

**UNIVERSITI TEKNOLOGI MARA**

**RISK CONTROL FOR HAZARDS OF  
ROAD MAINTENANCE AND  
UPGRADING WORKS TOWARDS  
SOCIAL SUSTAINABILITY**

**MUHAMMAD FADHLI BIN  
OTHMAN**

**MSc**

**February 2025**

## ABSTRACT

Roads are essential for economic advancement and national development. They are crucial for transportation, linking cities, enabling the movement of commodities and individuals, and promoting social connections. Effective road maintenance guarantees safety, comfort, and accessibility for all users, which is essential for social inclusion and improving quality of life. However, numerous complaints over potholes, irregular surfaces, and overall degradation have led to vehicular damage, disturbed traffic flow, and diminished road safety. Moreover, socioeconomic repercussions like accidents, injuries, fatalities, and financial difficulties intensify the issue, affecting social sustainability and the welfare of construction workers engaged in maintenance projects. In 2022, JKR documented a total of 9,342 road-related complaints throughout the year. In response to these issues, the Malaysian government designated substantial resources in Budget 2023, comprising RM2.7 billion for federal roads, RM5.2 billion for state roads, and RM300 million exclusively for contractors in the G1 to G4 classifications. Quotation procurement is used by JKR for managing road maintenance and upgrading works project. The use of quotation procurement lack of requirement for Hazard Identification, Risk Assessment, and Risk Control (HIRARC) processes. Thus, the road maintenance and upgrading works does not required procedure of HIRARC and risk management plan. This result endangers and exposed hazards to workers. Therefore, this research seeks to identify hazards, determined level of risk and recommend risk control related to road maintenance and upgrading works. It aims to provide appropriate risk control in order to improve safety and foster social sustainability. This study is conducted through semi-structured interviews with six expert informants from government agencies and private organizations. The study has identified 98 hazards with 32 (32.65%) high-risk hazards of the overall hazards. Additionally, a total of 201 risk control were recommended to address the identified hazards. This research seeks to benefit government agencies such as Public Work Department or Jabatan Kerja Raya (JKR), Department of Occupational Safety and Health (DOSH), technical organizations, and private contractors in boosting the worker safety by implementing the risk control recommendation of road maintenance and upgrading works towards social sustainability in Malaysia.

## ACKNOWLEDGEMENT

First and foremost, I extend my heartfelt gratitude to God, who has bestowed upon me the strength, wisdom, and opportunity to pursue my Master's degree and successfully navigate this challenging yet fulfilling journey. I am profoundly indebted to my respected supervisor, Associate Professor Sr Dr Asmalia Binti Che Ahmad, and both co-supervisor, Sr Dr. Wan Samsul Zamani Wan Hamdan and Sr Dr. Syed Abdul Haris Syed Mustapa. Their steadfast support, perceptive advice, and ceaseless encouragement have been pivotal in the triumphant completion of this thesis. Their readiness to assist and their unwavering enthusiasm have acted as a guiding light throughout this academic expedition. I extend my heartfelt appreciation to the entire staff of UiTM, whose contributions, both direct and indirect, have been invaluable to the completion of this thesis. A special acknowledgment is due to the dedicated lecturers at the Department of Quantity Surveying, College of Built Environment, UiTM Seri Iskandar. Their relentless support and assistance have been a pillar of strength in this endeavour.

At the core of this journey, my family has been my haven and my steadfast support. I express my profound gratitude to my dear family, especially my treasured mother and father, whose prayers have been my protective armour. My devoted wife, has been my constant source of encouragement and strength, and my siblings have provided spiritual support through their prayers. I also extend my heartfelt gratitude to my parents-in-law, and for their unwavering support and kindness throughout this journey.

I also extend thanks to Jabatan Kerja Raya Negeri Perak for their dedication. Grateful to all who contributed to this journey's success, your collective efforts have enriched this experience and set the stage for future achievements. My sincere thanks also go to the expert informants, whose contributions have been pivotal to the successful conclusion of this journey.

# TABLE OF CONTENTS

	<b>Page</b>
<b>CONFIRMATION BY PANEL OF EXAMINERS</b>	<b>ii</b>
<b>AUTHOR’S DECLARATION</b>	<b>iii</b>
<b>ABSTRACT</b>	<b>iv</b>
<b>ACKNOWLEDGEMENT</b>	<b>v</b>
<b>TABLES OF CONTENTS</b>	<b>vi</b>
<b>LIST OF FIGURES</b>	<b>ix</b>
<b>LIST OF TABLES</b>	<b>x</b>
<b>LIST OF CHART</b>	<b>xiii</b>
<b>LIST OF ABBREVIATIONS</b>	<b>xiv</b>
<b>CHAPTER 1 INTRODUCTION</b>	<b>1</b>
1.1 Overview	1
1.2 Problem Statement	3
1.3 Research Aim	5
1.4 Research Question	5
1.5 Research Objective	5
1.6 Scope of Research	6
1.7 Significance of The Study	10
1.8 Research Flow	11
1.9 Research Design	14
1.10 Research Method	15
1.11 Chapter Outline	16
1.12 Chapter Summary	18
<b>CHAPTER 2 LITERATURE REVIEW</b>	<b>19</b>
2.1 Introduction	19
2.2 Road	21
2.3 Road Development in Malaysia	22

# CHAPTER 1

## INTRODUCTION

### 1.1 Overview

Infrastructure plays a role, as a factor in fostering economic progress and national advancement. Having infrastructure is essential. The impact is the importance of maintaining road infrastructure for the safety and comfort of road users and transportation. (Tanamal et al., 2023). Roads improve access to education, health services, and social amenities, which are vital for the well-being and development of communities (De Vasconcellos, 2001). They enhance mobility for people, enabling them to travel for work, education, and leisure, thus promoting social inclusion and reducing inequalities (Litman, 2002).

Road is essential for facilitating human mobility and economic operations. Road complaints, especially regarding potholes, uneven surfaces, and overall degradation, are common and result in many negative consequences. These encompass vehicular damage, interrupted traffic flow, and jeopardized road safety, as emphasized by Yiu & Writer (2020). In addition to transportation, road degradation also results in considerable environmental consequences. It disrupts habitats, disturbs natural behaviors, and diminishes genetic diversity in animal populations, hence contributing to ecological imbalances (Forman & Alexander, 1998).

Moreover, roads also serve as the backbone of transportation networks, facilitating the movement of goods and people, which is essential for economic development. Graham and Glaister (2003) emphasize that efficient road infrastructure reduces transportation costs and enhances market access, thus stimulating trade and fostering economic growth. Roads play a crucial role in the movement of goods and services, facilitating both domestic and international trade. They provide critical connectivity for rural and urban areas to markets, which is essential for economic growth (Rodrigue et al., 2020). Road shape urban form and accessibility to amenities, influencing social interactions and community cohesion. Accessible roads ensure equal opportunities for all members of society to access essential services, fostering social inclusion and enhancing quality of life.