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Road TTAP Talk

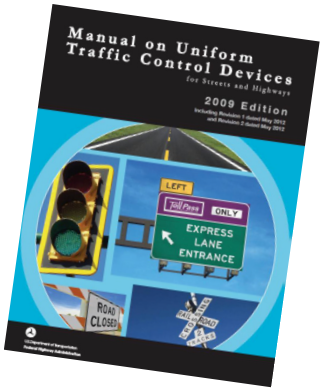
FHWA Publishes Revisions 1 and 2 to the 2009 MUTCD

by Matt Cate, P.E.

On May 14, 2012, the Federal Highway Administration (FHWA) published two final rules that may significantly change the timeline for implementation of many recent changes in the Manual on Uniform Traffic Control Devices (MUTCD). The first rule clarifies the definition of Standard statements in the MUTCD and addresses the role of engineering judgment and studies in the application of traffic control devices. The second rule eliminates many of the mandatory compliance dates detailed in the MUCTD's Introduction, leaving only four revised dates and eight existing, safety-critical dates in effect. This rule also adds a new Option statement exempting historic street name signs within a locally identified historic district from the Standards and Guidance statements in Section 2D.43, including requirements for retroreflectivity or illumination. These final rules became effective on June 13, 2012, and are incorporated into the 2009 MUTCD as Revisions 1 and 2, respectively.

Revision 1

Revision 1 addresses concerns raised by many agencies and organizations that the 2009



Edition of the MUTCD severely limited or even eliminated the opportunity to apply engineering judgment stating that "Standard statements shall not be modified or compromised based on engineering judgment or engineering study." Revision 1 to the 2009 MUTCD removes this sentence from the Standard definition (Section 1A.13, paragraph 01, Item A).

The revision also adds new language to Section 1A.09 regarding the use of engineering judgment. Specifically, the following text (Section 1A.09, paragraph 03) was added to provide further clarification regarding the role of engineering judgment in application of the MUTCD:

The decision to use a particular device at a particular location should be made on the basis of either an engineering study or the application of engineering judgment. Thus, while this Manual provides Standards, Guidance, and Options for design and applications of traffic control devices, this Manual should not be considered a substitute for engineering judgment. Engineering judgment should be exercised in the selection and application of traffic control devices, as well as in the location and design of roads and streets that the devices complement.

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From the Director

I'm writing this issue from a hotel room in Beijing, China. You're probably wondering what that has to do with TTAP activities. My trip is actually to examine rail related investments and research activities in several eastern countries—interests that fall under another hat that I wear. However, I always like to take a look at highway infrastructure when I'm traveling. It's interesting to look at how things are done and consider possible ideas we could import. So far I can say that China's freeway system is impressive—very similar to ours (which probably served as a model) —and they're doing some interesting things with signals and technology. However, the local street system, at least in the large cities, seems overburdened with traffic. Rush hour in Tennessee's major cities does not even come close, thankfully, to what I'm seeing here. Despite the heavy traffic, drivers seem very polite and you see a lot of courtesy and little use of horns, vulgar gestures, and other signs of frustration. Interesting!

Leaving the oppressive heat wave we've experienced these past several weeks in Tennessee is a side benefit of my travels. Growing up in South Carolina, I remember a lot of summer days with temperatures (and humidity) over 100, but I guess my blood has thickened up in the many years I've lived in Tennessee. It sure has seemed hot, and much of the state did have record setting highs! Pretty soon I reckon we'll be hearing this is evidence of global warming. Somehow, though, I think it's just a good old hot summer. I've had several projects requiring me to be outside a good bit. While it's been an ordeal, everybody survived by taking sensible steps to work safely. I hope you do the same.

While we've been working through the heat, our lawmakers in Washington have been busy. Much to my surprise (and many others, too), Congress worked through the issues and produced a surface transportation bill. The President quickly signed it, so we're in business, at least for a two year period. Everybody involved with highway transportation put a lot of pressure on our lawmakers to get something done, since this was long overdue. I'm still pouring through the bill's language, so I can't comment on what was produced. Perhaps by the time you read this, you'll have seen an in-depth analysis. I will say that it's a bit of a disappointment to me that the bill was not for a longer period. We'll see another act of this political theater in a year or so.

Well, I guess I'll wrap up with those comments. As always, please don't hesitate to call us for assistance. That's what TTAP is all about. Until next time, stay cool!

Speed Limits

by Dr. Airton G. Kohls (Text extracted from the FHWA – Speed Concepts Informational Guide)

Government agencies, mostly at the state, county and local levels, own and operate approximately four million miles of roads and streets in the U.S. Through road ownership and construction, statutes, traffic regulation and enforcement, government agencies create the physical and legal driving environment. Not all drivers respond in the same way to the same driving environment and these differences extend to speed selection. An understanding of speed issues requires some basic insights of agency functions and human behavior in a regulated environment.

Before a new road or street is built, plans are prepared by engineers. Except for minor streets and roads, the design process considers speed by adopting a designated design speed. The road is then constructed in accordance with the design plans and put into service for the motoring public, which is regulated by a set of laws and regulations, including an established speed limit.

Planning and Design of Roads and Streets

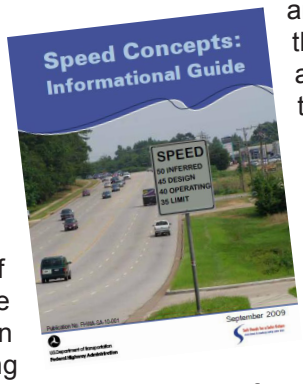
Roadway geometry is one of the informal information sources that drivers interpret when selecting a speed. However, roadway geometry can provide deceptive, conflicting and confusing speed cues. This is unfortunate but true and because the existing network is so extensive, substantial modifications are often impractical.

The AASHTO Policy on Geometric Design of Highways and Streets or the "Green Book" is the dominant reference publication for geometric design in the U.S. and its application involves selecting a "design speed." The definition of design speed has changed over time but the way it is used in the design process has not. The Green Book guidance on designating design speed does not address speed limits. The Green Book recommends that topography, anticipated operating speed, adjacent land use and functional classification be considered and as high a design speed as practical be selected, except for local streets. The selected (designated) design speed is used explicitly to determine:

- minimum sight distances.
- minimum horizontal curve radii.
- maximum grade.
- minimum rate of vertical curvature.
- minimum width of selected roadway cross section features.
- superelevation rate.
- maximum gradient.
- roadside clearance.
- freeway nose taper.
- acceleration/deceleration lane length.

The Green Book provides minimum or limiting values for the design criteria. It also recommends "above-minimum design values should be used, where practical." The underlying rationale for this guidance is that above-minimum features will safely accommodate a condition beyond the assumed parameters. Historically, this was thought to be "conservative" and consistent with other engineering disciplines that use factors of safety to intentionally "over design" critical components. The direct effect of utilizing above-minimum design elements is that it affords drivers greater comfort to travel at higher speeds and, thereby, leads to an "inferred" design speed greater than the designated design speed that may be inappropriate for surrounding conditions.

Frequently, roads and streets designed for a particular speed appear suitable for much higher speeds. Drivers read the road, not the design plans. What was contemplated by the designer as a factor of safety (with respect to the designated design speed) is often negated by driver speed choice. Landscape, development, perceived conflicts, and intersections also contribute to the driver's selection of speed. Just as selecting a design that is higher than necessary is inappropriate, it is also inappropriate to select a lower design speed if other cues will lead drivers to select a speed that is too high for the design geometry. We do not want the highway geometry to be a surprise to the driver.



The use of AASHTO policy is only mandatory in the design of roads that are part of the National Highway System, which includes all Interstate highways and other selected arterial highways. For other roads and streets, state DOTs and local government units (i.e. counties, cities, boroughs, towns), have the discretion to develop and apply the geometric design process and criteria they consider most appropriate. State DOTs use design processes and criteria that are the same or similar to AASHTO's. Local agency practice varies widely, with larger agencies typically adopting policies similar to their state DOTs, and therefore those of AASHTO. Local governments with limited roadway responsibilities (i.e., limited mileage and no arterials) may use very simple guidelines, such as those incorporated into

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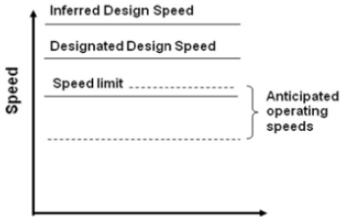
subdivision regulations. These guidelines typically assume low, but unspecified, speeds. Minimum or typical values are provided for features such as curve radii, grades and cross section features, without reference to a design speed.

Government agencies exercise control over the planning and detailed design of roads and streets, either by performing these functions or approving the work of consultants and third parties, such as developers. The current design process includes consideration of speed. However, the design speed process and AASHTO guidance often lead to inferred design speeds far in excess of the designated design speed. Further, many roads and streets were not designed for any particular anticipated speed, either because they predate the design speed method or the jurisdictional agency uses a different approach. The net result is that the geometric features of roads and streets have not been designed to encourage a predetermined operating speed. In fact, many aspects of the geometric design process are suspected of encouraging operating speeds higher than the design speed and higher than desirable.



Typical speed relationships contemplated by design process.

Establishing Speed Limits and Advisory Speeds

Speed limits are set in one of two ways: (1) determined specifically for a particular road or segment on the basis of an engineering study and displayed as a posted speed on a regulatory sign, or (2) a statutory speed limit that applies in the absence of a posted speed. Statutory speed limits are set forth in state laws. Often, more than one statutory speed limit applies within a state. For example, one speed limit may apply everyplace except within urban areas for which a different and lower limit applies. Once again, the authority to establish speed limits varies by jurisdiction and can include elected bodies, state DOTs and local transportation, public works and police agencies.

Posted speeds must be reasonable. Speed limits are only meaningful if the majority of motorists comply voluntarily and that occurs only if a speed limit is reasonable. An engineering study made in accordance with established traffic engineering practices should be conducted as part of setting a posted speed (MUTCD 2B.13); this is required in many states. A universal process for conducting these studies does not exist. As shown in the table below, different agencies often consider different factors. Different studies with similar circumstances may sometimes lead to a different speed limit. However, any such difference should be relatively minor since the 85th percentile speed is a dominant factor in establishing posted speeds. The MUTCD indicates that posted speeds "should be within 5 mph of the 85th-percentile speed of free-flowing traffic."

State or local officials often receive citizen requests for speed limit reductions because of perceived excessive speeds. However, research has shown that changes in posted speeds have little effect on operating speeds.

Setting and Enforcing Rational Speed Limits

The management of speed through appropriate speed limits is an essential element of highway safety. Appropriate speed limits are a prerequisite for effective and sustainable speed management. Speed limits should reflect the maximum reasonable speed for normal conditions. Speed limits should be accepted as reasonable by most drivers. Not all drivers will conform to reasonable speed limits. In essence, speed limits separate high-risk and reasonable behavior. If lower speed limits are desired, then engineering and other measures should be implemented that reduce speeds to a level that would support a lower limit.

Primary factors used to establish posted speeds

Factor	Percent time used	
	By state agencies	By local agencies
85th percentile speed	100	86
Roadside development	85	77
Accident experience	79	81
10 mph pace	67	34
Roadway geometrics	67	57
Average test run speed	52	34
Pedestrian volumes	40	50

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Speed Limits, *continued from page 4*

National Highway Traffic Safety Administration (NHTSA) and Federal Highway Administration (FHWA) jointly support efforts to demonstrate and evaluate an integrated "three E's" (engineering, enforcement, education) approach to the management of speed and crash risk. Rational speed limits are established on the basis of an engineering study of prevailing speed and other factors such as pedestrian activity and crash history. The 85th percentile speed is typically used as a starting point for setting a rational limit but it may be set as low as the average speed based on other factors, such as those listed earlier. Once the speed limits are appropriately set and the judiciary informed, a program of strict enforcement with a low tolerance for speeds exceeding the limits is combined with public information and education explaining the purpose of the revised limits and the consequences for violators. Evaluation of program effectiveness is a critical element of the demonstrations.

The full document "Speed Concepts Informational Guide" is available at: http://safety.fhwa.dot.gov/speedmgt/ref_mats/fhwasa10001/fhwasa10001.pdf

Did You Know?

by Dr. Airton G. Kohls

There are many web-based sources of information that help you be prepared and to excel on your everyday job. For example:

FHWA – Office of Infrastructure - http://www.fhwa.dot.gov/infrastructure/ including resources on:

- Asset Management
- Construction
- Design
- Federal-aid Program Administration
- Pavements
- Bridges
- Special Federal-aid Funding
- Structures
- System Preservation

FHWA – Office of Safety - http://safety. fhwa.dot.gov/ including resources on:

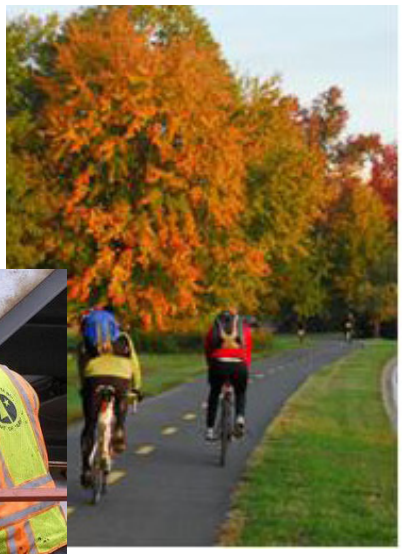
- Highway Safety Improvement Program
- Intersection Safety
- Local and Rural Road Safety
- Pedestrian and Bicycle Safety
- Roadway Departure Safety
- Speed Management Safety

Hazards to Outdoor Workers - http://www.cdc.gov/niosh/topics/outdoor/ including resources on:

- Heat Stress
- Hazard and Exposures
- Diseases and Injuries
- Chemicals
- Emergency Preparedness and Response

Best Practices Handbook for Roadside Vegetation Management - http://www.lrrb.org/pdf/200820.pdf

NCHRP Cost-Effective and Sustainable Road Slope Stabilization and Erosion Control - http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_430.pdf



Traffic Signal Management and Operations - Room for Improvement

*by Dr. Airton G. Kohls (*Information summarized from the NTOC 2012 National Traffic Signal Report Card)*

The National Transportation Operations Coalition released the 2012 National Traffic Signal Report Card in a continuous effort to bring more attention to the importance of and investment in traffic signal management and operations. The first and second National Traffic Signal Report Cards were released in 2005 and 2007 and assigned national scores of D- and D, respectively. The 2012 National Traffic Signal Report Card score has improved slightly to an overall D+, but is meaningful in demonstrating progressive improvement to programs that support management and operations of traffic signals. The report card supports the national initiative to raise awareness with transportation agencies, agencies' policymakers, and the public, and to bring attention to the benefits of strategic investment in improved management and operations of traffic signals.

Ensuring that traffic signals are properly timed and maintained should be a key priority at public agencies. Improving traffic signal operations can have a significant immediate impact on transportation system efficiency, potentially more than any other operational measure in the traffic engineering toolkit. One of the most important elements available to public agencies to achieve significant improvement is the proactive, performance, and objectives-based management of their traffic signal operations program. The signal assessment was divided into five topic areas identified as necessary for good signal operations. They were graded as follows:

- Management – **D**
- Traffic Signal Operations – **C**
- Signal Timing Practices – **C**
- Traffic Monitoring and Data Collection – **F**
- Maintenance – **C**

Key Strategies by Area

Management

- Field infrastructure reliability.
- Accommodation of planned and unplanned events, incidents, roadway construction, weather.
- Projects are developed systematically and linked to objectives.
- Develop a process to align signal timing that is appropriate to current traffic demand.

Traffic Signal Operations

- Select mode of operation and pursue strategies that are consistent with traffic demands and objectives.
- Utilize a systematic process to implement advanced operational strategies.
- Use signal timing review to direct data collection requirements.

Signal Timing Practices

- The mode of operation (coordinated, isolated) and operations strategy (free, time-of-day, traffic responsive, adaptive) and signal timing parameters (cycle, split, offset, and phase settings) are developed and implemented in consideration of measured or predicted traffic demand and operations objectives.

Traffic Monitoring and Data Collection

- A documented process is in place to provide information about the systems performance relative to operations objectives.
- Traffic monitoring and data collection needs are considered during the planning, design and operations of traffic signal facilities.

Maintenance

- Develop and utilize contingency plans and implement maintenance strategies to minimize disruptions to traffic signal operations in the context of resources and capability.
- Maintain an inventory of maintenance records, schematics, documentation for all traffic signal control equipment.
- Develop and utilize a process to evaluate equipment reliability and schedule maintenance activity.
- Conduct preventive maintenance activities on a routine basis for relevant traffic signal control equipment.
- Prioritize maintenance activities to ensure the integrity and readiness of critical infrastructure.

To read more on the NTOC 2012 National Traffic Signal Report Card, go to http://www.ite.org/reportcard/TechnicalReport.pdf.

Traffic Signal Academy – go to http://ctr.utk.edu/TrafficSignalAcademy/ for available training.

Revision 2

Revision 2 addresses overwhelming feedback from agencies at all levels of government regarding their ability to meet several recent additions or changes in the MUTCD, particularly where the changes were accompanied by target compliance dates. Most notable among these changes were the minimum requirements for traffic sign retroreflectivity, introduced in 2007 as Revision 2 to the 2003 Edition of the MUTCD.

Agencies now have the option to use "historic" street name signs in locally designated historic districts, provided that the district is compatible with guidelines for inclusion on the National Register of Historic Places. This photo provides an example of this usage on Bourbon Street in New Orleans' French Quarter.

In recognition of the financial burden that these compliance dates placed on agencies in a time of declining revenue and limited resources, FHWA has revised table I-2 of the MUTCD to eliminate 46 existing compliance dates and extend compliance dates for four changes. The target compliance dates for 8 items remain unchanged.

Revision 2 affects the target compliance dates established for Section 2A.08, Maintaining Minimum Retroreflectivity. The compliance date for agencies to implement and continue use of an assessment or management method to maintain regulatory and warning sign retroreflectivity at or above the established minimum levels is now June 13, 2014. It is significant to note that this compliance date is applicable only to the management of warning and regulatory signs. Street name signs and other guide signs should be incorporated into an agency's retroreflectivity management process as resources allow.

Also note that the changes in Table I-2 affect only the target compliance dates established for the standards in question – the text of the associated MUTCD sections, including the section addressing minimum retroreflectivity for traffic signs, remains unchanged by removal or modification of these compliance dates. Where compliance dates have been eliminated, new traffic control devices should be in full compliance with the MUTCD. Any existing traffic control device not addressed in the revised Table I-2 may remain in place for the remainder of its useful service life.

Revision 2 also creates an option for agencies to exempt historic street name signs from the provisions of MUTCD Section 2D.43, provided that the signs are located within a locally identified historic district compatible with the criteria contained in 36 CFR 60.4 (National Register of Historic Places: Criteria for Evaluation). Signs located within appropriate areas would be exempted from requirements regarding mixed-case lettering, minimum letter height, pictograph size and placement, retroreflectivity or illumination, color, and placement. This option cannot be exercised outside of compatible historic districts.

MUTCD Revisions on the Web

To learn more about Revision 1 and 2 to the 2009 MUTCD, visit FHWA's MUTCD website at http://mutcd.fhwa.dot.gov. The website provides access to full text versions of the revised MUTCD, links to both final rules, and documents containing only pages changed as a result of Revisions 1 and 2.

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2. Please list any additional training workshops you would be interested in attending.

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3. Please list topics for videos you would like TTAP to obtain.

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4. Please list any other ideas or suggestions on how TTAP could assist you.

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