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A Multi-modal Approach for Highway Assessment

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Abstract
The paper is based on a project carried out to develop a new concept for the assessment of highway performance considering multi-modality, traffic management and ITS. Step by step a single-mode concept like it is used in the Austrian guidelines is extended to a multi-modal transport approach taking into account the capacity and quality of different modes on the road as well as in the corridor. By showing different options of meeting the quality target of road traffic this concept is aiming at a more efficient and cost effective use of traffic infrastructure and supporting the efficient allocation of limited funds.

Keywords: assessment, level of service, multi-modal, traffic management

1 Introduction

The foundation of the concept that is described in this article was laid when the old Austrian Standard for Assessment of Road Design with the notation RVS 3.7 (FSV, 1994) was in a process of revision in 2001. Based on the diagnosis that in Austria like in many other countries the traffic situation could be characterized by growing traffic on the roads, increasing financial problems of rail and stringent infrastructure budgets, the experts of the relevant department of the Ministry of Transport decided that the revision of the Austrian standard evaluating road design should not only result in a mere update based on recent findings concerning the influence of road design parameters on traffic flow and travel speed. Over and above this, it has to be extended to a multi-modal transport approach considering the capacity and quality of different modes on the road as well as in the corridor. This should result in a more efficient and cost effective use of infrastructure on the one hand. On the other hand the new procedure should give a clear structure and transparency to the planning process and so provide a basis for the coordination of transport and land-use planning. In this regard the new standard should also be a tool that supports strategic decisions making on a higher level (Mailer, 2004).

In a tendering procedure Institute for Transport Planning and Traffic Engineering at the University of Technology Vienna (TUW-IVV) was commissioned by the Federal Ministry to do the research that should form the basis for the new standard. The research (Knoflacher, et al., 2008) was supervised by

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an expert committee of the Austrian Association Road and Transport which is preparing and publishing the Austrian road standards.

The author of this article was working at the TUW-IVV at that time and carried out most of the research. The recommendations have not been implemented in the Austrian standard. The standard was updated not before 2012 (FSV, 2012). It now has the notation RVS 03.01.11. However, its method is still similar to that of its predecessor. It is still not multi-modal. Therefore, the concept for revision developed in the research project in general and its multi-modal approach in particular are still up to date, maybe even more today. The findings have been published already e.g. (Mailer, 2004). In presenting the method this paper is based on this publication but updates it by referring to new findings and standards like the *Highway Capacity Manual 2010* (TRB, 2010) and the *Handbuch für die Bemessung von Straßenverkehrsanlagen* (FGSV, 2015) and of course the updated Austrian guideline (FSV, 2012).

2 Mono-modal Road Assessment

The Austrian Standard for Assessing Road Design (FSV, 1994) was and still is (FSV, 2012) based on a typical demand oriented approach. It checks if a given traffic volume that was counted or predicted can pass an existing or projected road section under predetermined conditions. Average travel speed of private car, which is called operational speed (FSV, 1994) or traffic speed (FSV, 2012), serves as primary measure of traffic quality. These speeds are dependent on road design. The standard procedure checks if they exceed a target speed that is dependent on road function (Fig. 1).

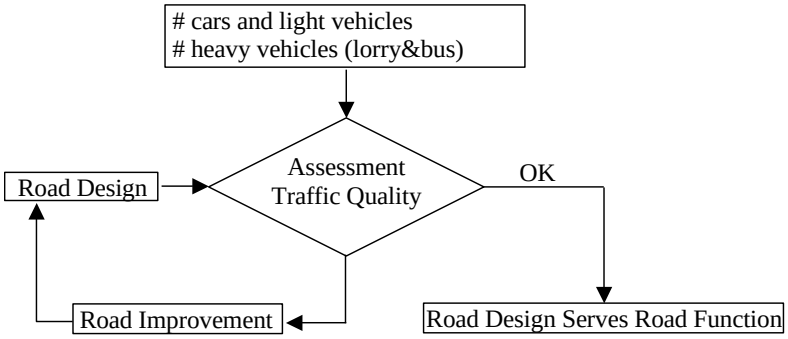

Figure 1: Typical Mono-modal Concept for Assessment of Road Design

In the old Austrian Standard RVS 3.7 the calculation of average car travel speed for road sections in non-built-up areas was based on a traffic volume - travel speed algorithm. This algorithm was considering design parameters such as number of lanes and their width, gradient as well as the load factor, i.e. the ratio of design volume to capacity. The capacity value used, however, did not reflect capacity in the true sense. For computing this value for a rural road segment an algorithm similar to that defined in the third edition of the HCM (TRB, 1985, 1994) for computing (service) flow rates was used. In the old Austrian standard the parameters determining the capacity value were design parameters like number of lanes and their width, curvature, overtaking sight distances as well as the influence of heavy vehicles depending on their proportion in the traffic stream and the gradient. Due to the definition of the corresponding adjustment factors the capacity value included the influence of these parameters on travel speed already. In the current Austrian Standard the influencing factors considered in the calculation of travel speed are very similar even though in line with the