Rider Education Report

Believe it or not, there is science behind the speed limits that are posted on various roadways. Several factors are used to determine a safe speed limit for a given stretch of road such as:

- Roadway environment:
- Roadway characteristics
- Geographic Context
- Crash experience
- Speed distribution of free-flowing vehicles
- Speed trends
- the 85th percentile

While I think the first six factors are obvious, the seventh may need some explanation. The 85th Percentile Rule is seen as the 'traditional' method of evaluating and setting speed limits. It is based on human behavior rather than data or statistical analysis. This method of setting speed limits suggests most drivers will naturally select the safest speed to travel under normal conditions for a given roadway.

The Manual on Uniform Traffic Control Devices for Streets and Highways defines the standards used by road managers nationwide to install and maintain traffic control devices on all streets, highways, pedestrian and bicycle facilities, and site roadways open to public travel. The 11th edition was adopted with an effective date of January 18, 2024. The MUTCD is published by the Federal Highway Administration (FHWA) under **23 Code of Federal Regulations (CFR), Part 655, Subpart F**

Highways usually have posted minimum speed limits to prevent slower-moving vehicles from triggering safety issues such as rear-end collisions, disrupted traffic flow, and traffic backups. Safe speed limits are chosen to balance safety with traffic efficiency. Unfortunately, most speed limits are reviewed reactively because of roadway changes, policy adjustments, zoning updates, or crash statistics, and after a road or other infrastructure project has been completed.

The legal basis for speed limits typically rests on statutes enacted by state legislatures and local ordinances approved by city or county governments. One of the first speed limits ever recorded was set in 1652. The law was issued in New Amsterdam (now New York) that stated that no "wagons, carts or sleighs shall be run, rode or driven at a gallop." The fine for breaking this speed limit was "two pounds flemish", or about $150 today.

There is a strong correlation between higher speeds and accident severity: a 5% increase in average speed typically leads to a 10% increase in injury and 20% increase in deaths.

Vehicle speed (mph)	Probability of pedestrian fatality (%) *	Probability of pedestrian fatality age ≤ 14 (%)**	Probability of pedestrian fatality age 15 to 59 (%)**	Probability of pedestrian fatality age ≥ 60 (%) **
20	5	1	1	3
30	45	5	7	62
40	85	16	22	92

Source: U.S. Department of Transportation

The suggested speed limits for curvy sections of roadway are determined using the following formula:

$$R_{min} = \frac{V^2}{15(0.01e_{max} + f_{max})}$$

Source: U.S. Department of Transportation

The variables in the above formula are defined as:
R_{min} = minimum radius of curvature (ft (m)).
V = design speed (mph (km/h)).
e_{max} = maximum rate of roadway superelevation (percent).
f_{max} = maximum side friction (demand) factor.

For more formulas about road design considerations:
https://www.fhwa.dot.gov/publications/research/safety/17098/004.cfm?utm_source=chatgpt.com

Your homework assignment this month: Check out the theory, do some practice calculations, then go out and gather some empirical data. You can thank me when you see me.

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