

UNIVERSITI TEKNOLOGI MARA

**STRUCTURAL PERFORMANCE OF STEEL
FABRIC REINFORCED CONCRETE SHORT
WALL PANEL USING CRUSHED CONCRETE
WASTE AGGREGATE**

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Thesis submitted in fulfillment of the requirements
for the degree of
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Candidate's Declaration

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi of MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as reference work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

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ABSTRACT

The Green Building Index (GBI) launched on 21st March 2009 formalised the commitment of the Malaysian Government towards sustainable issues. In line with this, the use of crushed concrete waste aggregate (CCwA) as a coarse aggregate in mix production of wall panel structural element was investigated. This research was conducted to study the behaviour of the steel fabric reinforced concrete short wall panel as IBS component incorporating CCwA replacing the Natural Aggregate (NA). Ten (10) samples were prepared using Grade 30 normal Ordinary Portland Cement (OPC) concrete with water cement ratio of 0.55, measuring 75 mm x 500 mm x 1000 mm (Thickness:Height:Length). The aspect ratio (H/L) and slenderness ratio (H/t) of the wall panel were 0.5 and 6.67 respectively. Two (2) wall panels were prepared with single layer and two (2) wall panels with double layer steel fabric using CCwA as a coarse aggregate. Two (2) more wall panel sample with single and double layers each using Natural Aggregate (NA) as control samples. In addition, four (4) samples (2 single layer and 2 double layers) were tested on fatigue load test to determine the ultimate cycles at failure. The short wall panel was subjected to compressive axial and fatigue load with pinned-fixed end conditions at upper and lower ends. The experimental result shows that all ten (10) wall panels failed in compression shear with crushing at upper and lower end edges of the wall panel. The average ultimate load for single and double layer steel fabric reinforced concrete short wall panel were 1349 kN and 1643 kN respectively. A single curvature crushing crack pattern was dominant for all samples with average maximum lateral displacement for single and double layer of steel fabric reinforced concrete short wall panel were 2.9 mm and 3.8 mm respectively, both occurred at 375 mm (0.7H) wall height. The structural behaviour of reinforced concrete short wall panel using CCwA as a coarse aggregate was similar with wall panel using NA in terms of structure strength capacity, displacement profile, and mode of failure. The percentage of difference between using CCwA and NA in wall panel in term of ultimate strength was decreased by 5.5 % and 6.6 % for single layer and double layer of wall panel respectively. The findings confirmed that the performance of CCwA is as good as NA. The use of CCwA wall panel helps to reduce unnecessary wastages and also prevent depletion of natural resources. Hence, using CCwA wall panels also addresses one of the six key criteria of GBI, which is Material and Resources. "Malaysia is Green".

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