UNIVERSITY OF NAIROBI

DEPARTMENT OF CIVIL ENGINEERING

TITLE: ASSESSMENT OF THE POTENTIAL USE OF PREFABRICATED FERROCEMENT PANELS IN CONSTRUCTION INDUSTRY

BY: ALEX WAMBUA MUSYOKA

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Abstract

The cost of construction is rising day by day due to increase of basic building materials such as steel, cement, sand, timber and labour. The cost of building using the conventional building materials and construction techniques is high. The overall problem addressed in this research is that timber prices has increased over the years due to the increase in number of construction projects. Due to its high demand, deforestation has occurred and millions of hectares of forests have been destroyed which in turn has led to climatic imbalance, increase in global warming and desertification. Thus it is necessary to come up with alternatives in order to prevent all these devastating effects from happening and in order to ease the pressure on the remaining tree population.

This study presents the results of an investigation aimed at developing reinforced concrete beams consisting of prefabricated U-shaped ferrocement reinforced mortar forms filled with concrete core to be used as a viable alternative to the conventional reinforced concrete beam. Ferrocement is a thin composite made with a cement based matrix reinforced with closely spaced layers of relatively small diameter wire mesh. Over the years applications involving ferrocement have increased due to its properties such as strength, toughness, ductility and environmental stability. Hence, it is an attractive material for construction of housing components because building techniques are simple enough to be done by unskilled labour and the labour costs are low. Ferrocement is boon for maintaining the ecological balance as it does not require timber formwork.

To accomplish this objective, an experimental program was conducted and it comprised casting and testing of 6 beams consisting of permanent precast U-shaped reinforced mortar forms filled with concrete core. One additional typical reinforced concrete beam was also cast to serve as control specimen. Two types of steel meshes were used to reinforce the permanent U-shaped forms; namely coffee tray mesh and chicken mesh. The behaviour of the beams incorporating the permanent forms under flexural loading was compared to that of the control beam.

The experimental results showed that better crack resistance, first crack and ultimate loads could be achieved by using the proposed beams. This verified the validity of using the proposed system. This research proves that use of prefabricated ferrocement panels should be implemented and used in Kenyaôs construction industry since it eliminates use of timber formwork and poses excellent unique properties such as resistance to cracking and is cost effective.