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The new German Highway Capacity Manual (HBS 2015)

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Abstract
With the introduction of the German Highway Capacity Manual (HBS) in January 2002 (FGSV, 2002), all methods for the evaluation of the performance of highway facilities were, for the first time in Germany, simultaneously updated and consolidated in a single work following the ideas of the American Highway Capacity Manual (HCM). This paper gives an overview of the new 2015 edition of the German HBS and describes the changes as for example the addition of chapters for freeway, rural roads, and major urban street facilities, comprising segments and intersections.

Keywords: Capacity Analysis, Level of Service Concepts, Preliminary Engineering

1 Standing of the HBS in Germany

In Germany in the past, the evaluation of the performance of highway facilities was based on methods that were set out in a number of different technical regulations and thus reflected different states of the art. With the introduction of the German Highway Capacity Manual (Handbuch für die Bemessung von Straßenverkehrsanlagen - HBS) in January 2002 (FGSV, 2002), all methods were, for the first time in Germany, simultaneously updated and consolidated in a single work. Following the concepts of the American Highway Capacity Manual (HCM), the HBS rates the level of service (LOS) using six LOS from A to F.

The basis for the first manual formed the research report from Brilon, Großmann, Blanke (1994) which, although not approved by any committee, was used by practitioners for project design. Being aware of the practical needs a committee was set up within the Forschungsgesellschaft für Straßen- und Verkehrswesen (FGSV) (Road and Transportation Research Association) the German counterpart of the Transportation research Board (TRB). In the FGSV, representatives of the federal government, the federal states and local authorities, institutions of higher education and engineering consultancies work in an unpaid capacity on sets of regulations and technical standards in the field of roads and transportation. This responsible committee finally approved the first German Highway Capacity Manual in 2001.

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In the last decade, the HBS became one of the most successful guidelines from FGSV. Its main application lies at the stage of planning and preliminary engineering in the field of design approval, answering the question if the design of a future or rebuilt facility will be able to cope with the expected demand within an acceptable LOS. The application of the HBS is mandatory for any project within the federal freeway and federal highway network. Therefore, the Federal Ministry of Transport as well as the subsequent Federal Highway Research Institute (BASt) closely cooperates with the FGSV committees where technical standards and guidelines are developed which can be applied on federal trunk roads. This usually applies for so-called 1st category regulations R1. When such a guideline has being drafted, the Federal Ministry of Transport sends the draft for comments to the 16 federal states (Bundesländer) which on behalf of and financed by the federal government construct, maintain, and manage the federal trunk road network. Afterwards, the draft of the guideline is revised considering the remarks and comments from the federal states if necessary or appropriate and finally approved by the responsible committee. The adoption by the Federal Ministry of Transport for the federal trunk roads is accomplished by a so-called Allgemeines Rundschreiben Straßenbau (ARS) (General Circular Road Construction) which is a kind of letter to the federal states asking them to apply the corresponding guideline. The 2001 edition of the HBS e.g. was introduced by ARS No. 10/2002. The ARS is usually integrated on green pages into the corresponding guideline right after the title. Therefore, the technical guideline and the commitment of the Federal Ministry of Transport form a unit. Furthermore, the federal ministry usually recommends the application of the guideline to other road authorities and the road network in their responsibility such as federal state and district roads.

Despite long-term political discussions, up to now there is no federal highway administration in Germany. After the German reunification in 1989, the Deutsche Einheit Fernstraßenplanungs- und -bau GmbH (DEGES) (German Unity motorway planning and construction company) was founded in 1991 with the task to support the new eastern federal states in reconstructing their federal freeway network as quickly as possible. DEGES nowadays serves as central planning, design, and construction service provider for not only the five new federal states but for a total of 12 federal states in Germany which are shareholders of the DEGES. In order to fund construction works in the federal trunk road network a heavy goods vehicles (HGV) toll system was introduced in 2005. The Verkehrs-infrastrukturfinanzierungsgesellschaft mbH (VIFG) (Association for Transport Infrastructure Financing Ltd.) was founded to create an institutional framework for the collection and allocation of the truck toll. It now also serves to manage Public-Private Partnerships (PPP) projects.

The highly efficient German trunk road network currently comprises around 12,900 km of federal freeways and almost 40,000 km of federal highways, making it one of the densest trunk road networks in Europe. Together with 86,000 km of federal state and almost 92,000 km of district roads the highway network of interstate traffic comprises a total of 230,000 km. In 2014 the average daily traffic (ADT) on federal freeways was 48,800 motor vehicles/24 h, with an HGV share of around 14.9 %. On federal highways outside built-up areas the ADT was around 9,650 motor vehicles/24 h, with an HGV share of around 8.3 %.

2 Principles of HBS

The first edition of the HBS has been fundamentally revised and extended within the FGSV by the highway capacity and quality of service committee K3. A total of 12 working groups have been formed to address the various thematic areas within the HBS, with each group developing draft chapters. The revision was based on the lessons learned so far in the application of the current HBS and numerous research projects that have since been concluded or are still ongoing (see references). This made it possible to fill numerous gaps in the current HBS regarding missing cross-sections and intersection types.