

DESIGN OF SMALL MAGNITUDE EARTHQUAKE VIBRATION ABSORBING SYSTEM FOR THE FOUNDATION OF HIGH-RISE BUILDINGS

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ABSTRACT

This paper consists of mechanical and civil processes involved in the design of a small magnitude earthquake vibration absorbing system for the foundation of high-rise buildings. It also gives detailed descriptions of the problems encountered, methods followed to overcome them, logical sequence of steps followed during the fabrication process and information regarding the research carried out. The required appendices that enhance the level of understanding our project are also included in this paper.

In the mechanical part of this project, an earthquake simulation shake table was designed and constructed. The idea was based on a full-scale earthquake simulation shake table located in Kobe, Japan named the E-defense, which is used to investigate the dynamic response of building and superstructure under earthquake circumstances, and formulate an advanced method in anti-earthquake construction. However, there is a distinct difference between the two as the full-scale shake table is operated by high capacity and performance hydraulic system, actuators, control system, etc.

On the other hand, the civil part of the project consists of designing and constructing one base-isolated and one conventional base-fixed buildings. The load exerted on each column of the building was calculated before determining the shape and dimension of the Lead-Rubber Bearings to be installed in the base-isolated building. However springs and rubbers were used in the prototype as a representation of Lead-Rubber Bearings in actual situation. All of this will be further addressed and explained in the coming sections of this report.

The combination of the two mentioned parts will form our designed prototype. Its main function is to display the effectiveness of earthquake vibration absorbing system in protecting high-rise buildings against small magnitude earthquake.