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FAILURE OF STEEL FABRIC WALL-SLAB CONNECTION UNDER GRAVITY LOAD

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DECLARATION BY THE CANDIDATE

I *SITI AISHAH BINTI ABDULLAH 2007239876* confirms that the work is my own and appreciates credit have been given where reference has been made to the work of others.

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Date : 25 June 2009

ABSTRACT

Steel reinforcement used for concrete structure has assumed a major role in construction industry. Many contractors are looking to replace the steel reinforcement used in reinforced concrete structural elements such as shear wall to steel fabrics because its ability to reduce construction time is also in line with Government emphasis on Industrialized Building System (IBS) – prefabrication and automation in order to solve the increasingly great shortage of construction workers in Malaysia. The performance of the wall-slab connection becomes more important because most of the reinforced concrete failures occur at the connection of the main structure element not because of any inadequacies in analysis of the structure or in the design but because of inadequate to the detailing of reinforcement. The problem becomes more significant in the case of wall-slab connection as there are no specific provisions design code cater for this type of connection.

Analysis of wall-slab connection model can be analyzing using LUSAS of version 14.3 using 3 dimensional models. In this study 5:4 wall to slab thickness ratio, concrete grade 30 N/mm^2, 510 N/mm^2 yield strength of the steel fabric and 460 N/mm^2 yield strength of the ordinary reinforcement were used to the models. While aspect ratio (h/l) and slenderness ratio (h/t) used are 1.5 and 20 respectively. The models were analyzed under vertical load of 35 kN with eccentricity of approximately 600 mm from the face of the wall and about 400 mm to the edge of the slab. The support for the model is fully fixed at the wall ends and pinned at the slab far end.

The analysis shows that the wall-slab connection model using welded steel fabric as reinforcement in structure panel would help to reduce the stresses and strain about fifty percent compared to ordinary reinforcement while in term of displacement and deformation shape it would help the concrete elements to reduce the value of the deformation and displacement value at the connection area about ten percent compare to ordinary reinforcement. Thus, further care has to be taken in detailing the connection to ensure safer behaviour was provided during application of vertical loads. From the deformation shape also clearly show that under applied load, the compression forces develop at the upper part of connection and extended throughout the thickness of the slab causing the steel reinforcement to yield. So by using welded steel fabric with high strength would help to prevent the connection to fail because a welded steel fabric has ability to elongate the reinforcement during yielding.

To a great extend, through this research analysis, it is proved that the finite element program is an excellent method because it can calculate stress of the structural element which is impossible for the engineer to calculate it manually.

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