# FEATURE ARTICLES

## "DEER CROSSING" SIGNS MAY PROVE VALUABLE IN REDUCING ACCIDENTS AND ANIMAL DEATHS

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A cooperative study by the Colorado Division of Highways and the Colorado Division of Game, Fish, and Parks concerning accidents involving deer and vehicles was initiated in 1968. The cooperating agencies are now in the process of evaluating procedures and devices that may help reduce the number of deer-vehicle accidents. Some of the devices being evaluated are two types of lighted deer crossing signs. One purpose of this evaluation is to determine the effect of these deer crossing signs on the speed of traffic. A reduction in the speed of traffic after motorists were exposed to one of these warning signs would possibly indicate its effectiveness. However, at this time, other motorist responses have not yet been evaluated.

### STUDY AREA

The study area is located three miles south of Glenwood Springs, Colorado, on State Highway 82. This segment of highway during some years has had the highest frequency of deer-vehicle accidents per mile in Colorado (1). It is a four-lane highway with a posted speed limit of 60 mph. The annual traffic volume was about 1.44 million vehicles in 1970, or a daily average of about 3,953 vehicles. This volume will undoubtedly increase.

### METHODS AND MATERIALS

The first lighted deer crossing sign to be evaluated consisted of a reflectorized yellow, diamond-shaped background with the words "Deer Xing" centered on the sign and lighted with neon tubing. The tubing was covered with a one-quarter-inch sheet of plexiglass.

The second sign to be evaluated was a lighted animated deer crossing sign that had a reflectorized yellow, diamond-shaped background with four silhouettes of deer made of neon tubing lighted in sequence from right to left across

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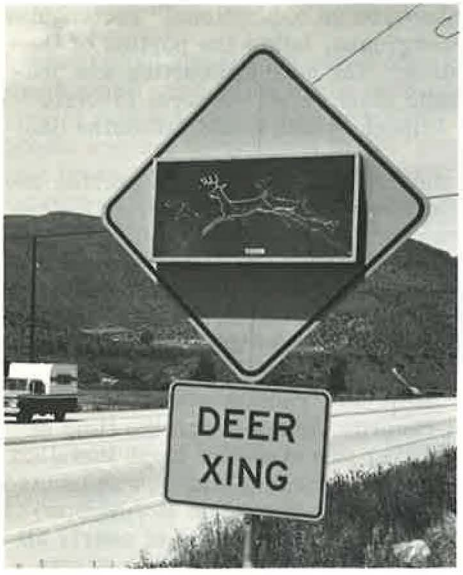
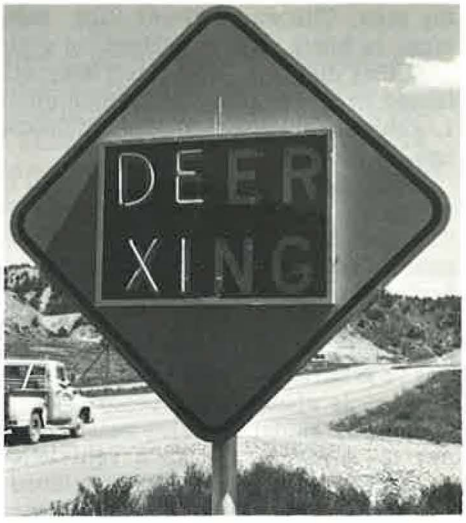
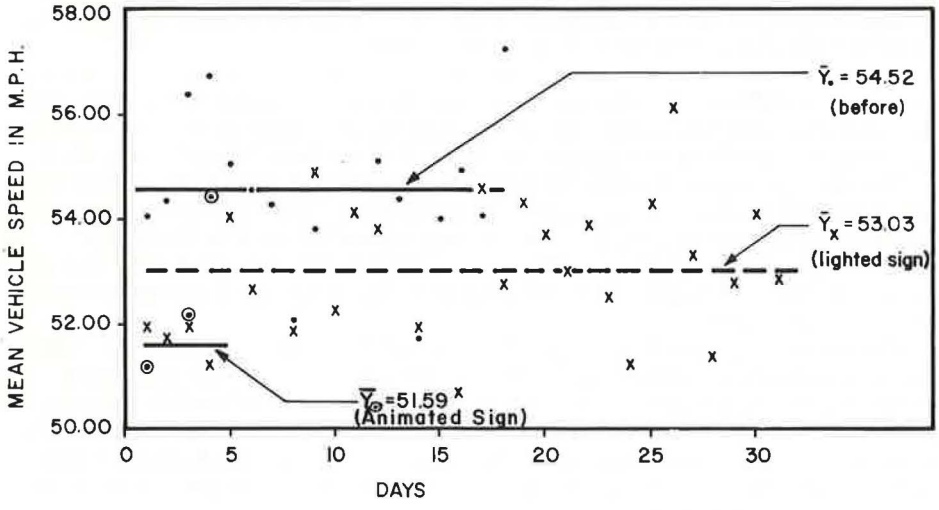



The animated "deer crossing" sign shows deer silhouettes lighted in sequence from right to left (photo by Don Domenick).




A Deer Xing sign with the $^1/_4$-inch plexiglass plate and four neon letters broken by vandals (photo by Don Domenick).




Days of pre-treatment and treatment data for the lighted and the animated deer crossing signs. A fourth point (not shown) for the animated sign is at 48.48 mph.

the sign. The words "Deer Xing" are displayed on an "educational" rectangular sign, in black on a reflectorized yellow background, below the portion of the sign that displays the lighted deer silhouettes. The neon silhouettes are protected by a face plane of $\frac{3}{8}$-inch clear plastic glass (e.g., General Electric Lexan) designed to withstand high-energy impact, which would minimize damage by vandals.

The design of this sign was born from the current trend toward greater use of symbol signs in the new national Uniform Manual on Traffic Control Devices. The four deer silhouettes incorporated features that provided legibility and a gradual and smooth "arc" progression in the animation. Distinctive natural features of the deer silhouettes were emphasized, such as the tail and antlers. Simple construction for minimum maintenance of the electrical equipment was accomplished by the use of a four-circuit primary flasher and four transformers to control the animation.

Vehicle speeds were recorded with an automatic vehicle speed recorder (Newmyer Model NH-1). This instrument records the speed and the time of day on a paper tape as a vehicle crosses over two magnetic loops installed 146.7 feet apart in the traveled lane. The speed-recording station was located 800 feet behind the deer crossing sign. The sign was turned on at 6:30 p.m. and off at 10:00 p.m. every day during test periods. The speeds of nearly all the vehicles that passed the station in the right lane were recorded. Eighty vehicle speeds were randomly selected from this sample for tabulation.

Sixteen days of pre-treatment data were gathered during February 1971. Pre-treatment data consisted of recording vehicle speeds during the above time interval with the sign turned away from traffic. Twenty-eight days of data were collected during March 1971 with the lighted deer crossing sign turned on and four days of data were collected during April 1971 with the lighted animated sign activated. Vehicle speed data were not collected when the highway surface was either wet or snow-packed.

## RESULTS

The $\frac{1}{4}$-inch plexiglass plate and neon tubing of the lighted deer crossing sign proved to be vulnerable to vandalism. Although the sign where the speed evaluation was conducted was not damaged during the evaluation period, other signs of identical design were frequently damaged.

In early 1971 the lighted deer crossing sign was removed from the study area and the lighted animated sign was installed on the same permanent base. The animated sign was turned toward traffic for only four days, and therefore its ability to withstand attempted vandalism has not been adequately tested.

The average speed of vehicles past the recording station with neither sign turned toward traffic nor activated was 54.52 mph. With the lighted deer crossing sign turned toward traffic, the average speed dropped to 53.03 mph. For the four days that the lighted animated sign was turned toward traffic the average speed was 51.59 mph. The differences between all three means are statistically significant ($P < 0.05$).

The mean daily speeds were plotted against the number of days the lighted sign was activated to check for motorist habituation to the sign over time. For the 28-day treatment period, there was no significant relationship between the number of days the sign was on and the speed of traffic. Also, as would be expected, there was no relationship between days and speed during the pre-treatment period. A similar test for the animated sign was not conducted because of the small sample.

## DISCUSSION

The lighted and the animated deer crossing signs caused a significant, although small, reduction in the speed of traffic immediately past the sign. The value of this small average reduction in speed in preventing deer-vehicle accidents was not determined in the present study. Several further questions must be answered before a conclusion in this regard can be reached: For what distance behind the sign is the lower speed maintained? Does lower speed indicate greater awareness and cautiousness of the driver, and therefore, increased safety to both the motorist and the deer? Further evaluation of deer crossing signs will attempt to answer these questions.

The present study, however, did reveal that a lighted deer crossing sign is observed by motorists and the warning heeded, at least to a degree. It also appears that the animated sign initiates a greater response on the part of the motorist than the lighted "Deer Xing" sign.

## REFERENCE

1. Yeager, L. E. (ed.). Colorado Game Research Review. Big Game Research. Published by Colorado Division of Game, Fish, and Parks, 1969, 35 pp.

NOTE: This report was prepared in cooperation with the U.S. Department of Transportation, Federal Highway Administration. The opinions, findings, and conclusions expressed are those of the authors and not necessarily those of the Federal Highway Administration.

# Unusual Prestressed Highway Pavement Built to Serve "TRANSPO 72" Show Near Washington

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Thirty-two hundred feet of prestressed concrete highway pavement was placed during the week of December 1, 1971, on the access road to the Dulles Airport site of TRANSPO 72, the transportation exhibition to be held May 27-June 4, 1972. The A1 Construction Corporation of West Pittston, Pennsylvania, paved the six long prestressed slabs for the general contractor, Shultz Construction Corporation of Reston, Virginia. The concrete was placed with a Maxon spreader and a CMI slipform paver, after which the concrete was hand-finished, dragged with burlap, and textured with a stiff brush.

The wet burlap curing medium was covered with polyethylene and straw to protect the concrete from temperatures that dropped below 20 F during the nights. No problems were encountered other than the normal starting diffi-

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