment for use in controlling speeds and performing crash investigation/reporting.



Work zone enforcement activities

The following best practice entries relate to work zone law enforcement:

<b>Subcategory</b>	<b>Ref. #</b>	<b>ENFORCEMENT Best Practices</b>
I1 Evaluation/ Coordination	I1-1	Contracting for Police Presence in Work Zones
	I1-2	Evaluation of Project ADVANCE (Aggressive Driving Video and Non-Contact Enforcement)
I2 Police Presence	I2-1	Active Law Enforcement Services to Control Speed in Work Zones
	I2-2	Full-Time State Police Positions Assigned to Safety and Construction Issues
	I2-3	Drone Radar in Work Zones
	I2-4	Speed Trailers in Temporary Work Zones

Enforcement → Evaluation/Coordination	I1-1
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**BEST PRACTICE:  
Contracting for Police Presence in Work Zones**

**DESCRIPTION:**

The California Highway Patrol (CHP) has contracted with the California Department of Transportation (Caltrans) to provide services on an as-needed basis. The CHP, where appropriate, provides awareness of work zone areas and enforcement of the speed limit. The interagency agreement shares the responsibility between Caltrans and CHP for enhancing highway worker and motorist safety in and around highway work zones. Caltrans and CHP personnel work closely together to determine actions necessary to address highway worker and motorist safety, traffic control procedures, and anticipated traffic delays. Issues of collaboration can include methods of job site communication, traffic handling, acceptable traffic delays, contingency plans to address traffic mobility, and emergency vehicle routes.

**REASON(S) FOR ADOPTING:**

Speed reduction and awareness of work zones was not being adequately accomplished through the use of signing, and channelizing devices, etc.

**PRIMARY BENEFIT(S):**

Reduction in highway and worker related accidents, creating an overall safer work zone.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All types. All locations.

**STATE(S) WHERE UTILIZED:**

California

**SOURCE/CONTACT(S):**

Wayne Brazelton, Caltrans  
Telephone: (916) 654-6072

Enforcement → Evaluation/Coordination

I1-2

**BEST PRACTICE:****Evaluation of Project ADVANCE (Aggressive Driving Video and Non-Contact Enforcement)****DESCRIPTION:**

Project ADVANCE is a program to monitor undesirable driving behavior, more specifically targeting aggressive drivers on Maryland roads. The project goal is to develop a mobile imaging device that would automatically recognize and take a computer image of an aggressive driver by recognizing vehicles that are speeding, making unsafe lane changes, and following too closely. The system consists of a computer, printer, LIDAR laser, laser chronograph (AUTONSENSE), several high-resolution digital cameras, and a printer, which can be set up at virtually any location. The system was implemented in December 1997.

**REASON(S) FOR ADOPTING:**

Project ADVANCE represents an innovative way to enforce traffic laws and protect the motoring public on high-volume roadways.

**PRIMARY BENEFIT(S):**

This system allows for traffic enforcement without disrupting traffic flow. This method of traffic law enforcement also enhances the police officer's safety by reducing his/her exposure to traffic.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Currently targets aggressive drivers on high volume roadways and aggressive driving problems on any roadways.

**STATE(S) WHERE UTILIZED:**

Maryland

**SOURCE/CONTACT(S):**

SGT. Janet Harrison, Operations Supervisor for Project Advance,  
Maryland State Police

Telephone: (410) 694-6100

Email: [cved@clark.net](mailto:cved@clark.net)

TFC M. Almond, Commercial Vehicle Enforcement, Maryland State Police

Telephone: (410) 694-6100

Telephone: (916) 654-6072

Enforcement → Police Presence	I2-1
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**BEST PRACTICE:**

**Active Law Enforcement Services to Control Speed in Work Zones**

**DESCRIPTION:**

The predominate use of on-duty Florida Highway Patrol (FHP) officers for active patrolling of projects for speed control/traffic enforcement began in 1995. Prior to that, the use of off-duty officers was the normal practice. The FDOT reimburses the FHP out of project funds per the FDOT/FHP agreement. The use of off-duty officers hired by the contractor is limited to: 1) Project Phase Traffic Shifts to Facilitate Traffic Flow—a bid item; and 2) Contractor’s Option for Equipment Movement, etc.—no direct pay.

**REASON(S) FOR ADOPTING:**

The use of off-duty officers was not achieving the desired results of lowering speeds on major freeway projects. Off-duty officers on contractor’s payroll had to obtain “on-duty” status to issue citations, thus rarely wrote citations for speeding.

**PRIMARY BENEFIT(S):**

The on-duty FHP officers are providing active patrolling with an emphasis on speed enforcement. Officers, when paid directly by the State, give more control of the officer’s assignments to the project’s personnel and are coordinated in advance with the FHP.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Urban or rural freeways and limited access roadways. All types of work.

**STATE(S) WHERE UTILIZED:**

Florida

**SOURCE/CONTACT(S):**

Norbert Munoz, Safety Engineer, FHWA Florida Division Office

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Enforcement → Police Presence

I2-2

**BEST PRACTICE:****Full-Time State Police Positions Assigned to Safety and Construction Issues****DESCRIPTION:**

- In Maryland a State Police Liaison Officer is available to provide valuable input on a number of highway safety related issues including work zones. The State Police and the Maryland State Highway Administration (MDSHA) understand each other's roles and work together as a team to solve mutual safety problems. The Liaison Officer has been working on location with MDSHA for over 10 years.
- New Jersey Department of Transportation (NJDOT) and New Jersey State Police (NJSP) developed a unique construction unit consisting of NJSP Troopers to assist NJDOT Resident Engineers in monitoring and enforcement of the approved traffic control plans (TCPs). The unit was activated in 1994 to increase the performance level of law enforcement services relating to work zone safety and to establish consistency in enforcement of TCPs on a statewide basis. Troopers assigned to the NJSP Construction Unit receive specific work zone safety training.

**REASON(S) FOR ADOPTING:**

MDSHA and the Maryland State Police realized that Maryland's highway system would operate more efficiently and safely if both agencies worked as a team. A number of highway safety issues: 1) work zone traffic control safety concerns, 2) freeway traffic incident management, 3) special events, and 4) seasonal traffic management responsibilities, led to the adoption of this policy.

The NJ DOT and NJSP realized the need to increase the level of performance of law enforcement personnel in work zones and provide enforcement consistency on a statewide basis.

**PRIMARY BENEFIT(S):**

The biggest benefits being realized from this best practice are: 1) improved highway safety, 2) immediate action on highway safety issues, 3) improved operations between State Police and MDSHA/DOT personnel, 4) uniformity in the implementation of TCPs, and 5) increased level of safety for workers and travelers. The NJDOT reports significant savings (estimated \$4-\$6 million per year) for the State by providing a mechanism for direct billing to the State for law enforcement services, rather than as a contract pay item.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All types of facilities. All types of work.

**STATE(S) WHERE UTILIZED:**

Maryland, New Jersey

**SOURCE/CONTACT(S):**

Wayne Styles, Traffic Policy and Management Team Leader, Maryland State Highway Administration

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Sgt. Richard Vercera, Liaison Officer, Maryland State Police

Telephone: (410) 582-5616

Email: [rvercera@mdshahq.shahanvc](mailto:rvercera@mdshahq.shahanvc)

Michael W. Gross, Manager, Bureau of Construction Services, New Jersey DOT

Telephone: (609) 530-5500

Sergeant Wade, Construction Unit Supervisor, New Jersey State Police

Telephone: (609) 883-0247

Enforcement → Police Presence	I2-3
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**BEST PRACTICE:**  
**Drone Radar in Work Zones**

**DESCRIPTION:**

A drone radar unit is attached to an arrow panel or signpost. The signal will then activate all radar detectors within range.

**REASON(S) FOR ADOPTING:**

The idea is to alert vehicles to slow down to a reasonable speed through work zones. The advance notice would also alert sleepy, fatigued, and inattentive drivers.

**PRIMARY BENEFIT(S):**

Speed reductions and safer work areas.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All types of high-speed facilities, locations, and work.

**STATE(S) WHERE UTILIZED:**

Massachusetts

**SOURCE/CONTACT(S):**

Charles F. Sterling, P.E.; Traffic Engineer; Massachusetts DOT

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Email: [Charles.Sterling@state.ma.us](mailto:Charles.Sterling@state.ma.us)

Enforcement → Police Presence	I2-4
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**BEST PRACTICE:**

**Speed Trailers in Temporary Work Zones**

**DESCRIPTION:**

A speed trailer with a speed advisory sign is placed prior to the work zone taper. The speed trailer includes a device for emitting radar to measure approaching vehicle speed, an advisory sign to alert motorists of the effective speed limit, a display showing the approaching vehicle speed, a strobe to simulate picture taking for automated enforcement capability, and a siren that is sounded if approaching speeds are above a preset speed.

**REASON(S) FOR ADOPTING:**

To determine the effectiveness of using a speed trailer to reduce speeds approaching and within rural high speed temporary work zones.

**PRIMARY BENEFIT(S):**

Speed reductions and safer work zones.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Rural high-speed temporary work zones.

**STATE(S) WHERE UTILIZED:**

Texas

**SOURCE/CONTACT(S):**

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## Best Practices Category J - ITS and Innovative Technology

These best practices utilize ITS systems to automatically collect and analyze before, during, and after traffic flows in the work zone; provide accurate real-time information automatically to motorists and to the construction team; enforce speed; as well as safely guide motorists through the work zone.

Examples of practices include:

- Accurate real-time traffic information automatically given to motorists and the construction team using software and communication modules in existing portable traffic management systems. The information disseminated to motorists cover all work zones:
  - ✓ On high-speed, high-volume facilities,
  - ✓ Involving lane and ramp closures,
  - ✓ Located in severely restricted areas, and
  - ✓ Involving major changes to existing traffic patterns.
- Effective tools and techniques for safely and efficiently merging traffic approaching a work zone with lane closures.
- Effective tools, techniques, and enforcement for slowing down traffic approaching work zones, as well as maintaining a safe speed through work zones.
- Automated/robotic equipment to perform high-exposure, short-term maintenance operations.
- A cost-effective, quick way to remove, cover, and/or obliterate existing pavement markings to prevent a conflict with new markings; and/or do not produce a shadow or ghost.



Roadside Traffic Sensor

The following best practice entries relate to ITS and innovative technology practices:

Subcategory	Ref. #	ITS AND INNOVATIVE TECHNOLOGY Best Practices
J1 Traffic Control	J1-1	Highway Closure and Restriction System
	J1-2	Mobile Surveillance/Ramp Metering
	J1-3	Automated Data Acquisition and Processing of Traffic Information in Real-Time (ADAPTIR)
	J1-4	Indiana Lane Merge
	J1-5	Portable ITS Technology
	J1-6	Portable Traffic Management System – Smart Work Zone
	J1-7	Portable ITS Technology in Work Zones
	J1-8	Portable Traffic Management System
	J1-9	Portable Queue Detectors with Variable Message Signs
	J1-10	Queue Length Detector
	J1-11	220 MHz Radios for Wireless Communication
J2 Traveler Information	J2-1	Advanced Traveler Information System (ATIS) or Indiana Expert system
	J2-2	Real-Time Traffic Information
	J2-3	Using the Estimated Duration of Delay on Variable Message Signs
	J2-4	Work Zone Real-Time Information System
J3 Work Zone Control	J3-1	Automated Machine for Cone Placement and Retrieval
	J3-2	Remotely Operated Autoflagger (Slow/Stop Sign)
	J3-3	Use of 42" flexible cones (a.k.a. "Grabber Cones")

ITS and Innovative Technology → Traffic Control

J1-1

**BEST PRACTICE:**  
**Highway Closure and Restriction System**

**DESCRIPTION:**

The Highway Closure and Restriction System allows the construction and maintenance offices throughout the State to input information relative to roadway closures or restrictions whether they be from highway work, weather, or roadway incidents/accidents. This information may be retrieved either through the Internet or by telephone. Requests to activate the variable message signs are also included as a part of this system. The system went online in January 1998.

**REASON(S) FOR ADOPTING:**

The previous system used by Arizona Department of Transportation was not usable by the general public. This system was designed to make work zone activities and road closure information more easily available to everyone.

**PRIMARY BENEFIT(S):**

The system provides real-time information to motorists and highway officials. Ease of access and quality of information are benefits. Well over 100,000 web page hits occur each month.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Type of facility: All State highways.  
 Location: Statewide.  
 Volume/Speed: All volumes/speeds.  
 Type of work: Any activity affecting traffic.

**STATE(S) WHERE UTILIZED:**

Arizona

**SOURCE/CONTACT(S):**

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 Telephone: (602) 379-3645, ext. 125  
 Email: [karen.king@fhwa.dot.gov](mailto:karen.king@fhwa.dot.gov)

Dottie Shoup, Supervisor, Traffic Operations Center, Arizona DOT  
 Telephone: (602) 252-1951

ITS and Innovative Technology → Traffic Control

J1-2

**BEST PRACTICE:****Mobile Surveillance/Ramp Metering****DESCRIPTION:**

This practice features self-powered mobile surveillance trailers with various off-the-shelf technologies such as: wireless communication infrastructure operating in several unlicensed frequencies (spread spectrum), and video image processing. This technology is able to transmit images and traffic data (speed, volume, occupancy) to the traffic management center (TMC) for locations without surveillance infrastructure, such as: sensors, loops, and CCTV, etc. The trailers can control ramp meters that may have had their surveillance disabled and remain in communication with the TMC.

**REASON(S) FOR ADOPTING:**

The reason for exploring this method of traffic surveillance is in some instances during construction, surveillance for essential links in the freeway system or in the city street network may be disrupted. If no existing surveillance infrastructure existed before construction begins and considerable traffic disruption is expected, this method would allow for collection of information that can be used to detour or inform the traveling public by activating variable message signs. During an event management scenario (Super Bowl, large conventions, or the State Fair), the trailers can be helpful in managing traffic.

**PRIMARY BENEFIT(S):**

This practice will allow the collection of traffic data (speed, volume, occupancy) and the transmittal of video images while the existing surveillance infrastructure is inoperable (due to construction, maintenance, etc.) or if there is no existing infrastructure. Freeway ramp meters will be running in normal mode and will remain in communication with the TMC although their sensors and loops may not be operating.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This method of collecting data can be utilized on freeways and city streets, in urban areas and rural areas, in a variety of construction activity.

**STATE(S) WHERE UTILIZED:**

California

**SOURCE/CONTACT(S):**

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ITS and Innovative Technology → Traffic Control

J1-3

**BEST PRACTICE:****Automated Data Acquisition and Processing of Traffic Information in Real-Time (ADAPTIR)****DESCRIPTION:**

This system senses and processes data relating to current traffic conditions and automatically provides travelers with appropriate speed control, lane control, and delay and diversion advisory messages via variable message signs (VMS) and highway advisory radio (HAR).

**REASON(S) FOR ADOPTING:**

ADAPTIR provides real-time information to travelers while improving safety and managing congestion in work zones. Currently there is better acceptance and adherence to information presented for the traveling public because the information is updated.

**PRIMARY BENEFIT(S):**

Possible accident reduction, congestion mitigation, and cost savings.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All types of work on urban and rural freeways.

**RELATED BEST PRACTICE(S):**

Portable ITS Technology (Practice J1-5)  
 Portable Traffic Management System – Smart Work Zone (Practice J1-6)  
 Portable ITS Technology in Work Zones (Practice J1-7)  
 Portable Traffic Management System (Practice J1-8)  
 Real-Time Traffic Information (Practice J2-2)  
 Work Zone Real-Time Information System (Practice J2-4)

**STATE(S) WHERE UTILIZED:**

California, Maryland

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ITS and Innovative Technology → Traffic Control	J1-4
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**BEST PRACTICE:  
Indiana Lane Merge**

**DESCRIPTION:**

The Indiana lane merge is a dynamic no passing zone placed prior to the taper of a work zone. The first sign includes flashing strobes that are constantly activated. Additional signs are automatically activated upstream of the work zone depending upon capacity.

**REASON(S) FOR ADOPTING:**

The Indiana lane merge was developed to reduce aggressive merging near the taper and encourage motorist to switch lanes well upstream of the discontinuous lane taper.

**PRIMARY BENEFIT(S):**

The biggest benefit realized from this practice is improved safety as a result of crash reduction. The practice also improves traffic smoothness and safety in the work zone.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

The primary type of project this practice is most applicable on is freeways both urban and rural.

**STATE(S) WHERE UTILIZED:**

Indiana

**SOURCE/CONTACT(S):**

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ITS and Innovative Technology → Traffic Control

J1-5

**BEST PRACTICE:**  
**Portable ITS Technology**

**DESCRIPTION:**

Portable ITS technologies such as variable message signs (VMS), highway advisory radio (HAR), and queue length detectors have been utilized on various construction projects in Missouri. The queue length detector technology was used and evaluated on an I-70 Missouri River Bridge rehabilitation project in 1995 near Rocheport, Missouri.

**REASON(S) FOR ADOPTING:**

The ITS technologies such as the queue length detectors provide additional data on the traffic situation and thus allow more effective management of the traffic through construction zones. The ITS technologies of VMS and HAR are effective methods to provide continuous and updated information to the traveling public as they approach or travel through construction zones.

**PRIMARY BENEFIT(S):**

Benefits are improved traffic management through construction zones and reduction in frustration of the traveling public if delays are experienced.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Type of Facility: Freeways, streets, 2-lane/2-way highway, bridge, and intersections.

Location: Urban, rural, recreational, and tourist locations with seasonal traffic.

Volume/Speed: High-volume/high-speed and high-volume/low-speed.

Type of Work: Resurfacing, reconstruction, and restoration/rehabilitation.

**RELATED BEST PRACTICE(S):**

Automated Data Acquisition and Processing of Traffic Information in Real-Time (ADAPTIR) (Practice J1-3)

Portable Traffic Management System – Smart Work Zone (Practice J1-6)

Portable ITS Technology in Work Zones (Practice J1-7)

Portable Traffic Management System (Practice J1-8)

Real-Time Traffic Information (Practice J2-2)

Work Zone Real-Time Information System (Practice J2-4)

**STATE(S) WHERE UTILIZED:**

Missouri

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ITS and Innovative Technology → Traffic Control

J1-6

**BEST PRACTICE:****Portable Traffic Management System – Smart Work Zone****DESCRIPTION:**

The Minnesota Department of Transportation (Mn/DOT) has experimented with the Portable Traffic Management System or Smart Work Zone for the past 2 years. The system utilizes traffic detection cameras and a series of changeable message signs in and around the work zone area to manage traffic and can be fully deployed and operational within four hours.

**REASON(S) FOR ADOPTING:**

The system was developed to utilize existing technology to better manage traffic through work zones. This technology enables traffic to be monitored and diverted to alternate routes during periods of congestion or when incidents occur.

**PRIMARY BENEFIT(S):**

The Portable Traffic Management System can be fully deployed and operational within four hours. Traffic can be managed more effectively to improve operations through construction zones. Changeable message signs effectively alert motorists regarding congestion and incidents through the work zone.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

The Portable Traffic Management System or Smart Work Zone is most effective in metropolitan areas where traffic can be diverted to alternative routes when construction or incidents create congestion.

**RELATED BEST PRACTICE(S):**

Automated Data Acquisition and Processing of Traffic Information in Real-Time (ADAPTIR) (Practice J1-3)

Portable ITS Technology (Practice J1-5)

Portable ITS Technology in Work Zones (Practice J1-7)

Portable Traffic Management System (Practice J1-8)

Real-Time Traffic Information (Practice J2-2)

Work Zone Real-Time Information System (Practice J2-4)

**STATE(S) WHERE UTILIZED:**

Minnesota

**SOURCE/CONTACT(S):**

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DOT

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ITS and Innovative Technology → Traffic Control

J1-7

**BEST PRACTICE:**  
**Portable ITS Technology in Work Zones**

**DESCRIPTION:**

The Indiana Department of Transportation (INDOT) has used a variety of technologies including highway advisory radio (HAR), variable message signs (VMS), Indiana lane merge, 2/10 reference markers, tow truck service, ambulance service, closed circuit TV, and smiley-face signs. The HAR is incorporated into the construction project and remains operational after construction to become a part of the State system. The ITS technologies have been used by INDOT for several years.

**REASON(S) FOR ADOPTING:**

The “smart work zone” includes various technologies to provide motorists with an earlier notice of when incidences occur. This information helps motorists to consider other options. Also, it improves emergency response time to the incident.

**PRIMARY BENEFIT(S):**

The biggest benefit realized is reduced congestion. Driver behavior is also improved due to making traveler information available.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

The “smart work zone” is most applicable on freeway facilities both urban and rural. It is especially useful where high volume is experienced.

**RELATED BEST PRACTICE(S):**

Automated Data Acquisition and Processing of Traffic Information in Real-Time (ADAPTIR) (Practice J1-3)

Portable ITS Technology (Practice J1-5)

Portable Traffic Management System – Smart Work Zone (Practice J1-6)

Portable Traffic Management System (Practice J1-8)

Real-Time Traffic Information (Practice J2-2)

Work Zone Real-Time Information System (Practice J2-4)

**STATE(S) WHERE UTILIZED:**

Indiana

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ITS and Innovative Technology → Traffic Control

J1-8

**BEST PRACTICE:**  
**Portable Traffic Management System**

**DESCRIPTION:**

This practice involves traffic monitoring via queue detection with automatic communication to variable message signs and highway advisory radio (HAR). An automatic work zone traffic management system was implemented on a project during the 1998 construction season, and later expanded to other projects. The technology has also been used to trigger ramp meters on Pennsylvania roads.

**REASON(S) FOR ADOPTING:**

To provide effective communication with the motoring public on real-time traffic information. The Pennsylvania Department of Transportation is looking for ways to encourage the use of alternate routes using with real-time information. Ramp metering improves flow in open expressway lanes.

**PRIMARY BENEFIT(S):**

A good safety record and efficient traffic flow, fulfilling the reasons listed above for using the system. A side benefit was improved public relations with commuters and local business officials.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Freeway reconstruction projects.

**RELATED BEST PRACTICE(S):**

Automated Data Acquisition and Processing of Traffic Information in Real-Time (ADAPTIR) (Practice J1-3)

Portable ITS Technology (Practice J1-5)

Portable Traffic Management System – Smart Work Zone (Practice J1-6)

Portable ITS Technology in Work Zones (Practice J1-7)

Real-Time Traffic Information (Practice J2-2)

Work Zone Real –Time Information System (Practice J2-4)

**STATE(S) WHERE UTILIZED:**

Pennsylvania

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ITS and Innovative Technology → Traffic Control

J1-9

**BEST PRACTICE:****Portable Queue Detectors with Variable Message Signs****DESCRIPTION:**

Portable queue detectors are placed in advance of work zones, including video cameras mounted on poles on a series of trailers parked at various places in advance of work zones. The system of detectors collects lane-occupancy and traffic speed data and sends them to a computer, which is connected to variable message signs. The variable message signs are mounted at the back of the video camera trailers. The computer processes the data and when it determines that a slowdown is occurring and backups are forming, it automatically displays warning messages on the variable message signs.

**REASON(S) FOR ADOPTING:**

To keep motorists advised of real-time conditions, to smooth traffic flow, and to give drivers advance warning to slow down and thus avoid rear end crashes.

**PRIMARY BENEFIT(S):**

Reduction (as much as 60 percent) in the number of rear end crashes.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

In advance of work zones.

**RELATED BEST PRACTICE(S):**

Queue Length Detector (Practice J1-10)

**STATE(S) WHERE UTILIZED:**

FHWA

**SOURCE/CONTACT(S):**

Methods and Procedures to Reduce Motorist Delay in European Work Zones  
FHWA-PL-01-001 [www.international.fhwa.dot.gov](http://www.international.fhwa.dot.gov) October, 2000

ITS and Innovative Technology → Traffic Control

J1-10

**BEST PRACTICE:**  
**Queue Length Detector**

**DESCRIPTION:**

This detector uses infrared beams projected across the traffic lanes to monitor how long it takes vehicles to cross through the beam. If the length of time exceeds a certain preset amount, then traffic has stopped or slowed. When this happens an alert is automatically sent to workers to try to remedy the problem, and take action to increase traffic flow.

**REASON(S) FOR ADOPTING:**

To detect traffic queues, minimize delays caused by road work, and reduce the number of rear-end collisions.

**PRIMARY BENEFIT(S):**

Increased safety, fewer rear-end collisions, less delay.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Any work zone where queues may form.

**RELATED BEST PRACTICE(S):**

Portable Queue Detectors with Variable Message Signs (J1-9)

**STATE(S) WHERE UTILIZED:**

Missouri

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ITS and Innovative Technology → Traffic Control

J1-11

**BEST PRACTICE:****220 MHz Radios for Wireless Communication****DESCRIPTION:**

220 MHz radios are used for wireless communication between data sensors and an onsite PC for processing. The 220 MHz radios enable the transmission of data for a distance of up to 8-10 miles, using antennas mounted on 25-40 foot poles. FHWA can grant permission for use of up to five frequencies over the 220 MHz band so an FCC license is not necessary. The University of Cincinnati tested and used 220 MHz radios in developing the Travel Time Prediction Rating System (TIPS).

**REASON(S) FOR ADOPTING:**

Facilitates the distribution of real-time information to travelers thereby enabling them to make decisions about alternate routes, minimizing their frustration and smoothing out traffic flow, thereby increasing safety and lessening delays.

**PRIMARY BENEFIT(S):**

Eliminates the need for hard wire connections between devices.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

To transmit real-time data from sensors to processing units and changeable message signs at work zones, and for coordinating traffic signals.

**STATE(S) WHERE UTILIZED:**

Ohio

**SOURCE/CONTACT(S):**

Rodger Dunn, Ohio DOT

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**BEST PRACTICE:****Advanced Traveler Information System (ATIS) or Indiana Expert System****DESCRIPTION:**

The ATIS, Indiana Expert System, initially began as an operational test in 1996 for the Borman advanced traffic management system, which is part of the Gary-Chicago-Milwaukee (GCM) corridor. The expert system enables Hoosier Helper incident response teams to program messages to travelers from their vehicles at the site of an incident. The Indiana Expert System can send these messages to highway advisory radio (HAR), variable message signs (VMS), pagers, etc. simultaneously. The Indiana Expert System has also been used in work zones to provide traveler information.

**REASON(S) FOR ADOPTING:**

The Indiana Expert System was adopted to reduce the time required to deliver real-time messages to the public and minimize the number of people involved in the process. This information allows travelers to use alternate routes, avoiding long delays, and potentially preventing crashes.

**PRIMARY BENEFIT(S):**

The biggest benefit realized is improved traveler information.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

The Indiana Expert System is most applicable to urban and rural freeways.

**STATE(S) WHERE UTILIZED:**

Indiana

**SOURCE/CONTACT(S):**

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**BEST PRACTICE:  
Real-Time Traffic Information****DESCRIPTION:**

These systems are designed to keep drivers informed of current traffic conditions on the road ahead. Delay information (in units of time or distance) and other messages are displayed to motorists using changeable message signs. These systems use queue length detectors, traffic sensors, and communications devices to transmit data, and calculate delay. Traffic information systems can run 24 hours a day, 7 days a week, keeping motorists informed of traffic conditions, the need to be cautious, or take an alternative route, during work zone projects.

- The Computerized Highway Information Processing System (CHIPS) relies on the queue length detector developed under the Strategic Highway Research Program. A series of variable message signs warn motorists of any slowed or stopped traffic or lane blockages ahead, as well as provide estimated length of delay, based on queue detector information. The system uses radio signals to transmit information.
- ADDCO (SmartZone) gathers data using sensors, monitors and manages traffic flow via a CCTV camera, and updates drivers with real-time information using a 6' by 3' dynamic message sign.
- ADAPTIR is a portable real-time message system that detects traffic speeds at various locations using sensors and sends data to a computer base station. A computer model is used to calculate travel delay at a set of locations. Information is displayed on changeable message boards.
- The Travel Time Prediction System (TIPS) collects real-time information on traffic flow through sensors at the roadside and uses these data to calculate estimated travel times between two points, such as from the beginning to the end of a work zone. This travel time information is then displayed on portable, electronic changeable message signs in real-time. Traffic flow is detected using microwave radar sensors, and radio communication devices transfer the data from the sensors to an onsite PC for processing into travel time estimations and then to the message signs. Sensors and radios are powered by solar panels. Radio communications devices use 220 Mhz radios for wireless communication.

**REASON(S) FOR ADOPTING:**

These systems are able to: lessen motorist frustration by informing them of what to expect and enabling them to choose alternate routes to avoid delays, reduce user costs, and increase safety (especially on highways with limited sight distance).

**PRIMARY BENEFIT(S):**

Reduced crashes, providing travelers with information on which to make alternate route decisions, and reduced motorist frustration.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Any work zone exposed to traffic. May be most useful in areas with high traffic volumes and highways with limited sight distance.

**RELATED BEST PRACTICE(S):**

Automated Data Acquisition and Processing of Traffic Information in Real-Time (ADAPTIR) (Practice J1-3)  
Portable ITS Technology (Practice J1-5)  
Portable Traffic Management System – Smart Work Zone (Practice J1-6)  
Portable ITS Technology in Work Zones (Practice J1-7)  
Portable Traffic Management System (Practice J1-8)  
Work Zone Real-Time Information System (Practice J2-4)

**STATE(S) WHERE UTILIZED:**

Illinois, Ohio

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ITS and Innovative Technology → Traveler Information

J2-3

**BEST PRACTICE:****Using the Estimated Duration of Delay on Variable Message Signs****DESCRIPTION:**

On message signs, traffic delays are communicated in terms of time (e.g., 20 minute queue ahead) instead of distance (e.g., 3 mile backup ahead). In several locations, the information is posted in real-time as sensors collect traffic data for analysis.

**REASON(S) FOR ADOPTING:**

To inform drivers of expected delays so they can change route and/or know what to expect.

**PRIMARY BENEFIT(S):**

Drivers remain calm.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All work zones.

**STATE(S) WHERE UTILIZED:**

FHWA

**SOURCE/CONTACT(S):**

Methods and Procedures to Reduce Motorist Delay in European Work Zones  
FHWA-PL-01-001 [www.international.fhwa.dot.gov](http://www.international.fhwa.dot.gov) October, 2000

ITS and Innovative Technology → Traveler Information

J2-4

**BEST PRACTICE:****Work Zone Real-Time Information System****DESCRIPTION:**

A smart work zone system was utilized on Interstate 95 north of Fayetteville, North Carolina during repair and rehabilitation. The system consisted of six speed sensors, eight changeable message signs, six cameras, one command center, one laptop, and a project website. The system incorporated roadside speed and volume sensors to detect delay/congestion. This information was then transmitted to an on-site computer via radio, cellular, or satellite for processing. Delay information was then transmitted from the computer to travelers via portable changeable message signs and a project website: [www.i95fayetteville.com](http://www.i95fayetteville.com). When estimated delay exceeded a certain pre-set threshold the changeable message signs (CMS) would automatically display a notice directing travelers to a specific alternative route. The North Carolina Department of Transportation (NCDOT) prepared this alternate route for the additional traffic by installing a traffic signal.

**REASON FOR ADOPTING:**

The system was adopted to provide the motoring public with automated, real-time traffic information in the work zone to reduce delay.

**PRIMARY BENEFIT(S):**

- Reduction of congestion associated with lane closures.
- Reduction/elimination of “rear end” crashes and fatal crashes due to excessive queuing.
- Increased productivity for the contractor.
- Improved communication with the motoring public resulting in a more positive image of NCDOT.
- Real time, credible information resulting in better compliance with suggested traveler action.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This system tends to work well on rural interstates with AADTs up to 55,000 that have available alternate routes and have high frequency of lane closures.

**RELATED BEST PRACTICE(S):**

Automated Data Acquisition and Processing of Traffic Information in Real-Time (ADAPTIR) (Practice J1-3)  
Portable ITS Technology (Practice J1-5)  
Portable Traffic Management System – Smart Work Zone (Practice J1-6)  
Portable ITS Technology in Work Zones (Practice J1-7)  
Portable Traffic Management System (Practice J1-8)  
Real-Time Traffic Information (Practice J2-2)

**STATE(S) WHERE UTILIZED:**

North Carolina

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ITS and Innovative Technology → Work Zone Control

J3-1

**BEST PRACTICE:****Automated Machine for Cone Placement and Retrieval****DESCRIPTION:**

The California Department of Transportation (Caltrans) developed and tested a machine that will mechanically place and retrieve cones, thus reducing maintenance personnel exposure to the hazards of traffic and physical exertion involved in handling the cones. The Automated Cone Machine utilizes robotics, automation, and advanced computer control to place and retrieve cones around highway work zones. The development of the machine was conducted by the Advanced Highway Maintenance and Construction Technology Center (AHMCT) (<http://www-anmct.engr.ucdavis/ahmct/>), which is jointly managed by the University of California, Davis and Caltrans.

**REASON(S) FOR ADOPTING:**

Deployment of cones is currently achieved by a person riding on the exterior of a modified vehicle. This process requires a considerable amount of manual effort and personnel are exposed to the hazards of traffic in addition to the physical exertion involved in handling the cones.

**PRIMARY BENEFIT(S):**

Benefits are expected in improved safety and operational efficiency. The advanced cone machine removes the need for a worker riding in the rear area of the truck.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Roadway maintenance on all freeways.

**STATE(S) WHERE UTILIZED:**

California

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ITS and Innovative Technology → Work Zone Control	J3-2
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**BEST PRACTICE:**

**Remotely Operated Autoflagger (Slow/Stop Sign)**

**DESCRIPTION:**

The Minnesota Department of Transportation (MnDOT) experimented with a remotely controlled Stop/Slow Sign to be used in place of a human flagger on low-speed, low-volume, 2-lane highways.

**REASON(S) FOR ADOPTING:**

The autoflagger is remotely controlled and requires only one person to operate. This effectively removes the flaggers from the traffic lane or shoulder thereby increasing their safety.

**PRIMARY BENEFIT(S):**

The remotely controlled autoflagger increases the safety of flaggers by removing them from the traffic lane or shoulder.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Use of the autoflagger is limited to low-speed, low-volume, 2-lane highways. When used for lane closures, the length of lane closure is limited to 1000 ft., and there must be adequate sight distance.

**STATE(S) WHERE UTILIZED:**

Minnesota

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ITS and Innovative Technology → Work Zone Traffic Control

J3-3

**BEST PRACTICE:****Use of 42" Flexible Cones (a.k.a. "Grabber Cones")****DESCRIPTION:**

The Ohio Departments of Transportation (ODOT) evaluation began during the 1997 construction season. As of July 31, 2001 the "weighted channelizer" was approved for use. This device is used in the "activity" area of the work zone, with drums being used on transitions/tapers. The maximum spacing allowed by ODOT is 40 feet. The weighted channelizer should not be used in the transition/taper area during night operations on highways. On low speed facilities the weighted channelizer can be used day or night, on any section of the work zone, for an unlimited length of deployment.

**REASON(S) FOR ADOPTING:**

ODOT was looking for a device to use for short-term night time setups that could be installed/torn down quickly, and could reduce the chance of driver confusion.

**PRIMARY BENEFIT(S):**

- Ease of installation/tear-down, which results in less exposure for the work crew during these periods, and reduces the chance of driver confusion.
- Ease of transportation was noticeable.
- Reduced spacing of the devices in the "activity" area presents the driver with more of a visual barrier between the travel way and the work area.
- This device takes up less storage space than drums.
- This device when placed on the road occupies less space than a conventional drum.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Temporary work zone activities on low and high speed facilities.

**STATE(S) WHERE UTILIZED:**

Ohio

**SOURCE/CONTACT(S):**

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## Best Practices Category K - Evaluation and Feedback

These best practices emphasize methods to collect and evaluate work zone data and feedback from motorists and others. Performance measures for work zone congestion/delay and safety can be used to evaluate how well agencies are meeting performance goals for mobility and safety in work zones. Encouraged are best practices that emphasize the electronic collection of work zone crash data, since this enables an agency to use automated processes to analyze the data for trends and to produce reports that can be periodically furnished to appropriate DOT offices (including, but not limited to, design and construction project personnel). Through mechanisms such as surveys, meetings, and project hotlines, motorists provide perspectives on how well their demands for mobility and safety in work zones are being met.

Examples of practices include:

- Uniform work zone definitions and work zone data for reporting work zone crashes.
- Performance measures for work zone congestion and delay that can be applied to a specific project, as well as, statewide and nationally.
- An electronic crash data collection system developed to simultaneously transmit the raw work zone crash data to the DOT.
- Collection and evaluation of before, during, and after work zone traffic flow data.
- Conduct project area-wide customer surveys to routinely evaluate work zone acceptability.

The following best practice entries relate to evaluation and feedback:

<b>Subcategory</b>	<b>Ref. #</b>	<b>EVALUATION AND FEEDBACK Best Practices</b>
K1 Data Collection/ Analysis	K1-1	Analysis of Work Zone Crash Data (Wyoming)
	K1-2	Analysis of Work Zone Crash Data (New York)
K2 Driver Surveys	K2-1	Analysis of Truck Drivers' Opinions on Safety and Traffic Control
	K2-2	Project Specific Customer Surveys on I-15 Project
K3 Equipment Evaluation	K3-1	Research Project on Lighting Configurations of Work Zone Devices and Equipment
K4 Project Review	K4-1	Traffic/Through Construction Workgroup
	K4-2	City Organized Consultant and Contractor Quality Improvement Team
	K4-3	Involvement of the Colorado Contractor's Association in Annual Work Zone Traffic Control Reviews
	K4-4	Maintenance of Traffic (MOT) Committee
	K4-5	Work Zone Safety Task Force
	K4-6	Work Zone Safety Award Program
	K4-7	Statewide Work Zone Inspection Program
K5 Studies and Analysis	K5-1	Study – "Countermeasures to Reduce Accidents in Work Zones"
	K5-2	Study – "Effectiveness of Unmanned Radar – A Speed Control Technique in Freeway Work Zones"
	K5-3	Work Zone Review Team
	K5-4	Study – "Road Construction Safety Audit Procedure"

Evaluation and Feedback → Data Collection/Analysis
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K1-1
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**BEST PRACTICE:**

**Analysis of Work Zone Crash Data (Wyoming)**

**DESCRIPTION:**

The Wyoming State Traffic Engineer monitors construction related accidents and submits an annual report to the State Construction Engineer. Data collected includes the number of crashes that occur: in detour or lane transition, while flagging is present, involving a traffic control device, involving contractor’s equipment, resulting in injuries, resulting in fatalities, in an urban area, in a rural area, during the day, and during the night.

**REASON(S) FOR ADOPTING:**

The intent of this analysis is to correct problems with accident locations as they develop and to determine accident trends and the relationship between various methods of traffic control and crashes.

**PRIMARY BENEFIT(S):**

Since this analysis is coordinated with other sections within the Wyoming Department of Transportation (WYDOT), actions (such as revising traffic control standards) can be taken to clarify/correct recurring observations. These corrective actions could involve situations in planning, pre-construction, construction, and maintenance.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

This practice/policy is applicable for all work zones.

**RELATED BEST PRACTICES:**

Analysis of Work Zone Crash Data (New York) (K1-2)

**STATE(S) WHERE UTILIZED:**

Wyoming

**SOURCE/CONTACT(S):**

Mike Gostovich, State Traffic Engineer, Wyoming DOT  
Telephone: (307) 777-4491

Evaluation and Feedback → Data Collection/Analysis

K1-2

**BEST PRACTICE:****Analysis of Work Zone Crash Data (New York)****DESCRIPTION:**

The New York State Department of Transportation (NYSDOT) compiles work zone fatalities and injury crashes based on type, area within the work zone, driver characteristic, and type of collision. This information is used to identify trends in driver behavior and work zone emphasis areas, as well as for reporting purposes to FHWA and NYSDOT in their Annual Report. The information is collected at the NYSDOT Regional level and collected and analyzed by the main office. The information is categorized in many ways including the following:

- Accident Category (fatal, hospital, minor, unknown)
- Accident Type (i.e., rear end, worker hit by vehicle, etc.)
- Work Zone Situation (i.e., alternating 1-way traffic, lane shift, etc.)
- Project Related Traffic Accidents at Flagger-Controlled Locations (i.e., head-on, sideswipe, etc.)
- Project Related Traffic Accidents Related to Project Type (i.e., bridge, pavement, maintenance, etc.)
- Project Related Traffic Accidents Related to Facility Type (principal arterial interstate, minor collector, etc.)
- Project Related Traffic Accidents Related to Driver Characteristics (age, sex, and locality)
- Project Related Traffic Accidents Related to Time of Day (daytime, nighttime, hourly, etc.)
- Accidents Involving DOT Employees (i.e., trip or fall, vehicle struck worker, etc.)
- Accidents Involving Consultant Employees
- Accidents Involving Contractor Employees (i.e., fall from elevated structure, work zone intrusion, etc.).

**REASON(S) FOR ADOPTING:**

This practice is done to identify trends and develop countermeasures to reduce the deaths and injuries associated with the accidents.

**PRIMARY BENEFIT(S):**

Reduced fatalities and injuries as a result of the countermeasures.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All New York State Department of Transportation projects.

**RELATED BEST PRACTICES:**

Analysis of Work Zone Crash Data (Wyoming) (K1-1)

**STATE(S) WHERE UTILIZED:**

New York

**SOURCE/CONTACT(S):**

Chuck Riedel, New York State DOT

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Evaluation and Feedback → Data Collection/Analysis

K2-1

**BEST PRACTICE:****Analysis of Truck Drivers' Opinions on Safety and Traffic Control****DESCRIPTION:**

This study was conducted to determine truck drivers' travel characteristics, concerns about work zone traffic control devices, and assessment of work zone features on highway work zones, as well as to determine the location of crashes and bad driving situations based on the experiences and perceptions of truck drivers.

**REASON(S) FOR ADOPTING:**

Truck drivers indicated that flaggers were blending into the orange traffic control devices. A similar study was performed a few years earlier looking at older drivers and general.

**PRIMARY BENEFIT(S):**

The study identified a number of problems, confirmed a few suspicions, and provided reassurance regarding some good practices. Flagger visibility was an issue that was immediately acted upon by changing the color of the safety vest to yellow green.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All locations. All types of work.

**STATE(S) WHERE UTILIZED:**

Illinois

**SOURCE/CONTACT(S):**

Dennis Whitehead, Work Zone Manager, Illinois DOT  
Telephone: (217) 782-3466

Evaluation and Feedback → Drivers Survey

K2-2

**BEST PRACTICE:****Project Specific Customer Surveys on I-15 Project****DESCRIPTION:**

This practice was implemented as a part of the I-15 reconstruction contract. The surveys evaluated the effectiveness of minimizing delays and enhancing the safety of work zones and began shortly after construction began. This practice basically consists of mail-out surveys and central location surveys to acquire input from the traveling public on the effectiveness of the maintenance of traffic measures utilized on the project. Changes are made if problem areas are identified by the surveys.

**REASON(S) FOR ADOPTING:**

The main reason for adopting this practice was the sheer size of the I-15 reconstruction project and the fact that it would undoubtedly impact most of the traveling public in Salt Lake City at one time or another. This practice was an effort to collect information on public opinion and reaction to the project maintenance of traffic measures, and to use it to identify problem areas, making improvements where needed.

**PRIMARY BENEFIT(S):**

Gaining extensive public input into the traffic control measures, and identifying modifications based on input received.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Large urban projects.

**STATE(S) WHERE UTILIZED:**

Utah

**SOURCE/CONTACT(S)**

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Evaluation and Feedback → Equipment Evaluation

K3-1

**BEST PRACTICE:**

**Research Project on Lighting Configurations of Work Zone Devices and Equipment**

**DESCRIPTION:**

This research project used a sequencing light that repeatedly runs across the taper.

**REASON(S) FOR ADOPTING:**

Due to problems with drivers going through the taper and into the work area at lane closures for nighttime operations such as lane closures.

**PRIMARY BENEFIT(S):**

Safer work zones.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Freeways. All types of work with a taper.

**STATE(S) WHERE UTILIZED:**

Texas

**SOURCE/CONTACT(S):**

Greg Brinkmeyer, Policy & Standards Engineer, Traffic Operations Division,  
Texas DOT

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Evaluation and Feedback → Project Review

K4-1

**BEST PRACTICE:****Traffic/Through Construction Work Group****DESCRIPTION:**

This group has been meeting for several years to discuss work zone problems and to evaluate various countermeasures and determine ways to move traffic safely. The work group includes members from Arizona Department of Transportation (ADOT) Traffic Design, Construction Operations, Roadway Design, the cities of Phoenix and Tempe, as well as local ATSSA members and FHWA.

**REASON(S) FOR ADOPTING:**

The Construction Workgroup provides a means for those most involved in traffic control to meet and discuss common problems and to resolve conflicts. The group was organized to gain valuable input from those most qualified to suggest and make decisions regarding construction operations.

**PRIMARY BENEFIT(S):**

Communication at this level between the State, cities, and the barricade companies resolves conflicts at a common level resulting in a beneficial situation for all. True partnerships are developed among the various agencies.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All types of highway work: resurfacing, reconstruction, restoration/rehabilitation, utility, etc.

**STATE(S) WHERE UTILIZED:**

Arizona

**SOURCE/CONTACT(S):**

Paul Hurst, Construction Operations Group, Arizona DOT  
Telephone: (602) 255-8544

Curt Litin, Traffic Design Group, Arizona DOT  
Telephone: (602) 255-8687

Evaluation and Feedback → Project Review

K4-2

**BEST PRACTICE:****City Organized Consultant and Contractor Quality Improvement Team****DESCRIPTION:**

This program brought together members of the contractor and consultant organizations to identify barriers to getting projects built quicker, better, safer, and at less cost. The city invited representatives from other cities to come to Phoenix to review the recommendations and to refine the process. This program was started approximately 20 years ago and is updated when applicable.

**REASON(S) FOR ADOPTING:**

The City of Phoenix realizes the impact local street construction has on neighborhoods and schools and wanted to be more responsive to their needs. If projects could be built faster, they would have less impact, be more likely to save money, and the work would likely be done more safely.

**PRIMARY BENEFIT(S):**

Less impact on the neighborhood community. Savings in construction dollars. Better relationships between the citizens, city, and the construction/consultant groups.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All streets and highways.

**STATE(S) WHERE UTILIZED:**

Arizona

**SOURCE/CONTACT(S):**

Jim Sparks, Traffic Engineer, City of Phoenix  
Telephone: (602) 262-4435

Evaluation and Feedback → Project Review

K4-3

**BEST PRACTICE:****Involvement of the Colorado Contractor's Association in Annual Work Zone Traffic Control Reviews****DESCRIPTION:**

As part of Colorado's 1997 Quality Assurance program, the Colorado Contractors Association (CCA) participated as a member in the statewide work zone traffic control review. The CCA's involvement during this inspection provided an industry perspective for the review team in addressing construction work zone practices.

**REASON(S) FOR ADOPTING:**

The Colorado Department of Transportation, and the FHWA wanted to develop a strong working relationship with the contracting industry, participation of the CCA provides valuable input on the current safety devices and procedures utilized in the industry. This allows the review team to incorporate additional findings and recommendations, simplifying standards, improving safety, and ensuring efficient traffic flow through work zones.

**PRIMARY BENEFIT(S):**

As a result of this partnership, CCA will continue to be an active member on the quality assurance review team for work zones. Participation of the CCA offers industry support, buy-in, and enhances the communication between contractors and government officials for properly maintaining traffic control on construction projects.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All types of projects. All locations.

**STATE(S) WHERE UTILIZED:**

Colorado

**SOURCE/CONTACT(S):**

Eldon Strong, Colorado Contractors Association  
Telephone: (303) 290-6611

John Ward, Colorado DOT  
Telephone: (303) 757-9592

Evaluation and Feedback → Project Review

K4-4

**BEST PRACTICE:**  
**Maintenance of Traffic (MOT) Committee**

**DESCRIPTION:**

The MOT Committee consists of a multi-discipline team made up of representatives from construction, design, maintenance, traffic engineering, safety, product evaluation, utilities, and FHWA, and sometimes members from private organizations such as Builders Associations and ATSSA. MOT Committees review, investigate, and develop recommendations (for senior management) to improve the MOT for all work zone traffic control. Issues such as pavement edge drop-off protection, MOT cost overruns, revision of specifications, and safety training are topics generally considered by MOT committees.

**REASON(S) FOR ADOPTING:**

This group provides a means for those most involved in traffic control to meet and discuss common problems and to resolve conflicts. Problem situations are discussed among those who are most qualified to suggest and make decisions.

**PRIMARY BENEFIT(S):**

The biggest benefits realized from this best practice are: 1) good input from the various offices/associations, 2) development of better policies and/or directives, 3) better information exchange and the reduction of potential problems, and 4) promotion of development of a good working relationship with other offices.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All types of facilities. All types of work.

**STATE(S) WHERE UTILIZED:**

Florida, Maryland

**SOURCE/CONTACT(S):**

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Email: [norbert.munoz@fhwa.dot.gov](mailto:norbert.munoz@fhwa.dot.gov)

Tom Conway, Florida DOT

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Email: [tom.conway@dot.state.fl.us](mailto:tom.conway@dot.state.fl.us)

Wayne Styles, Traffic Policy and Management Team Leader, Maryland State  
Highway Administration  
Telephone: (410) 787-5864  
Email: [wstyles@sha.state.md.us](mailto:wstyles@sha.state.md.us)

Evaluation and Feedback → Project Review

K4-5

**BEST PRACTICE:****Work Zone Safety Task Force****DESCRIPTION:**

This Task Force is comprised of Washington State Department of Transportation (WSDOT) Service Center and regional representatives from design, construction, maintenance, traffic, and employee safety, along with representatives from Washington State Patrol, the construction industry, local professionals, and technical engineers. The Task Force initially identified 28 recommendations with the purpose of reducing work zone impacts, including increasing safety training, better reflective gear for workers, intensified public education and outreach through the *Give 'em a Brake* campaign, and partnering with Washington State Police whose presence in work zones has greatly increased safety. The Task Force continues to meet quarterly to monitor progress with the implementation of the recommendations and to develop new initiatives.

Minnesota has had a Work Zone Safety Committee for more than 10 years. This Committee has representation from contractors, consultants, vendors, trucking industry, local government, Minnesota Department of Transportation (Mn/DOT), and the FHWA. The function of the Committee is to discuss problems, listen to comments, and make recommendations to improve work zone safety.

**REASON(S) FOR ADOPTING:**

The Task Force was initiated in response to the increase in work zone accidents and near miss traffic incidents.

**PRIMARY BENEFIT(S):**

The Task Force brings attention and focus to work zone safety with high level support. Issues are addressed by a multi-disciplined team. Numerous actions to improve work zone safety have been implemented as a result of the Task Force.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All inclusive.

**STATE(S) WHERE UTILIZED:**

Washington, Minnesota

**SOURCE/CONTACT(S):**

Brian Ziegler, Asst. Secretary Field Operations Support, Washington DOT

Telephone: (360) 705-7801

Email: [ziegleb@wsdot.wa.gov](mailto:ziegleb@wsdot.wa.gov)

Mike Robinson, District Engineer, Minnesota DOT

Telephone: (218) 723-4960

Evaluation and Feedback → Project Review

K4-6

**BEST PRACTICE:****Work Zone Safety Award Program****DESCRIPTION:**

The Minnesota Department of Transportation (Mn/DOT) has had a Work Zone Safety Awards Program in place since 1988. Originally the program was designed to recognize only contractors and public agency personnel who have put forward outstanding work zone safety efforts on construction projects. Since 1994 Mn/DOT has maintained a Work Zone Safety Awards Program for county maintenance employees as well. This program is designed to recognize those counties that put forward outstanding work zone safety efforts on county maintenance projects.

**REASON(S) FOR ADOPTING:**

This program was implemented to increase the awareness of work zone safety among counties, maintenance workers, contractors, and Mn/DOT construction personnel by rewarding those whose work demonstrates outstanding efforts in work zone safety.

**PRIMARY BENEFIT(S):**

This award program has had a very positive impact toward improving work zone safety consciousness with county maintenance and front-line workers throughout Minnesota.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All counties, contractors, and public agency personnel in the State of Minnesota are eligible to win this award.

**STATE(S) WHERE UTILIZED:**

Minnesota

**SOURCE/CONTACT(S):**

Bill Servatius, Construction Programs Coordinator, Minnesota DOT  
Telephone: (651) 296-2721

Mitch Wibee, Office of Traffic Engineering, Work Zone Specialist, Minnesota DOT

Telephone: (651) 284-3464

Email: [mitch.wibee@dot.state.mn.us](mailto:mitch.wibee@dot.state.mn.us)

**BEST PRACTICE:****Statewide Work Zone Inspection Program****DESCRIPTION:**

The New York State Department of Transportation (NYSDOT) has an aggressive safety program which has the full commitment of personnel at all levels. The safety program includes worker and traveler safety aspects. Each year a statewide survey of maintenance and protection of traffic is conducted, and approximately 25% of all active work zones are inspected. The purpose of the Statewide Work Zone Inspection Program is to gather information, which enables NYSDOT to evaluate the overall adequacy of work zone traffic control on department projects and identify areas where improvements are needed. The evaluation includes design, implementation, and maintenance of work zone traffic control and reflects the department standards, practices, and policies on a statewide basis as well as the training, knowledge, and attention to detail of project level personnel.

The NYSDOT evaluates the work zones based on a zero through five point rating system. Emphasis Points are also developed based on trends that are observed in previous inspections. A report is written up for each project that is inspected. Any project that receives a rating of three or less for daytime construction or a four or less for nighttime construction, is given a list of corrective actions that the NYSDOT Regional Office must take to bring the project into compliance. The Regional Director must also submit the steps that have been taken to improve the deficiencies that were documented during the review to the NYSDOT Chief Engineer. Training initiatives are developed each year based on deficiencies that are observed during the field reviews. Specifications are also considered when deficient areas are identified that are a result of a lack of guidance.

**REASON(S) FOR ADOPTING:**

The safety program ensures the continual improvement of maintenance and protection of traffic and workers on New York State Highways through a process of evaluating uniformity and compliance with state standards.

**PRIMARY BENEFIT(S):**

- Effective traffic control through maintenance and construction work zones.
- Steady improvement in results indicated by the survey.
- Promotion of the open exchange of ideas between Regional and Central Office personnel.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All work zones on New York State highways, with an emphasis on construction and maintenance work zones.

**STATE(S) WHERE UTILIZED:**

New York

**SOURCE/CONTACT(S):**

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Evaluation and Feedback → Study and Analysis

K5-1

**BEST PRACTICE:****Study – “Countermeasures to Reduce Accidents in Work Zones”****DESCRIPTION:**

The goal of this project was to characterize the nature of work zone accidents in Arizona. Data from Arizona’s accident records system was reviewed and analyzed, from a three-year period. The report issued recommended effective countermeasures to reduce accidents in work zones including: reduction of speed limits in work zone, police presence, speed limit enforcement, public education, proper application of signing, and increased attention to pavement marking.

**REASON(S) FOR ADOPTING:**

The frequency of work zone accidents had been identified as a problem in Arizona. Arizona had a goal to reduce the number of work zone accidents, fatalities, and injuries. This project will have a positive affect on these goals by identifying effective countermeasures for reducing work zone accidents.

**PRIMARY BENEFIT(S):**

The goal is to reduce the number and frequency of work zone accidents. This will result in fewer injuries, fatalities, and economic loss.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

All types of highways. All types of work: resurfacing, reconstruction, restoration/rehabilitation, utility, etc.

**STATE(S) WHERE UTILIZED:**

Arizona

**SOURCE/CONTACT(S):**

Arizona Transportation Research Center  
Telephone: (602) 712-3130

Evaluation and Feedback → Study and Analysis

K5-2

**BEST PRACTICE:****Study – “Effectiveness of Unmanned Radar – A Speed Control Technique in Freeway Work Zones”****DESCRIPTION:**

In 1996, the Virginia Department of Transportation (VDOT) purchased 36 drone radar devices for use in construction work zones on the Interstate system. A study was performed in 1997 that evaluated the effectiveness of the drone radar devices in slowing speeding motorists. The devices were successful in reducing the overall speeds in the selected work zones by an average of 3 to 4 miles per hour, and also reducing the speed variance of motorists traveling through the work zones.

**REASON(S) FOR ADOPTING:**

To reduce excessive speeding and speed variance through freeway construction work zones, and to increase awareness and reduce work zone accidents.

**PRIMARY BENEFIT(S):**

A slight reduction in both overall speeds and the speed variance through freeway work zones.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Urban and rural freeway roadways statewide.

**STATE(S) WHERE UTILIZED:**

Virginia

**SOURCE/CONTACT(S):**

David Rush, Senior Transportation Engineer, Virginia DOT

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Evaluation and Feedback → Study and Analysis	K5-3
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**BEST PRACTICE:  
Work Zone Review Team**

**DESCRIPTION:**

A team composed of FHWA, Kansas Department of Transportation, traffic engineers, designers, and construction personnel periodically performs an onsite scan of project work zones throughout the State. As they scan the work zones participants list positive and negative aspects of the operation. The information is shared with the appropriate construction office and further action is taken if necessary.

**REASON FOR ADOPTING:**

This enables the State to standardize work zone procedures as well as educate field personnel on acceptable work zone management.

**PRIMARY BENEFIT(S):**

Work zones through out the State are standardized, and personnel are more aware of best possible practices and procedures. Helps limit dangerous liability. Enables headquarters personnel to determine first hand what does and does not work in the field, improving work zone design in the future.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Any work zone statewide.

**STATE(S) WHERE UTILIZED:**

Kansas

**SOURCE/CONTACT(S):**

Mike Herzog, Construction/Maintenance Bureau, Kansas DOT  
Telephone: (785) 296-3576

Evaluation and Feedback → Study and Analysis	K5-4
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**BEST PRACTICE:**

**Study – “Road Construction Safety Audit Procedure”**

**DESCRIPTION:**

A road construction safety audit (RCSA) was developed for Wyoming Department of Transportation (WYDOT) to use in evaluating alternatives for rural Interstate reconstruction projects. The audit evaluates the traffic control plan, devices used, and potential strategies before an Interstate work zone is established on the roadway. The objective of the RCSA is to ensure that safety considerations have not been overlooked, and alternative devices and strategies have been considered.

**REASON(S) FOR ADOPTING:**

A formal process to select reconstruction alternatives based on a safety perspective does not currently exist.

**PRIMARY BENEFIT(S):**

With this procedure, WYDOT engineers are able to systematically compare and evaluate benefits, costs, and trade-offs of the various work zone and traffic redirection alternatives.

**MOST APPLICABLE LOCATION(S)/PROJECT(S):**

Reconstruction on rural freeways.

**STATE(S) WHERE UTILIZED:**

Wyoming

**SOURCE/CONTACT(S):**

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# Subject Index

The topics listed below are drawn from the best practices contained in the Guidebook. The subtopics provide more specific ways for identifying specific best practices that relate to areas of interest. The numbers given for each topic or subtopic are the best practice reference numbers (not page numbers).

## **Agency Work Zone Quality Improvement Strategies**

Awards and Contests

B2-10, K4-6

Committees, Steering Groups, Tours, Workshops

A2-1, A2-2, A2-4, A2-5, A3-3, B2-8, B4-2, B4-4, B4-5, B4-7, B4-8, G2-2, K4-1, K4-2, K4-4, K5-3, K5-4

Organizational Approaches, Public-Private Partnerships

A2-2, A2-4, A3-2, B1-1, D2-3, E2-1, G3-2

Strategy, Checklists, Surveys, Toolkits

C2-6, K2-2, K4-3, K4-7, G4-17

## **Analysis**

Cost Analysis

A1-1, A5-3, C2-1, C2-5

Lane Closure Analysis

A1-1, A1-3, A1-5, A4-1, C1-1, C2-6, D1-5, D2-4, E2-2

Traffic Analysis and Modeling

A2-7, A4-3, C1-1, C2-2, C2-4, C2-6, D1-2, D1-5, E2-4

Value Engineering

D2-1, E2-8, E2-9

## **Community Involvement**

Mitigating Negative Impacts on the Community

A7-1, A7-2, C1-1, G4-15, H3-2

Public Relations/Media

B2-3, B3-1, E1-5, H1-3, H2-1

Stakeholder Forums/Discussions

B1-5, E1-1, E1-2, E1-8, E1-9, E3-2, G2-2

Task Forces

A2-3, A2-5, D2-1, K4-5, K4-7

## **Constructability Reviews**

B4-4, E1-3, E1-4, E1-7, E1-8, E1-10, E1-12, E2-1, G3-1, G4-2, G4-5

**Construction Methods**

A5-1, A5-2, A5-5, G1-2, G1-5, G1-6, G4-13, G4-14, G4-18, G4-20

**Documentation Guidelines**

A2-6, A3-4, G4-5, G4-11

**Education/Outreach**

Driver Education/Training

B1-3, B1-6, H1-8

Public Outreach/Information Campaigns

B1-1, B1-2, B1-3, B2-1, B2-3, B2-5, B2-6, B2-7, B2-11, B4-9, H1-11

Staff/Contractor Education and Training

A3-2, B2-2, B2-8, B4-3, B4-4, B4-6, B4-7, B2-11, G4-12, G4-13, G5-1

**Enforcement**

A6-2, I1-1, I1-2, I2-1, I2-2, I2-3, I2-4

**Equipment**

E2-11, G1-1, G4-11, G4-13, G4-20, G4-21, J1-11, J3-1, J3-2, J3-3

**Evaluation**

A4-2, E1-6, G5-2, K2-2

**Incident Management**

A3-4, B2-4, E1-11, G2-1, G2-2, H1-5, H3-4

**Innovative Contracting**

Contract Start or Duration

A2-4, E2-7, F1-1, F2-1, F3-1, F3-2, F3-3, G4-1, G4-2, G4-14

Contract Types

B4-6, F4-1, F2-1, F4-2, G2-1, G3-2, H2-1

Lane Rental

F4-1, F4-3, B4-6, G4-16

**Multiple Projects/Corridors**

Corridor Management

D1-1, D1-2, D1-3, D1-4, D1-5

Multiple Project Coordination

A1-8, A3-1, C2-3, D1-1, D2-2, E2-1, H1-6, H2-2, H2-3

## **Public Relations**

B4-1, B4-6, H1-4

## **Research**

K1-1, K1-2, K2-1, K3-1, K5-1, K5-4

## **Traffic Management Technologies**

G4-10, G4-16, G4-21, H3-7, J1-2, J1-5, J1-6, J1-7, J1-8, J1-9, J1-10, J2-1, J2-3

## **Traffic Management/Control Planning and Application**

Applications/Implementation

A6-4, A7-2, B2-6, E3-2, G4-9, G4-15, I1-2

Checklist, Strategies, Guidance, Performance Goals

A2-6, A4-1, A4-2, A4-3, A4-4, A5-4, A6-3, C2-1, C2-3, D3-1, D3-2, D3-3, E1-6, E2-1, E2-2, E2-3, E2-11, E3-1, G4-6, G4-13, K4-3

Roles and Responsibilities

A3-3, A6-2, A7-2, E2-6, G2-1, G3-2, G4-3, H2-2, I1-1, K4-4

## **Traveler Information**

Periodic Traveler Information

B1-4, B2-9, G4-10, H1-1, H1-2, H1-3, H1-6, H1-7, H1-9, H1-10, H1-12, H2-4, H3-1, H3-4, H3-6, H3-9

Real-Time Traveler Information

B2-4, G4-15, H1-3, H1-5, H1-9, H3-3, H3-8, J1-1, J1-3, J2-1, J2-2, J2-4

## **Work Zone Lane Management**

Design for Lane Closure

A1-3, A1-9, A6-5, A6-6, D3-4, G4-15

Lane Closure Restrictions

A1-2, A1-4, A1-5, A1-6, G4-1

Managing Lane Closure

A1-8, A6-1, A6-2, E2-6, E2-11, G1-3, G4-1, G4-3, G4-6, G4-7, G4-16, J1-4

Total Closure to Reduce Construction Time

A1-1, A1-6, A1-7, E2-2, E2-4, E2-5, E2-10, H3-6

## **Work Zone Speed Management**

A4-4, G4-7, G4-11, G4-12, G4-13, G4-21, I2-3, K5-1

## **Worker Safety**

A2-3, A3-2, A5-5, A6-4, G5-3, J3-1, J3-2