SEISMIC PERFORMANCE OF STEEL FRAMES WITH MASONRY INFILL

By

Eng/ Ahmed Abdallah Bedir Abdallah

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
MASTER OF SCIENCE
in
Structural Engineering

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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Title of Thesis:

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Key Words:
Infill walls; pushover analysis; Time history analysis; Soft story; Steel frames.

Summary:

Using infill walls has a great effect on the strength and ductility of structures. This research focuses on the assessment of the seismic behavior of multi-bay, multi-story steel frames with masonry infill. A numerical model is used to study the problem, considering the skeletal frame elements as well as the masonry infill. Different parameters are investigated such as; the number of stories, span length, wall thickness, compression strength and modulus of elasticity of infill walls. The effect of each parameter on the strength, stiffness, and ductility of the structural system was assessed with and without the infill. In addition, the presence of a "soft story" at the ground floor is investigated. Free vibration analysis is performed to identify the difference in the fundamental period of vibration for the bare frames and the infill frames. Pushover analysis is performed to study the effect of infill walls on the frames under lateral loads beyond the elastic limit. The progress of plastic hinges and the ductility for the various systems is outlined. Finally, time history analysis is performed and the results are compared with pushover analysis. Based on the studies it may be conclude that using infill walls increases the initial stiffness as well as the value of base shear. Increasing the span length, the compression strength and thickness of infill walls results in an increase in the base shear. Straining actions on first floor columns increases when soft story is considered.

Disclaimer

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

Name: Date: ../../2022

Signature:

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Contents

List of Tables

List of Figures