On-Pavement Signing

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Description

Pavement marking legends are placed on the roadway to remind drivers of the speed limit or to slow down. Use of wording on the pavement surface is more dramatic than use of signing only, which can get lost in the clutter of a streetscape. On-pavement speed limit markings have been used to reinforce speed limits or to indicate a transition zone (see Figure 1).

Placement

No guidance was found on exactly where on-pavement markings should be placed. However, the use of legends should correspond to vertical signing.

Effectiveness of On-Pavement Curve Signing

Several combinations of on-pavement signings have been previously used to reduce lane departure crashes. These have been applied predominantly on rural two-lane curves. The treatment consists of several variations of a curve sign and other text, such as the speed limit. One study was conducted in Iowa and several studies have been conducted in other states. No studies on use of on-pavement speed limit or other types of on-pavement signing to reduce lane departures were found.

Iowa Studies on Effectiveness of On-Pavement Curve Signing to Reduce Speed

Hallmark et al. (2012) evaluated use of on-pavement markings on two rural two-lane curves in Iowa. The on-pavement treatment consisted of the wording SLOW and a curve arrow sign framed by two bars (see Figure 2). The treatment was placed upstream of the curve in both directions of travel. The team used a thermoplastic product since this material was much more durable than pavement marking paint.

One treatment was applied to a site along County Road (CR) 99 in Des Moines County, Iowa, which has an average daily volume of 780 vehicles per day (vpd) and a tangent speed of 55 miles per hour (mph) with no advisory speed. The second site was along L-20 in Harrison County, Iowa, and has a daily volume of 1,880 vpd with a tangent speed of 55 mph and an advisory speed of 35 mph.

Figure 1. On-pavement speed limit signing along E-18 in Roland, Iowa (Hallmark et al. 2007)
Results of speed analyses are shown in Table 1. As noted, the mean speeds were reduced by 0.7 to 1.8 mph at 1 month after installation and 0.6 to 1.5 at 12 months after.

Similarly, there were changes in 85th percentile speed: -1 to 2 for both 1 and 12 months after installation.

Table 2 shows the change in the fraction of vehicles traveling 5 or more and 10 or more mph over the advisory speed if present or posted speed limit is not present.

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Decreases from 1 to 30 percent in the fraction of vehicles traveling 5 or more mph over the advisory or posted speed limit were found at three locations, and an increase of 32 percent was found at the fourth location at 1 month. Similar decreases were found at 12 months. Decreases in the fraction of vehicles traveling 10 or more mph over the posted or advisory speed were found at three of the locations where data were collected (5 to 61 percent) and an increase resulted at the fourth (26 percent). At 12 months, decreases were also found at three locations (2 to 58 percent) and an increase was noted at the fourth (20 percent).

Other National Studies on Effectiveness of On-Pavement Curve Signing to Reduce Speed

Chrysler and Schrock (2005) examined the effectiveness of pavement markings consisting of words and symbols on reducing speeds in rural highway curves. The researchers tested four different markings: transverse lines, CURVE AHEAD pavement markings (see Figure 3), and CURVE 55 MPH pavement markings. The researchers also tested pavement markings with a curve symbol plus 50 MPH markings at a urban location.

An increase of around 5 mph resulted at the point of curvature (PC) for the CURVE AHEAD signing. Speeds were reduced by one mph for the CURVE 55 mph markings, although an analysis of variance indicated that the difference was not statistically significant. A reduction of 7 mph was reported for the curve symbol plus 50 MPH markings at the urban location (on a divided four-lane highway).

Retting and Farmer (1998) studied the use of pavement markings in the tangent section leading up to a curve and their effects on speed. The researchers conducted this study on a suburban two-lane secondary road in northern Virginia. The study site had a sharp left curve with a 15 mph advisory speed.

The researchers collected before and after data on both a test site and a control site. The researchers used 8-ft white letters spelling SLOW at the test site, along with two white lines perpendicular to the flow of traffic and a left curving arrow (see Figure 4).
Results showed a daytime decrease in mean speed of 1.1 mph and a 5.6 percent decrease in the drivers exceeding the advisory speed by 5 or more mph. At night, a decrease in mean speed of 1.6 mph was observed and 6.1 percent decrease in vehicles traveling 5 mph over the advisory speed. Late night mean speed dropped by 3.4 mph, and drivers exceeding 40 mph dropped by 16.9 percent.

**Studies on Effectiveness of On-Pavement Curve Signing to Reduce Crashes**

No information was available about the crash reduction impacts of on-pavement marking legends.

**Advantages**

- Inexpensive
- Can be implemented rapidly
- No increase in noise
- No impact to emergency vehicles
- No adverse effect on vehicle operation

**Disadvantages**

- Increased maintenance costs
- Not necessarily visible when snow or ice on the roadway

**Appropriateness**

Pavement marking legends are appropriate for most situations. The skid resistance should be considered, particularly as the treatment wears.

**Cost**

Costs depend on materials used (paint versus thermoplastic). The treatment is low cost but long-term maintenance does need to be considered.
References

Chrysler, Susan T. and Steven D. Schrock. Field Evaluation and Driver Comprehension Studies of Horizontal Signing. Report FHWA/TX-05/0-4471-2. Texas Transportation Institute, College Station, TX, 2005.


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