UNIVERSITI TEKNOLOGI MARA

DEVELOPMENT OF HYBRID STRENGTH BRICK CONTAINING BOTTOM ASH

ANUAR BIN ABDL WAHAB

Thesis submitted in fulfilment
of the requirements for the degree of
Master of Science
(Civil Engineering)

Faculty of Civil Engineering

November 2019

ABSTRACT

The field of construction is now expanding widely. Hence, the use of a variety of building materials has greatly increased. One of the building materials involved was brick. Brick consists of a variety of brick commonly used in the construction industry. Sand cement brick was not the main focus of this study. This brick used sand as the main materials for production. This condition causes dependence on the use of materials such as a sand increase in the construction industry. Therefore, an innovation study in producing a new brick known as Hybrid Strength Brick (HSB) is to reduce the dependence of this sand. HSB is a new type and concept brick by three layers with two different strength grades and different materials. It was found that the dependence on sand caused a wide range of alarming environmental problems. Additionally, HSB also uses other wasted materials bottom ash from portion of the incombustible residue of combustion in an incinerator or furnace that burned coals which are usually for production of electric power which is largely generated annually resulting in a lot of storage space required. The manufacture of HSB bricks was layering method where it was the latest brick making method. Through this study, the mixing of the material is designed to obtain the brick that has the appropriate brick characteristics through the established laboratory test. The characteristics are compressive strength, modulus of elasticity, density, water absorption, porosity and initial rate of suction of this brick compared with sand cement brick and bottom ash bricks to identify the existence of factors that affect these characteristics. Then the resulting analysis of this comparison determined the optimum mix for HSB. The finding showed that the optimum mix for this study was the HSB M8, the bricks with different grades strength of bottom ash (BA). Grade 10N/mm^2 of BA used as an outer layer while grade 5N/mm^2 as an inner layer. HSB M8 had the whole acceptable brick characteristics.

ACKNOWLEDGEMENT

In The Name Of Allah, The Most Gracious, The Most Compassionate and The Most Merciful.

Firstly, all thanks and praise are due to Allah S.W.T for making things possible; who give me strengths and inspiration to complete this project paper accordingly.

I would like to place my sense of gratitude to my supervisor, Associate Professor Dr. Mohd Fadzil Bin Arshad and co supervisor, Associate Professor Dr Ahmad Ruslan Bin Mohd Ridzuan as for his valuable guidance, continuous support and encouragement that he has provided to me throughout the completion of this project paper.

I also dedicate my deepest gratitude and love to my wife, Nurul Azizah Abu Bakar. You are my greatest treasure, thousand million thanks for being passionate, understanding, supportive and encouraging all my way.

Also not forgotten to all of my friends, for making life enjoyable and helping me out during my tough time. To those who remain unmentioned thanks are also extended.

Finally, this thesis is dedicated to the loving memory of my very dear father, Abdul Wahab Busu and mother, [redacted] for the vision and determination to educate me. This piece of victory dedicated to both of you. I wish and believe Allah will wish you good faith forever. Thank you.

TABLE OF CONTENT