شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

HANAA ALY

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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

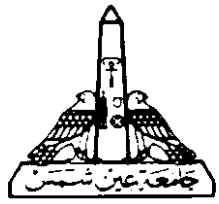
قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

HANAA ALY



Investigating The Factors Affecting Pavement Overlay Service Life

A Thesis
Submitted to the Public Works Department
Faculty of Engineering
Ain Shams University
for the Fulfillment of the Requirements of M. Sc. Degree
In Civil Engineering (Highways and Traffic)

Prepared by
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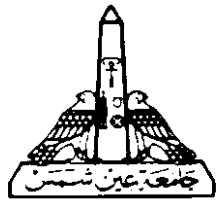
Cairo, 2020



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Date: …../…../ 2020

DEDICATION

This work took a part of my life. I wish to dedicate it to who suffered to educate, prepare and help me to be as I am,

TO MY MOTHER AND MY FATHER

Also, I wish to dedicate my thesis

to my brothers and my sisters

for their encouragement and help to complete this work.

Researcher data

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Statement

This Thesis is submitted to Ain Shams University, Faculty of Engineering, Public works department for the degree of M. Sc. in Civil Engineering (Highways and Traffic).

The work included in this thesis was carried out by the author in the department of Public Works, Faculty of Engineering, Ain Shams University, from 2017 to 2020.

No part of the thesis has been submitted for a degree or a qualification at any other University or Institution.

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Abstract

No doubt, studying the effect of different factors as traffic loading, atmospheric temperature, density of rain fall or precipitation, pavement thickness, etc. on pavement service life is very important to guarantee the completion of pavements design period safely and as it was planned prior construction. Different techniques have been proposed to study the effect of various factors affecting pavement service life. However, most of them are associated with various drawbacks either in historical data availability which is considered as a main part in using empirical methods or in causing damage to pavements as in destructive mechanical methods.

The main objective of this study is to develop a model to study the effect of different factors on pavement service life. This model studies the effect of the following factors: Age before overlay, AC thickness, overlay thickness, age of overlay, international roughness index, equivalent single axle load, temperature, and precipitation. This model objective is to overcome the different drawbacks of both empirical and mechanical methods.

This study relies on (Neuro Solution 6) program to build a network model through which studying the effect of various factors on pavement service life will be accomplished. In this model the pavement survival probability S(t) acts as dependent variable while factors affecting pavement service life as traffic loading, temperature, precipitation, etc.

are the independent variables. Independent variables data for each pavement section are extracted from General Pavement Studies (GPS 6) Experiment which is one of the Long Term Pavement Performance (LTPP) projects while the dependent variable S(t) is calculated using a third degree regression model .

Survival probability S(t) is firstly calculated using Kaplan-Meier analysis, a major drawback in this analysis is that the output data is not described by a known distribution or function. Consequently, A third degree regression model with the aid of MATLAB program is used to best describe Kaplan – Meier output data and be easily used in calculating S(t) for each pavement section used for building the network model.

The results clarify that the Neural Network model is adequate in predicting the influence of various factors on pavement service life. The data extracted from the model can be used to aid in making right decisions for pavement rehabilitation, overlay design, and pavement expenses.

Key words: (Neuro Solution 6) Program, General Pavement Studies (GPS), Long Term Pavement Performance (LTPP).