# CHAPTER 1

# INTRODUCTION

## 1.1 BACKGROUND OF STUDY

The human population is expanding at an exponential rate every year and therefore there is a need to meet the demand for shelters by increasing the production of the construction, (Solidia Technologies, 2015). Due to the limited space for good soil, the developers around the world take a few resolutions by constructing the infrastructure located at soft clay soil. Recent problem concerning land scarcity in the vicinity of existing urban areas often necessitates the use of some sites with soil of low quality (such as soft clays), untreated soils in their virgin state may be unsuitable for short or long term construction activities and so their properties must be improved before use it. The construction of buildings, roads, canals, harbours and railways on soft clay has always been associated with problems of stability and settlements. Soft clays are usually characterized by their poor strength, high water content and high compressibility (Churchman *et al*. 2006).

According to Tanaka, (2012), soft clay is a problematic soil because of the texture of the soil which is liquefiable and from that it will form settlement to the structure. At soft clay soil may result bad cracking on building and the worst may collapse. The soil improvement is compulsory to modify the soil structure and the properties. From the soil improvement, the shear resistance and the settlement can withstand the structure from any disaster. Their poor strength, high water content and high compressibility. Many methods for soil improvement are available around the world including, dewatering, compaction, preloading with and without vertical drains, grouting, deep mixing, stone columns, deep densification and soil reinforcement.

Many of these techniques have been used for many years, while others (deep dynamic compaction, compaction piles) show rapid advances in recent years. The use of ceramic waste columns as a technique of soil reinforcement is frequently implemented in soft cohesive soil and have been successfully used to support isolated footing, large raft foundations and embankment. Besides, their use in soft clays has been found to provide moderate increases in load carrying capacity accompanied by significant reduction in settlement. Being granular and freely drained material, consolidation settlement is accelerated and post construction settlement is minimized

The lateral expansion of column due to ramming will induce pore pressure in clay, but is rapidly dissipated back into the much large voids in the bottom ashes column. It is to produce a rigid vertical stone mass surrounded by stronger material, which has a slightly reduced void ratio. It has also been reported that the stone columns have increased the tendency to resist the liquefaction potential in the subsoil, and provide sufficient safety for slope stability.

Researchers had mixed clay with waste material to enhance its engineering quality. The selected waste material is ceramic waste. It is a by-product from electric power plant. These waste material is disposed and generally have no economic value. Ceramic waste is physically course, porous, glassy, granular and incombustible materials that are collected from the crush of ceramic waste. It is found that it has pozzolonic properties which make it possible to replace cement in deep soil mixing

## 1.2 PROBLEM STATEMENT

Soft clay are collapsible soils that appear to be good and strong in dry state but rapidly consolidate under wetting condition and it may generate large and expecting settlements to the soil structures. This will produce disastrous consequences for structure that build on the soft clay. Due to fail to meet certain standard, soil improvement should be directed with a specific end goal to increment and enhance the delicate soil quality thus it will prevent any settlement occur. The ceramic waste column was expanded the bearing capacity of soil, as well as diminishes the settlement of structure's establishment.

The greatness and heading of therapist and swell relocations are influenced by an assortment of elements. The displacement would bring about genuine effects on a few buildings and structures. It really dangerous when they construct the building in bad and weak condition of the soft clay where it will cause failure to the structure. Ceramic waste are made of wastage of production of the ceramic factory where this ceramic waste is not recycling at any form at present There is a firmly probability of ceramic waste remains being utilized as substitute of fine aggregates, for example, sand. Its utilization in cement turn out to be more critical and essential in perspective of the way that wellsprings of normal sand as fine totals are getting depleted day by day (Tanaka, 2012).

The designing and development group has now responded to the call for the utilization of green technology and reused by item in development. One of those by item is the ceramic waste from production from ceramic factory that faces an expanding creation running into several thousand tons in Malaysia alone, and its strategy for transfer is consigned to landfills alone with no other business use. A powerful use of ceramic waste in development materials will altogether lessen the amassing of the by-items in landfills and in this manner diminish natural contamination. The cost of deposition of the ceramic will be save and more natural resources and raw materials will be replacing thus it will save energy and protecting the environment.