TRIBHUVAN UNIVERSITY

INSTITUTE OF ENGINEERING

PULCHOWK CAMPUS

DEPARTMENT OF CIVIL ENGINEERING

M.Sc. Program in Structural Engineering

Thesis no: S00101

ANALYTICAL STUDY OF INFILL BRICK MASONRY WALL WITH OPENING UNDER IN-PLANE LATERAL LOAD

JIBENDRA MISRA

March- 2009

CERTIFICATE

This is to certify that the work contained in this thesis entitled “Analytical Study of Infill Brick Masonry Wall With Opening Under In-Plane Lateral Load”, in partial fulfillment of the requirements for the degree of Master of Science in Structural Engineering, as a record of research work, has been carried out by Mr. Jibendra Misra (061/MSS/r/103) under my supervision and guidance in the institute of Engineering, Pulchowk Campus, Lalitpur. The work embodied in this thesis full fills the requirements relating to the nature and standard of the work for the award of M.Sc in Structural Engineering and no part of work has been published or submitted for the award of any degree elsewhere.

Associate Professor Dr. Prajwal Lal Pradhan
Department of Civil Engineering
IOE, Pulchowk Campus
Tribhuvan University, Nepal
March, 2009

ACKNOWLEDGEMENT

I would like to express my deep indebtedness to my supervisor Dr. Prajwal Lal Pradhan, Associate Professor, Institute of Engineering, Pulchowk Campus for his proficient guidance, kind support, continuous suggestions and persistent encouragement for the betterment of work throughout my thesis work. The completion of this thesis work was possible only due to his abundant advice and rewarding technical support.

The knowledge gained from my teachers right from the beginning of M.Sc. course has gratefully helped in this research. Hence I wish to express deep appreciation to all teachers and faculty of M.Sc. Structural Engineering who helped me in various ways throughout the M.Sc Course.

I am grateful to all the teachers of Department of Civil Engineering, Pulchowk Campus especially Prof. Dr. P.N. Maskey, Prof. Dr. Mohan Prasad Aryal, associate Prof. Dr. Roshan Tuladhar for their kind suggestions and supports during entire period of this thesis work.

Finally I would like to express my sincere thanks to all my teachers and friends for their direct and indirect cooperation, advice and help during the period of this thesis work.

Lastly, I am privileged to be a student of the Department of Civil Engineering of the Institute of Engineering, Pulchowk Campus, Tribhuvan University.

Jibendra Misra
061/MSS/r/103
TU Regd. No. 3-2-45-360-99

ABSTRACT

The effort of this research is focused on the study of brick masonry wall in reinforced concrete frame structure. The main objective of the study is to get the analytical behavior of models in static lateral load case. Five samples of infill frame and three samples of masonry panel wall without RC frame were prepared and studied numerically under lateral static load. The effect of opening size and stiffness of infill relative to the frame were studied in terms of lateral stiffness, rotational stiffness etc. It is observed that effect of opening size have large influence on the overall response of infill. The lateral stiffness of masonry panel is drastically improved if it bounded by reinforced concrete frame.

TABLE OF CONTENTS

LIST OF ABBREVIATION

a	Width of equivalent strut
h_{col}	Column height between centerlines of beams
h_{inf}	Height of infill panel
E_{fe}	Expected modulus of elasticity of frame material
E_{me}	Expected modulus of elasticity of infill material
I_{col}	Moment of inertial of column
L_{inf}	Length of infill panel
K	Stiffness
K_{θ}	Rotational Stiffness
θ	Angle whose tangent is the infill height-to-length
E	Young's modulus of elasticity
ρ	Density
ν	Poisson's ratio