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Management and Evaluation of Asphalt Concrete Mixtures

(Case Study)

By

Ali Amer Kamal Al-Khafaji

Supervised By

Associate Prof. Dr. Majed Msallam

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COMMITTEE DECISION

This Thesis (Management and Evaluation of Asphalt Concrete Mixtures-Case Study) was successfully Defended and Approved on

Examination Committee	**Signature**
Dr. Majed Msallam (Supervisor) Ph.D., C.E. Associate Prof. of Civil Engineering	----------
Dr. Basim Jrew (Member) Ph.D., Professor of Civil Engineering	----------
Dr. Subhi Bazlamit (Member) Ph.D., P.E. Prof. of Civil Engineering	----------

AUTHORIZATION FORM

I, **Ali Amer Kamal Al-Khafaji**, authorized Isra University to supply copies of my thesis to libraries or establishment or individual on request, according to Isra University regulation.

Signature:

Date:

DEDICATION

This Work is dedicated to my father **Consultant Engineer Amer Kamal Abdul Ameer Al-Khafaji** and my **Mother** for support me all the time in my life and their love.

My wife **Eng. Sarah** and our daughter **May** without whose support this thesis would not have been written.

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Ali Amer Kamal Al-Khafaji

TABLE OF CONTENTS

LIST OF TABLE

TABLE OF FIGURE

LIST OF ABBREVIATIONS

Abbreviation	Meaning
AC %	Asphalt Cement Percentage
AASHTO PP2-99	Mixture Conditioning of Hot Mix Asphalt (HMA)
AASHTO T 166-13	Bulk Specific Gravity of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens
AASHTO T 209-12	Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
AASHTO T 245-14	Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
ADT	Average Daily Traffic
CA %	Course Aggregate Percentage
CMS	Compaction Monitoring System
EAS	Engineering Axis for Studies
ESAL	Equivalent Single Axle Load
FA %	Fine Aggregate Percentage
Filler %	Filler Percentage
Gmb	Bulk Specific Gravity of The Compacted Asphalt Mixture
Gmm	Theoretical Maximum Specific Gravity of Bituminous Paving Mixtures
HMA	Hot Mix Asphalt
HMAC	Hot Mix Asphalt Cement
LTA	Low Temperature Asphalt
MS	Medium Setting
MS-2	Mix Design Method for Asphalt Concrete and Other Hot-Mix Types
OBC	Optimum Bitumen Content
PCC	Portland Cement Concrete
PWD	Public Works Department
R	The Prediction Strength
RAP	Reclaimed Asphalt Pavement
RZ	Restricted Zone
Spec. Grav.	Specific Gravity
SPSS	Statistical Package for The Social Sciences Software
SS	Slow Setting
TMD	Theoretical Maximum Density
TP&PD	Transportation Planning and Programming Division
Va	Volume of Void
VFA	Voids Filled with Asphalt
VIF	Variance Inflation Factor
VMA	Voids In Mineral Aggregate
WMA	Warm-Mix Asphalt
β	Beta Coefficient

EQUATION TABLE

ABSTRACT

Management and Evaluation of Asphalt Concrete Mixture "Case Study"

By: **Ali Amer Kamal Al-Khafaji**

Supervisor: **Associate Prof. Dr. Majed Msallam**

The process of producing and designing good asphalt mixtures based on specifications and standards is not an easy or simple process. In the Hashemite Kingdom of Jordan, asphalt mixtures are designed using Marshall Design Method. Many tests are made to ensure the quality of the asphalt that is used to base highways like the Stability, Flow, Specific Gravity, Air Voids and Voids in the Mineral Aggregate (VMA).

In this study, 142 asphalt mixed samples were used with different amounts of the contents of the mixture (Asphalt Cement, Fine Aggregate, Course Aggregate and Filler) in which 71 samples of the Wearing layers and 71 samples of the Binder layer were already tested as actual data and validated the by SPSS Computer Software to determine the predicted models to estimate the actual data for management process.

The dependent variables are (Stability, Flow, Specific Gravity, Air Voids and Voids in the Mineral Aggregate (VMA). The independent variables are (Asphalt Cement, Fine Aggregate, Course Aggregate and Filler).

The Correlation Coefficient (R^2) of each dependent variables were determined.

The (R^2) for Specific Gravity is (59.8 %), for Air Voids are (76.2 %), for Stability is (74.9 %), for Flow is (90.3 %) and for VMA is (61.0 %) respectively.

A Flow Management Diagram was designed for Actual and Predicted results based on the adjustment factor for each dependent variable.

Key Words Flow, Specific Gravity, Air Voids, Stability, Voids in the Mineral Aggregate (VMA), Variance Inflation Factor (VIF), Hot Mix Asphalt Cement (HMAC), Asphalt Mixed, Marshall Test.