

## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 Introduction**

Earthquakes known as the shaking motion of earth as the result of a sudden release of energy in the earth crust that will creates seismic waves. These are related to motion force acting within the earth crust. Plate boundaries will reserve energy due to friction between two plate faces, and earthquake will occur once the energy released when the friction are loss. Earthquake causes the movement and ground shaking then consequently causes structural building to be unstable and undergo displacement where it will be shift quickly from its original position due to the sudden seismic force. Earthquake is a movement of the surface of earth due to internal energy from the core of earth at a sudden that may cause the building to collapse and the death of thousands of people. The main cause of earthquake is the orogenic movements such as mountain building and valley farming, subduction and plate convection followed by geothermal and mechanical disturbances during volcanic activities and land erosion.

It is important to highlight that earthquakes do not need to be in large magnitude to produce severe damage. This is because the degree of damage depends not only on the physical size of an earthquake but also on other factors such as where and when an earthquake occurred, the population density in the area concerned and secondary events such as fire and also type of soil of the area.

Malaysia is situated on the southern edge of the Eurasian Plate as shown in Figure 1.1. It is close to the most two seismically active plate boundaries, the inter-plate boundary between the Indo-Australian and Eurasian Plates on the west and the inter-plate boundary between Eurasian and Philippine Plates on the east. Large earthquakes in and

around these boundaries could extend and have extended to Malaysia. East Malaysia, beside of affected by large earthquakes located over Southern Philippines and in the Straits of Macassar, Sulu Sea and Celebes Sea, these two states also have experienced earthquakes of local origin. Several possible active faults has been delineated and local earthquakes in East Malaysia appear to be related to some of them.

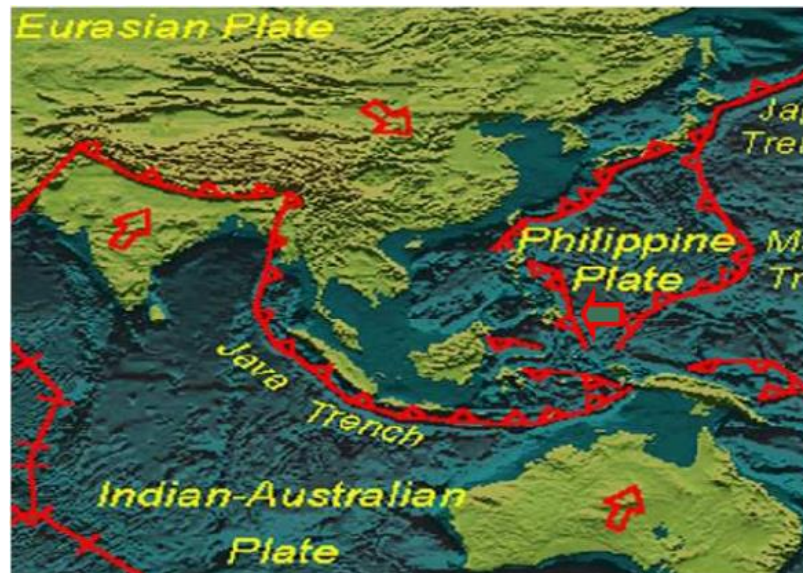


Figure 1.1 Major tectonic plates around Malaysia (Natawidjaja, D., 2001)

Figure 1.2 show the earthquake hazard zonation in Malaysia which been divided into five zone and each area has their own color that represent the level of seismicity in Malaysia. As mentioned before, Sabah is one of the high level of seismicity that reach to the level VI to VIII which it is worth noting that an earthquake of scale VIII can cause human injuries and property damages (MOSTI, 2009).

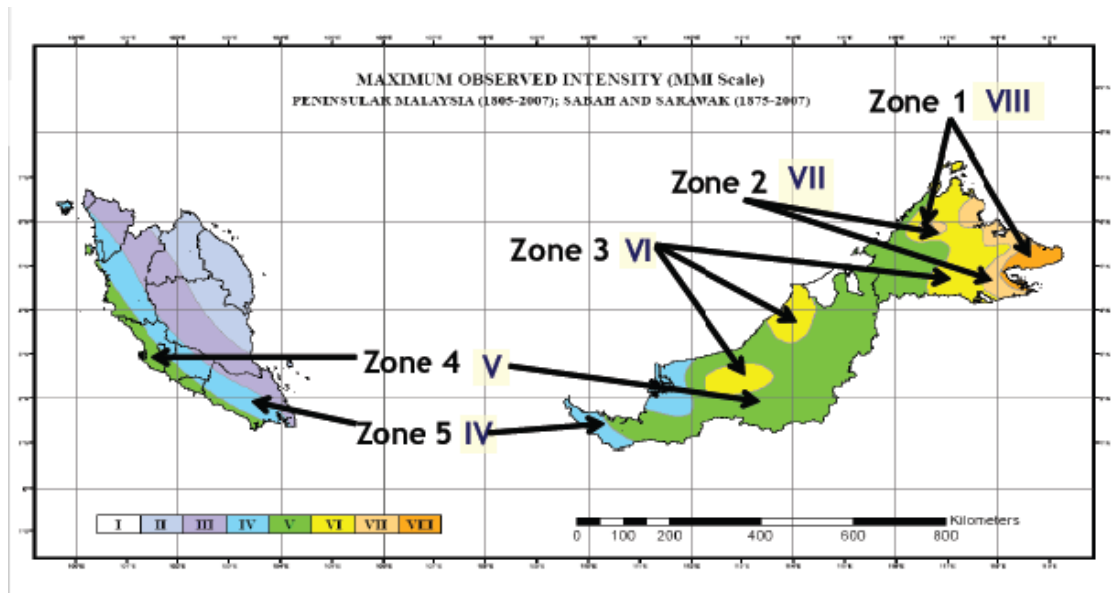


Figure 1.2 Earthquake hazard zonation in Malaysia

Malaysia has been categorized as belonging to the low seismicity group. Consequently, earthquake resistant design has not been given much emphasis until a decade ago when the Malaysian lawmakers (or Members of Parliament) were briefed by the Meteorological Department (MMD), in 2002, on the distant shock waves of the 2001 Gujarat earthquake, which travelled 600 km from its epicenter to rock and cause devastations to many cities in India (Bendick et al, 2001).

On December 26, 2004, the giant earthquake happened in Sumatran region that is closest seismic region to Malaysia shows that the seismic activity in Malaysia increased. The Sumatra earthquake with the magnitude of 7.2 that occurred on May 9, 2010 was also felt in several places in Peninsular Malaysia, even though Malaysia is not in a high seismic zone but it is surrounded by the area that are in high seismic country. That is the reason why Malaysia can feel the vibrations as well. The effect of earthquake still felt in several areas in Peninsular Malaysia even though Malaysia is not exactly located in the seismic region. It is because the seismic is being transfer through the same type of soil. With different type of soil, the level of seismicity is different.

On past few years, Malaysia was only having a small earthquake in some place which does not has much effect on the building. However, Malaysia is affected by the earthquake from another country in seismically active plate boundaries from Indonesia