



Setting Speed Limits on Local Roads

Speed limits are an important tool for promoting safety on streets and highways. Limits tell drivers what is the reasonable speed for a road section. They also help traffic enforcement by setting standards for what is an unsafe speed.

The state has set speed limits for all roads. However, municipalities can change speed limits for their roads under authority and guidelines in the *Wisconsin Statutes*. Selecting the appropriate speed limit can be a challenge because people often disagree. Residents frequently seek lower speeds, especially after a serious crash. Drivers tend to choose speeds that seem reasonable for the conditions—often higher than the posted limit—and that satisfy personal needs (saving time, enjoyment, inertia).

Local officials have a key role in setting limits. They must balance the competing concerns and opinions of drivers, residents, and law enforcement agencies with statutory requirements and the recommendations of traffic engineers.

This booklet is designed to help. It includes background information and research recommendations, summarizes statutory limits, describes the process for changing limits, and discusses signs, enforcement, advisory speeds, and other speed issues.

Background

High speeds are a factor in up to one-third of all fatal crashes, and injuries from speed-related crashes (including speed too fast for conditions) cost society \$27 billion per year (1994 estimate). Although speed by itself may not necessarily cause accidents, it affects their severity. For example, 85% of pedestrians struck by vehicles traveling 40 mph were killed while only 5% were killed when the speed was 20 mph.

Common sense says that regulating speed is a good way to make streets and highways safer. As a result, citizens may demand lower speeds, especially if there has been a severe crash or a frightening “near miss.”



However, driving behavior is not so easy to manage. Many studies, including a 1997 federal speed study (FHWA-RD-92-084), show that simply lowering speed limits has little effect on actual speeds, usually only reducing speeds by one to two miles per hour. At the same time, the difference in speeds, which is a common cause of crashes, increases, often making the roadways less safe. In general, drivers choose their speed based on what they think is safe and reasonable for the conditions present. An unreasonable posted speed gets little consideration from drivers. They determine “safe and reasonable” from a variety of factors, including:

- Road geometry—roadway characteristics such as lane width, shoulder width, sight distance, curves, and hills
- Land use, including frequency of driveways and cross streets
- Traffic volume and prevailing speed
- Presence of pedestrians, bikes, and parked cars
- Visual clutter such as billboards and commercial buildings
- Weather and road conditions
- Vehicle type and characteristics
- Driver capability, attitudes and habit
- Public attitudes
- Enforcement
- Speed zoning

A new alternative for managing vehicle speeds is called “traffic calming.” This emphasizes physical changes to local streets—making them appear narrower or more restricted, for example—so drivers will voluntarily choose lower “safe and comfortable” speeds.

Philosophy

Prevailing speed—the one which most drivers choose—is a major consideration in setting speed limits. Wisconsin’s statutes recognize this in declaring that “no person shall drive a vehicle at a speed greater than is reasonable and prudent under the conditions...” [246.57(2) *Wisc. Stats.*]

Engineers recommend setting limits at the 85% percentile speed, where 85% of the freely flowing traffic travels at or below that speed. They also emphasize considering the road’s design speed in setting speed limits. This is the highest safe speed for which the road was designed. It takes into account road type, road geometry, and adjacent land use. Research studies show that accident rates go down when speed limits are within 10 mph of the design speed. When the difference is greater, motorists choose a wider variety of speeds. This variance in speed between vehicles, more than the speed itself, results in higher accident rates.

However, the prevailing speed and design speed may be hazardous for pedestrians, bicyclists, and other road users. Modern roads are often over-designed, particularly in residential areas, where they tend to emphasize functions like accommodating fire trucks or street parking. The wide, unobstructed roads that result can unintentionally encourage drivers to drive too fast for the safety of other road users. Simply setting lower speed limits is unlikely to produce the desired results, however, especially without effective enforcement. In these cases, authorities may wish to consider using some traffic calming techniques.

Speeds should be consistent, safe, reasonable, and enforceable. When 85% of drivers voluntarily comply with speed limits, it is possible and reasonable to enforce the limits with the 15% who drive too fast. Unreasonably low limits can promote disrespect for and disregard of other, reasonable posted limits. They also promote a false sense of security among residents and pedestrians who may expect that posting lower limits will change drivers’ speed behavior. Unreasonably high limits create unnecessary risks.

Authority

Power to set speed limits rests with the state. Chapter 346.57 *Speed Restrictions* of the *Wisconsin Statutes* requires drivers to use a speed that is “reasonable and prudent,” to exercise “due care,” [346.57(2)] and to reduce speed under a variety of conditions such as “going around a curve...passing school children, high-

way construction or maintenance workers...and when special hazard exists...” [346.57(3)].

The *Statutes* give fixed limits for more than a dozen situations depending on the road type, jurisdiction, and land use [346.57 (4) (a-k)]. (See chart.)

Local or state officials have authority to change these limits within the limitations in Chapter 349.11 (summarized in chart). They must conduct an engineering and traffic investigation to determine a reasonable and safe speed limit. The limit must then be legally adopted by the local authority and appropriate signs erected. When properly changed, such limits do not create additional liability. In addition, changes beyond those specified in the statutes are possible in consultation with the state Department of Transportation.

Speed limits and authority to change

Fixed limits – Statute 346.57(4)*	Sub-section	Local government authority** – Statute 349.11.3(6) or 349.7
65 MPH – Interstate	(gm)	WisDOT ONLY
55 MPH – STH	(h)	WisDOT ONLY
55 MPH – CTH, town roads	(h)	Lower by 10 MPH
45 MPH – Rustic Roads	(k)	Lower by 15 MPH
35 MPH – town road (1,000 ft. min) with 150 ft. or less driveway spacing	(j)	No changes permitted
25 MPH – Inside corporate limits, residential street (other than outlying district)	(e)	Lower or raise by 10 MPH
35 MPH – Outlying district inside corporate limits (1,000 ft. min., 200 ft. driveway spacing)	(f)	Lower or raise by 10 MPH
35 MPH – Semi-urban outside corp. limits (1,000 ft. min., 200 ft. driveway spacing)	(f)	Lower or raise by 10 MPH
15 MPH – School Zone	(a)	Lower by 10 MPH or raise to speed of adjacent street
15 MPH – School Crossing	(b)	Lower by 10 MPH or raise to speed of adjacent street
15 MPH – Pedestrian safety zone	(c)	No changes permitted
15 MPH – Alley	(d)	Lower by 10 MPH
15 MPH – Public park (within, contiguous or adjacent to)	(j)	Lower by 10 MPH
Construction or maintenance zones as appropriate	(10)	State and local agencies have authority to establish

* From WisDOT Highway and Transportation Laws and Rules, 1995.

** All speed limit changes should be based on an engineering study.

All limits, whether set by statute or local authority, are only effective and enforceable when official signs have been erected to give adequate warning to highway users. Signs must conform to the specifications in the *Manual on Uniform Traffic Control Devices (MUTCD)* and the *Wisconsin Supplement* to the MUTCD.

Speeds may also be temporarily reduced in work zones where highways are being constructed, reconstructed, maintained or repaired [Ch.349.11(10)]. These changes must be properly posted and are not restricted by the other limitations in Chapter 349.11. Appropriate work zone signing and set up is described in *Workzone Safety: Guidelines for Construction, Maintenance and Utility Operations*.

The local agency that maintains the roadway has jurisdiction for determining the speed limit. In most cases the responsibility is clear. If a roadway segment has joint jurisdiction, such as a road on the border between two cities, then both agencies must agree on the speed limit. Obviously, the speed must be the same in both directions. In cases where the county or state maintains a road within the corporate limits of a city or village, the county or state is responsible for setting the speed limit. Coordination with local officials and law enforcement agencies is essential to set effective speed limits.

Required studies

Local authorities are required by the statutes to conduct engineering and traffic speed studies to determine a reasonable and prudent speed limit for a section of road or highway. Local law enforcement, the county Traffic Safety Commission, and WisDOT District engineering staff can be very helpful in conducting and interpreting these studies for local municipalities.

Engineering studies should include the following:

1. Measure prevailing speed characteristics and determine the 85th-percentile speed and pace speed
2. Evaluate reported accident experience for the past three to five years
3. Review roadside development and culture, and driveway access for conflicts
4. Evaluate sight distances at intersections, horizontal curves, and vertical curves
5. Check the road's geometrics including lane widths, sharp curves, and roadside hazards
6. Consider conflicts with parking practices, and pedestrian and bicycle activity
7. Evaluate pavement surface characteristics and shoulder conditions
8. Determine the current level of enforcement

A speed study is a statistical evaluation of speed characteristics at a specific location. It includes averages, ranges, distribution, and variability of speeds, and confidence levels of the analysis. Spot speed studies should be unbiased, measuring a statistically valid sample of vehicles.

Accurate spot speed measurements are important for setting limits. They should represent free flowing traffic on a clear, dry day. There should be a large enough number of measurements to produce an appropriate level of confidence about the data analysis. Spot speed is the instantaneous speed at one location. This is different from the average speed over a distance. As a general rule, the minimum sample size should never be less than 30 measured spot speeds. On higher volume roads the study should include about 100 cars.

Data can be collected in a variety of ways. Radar or laser speed detection units are commonly available and generally used to measure a sample of every *n*th vehicle. Speed can also be measured manually by counting the time it takes every *n*th vehicle to travel a measured distance between two points. Automatic data recorders using detector loops and tube counters can produce considerably more information by measuring every vehicle during a given time period and automatically calculating the spot speeds in free flowing traffic. Video and radar speed cameras are also used and can capture a broad variety of data which is preserved for multiple analyses. Once collected, data is then analyzed statistically and presented in tables and graphs.

Signs

A speed limit is not in effect until the area has been properly signed. Conversely, signs must not be installed until the limit has been approved and officially authorized. Signs are governed by the *Manual on Uniform Traffic Control Devices (MUTCD)*. Two types may be used: one for passenger cars and another for special limits for trucks and buses.

No more than three speed limits should be displayed on any one speed limit sign or assembly. Signs with special limits for trucks or other vehicles should include the word TRUCKS or a similar appropriate message. They can be displayed below the standard message or on a separate plate which should refer to SPEED or MPH.



The standard SPEED LIMIT sign must be 24 by 30 inches. Signs must be located:

- at each point where the speed limit changes
- beyond major intersections
- at other locations where it is necessary to remind motorists of the limit



REDUCED SPEED AHEAD signs may also be used to give advance warning of a lower speed zone. This sign should be used in rural areas to alert motorists when they may need extra time to slow to the posted limit. It must always be followed by a SPEED LIMIT sign at the beginning of the new zone.

Near schools, the END SCHOOL ZONE sign may be used as an alternate to the SPEED LIMIT sign.



Enforcement

Enforcement is critical. Without it speed limits are not effective. When it is considerably increased, violations and crashes have been reduced.

Local officials should actively involve enforcement personnel in setting speed limits to ensure they are reasonably enforceable. Enforcement agencies should always be advised when changes have been adopted.

Enforcement requires wide public support. A first step is to ensure that speed limits are publically perceived as reasonable and fair because the voluntary cooperation of most drivers is essential. A second step is vigorous public information and education stressing the safety benefits of the enforcement. This should be a cooperative effort between highway and enforcement officials. It should target specific aspects of the speeding problem such as young drivers, nighttime, school zones, work zones, or specific roads where potential traffic and pedestrian conflicts are high.

Within law enforcement agencies, traffic enforcement doesn't compete well with criminal and drug enforcement. As a result, local highway officials must actively seek adequate agency enforcement. These efforts will be most effective when the safety benefits are made clear and there is strong support from local elected officials.

Aggressive, targeted enforcement, combined with education, has effectively produced better public compliance with traffic laws. The Federal Highway Administration recommends targeting enforcement programs to high crash locations where speeding was a contributing factor and to areas with high traffic volumes.

Long term, low intensity speed enforcement can produce meaningful results, however. Studies indicate that some amount of the enforcement effort (15% is

recommended) should be directed to random locations and times. Stationary, marked patrol vehicles are most effective in creating longer term enforcement benefits.

Minimum speed limits and slow moving vehicles

Except on Interstate highways, there is no specific minimum speed on Wisconsin highways. However, the statutes prohibit driving a motor vehicle "at a speed so slow as to impede the normal and reasonable movement of traffic, except when necessary for safe operation or to comply with the law." [Section 346.59 Wis. Stats.]

Vehicles which normally travel slower than 25 mph must display slow moving vehicle emblems. [Section 347.245 Wis. Stats.] In addition, the operator of a vehicle moving so slowly that it impedes traffic must yield the roadway to overtaking vehicles, if practicable, when the operator of an overtaking vehicle gives an audible warning. [Section 346.59(2) Wis. Stats.]

Advisory speed signs

Advisory speed signs are used to tell drivers that a lower speed may be necessary at curves, turns, intersections, and other localized conditions. They add emphasis and specific information to other warning signs, recommending a comfortable and safe speed to drive in these locations. Advisory speeds should not be confused with



enforceable speed limits and they do not imply the maximum operating speed at which skid and rollover occurs.

The advisory speed must be determined by an accepted traffic engineering procedure but no ordinance is required. Signs can be erected by maintenance or sign supervisors and must be in accordance with guidelines in the *MUTCD, 2C-35*.

As with other traffic signs, advisory speeds should be consistent and reasonable to promote driver respect and compliance. This is not always the case. Research published by the national Transportation Research Board (TRB) found that on the two-lane highways studied, the posted advisory speeds at most curves were well below prevailing traffic speed and also below speeds established using recommended devices and criteria.

One widely used device for establishing advisory speeds on curves is the ball bank indicator. This relatively inexpensive curved level is mounted in an engineer's car. The engineer makes successive trial runs through a curve, taking care to drive parallel to the centerline of the curve, increasing speed by five mph each time. The indicator shows the angle of deflection in degrees. Advisory speeds are set based on average curve speeds for different angles of deflection.



The TRB study reports that the generally accepted criteria, which were established based on tests conducted in the 1930s, produce unrealistically low speeds with modern cars and should be revised upwards. Ballbank readings of 12 degrees above 40 mph, 16 degrees between 30 and 40, and 20 degrees below 30 would better reflect average curve speeds, the authors say.

Ballbank readings tend to fluctuate rather widely during a trial run and can be affected by loose-surfaced roads and vehicle suspension systems. As a result, setting a recommended speed depends to a significant extent on the judgment and experience of the person making the tests. The recommended speed should feel comfortable for the average driver and be lower than the maximum safe speed. It should also be sensible in comparison with prevailing speeds.

Summary

Establishing and enforcing reasonable and safe speed limits is the responsibility of local officials. This often includes balancing conflicting issues of safety, traffic movement, and community concerns.

Coordination with local law enforcement is vital to effective speed control. Most speed zones should encourage voluntary compliance by using reasonable speed limits. Traffic calming techniques that involve physical and perceptual changes can also be helpful. Enforcement officials should be consulted in determining effective limits and they should work with the community in difficult areas.

The traffic engineering staff of the state Department of Transportation can also be a helpful resource. Since they participate on county Traffic Safety Commissions, this may be an easy way to contact them for assistance.

References

- Establishing Realistic Speed Limits*, Department of State Police, State of Michigan, 1992, 21 pp.
- Evaluation of Criteria for Setting Advisory Speed on Curves*, Mashrur A. Chowdhury, Davey L. Warren, Howard Bissell, & Sunil Taori, Transportation Research Board Paper No. 980133, Jan. 11-15, 1998, 21 pp.
- Factors Affecting Speed Variance and Its Influence on Accidents*, Nicholas J. Garber & Ravi Gadiraju, Transportation Research Record 1213, Transportation Research Board, 1998, 10 pp.
- Pocket Handbook on Speed Zones*, T.I.C., 1999.
- A Policy on Geometric Design of Highways and Streets*, AASHTO, 1990, pp 62-68.
- Safety Strategies for Rural Roads, Draft Final Report*, DSTI/DOT/RTR/RS8(98)1, Organization for Economic Cooperation and Development, Scientific Expert Group RS8 on "Safety Problems of Rural Roads," October 1998, 131 pp, pp 73-87.
- Spot Speed Studies, Ch.3 of Manual of Transportation Engineering Studies*, Institute of Transportation Engineers, H. Douglas Robertson, Ed., 1994, pp 33-51.
- Speeding and Highway Safety: The U.S. Department of Transportation's Policy and Implementation Strategy*, National Highway Traffic Safety Administration, Federal Highway Administration, November 1996, 4 pp.
- Speed Limits*, Wisconsin Department of Transportation, Division of Highways, pamphlet.

Several sample speed limit ordinances are reprinted on the back page of this factsheet.

Sample speed limit ordinances

Local boards of elected officials must adopt speed limits in ordinance form. Here are sample ordinances for county and municipal governments. Local ordinances also may include details on forfeitures and law enforcement authority. The ordinance should be reviewed by the agency's attorney.

Sample amendment to a speed ordinance

AMENDING CHAPTER 1 OF THE
BADGER COUNTY CODE OF ORDINANCES

SPEED LIMIT CHANGES

The County Board of Supervisors of the County of Badger does ordain as follows:

ARTICLE 1. Unless otherwise expressly stated herein, all references to section and chapter numbers are to those of the Badger County Code of Ordinances.

ARTICLE 2. Section(2)(b)(2) is created to read as follows:

- 1) Chestnut Road, City of Centerton. Twenty-five miles per hour from its intersection with USH 51 to its intersection with Winona Drive.



"Badger County" traffic ordinance

SPEED LIMITS. (1) The provision of sections 346.57 and 346.59 of the Wisconsin Statutes, relating to the maximum and minimum speed of vehicles, are hereby adopted as part of this section as is fully set forth herein, except as specified by section 2 of this ordinance, pursuant to section 349.11(3)(c) of the Wisconsin Statutes.

(2) No vehicle shall exceed the following speed limits on the following county trunk highways:

- (a) County Trunk Highway "A"
 - (1) **Unincorporated Village of Estesville, Town of Terry.** Thirty-five miles per hour from its junction with STH 78, in Estesville, southwesterly 0.35 miles.
 - (2) **City of Covington, Town of York.** Thirty-five miles per hour from its intersection with CTH "N" (Veterans Drive), easterly to a point 0.15 miles east of its intersection with Race Track Road.
- (b) County Trunk Highway "AB"
 - (1) **Town of Finis.** Thirty miles per hour from the bridge over the Yahara River located on a line common to sections 13 and 14, Town of Finis, southwesterly to USH 51.
 - (2) **Chestnut Road, City of Centerton.** Thirty miles per hour from the intersection of USH 51, easterly to Droster Road.

Sample municipal ordinance

Section 3. **SPEED LIMITS.** [Towns, Cities, and Villages] The _____ [Council or Village Board] hereby determines that the statutory speed limits on the following streets or portions thereof are unreasonable, unsafe and imprudent and modifies such speed limits as follows:

(1) **SPEED LIMITS INCREASED.** Speed limits are increased as follows upon the following designated streets or portions thereof:

(a) Outlying Districts

45 miles per hour on _____ Avenue between _____ Street and the _____ [City or Village] limits;

(2) **SPEED LIMITS DECREASED.** With the approval of the Wisconsin Department of Transportation, the speed limits are decreased as hereinafter set forth upon the following highways or portions thereof:

(a) Semi-Urban Districts

25 miles per hour on _____ Road between County Trunk _____ and the _____ [City or Village] limits;

30 miles per hour on _____ Road between County Trunk _____ and the limits



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