



**ISRA UNIVERSITY  
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**Master Program in Engineering Project Management**

# **Management of Skid Resistance on Highway Flexible Pavements**

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**By**

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# بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

"يَرْفَعِ اللَّهُ الَّذِينَ آمَنُوا مِنْكُمْ وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ وَاللَّهُ بِمَا تَعْمَلُونَ خَبِيرٌ"

صدق الله العظيم

( المجادلة 11 )

# MANAGEMENT OF SKID RESISTANCE ON HIGHWAY FLEXIBLE PAVEMENTS

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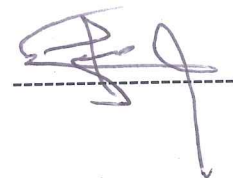
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## ***DEDICATION***

Every challenging work needs self-efforts as well as guidance of elders especially those who were very close to our heart. To my lovely parents whose affection, love, encouragement and prayers of day and night make me able to get such success; to my lovely sisters who continue to support me through words and actions, I thank you for constant support and encouragement; to my lovely baby ,Elien, you are the light of my life. I never knew I could love someone so much. I know my study has taken me away from you for many hours. I also know that one day you will understand why I did this and will hopefully be proud of your mommy for her accomplishments. I want you to know that in the longest hours of this endeavor, your smile, hugs and kisses, and love for life kept me going; to all my friends and colleagues who stood by me and gave me their support; Finally, to my husband Basel, why I chose you to be finally mentioned, because you occupied the largest area of this dedication and you deserve to have this status, finals are always the prettiest and definitely you are. Without your pushing me forward, your nights alone with Elien and your love, I could not have done this. You are an equal part in this accomplishment. Thank you for having faith in me when I began to lose it in myself and for not letting me give up. Thank you for understanding how important this was to me and for supporting me every step of the way. I love you with all that I have.

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***Dania AL-Othman***

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## List of Abbreviations

Symbol	Description
AASHTO	American Association of State Highway and Transportation Officials
ASTM	American Society for Testing and Materials
BPN	British Pendulum Number
BPT	British Pendulum Tester
CRCP	Continuously Reinforced Concrete Pavement
DFT	Dynamic Friction Tester
FHWA	Federal Highway Administration
FNs	Friction Number of Smooth Tire
FNt	Friction Number of Tread Tire
HFS	High Friction Surfaces
HMA	Hot Mix Asphalt
IDOT	Illinois Department of Transportation
JPCP	Jointed Plain Concrete Pavement
JRCP	Jointed Reinforced Concrete Pavement
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
PCP	Prestressed Concrete Pavement
PFM	Pavement Friction Management
PIARC	Permanent International Association of Road Congresses
PSV	Polished Stone Value
SMA	Stone Matrix Aggregate
SRMP	Skid Resistance Management Plan
VIF	Variance Inflation Factor
WFT	Water Film Thickness

# **Management of Skid Resistance on Highway Flexible Pavements**

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## **ABSTRACT**

Skid resistance is one of the major road pavement characteristics, which determines the friction between the road surface and vehicle tire. Skid resistance is important to ensure sufficient road safety. Skid resistance plays very important role especially during wet and rainy conditions.

This study aimed to identify the most important factors that effect on skid resistance to reduce the exposure of vehicles to traffic accidents caused by skid resistance especially in wet weather and to determine the management process to maintain a sufficient level of skid resistance pavement monitoring to reduce time and effort in laboratories tests and to improve rods safety.

Thus, the factors that effect on skid resistance were selected and analyzed using SPSS software, the portable skid resistance tester; British pendulum skid tester was used to measure the surface texture. This research presents a review on the research studies that have been done on characterization of the frictional properties of the pavement surface and discussed methods used for measurement and evaluation of texture characteristics.

The factors that influence friction and the concepts of how friction is determined (based on measurements of surface micro-texture and macro texture) are discussed. Number of different methods and devices, which are currently being used in practice to measure skid resistance both in the laboratories and in-situ in Jordan and outside Jordan was discussed. Also, a discussion of how paving mixtures and type of aggregates can be selected to achieve the design friction level. In this research skid resistance prediction models were performed, such models type of tire, pavement surface texture characteristics, vehicle speed and mixture type. Methods for monitoring the friction of in-service pavements and determining appropriate actions in the case of friction deficiencies (friction management) are described. This research examines how benefits can be accrued from the implementation of a fit-for-purpose local strategy to manage road surface skid resistance.

The results of this study indicate that the management process models were applied to reduce time and effort and to quantify the impacts of these factors on skid resistance and applying skid resistance management process lead to improve Highway safety and reducing accidents, which in term reducing the rate of fatalities.

### **Key words**

Skid resistance, Skid resistance management strategy, British pendulum skid tester, Pavement Friction, Skid resistance prediction models.