FAYOUM UNIVERSITY

FACULTY OF ENGINEERING

CIVIL ENGINEERING DEPARTMENT

EFFECT OF UNREINFORCED MASONRY INFILL WALLS ON SEISMIC PERFORMANCE OF REINFORCED CONCRETE FRAMED STRUCTURES

By

Mohamed Magdy Ali Abdelaziz

A thesis submitted in partial fulfillment

Of

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Master Degree

This thesis for M.Sc. degree has been approved by

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ABSTRACT

The influence of the Unreinforced Masonry (URM) infill walls in the structural response of Reinforced Concrete (RC) structures when subjected to earthquakes is not considered in the Egyptian national building code. However, the interaction between infill masonry walls and R.C frames in the seismic structural behavior was investigated by large number of experimental and analytical researches. The purpose of this research work is to investigate the effect of the URM infill walls on the dynamic characteristics of RC framed structures. Three groups of 2-D three-bays framed structures will be used in this study. These groups are three stories, six stories and, nine stories RC framed structures representing low, medium and, high rise buildings, respectively. A set of different infill panels' configuration has been developed to perform the analysis as (1) bare frame (BF), (2) fully infilled frame (IF), (3) infilled frame with open ground story (OGS) in which the infill walls are omitted from the ground story to represent the common practice of removing the walls for commercial reasons, (4) infilled frame with partially open ground story (POGS) in which only two panels are removed. Double-strut nonlinear cyclic model for masonry panels has been utilized in order to account for the stiffness and structural action of the masonry infill panels using the structural software package SeismoStruct software. Static pushover analysis, as well as, dynamic time history analysis, using three different ground motion records to represent wide range of frequency content, has been used to perform the seismic analysis of the considered model configurations. The selected ground motion records have been scaled from 0.1g to 0.5g to cover all possible peak ground accelerations. Based on the obtained results, the seismic performance of the framed structures is strongly influenced after using the infill walls. The regular distribution of the infill walls can improve the framed structure performance in terms of capacity, story drifts and displacement control despite the early cracking of the infill walls. However, omitting the infill from the ground story leads to soft story phenomena as the columns in this story are more vulnerable due to the shear forces acting on them. As a result, the national Egyptian building codes should consider the soft story irregularity due to omitting the infill panels.