

Key words: Variable Message Signs, Driver Information Systems

Abstract

The purpose of this study was to investigate how a slippery road VMS (Variable Message Sign) and a headway recommendation VMS affect driver behaviour. The comprehension of these new signs and their functions was also studied.

The slippery road VMS included a slippery road pictogram with a snow flake symbol beneath it and a headway recommendation. The recommendation was assigned to each vehicle and its value depended on vehicle type, speed, and the prevailing road surface condition class. The signs were studied at Eurajoki (highway 8), Kullaa (11) and Koski TL (10). The slippery road VMS was only installed for one driving direction. It was lit by the road weather centre when the road surface condition was classified as possibly slippery. When the center had confirmed the road to be slippery, the VMS was set on a blinking mode. The headway VMS in Eurajoki was on also in good road conditions. Data on behaviour was collected with automatic counters based on loop detectors located well before the VMS, ca. 500 m after them, and further after the VMS, in both driving directions. The other direction was used as control data. Data was collected before and after the implementation of the VMS in different road surface conditions.

When the road was slippery the average speeds decreased significantly about 2 - 4 km/h by the slippery road VMS at every other place than at Koski. The speed reductions were usually larger in slippery than in possibly slippery conditions. The speed reductions were more profound in the dark than in daylight. The speed reductions were observed only at the loop detector stations 500 m after the VMS whereas clear speed reductions could not be identified at the next loop detectors situated between 3 and 14 km after the VMS. We could not observe any significant speed reductions in the control direction. The headway VMS decreased the proportion of headways below 1.5 seconds by 28 - 48 % in good, and by 37 - 47 % in slippery road conditions. The proportion of headways below 1.5 seconds remained unchanged at Kullaa and Koski TL, where there were no headway VMS signs. The headway VMS also reduced driving speeds by ca. 1 km/h in good road conditions.

The signs were in operation in the spring for ca. 1.5 months before the end of wintery road conditions. Of the 149 drivers interviewed, 70 % understood the slippery road VMS correctly and 23 % understood it partly wrongly. Ca. 40 % stated correctly the meaning of the steady VMS display, and 30 % that of the blinking display. The heading VMS was correctly understood by 48 % (n=131) of the drivers whereas 27 % thought that the VMS showed the measured distance to the car in front.

The slippery road VMS signs reduce driving speeds considerably in adverse conditions. Usually even small decreases in average speeds correlate with accident risk reductions. The effect of the VMS does not last very long, although we could not quantify the length of the effect in distance. We also have no knowledge of the effects in longer use. The headway VMS had the expected effect of reducing the proportion of very short headways, and of decreasing driving speeds, too. The drivers had some problems in comprehending the different operation modes of the slippery road VMS, and the headway recommendation. Even so, the headway VMS still seemed to remind most drivers of the importance of maintaining a sufficiently long headway to the car in front.