



Prevent run-off-road crashes, reduce their severity

A safer layout of rural roads can prevent many serious run-off-road crashes. Wider bends or improved delineation of tight bends, profiled acoustic edge markings, trees or obstacles that are fenced off or placed further from the road: these are just some of the measures that can improve safety of especially the 60 and 80 km/h roads. Measures against distraction, fatigue, or risky driving (e.g. speeding) can also prevent run-off-road crashes. These are findings from SWOV research that has recently been published.

Every year, more than 200 fatal run-off-road crashes occur in the Netherlands: one third of the total number of fatal road crashes. In addition, there are another 1,100 run-off-road crashes with serious road injuries. As run-off-road crashes are such a large share of the fatal road crashes, large safety gains can be achieved by reducing their number. That is why in the past much attention was paid to safe roadsides. Despite the (proposed) measures much safety gain can still be made. Especially when one considers that the decrease of the number of fatal run-off-road crashes did not decrease at the same pace as the total number of fatal crashes. Accomplishing a further decline of the number of serious run-off-road crashes, requires understanding of the factors that play a role in the occurrence of run-off-road crashes. Therefore,

SWOV, commissioned by the Dutch Ministry of Infrastructure and the Environment and the Province of Zeeland, carried out two in-depth studies into the factors and circumstances that have an influence on the occurrence and severity of run-off-road crashes.

In-depth study

Between March 2009 and October 2010, SWOV carried out two in-depth studies into run-off-road crashes; a total of 86 run-off-road crashes were studied in detail. Part of these crashes had occurred in the Province of Zeeland, part of them had taken place in the research area of the SWOV team for in-depth investigations: the regions Haaglanden and Hollands Midden. All 86 run-off-road crashes were reconstructed in detail using informa-

tion from inspections of the crash locations, interviews with the drivers who had been involved and inspections of their vehicles. This provided insight in, among other things, what had happened before the crash occurred, the circumstances at the crash location, what the driver was doing and his/her mental and physical condition. Subsequently SWOV determined which factors had played a role in the occurrence and the consequences of the run-off-road crashes, and subdivided the crashes into four subtypes.

Distraction, fatigue and fright

The researchers concluded that in almost 20% of the run-off-road crashes distraction played an important role: the driver had for instance been changing a cd, had reached for something on the floor of the vehicle, or was looking at something that had occurred at the side of the road.

In approximately 25% of the crashes hazardous behaviour played a role. The drivers involved in these crashes were mainly young, inexperienced male drivers who took a bend too fast which

was poorly delineated, or who overtook when this could not safely be done and consequently crashed into a tree or other obstacle.

Fatigue, sleep, or a blackout played an important role in the occurrence of 15% of the run-off-road crashes. In these cases the drivers involved were mainly fairly experienced drivers (under the age of 40) or, on the other hand, senior drivers (over 65). The first group was mostly fatigued, the seniors often seemed to have a medical problem.

Approximately 15% of the run-off-road crashes happened because the drivers reported to have swerved suddenly in reaction to an animal crossing, an approaching vehicle, or to sun glare.

Prevention of crashes

Many run-off-road crashes can be prevented by adjusting the road design. SWOV found that when the driver ran off the road in a bend, that bend often had a tight curve radius. SWOV recommends that the road delineation of these bends should be improved in order to offer better visibility and guidance to the driver.

The application of a profiled, acoustic edge marking or installation of rumble strips to the hard shoulder can also help prevent run-off-road crashes.

Not only adjustments to the road can prevent

run-off-road crashes, one should also consider measures that are aimed at the vehicle or at the driver. Examples are an intelligent speed assistant (ISA) for young novice drivers, electronic stability control (ESC), and public information about the risks of distraction while driving. Indeed, the SWOV in-depth studies have shown that distraction is an important factor in about 20% of the run-off-road crashes.

Finally, drivers should more often ask themselves the question whether they are fit to drive at that specific moment in time. How this so-called state awareness of road users can be improved further, is still to be investigated.

Reduce severity

If, by any chance, it is not possible to prevent a run-off-road crash, the severity of the consequences should be reduced. This can, for example, be done by moving obstacles to outside the emergency and recovery zone, and preferably also outside the minimally required obstacle-free zone, or fencing off or removing these obstacles altogether and by making slopes, ditches, and banks of gulleys more gentle. The most serious injury in run-off-road crashes is sustained when the vehicle hits a tree that is close to the roadside or because the vehicle rolls over. Rolling over is often caused by steep slopes of for instance gulleys.

Apply present guidelines

SWOV believes that the measures concerning the adaptation of the road layout can already be carried out by applying the present guidelines described in the CROW *Handbook for the safe design of roadsides*. SWOV has found that these guidelines had not been applied on many of the roads on which the investigated run-off-road crashes occurred. Although it is not compulsory for road authorities to follow these guidelines, the results of the in-depth studies indicate that it is certainly advisable to give roadsides the layout that is recommended in the abovementioned handbook.

Run-off-road crashes: characteristics, crash scenarios and possible interventions

R. Davidse (red.) (2011). R-2011-24. SWOV, Leidschendam.

In Dutch with an English summary.

Run-off-road crashes in the Province of Zeeland: characteristics and possible solutions

R. Davidse, M. Doumen, K. van Duijvenvoorde & W. Louwse (2011). R-2011-20. SWOV, Leidschendam.

In Dutch with an English summary.