CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Nowadays, the world becomes more advanced but the construction industry is highly dependent on conventional materials such as cement, aggregate and sand for concrete production. The increasing of demand has been placed on construction material industry especially in the last decade owing to increasing the human population and country development will cause a chronic shortage of building materials and the increasing of cost materials construction.

To meet with that, the consideration using cheaper and locally available materials to meet desired needs will enhance self-efficiency and for sustainable development. Therefore, the lightweight concrete has been introduced. In lightweight concrete, researcher from Sri Lanka suggested the used of offshore sand as synthetic lightweight coarse aggregate (SYLCAG) to replace the natural coarse aggregate.

In this chapter, the outline of this study will be discussed more. It include the background of study, problem statement, objective, scope of study and significant of study and what is the expected outcome regarding SYLCAG will be discussed. All of the outline will be the base in conducting this study.
1.2 BACKGROUND OF STUDY

Concrete is known as a composite material composed of aggregate or filler (coarse granular material) entrenched in a hard matrix of material called cement or binder which fills the space between the aggregate particles and glues them together. In today’s world, concrete as a predominant material compared to steel, timber asphalt and stone has widely used in construction industries for bridges, buildings, dams and highways.

There are many types of concrete and one of them is called lightweight concrete. Lightweight concrete has in place density of 1440 to 1840 kg/m$^3$ and compared to normal weight concrete with a density in the range of 2240 to 2400 kg/m$^3$ (NRMCA, 2003). In this study, it will focus more on lightweight aggregate concrete. Lightweight aggregate concrete can be produced by using variety of lightweight aggregates such as natural materials, thermal treatment of natural raw materials, manufacture from industrial by-products and processing of industrial by-product.

Due to high demand of the coarse aggregate, researcher has provide with an alternative of replacing river sand as aggregate by using offshore sand. According to Dias (2007) the offshore sand should be extract from 15m ocean depth. Compare to beach sand, offshore sand has lower chloride content. This offshore sand should be washed by rain for a period of time to reduce its chloride content. In this study, the offshore sand will be used as coarse aggregate to replace the normal weight aggregate to determine the flexural behavior and failure characteristic as a lightweight aggregate concrete.

1.3 PROBLEM STATEMENT

Raw material in construction industries all over the world especially natural aggregates with over-exploitation of it source has led to various harmful consequences including the shortage of the natural aggregates itself. According to BEM (2006), taking example of Selangor is apparent to be rich in potential of aggregate resources but however only 6% has been identified to be the potential one as a large proportion of this potential area is already inaccessible due to development. Therefore to overcome the shortage of natural aggregate source, various suggestion of alternative has been made such as by
using offshore sand, dune sand, quarry dust and washed soil. In this study, the offshore sand will be used as a material to produce lightweight coarse aggregate to replace the entire normal weight coarse aggregate in concrete and whether the SYCLAG beam concrete can identically behave as the normal concrete.

**1.4 OBJECTIVES**

The objectives of this study are shown below:

i. To determine the compressive strength of concrete using SYLCAG.

ii. To compare the behavior of reinforced SYCLAG beam with normal reinforced beam.

iii. To observe the failure mode and crack pattern of reinforced SYCLAG concrete beam.

**1.5 SCOPE OF STUDY**

The scope of study is basically to study the flexural behavior and failure characteristics of reinforced SYCLAG concrete beam. The aggregate used is the well graded aggregate. The reinforced concrete beam to be study is lightweight aggregate concrete which the coarse aggregate is made up from offshore sand. The offshore sand were taken from reclamation project in Pantai Klebang, Malacca which was constructed in form of concrete and then crushed to be taken as artificial aggregate used for making a concrete samples. The density of SYLCAG will be 1600 kg/m$^3$.

Testing for both beams will be done in laboratory at 28 days age of curing period. The numbers of beams need to be prepared are 2 concrete beams including one control sample labeled as beam CB and one research sample labeled as beam SB. The size of each beam is 150 mm x 200 mm x 1500 mm. The number of cubes involve altogether will be 24 concrete cube as 6 sample for control cube at each age of 7 days and 28 days of curing period and 6 sample for SYLCAG concrete cube at age of 7 days to 28 days of curing period. The size of each cubes is 150 mm x 150 mm x 150 mm. After testing the