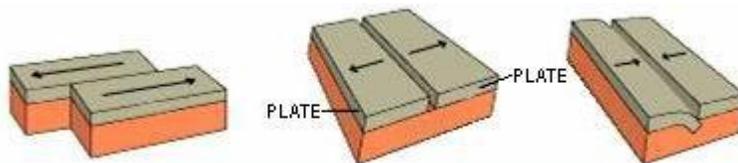


## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 BACKGROUND**

Most of the structural building in Malaysia is designed without considering of the earthquake effects such as Petronas Twin Tower (KLCC), KOMTAR Tower, Berjaya Times Square Tower and also offshore structure. There are no regulations requiring the tall building to be designed for earthquake in Malaysia as Malaysia does not lie in any presently demarcated seismic zone. However, Malaysia is located close to two most seismically active plate boundaries which are inter-plate boundary between Indo-Australian Plates and Eurasian Plates on the west and also the inter-plate boundary between Eurasian and Philippine Plates on the east (Husen, et al., 2013). These plates undergo many small movements against each other by time to time. The plates can slide horizontally against each other or pull away from each other or can be it coming towards each other causing one plate to dive beneath the other as in Figure 1.



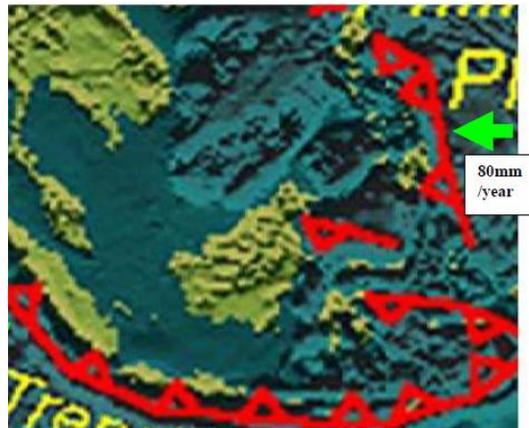
**Figure 1.1:** Types of plate's movement

Source: Ir Ng Pek Har, Hadi Golabi (2005)

The movements of involving large plates can cause the sudden movement that will results the huge energy to be released in the form of waves. These waves will travel inside the earth and along the ground which are felt by us as shakes and tremors. This is called an earthquake. The intersecting edges of the plates are called faults. Therefore, an earthquake is happen once there are both abrupt slide on a fault, causing earth trembling and emitted seismic vitality affected by the slide or through volcanic or magmatic movement or further unexpected pressure adjustments in the ground.

The tremor affects endangers such as ground shaking, liquefaction, surface faults, landslide, tsunami and also tectonic deformations. These all types of hazards depend on the geographical location, ground conditions and amount of tectonic activity along the faults. Geotechnical factors often exert a main influence on destruction patterns and loss of life in earthquake events (Aminaton Marto, et al., 2011). Along the transmission during seismic waves, the resonance effect would cause amplification behavior during upward propagation. The amplified waves make possible the soil liquefaction to be happens within the region (Marto, n.d., 2014). The impact and damage due to tsunami depends on some factors such as wave speed and height which are their coastal topography areas and also debris that carried by water (Ghobarah, et al., 2006).

Microzonation is the Mapping of seismic hazard at local scales to incorporate the effects of local geotechnical factors (Aminaton Marto, et al., 2011). At the east of Malaysia, the Philippine plate moves westward with an estimate velocity of 80mm/year and cause micro faults in Sabah (Mohd Rosaidi bin Che Abas, 2001). Sabah is the only state in Malaysia that exposed to earthquake activities if compared to other parts of Malaysia.



**Figure 1.2:** The movement of Philippine plate moves westward

Source: Mohd Rosaidi bin Che Abas (2001)

The Peninsular Malaysia, Sabah and Sarawak located just behind the active seismic area. Therefore, there is an effort to investigate the behavior of offshore structure to sustain earthquake effect. The study is also covering the 3 legs of offshore platform and by using the software of SAP 2000 to make a model for offshore structure.