

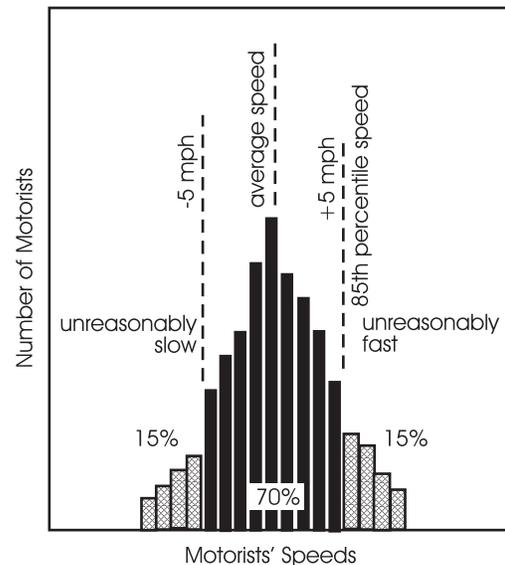
Speed Limits

Establishing safe and reasonable speed limits is an important and sometimes challenging responsibility of a transportation agency. Speed restrictions should advise drivers of limits within which a vehicle can be operated safely under normal conditions and allow sufficient time to react to unexpected conditions. Properly selected speed limits should facilitate efficient traffic flow, reduce violations, and promote safe driving conditions.

Several types of speed control are used on streets and highways. These include statutory limits established by state code, such as in school zones or business districts, other regulatory limits, which are established by the authorities responsible for the road, and advisory speed limits, which are unenforceable recommendations often used in situations such as curves and work zones.

The Code of Iowa, primarily in Chapter 321, describes several statutory speed limits and procedures for altering and establishing more appropriate control when warranted by proper study. To accomplish such a study, it should be assumed that most drivers will operate their vehicles in a reasonable manner, considering such things as road and weather conditions, traffic volumes, adjacent obstructions and distractions. This assumption leads to the theory of “85th percentile speed,” defined as the speed 85% of drivers are moving at or below.

Many studies have shown that despite the posted speed limit on a given section of road, most drivers tend to travel at a speed that is comfortable relative to roadway conditions and, at that speed, the least amount of congestion and crashes will occur. The following graph illustrates a typical distribution of driver speed on a given section of road.



Typical distribution of driver speed

The 70% of drivers who maintain a speed within 5 mph of the average speed, plus the 15% slow drivers, equal the 85th percentile speed. The remaining 15% are exceeding reasonable limits and thus are subjects for enforcement.

85th Percentile Speed

Determining the 85th percentile speed is the first step in establishing a reasonable speed limit for a section of road or street. The 85th percentile speed is usually determined with a radar check for that area, although electronic counters are available and can be downloaded into a computer for analysis. This process is referred to as a “spot speed study,” defined as measuring a sample of vehicle speeds passing a given location over a period of time. This information is then used to estimate the speed distribution of the entire traffic stream. Here are some suggestions for collecting this data:

- Select a location away from the influence of signals, intersections, etc.
- Ensure that the visibility of the observer and

or equipment does not influence driving habits.

- Minimize variables that may affect results, such as curves, rough roads, work zones, adverse weather, or excess traffic flows.
- Conduct the study during off-peak hours.
- Select study vehicles at random, not always the first vehicle in a platoon.
- Collect speeds of commercial vehicles in relation to their approximate percent of total volume.

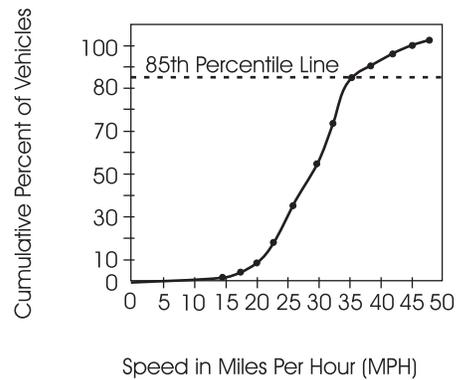
It is usually recommended to collect the speeds of at least 50 and preferably 100 vehicles, half from each direction of travel (on lower volume roads, a lesser number may be used). After data are obtained, analysis can be conducted, starting with creation of a frequency distribution table, as shown in the following figure.

Frequency distribution table

mph (1)	Mid-Point (2)	Frequency (3)	Cum. (4)	% (5)
13–15	14	1	1	1
16–18	17	2	3	3
19–21	20	5	8	8
22–24	23	11	19	19
25–27	26	15	34	34
28–30	29	21	55	55
31–33	32	17	72	72
34–36	35	13	85	85
37–39	38	7	92	92
40–42	41	6	98	98
43–45	44	1	99	99
46–48	47	1	100	100

Column 1 lists the observed speeds in 3 mph increments and column 2 records the midpoint of those speeds, which will be used later in constructing a graph. Column 3 lists the number of vehicles observed at each speed. Columns 4 and 5 indicate the cumulative frequency of these observed speeds in number and percent, respectively.

After the data are displayed in the frequency distribution table, a cumulative speed distribution curve (shown in the following figure) is constructed, using the midpoint speeds from column 2 on the horizontal axis and the cumulative percent from column 5 on the vertical axis. The 85th percentile speed is shown where the plotted curve intersects the 85% line, in this example, 35 mph. The speed limit selected for posting should be rounded to the nearest 5 mph increment.



Cumulative speed distribution curve

Other Factors

In addition to 85th percentile speed, other factors may be considered in selecting the most appropriate posted limit.

Crash History. If a section of street or road has experienced a high frequency of crashes, this data should be analyzed for contributing effects of speed. Lowering or raising the posted limit may be warranted, depending on predominant crash causes.

Traffic Volume. As volumes increase, it becomes more important that most vehicles maintain a similar speed. Adjusting the posted limit may be of assistance.

Roadway Environment and Features. Physical features (undesirable geometrics, poor sight distance, or surface conditions) and environmental factors (schools, residential areas, and large

numbers of pedestrians and/or bicyclists) may influence posted speed limits.

Engineering Judgement. Occasionally, establishment of appropriate speed limits in a given location must be based on judgement and experience. For instance, in very low volume areas where gathering a statistical speed sample is difficult, it may be necessary to base speed limit decisions on impressions from simply driving that section of road.

Selection of the most appropriate speed limit to post can be a challenging responsibility, but proper speed limitations will result in safer and more efficient traffic flow. Setting realistic speed limits is important in inviting driver compliance, allowing effective enforcement, minimizing public antagonism, and reducing crash incidence. In contrast, unrealistic limits fail to reflect behavior habits of the majority of drivers, tend to breed disrespect for all traffic control devices, result in antagonism toward enforcement efforts, create a poor community image for visitors, and increase the potential for crashes and the need for focused enforcement.

Section 2B.15 of the *MUTCD* requires that Speed Limit signs (R2-1) be erected at the point where a change occurs in established speed limitations. Although no specific spacing or interval for Speed Limit signing is included, the *MUTCD* further states that signs be posted beyond major intersections and at other locations where it may be necessary to remind motorists of the established limits. These signs should not be erected until speed limits are officially approved and authorized by the controlling jurisdiction.

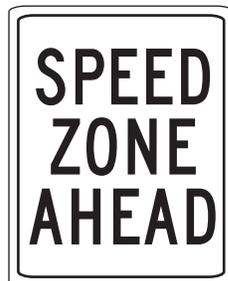
The *MUTCD*, Sections 2B.11 through 2B.16, also describes the proper application of associated speed limitation signing, such as Minimum Speed (R2-4), Speed Zone Ahead (R2-5c), and other specialized signs.



R2-1



R2-4



R2-5c