CHAPTER 3

RESEARCH METHODOLOGY

This experiment will be conduct at Soil and Geotechnical Laboratory, Faculty of Civil Engineering and Earth Resources in Universiti Malaysia Pahang (UMP), to determine the physical, chemical and mineralogical properties of clay drying and wetting and to establish the suction-water content SWCC mansuli bentonite.

3.1 PREPARATION OF SOIL

In this study, mansuli bentonite has been used and prepared with several condition depends on suction method. For both method vapour equilibrium test and chilled mirror device method, mansuli bentonite was sieved to less than 63 µmetres after being oven-dried. There will be two types of sample as follows:

3.1.1 Powder

Original condition of oven-dried sample has been used for wetting process. There is no chemical or additional water added on soil samples. The sample was placed in the desiccator.
3.1.2 Slurry

Slurry sample will be prepared for drying process. The procedures are as follows:

1) Water added into oven-dried mansuli bentonite. The volume of water added based on the calculation of 1.2 x liquid limit (LL) of mansuli bentonite.

2) Sample left in a container for 7 days before testing to ensure the particles of water and soil reach equilibrium.
3.2 PHYSICAL PROPERTIES OF SOIL

3.2.1 Particle Size Distribution

Sieve analysis is the test used to determine the size distribution on soils. By having this test, a graph shows the percentage of grain distribution can be obtained and from the graph, the dispersion of the graph will identify which type of clay the soil contain the most, whether grain or fine. Fine analysis is used to determine the distribution of finer particles. This experiment based on the reference of American Society for Testing and Materials ASTM D 422 – Standard Test Method for Particle – Size Analysis of Soils.

3.2.2 Specific Gravity

This physical property of soil used to identify void ratio and degree of saturation of a soil. It also used to measure the density of soil solids. This experiment based on the reference of BS1377: Part 2:1990:8.3 – Standard test of Specific Gravity for fine grained soil using density bottle.

3.3 TECHNIQUES OF CONTROLLING SUCTION

3.3.1 Vapour Equilibrium Technique

This technique was implemented by controlling the relative humidity of a closed system (desiccator) based on the relation existing at equilibrium between suction and the relative humidity given by Kelvin’s law (Fredlund D.G. and Rahardjo H, 1993). The relative humidity can be controlled by using saturated saline solutions (Delage P.,1998), (Marinho F.A.M., 2008). This technique is easy to use and can reach very high suction values. Suctions corresponding to several saturated salt solutions at 20oC (after Delage P., Howat M., Cui Y.J, 1998). Salts solution used ar such as Potassium Sulphate, K2SO4, Potassium Nitrate, K2NO3, Zinc Sulphate, ZnSO4, Sodium Chloride, NaCl, Magnesium Nitrate, Mg(NO3)2, Potassium Carbonate, K2CO3, Potassium Acetate, KCH3CO2