Introducing "Building Casketing" as a new Technique for Seismic Retrofit of Existing Buildings with "L" Shaped Plan

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Abstract

In order to retrofitting by the peripheral frames method for structures with L shaped plan, we have 6 models to examine the effect of changes in dimensions plan and elevation of the building be considered. Models are with moment resisting frame systems that designed with the old seismic and concrete regulations. Nonlinear static and dynamic and endurance time method analysis on the models was done. According to the results, the models have not life safety level and need to retrofitting. Have upgraded seismic performance level of the models by adding peripheral frames to the structure.The retrofitting models evaluated by the new regulations and according to the results, the retrofitting models reach to the life safety performance level and target displacement have decresed.

Keywords: Reinforced concrete, Moment resisting frames, Evaluation of seismic performance, Peripheral frames, Nonlinear analysis

1. INTRODUCTION

Reducing the vulnerability of the buildings and lifeline against earthquake can be considered one of the important issues in earthquake engineering. In fact today, Just in case of occurring massive and devastating disasters such as earthquake in large cities, can be understood this problem. Since most of the old structures are not resistant against earthquake and most of these structures haven't experienced a major earthquake, need rehabilitation. Also many old buildings due to weak enforcement and flaws in design and the changes in seismic regulations and loading, diagnosed they are vulnerable. As regards most important structures such as office buildings, hospitals, schools, power plants, industrial facilities due to specific conditions, in order to rehabilitation these structures is needed that don't have any serviceability for a long time virtually is impossible. Thus providing a new method for retrofitting that could rehabilitation such buildings against earthquakes, without interruption in function seems necessary. Also most of the rehabilitation methods require changes in the interior of buildings. For these buildings retrofitting operations should run outside the building, as far as it is possible has not entered any damage to the building interior. One of these methods, is retrofitting buildings by peripheral frames.

The research on retrofitting buildings with L shaped plan with moment resisting reinforced concrete frame system is done. This method requires no drilling operations for foundation rehabilitation and all retrofitting operations done in out of the building. The retrofitting don't inter any damage to the nonstructural components and don't have problems such as noise of destruction and interruption in structure activities. In recent years, studies on rehabilitation of outside the building have done. Such as these studies can mention to Fujimura [1], Horyo [2], Okuzono [3], Ono [4], and Suzuki [5] in 1999 and Yamanaka [6] in 2001. In studies which these scientists have done generally adding shear wall and adding steel brace to the structure for increasing lateral stiffness from outdoor into building.

In this study used 3 methods for analysis. These methods are: nonlinear static analysis (pushover), nonlinear dynamic time history analysis and endurance time (ET) method analysis. For dynamic time history analysis used 7 accelerograms. Considered average resposes of 7 accelerograms as a final answer. Endurance Time method is basically a simple dynamic pushover test that tries to predict damage measure of structures at different intensity measures by subjecting them to some predesigned intensifying dynamic excitations. Because of the increasing demand of the ET acceleration function, structures gradually go through elastic to yielding and nonlinear inelastic phases, finally leading to global dynamic instability [7,8]. For this analysis have 3 accelerograms that called (e) series ET accelerograms. Considered average resposes of 3 accelerograms as a final answer.