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## 222 SPEED STUDIES

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**ARS §28-702 requires that all posted speed zones be based on an engineering and traffic investigation.**

Speed zoning revisions may be necessary because of highway improvements, roadside development, traffic operational changes, route and milepost changes, or requests. It is important that speed regulations be updated promptly to reflect any revisions to the existing speed zoning.

On new highway alignments or major highway reconstruction projects, such as adding lanes or a divided cross-section, a speed study should be conducted by the TSMO Operational Traffic and Safety Group as soon as practical after all work has been completed and the roadway is open to free-flow traffic. It is important to note that the speed limit represents the maximum speed that should be traveled based on the prevailing conditions of the roadway.

To improve safety and efficiency it is desirable for traffic to be going close to a uniform speed as differential in speeds leads to higher crash potential. Once the roadway is constructed, drivers operate at a speed they determine to be reasonable and prudent, based on their perspective of the roadway conditions usually represented by the 85th percentile speed of free flow traffic. To encourage uniformity in traffic speeds the 85th percentile speed of free flowing traffic is the standard starting point for determining the appropriate speed limit. Several factors may also affect the appropriate speed limit. Analysis of these factors (listed below) in conjunction with the 85th percentile speed provides an accurate representation of traffic operating conditions along any given section of highway and provides a scientific basis for the selection of speed limits:

- A. Pace Speed
- B. Length of section
- C. Alignment
- D. Roadway width and shoulders
- E. Surface condition
- F. Sight distance
- G. Traffic volume
- H. Crash experience/history
- I. Maximum comfortable speed on curves
- J. Side friction (roadside development, parking, bicycle use, and pedestrian activity)
- K. Signal progression.
- L. Other factors

To achieve a comfortable operating speed, a specific location may justify a speed that is lower than the lawful posted speed for a given section of highway, such as an isolated horizontal curve

on an otherwise straight section. Such locations should be treated by the application of appropriate warning signs combined with advisory speed plaques.

In order to achieve these goals of self compliance, increase overall safety, and minimizing speed differentials, speed zoning should incorporate other factors as described in the Manual on Uniform Traffic Control Devices (MUTCD). The FHWA's USLimits2 as an additional resource that may be utilized. USLimits2 shall not be used as a standalone evaluation.

To promote efficiency and still provide an adequate representative sample for speed zone studies, the sample size should be based on the following criteria:

- a. If automatic electrical and/or mechanical devices such as hose or plate counters are selected to collect speed data, procure a sample of vehicles during a 24-hour period for each travel direction.
- b. If a radar or other manually-operated spot speed measuring device is selected to collect speed data, and
  - i. If the average daily traffic (ADT) is under 2000, procure a minimum sample size of 50 vehicles per direction within a maximum time limit of two hours.
  - ii. If the ADT is 2000 and over, procure a minimum sample size of 100 vehicles per direction within a maximum time limit of two hours.

Efforts should be made to disguise or conceal the fact that speeds are being recorded. The data may be distorted due to concern that enforcement activities may be occurring, which may lead to the determination of unrealistically low speed limits. Data collection needs to be as close to the road as possible and in a safe location while using the equipment within the manufacturer recommendations. A speed survey should be made at times of the day when it is possible to measure free-flowing traffic. Free-flowing traffic is defined as a condition when drivers have relative freedom to choose a speed without interference from other traffic. Usually, these conditions do not occur during peak traffic hours, except on low-volume facilities. The first vehicle in a platoon should be used for sampling unless all vehicles are free-flowing. Other vehicles in the platoon should be ignored and not included in the study.

Unpaved roads having a gravel or dirt surface normally should not be speed zoned or posted, due to the high potential for varying roadway conditions. However, a field investigation may be conducted to determine an approximate "reasonable and prudent" speed for a segment of unpaved highway for assessing any potential need for warning signs (see TGP 321).

**By law, speed zones and/or adjustments to existing speed zones shall be established only when a traffic engineering investigation shows roadway conditions to be satisfactory for that speed. Traffic engineering studies recommending new speed zones and/or adjustments to existing speed zones prepared by a registered professional engineer shall be signed and sealed and submitted to the State Operational Traffic and Safety Engineer for approval.**

**Speed Limit sign changes recommended in a traffic engineering investigation shall not be posted until a new speed regulation reflecting these changes has been approved by the State Operational Traffic and Safety Engineer or their designee.**