Western Transportation
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SAFETY AND OPERATIONS PROGRAM

Guidance for Radar Speed Sign Deployments

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Overview

Radar speed signs have seen increased application in recent years in communities across the United States. These devices, which measure (by radar) and display the speed of vehicles passing by, are typically mobile (trailer-based) units or are permanent pole/post-mounted digital display boards. Smaller portable pole/post-mounted displays intended for brief deployments have also recently become available. Such devices are used to reduce traffic speeds by making drivers aware of how fast they are moving relative to the speed limit and inducing them to adjust their speed accordingly. This is considered a "feedback loop", a very effective way of permitting human beings to measure performance against a benchmark by displaying performance.

Typically, the deployment of radar speed signs has been driven by subjective judgment rather than engineering studies. Devices are typically placed where there is a perceived problem with little quantification of the problem itself. Consequently, it was necessary to establish criteria regarding when/how such signage can be deployed and operated to address safety and speed issues effectively. California Department of Transportation (Caltrans) District 2 personnel determined that there was a need to develop such guidance for the use of radar speed signage in their district. This guidance would also be considered applicable to other districts throughout California, and should also be of interest to others outside the state.

Objectives

Radar speed signs are typically deployed on a case-by-case basis and decisions regarding when and where to deploy them are often driven by motives other than engineering studies or hard data. Consequently, the objectives of this research were:

- Establish applicable situations for radar speed sign use (ex. speeding issues)
- Determine whether signs have been effective in similar applications
- Provide guidance on where signs should be located (settings)
- Develop physical and functional specifications for signage (not discussed here)

Past Uses and Effectiveness

One of the approaches taken in developing guidance was to consult the findings of past research. A review of available literature synthesized the results of these studies for use in developing guidance/criteria for consultation and application in California. To a significant extent, previous research studies have examined the impacts of various applications on speeds; studies related to safety were essentially non-existent. Radar speed sign effectiveness for various conditions was:

- Work zone effectiveness :
  - o Trailer: 2-9 mph reduction
  - o CMS/Radar: 2-10 mph reduction
  - o Post-mounted: 3 mph reduction
- School zone effectiveness:
  - o Trailer: 1-5 mph reduction
  - o Permanent sign: 1-9 mph reduction
- Other location (residential, commercial, speed transition zones) effectiveness:
  - o Trailer: 1-5 mph reduction
  - o Permanent sign: 2-8 mph reduction

Image: Turnbull

Existing Information

California MUTCD

- Option
  - o A Vehicle Speed Feedback sign that displays to approaching drivers the speed at which they are traveling may be installed in conjunction with a Speed Limit (R2-1) sign
  - o When used, the Vehicle Speed Feedback sign may be mounted on either a separate support or on the same support as the Speed Limit (R2-1) sign
- Standard
  - o If a Vehicle Speed Feedback sign displaying approach speeds is installed, the legend shall be YOUR SPEED XX
  - o Vehicle Speed Feedback signs shall not alternatively be operated as variable speed limit signs
- Guidance
  - o To the degree practical, numerals for displaying approach speeds should be similar font and size as numerals on the corresponding Speed Limit (R2-1) sign
- Support:
  - o Driver comprehension may improve when the Vehicle Speed Feedback Sign is mounted on the same support below the Speed Limit (R2-1) sign
  - o Vehicle Speed Feedback Signs are appropriate for use with advisory speed signs and with temporary signs in temporary traffic control zones

Development of Guidance

Guidance related to the deployment of radar speed signs under various conditions and metrics were developed based on the review of the information and included:

- o Excessive mean and 85th% speeds
- o School and work zones
- o Safety concerns
- o Transition zones
- o Posed speed noncompliance
- o Pedestrian presence

Two levels of guidance developed: General and Location-specific

- o General guidance – direct use in addressing general concerns (ex. mean and 85th% speeds, ADT, etc.)
- o Location-Specific – direct use in addressing site concerns (ex. school and park zones, work zones, etc.)

Varied distribution of potential sites and different applications precluded extensive site-based performance studies. Rather, existing study results and practitioner feedback were employed along with engineering judgment in developing guidance.

- Consideration of the various application locations made first
  - o Done through literature review and a survey of practitioners in California regarding past and current use of radar speed signs
- N ext factors and characteristics requiring use were considered
- Finally, objective criteria developed to evaluate potential deployments developed

Image: Veneziano

General Guidance

Criteria	Guidance
85th percentile speed	A radar speed sign may be considered when the observed 85th percentile speeds at a site exceed the posted speed limit by 5 mph or more.
Mean speed	A radar speed sign may be considered when the observed mean speeds at a site exceed the posted speed limit by 5 mph or more.
Average daily traffic (ADT)	A radar speed sign may be considered when ADT exceeds 500 vehicles.
Accidents	A radar speed sign may be considered at sites exhibiting a correctable speed-related accident history within a recent time period.
Pedestrians	A radar speed sign may be used at sites with a pedestrian-related accident history.
Posted speed limit	A radar speed sign may be considered in conjunction with other guidance when the posted speed limit at a site is 25 mph or greater.

Location-Specific Guidance

Schools and parks	A radar speed sign may be considered for use within one half (1/2) mile of a school zone or park, and
	A radar speed sign may be considered when the posted speed limit in a school zone or park area is 15 mph or greater, and
	• A radar speed sign may be considered when the 85th percentile speeds in a school zone or park area exceed the posted speed limit by 5 mph or more, or • A radar speed sign may be considered when the observed mean speeds in a school zone or park area exceed the posted speed limit by 5 mph or more, or • A radar speed sign may be considered when ADT exceeds 500 vehicles, or • A radar speed sign may be considered to supplement an advisory or conditional speed limit already in place (e.g., a sign stating: Speed Limit 25 when Children Present)
Street conditions	Transition zones—A radar speed sign may be considered in conjunction with other guidance where a speed transition zone exists (high to low speed limits).
	Curve warning—A radar speed sign may be considered in conjunction with other guidance where a curve speed warning advisory sign exists (high to low speed).
	Signal approach—A radar speed sign may be considered in conjunction with other guidance for high-speed signalized intersection approaches where the speed limit exceeds 45 mph.
Work zones	A radar speed sign may be considered when the posted speed limit in a work zone is 35 mph or greater, and
	• A radar speed sign may be considered when the observed mean speeds in a work zone exceed the posted speed limit by 10 mph or more. • A radar speed sign may be considered when the observed 85th percentile speeds in a work zone exceed the posted speed limit by 10 mph or more. • A radar speed sign may be considered when there have been speed-related accidents in a work zone

Conclusions and Recommendations

Conclusions

- Primary purpose of work was to develop guidance for deployment in a systematic manner
- Past results indicated signs were used in a number of common applications achieved reductions in speeds
- Two levels of guidance developed: General and Location-specific
- General guidance – direct use in addressing general concerns
- Location-Specific – direct use in addressing site concerns
- Systematic deployment based on guidance could lead to better compliance with posted speeds
  - o More uniform application – avoidance of "sign saturation"
- Guidance could be applied nationally based on the fact that it was established using results from studies performed throughout the U.S. and internationally
  - o Local conditions, speed limit criteria and requirements need to be taken into consideration and adjusted before these guidelines are applied

Recommendations

- Evaluate the safety impact of radar speed signage
- Evaluate the proposed guidance as it is applied in the field
- Determine the effectiveness of speed displays, flashing speed displays, flashing speed feedback displays, blank-out signs with any combination of speed or speed feedback display, and other types of displays
- Conduct benefit-cost analyses of various treatments, depending on roadway function and characteristics
- Determine whether placement distances and angles produce more significant speed-reduction results than other strategies

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