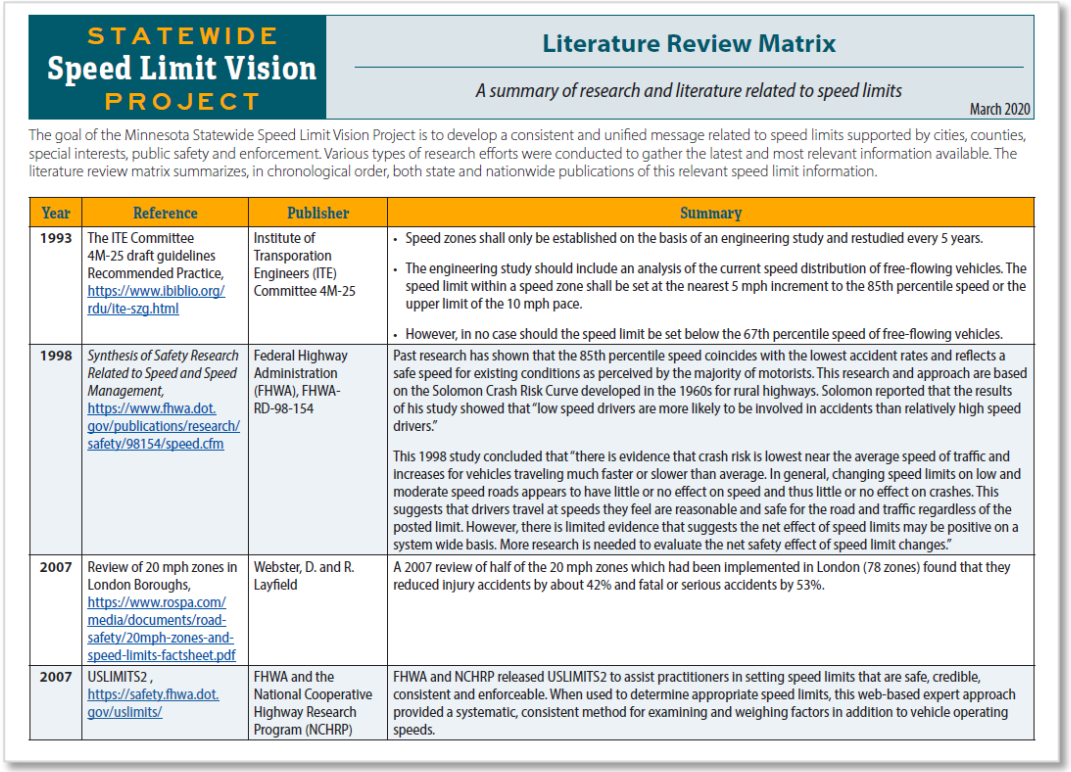
Literature Review Matrix Overview

What it is the Literature Review Matrix?

Summarizes the journey undertaken regarding speed limits in both Minnesota and nationwide

Covers the latest and most relevant speed limit information available since 2008

Summarizes both state and nationwide publications from 1993 to today



STATEWIDE Speed Limit Vision PROJECT

Literature Review Matrix

A summary of research and literature related to speed limits

March 2020

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://www.rospa.com/media/documents/road-safety/20mph-zones-and-speed-limits-factsheet.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%.
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.

MnDOT last formally studied the topic of local road speed limits in 2008 during a study of local speed limit issues in consultation with local governments.

Current Practice

- Has remained relatively constant in approach over last two decades

- Four general methods:
    1) Engineering Approach
    2) Expert System Approach (USLIMITS2) (developed in 2007)
    3) Optimization: setting speed limits to minimize the total societal costs of transport
    4) Injury minimization and Safe system approach: speed limits are set according to the crash types that are likely to occur

Current Practice

- Engineering, Expert Systems, and Optimization 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 Approach, which establishes the speed limit street-by-street based on an engineering study and uses the 85th percentile speed, is the most common.

The **85th percentile speed** is **defined** as, "the **speed** at or below which **85** percent of all vehicles are observed to travel under free-flowing conditions past a monitored point." Another way to consider this is the **speed** at which only 15% of traffic violate on average.

Current Practice in Minnesota

Traditionally Speed limits are set by Statute or by Engineering Study

In Minnesota

- Statutory Urban Speeds
  - Minnesota – 30 mph
  - All neighboring states – 25 mph

- Mn MUTCD (2019)
  - Engineering Approach
  - Should be within 5 mph of the 85th percentile speed of free-flowing traffic
  - May consider other factors

The Conversation is Moving Beyond the Engineering Approach

A well-documented study in 2011 by AAA showed that **pedestrians and bicyclists are more vulnerable and have a higher likelihood of injury in higher speed crashes.**

The likelihood of injury to pedestrians increases as driver speed increases.

The Conversation is Moving Beyond the Engineering Approach

Use of Engineering Approach being re-examined

Especially on local roads, related to safety of speed limit changes and non-motorized roadway users

Alternative approaches being used by agencies across the U.S.

Incorporate factors such as crash history and presence of vulnerable road users such as pedestrians

Impact on Driver Speed

As agencies lower speed limit on a more systematic basis, they have seen an impact on driver speeds.

Lowering the speed limit did lower the odds of drivers going over 35mph by up to **29%** in Boston, where they lowered the default speed limit on city streets from 30mph to 25mph in 2017.

-2018 article published by the Insurance Institute for Highway Safety

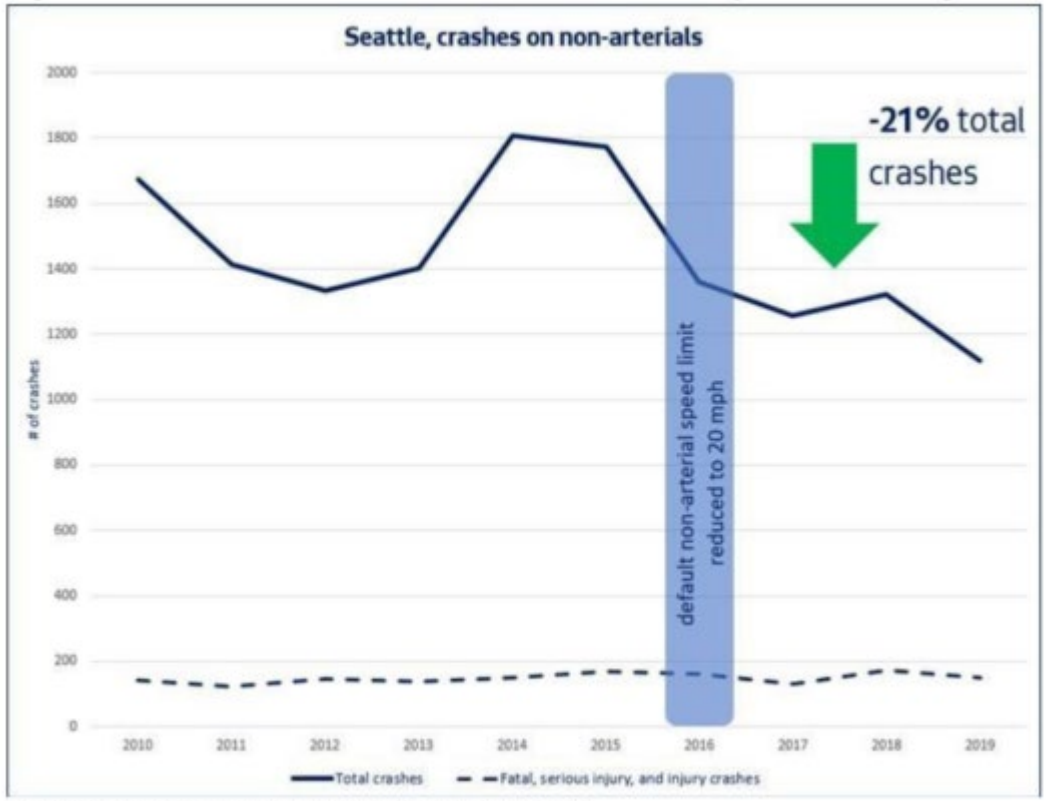
Impact on Overall Crashes

The before and after research in **U.S. cities** of the effect of changing speed limits on crash reduction is limited.

However, the Seattle DOT recently prepared an evaluation of changes they made in 2016 on non-arterial streets.

They have seen a 21% reduction in total crashes on local streets since they lowered the speed limit on those streets to 20 mph.

Figure 5: Seattle crashes on non-arterial streets after speed limit change



Source: Dongho Chang, Seattle Department of Transportation

Not Everyone Agrees

A 1998 FHWA 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. This suggests that drivers travel at speeds they feel are reasonable and safe for the road and traffic regardless of the posted limit.

Research shows 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.

-Based on the Solomon Crash Risk Curve developed in the 1960s for rural highways

Not Everyone Agrees

2015 MnDOT study concluded

Driver behavior **did not change** before and after speed limit change

Beyond changing the posted speed limit, efforts to change driver behavior should be focused on added enforcement and making changes to the road environment as well.

On their website, the **National Motorists Association,** a driver advocacy group, states that ideally speed limits should be based on sound traffic-engineering principles that consider responsible motorists' actual travel speeds. Typically, this should result in speed limits set at the 85th percentile speed.

Not Everyone Agrees

- The current practice for setting speed limits is being reviewed by the AASHTO, NCUTD, FHWA, ITE, and others.
- A 2017 study published by the National Transportation Safety Board (NTSB) study recommended to FHWA that they:
  - Revise the Manual on Uniform Traffic Control Devices (MUTCD) to remove the guidance that speed limits should be within 5 mph of the 85th percentile speed
  - Incorporate the safe system approach for urban roads to strengthen protection for vulnerable road users.
- In early 2021, FHWA proposed changes to the MUTCD to reinforce the understanding that other factors, in addition to the 85th-percentile speed, have a role in setting speed limits. These changes would allow agencies to establish detailed criteria based upon national guidance or research, outside the MUTCD.

Full Literature Review Matrix found here:

https://clients.bolton-menk.com/mnspeedlimitvision/research/