Ain Shams University
Faculty of Engineering

SHEAR DIAPHRAGM WITH LIGHTWEIGHT CONCRETE FILL

By

KARIM MOHAMMED M. EL-DASH

A Thesis
Submitted in partial fulfillment for the
requirements of the Degree of Master of Science
in Structural Engineering

Supervised by

Dr. MOSTAFA K. M. ZIDAN

Assoc. Prof. of Struct. Eng.
Faculty of Engineering
Ain Shams University

Cairo - 1988

بسم الله الرحمن الرحيم

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Statement

This dissertation is submitted to Ain Shams University for the degree of Master of Science in Structural Engineering .

The work included in this thesis was carried out by the author in the Department of Structural Engineering , Ain Shams University, from October 1986 to November 1988.

No part of this thesis has been submitted for a degree or a qualification at any other University or Institution .

Date : 4/12/1988
Signature : Karim El-Dash
Name : Karim M. M. El-Dash

Examiners Committee

Name and Affiliation | **Signature**

1- Prof. Dr. SAAFAN ABD EL-GAWAG SAAFAN — S. A. Saafan
Professor of Structural Engineering
Faculty of Engineering
Ain Shans University

2- Prof. Dr. EL-SAYED BAHAA EL-DIN MASHALY
Professor of Structural Engineering
Faculty of Engineering
Cairo University

3- Assoc. Prof. Dr. MOSTAFA K. M. ZIDAN — M. Zidan
Associate Professor of Structural Engineering
Faculty of Engineering
Ain Shams University

Date : / /198

To

my mother

and my wife

ACKNOWLEDGEMENT

The author wishes to introduce his favourite thanks and sincere gratitude to Dr. Mostafa K. M. Zidan , Associate Proffessor of Structural Engineering , Ain Shams University , Cairo , for his continuous encouragement , powerful assistance and invaluable efforts during whole the work in the presented thesis .

Also the engineers of Al-Alamia Computer company must be acknowledged for their help to complete this analysis on their devices and for their continuous friendly stand .

ABSTRACT

In the present thesis an analytical study of the elastic behaviour of corrugated steel shear diaphragms with lightweight concrete fill under in-plane forces is investigated using the finite element method through out a comprehensive and powerful computer package which was used to solve the large number of equations of the finite element model , to display the nodal displacements and to obtain the distribution of stresses through the different elements of the model .

The composite diaphragm is simulated in the finite element model by an equivalent orthotropic plate elements . The derivation of the elastic properties of these equivalent orthotropic plate element is given .

A parametric study on the behaviour of the composite diaphragm under different conditions of fastening , and different geometrical and structural parameters is presented .

The effect of using such composite diaphragms as roofs on the structural behaviour and on the internal forces of rectangular steel structures is also presented . A comparison between the use of composite decks and the use

of pure steel diaphragms (without lightweight concrete fill) as roofs of these structures is investigated .

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