UNIVERSITI TEKNOLOGI MARA

STRESS ANALYSIS IN STEEL FIBER REINFORCED LIGHTWEIGHT CONCRETE WALL PANEL WITH SQUARE OPENING USING LUSAS

NORADILA BINTI MOHD TAIB

MSc

Jan 2014

AUTHOR'S DECLARATION

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

In the event that the dissertation is to be found to violate the conditions mentioned above, I voluntarily waive the right of confinement of my qualification and agree to be subjected to the disciplinary rules and regulations of Universiti Teknologi MARA.

Name of Candidate	: Noradila Binti Mohd Taib
Candidate I.D Number	: 2011284252
Programme	: Master of Science in Civil Engineering (Structures)
Faculty	: Civil Engineering
Thesis Title	: Stress Analysis in Lightweight Concrete Wall Panel with Square Opening using LUSAS
Signature of Candidate	: ..... 4/3/14 .....

ABSTRACT

Reinforced concrete (RC) wall panel have becoming increasingly popular as load bearing structure member and Construction Industry Development Board (CIDB) play their role by introducing prefabrication technology as the method offers advantage in terms of speed of construction, better quality, easy handling and economical. Steel fiber reinforced lightweight concrete (SFR-LWC) wall panel were introduced in order to replace normal weight concrete towards benefit of reducing self-weight, overall cost of construction and most importantly sustainable. Demands for opening at wall panel are generally for doors, windows and pathway ventilation in which may create stress concentration especially at perimeter opening. In this research paper, wall panel with and without opening was model using the finite element LUSAS 14.7 software. The behavior of load bearing wall and stress concentration factor was evaluated when subjected to direct compression axial load. The model is 2000 mm wide 3000 mm high and 150 mm thick wall with 800 mm width 800 mm height and 150 mm thick size of opening. The SFR-LWC without opening (SW) showed higher ultimate load of 3911.48 kN compared to wall with opening (WO) of 1659.44 kN. The maximum compression vertical and horizontal displacements for SW were 3.43 mm and 0.454 mm respectively, meanwhile for WO was 1.96 mm and 0.031 mm respectively. Single curvature deformation profile is dominant due to applied boundary conditions of pinned at upper end and fixed at lower end. Stress concentration factor for WO is 2.91 focusing at corner. The wall panel with opening were have critical effect on the ultimate load carrying capacity, as the result shown by having opening size area of 11% from the total wall section were reduced the ultimate load carrying capacity by 56% than SW. The addition of steel fiber is superior resistance to cracking and control crack propagation of SFR-LWC as the cracks were appear when the concrete exceeded tensile strength in which stress concentration were develop.

TABLE OF CONTENTS