EVALUATING TIME AVAILABLE FOR COMPACTION OF HMA

A.M Kamal Nishantha

(158309P)

Thesis submitted in partial fulfilment of the requirements for the Degree of Master of Engineering

Department of Civil Engineering
University of Moratuwa
Sri Lanka

August 2019

DECLARATION

"I declare that this is my own work and this thesis does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

Also, I hereby grant to University of Moratuwa the non-exclusive right to reproduce and distribute my thesis, in whole or in part in print, electronic or other medium. I retain the right to use this content in whole or part in future works (Such as articles or books).

Signature: Date:

The above candidate has carried out research for the Master thesis under my supervision.

Name of the supervisor: Prof. W.K Mampearachchi

Signature of the supervisor: Date:

EVALUATING TIME AVALABLE FOR COMPACTION OF HMA

Road sector development has rapidly increased in Sri Lanka after the civil war. Asphalt concrete is widely used for the construction of roads due to speedy construction, durability, riding quality and easy to apply compared to other materials.

The primary objective of this research is to find the time available for compaction of hot mixed asphalt concrete with effect of wind velocity, lay down temperature, and ambient temperature. The secondary objective is to check the value 135^0C as the minimum lay down temperature for tropical climates. In this study, cooling time was measured in laboratory and field with different asphalt layer thickness, base temperature, and ambient temperature with different mixtures and lay down temperatures.

According to standard specification for construction and maintenance of roads and bridges, it has specified that the breakdown and the intermediate rolling shall be carried out at temperature not less than 135^0C and 115^0Crespectively. The final rolling shall be completed before the temperature of the mix falls below 90 ^{0}C.

According to the field data, cooling rate at 12.30 pm to 1.30pm was low during day time and that time was more suitable for asphalt laying and also found that HMA lay down temperature below 135^0C was not significantly affected to compaction of HMA because compaction density can be achieved applying more roller passes and compaction effort. But in laboratory test, stability of HMA below 115^0C was contradict to the specification. So that the value of 135^0C not for minimum lay down temperature of HMA and recommended to complete all the compaction process before reaching 115^0C and final rolling complete before 90^0C during day time in western province.

Key words: Temperature of Asphalt, HMA, TAC, Asphalt compaction

ACKNOWLEDGEMENT

I wish to express my sincere gratitude to my supervisor Prof. WasanthaMapearachchi for his inspiring discussions, without which I would not have been successfully complete this thesis. Furthermore, I would thank Prof. WasanthaMapearachchi for his invaluable personal time spent with me through numerous conversations. He has not only taught me how to approach my capstone project; but more importantly, he has provided invaluable insight which will help me in my journey to be a Highway Engineer. He has assisted in my development of large knowledge of Highway engineering concepts and some interesting ideas such as Asphalt.

I am also gratitude to Eng. W.A.S Kumara for his precious comments and guidance throughout this project, which helped me comprehend the basic concept behind many subject matters.

The project coordinator Dr.Dimantha De Silva is to be paid gratitude for encouraging and giving invaluable instructions and coordination.

Also I would like to express my sincere gratitude to my teachers Prof. J.M.S.J Bandara, Dr. H.R Pasindu, Prof. H.S Thilakasiri, and Prof. S.A.S Kulathilaka.

Special thanks go to Eng. SusanthaAttapaththu Material engineer, Road Development Authority for sharing his experience,support provided and invaluable assistance as well as some sample data information.

. I would like to convey my Special thanks to the staff of the Material testing laboratory, Provincial Road Development Authority forgiving support to success of my project.

Finally, I would like to thank all my family members and friends for their continuedand unconditional support and assistance.

TABLE OF CONTENT

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

Abbreviation	Description
HMA	Hot Mixed Asphalt
TAC	Time Available for Compaction
SLS	Sri Lanka Standard
ICTAD	Institute of Construction Training and Development
ABC	Aggregate Base Course
RDA	Road Development Authority
ASSHTO	American Association of state Highway Transport officials