CHAPTER 1

INTRODUCTION

1.1 Background Study

The combination of two hydrogen cations and an oxygen anion are the most important elements in our daily life as they have a unique behaviour that make them crucial to the universal requirement. One of the special characteristics of water is its ability to change the situation based on the Earth condition. Water can be classify into three states which are in gaseous, liquid and solid. These three elements play an important role to the hydrological cycle. The term hydrology literally is a combination of two words which is the science or study of (‘logy’ from Latin ‘logia’) and water (‘hydro’ from Greek hudor) (Tim Davie, 2002). Hydrology is a scientific research about the water and its behaviours, distribution, occurrence, reactions and effect on the Earth surface, for the soils and also atmosphere (Richard Mc Cuen, 1998).

One of the subdivision that involved in the hydrological cycle is the infiltration process. Infiltration occur when the precipitation or water from surface runoff soaks into subsurface soils and moves into rocks through pore spaces and cracks. Water can be absorbed by the soil and may stay inside it for a long time until it gradually evaporated. But
if there are a lot of vegetative cover such as green plants, the infiltrated water can also be absorbed by plants roots and later give off water vapour through pores in their leaves during the transpiration process. Infiltration take place at the upper layers of the ground but may also continue further downward into the water table.

By depending on the saturation of the ground, the water can continue downwards to replenish water tables and aquifers and this is called percolation. In some cases where there are water bodies at the nearby area, the infiltrated water can also ended up in the water bodies. There are factors that affect the rate of infiltration for examples the types of soils, pre saturation levels, the amount of precipitation, the amount of vegetation cover over the area, the topography of the land as well as the levels of evapotranspiration in that region.

1.2 Problem Statement

The study of the infiltration rate is compulsory and important for particular places in order to determine the condition of the soil so that we can avoid any further damage occur after the places undergo the development process. And the consequences of the failure in obtaining both the infiltration rate and also the conditions of the soil may lead to one of the typical phenomenon which is flood. The suitable design of drainage system needed to be installed based on the condition and types of soil in accordance with the stated system. The precise planning with the consideration of a lot of aspects can save lives and properties from the natural disaster caused from our own clumsiness.

The low infiltration rate of a particular place caused it to be damaged by the flood. There are some safe ways that can be taken in order to face the any probabilities that may happen. The rapid development has caused the urbanization to take place in a larger scales in order to fulfil the necessity of the citizen and to achieve the nation’s mission which is the newly industrial country. The development process involved the development of residential area, industrial and also the construction of the infrastructure. However, the effect from the development has been one of the major factor that lead to flood.
Besides that, the decrement of the places with high permeability of soils plays an important role in restraining the flood to occur. Forest and soil act as an absorbing agent for the natural rainfall. When the rain fall down, it created the surface runoff which is known overland flow where the water moves from the ground surface to a waterway. Surface runoff is affected by other process in the hydrological cycle such as precipitation and infiltration plus factors such as imperviousness and land slope. The function of the forest and soils are to increase the time taken for the runoff to flow into the drainage system which are river and drains. Moreover, most of the surface runoff had absorbed as the groundwater and the remaining get into the drainage system where the existing drainage system can withstand the volume of water flow inside it.

When the forest has been explored and cut off in order to objectify the development process, the natural surface of the soil ground had been changed to the impervious surface such as cement, bitumen, concrete etc. Based on these materials, the runoff cannot be fully absorbed like usual so that in a flash of light the drainage system becomes full and may lead to the excessive water and thus the flood.

1.3 Objectives

The main objective of this study is to obtain the infiltration rate of the water before and after the place is develop, therefore the objectives of this study are:

i. To determine the infiltration rate of water at two different areas which is at the developed and undeveloped area using Double Ring Infiltrometer.

ii. To compare both of the infiltration rate of the two different areas.

iii. To classify the types of soil exist at the site using the sieve analysis method.