ICESW 2017-xx-xx

RISKS OF SEISMIC ACTIVITIES ON BUILT ENVIRONMENT IN NIGERIA

Akpabot Ifiok Akpabot[1], Anthony Nkem Ede[1]*, Oluwarotimi Michael Olofinnade[1], Gideon Olukunle Bamigboye[1]

[1]Department of Civil Engineering, Covenant University, Ota, Nigeria

ABSTRACT

Every building is designed to be safe and meet certain needs in order to prevent collapse. Factors leading to building collapse could be natural or man-made. Results of collapse of buildings are numerous; they include death, disability of victims, destruction of properties, economic losses, etc. Until recently, Nigeria was believed to be aseismic due its distance away from major earthquake zones. However, modern seismic activities have led to the prediction of a major earthquake occurrence in Nigeria in the future. This study seeks to estimate the risks and impact of seismic hazard on the built environment in Lagos State, Nigeria. Assuming a uniform seismic intensity measure for the study area, a model is created that estimates the number of casualties and built area that would be affected by earthquakes of different ground motions. Monte Carlo simulation method is used in MATLAB software to draw random data of building area, occupancy limits, construction quality and failure probability for the computational analysis. The results showed that an average seismic intensity measure of 0.4g will affect between 1000-1060 km^2 of building area. At the same intensity, between 6.5-6.9 million of a total population of 21 million people residing in Lagos State will be affected. These huge losses therefore call for urgent mitigating activities such as the design and construction of seismic resistant buildings to reduce risks of damages when earthquake occur.

KEY WORDS: Reinforced-concrete, building collapse, seismic-risks, built area, ground motion

INTRODUCTION

Buildings provide a wide range of accommodation for people in form of schools, offices, residences, etc. Every building is designed to be safe and meet certain needs in order to prevent collapse which usually leads to loss of lives and damage to properties [1]. Buildings enhance sustainable development but in Nigeria this is yet to produce the required results because of numerous building failures [2]. Buildings that are functional increase the national Gross Domestic Product as they meet present needs and also aid in reducing future deficiencies [3]. Building collapse is the total loss of bearing capacity that results in sudden falling apart of a building [4]. The consequences of building collapse are usually very fatal, they include loss of lives, disability of collapse victims, loss of properties, economic losses, loss of time and valuable resources, increase in number of homeless people, etc. [5,6,7]. The impact of building collapse has the tendency of impeding the development of any nation.

In Nigeria, the conservation of the existing building stock and the future ones to be constructed remains a great challenge [8]. The causes of building collapse in Nigeria are numerous; some of these include corruption, insufficient supervision, incompetence, greed, poor planning, lack of compliance to building codes, poor quality of materials, and limited financial resources, etc. [9,10]. Oloyede et al., [11] stated that building collapse is attributed to natural and man-made phenomena. They went further to explain that a natural phenomenon may consist of earthquakes and typhoons while man-made phenomena consist of disasters which may be borne out of man's negligence.

*Anthony Ede: ede.anthony@covenantuniversity.edu.ng