DEVELOPMENT OF ROAD SAFETY MANAGEMENT FRAMEWORK FOR THE NATIONAL ROAD NETWORK

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Master of Science (Major Component Research)

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DECLARATION OF THE CANDIDATE & SUPERVISOR

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L.M.K.Rathnayaka Date

The above candidate has carried out research for the master's Dissertation under my supervision.

Name of the supervisor: Prof H.R.Pasindu

10/12/2025
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Prof H.R.Pasindu Date

ACKNOWLEDGEMENT

I am especially indebted to Prof. H. R. Pasindu, Senior Lecturer of the Department of Civil Engineering, University of Moratuwa, who supervised and guided me throughout the whole period of the study and who provided me the academic environment necessary to pursue my research goals. I am very grateful for all the opportunities provided by Prof. H.R. Pasindu to improve my knowledge and gain experience in the vast area of Transportation Engineering. Without that support and guidance, I could not have achieved such success in this study.

I offer my sincere gratitude to Dr. T.W.K.I.M. Dias, Senior Lecturer of the Department of Civil Engineering, General Sir John Kotelawala Defense University, for being my co supervisor and guiding me on the right track throughout this study.

Also, I wish to thank you for the immense support given by the Department of Civil Engineering, University of Moratuwa, and its academic and non-academic staff members. Prof. (Mrs.) Chintha Jayasinghe (Head – Department of Civil Engineering), Prof. J. M. S. J. Bandara, the previous Heads of the Department, were always kind enough to give all the administrative support whenever necessary.

Moreover, special thanks to the staff of the faculty of graduate studies and the library of the University of Moratuwa for their support in finding some research papers.

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ABSTRACT
Development of road safety management framework for the national road network

Road safety is a fundamental aspect of sustainable transportation systems, playing a vital role in protecting human lives, ensuring public well-being, and supporting socioeconomic development. However, many countries face persistent challenges in managing road safety at the national level due to insufficiently structured frameworks, inadequate data utilization, and limited analytical tools for identifying and addressing high-risk road segments. These limitations hinder the ability of road authorities to identify methodologies for effectively identifying critical safety issues, prioritizing high-risk road sections, and implementing targeted interventions within constrained budgets. To address these limitations, it is essential to adopt evidence-based approaches that enable the prioritization of road safety projects while considering financial and operational constraints. Furthermore, identifying long-term funding needs for high-priority safety improvements is crucial for sustaining progress. To achieve substantial progress in reducing road crashes and enhancing overall safety, it is imperative to adopt a structured road safety management framework that integrates systematic assessment procedures, clear operational roles, and accountability at all levels.

The framework begins by identifying the key objectives of the national road safety strategy and developing criteria for road segmentation using fixed or variable lengths based on the available crash data. Then the road segments are initially screened and classified as high-risk road segments through the combined application of comprehensive crash data analysis and appropriate black spot identification method.

This study proposes a comprehensive approach that includes three key road safety assessments: roadway environment assessment (which categorizes the roadside land use context as urban, suburban, or rural), road infrastructure safety assessment (which evaluates safety issues arising from roadway deficiencies), and crash risk assessment (based on historical crash data). The high-risk road segments identified during the initial screening are further evaluated through these three safety risk assessments.

The level of service of each road section (road safety performance) is then evaluated based on the outcomes of each risk assessment, through the development of performance matrices. Finally, a macro-level decision-making matrix and appropriate risk rating method are developed to determine the overall safety performance of the relevant sections. According to the safety management strategy, relevant road agencies and authorities will decide on the safe treatment strategies and the location of safety priorities they can adopt based on their budgetary restrictions.

Keywords: Road Safety, National Road, Road Segmentation, Risk Assessment, Crash data

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

Abbreviation	Description
HIC	High Income Countries
LMICs	Low- and Middle-Income Countries
RSMF	Road Safety Management Framework
WHO	World Health Organization
SDGs	Sustainable Development Goals
RDA	Road Development Authority
PRDA	Provincial Road Development Authority
AADT	Annual Average Daily Traffic
IRR	Infrastructure Risk Rating
ADB	Asian Development Bank
SLADMS	Sri Lankan Accident Data Management System
CSI	Cumulative Safety Index
SPF	Safety Performance Function
HSM	Highway Safety Manual
RSI	Road Safety Index
CMF	Crash Modification Factor
ECDF	Empirical Cumulative Distribution Function
RRI	Risk Rating Index

LIST OF APPENDICES