



Application of simplified assessment Procedures in Existing Codes for steel Buildings

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Abstract

Besides the complex instructions of guidance documents for seismic rehabilitation of existing buildings, some institutions have provided simple criteria in terms of simplified rehabilitations. FEMA356 is one of documents that introduced a simple method for assessment of certain buildings that do not require advanced analytical procedures. Furthermore the New Zealand guideline has presented a simple lateral mechanism analysis that is a hand static analysis for determining the probable collapse mechanism, lateral strength and displacement capacity of the structure. In this study the accuracy of simplified methods is examined on samples of steel moment and braced frames. After comparison of obtained results, suggestions are presented to improve seismic retrofit criteria.

Keywords: Simplified Rehabilitation, Pushover analysis, steel moment frames, braced frames

1. INTRODUCTION

The simplified rehabilitation method is less complicated than the complete analytical rehabilitation design procedures found. In many cases, this method represents a cost-effective improvement in seismic performance, and often requires less detailed evaluation or partial analysis to qualify for a specific performance level. FEMA 178[1], the NEHRP handbook for the seismic evaluation of existing buildings, was the basis for the simplified rehabilitation method that different versions of it have been completed and new analysis techniques have been provided in FEMA356[2].

Another guidance document for seismic assessment of existing buildings is NZSEE recommendations in New Zealand [3]. This guideline has proposed a hand analysis to determine the probable collapse mechanism, lateral strength and displacement capacity with simplified consideration of capacity issues, so this method was named simple lateral mechanism analysis (SLaMA). The behavior of the structure is reduced to that of an equivalent single-degree-of freedom system.

In this study three different special steel moment frames and braced frames with different number of stories (4- 8 and 12-storey) are assessed with the simplified methods proposed by the NZSEE and FEMA356.

2. SIMPLIFIED REHABILITATION METHOD OF FEMA-356

Simplified rehabilitation method that proposed by FEMA356, reflects a level of analysis and design that is appropriate for small, regular buildings and buildings that do not require advanced analytical procedures and achieves the Life Safety Performance Level. This method only applies to a select group of simple buildings that conform to the limitations of Table (1).

Table 1- Limitations on Use of the Simplified Rehabilitation Method

Model Building Type	Maximum Building Height in Stories by Seismic Zone1 for Use of the Simplified Rehabilitation Method		
	Low	Moderate	High
Steel Moment Frame			
Stiff Diaphragm	6	4	3