



Photo: Paul Voorham

The EuroRAP RPS method as a safety instrument

The RPS method seems to be a useful instrument for gaining insight in the level of protection that a road offers to vehicle occupants. In addition, the results of an RPS inspection provide indications for road authorities how they can improve separation of driving directions, roadside environment, or the construction of an intersection. These are the conclusions of a SWOV study into the relation between Road Protection Scores (RPS) and the casualty rates at road sections of provincial roads in the Dutch province of Utrecht.

Road Protection Score

The European Road Assessment Programme EuroRAP has developed a method to systematically estimate the extent to which a road's design and layout offer protection to passenger car occupants. If road design and layout are such that possible errors committed by road users do not have serious consequences, that road offers protection to its users. The one road offers more protection than the other. For example, if an individual goes off the road by making a steering error, the chance that this person survives is greater if there are no trees by the road side than if there are. The protection level is expressed in the Road Protection Score (RPS): a star rating with a maximum of four. The RPS method is only useful when there is a clear relation between the number of stars that a road section has been awarded and the

casualty rate of vehicle occupants on those road sections. The first RPS method, version 1.0, only assesses the road features that minimize the severity of car crashes; SWOV studied this version. Meanwhile RPS method version 2.0 has been developed; this version also assesses the road features that prevent the occurrence of crashes.

Study

For provincial roads in the province of Utrecht, the RPS method version 1.0 was used to award stars to the roadside of each road section, to the separation of driving directions of each road section, and to the intersection that is possibly part of a road section. Based on these individual assessments a total assessment was made for each road section. This task, commissioned by the Royal Dutch Touring Club ANWB, was

accomplished by Mobycon consultancy which used a EuroRAP software programme. SWOV then investigated whether the RPS method version 1.0 was valid for the provincial roads in the province of Utrecht: whether a relation could be found between the number of stars that the RPS method had awarded to road sections of those roads and the casualty rates for motor vehicle occupants on these road sections.

Method

First a study was carried out in international literature of the relation between RPS-score and casualty rate. Then SWOV calculated the casualty rate for each road section of provincial roads in the province of Utrecht. This casualty rate was determined by the number of fatalities and serious road injuries among motor vehicle occupants per million motor vehicle kilometres. For the calculations the number of casualties, the lengths of the road sections, and the estimated traffic volumes were used. These estimates were made by the road authority. Roadside crashes, head-on collisions and lateral crashes on intersections during the period 2005-2007 in which motor vehicle occupants

were killed or had to be admitted to hospital, were used to calculate the casualty rate.

Not only for road sections, but also for entire roads (provincial roads with a specific N indication) a possible relation between the number of stars and the casualty rate was investigated. Finally, it was investigated whether the outcome of crashes on road sections with a large number of stars was less serious than the outcome on road sections with fewer stars.

Results

On road sections of provincial roads in the province of Utrecht the casualty rate declined as the number of stars got higher. This was the case for the overall assessment of the road section as well as for the individual assessments of the roadside, the separation of driving directions (single carriageway road sections) and the intersection. It must be mentioned, however, that the variance of the crash rate was very large because of the large number of short road sections on which no serious crashes had occurred. It was therefore impossible to establish a statistically significant relation between the casualty rate and the number of stars. The casualty rate was only significantly lower on four-star intersections than the casualty rates on one and on two-star intersections. However, this does not mean that the RPS method is not valid; the sample was too small and the number of short road sections was too high to allow establishing possible significant differences.

Also on entire roads (N-roads in the province

of Utrecht) does the casualty rate go down when the number of stars for all the road features together gets higher. The same as for road sections, this decline is not statistically significant; in this case this was due to the small number of roads.

The study did not show a relation between injury severity and the star-rating of road sections.

Recommendations

The sample being too small made it impossible to establish whether or not the RPS method version 1.0 is valid. International evaluation studies have found similar results. The method has not been made entirely public, but the available information indicates that the assumptions are plausible. In addition, the literature that was consulted and the present study also point in the same positive direction. Based on the results of the study SWOV recommends the following:

- A follow-up study with a sample consisting of road sections of provincial roads in different provinces should be carried out.
- EuroRAP should make the entire RPS method public; this will make a scientifically customary 'peer review' possible.
- The method should be developed further so that also the crash rates will be expressed in the road assessments; this has already been realized in version 2.0.
- It is not advisable to calculate the overall RPS score on the basis of the prevalence of crash types.

The following SWOV report has been published on this subject:

The relation between Road Protection Scores (RPS) and the casualty rate at road sections in the province of Utrecht. W. Vlakoveld & W. Louwse (2011). R-2011-7. SWOV, Leidschendam.