Traffic Flow and Safety Analysis at Urban Intersection: Selected Study Case

Editors:
Kamarudin Ambak
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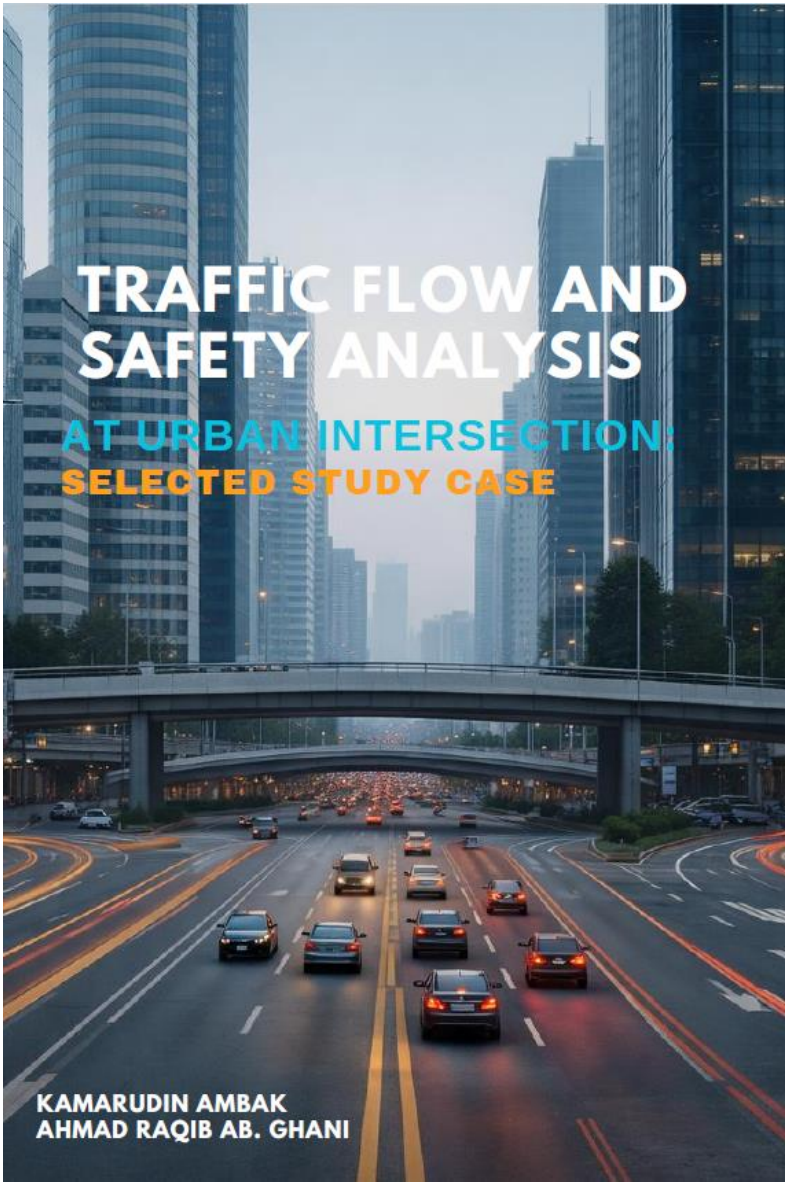
Abstract: In the bustling context of urban planning, this study aimed to address the primary objective of identifying operational failures at signalized intersections, with a specific focus on the chaotic interplay of mixed traffic. The findings painted a stark picture of the limitations inherent in current traffic models. It was observed that the sheer volume of motorcycles disrupted standard "gap acceptance" behaviors, creating unique "dilemma zones" that traditional Highway Capacity Manual (HCM) methodologies overlook. The data revealed that drivers frequently misjudged the approach speed of smaller vehicles during permissive phases, leading to critical conflicts that statistical averages often fail to capture. The contribution of this work lies in its translation of observed chaos into actionable engineering data. By establishing new saturation flow baselines and identifying specific geometric flaws, the study offers more than a summary of traffic counts; it proposes a recalibrated framework for safety audits. Ultimately, it advocates for a specific shift from permissive to protected signal phasing, providing a technical roadmap to reduce accident severity and harmonize the flow of diverse vehicle types in developing urban centers.

Keywords: Signalized intersections, mixed traffic, urban planning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CONTENTS

PREFACE

Urban intersections represent critical nodes within transportation networks, where traffic flow efficiency and road safety are constantly challenged by growing vehicle volumes and diverse user behavior. This book, Traffic Flow and Safety Analysis at Urban Intersection: Selected Study Case, presents five field-based research chapters focused on Malaysian urban intersections. Each chapter explores different traffic-related phenomena-from congestion and signal performance to pedestrian behavior and traffic conflict analysis. The insights gained offer practical implications for urban planning, traffic engineering, and policy formulation. By combining empirical analysis with contextual understanding, this compilation contributes meaningfully to the discourse on sustainable and safer urban mobility in Malaysia. We hope this book serves as a valuable reference for academics, practitioners, and policymakers dedicated to enhancing traffic operations and road safety standards across urban environments.

Kamarudin Ambak
Ahmad Raqib Ab Ghani

CHAPTER 1

TRAFFIC FLOW AND SAFETY ANALYSIS OF TAMAN MELEWAR INTERSECTION

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1.1 INTRODUCTION

The rapid population and economic expansion in Malaysian cities over the past two decades have led to a significant increase in private automobile ownership. Almost every household in Malaysia now owns at least one private automobile, considering it a necessity due to the ease of acquiring a vehicle [1]. However, this surge in the number of registered cars has created transportation challenges, particularly in metropolitan areas, where congestion has become a significant issue [2].

Signalized intersections, known for their complex traffic movements and constantly changing traffic lights, are considered hazardous areas within the road network [3]. The primary cause of traffic congestion on roads is overcrowding, where an excessive number of vehicles saturate the route, disrupting the flow of traffic [4]. This congestion hinders the

CHAPTER 2

FACTOR AND SOLUTION FOR TRAFFIC CONGESTION AT INTERSECTION OF THE TWO-WAY ROAD FROM AYER HITAM TO KLUANG AND TO THE ENTRANCE OF UTHM KAMPUS BANDAR

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2.1 INTRODUCTION

The industrial rapid growth in Malaysia has made roads as the main alternative in connecting parties related to collaboration. Thus, road construction is quite high demand, and the costing often will be an issue as the uses of high-grade aggregate will be in large amounts to ensure the quality of road construction. Road design consists of multiple layers of varying thicknesses, depending on the stresses expected, to sustain the most diverse environmental conditions and remain serviceable for several decades.

Therefore, this study was conducted to study the issues and traffic congestion at the intersection of the two-way road from Ayer Hitam to Kluang and to the entrance of UTHM Kampus

CHAPTER 3

PEDESTRIAN BEHAVIORAL INTENTION TO COMMIT CROSSING VIOLATIONS USING TRAFFIC LOCUS OF CONTROL (T-LOC)

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3.1 INTRODUCTION

Walking is the most basic and straightforward means of transportation. It is an important means of transportation, and pedestrian movement is still a significant part of today's metropolitan transportation networks [1]. A Pedestrian is defined as someone who walks rather than riding in or upon a motor vehicle or other vehicle. [2]. Every year, however, roughly 1.3 million people's lives are cut short because of a car accident. Between 20 and 50 million additional people are affected by non-fatal injuries, with many of them becoming disabled as a result of their injury. Moreover, half of all road traffic fatalities are caused by pedestrians, cyclists, and motorcyclists. [3]. A traffic accident claims the lives of over 1.3 million people every year. Between 20 and 50 million additional people are affected by non-fatal injuries, with many of them becoming disabled because of their injury. Road injuries and fatalities are serious issues in Malaysia, with over 6,000 people

CHAPTER 4

THE SIGNALIZED INTERSECTION PERFORMANCE AND TRAFFIC EMISSION STUDY AT PRESINT 8, PUTRAJAYA

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4.1 INTRODUCTION

A signalized intersection is a kind of intersection control in which traffic signals regulate the flow of traffic on the road. A condition on the road when there are many cars on the roadway owing to a greater demand than the capacity at the same time and location is referred to as traffic congestion. Traffic congestion is most common during the morning and evening rush hours, when road users are traveling to and from work, school, or other institutions, among other destinations. Intersections are crucial components of a highway transportation system since they are the sites where delays, accidents, and pollutants tend to congregate the most often. The timing of the traffic light determines the intersection's traffic flow. The signal timing optimization thereby has an impact on the intersection performance, defining the degree of saturation, the length of the vehicle queue, vehicle delay, and level of service (LOS) intersection performance.

CHAPTER 5

TRAFFIC CONFLICT AT BATU BERSURAT ROUNDABOUT, KUALA TERENGGANU

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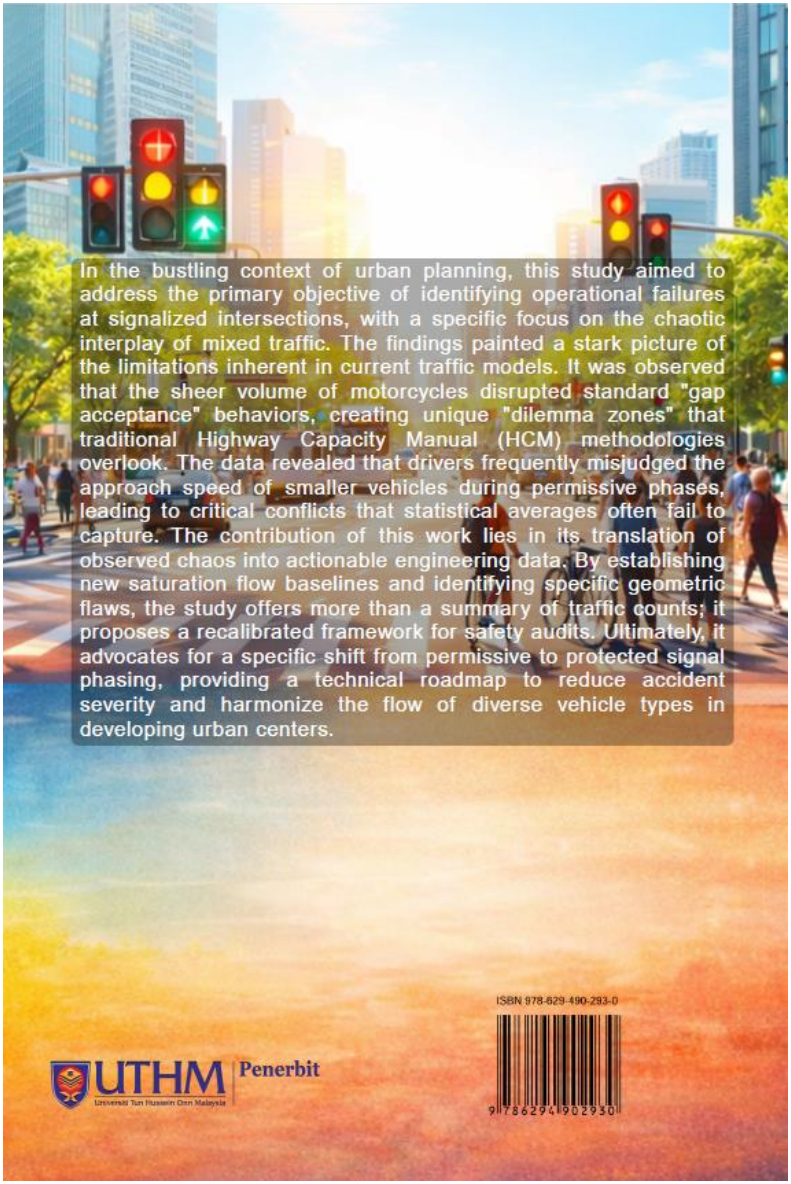
5.1 INTRODUCTION

Roundabouts are a good solution for safety concerns present at the other types of intersections. However, making these roundabouts is not that easy, especially for multi-lane roundabouts to be safe for all ranges of road users, mostly for those with reduced cognitive and physical capabilities such as the older drivers. The features of roundabouts such as advance warning and signage play an important role in determining the driver's performance as they travel around the roundabout. This situation presents a significant safety concern to reduce the serious injuries from occur at or near intersections as many jurisdictions have turned to implementing roundabouts [1].

The aim of this research is to evaluate the roundabout traffic conflict exposure to identify which negotiations contribute the highest conflict exposure. The "drive-around" mode that applied at roundabout are aimed to reduce the conflicts of crossing vehicular. Not only that, but the approach to the roundabout also deflected to a certain degree able to reduce the approaching speed and facilitate weaving and merging maneuvers between



In the bustling context of urban planning, this study aimed to address the primary objective of identifying operational failures at signalized intersections, with a specific focus on the chaotic interplay of mixed traffic. The findings painted a stark picture of the limitations inherent in current traffic models. It was observed that the sheer volume of motorcycles disrupted standard "gap acceptance" behaviors, creating unique "dilemma zones" that traditional Highway Capacity Manual (HCM) methodologies overlook. The data revealed that drivers frequently misjudged the approach speed of smaller vehicles during permissive phases, leading to critical conflicts that statistical averages often fail to capture. The contribution of this work lies in its translation of observed chaos into actionable engineering data. By establishing new saturation flow baselines and identifying specific geometric flaws, the study offers more than a summary of traffic counts; it proposes a recalibrated framework for safety audits. Ultimately, it advocates for a specific shift from permissive to protected signal phasing, providing a technical roadmap to reduce accident severity and harmonize the flow of diverse vehicle types in developing urban centers.

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