

Influence of Driving Speed on Bearing Capacity Measurement of Intra-Urban Roads with the Traffic Speed Deflectometer(Tsd)

Authors : Pahirangan Sivapatham, Barbara Esser, Andreas Grimmel

Abstract : In times of limited public funds and, in particular, an increased social, environmental awareness, as well as the limited availability of construction materials, sustainable and resource-saving pavement management system, is becoming more and more important. Therefore, the knowledge about the condition of the structural substances, particularly bearing capacity and its consideration while planning the maintenance measures of the subordinate network, i.e., state and municipal roads unavoidable. According to the experience, the recommended ride speed of the Traffic Speed Deflectometer (TSD) shall be higher than 40 km/h. Holding of this speed on the intra-urban roads is nearly not possible because of intersections and traffic lights as well as the speed limit. A sufficient background of experience for the evaluation of bearing capacity measurements with TSD in the range of lower speeds is not available yet. The aim of this study is to determine the possible lowest ride speed of the TSD while the bearing capacity measurement on the intra-urban roads. The manufacturer of the TSD used in this study states that the measurements can be conducted at a ride speed of higher than 5 km/h. It is well known that with decreasing ride speed, the viscous fractions in the response of the asphalt pavement increase. This must be taken into account when evaluating the bearing capacity data. In the scope of this study, several measurements were carried out at different speeds between 10 km/h and 60 km/h on the selected intra-urban roads with Pavement-Scanner of the University of Wuppertal, which is equipped with TSD. Pavement-Scanner is able to continuously determine the deflections of asphalt roads in flowing traffic at speeds of up to 80 km/h. The raw data is then aggregated to 10 m mean values so that, as a rule, a bearing capacity characteristic value can be determined for each 10 m road section. By means of analysing of obtained test results, the quality and validity of the determined data rate subject to the riding speed of TSD have been determined. Moreover, the data and pictures of the additional measuring systems of Pavement-Scanners such as High-Speed Road Monitor, Ground Penetration Radar and front cameras can be used to determine and eliminate irregularities in the pavement, which could influence the bearing capacity.

Keywords : bearing capacity measurement, traffic speed deflectometer, inter-urban roads, Pavement-Scanner, structural substance

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