Study of Driver Behavior at Entrance Ramps of Expressways in Sri Lanka

Dhammika Ratiyala[1] and Wasantha Mampearachchi[2]

Abstract

Driver behaviour characteristics have a significant influence on the design of an expressway interchange ramp terminal in relation to traffic safety. In general, ramp terminals are more prone to accidents because of their function, which includes traffic merging, diverging, and changing lanes more frequently. These factors increase driving anxiety and lead to more accidents. In addition, due to the adoption of various design standards in various projects, the ramp terminal lengths of Sri Lankan expressways differ from one to another. The primary goal of this research is to examine how drivers behave at the entrance ramp terminal in relation to crucial influencing elements such as vehicle entry speed, ramp terminal entry zone, and expressway through traffic speed at the proximity of the entrance ramp terminal, as well as to examine ways to enhance drivers' behaviour there. Six interchanges, Kerawalapitiya, Kothalawala, Kottawa, Galanigama, Pinnaduwa, and Godagama, were selected for further study based on the variation in acceleration lane lengths among them. The study was conducted utilizing video data from a CCTV camera installed at the Kottawa Interchange on 27th February 2020, and since there was no CCTV camera available at the other five Interchanges, a drone survey was carried out in other places on 14th October 2020. The analysis was carried out based on two important parameters, which were identified through the literature survey: 1. Vehicle entering speed to the expressway and 2. Vehicles entering the zone to the expressway through the entrance ramp terminal. The speed of the vehicles as they enter the expressway is significantly lower than the speed of expressway vehicles, except at Godagama Interchange, according to the analysis. The entry speed into the expressway is 60 kmph on average for all six interchanges. This necessitates a larger space between oncoming expressway traffic and entering traffic using the acceleration lane. Another significant aspect was that the vehicles entering the expressway did not use the expressway acceleration lane as anticipated. At the Kottawa Interchange, a higher percentage of vehicles entering the expressway (20%) was observed beyond the ramp's tapering. In violation of the safety regulations, 27% of vehicles at the Godagama Interchange entered the expressway in the chevron area. When all interchanges are considered, only 50% of the vehicles entered the expressway through the designated zone, while the remaining 50% used the ramp taper, the chevron region, or beyond the ramp taper. The research results support the conclusion that drivers lack the necessary knowledge to use the expressway ramp terminal based on a careful investigation of driver behaviour, including how they enter the expressway and at what speed. In order to educate the drivers before they enter the expressway, The phrase "Prepare for the Expressway Speed" has been selected as the appropriate wording for the signboard as a result of a survey that was conducted among design engineers and experts involved in the field of geometric design of roads in Sri Lanka. Additional variable speed signboards displaying ramp speed to expressway speed along the ramp have been identified as a secondary measure to promote uniform speed at the expressway entrance. Based on the research results, it is recommended to notify drivers of the expected way to enter the expressway through the entrance ramp terminal by signboards, publicity through television programs, or printed media.

Keywords: *Expressway, Entrance Ramp Terminal, Entering Speed, Driver Behavior*

Authors Details.

1. Highway Design Engineer, Department of Civil Engineering, University of Moratuwa dsratiyala@gmail.com

2. Senior Professor, Department of Civil Engineering, Faculty of Engineering, University of Moratuwa. wasanthak@uom.lk