



Effect of Earthquake loads on School Buildings in the Kingdom of Saudi Arabia

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Abstract

Background: The designing of the reinforced concrete building for the reduction of the seismic load has significantly gained popularity. Most of the buildings in Saudi Arabia are designed for the gravity load, based on its seismicity level. **Objective:** The study evaluates the effects of the earthquake load on the RC school building located in Saudi Arabia. **Method:** An equivalent static analysis technique used to apply the seismic analysis and design method according to Saudi Building Code SBC301 (2007). This design code is used to redesign the chosen school building. The SAP 2000 structural analysis software was used to analyse and study the structure behaviour due to the seismic load. **Results:** The results of the study provide that the RC school building design in Saudi Arabia is inadequate, and unsafe for the earth quakes. **Conclusion:** One of the important conclusions in this study is that the designer of the school building in Saudi Arabia should take into consideration the earthquake loads. It also emphasizes on the development of the adequate framework for the implementation of the safe designing of the buildings inclusive of earthquake safety measures.

Keywords: Effect; Saudi Building Code (SBC301-2007); School Building; Seismic; Saudi Arabia.

1. Introduction

It is a well-established fact that Saudi Arabia is located within the small and medium band of earthquakes (Ismaeil, Alhadi, and Alashker, 2017 [1]). Previous researches have demonstrated the fact that there are earthquakes in Saudi Arabia (Fnais et al., 2014 [2]; Alashker, Nazar, and Ismaiel, 2015 [3]). This is also evident from the Arab News reporting of the 63000 earthquakes in the previous 6 years in Saudi Arabia (Arab News, 2018 [4]). This necessitates the consideration of the seismic loads when the buildings are being designed, which have now become part of the development and adoption of a national code and the experienced seismic activity at several regions in the Kingdom. In the past decades, the inclusion of dynamic loads in the design of building in Saudi Arabia was very much limited to important huge structures. A major part of the building industry is designed with focus on the gravity loads only with minor consideration towards the detailing on the accommodation of the lateral loads. Certain rehabilitation of the existing buildings has occurred to sustain the expected performance level. Hakim (2013) further adds that the capacity of the building should be evaluated before rehabilitation work [5].

In recent times, the integration of the reinforced concrete building has gained immense popularity among the researchers (Mahrenholtz et al., 2015 [6]; Gong et al. 2017 [7]). It is because the occurrence of earthquake has increased

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