

Development of Radar Speed Sign Warrants

David Veneziano, Jared Ye and Larry Hayden
Western Transportation Institute – Montana State University

Ian Turnbull
Chief, Office of ITS Engineering and Support, Caltrans District 2

Kristi Westoby
Chief, Office of Traffic Investigations, Caltrans District 2

Sean Campbell
Caltrans Division of Research and Innovation



MONTANA
STATE UNIVERSITY

College of
ENGINEERING

Western Transportation Institute

Overview

- Introduction
- Objectives
- Past work
- Existing direction
- Development of guidance
- Guidance
- Conclusion(s)



Introduction

- Radar speed signs have seen increased application in recent years
 - Mobile (trailer), permanent (pole) or portable (smaller pole mount)
- Used to reduce traffic speeds
 - Used in school and work zones, residential areas, high-to-low speed transition areas
- Deployment typically driven by subjective judgment rather than engineering studies



Examples



Image source: Veneziano



Image source: Turnbull



Image source: Veneziano

Objectives

- Establish criteria regarding when/how signage can be deployed and operated to address safety and speed issues
 - 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 Work

- Past research/evaluations consulted in developing new guidance
 - Work focused on effectiveness on speeds, negligible safety evaluation
- Speed studies identified a number of specific applications of signage
 - Work zones
 - School zones
 - Other locations – residential, commercial, speed transition zones



Past Work

- Work zone effectiveness
 - Trailer: 2-9 mph reduction
 - CMS/Radar: 2-10 mph reduction
 - Post-mounted: 3 mph reduction
- School zone effectiveness
 - Trailer: 1-5 mph reduction
 - Permanent sign: 1-9 mph reduction
- Other location effectiveness
 - Trailer: 1-5 mph reduction
 - Permanent sign: 2-8 mph reduction



Existing Direction

- California MUTCD

- Option

- 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
 - 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

- If a Vehicle Speed Feedback sign displaying approach speeds is installed, the legend shall be YOUR SPEED XX
 - Vehicle Speed Feedback signs shall not alternatively be operated as variable speed limit signs

- Guidance

- 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:

- Driver comprehension may improve when the Vehicle Speed Feedback Sign is mounted on the same support below the Speed Limit (R2-1) sign
 - Vehicle Speed Feedback Signs are appropriate for use with advisory speed signs and with temporary signs in temporary traffic control zones



Existing Direction

- Enterprise Program warrants transition zones, posted speed adherence and intelligent work zones
- Employed series of questions related to application of interest to determine use
- If responses to more than one question were yes, sign was justified
 - Of interest – specification of 5 miles between signs
- Limitation – no documentation on how guidance was developed



Development of Guidance

- Developed based on past results and existing CA MUTCD information
- Review of past evaluation identified different application types
 - Excessive mean and 85th% speeds
 - School and work zones
 - Safety concerns
 - Transition zones
 - Posed speed noncompliance
 - Pedestrian presence
 - Etc.



Development of Guidance

- Two levels of guidance developed: General and Location-specific
 - Based on past uses identified in literature and through survey of CA practitioners
- General guidance – direct use in addressing general concerns (ex. mean and 85th% speeds, ADT, etc.)
- Location-Specific – direct use in addressing site concerns (ex. school and park zones, work zones, etc.)



General Guidance

- 85th percentile speed - A 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 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 – A sign may be considered when ADT exceeds 500 vehicles
- Accidents – A sign may be considered at sites exhibiting a correctable speed-related accident history within a recent time period
- Pedestrians – A sign may be used at sites with a pedestrian-related accident history
- Posted speed limit – A 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 sign may be considered for use within one half mile of a school zone or park, and
 - A sign may be considered when the posted speed limit in a school zone or park area is 15 mph or greater, and
 - A 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 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 sign may be considered when ADT exceeds 500 vehicles, or
 - A sign may be considered to supplement a conditional speed limit already in place (e.g., a sign stating: Speed Limit 25 when Children Present)



Location-Specific Guidance

- Work zones
 - A sign may be considered when the posted speed limit in a work zone is 35 mph or greater, and
 - A sign may be considered when the observed mean speeds in a work zone exceed the posted speed limit by 10 mph or more
 - A 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 sign may be considered when there have been speed-related accidents in a work zone



Location-Specific Guidance

- Street conditions
 - Transition zones—A sign may be considered in conjunction with other guidance where a speed transition zone exists (high to low speed limits).
 - Curve warning – A sign may be considered in conjunction with other guidance where a curve speed warning advisory sign exists (high to low speed).
 - Signal approach – A sign may be considered in conjunction with other guidance for high-speed signalized intersection approaches where the speed limit exceeds 45 mph



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



Conclusions

- 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
 - More uniform application – avoidance of “sign saturation”



Disclaimer

The contents of this presentation reflect the views of the authors, who are responsible for the facts and the accuracy of the data herein. The contents do not necessarily reflect the official views or policies of the State of California, the California Department of Transportation or the Federal Highway Administration. This information does not constitute a standard, specification, or regulation. This information is not intended to replace existing Caltrans mandatory or advisory standards, nor the exercise of engineering judgment by licensed professionals.



MONTANA
STATE UNIVERSITY

College of
ENGINEERING

Western Transportation Institute

Acknowledgements

- The California Department of Transportation for vision and financial support
- The COATS Steering Committee members for review and input
- University Transportation Centers Program



Questions



MONTANA
STATE UNIVERSITY

College of
ENGINEERING

Western Transportation Institute