UNIVERSITI TEKNOLOGI MARA

EVALUATION OF WALL-DEEP BEAM CONNECTION USING CCwA UNDER VERTICAL AND LATERAL LOADS

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Abstract

Shear wall are structural vertical member that is able to resist combination of shear, moment and axial load induced by wind load and gravity load transferred to the wall from other structural members. Deep beam recieved loadings from upper shear walls and distribute to the widely spaced columns or deep beams that support the shear walls.

The development of construction industry contributed negative effect to our environment in term of wastage of construction materials. Taking sustainable development into account, the concrete industry needs to apply a variety of strategies concerning future concrete use. Crushed Concrete waste Aggregate (CCwA) was identified as one of the best alternative to replace the natural aggregate. The knowledge on the effectiveness of CCwA as replacement to natural aggregate was inadequate. This research used CCwA as coarse aggregate to replace natural aggregate in the concrete mix wall-deep beam specimen were constructed to investigate the performance of wall-deep beam when using CCwA as course aggregate. This research will be carrying out experimentally.

Two specimen of wall-deep beam were designed and prepared. The deep beam size was 200 x 1000 x 600 (Thickness: Length: Height) and the wall was 70 x 100 x 1000 (width: length: height). This dimension was reduced by half from the actual dimension to fulfill the testing facilities. CCwA was used in full course aggregate as replacement over natural aggregate. One sample was subjected to vertical load and another one was subjected to lateral load.

Under vertical load, the wall tend to fail under crushing whilst the connection is still intact. There were no cracks visible at wall-deep beam connection. The ultimate load and ultimate deflection were 934.62 kN and 3.66 mm respectively. All cracks and failure occured on the wall. It was found that the wall was governed by compression shear failure. Under lateral load, specimen failed at the connection of the wall-deep beam due to flexural. The ultimate moment was 10.17175 kNm and ultimate rotation was 0.088289 radian. It was found that wall-deep beam connection governed by brittle mode failure. Similar behaviour was observed in specimen on the wall-deep beam using natural aggregate.

Keyword: Wall-deep beam, Crushed Concrete waste Aggregate (CCwA), Vertical load, Lateral load.

CANDIDATE DECLARATION

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

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