CHAPTER I

INTRODUCTION

1.1 Background of Problem

Concrete is the most favourite material used in construction industry. Because concrete has basic ingredients that are easy to find, namely cement, coarse aggregate, fine aggregate, and water. Moreover, the maintenance of concrete is also easily to conduct, most economical, good in compression, durable and good fire resistance.

In terms of making a construction, most of people use new materials as concrete mixture because people do not think yet about the use of recycled materials from building utilized materials (recycled materials from ruin building) as green building, people still use the conventional way on concrete composition. Moreover, in line with the development of knowledge, the mixture of concrete are developed also with the substitution of recycled aggregate. According to Akbari (Akbari et al, 2011), one of the developing country which has used recycled aggregate as concrete mixture is Malaysia. Furthermore, the use of recycled aggregate is not only applied in Malaysia, but also in the developed countries South Africa, Netherland, United Kingdom (UK), Germany, France, Russia, Canada and Japan (Parekh and Modhera, 2002).

Recycled aggregate is very good to be used because it can decrease the waste of material. According to Akbari et al (2011) some quantity of such waste is being recycled and utilized in building materials and share of recycled materials varies from

25%in old buildings to as high as 75% in new buildings. Moreover, the use of recycled aggregate is very important because it relates with the following aspects, namely (a) reduce the demolition material number (b) reduce the need of new materials and (c) results—of destruction by natural phenomena (earthquakes, tsunami, heavy cyclonetc.). In the context of Construction & Demolition (C&D) wastes are composed of concrete rubble, bricks and tiles, sand and dust, timber, plastics, cardboard and paper, and metals. Concrete rubble usually constitutes the largest proportion of C&D waste. It has been shown that crushed concrete rubble, after separation from other C&D wasteand sieved, can be used as a substitute for natural coarse aggregates in concrete or as a sub-base or a base layer in pavements. This type of recycled material is called recycled aggregate (Lymbaciya, 2000)

Unfortunately, according to Keichii et al (2000), the quality of concrete from recycled aggregate is lower than the natural aggregate because the recycled aggregate absorbed more water than natural aggregate; then the recycled aggregate has a porous mortar matrix around the natural aggregate and develops an inferior bond (Keichii et al, 2000).

Recycled coarse aggregate passing 4.76 mm sieve is not recommended for general use in concrete because it usually has an adverse effect on water demand and may contain increased levels of contamination. In specific circumstances where there is a high degree of control (e.g. fines from reclaimed product at a precast concrete works), 10% replacement of natural sand can be made without adverse effect on the product.. Fine recycled aggregate may also be useful for large scale grouting operations (eg old tunnels and mine workings) (Garston, 1998).

Recycled aggregates, particularly recycled masonry aggregates, typically have higher porosity than natural aggregates. Because of this, concrete with recycled aggregates absorbs a higher amount of moisture than ordinary concrete. Also the angularity of the crushed material contributes to a high water requirement. However, by pre-wetting the aggregate, or by partly saturating the aggregate in the concrete mixer prior to the addition of cement, the recycled aggregate concrete will result with properties similar to those of ordinary concrete mixes, prepared with a comparable water/cement ratio (Hendrinks and Pieterson, 1998).As a rule, the workability of concrete with a high level of aggregate replacement is low. This is especially so, if also the fraction 0-4 mm is replaced. Adding water may increase workability, but will have adverse influence on the strength and the durability of the resulting concrete. Generally, the addition of some more super plasticizer will be sufficient. A common alternative is to increase both water and cement, thereby keeping the water/cement ratio constant (Hendrinks and Pieterson, 1998).

EFFECT OF RECYCLED COARSE AGGREGATE ON CONCRETE PROPERTIES

The RCA mean **RECYCLED COARSE AGGREGATE.** In this study, the recycled coarse aggregate has been used from an old concrete cube. The researcher manually crushed the concrete cube to match the specifications of the gradation of the coarse aggregate.

1.2 Problem Statement

Based on the background of problem, the researcher will described the following research statement:

1. How are the comparison between Recycled coarse Aggregate (RCA) and natural aggregate NCA?
2. What are the mechanical properties of concrete content with 0%, 35%, 50% and 65% of (RCA)?

1.3 Objectives of Research

The objectives of this research are as follow:

1. Analysis properties of recycled coarse aggregate.
2. Investigate properties of concrete using variety of recycled coarse aggregate percentage.

1.4 Scope of Study

This research has scope of study to limit the analysis of study. The scopes of study of this research are as follow:

1. The comparison between Recycled coarse Aggregate (RCA) and in terms of characteristics absorption, specific gravity,. Apparent Specific Gravity. L.A Absorption Test Mass Loss.
2. The comparison between Recycled Concrete Aggregate with 0%, 35%, 50% and 65% mixture in terms of compressive strength at 28 days with 8 targeted groups of

samples for this study with compressive strength. 4 samples for every targeted group will be prepared to be tested for compressive strength at 28 days

3. The Modulus Elasticity 8 targeted group for Modulus Elasticity Test 4 samples for every targeted group.
4. Flexural strength test 8 targeted group every target 4 samples at 28 days.

1.5 Benefit of Research

The benefit of research will be described in two sides, namely:

1. Theoretical Side

   The researcher expect that this research can give theoretical contribution for Civil Engineering Department especially in designing and finding compressive strength of recycled aggregate as mixture..

2. Practical Side

   The researcher expect that this research can give contribution on practical life which can be used to solve the problem in terms of concrete