

**MODELING OF STRUCTURAL  
DEFORMATION OF STAFF'S QUARTERS  
SEKOLAH MENENGAH KEBANGSAAN  
RANAU SUBJECTED TO THE 2015  
RANAU EARTHQUAKE USING  
RUAUMOKO 2D**

**MUHAMMAD SHAMIN BIN ZULHAIMI**

**Bachelor of Engineering (Hons) Civil  
(Infrastructure)  
UNIVERSITI TEKNOLOGI MARA  
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By

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This report is submitted as a  
partial requirement for the degree of  
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## DECLARATION BY THE CANDIDATE

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This topic has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Under Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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## **ABSTRACT**

Soft-storey is a multi-storey building with more than one floor that contains an open space at the ground floor level. This type of building can be known as a building that have a strong beam but weak in column that has less resistance, stiffness and ductility to stand earthquake stress. Most of the building in Malaysia was designed using BS8110 that was non-seismic codes of practice. Thus, the main problem of structure damage of most building due to earthquake is because the building was designed with lack of detailings for seismic resistance. The main objective of this study is to determine the structural deformation of soft storey building under an earthquake record. The Staff's Quarters Sekolah Menengah Kebangsaan Ranau building that undergone damage after the 2015 Ranau earthquake is selected as the prototype soft storey building for this study. The structural deformation prototype building is modelled by using finite element application that is Ruaumoko program. In this program, the building frame structure prototype tested under the 2015 Ranau Earthquake with magnitude of 6.0 scale richter and 0.12g Peak Ground Acceleration (PGA). This study was started by static analysis of the prototype building by using Orion R18 Software and proceed to the non-linear dynamic analysis by using Ruaumoko 2D and Dynaplot Program. Based on the analysis conducted, the structural mode shape of the building is determined and the structural deformation of the prototype building were illustrated using Dynaplot Program. In addition, based on the mode shape and structural deformation analysis, the damages detected was analysed by the visual observation of Staff's Quarters Sekolah Menengah Kebangsaan Ranau after 2015 Ranau Earthquake showed similarity between real damages as compared to the simulation study. This kind of study is useful in predicting the effect of seismic loading towards building and also infrastructural elements such as bridge, pavement and others.

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