جامعة الإسراء
Isra University

Developing Pavement Maintenance and Rehabilitation Management System of Desert Highway in Jordan Using Micro PAVER v. 7.0.9 Software

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The Thesis was submitted in Partial Fulfillment of the Requirements for Master's Degree in Engineering Projects Management

Faculty of Engineering

Isra University

August 2019

Committee Decision

This Thesis (Developing Pavement Maintenance and Rehabilitation Management System of Desert Highway in Jordan Using Micro PAVER v. 7.0.9 Software) was Successfully Defended and Approved on 2019/8/25.

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Authorization Form

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Dedication

الإهداء

إلى من بدعائهما تحققت الأحلامُ وتبددت الصعاب...

إلى الذين أرتكزُ عليهم إذا ضاقت بي الدنيا، حتى تنجلي الأحزانُ وتعمّ الافراح، ببركة دُعائهما وجُهدٍ جهيد... الحبيبةُ أمي الغالي أبي.

إلى الذي تحمل كل شيء دون كللٍ، فكان سنداً واتزان، تجاوزتُ بدعمهِ كل عوائق الطريق، فكان سلوى كل ضيق، أعبرُ بهِ ظلام الطريق، نحو أملٍ مُشرقٍ ومجدٍ كبير... زوجي الحبيب.

إلى من أهداها اللهُ لي أماً بحنانِها، إلى التي أغدقتني عطفاً وحباً حتى أصابت في قلبي القمم ... أم زوجي بل أُمي الثانية، حيثُ يليقُ بها هذا النداءُ العظيم.

إلى الذين لم أوفيهم حقاً ولم أعطيهم ما يستحقون، وقتاً وحناناً، فتحملوا معاناة البُعدِ والاحتياج العظيم... أولادي حيدر وماس.

إلى من دعموني بالحب والدعاء، فخففوا عني حملاً ثقيل ... إخوتي وأخوات.

إلى من أهداهُم الله لي أهلاً عوضوني عن كلّ بعيد.

إلى من أهداهم لي اللهُ دونَ اختيار، فكانوا لي رفقاء الطريق.

إلى كل من قدم دعماً علمياً رائعاً ودُعاءاً متواصلاً عن ظهر غيب، حتى وصلنا إلى ما نطمحُ إليه.

إلى من حق علي ذكرُهم هنا، فلم يُسعفني المقامُ والتفكير.

أُهدي هذا الإجهاد ...

Acknowledgement

Writing this academic work has been a very important part of my life. I would like to thank all those who helped and encouraged me during my study. I greatly appreciate their advice and continual support throughout the completion of this thesis.

First of all, I am highly indebted to my university Supervisor professor Dr. Basim Jrew & Associate Prof. Dr. Majed Msallam as a Co-Supervisor for the cooperation, perceptive remarks, support, kindness, and useful guidance they have continually given me over the period of the study.

I am very grateful to His Excellency the former Minister of Public Works and Housing Professor Mohamed Talib Obaidat for guidance and advice.

My thanks, gratitude and appreciation to the members of the Committee (Prof. Dr. Saad Abo-Qadais and Assistant Prof. Dr. Moawiah Alnsour) for their valuable assistance in reviewing this thesis.

I would also like to thank all my teachers, instructors, and professors in my universities; Anbar University and Isra University. Their support have helped me a lot and helped me to be what I am now.

Lastly, and most importantly, thanks to my friends who were beside me during this period in which I had the honor to meet new and distinguished colleagues from different Arab countries, I wish them all success.

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List of Abbreviations

Abbreviation	Meaning
AASHTO	American Association of State Highway and Transportation Officials
AC	Asphalt Concrete
ADT	Average Daily Traffic
APWA	American Public Works Association
VIV	Video Inspection Vehicle
ASTM	American Society for Testing and Materials
SR	Surface Rating
CDV	Corrected Deducted Value
LCD	Last Construction Date
CPATT	Centre for Pavement and Transportation Technology
DOD	Department of Defense
DV	Deduct Value
ACP	Asphalt Concrete Pavement
PCC	Portland cement Concrete
RCI	Riding Comfort Index
CS	Condition Score
GIS	Geographic Information System
PQI	Pavement Quality Index
HMA	Hot Mix Asphalt
IRI	International Roughness Index
RDI	Rutting Depth Index
M&R	Maintenance and Rehabilitation
SRI	Skid Resistance Index
AUPC	Area Under the Performance Curve
PDIM	Pavement Distresses Identification Manual
PCI	Pavement Condition Index
PMMS	Pavement Maintenance Management System
PMS	Pavement Management System
PSI	Present Serviceability Index
PCR	Present Condition Rating
SCI	Structural Condition Index
TDV	Total Deducted Value
TX/DOT	Texas Department of Transportation
MN/DOT	Minnesota Department of Transportation

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Developing Pavement Maintenance and Rehabilitation Management System of Desert Highway in Jordan using Micro PAVER v. 7.0.9 Software

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Abstract

Highways are both major parts of the transportation infrastructure in Jordan and play a significant role in the development of the local economy and community.

After Extensive study in this field, many problems were found. Initial from shortage in the documentation, weakness in the database and usage, the system was not sufficiently and not flexible to deal with defects. Finally, the system was not effectively helping decision maker in provide right decision.

The main aim of this research is to develop a Pavement Maintenance Management System (PMMS), which provides a systematic process for maintaining, upgrading and operating the pavements and tools to facilitate a more flexible decision-making approach to meet the expectations of highway users.

The system developed has four major components: data collection, analysis, maintenance plan, and implementation. In addition, it is based on the direct integration of Micro PAVER pavement software and ArcGIS mapping software. A case study of about 240 km of Desert highway was inspected to analyze the proposed PMMS. A visual survey was conducted on the field, condition analysis was done and decisions were executed by Micro PAVER software to determine maintenance needs, budgets, and priorities for present and future conditions. Desert highway is considered a major rural arterial consisting of two lanes in each direction with heavy traffic. The selected highway was divided to zone, branch and section. Sampling procedure was selected randomly as input data required in to Micro PAVER computer software.

The updated Micro PAVER v.7.0.9 software was used for the assessment and prediction of the condition of highway pavement and maintenance cost for existing conditions (year of the study-2019), short-term conditions (2019-2023) and medium-term conditions (2019-2028). The study shows that the PCI of the existing conditions was rated as (very poor) with 2, 200, 996. 48$ maintenance cost. The PCI of short-term condition was rated (very poor) with 220, 304, 278. 00$ maintenance cost whereas the PCI of medium-term condition was rated (very poor) with 223, 283, 912. 00$ maintenance cost. The Desert highway network in Jordan needs to be reconsidered for future maintenance plans to improve the quality of its service.

Keyword: PAVER software, Pavement Maintenance Management System (PMMS), Pavement Management System (PMS), Maintenance and Rehabilitation (M&R), Present Serviceability Index (PSI), Geographic Information System (GIS), Pavement Condition Index (PCI), and International Roughness Index((IRI).