Evaluation of the effects of auxiliary lanes on road traffic safety at downstream of U-turns

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Abstract

To assess the safety impact of auxiliary lanes at downstream locations of U-turns, the Traffic Conflict Technique (TCT) was used. On the basis of the installed components at those locations, four types of U-turns were identified: those without any auxiliary lane, those with an acceleration lane, those with outer widening, and those with both an acceleration lane and outer widening. To give relative importance to high severity conflicts, weighting coefficients were used on the basis of the Czech TCT. The Severity Conflict Rate (SCR) was assessed by applying weighing coefficients to the observed conflicts related to the traffic volumes. According to the results, a comparatively highest value of SCR and a lowest level of road safety occurs if a location has no auxiliary lane. The highest level of road safety occurs if the layout includes a single component, either an acceleration lane or outer widening. If there are two components at the downstream zone, this causes larger area for conflict interactions and results in moderate level of road safety.

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1. Introduction

1.1. Road Traffic Crash Trends in Thailand

Road traffic crashes in developing as well as emerging countries tend to be one of the major reasons for fatalities and disabilities. Road traffic injuries take an enormous toll on individuals, communities as well as national economies. Middle-income countries, which are motorizing rapidly, are the hardest hit. The economic growth in Thailand has resulted in an expanding network of roads and an increased number of drivers. The growing number of...
vehicles on the road in turn has contributed to a significant increase in road crashes annually. In Thailand, the road traffic crash problem is regarded as one of the most serious social problems. There were 13,766 reported road traffic fatalities in Thailand in 2010, and the estimated GDP loss was approximately 3% due to road traffic crashes (WHO Committee, 2013). Although there is a declining trend in the number of traffic crashes in Thailand, yet it is high among South-East Asian countries. Figure 1 shows the traffic crash trend in Thailand (Prapongsena et al., 2014).

![Fig. 1. Road traffic crash trend in Thailand (Prapongsena et al., 2014)](image)

### 1.2. Road Safety at Median Openings in Thailand

Median openings (including U-turns) are considered the most road traffic crash–prone locations after straight and curve sections of Thai highways, as illustrated in the Fig. 2.

![Fig. 2. Crash frequency by location on Thai highways (Prapongsena et al., 2014)](image)

Charupa (2011) stated that U-turns are frequently located near the entrance and exit of villages and towns. Often, the various types of U-turns confound unfamiliar drivers. In many areas, U-turns are situated close to each other in order to service the local residence. However, in some areas, U-turns are located far from each other, causing illegal driving such as driving in the wrong direction to reach the closest.
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