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A Dissertation Report on

"Fabrication and Testing of Light Weight Scaled Building Model Subjected to Base Motion"

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ABSTRACT

Masonry structure is one of the most important forms of shelter. For centuries, it continues to be the oldest, one most economical and preferred form of dwelling. It is also known that masonry structures suffer great deal of damage during earthquakes; especially one/two storied masonry buildings. It is reported that almost 75% of the fatalities, attributed to earthquakes in the last century, is caused by collapse of buildings of which the greatest proportion (more than 70%) is due to collapse of masonry buildings. It is also true that the knowledge of this phenomenon is not something new but there is scarcity of work in this regard. There is a need to develop simple, portable and economical procedures to analyze and demonstrate failure patterns of such structures so as to minimize the usage of complicated techniques. The present study makes one such attempt to develop a simple and portable experiment setup which helps to showcase the failure patterns and collapse of a masonry building during an earthquake.

In this regard, a light weight masonry unit with density one third than that of the normal brick masonry was used to develop a scaled masonry building model (of scale 1:3) using soil cement mortar (1:10). The dimensions the model are 2m x 1m in plan and 1m in height with provisions of openings. The model was constructed on a steel frame (meant to be shock table) and tested. Lateral force was exerted in the form of shock loads at the base of the model (steel frame) using sandbag and later steel mass as pendulum masses. The response of the model was recorded through accelerometers mounted on the model at various suitable locations; DAS (data acquisition system) was used to record captured responses and to convert them into digital input for analysis. Natural frequencies and damping ratios of model was calculated for every impact and compared. The base acceleration values as high as 8.3g, was recorded when steel mass was used for impact. The failure patterns were recorded after every impact. The pendulum impacts were exerted at the base of the model till the collapse of the model. The experimental process and responses of the model was video graphed.

The failure patterns which were similar to the failures in a full scaled model, was successfully demonstrated. It can be concluded that, this experiment not only proved to be efficient and economical compared to complicated techniques, the time and efforts required for this was also less compared to full scaled model testing.