T3S

Are We There Yet?

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South Carolina Transportation Technology Transfer Service

In This Issue...

Save a Tree – Electronic Delivery Options Now Available!

Fall is in the air, and T^{3}S has started planning the training calendar for 2008. 2007 was a very busy year. We offered some new courses that were very popular and also had specific requests from agencies for courses that we have offered in the past. We also offered courses in some new areas of the state, and those courses were a big success. We hope to be able to return to some of those venues next year.

T^{3}S also faced a significant challenge this year and would like to request your assistance. Our postage rate increased significantly at the beginning of 2007, and we are looking for ways to decrease that area of our budget. We currently mail over 1000 brochures for each workshop and mail approximately 1200 newsletters on a quarterly basis. Sending these items electronically would lower the dollars spent on postage and allow us to shift those budget funds into offering more workshops. Electronic mailings will also save us money on printing cost. We realize that some of you do not have the capability of receiving items electronically, and we will continue to mail copies to you as we have in the past.

If you are willing to receive our brochure and/or newsletters electronically, please visit our web site at www.clemson.edu/t3s and complete the electronic request form. You will have the option of selecting only the brochure or selecting the brochure and newsletter. A couple of advantages to receiving the brochure and newsletter via e-mail are that you will receive notification of workshops faster, and you can easily forward them to other individuals in your office who might be interested. We will send the documents in a pdf format that will allow you to print them for your accounting department for payment processing. Also, our workshops are listed on our web page and on-line registration is available for all our workshops.

We look forward to working with you in 2008. Please remember, if there is a need for a specific training course in your area, please call Sandi Priddy toll free at 888-414-3069 and let us know. We are always looking for success stories to publish in our newsletter and would love to hear from you about yours. Thank you for your continued support of T^{3}S.

SCDOT

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How Do I Conduct a Crash Study?

Crash studies help transportation engineers identify locations with safety problems, identify contributing factors, and assess potential countermeasures.

The majority of the highway system in the United States consists of two-lane rural roads. Typically, these roads carry relatively low traffic volumes; however, some of these roadways are becoming congested because of expanding urban areas, recreational travel, seasonal residencies, and special events.

According to the National Highway Traffic Safety Administration, in 2004 approximately 57 percent of all fatal crashes happened on rural roads. Approximately 90 percent of these fatalities occurred on two-lane roads. Problems on rural roads have been related to three basic causes:

1. Inadequate road geometry (e.g., width, grades, alignment, sight distance) either at specific locations or over long sections
2. Lack of passing opportunities due to either limited sight distance or heavy oncoming traffic volume
3. Traffic conflicts due to turns at access points (e.g., intersections, driveways). Widening or realigning an existing two-lane road is expensive, so as an alternative many agencies are considering low cost safety improvements which can solve many operational problems.

Crash statistics are commonly used by transportation engineers to identify locations with above-average crash occurrences or crash patterns that are a significant portion of the total crashes. Crash studies are essentially comprised of six steps:

1. Identify sites with potential safety problems
2. Characterize crash experience
3. Characterize field conditions
4. Identify contributing factors and appropriate countermeasures
5. Assess countermeasures and select most appropriate
6. Implement countermeasures and evaluate effectiveness

Identify Sites with Potential Safety Problems

The following methods can be used to identify sites with potential safety problems: crash data, traffic measures (e.g., speed studies, volume/capacity studies), field observations, citizen input, enforcement input, and surrogate measures for crashes (e.g., number of conflicts, brake activation). Crash statistics are the most common of these methods; however, they can be computed in a variety of ways. Users of crash data must understand the limitations of each approach.

For spot locations, the number of crashes is the simplest and most direct approach. Various minimum numbers of crashes are used to determine if a site is having a safety problem. For roadway sections with consistent characteristics, crash density can be used. Typically the minimum distance of the roadway section is 1 mile. Crash density is then the number of crashes per mile.

If there are considerable variations in traffic volumes throughout the road system, crash analyses using the number of crashes can result in misleading conclusions. For example, two locations can have the same number of crashes but do not reflect the same degree of hazard potential if one carries twice as much traffic as the other. To account for exposure, crash rates are used. Crash rates are the number of crashes divided by the number of entering vehicles and the number of miles of roadway. The crash rate method is presented in Figure 1. While this method is more complex, it generally provides better results.

Additional improvements to the crash statistics can be achieved using the number rate method and quality control methods. However, these methods are recommended for agencies with large complex systems and thus are not discussed herein.

Two additional crash evaluation methods that can be used are crash severity measures and crash indexes. Crash severity measures allow for more severe crashes (e.g., fatal and injury crashes) to be given more importance than less severe crashes (e.g., property damage-only crashes). An overall crash index can be used to combine different methods into a single measure. Each measure can be weighted the same or differently. The combination minimizes the weaknesses of the individual measures.

Characterize Crash Experience

Once the sites with potential safety problems have been identified, the crash experience needs to be characterized. Activities that help to characterize the crash experience include: a list of the types of crashes, a review of crash report forms, preparation of collision diagrams, and field visits. The information gathered in this step helps identify contributing factors which can be used to identify appropriate countermeasures.

Characterize Field Conditions

Next, the physical condition of the site must be investigated. The geometries of the roadway are needed as a basis for all data collected about the roadway. On-site observation by an engineer is recommended. The timing of the visit should correspond to the safety problem; thus, the visit may need to take place during off-peak periods or at night. Photographs are a good tool for documenting geometric or operational problems for later review. Condition diagrams may also be developed. Condition diagrams are scale drawings of the location of interest that show geometric and traffic control details. Traffic volume counts and vehicle classification counts are also needed. In addition, supplementary traffic studies can be employed to further define the safety problem and help identify appropriate countermeasures.

FIGURE 1

Crash Rate Method

1. Locate all crashes in accordance with accepted coding practices.
2. Identify number of crashes in each established section and at individual intersections and spots.
3. Calculate the actual crash rate for each established section during the study period.

$$\text{Rate/MVM} = \frac{(\text{number of crashes on section})\ (10^6)}{(\text{ADT})\ (\text{number of days})\ (\text{section length})}$$

(ADT is the average daily traffic. MVM is million vehicle miles.)

4. Calculate the actual crash rate for each intersection or spot during the study period.

$$\text{Rate/MV} = \frac{(\text{number of crashes at intersection or spot})\ (10^6)}{(\text{ADT at location})\ (\text{number of days})}$$

(ADT at location represents the sum of all vehicles entering the intersection. MV is million vehicles.)

5. For the same period, calculate the systemwide average crash rates for sections, intersections, and spots—using the formulas above and the summation of total crashes, total vehicle miles, and total vehicles, respectively, for each category of location.
6. Select appropriate rate cutoff values as criteria for identifying high crash locations. A value about twice the systemwide rate is usually realistic and practical.
7. If actual rates exceed the minimum established criteria, the location is identified as a high crash location and placed on the list for investigation and analysis.

Selection of cutoff value (step 6) is not as critical as it might appear. The principal purpose is to control the size of the list of locations to be investigated—a shorter list with high values, a longer list with low values. Experience will disclose the proper level for a particular agency.

Identify Contributing Factors and Appropriate Countermeasures

The next step is to determine potential countermeasures that could effectively correct or improve the situation. Countermeasures can be identified using the following sources:

- Detailed investigations of crashes
- Review of site plans
- Site visits
- Other transportation engineering studies
- Practices and previous experiences
- Technical literature

Many references are available that suggest countermeasures for certain situations including: The Institute of Transportation Engineers (ITE) Traffic Engineering Handbook, The National Cooperative Highway Research Program (NCHRP) Report 440- Accident Mitigation Guide for Congested Rural Two-Lane Highways, and the NCHRP 500 report series.

Assess Countermeasures and Select Most Appropriate

When selecting the most appropriate countermeasure the following should be considered:

1. Identify all practical countermeasures including doing nothing
2. Identify all practical combinations of countermeasures
3. Identify practical limitations and constraints
4. For each alternative identify the potential effect

Documentation of the data and process is needed.

The proposed countermeasures should be evaluated to determine which will provide the greatest return. Evaluations may be as simple as listing the advantages and disadvantages of each alternative. In contrast, a complete economic analysis using benefit-cost or cost effectiveness could be completed. Typically, evaluations involve the following six steps:

1. Estimate net crash reduction
2. Assign values to crash reduction
3. Estimate secondary benefits
4. Estimate improvements costs
5. Analyze effectiveness at each location
6. Assign program priorities

The final part of this step is to narrow down the range of possibilities to one or more measures.

Implement Countermeasures and Evaluate Effectiveness

The final step in the process is to implement the selected improvements and evaluate their effectiveness.

The Federal Highway Administration (FHWA) developed a detailed procedure consisting of the following six tasks:

1. Develop evaluation plan
2. Collect and reduce data
3. Compare measures of effectiveness
4. Perform statistical tests
5. Perform economic analysis
6. Prepare evaluation documentation

Several sources provide additional information on conducting evaluation studies.

The following four evaluation approaches are also recommended by the FHWA:

- Before and after study with control sites
- Before-and-after study
- Comparative parallel study
- Before, during, and after study

Of these techniques, the before-and-after study with control sites is considered to be the most desirable. This technique involves matching the improved sites with similar comparison sites that are not improved. By using a comparison site, the crash experience that would have been observed at the improved sites had the improvement not been made can be estimated.

The phenomenon known as regression to the mean affects the validity of a before-and-after study of a crash countermeasure. If a safety improvement is implemented at a site based on a high short-term crash experience, it is likely that even if no improvement was made the crash experience would decrease (regress to the mean). Thus, regression to the mean effects can be mistaken for the effects of crash countermeasures. Newer Empirical Bayes techniques account for the effect of regression to the mean but are more complicated.

In conclusion, the majority of the highway system in the United States consists of two lane rural roads. According to the National Highway Traffic Safety Administration, in 2004 approximately 90 percent of the fatalities that happened on rural roads occurred on two-lane roads. Crash studies can be used by transportation engineers to identify locations with safety problems, identify contributing factors, and assess potential countermeasures.

This article originally appeared in Low Cost Local Road Safety Solutions, Copyright ©2006 The American Traffic Safety Services Association (ATSSA). The Texas Transportation Institute (TTI) undertook a synthesis of existing technical research and the development of the case studies for that publication.

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Orange Barrels Full of Money

Taking the right steps for work-zone safety can be profitable for the contractor

By Scott Richert

It's hard to argue against safety. No one, especially a highway or bridge contractor, wants to be considered responsible for someone's injury or death, whether it is a crew member working on a project or a member of the general public passing through the construction zone.

The push-back usually comes in the form of an argument about the necessary level of precautions that a contractor should take. There is certainly a cost involved in safety, and in a low-margin business like construction, the urge to cut corners on up-front costs can be powerful.

But the payoff for resisting that urge is not just in the psychic benefit of knowing the right thing has been done to protect people. There is a real, quantifiable, dollars-and-cents benefit in planning for safety at the beginning of a project with every bit as much care as what goes into planning for manpower, equipment and materials. Safety and risk management are key elements to a successful project, and a successful project means not only a profit but also a good reputation and a better likelihood of more work in the future.

It's a dangerous job

Road and bridge construction is dangerous work. The statistics are compelling:

- The construction industry accounts for more than one

out of every five worker fatalities, according to the Bureau of Labor Statistics. In 2003, there were 1,126 construction fatalities;
- In 2005, 1,074 fatalities occurred from motor vehicle crashes in work zones, and more than 41,000 people were injured, according to the U.S. Department of Transportation; and
- Workers killed on the job from falls—a major concern during bridge construction—totaled 767 in 2005, according to the Bureau of Labor Statistics. Close to 40,000 were injured by falls.

The human costs are incalculable, but losses also mount in purely financial terms. A 2002 study published by the American Society of Civil Engineers found that construction workers in highway work zones suffer 27,000 first-aid injuries and 26,000 lost-time injuries per year, at a total annual cost of $2.46 billion. Motorists suffer injuries and property damages that total $6.2 billion per year.

The study's conclusion: Highway work-zone injuries per billion dollars spent on a project cost at least four times more than in total U.S. construction.

In addition, a study by Travelers of 817 fall-related claims that resulted in more than $25,000 in losses found that the average amount paid was $270,000 per claim.

Visibility is the key

Contractors operate on small profit margins. It doesn't take much to erode the bottom line. An accident in a work zone causes obvious direct costs but also takes a high toll in often-hidden indirect costs. Accidents bring work to a halt while aid is rendered, debris is cleared and an investigation takes place. Injured employees and damaged equipment may need to be replaced, while co-workers may become less productive because of distractions and morale problems. None of this is conducive to staying on the tight schedule that is usually required to make a profit on a construction job.

The aftermath of an accident often includes expensive lawsuits and could ultimately drive up insurance rates. Deductibles are an immediate cost for contractors, but the ripple effect of having a record of major claims against insurance lasts long after the immediate job is completed. In fact, one of the best defenses against liability claims is a good safety management record that demonstrates that risks are kept at a minimum. Those contractors who manage risk poorly will pay more in the long run.

It can be easy to lose sight of the immediate impact when the numbers are big—$8.66 billion a year industry-wide, according to the Practice Periodical on Structural Design and Construction—or when the costs are to be paid in the future.

Just one low-end example from the chart: If a project is bid with a 4% profit margin and an accident causes $10,000 in direct and indirect costs, $250,000 worth of work has to be performed to break even. That's a quarter of a million dollars worth of work just to cover the fallout from what may be a fairly insignificant injury.

Three losses to gain

Careful planning before a project begins is necessary for an effective risk-control program. Such a program will include three levels for action:

- Loss Prevention: This area of the program focuses on reducing the probability of accidents through establishing safety and risk-management procedures, ensuring proper equipment selection and maintenance and providing effective employee and supervisor training;
- Loss Minimization: The impact of an accident can be minimized by ensuring workers with first aid and CPR training are available, creating an emergency action plan, providing for an accurate flow of information and establishing a protocol for quick response by emergency personnel; and
- Loss Reduction: After an accident has occurred, losses can be reduced by planning ahead for alternative ways of continuing work, providing the best medical care

possible, managing workers' compensation claims effectively and creating contingency plans.

In addition, it is important that all levels of a company play a role in implementing risk management. Top management should show ownership by establishing safety as a priority and making sure that dedication to risk control is visible. By integrating risk control into all parts of the business, identifying management problems and correcting them and earmarking the required investment for effective safety policies and equipment, management can display its commitment.

Middle managers and site supervisors are responsible for creating a safety and loss-prevention environment, integrating risk control into their jobs, providing training and orientation for new employees, responding to employee safety concerns, performing jobsite inspections and being trained in hazard recognition and abatement.

Employees should demonstrate a safe work attitude, follow established policies and procedures and know the hazards and abatement issues in their work area.

Safety areas

Each construction site has its own risks and challenges, so good safety planning begins with a careful assessment of the specific job and its possible hazards. The following are three situations that offer opportunities to enhance safety. Highway work zones: whenever construction activity exists side by side with road use, there is the potential for accidents. Controlling road use through a construction zone is essential for safety. Priorities should include:

- Inhibiting traffic flow as little as possible. When drivers proceed smoothly through an area, there is less chance for human error;
- Guiding motorists with clear signs, markings and other information that is easy to see and understand;
- Inspecting the work zone day and night to ensure conditions have not changed (damaged signs, missing cones, etc.);
- Training all workers, including flaggers, to operate in a safe manner; and
- Reviewing specific work to be done, potential hazards and risk mitigation plans at the beginning of each work shift.

Fall management for bridge projects: each project should begin with preplanning to identify all fall hazards and controls that will be used. Supervisors and workers should review daily work with a particular focus on hazards and how they will be mitigated.

Work areas should be kept clear of debris, and cords should be taped down or hung off the ground so that people can walk and work without tripping. Instilling in employees the importance of safety and encouraging them to watch out for each other is vital.

Finally, it is important that a rescue procedure be identified, employees be drilled on its use and any necessary equipment for implementation be available at the jobsite.

Equipment operation: contractors already know that a job goes easier when the right equipment is used. But it also is important to have the right operators who are familiar with the capabilities and limitations of the specific equipment.

While some equipment operators are regulated, others are not, but that does not mean a contractor should let down his or her guard. For example, federal OSHA regulations require a forklift operator to be certified through specialized training and that certification must be renewed every three years. However, in some states, crane operators are not required to be licensed or certified. Currently, several national organizations are advocating for the certification of crane operators. If successful, such certification will include safety training on how cranes should and should not be used, the dangers of exceeding manufacturer's specifications and other key information.

Until such certification exists everywhere, contractors should ensure that operators have experience with both the equipment and the type of construction project that is being undertaken. It is just one more step in making sure that a job goes smoothly and safely.

Best record wins

Safety is an area where contractors can do well by "doing good." Besides recognizing that managing risk is the right thing to do for fellow human beings, the best contractors know that their reputation and record are just as important in winning jobs as their bid.

Project owners are interested in contractors who perform well, avoid delays, and deliver what they promise.

Good safety management provides the right environment for productive workers to complete high-quality projects on time. The smart contractor pays attention to safety and knows that the payoff will be reflected in the bottom line.

Richert is a construction-risk control field manager, Midwest Region, for Travelers.

Source: Safety 2006 *June 2007 Volume: 2 Number: 1*

The World of a Traffic Engineer

By Bradley Dicola

Traffic engineering includes a wide array of topics and issues, many of them very close to home to the everyday citizen. It is not always understood, however, what exactly a traffic engineer does.

Traffic engineering exists within the larger context of transportation engineering. Transportation engineering deals with the planning and design of all transportation systems, including air, rail, water, and roadway. This may include the design of airports, ports and harbors, canals, rail lines, transit systems, roadways, and multi-use paths. Traffic engineering provides for safe and efficient movement of pedestrians, bicycles, and motor vehicles. This is done through traffic signals, signs, and markings. Similar positions that may overlap with traffic engineers include traffic and transportation planners and highway engineers. (Note that the title of traffic engineer and highway engineer are often interchanged with one another, depending upon the nature of the work and the organization of the agency.)

According to the Institute of Transportation Engineers Yearbook, traffic engineering is defined as follows:

> Traffic Engineering is that phase of engineering which deals with the planning, geometric design, and traffic operations of roads, streets, and highways, their networks, terminals, abutting lands, and relationships with other modes of transportation for the achievement of safe, efficient, and convenient movement of persons and goods.

This definition provides an idea of the diversity of topics and disciplines in which the traffic engineer is involved—everything from safety studies to intersection improvements to congestion relief. The role that traffic engineers play in the operation of our transportation system is vital to national mobility, economic growth, and traffic safety. Traffic engineers everywhere face new challenges, as it becomes more difficult to add capacity by way of additional roadway construction. Traffic operations solutions, including intelligent transportation systems (ITS), need to be utilized to provide the continued efficient movement of goods and people.

Safety

Safety is a priority for every traffic engineer. Traffic engineers are concerned with signs, markings, and signals; establishing speed limits; and evaluating sight distance—just to name a few of the areas. Traffic engineers also evaluate troublesome roadway locations, analyze crash histories, and evaluate countermeasures to improve safety.

Traffic Operations

Traffic engineers are also heavily involved in traffic operations, which focuses on making roadways more

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Safety Zone

FHWA Guidance Available on Implementing the Updated Work Zone Safety and Mobility Rule

To help State transportation agencies meet the challenge of maintaining work zone safety and mobility while performing needed rehabilitation and reconstruction work on the Nation's roads, the Federal Highway Administration (FHWA) has issued a collection of four guides:

- Implementing the Rule on Work Zone Safety and Mobility (Pub. No. FHWA-HOP-05-065).
- Work Zone Public Information and Outreach Strategies (Pub. No. FHWA-HOP-05-067).
- Work Zone Impacts Assessment: An Approach to Assess and Manage Work Zone Safety and Mobility Impacts of Road Projects (Pub. No. FHWA-HOP-05-068).
- Developing and Implementing Transportation Management Plans for Work Zones (Pub. No. FHWA-HOP-05-066).

Available online at www.ops.fhwa.dot.gov/wz/resources/final_rule.htm, the guides provide assistance in understanding and implementing FHWA's updated Work Zone Safety and Mobility Rule, which was published in the Federal Register in September 2004. The rule applies to all State and local governments that receive Federal-aid highway funding. Transportation agencies were required to comply with the provisions of the rule by October 12, 2007.

The overarching goal of the rule is to reduce crashes and congestion in and around work zones. Provisions in support of this goal encourage agencies to consider work zone safety and mobility impacts both early on and throughout the project delivery process and to expand work zone planning beyond the project work zone itself to address corridor, network, and regional issues. The updated rule also advocates expanding work zone management beyond traffic safety and control to encompass broader solutions that address the need for continued mobility during road construction.

Implementing the Rule on Work Zone Safety and Mobility includes a general overview of the rule, a look at differences between the updated rule and the former rule, sample approaches to implementation, examples of State transportation agency practices that relate to the rule's provisions, and sources for more information. Also featured are sections on developing and implementing a work zone policy, implementing agency-level processes and procedures, and developing and implementing transportation management plans (TMPs), which are required for all Federal-aid highway projects. Among the State examples highlighted is the California Department of Transportation's use of three categories of TMPs based on the expected work zone impacts of projects. The Ohio Department of Transportation, meanwhile, uses a work zone traffic management policy that includes a Permitted Lane Closure Map. The map provides a schedule of times when lanes can be closed on Interstates and other freeways.

Work Zone Public Information and Outreach Strategies addresses the use of public information and outreach as a work zone management tool. The guide includes sections on identifying the target audience, building partnerships, designing communications strategies, developing a campaign message, and working with the mass media. The guide also features examples of successful work zone public information and outreach campaigns used by transportation agencies. For example, in Santa Cruz, California, visually-impaired pedestrians were specifically targeted in the outreach campaign for a work zone that affected downtown sidewalks. And during the I-65 construction project in Kentucky, which involved full road closure on weekends, outreach was targeted to commercial truck drivers. This included publicizing project details and alternate routes in a direct mailing to trucking companies, in trucking industry publications, and on the CB radio network.

Guidance on evaluating work zone impacts is provided in Work Zone Impacts Assessment: An Approach to Assess and Manage Work Zone Safety and Mobility Impacts of Road Projects. "Many agencies already perform certain aspects of work zone impacts assessment. This guide reemphasizes them and puts them in the context of an overall approach for conducting comprehensive work zone impacts assessment and management," says Tracy Scriba of FHWA. "The approach presented in the guide incorporates additional concepts and principles advocated by the updated rule, such as in the areas of transportation operations, public information, and performance assessment." The assessment process follows the typical program delivery process of transportation agencies, including systems planning, preliminary engineering, design, and construction, as well as the ongoing activities of performance assessment, system management, and maintenance and operations.

The guide's appendices include a real-world example of how the work zone impacts assessment conducted by the Virginia Department of Transportation for its Woodrow Wilson Bridge project outside of Washington, DC, fits into the assessment process described in the guide. This assessment focused on the reconstruction of the I-495/ Route 1 Interchange as part of the bridge project.

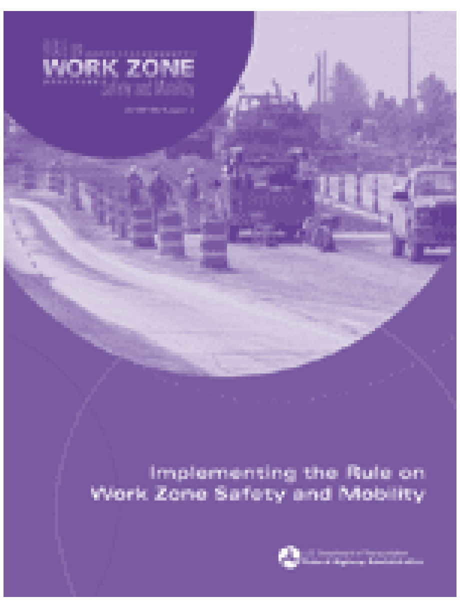
Developing and Implementing Transportation Management Plans for Work Zones looks at how coordinated transportation management strategies can be used to manage the work zone impacts of a road project. These strategies include temporary traffic control measures and devices; public information and outreach; and such operational strategies as travel demand management, signal retiming, and traffic incident management. The scope, content, and level of detail of a TMP can vary based on an agency's work zone policy and the anticipated work zone impacts of the project. A well-designed TMP can help agencies:

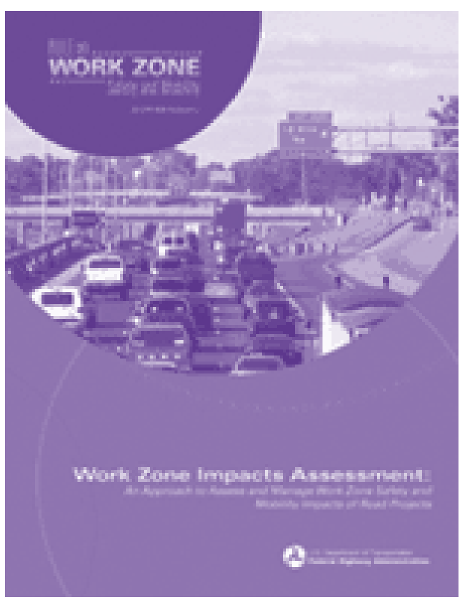
- Address the broader safety and mobility impacts of work zones at the corridor and network levels.
- Promote more efficient and effective construction phasing and staging, minimize the duration of contracts, and control costs.
- Improve work zone safety for construction workers and the traveling public.
- Minimize the traffic and mobility impacts of a work zone.
- Improve public awareness and minimize complaints from the traveling public and local businesses and communities.
- Minimize circulation, access, and mobility impacts to local businesses and communities.

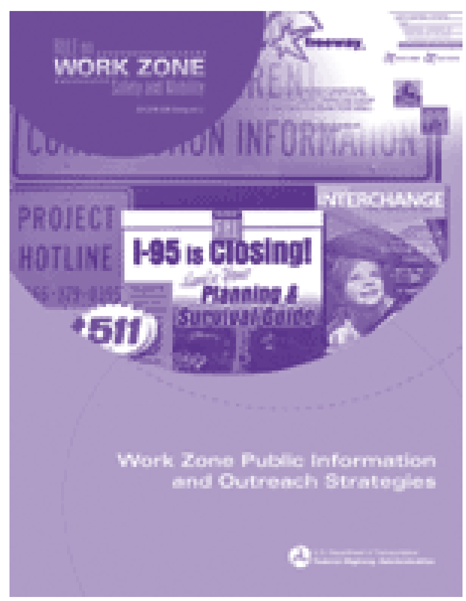
The guide includes sections on TMP development, implementation, and assessment; potential TMP components; transportation management strategies for work zones; and examples of current TMP use. Also included are appendices that contain a TMP components checklist and a work zone management strategies matrix.

In addition to the online versions of the guides, printed copies are available at no cost. To request a printed version, send an email to workzonepubs@dot.gov with the title of the publication, quantity needed, and shipping instructions. The guides will also be available on CD this summer. The CD will include such additional resources as an implementation checklist, frequently asked questions, work zone public information and outreach campaign framework templates, TMP components checklist, work zone management strategies matrix, and a flow chart illustrating how the rule applies to the project delivery process. The CD will also feature a brochure and four fact sheets on implementing the rule.

For more information, contact Tracy Scriba at FHWA, 202-366-0855 (email: tracy.scriba@fhwa.dot.gov), or visit www.ops.fhwa.dot.gov/wz/resources/final_rule.htm.







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efficient. By studying traffic operations, traffic engineers can develop signing, marking, and signaling schemes that allow traffic to flow more effectively. As traffic engineers become more knowledgeable about traffic patterns, vehicles move more smoothly, and congestion is reduced or eliminated without constructing more roads. Traffic operations are particularly important in urban areas that are facing congestion problems and find it cost-prohibitive to construct new capacity. Traffic operations includes the effective design and maintenance of traffic signals and signal systems, as well as the implementation of ITS technologies to provide for better traffic flow and transportation system utilization. The core goal of traffic operations analysis is to maximize the safe movement of vehicles through the existing roadway network in the most efficient manner possible.

Planning

Planning is another area of involvement for traffic engineers. Quantifying the current state of the roadway system is important to determining potential future needs in the transportation network. Traffic engineers are often responsible for making sure that speed, volume, crash, and other data are continuously collected and properly documented. The data collected serves as an important factor in determining the need for new projects and their priority in funding.

Traffic engineers also assist planners in determining the traffic impacts of new development. Traffic engineers face a wide variety of challenges and must be familiar with several different fields of work such as traffic law, driver psychology, and human perception. The ability to perform these tasks well is important to the efficiency and safety with which goods and people travel.

How Can Traffic Engineering Expertise Benefit Locals

Most West Virginia municipalities do not have a traffic engineer on staff, yet are faced with issues such as traffic congestion, lack of parking, and troublesome intersections. Municipalities often get calls from citizens complaining of speeding vehicles and high traffic volumes in their neighborhood. A traffic engineer can help the municipality by setting out traffic recorders to gather speed and volume data and analyzing the information collected.

Another request that municipal street departments get is requests for stop signs. Often the public and city council request the installation of stop signs, thinking that they are the solution to speeding problems. A traffic engineer can help determine if indeed a stop sign is the best option or if other alternatives should be used.

Many West Virginia towns and cities are not designed to be both pedestrian and motorist friendly. Hilly terrain, narrow streets, and narrow sidewalks or lack of sidewalks are just a few of the challenges faced by motorists and pedestrians. A traffic engineer can help assess the situation and suggest ways to accomodate motorized and non-motorized modes.

The WV LTAP is fortunate to have a traffic engineer on staff and is available to provide on-site technical assistance to the community.

TYPICAL ACTIVITIES OF A TRAFFIC ENGINEER

1. Conducting traffic impact studies, including conducting traffic counts and analyzing data
2. Designing roadway intersections and parking lots
3. Determining feasibility and best practices for traffic calming devices
4. Analyzing crash data, determining causes of crashes and selecting countermeasures
5. Enhancing traffic operations

Information Request and Address Change Form

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Free Publications!

We are currently working to update and re-organize the T^{3}S video library. During the reorganization process we have found that we have several copies of some publications. If you would like to obtain any of the following publications for your agency library, please complete this form and fax it to 864-656-2670. These will be available on a first come, first served basis free of charge!

☐ *Shorter Duration, Safer Work Zones, More Satisfied Travelers*, FHWA—Brochure, Successful applications of full road closure in work zones.

☐ *Pedestrian and Bicyclist Intersection Safety Indices*, FHWA—Results of data collected on pedestrian and bicycle crashes, conflicts, avoidance maneuvers, and subjective ratings of intersection video clips by pedestrian and bicycle experts.

☐ *Field Guide for Inspecting Signalized Intersections to Reduce Red-Light Running*, FHWA—Suggest a procedure for conducting an investigation of a specific intersection that has been identified as a red-light running problem sight.

☐ *FHWA Road Safety Audit Guidelines*, FHWA—This publication provides a foundation for public agencies to draw upon when developing their own safety audit policies and procedures. Intended for policy makers, RSA teams, designers, planners, operations and safety analysts, and project managers.

☐ *Maintaining Traffic Sign Retroreflectivity: Impacts on State and Local Agencies:* FHWA—Analyzes the impacts that might be expected from the adoption of proposed minimum maintained retroreflectivity levels for traffic signs to improve night visibility.

☐ *Synthesis of the Median U-Turn Intersection Treatment, Safety, and Operational Benefits*: FHWA—This synthesis summarizes the advantages and disadvantages of the MUTIT compared to conventional, at-grade- signal-controlled intersections with left turns permitted from all approaches. Design guidelines are presented including the location and design of median crossovers on major roads.

☐ *Good Practices: Incorporating Safety into Resurfacing and Restoration Projects*, FHWA—This report identifies a set of common issues host agencies confronted in developing integrated resurfacing-safety improvement programs, and also observed a set of common success factors.

☐ *Innovative Intersection Safety Improvement Strategies and Management Practices: A Domestic Scan*, FHWA—Innovative treatments and practices that have been successfully implemented in the United States to improve intersection safety.

☐ *Low Cost Treatments for Horizontal Curve Safety*, FHWA —Provides practical information on low-costs treatments that can be applied at horizontal curves to address identified or potential safety problems.

☐ *Context Sensitive Roadway Surfacing Selection Guide*, FHWA—Documents the available options for roadway surfacing, and provides a decision-making process to allow consideration of all conventional engineering design factors.

☐ *Guidelines for Using Prime and Tack Coats*, FHWA—A publication for project development and field personnel to provide decision making guidance on how to use, when to keep, and when to eliminate prime and tack coats.

SPEED BUMP **Dave Coverly**

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