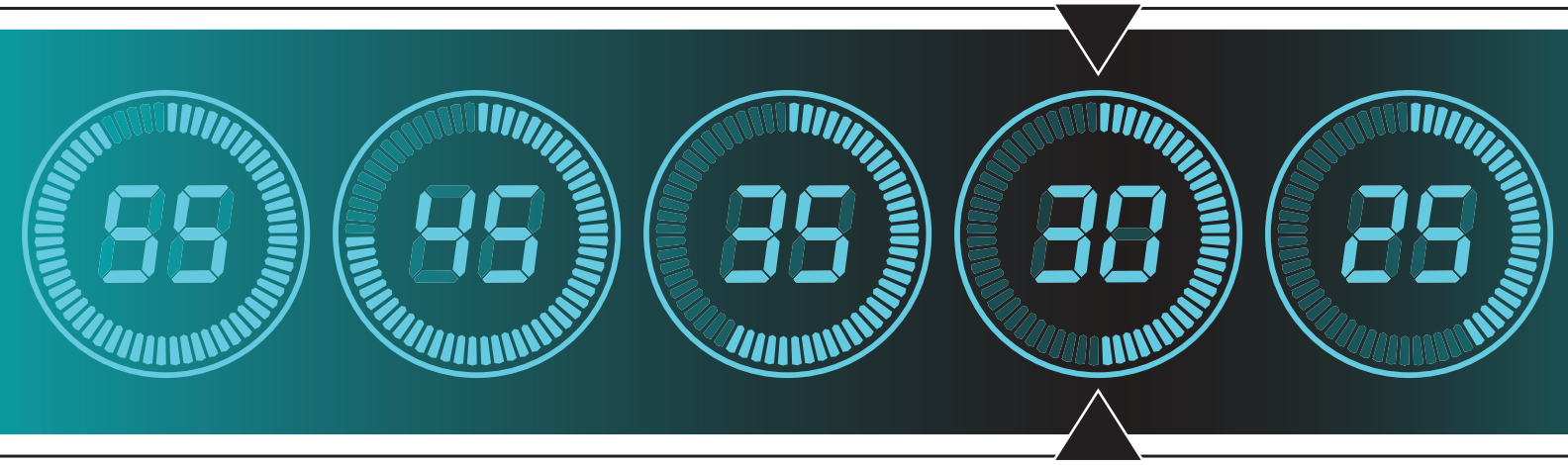

Speed Limits: **Leading to Change**

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In January 2019, the National Committee on Uniform Traffic Control Devices (NCUTCD) voted to send a ballot item to the Federal Highway Administration (FHWA) to revise language in the *Manual on Uniform Traffic Control Devices* (MUTCD) regarding the setting of speed limits.[1] In January 2018, the NCUTCD established a task force to further understand the recommendations made by the National Transportation Safety Board (NTSB), *Reducing Speeding Related Crashes Involving Passenger Vehicles*.[2,3] The task force conducted a survey in the spring of 2018 of the profession to identify practices and attitudes related to setting of speed limits, and 740 professionals completed the survey.

At the 2018 mid-year NCUTCD meeting, the task force met with the NCUTCD Technical Committees and facilitated an open discussion with the NCUTCD. The national committee provided direction to refine language related to speed limit setting recommended in the next edition of the MUTCD. The recommended changes made by the NCUTCD addresses many of the NTSB recommendations and issued a ballot item for comment to the seventeen sponsors of the NCUTCD, including the Institute of Transportation Engineers (ITE). The task force responded to nearly 100 comments from the sponsors and a revised ballot item was approved by the Regulatory and Warning Sign Technical Committee to be sent to the NCUTCD. The approved ballot item was then forwarded to FHWA quickly, following the January 2019 meeting, for hopeful incorporation in the upcoming update of the MUTCD.[4]

Setting of speed limits elicits some of the most passionate technical and emotional responses in our industry. The topic of vehicle speeds and speed limits is one of the most frequently researched topics in our industry. More than two dozen detailed, relevant research efforts were reviewed by the task force. To understand the context of this proposal, the history of speed limits in the MUTCD, NTSB recommendations, NCUTCD task force efforts, and the next steps are summarized.

History

The language in the MUTCD has evolved over time related to setting of speed limits. The initial discussion on this topic was in 1948 and the MUTCD indicated:

> *The limit that is displayed on the sign shall be the prima facie or absolute speed limit established by law, or a prima facie or absolute speed limit established after appropriate engineering and traffic investigation according to law.*

A key element of setting speed limits (i.e., when non-statutory, requires a study) is still present in the current MUTCD paragraph 1.

The 1961 MUTCD language was similar, but in 1971 the factors of a traffic investigation were added to provide practitioners with guidance. The list of factors included characteristics, speed distribution (both 85th percentile speed and pace speed), roadside development, geometry, parking/pedestrian activity, and accident experience (the first appearance of the "list of factors" that exists today in section 2B.13). This language carried forward to the 1978 and 1988 manuals. In the 2000 manual the list of factors was converted to an option and guidance was added that speed limits should be rounded up from the 85th percentile. This was the first time pace speed was separated from 85th percentile speed when discussing speed distributions. In the 2003 MUTCD, guidance was added to re-evaluate non-statutory speeds every five years and simply stated the rounding (not just up) requirement. The five-year study frequency was replaced in 2009 to re-evaluate roadways that have undergone significant changes. The 2009 manual made several additions which separated the "list of factors" from the standard of doing engineering studies.

NTSB Report

In July 2017, the NTSB issued its report on speed related crash reduction. It included numerous recommendations. The NTSB focused on the following five safety issues pertaining to the effective application of proven and emerging countermeasures for speeding: 1) speed limits, 2) data-driven approaches for speed enforcement, 3) automated speed enforcement, 4) intelligent speed adaptation, and 5) national leadership. It included four specific recommendations directed to FHWA and the MUTCD.[5]

The basis for the NTSB recommendations were findings that there is not strong evidence that, within a given traffic flow, the 85th percentile speed equates to the speed with the lowest crash involvement rate on all road types.[6] They stated that the unintended consequences of the reliance on using the 85th percentile speed for changing speed limits in speed zones include higher operating speeds and new, higher 85th percentile speeds in the speed zones, and an increase in operating speeds outside the speed zones. Expert systems such as USLIMITS2 were noted as being able to improve the setting of speed limits by allowing traffic engineers to systematically incorporate crash statistics and other factors in addition to the 85th percentile speed, and to validate their engineering studies. The Safe System approach to setting speed limits in urban areas was noted as an improvement over conventional approaches because it considers the vulnerability of all road users.

NCUTCD Task force

In addition to the NCUTCD task force survey, the Texas A&M Transportation Institute (TTI) was conducting the National Cooperative Highway Research Program (NCHRP) project 17-76 (*Guidance for the Setting of Speed Limits*) which is scheduled to be complete in the fall of 2019. The task force survey data were provided to the TTI team to assist with the investigation. AAA also was conducting a similar survey of speed limits and collaboration with AAA was undertaken. The background findings of the NCUTCD task force survey included the following:

- While consultants were the most represented single group in the survey (approximately 27 percent), public agencies were the largest overall responding group (state agency/DOT (approximately 18 percent), smaller cities (approximately 17 percent), county/regional agency (approximately 16 percent) and larger cities (approximately 9 percent).
- Survey respondents averaged 20 years of professional experience, compared to a typical ITE member who has about 18 years of experience (nearly 15,000 collective years of experience).
- Participants had a wide range of experience with speed limit studies, somewhat equally spread over the five survey categories of 0, 1–5, 6–20, 21–50, 50+ years of experience.
- More than 85 percent of the respondents have regularly (just less than 60 percent) or occasionally (about 25 percent) used the MUTCD.
- A majority of respondents depend upon the MUTCD or state/local guides/requirements in setting a speed zone.
- Few respondents have used USLIMITS2 (16 percent)—this is consistent with other recent surveys conducted by the AASHTO Committee on Traffic Engineering that indicates limited state DOT use of USLIMITS2.[7]

The survey of the top five factors viewed as most important from all participants were context—location (57 percent), crash history (46 percent), speed of vehicles (46 percent), pedestrian activity (41 percent), and geometrics of the road (33 percent). While all analysts consider speed, crashes, and context important factors, the survey exposed a changing trend in importance of certain criteria. The percent of the respondents selecting each criteria was compared by experience level. When breaking out the responses to the five most important factors for those who have less than 10 years of experience versus those who have more

than 20 years of experience, a trend becomes apparent. Younger professionals are placing greater importance on context and modes (very likely urban related) and more experienced professionals are placing greater importance on access, geometrics, and speed. While this result has been shrugged off by some as a "they did not know better," it is worthy of further discussion as all analysts consider context important and emerging professionals appear to be diving into how to characterize this factor better than in the past.

Table 1. Changes in speed setting criteria importance by experience level

Criteria that are more important for those with 10 years of experience or less compared to those with 20 years or more of experience	Criteria that are more important for those with more than 20 years of experience compared to those with 10 years or less of experience
Bicycle Activity	Speed of Vehicle
Pedestrian Activity	Statutory Requirements
Policy	Geometrics (sight distance)
Context – Location	Percent Vehicles over PSL/% Pace
Context – Land Use	Access Management

Note: Findings only include participants that had done at least one speed study

Related to setting speed limits and rounding, the most frequent response was to round to the nearest 5 miles per hour (mph) (8 kilometers/hour [km/hr]) of the 85th percentile; but when given the option to choose how they "would" do it they offered nearly 350 observations and context was the most frequent word used in the comments. A word cloud was developed based on the number of word frequencies and is shown in Figure 1. The size of a word is an indicator of word frequencies present in the text body of responses.

It was clear from the survey that while there may be occurrences of people narrowing their speed zone assessment to only the 85th percentile, this is rarely done. Analysts look at many factors. Even with the variations between more experienced and less experienced analysts or having done studies to having not done studies, speed distribution was nearly always viewed as a key factor. The task force made the following findings in its recommendation to the NCUTCD Council:

- Use of speed distribution in setting of speed zones is important but is only ***one*** of the factors in setting speed zones.
- Reinforce that the "other" factors ***should*** be considered in conducting speed zone studies and a change from option (may) to guidance (should) be made (returning it to its historic status).
- The inclusion of ***bicycle activity*** as one of the "factors" both in terms of road context and road users.
- Clarify "factors" to include lane widths, medians, driveways, land use, and past study data. Past studies provide valuable insights into understanding if or how speed distribution may have changed over time (speed creep).
- To clarify the use of the 85th percentile speed, limit the ***specificity*** of setting speed zones within 5 mph (8 km/hr) of the 85th percentile for freeways, expressways, and rural highways.
- The industry use and knowledge of USLIMITS2 is very limited (it was originally developed in 2006). Before prescriptively requiring it as a methodology in MUTCD for setting speed zones, more information is needed about why analysts do not use it currently. A survey participant noted that the assessment should be more transparent to users (less of a black box). In addition, requiring the use of a specific process is not likely appropriate for the MUTCD and rather should be part of national guidance document(s) for states/locals to utilize in establishing their policies.
- Setting of reasonable speed zones requires consideration of many factors that are not well defined in the MUTCD. These factors are best defined as part of national guidance/research documents and do not need to be defined in the MUTCD as they can involve state/local interpretation.
- The majority of task force members were not supportive of the elimination of studies in setting of non-statutory speed zones given the safety, enforcement, and legal consequences.
- As the NCHRP 17-76 research progresses, consideration of target speeds (reflecting on survey findings in Table 2 and NCHRP 855 Table 2) should be considered further, but not be part of MUTCD.

Figure 1. Word cloud of responses to question asking how would professionals set speed limits, if given the choice.

Related to the concept of Safe Systems, the changes to consider maximizing pace speed (a 10 mph (16 km/hr) range where the greatest percentage of vehicles can be found in a speed distribution), road context, and road users are all aimed to better address the needs of vulnerable users in urban areas. Pace particularly is a statistic that can be utilized more effectively in setting speed limits. Considering context and having less speed variation contributes to safer roadways.[8] Studies have outlined that it is not speed but the greater variation in speed that contributes to crashes—particularly excessive speed. Using the naturalistic driving study data, the Iowa State University study showed that the risk of a crash or near-crash increased significantly with increases in the standard deviation of speeds over the course of each event. Selecting speed limits to maximize the pace can contribute to fewer crashes and the negative consequences associates with such crashes.

It should be noted that the NCHRP Report 855 also highlighted that "bicycle separation is highly contingent on the difference between bicycle speed and motorized traffic speed." Essentially, as speeds go up, the separation should also increase. Intersections are of particular concern to pedestrians and cyclists alike. Provision of appropriate crossing treatments become critical where speed is high.

Based upon these findings, the following recommended text was forwarded to FHWA as part of the NCUTCD recommendation[10] regarding possible changes to the MUTCD. While other editorial changes were also made, these are the key sections that relate to the NTSB report.

Standard:

01 **Speed zones (other than statutory speed limits) shall only be established on the basis of an engineering study that has been performed in accordance with traffic engineering practices.**

Guidance:

01a *Factors that should be considered when establishing or reevaluating speed limits within speed zones are the following:*

A. Speed distribution of free-flowing vehicles (such as current 85th percentile, the pace, review of past speed studies).
B. Reported crash experience for at least a 12-month period relative to similar roadways.
C. Road characteristics (such as lane widths, curb/shoulder condition, grade, alignment, median type, sight distance).
D. Road context (such as roadside development and environment including number of driveways, land use, functional classification, parking practices, presence of sidewalks/bicycle facilities).
E. Road users (such as pedestrian activity, bicycle activity).

01b *When a speed limit within a speed zone is posted on freeways, expressways, or rural highways, it should maximize the percentage of vehicles in the pace and should be within 5 mph of the 85th percentile speed of free-flowing vehicles*

The Steps Ahead

Completion of NCHRP 17-76 will provide greater guidance for local and state agencies who develop policies related to setting of speed limits. This will include more information on definitions and applications. The NCUTCD survey clearly established that most professionals rely on local and state policies in combination with the MUTCD in conducting analysis of speed zones. The policies are the place where greater detail can be placed regarding the definition and use of factors in setting of speed limits, including the use of USLIMITS2 as a validation tool.

Exposed in this effort to update the setting of speed limits was the need to consider culture changes for communities wishing to eliminate serious injuries and fatalities associated with motor vehicle crashes. The task force highlighted the need for expanded collaboration between engineering, enforcement, and judicial professionals in the application of speed limits to achieving the goal of reducing excessive speeding, crashes, and fatalities. The Governors Highway Safety Association recently released a report[11] that places the target on the need to address excessive speeding. They found that:

- Progress on the issue of excessive speed has been limited at best.
- Efforts to combat speeding face political roadblocks.
- When it comes to speeding, drivers have a minimal perception of risk.

Table 2. NCHRP Report 855[9] Suggested Target Speed for Context/Roadway

Roadway	Context				
	Rural	Rural Town	Suburban	Urban	Urban Core
Freeways	Not addressed in 855 since "designs are based on federally developed standards with little flexibility." Assumed to be high.				
Principal Arterial	High	Low / Med	Med / High	Low / Med	Low
Minor Arterial	High	Low / Med	Med	Low/Med	Low
Collector	Med	Low	Med	Low	Low
Local	Med	Low	Low	Low	Low
Suggested target speeds: Low (<30 mph), Med (30 to 45 mph), high (> 45 mph)					

This is where the Institute of Transportation Engineers is well positioned to make a difference. By working collaboratively with enforcement professionals to define how to set speeds that best address the needs of communities, we can build a culture that reinforces safe speeds and makes excessive speed and its thousands of fatalities unacceptable. Working with the judicial system, we can develop approaches and systems that support enforcement personnel in this pursuit rather than waste their energy, time, and resources by not adjudicating excessive speeding to the greatest extent of the law. We can tackle distracted driving and driving under the influence of alcohol or drugs together with speed not in silos. We can advance development of enforcement methods that do not result in the perceptions of entrapment or the beliefs of "agency undue enrichment." We can use "big data" to our advantage in better understanding the relationships of speed management, crashes, and safety. We can openly share those data and knowledge collaboratively amongst our industries. We can work through these barriers together in building a culture that values both the safety of our communities and the rational mobility of travelers and goods movement.

There are partners all around us in education, public outreach, medical professionals, AAA, MADD, truckers, AARP, enforcement, emergency services, and road users who share the desire of getting home alive and safe. Let's work together to Shape our Communities. **itej**

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7. 2017 Survey: USLIMITS2, Committee on Traffic Engineering, AASHTO, August 2017, https://traffic.transportation.org/surveys/.
8. *The Interrelationships between Speed Limits, Geometry and Driver Behavior*, Center for Transportation Education and Research, Iowa State University, November 2018, page 78.
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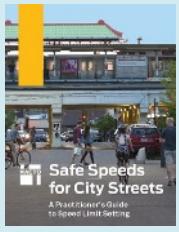
10. NOTE: recommendations to FHWA do not represent changes to the MUTCD. They will consider this recommendation as they advance the update to the MUTCD in the next year.
11. *Speeding Away from Zero: Rethinking a Forgotten Safety Challenge*, Governors Highway Safety Association, January 2019.

Safe Speeds for City Streets: A Practitioner's Guide to Speed Limit Setting



Guidance from the National Association of City Transportation Officials (NACTO), released this month, gives practitioners a detailed, context-sensitive method to set safe speed limits on urban streets. Using the Safe Systems approach, the guidance provides a consistent, rational, scalable approach to urban speed limit setting, from citywide strategies to corridor-by-corridor methods based on easy-to-study street characteristics.

The National Traffic Safety Board (NTSB) has recommended an overhaul of how speed is managed on U.S. streets, including the way that speed limits are set. Answering this call, NACTO's new guidance, based on best practices from a wide diversity of municipalities across North America, gives practitioners the specific methods—at the level of an entire city or a single street—needed to set safe speed limits on streets.

Visit nacto.org/safespeeds for more.

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