STUDY OF DRIVER BEHAVIOR AT ENTRANCE RAMPS OF EXPRESSWAYS IN SRI LANKA

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Thesis/Dissertation submitted in partial fulfillment of the requirements for the degree

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DECLARATION

I declare that this is my own work and this thesis/dissertation does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other University or Institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text. I retain the right to use this content in whole or part in future works (such as articles or books).

Signature: Date: 07.08.2023

The above candidate has carried out research for the Masters thesis/dissertation under my supervision. I confirm that the declaration made above by the student is true and correct.

Name of Supervisor: Prof. W.K. Mampearachchi

Signature of the Supervisor: Date: 07/08/2023

ACKNOWLEDGEMENT

I would like to express my gratitude to everyone who supported and helped me with this research.

First and foremost, I would like to express my heartfelt gratitude to my supervisor, Prof. W. K. Mampearachchi, for his invaluable guidance, instructions, wayfinding, and encouragement from the selection of the research to its completion. Without his invaluable assistance, I can honestly say that I would not have been able to successfully complete the research and this report.

I would like to express my gratitude to Prof. J.M.S. Bandara and Dr. H.R. Pasindu for all of their instructions and comments that helped me complete this research successfully.

In addition, I would like to thank Eng. L.V.S. Weerakoon, Director General, Road Development Authority; Eng. J.N. Lodwick, former Director, Expressway Operation Maintenance and Management Unit, Road Development Authority; Eng. Thushara Udayasiri and Eng. H.B.N.S. Kumara, Traffic Engineers, Expressway Operation Maintenance and Management Unit, Road Development Authority for providing Closed Circuit Television Data for the Kottawa Interchange and other facilities such as permission to conduct drone survey at five Interchanges and provision of traffic data.

Finally, I wish to offer my sincere appreciation to everyone who helped me in various ways to complete my research and report.

ABSTRACT

Driver behavior 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 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. The research also aims to explore ways to enhance drivers' behavior in this context.

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 utilized video data from a Closed-Circuit Television camera installed at the Kottawa Interchange on 27 February 2020. CCTV cameras were not available at the other five Interchanges; a drone survey was carried out at those locations on 14 October 2020.

The analysis was based on two important parameters identified through a literature survey: 1. Vehicle entry speed to the expressway and 2. Vehicle entry 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% using 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, as revealed through a careful investigation of driver behavior, including how they enter the expressway and at what speed. In order to educate the drivers before they enter to 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 involved in the field of geometric design of roads in Sri Lanka. Additional variable speed signboards displaying from 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 inform drivers about the expected way to enter the expressway through the entrance ramp terminal using signboards, television programs, or printed media.

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

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LIST OF ABBREVIATIONS

Abbreviation	Description
EOM&M	Expressway Operation Maintenance & Management
AASHTO	American Association of State Highway and Transportation Officials
CCTV	Closed Circuit Television
RDA	Road Development Authority

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