

College: Engineering
Dept.: Civil

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Certificate: Master

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Title:

Improving Building Resistance to Earthquake Forces

Abstract:

Multi-story steel buildings of various heights under the action of earthquake force are analyzed by using time-history analysis technique. The ground motion records of El Centro, California in 1940 are considered in this study. Different types of stiffening systems (bracing and shear walls) are used for the considered buildings. The main objective of this study is to evaluate the response of steel structures subjected to earthquake excitation and to investigate the effect of various stiffening systems in improving the response of these buildings. The finite element method of SAP 2000 V17 program is used in the analysis.

A static analysis is conducted to obtain an indication on the stiffness of the studied stiffening models in order to interpret the stiffness effect on the response of the structures under the seismic load. It is found that, the natural period of a structure is highly affected by the height of the structure and the used stiffening system. It is inversely proportional with the stiffness and directly proportional with the height of the structure. It is concluded that the roof displacement and its maximum value at a specific moment does not give a clear indication for the behavior of building. Therefore the full time response of the building must be considered. Also it has been concluded that it is not necessarily when the stiffness of a building increases, the roof or any story displacement of the building decreases under earthquake load.