



Safety of characteristic subsections of roadwork zones on motorways

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Abstract

Roadwork zones interrupt the flow of traffic and shall reduce the safety of motorways (autobahns), at least in specific sections. Motorways are the fastest roads in the German road network and have the highest level of safety – higher than roads inside and outside built-up areas. Nevertheless, a total of 17,172 accidents involving personal injury occurred on motorways in the year 2011, 1,118 of them at roadwork zones. A total of 18 people were killed and 220 seriously injured. The principal aim of this research project was to find out if either roadwork zones on motorways are more unsafe than other motorway sections or they are specific subsections inside of roadwork zones or near them which are particularly unsafe.

The research project consisted of an analysis of the statistics in the vicinity of all roadwork zones on German motorways (autobahns). Road accidents recorded by the police for a period of at least 12 months at 76 selected roadwork zones and a retrospective accident analysis of 12 completed motorway roadwork zones were macroscopic analyzed. In addition, a microscopic analysis of the accident occurrence was carried out at eight existing roadwork zones with a total length of 57 kilometers and included also the analysis of the driving behavior of car and truck drivers throughout the length of the roadwork zones and/or in characteristic subsections in or near them.

The results of the research project confirm that accidents at roadwork zones on motorways are generally accidents involving minor damage to property. The study shows different accident rates and accident cost rates for some characteristic subsections along the roadwork zone. Nevertheless, there are problem areas in terms of road safety, particularly at the beginning and the end of roadwork zones, lane realignment points, carriageway changeover points and temporary slip roads. These characteristic subsections of roadwork zones have an influence on the road safety. The same applies to the existence of an impact through the type of traffic routing, the length of the roadwork zone or specific road equipment (e.g. road signs with a yellow background).

Keywords: roadwork zone, accidents, road safety, characteristic subsection, motorway

1 Introduction

Roadwork zones interrupt the flow of traffic and shall reduce road safety of motorways, at least in specific sections. However there are discrepancies in the literature about the factors that have an impact on the road safety at motorway roadwork zones. While some studies attribute the reduced level of road safety to roadwork zones as a whole (Lenz et al., 1970; Brühning et al., 1971), others attribute it to specific sections in the vicinity of these roadwork zones, such as lane realignment points, or even to specific parameters such as the angle of realignment (Köppel, 1978).

Motorways (autobahns) are the fastest roads in the German roadwork and have the highest level of safety – higher than either roads inside built-up areas or other roads outside built-up areas. Nevertheless, a total of 17,172 accidents involving personal injury occurred on motorways in the year 2011, 1,118 of them at roadwork zones. A total of 18 people were killed and 220 seriously injured. The accident severity (fatalities per 1,000 accidents involving personal injury) of accidents that occur on sections of motorway without roadwork zones is up to 1.6 times higher than that of accidents that occur at roadwork zones (figure 1).

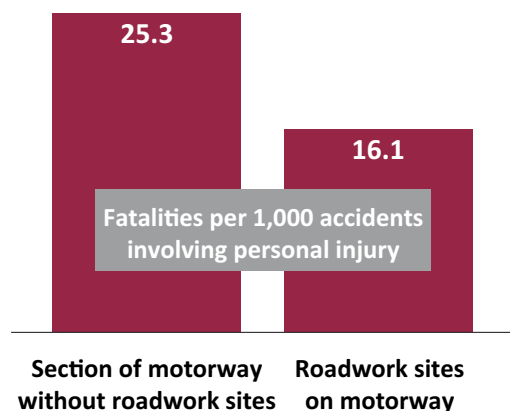


Figure 1: Accident severity on motorways in 2011 (data source: Federal Statistical Office 2012; own calculation)

In 2011, the social economic costs of accidents (accident costs in accordance with M Uko (FGSV, 2012)) on sections of motorway without roadwork zones amounted to €2.2 billion, while those of accidents at motorway roadwork zones amounted to €121 million, which is about 5.4% of the total motorway accident costs. In the period of the analyzed accident occurrence (2006 to 2008), the costs of accidents at motorway roadwork zones accounted for around 5% of the total costs of accidents on motorways (Federal Statistical Office, 2007-2012).

The principal aim of this research project was to find out if either roadwork zones on motorways are more unsafe than other motorways sections or they are specific subsections inside of roadwork zones or near them which are particularly unsafe.

2 Methodology and sample

A three-step approach was chosen for the study:

- **Macroscopic analysis of already completed roadwork zones**

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