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## SETTING SPEED LIMITS – THE 85<sup>TH</sup> PERCENTILE SPEED

### How are regulatory (posted) speed limits set?

The traffic engineering industry standard utilized in setting the regulatory speed limit for a street uses the “85th percentile speed.” The City of Lincoln collects speed data utilizing radar equipment and analysis methods to calculate the 85th percentile speed, mean speed, pace speed, and other street characteristics such as street function, adjacent land use, and crash experience. The 85th percentile speed is a statistical measure that merits more detailed explanation.

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. Traffic engineers use the 85th percentile speed as a standard to set the speed limit at a safe speed, minimizing crashes and promoting uniform traffic flow along a corridor.

### What influences the 85<sup>th</sup> percentile speed?

With the definition of 85th percentile speed, it would seem that the signed (posted) speed limit of a street would be highly influential in determining the 85th percentile speed, however the exact opposite is the case. A deeper dive into 85th percentile speed helps to reveal why it is a major consideration in determining a street’s posted speed limit.

As described above, the 85th percentile speed defines the speed that 85 percent of drivers will drive at or below under free-flowing conditions. Most people don’t drive according to the posted speed limit, but account for the visual aspects of the street and a ‘feel’ for the street. The visual factors that influence speeds can include:

- Lane and shoulder configurations, widths, and presence of curbs
- Presence of vertical and horizontal curves
- Sight distance and obstructions
- Presence of surrounding developments to the street
- Access management characteristics and medians/turn lane configurations

The ‘feel’ for the street can be as simple as being the regular route that someone drives for years, the travel through a busy commercial area, or driving a route with open access and block by block intersection spacing. With so many factors impacting the speeds on a street, the 85th percentile speed becomes a good metric that can quantify these variables and put them into one useful number.

## How is the 85<sup>th</sup> percentile speed determined?

So how is the 85th percentile speed determined? By the completion of a spot speed study, data is gathered for a sample size of vehicles. As an example, 100 free flowing vehicle speeds are collected over a two-hour period using handheld radar. These speeds are then plotted and analyzed to create reporting statistics, evaluation metrics, and graphical representations such as the following figure:

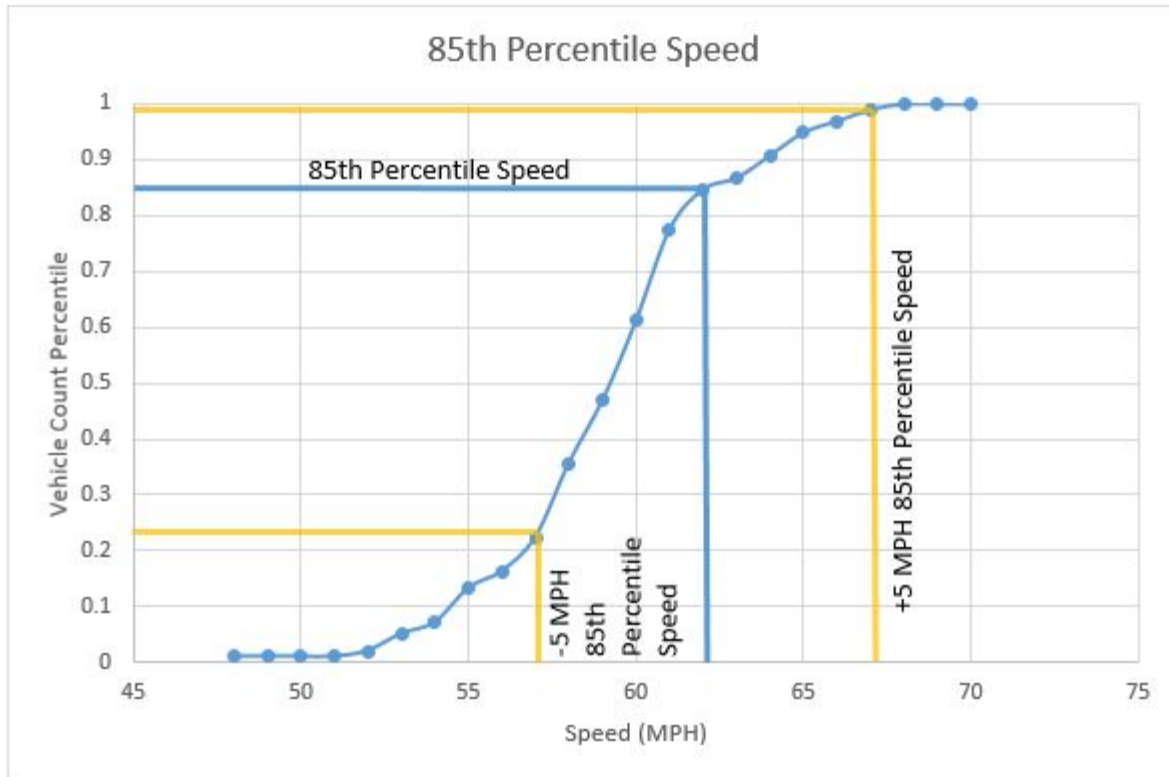


Figure 1: 85<sup>th</sup> Percentile Speed Graph

As illustrated in Figure 1 above, the 85th percentile speed of this segment is roughly 62 MPH (blue line). Using this as the base point, the percent of vehicles traveling up to 5 MPH over and under this speed limit were also checked (yellow lines). As the figure shows, only 23% of the total vehicles on the street were traveling less than 5 MPH below the 85th percentile speed, while less than 2% of vehicles were traveling more than 5 MPH over the 85th percentile speed limit. This means that roughly 75% of vehicles on the segment were traveling within 5 MPH of the 85th Percentile Speed.

This is why the 85th percentile speed is such a large consideration when determining speed limits. If the speed limit is set to the 85th percentile speed, we know that 85 percent of drivers will be driving at or below the speed limit, and that a majority of vehicles will be driving within 5 MPH of the speed limit (75% in our example).

This uniformity of vehicle speeds increases safety and reduces the risks for vehicle collisions. When vehicles deviate from a standard speed, either faster or slower, the potential for crashes increase, whether caused by a slow car in a rear end collision or a fast car completing lane changes to maneuver through slower traffic. By setting the speed limit to the 85th percentile speed this uniformity is achieved and safety is increased. 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, 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, and create a poor community image for visitors, in addition to increasing the potential for crashes