STATEWIDE
Speed Limit Vision
PROJECT

Literature Review Matrix

A summary of research and literature related to speed limits

April 2024

The goal of the Minnesota Statewide Speed Limit Vision Project is to develop a consistent and unified message related to speed limits supported by cities, counties, special interests, public safety and enforcement. Various types of research efforts were conducted to gather the latest and most relevant information available. The literature review matrix summarizes, in chronological order, both state and nationwide publications of this relevant speed limit information.

Year	Reference	Publisher	Summary
1993	The ITE Committee 4M-25 draft guidelines Recommended Practice, https://www.ibiblio.org/rdu/ite-szg.html	Institute of Transporation Engineers (ITE) Committee 4M-25	• Speed zones shall only be established on the basis of an engineering study and restudied every 5 years. • The engineering study should include an analysis of the current speed distribution of free-flowing vehicles. The speed limit within a speed zone shall be set at the nearest 5 mph increment to the 85th percentile speed or the upper limit of the 10 mph pace. • However, in no case should the speed limit be set below the 67th percentile speed of free-flowing vehicles.
1998	*Synthesis of Safety Research Related to Speed and Speed Management,* https://www.fhwa.dot.gov/publications/research/safety/98154/speed.cfm	Federal Highway Administration (FHWA), FHWA-RD-98-154	Past research has shown that the 85th percentile speed coincides with the lowest accident rates and reflects a safe speed for existing conditions as perceived by the majority of motorists. This research and approach are based on the Solomon Crash Risk Curve developed in the 1960s for rural highways. Solomon reported that the results of his study showed that "low speed drivers are more likely to be involved in accidents than relatively high speed drivers." This 1998 study concluded that "there is evidence that crash risk is lowest near the average speed of traffic and increases for vehicles traveling much faster or slower than average. In general, changing speed limits on low and moderate speed roads appears to have little or no effect on speed and thus little or no effect on crashes. This suggests that drivers travel at speeds they feel are reasonable and safe for the road and traffic regardless of the posted limit. However, there is limited evidence that suggests the net effect of speed limits may be positive on a system wide basis. More research is needed to evaluate the net safety effect of speed limit changes."
2007	Review of 20 mph zones in London Boroughs, https://content.tfl.gov.uk/review-of-20mph-zones-in-london-boroughs-full-report.pdf	Webster, D. and R. Layfield	A 2007 review of half of the 20 mph zones which had been implemented in London (78 zones) found that they reduced injury accidents by about 42% and fatal or serious accidents by 53%.

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2007	USLIMITS2 , https://safety.fhwa.dot.gov/uslimits/	FHWA and the National Cooperative Highway Research Program (NCHRP)	FHWA and NCHRP released USLIMITS2 to assist practitioners in setting speed limits that are safe, credible, consistent and enforceable. When used to determine appropriate speed limits, this web-based expert approach provided a systematic, consistent method for examining and weighing factors in addition to vehicle operating speeds.
2008	Study and Report on Speed Limits, https://edocs-public.dot.state.mn.us/edocs_public/DMResultSet/download?docId=38591888	Minnesota Department of Transportation (MnDOT)	Recommended some changes to the definition of Urban District, Rural Residential District, and Residential Roadway. Recommended no change to the basic Urban District speed limit of 30 mph based upon the following: • Analysis of pedestrian crash data of 25 mph vs. 30 mph was inconclusive • A review of survival rates at different speeds, shows that speed limits would have to be lowered to 20 mph to make any significant difference • The level of resources committed to law enforcement and driver education make it difficult to enforce the 30 mph speed limit • Current funding would make it difficult to establish a 25 mph statutory speed limit • Concerns over larger disparity in travel speeds if just signs are changed. • Concerns over lack of education. If the speed limit is lowered, the chances of people abiding by it without additional education are limited therefore the dispersion of speeds will be greater
2011	Impact Speed and a Pedestrian's Risk of Severe Injury or Death, https://aaafoundation.org/impact-speed-pedestrians-risk-severe-injury-death/	AAA Foundation for Traffic Safety	The study used data from a federal study of crashes that occurred in the United States in years 1994 – 1998 in which a pedestrian was struck by a forward-moving car, light truck, van, or sport utility vehicle. Results showed that the average risk of severe injury or death to a pedestrian struck by a vehicle increases by vehicle speed. Average risk of **severe injury** by impact speeds: 10% at 16 mph, 25% at 23 mph, 50% at 31 mph, 75% at 39 mph, 90% at 46 mph Average risk of **death** by impacts speeds: 10% at 23 mph, 25% at 32 mph, 50% at 42 mph, 75% at 50 mph, 90% at 58 mph
2012	*NHTSA Summary of State Speed Laws, 12th Edition,* https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/summary_state_speed_laws_12th_edition_811769.pdf	National Highway Traffic Safety Administration (NHTSA)	States surrounding Minnesota have a statutory speed limit of 25 mph unless otherwise posted: Iowa, Wisconsin, North Dakota, South Dakota, and Nebraska. The most common speed limit in the United States for local city streets is 25 mph.

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2012	Methods and Practices for Setting Speed Limits: An Informational Report, https://safety.fhwa.dot.gov/speedmgt/ref_mats/fhwasa12004/	FHWA Safety Program	Four general approaches to setting speed limits • Engineering approach (85th percentile) • Expert system approach (USLIMITS2) • Optimization approach: Setting speed limits to minimize the total societal costs of transport • Injury minimization and safe system approach: Setting speed limits according to the crash types that are likely to occur The engineering, expert system, and optimization approaches are generally used for adjusting speed limits on a street by street basis. The safe system approach is more commonly applied at the city, county or state level to adjust a state statutory speed limit across the board. The engineering or 85th percentile approach is just one of the methods used in current practice, but it is the most common. • The FHWA Manual on Uniform Traffic Control Devises (MUTCD) recommends that the speed limit be within 5 mph of the 85th percentile speed of free-flowing traffic. • Setting speed limits lower than the 85th percentile speed does not encourage compliance with the posted speed limit. • Adjustments made for roadway factors and or crash data may lower the 85th percentile speed but normally not more than 7 mph • Adjustments may be made for as much as 10 mph below the 85th percentile, considering the following factors: narrow roadway, horizontal and vertical curves, driveways with restricted ability, high driveway density, rural residential or developed areas, and narrow shoulder width.
2012	Methods and Practices for Setting Speed Limits (TRS 1204), https://lrrb.org/media/reports/TRS1204.pdf	Minnesota Department of Transportation (MnDOT)	A synthesis of pertinent research to be used for further study. Focused on national resources, consultation with state practitioners, state practices, international practices, and related research.

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2013	*A Model for Setting Credible Speed Limits in Urban Area,* https://www.semanticscholar.org/paper/A-Model-for-Setting-Credible-Speed-Limits-in-Urban-Bellalite/95b1576e23ef1dc717b0501a1e0d307845e8c3a7	Institute of Transportation Engineers (ITE) Journal	This article presents a new model for setting credible speed limits exclusively in urban areas by setting limits from 25 to 43 mph by increments of 6 mph. The model is based on research in Quebec, Canada. The model uses eight key parameters whose cumulative effects significantly affect the 85th percentile speeds, giving more weight to certain factors. Parameters include: number of lanes, width of visual clearance, length of zone, type of surroundings, access points, on-street parking occupancy, pavement width, and number of commercial buildings.
2015	Traffic Safety Fundamentals Handbook, https://edocs-public.dot.state.mn.us/edocs_public/DMResultSet/download?docId=20073161	MnDOT	Data showed the relationship between speed limit and average crash rates for urban highways on the State's system. This data indicates that in Minnesota crash rates go down as speed limits increase along urban highways. • It should be noted that a similar relationship between speed limits and crashes is documented in the Highway Safety Manual. The same Minnesota research indicates that access density is a better predictor of urban crash rate than is the posted speed limit. • Speed zones are established based on an analysis of existing vehicle speeds along a segment of roadway and a variety of other information including road cross-section, density of access, land use and other characteristics of the road environment. • A study of before and after speed limit changes in Minnesota showed that the outcome was identical, driver behavior did not change. • Beyond merely changing the posted speed limit, efforts to change driver behavior should be focused on two approaches – added enforcement and making changes to the road environment in order to adjust driver perception.
2017	Evaluation of Bicycle Traffic Control Devices and Street Design Elements in Minneapolis, https://www.minneapolismn.gov/media/-www-content-assets/documents/Bicycle-and-Street-Design-Evaluation-Report-2017.pdf	City of Minneapolis	This report documents the evaluation of 16 bicycle treatments and street design elements installed by Minneapolis Public Works in 2011 and 2013. There was no substantial effect on motor vehicle speeds after the posted speed limit was reduced on 15th Avenue SE from 30 mph to 25 mph, or after the subsequent striping changes were made. The 85th percentile speeds before the project was installed ranged between 23 mph and 32 mph. After the project was installed, 85th percentile speeds ranged between 23 mph and 33 mph. Before-and-after speed distribution varied by block segment. This suggests that other factors such as signal spacing, pedestrian and bicycle volumes, and adjacent land uses may have a greater influence on motor vehicle speeds than the in place signing and striping installed along this corridor.

Year	Reference	Publisher	Summary
2017	"Reducing Speeding Related Crashes Involving Passenger Vehicles," https://www.ntsb.gov/safety/safety-studies/Documents/SS1701.pdf	National Transportation Safety Board (NTSB)	• Speed-related crashes account for 31% of traffic fatalities — the same percentage as alcohol-impaired driving. • They also found that speed—and therefore speeding—increases the likelihood of being involved in a crash, and increases the severity of injuries sustained by all road users in a crash. • Typically, speed limits are set by statute, but adjustments to statutory speed limits are generally based on the observed operating speeds for each road segment—specifically, the 85th percentile speed of free-flowing traffic. • Raising speed limits to match the 85th percentile speed can result in unintended consequences. It may lead to higher operating speeds, and thus a higher 85th percentile speed. • In general, there is not strong evidence that the 85th percentile speed within a given traffic flow equates to the speed with the lowest crash involvement rate for all road types. • Alternative approaches and expert systems for setting speed limits are available, which incorporate factors such as crash history and the presence of vulnerable road users such as pedestrians. • NTSB recommended to the FHWA that they consider expanding the approach to setting speed limits beyond the 85th percentile.
2018	"Studies Say Lower Speed Limits will Help Improve Road Safety," https://aashtojournal.org/2018/08/31/studies-say-lower-speed-limits-will-help-improve-roadway-safety/	American Association of State Highway and Transportation Officials (AASHTO) Journal	Documented the Insurance Institute for Highway Safety (IIHS) study on Boston, Massachusetts, which lowered the default speed limit on city streets from 30 mph to 25 mph beginning January 9, 2017. This was after the Massachusetts legislature amended state law in 2016 to allow cities and towns to lower speed limits from 30 mph to 25 mph on municipal roads in densely populated areas or business districts. This study found that lowering the speed limit did lower the amount of speeding drivers going over 35 mph by up to 29%.

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2019	NCUTCD proposal for recommended changes to the MUTCD, https://ncutcd.org/wp-content/uploads/meetings/2019A/AttachNo12.18B-RW-03.SpeedLimitProcdedures.Approved.pdf	National Committee on Uniform Traffic Control Devices (NCUTCD) Item No. 18B-RW-03	• Changes the MUTCD to reinforce the stated understanding that other factors have a role in setting speed limits (in addition to 85th percentile). • Retains reference to 85th percentile as a factor that should be considered, particularly for freeways, expressways and rural areas • Leaves reference to setting of speed zones in broad terms allowing states/locals to establish detailed criteria based upon national guidance or based upon research, outside the MUTCD • Anticipates the development of a national speed management guide (in development through NCHRP 17-76) for states and local agencies to use uniformly in establishing a process of setting speed zones. • Recommends that statutory speeds in states/local agencies follow speed management guidance being developed in NCHRP 17-76, but do not address such in the MUTCD. [NCHRP 17-76 is due out in Fall 2020.]
2019	Current Speed Limit Legislation in Minnesota, https://www.revisor.mn.gov/statutes/cite/169	Minnesota Statute (MS) 169	No person shall drive a vehicle on a highway at a speed that is greater than is reasonable and prudent under the conditions. Statutory speed limits established by the legislature: • The speed limit is "30 miles per hour in an urban district" • 55 mph on rural roads, 65 mph on rural expressways, and 70 mph on rural interstates. • 25 mph in residential roadways if adopted by the road authority having jurisdiction over the residential roadway; and • The speed limit is "35 miles per hour on a town road in a rural residential district if adopted by the road authority having jurisdiction over the rural residential district".
2019	National Motorists Association website, https://www.motorists.org/	National Motorists Association	Ideally speed limits should be set at the 85th percentile speed and at a minimum should never be set below the 67th percentile free-flow speed. This is based on draft guidelines that were a result of the 1993 ITE Committee 4M-25 on Speed Zone Guidelines Recommended Practice.
2019	*Sustainable Speed Limits for Urban Streets,* https://www.nxtbook.com/ygsreprints/ITE/G110939_ITE_November2019/index.php#/26	Op-ed in the ITE Journal by Peter Martin, PE	The current practice for setting speed limits is being reviewed by the American Association of State Highway Officials, the National Committee on Uniform Traffic Control Devices, ITE, and others. • Lowering speeds on urban streets through a combination of physical, operational, and regulatory measures makes sense • It is well documented that pedestrians are more vulnerable with higher risk of injury at higher speeds. • Reduced speeds benefit many streets, but low speeds on pedestrian oriented streets benefit most.

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2019	*Minnesota Manual on Uniform Traffic Control Devices (MN MUTCD),* https://www.dot.state.mn.us/trafficeng/publ/mutcd/	MnDOT	The 85th percentile speed or engineering approach is most common method as described in the MUTCD. The Minnesota Manual on Uniform Traffic Control Devices (MN MUTCD) Section 2B.13 Speed Limit Sign provides that "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. The engineering study shall include an analysis of the current speed distribution of free-flowing vehicles". (2B-14) MN MUTCD Section 2B.13 Speed Limit Sign (R2-1) provides guidance that "when a speed limit within a speed zone is posted, it should be within 5 mph of the 85th percentile speed of free-flowing traffic." (2B-15)
2020	*City Limits: Setting Safe Speed Limits on Urban Streets,* https://nacto.org/safespeeds/	National Association of City Transportation Officials (NACTO)	Developed by a steering committee of NACTO's 86 member cities and transit agencies, *City Limits* outlines how to use a safe systems approach to set speed limits in urban environments, in contrast to traditional methods (e.g. the 85th percentile). *City Limits* outlines a three-method approach to speed limit setting that provides an alternative to percentile-based speed limit setting: • Setting default speed limits on many streets at once (such as 25 mph on all major streets and 20 mph on all minor streets), • Designating slow zones in sensitive areas, and • Setting corridor speed limits on high priority major streets, using a safe speed study, which uses conflict density and activity level to set context-appropriate speed limits.
2020	*Effects of Residential Street Speed Limit Reduction from 25 to 20 mi/hr on Driving Speeds in Portland, Oregon: Final Report,* https://clients.bolton-menk.com/mnspeedlimitvision/wp-content/uploads/sites/105/2021/03/pbot-20-mph-speed-study-finalv5.pdf	Portland State University - Civil & Environmental Engineering (report prepared for Portland Bureau of Transportation)	Report analysis suggests the reduction of posted limits to 20 mph resulted in lower observed vehicle speeds and fewer vehicles traveling at higher speeds (e.g. over 30 mph). However while observed average speeds decreased at a majority of sites, they did increase at a few sites. Models also suggest the role of roadway characteristics such as width, pavement condition, and curb presence on vehicle operating speeds. Article from Portland.gov website: *Analysis indicates 20 mph speed limit reduced driving speeds*, https://www.portland.gov/transportation/vision-zero/news/2020/12/1/analysis-indicates-20-mph-speed-limit-reduced-driving
2021	*Posted Speed Limit Setting Procedure and Tool* *https://nap.nationalacademies.org/catalog/26216/posted-speed-limit-setting-procedure-and-tool-user-guide*	National Cooperative Highway Research Program (NCHRP)	The TRB National Cooperative Highway Research Program's NCHRP Research Report 966: Posted Speed Limit Setting Procedure and Tool: User Guide provides and explains a speed limit setting procedure (SLS-Procedure) that considers factors beyond the 85th percentile speed, including both driver speed choice and safety associated with the roadway. This report also provides instructions for using an automated version of the SLS-Procedure via a spreadsheet-based Speed Limit Setting Tool (SLS-Tool).