Speed Reduction in School Zones

Charles V. Zegeer∗  James H. Havens†
Robert C. Deen‡

∗Kentucky Department of Transportation
†Kentucky Department of Transportation
‡Kentucky Department of Transportation
This paper is posted at UKnowledge.
https://uknowledge.uky.edu/ktc_researchreports/877
SPEED REDUCTION IN SCHOOL ZONES

by

Charles V. Zegeer
Research Engineer

James H. Havens
Director

and

Robert C. Deen
Assistant Director

Division of Research
Bureau of Highways
DEPARTMENT OF TRANSPORTATION
Commonwealth of Kentucky

accepted for publication by the
Transportation Research Board

June 1976
The use of flashing beacons together with signing has become somewhat standard throughout the country to alert drivers to the presence of school children and to regulate vehicle speed in school zones. Yellow beacons, usually two flashing alternately, may be used with both warning signs and regulatory signs. The only regulatory signs related to school zones are speed-limit signs. Both hazard identification beacons and speed-limit sign beacons are intended to operate only during hours when the warning and speed regulations are in effect. The effectiveness of signs and flashing lights in reducing speeds in school zones has been questioned.

The purpose of this study was to determine the effectiveness of flasher beacons in reducing vehicle speeds in Kentucky. Speed measurements were made during flashing and non-flashing periods at 48 locations. The physical characteristics of each site were identified and compared to speed reductions. A large sample (120 of 424 school flashers currently maintained by the Bureau of Highways in 33 counties in central, northern, and northeastern Kentucky) was inspected to ascertain their condition and operation. This information was helpful in determining the reliability of the beacons in everyday operation.

In Kentucky, pedestrians between the ages of 5 and 9 represent less than 10 percent of the total population but account for over 16 percent of all pedestrian fatalities. This percentage exceeded all other age groups (1). Of the 167 pedestrian deaths in 1973, there were 27 child fatalities (5 to 9 years old). Approximately 600 children pedestrians (5 to 14 years old) were injured in Kentucky by motor vehicles.

The following findings and conclusions were based on an analysis of physical and geometric features of the sample locations:

Speed reductions attributable to flashers were statistically significant at the 95-percent level at 84 percent of the locations; the average speed reduction was 3.6 mph (1.6 m/s). Seventy-one percent of the locations showed speed reductions less than 4 mph (1.8 m/s). Only two locations yielded speed reductions over 10 mph (4.5 m/s).

The 85th-percentile speeds decreased by about 5 mph (2.2 m/s) for all locations. The higher-speed locations had lower reductions (2 mph (0.9 m/s)) than the low-speed locations (4 mph (1.8 m/s)).

The 85th-percentile speeds at all locations during flashing periods exceeded the 25-mph (11-m/s) limit by about 19 mph (8.3 m/s).

Uniformity of driving speeds was the same at low-speed (25 to 35 mph (11 to 16 m/s)) and medium-speed (36 to 45 mph (16 to 20 m/s)) locations whether the flashers were on or not. However, at high-speed locations (46 to 55 mph (21 to 25 m/s)), a 15-percent drop of vehicles in the 10-mph (4.5-m/s) pace was noted -- indicating that the inter-vehicle accident potential is increased when the flashers are on.
Crossing guards contributed to a drop of vehicle speeds of about 9 mph (4 m/s) and the average speeds were under 25 mph (11 m/s) at four of the five locations. Without the crossing guards at these same locations, the speed reduction averaged only 2.7 mph (1.2 m/s). Crossing guards were stationed at about ten percent of all locations.

Regular speed enforcement in school zones by police agencies caused average speed reductions of 8.4 mph (3.8 m/s) at seven locations.

Speed reductions at high-speed locations were slightly higher than at other locations. However, the average speeds exceeded the 25-mph (11-m/s) limit by about 18 mph (8 m/s) at high-speed locations compared to 9.7 mph (4.3 m/s) and 4.2 mph (1.9 m/s) at medium- and low-speed locations, respectively. Only eight percent of the vehicles traveled below the speed limit when flashers were not operating.

Pedestrian volumes (increasing from 50 to 400 per day) in the school zones contributed to a slight decrease in vehicle speeds (about 2 mph (1 m/s)). Also, school bus volumes (increasing from 0 to 32 buses per day) contributed to a slight decrease in vehicle speeds (about 2 mph (1 m/s)).

Highway width did not appear to affect speed reductions. Short sight distances between motorists and school flashers contributed to the ineffectiveness of flashers at five locations.

Average decreases in speed of less than 1 mph (0.4 m/s) during flashing periods were attributed to traffic volume increases at only two locations.

Signalized or "stop sign" intersections adjacent to or between school flashers resulted in virtually no speed reductions in four of five such locations. Excessively long flashing periods at ten locations resulted in speed reductions of less than 2.6 mph (1.2 m/s). School flashers at three locations, with a recent history of inappropriate flashing, yielded an average speed reduction of only 1.7 mph (0.8 m/s).

Several flasher installations were not warranted because of low pedestrian volumes and low vehicle speeds and volumes. A few continually flashing lights were also found.

Nearly all school flasher locations have favorable as well as unfavorable features which contribute to driver compliance or non-compliance with the 25-mph (11-m/s) speed limit. A single, significant defect can render the flasher ineffective.

About 14 percent of the school flashers were defective or malfunctioned. Major malfunctions included inoperative clocks and defective bulbs or fuses. Other deficiencies included flashers mounted among commercial signing, obstructed view, deteriorating signs, worn pavement markings, non-uniform signs, and erratic flashing periods.
REFERENCE