CHAPTER I
INTRODUCTION

A. Background

The foundation is an important part in building structure. It is the part of structure which serves exclusively to transmit load from structure on to the sub-soil. It is classified in to shallow foundation and deep foundation. Shallow foundation has bearing capacity in the base area, due to the foundation served to continue and spread the load to the ground such as spread footing, raft foundation, continuous footing. Deep foundation is the foundation that continues the load to the hard soil or gravel such as bore pile and pile foundation.

Bearing capacity of soil expressed the shear strength of soil against the settlement caused the load from structure on it. It is mean the ability of soil strength to support the load foundation of the structure on it. The greater bearing capacity of soil, the smaller settlement of soil caused the load. Designing the foundation must consider the bearing capacity of the soil below the foundation because bearing capacity is the most important factor for designing the foundation. Therefore it is necessary to improve and investigate either on the soil or on the foundation.

Geotechnical engineers are in search of an alternative method for improving the bearing capacity and reducing the settlement of footing resting on soil. There were variety of method to improve and to investigate the soil and the foundation design. In this research, the foundation improvement should be conducted as the alternative solution by adding the structural skirt to the foundation or called “skirted foundation”. Skirted foundation is steel foundation with a thin circumferential skirt steel around the periphery of foundation.

B. Problem Formulation

1. How does the effect of variation skirt length on vertical load of settlement of circular footing on clay?
2. How does the influence of the ratio between skirt length (L) and diameter of footing (D), L/D towards the settlement?
3. How does the magnitude of load in similar settlement as reference?

C. Aim and Benefit of Research

1. Research Aim
   a. To determine the effect of skirted length on vertical load of settlement on circular footing clay.
   b. To know the influence of the ratio between skirt length (L) and diameter of footing (D), L/D towards the settlement.
   c. To know the magnitude of load in similar settlement as reference.
2. Research Benefit
   a. To give the information about the influence of the skirted footing on clay.
   b. To develop the alternative reducing the settlement of circular footing on clay.

D. Limitation of Problem

In order to prevent the expansion of the discussion in this research, then in the study was given the following limitation of problem:

1. To study the behavior of the skirted circular footing on clay, laboratory tests we conducted on small scale model of circular footing with predetermine diameter (D) equal to 75 mm, 100 mm, and 150 mm, 10 mm for each thickness. And the skirts have height 100 mm, and 150 mm, with thickness 2 mm at all.
2. The footing models were machined from steel plates.
3. The skirts are welded firmly and accurately to footing.

4. Six laboratory experiments are conducted to study the behavior of skirted footing and three other without skirted footing.
5. The research has the modified piston a notch at the center of the surface for mounting a calibrated footing ring.
6. The soil bin is made out of the steel diameter 60 cm, height 50 cm and thickness 2 mm.
7. The soil that used in this research taken from Sukoharjo.
8. The ground water table is neglected and the experiment conducted in homogenous soil with water content and compaction of the soil are same condition.
9. The footing is placed on the surface of the soil, to know the displacement occurred.

E. Research Authenticity

The various researchers have studied the effect of the skirt footing. (Wakil, 2013) investigated the effects of skirt length and the relative density of sand on the ultimate load. (Satria, 2016) has studied the effect of skirts to circular footing to improve the bearing capacity of foundation on sand. (Ashraf & Wasim, 2011) were improving the bearing capacity of footing on soft clay with sand pile with/without skirts.

The previous investigations were carried out only in sandy soil. In this research "The Effect of Skirt to Circular Footing on Clay Subjected on Vertical Loading" improves the effect of the skirt circular footing on clay. It has never been conducted previously at the Universitas Muhammadiyah Surakarta.

Table I.1 Differences between this study and previous research

No.	Differences	This Research	El Wakil	Satria	Ashraf & Wasim
1	Material	Clay	Sand	Sand	Soft Clay with Sand Pile
2	Skirt Footing	Six models. T_f= 10 mm; T_s= 2 mm L= 100 mm;150 mm D= 75; 100; 150 mm.	Five models. Tf= 20 mm; Ts= 1.5; 2.5; 3.5 mm; D= 100 mm; L/D= 0.5; 1.0; 1.5	Nine models. T_f= 10 mm; T_s= 2 mm; D= 75; 100; 150 mm; L= 75; 100; 150 mm.	the model footing made of steel Df= 100 mm, Tf= 20 mm, Ts= 4 mm Ds= 102 mm (internal diameter). Different h/D= 1, 1.5, 2. L/h = 0.25, 0.50, 0.75
3	Unskirted Footing	D= 75; 100; 150 mm. T_f= 10 mm	D= 100 mm tested to different relative density D_r= 35%; 65%; 90%.	D= 75; 100; 150 mm. T_f= 10 mm	The model footing made of steel Df= 100 mm, Tf= 20 mm. Different h/D= 1, 1.5, 2. L/h = 0.25, 0.50, 0.75
4	Soil Bin	Modified Cylinder height 500 mm and diameter 600 mm	Made out of two steel rings each of 300 mm height and 750 mm diameter a soil bin of total height 600 mm	Modified Cylinder height 500 mm and diameter 600 mm	the box is cylinder-shaped having inside diameter of 90 cm and 120 cm depth
5	Loading Machine	Frame Load Testing Machine, 250 kN maximum capacity	Motorized loading machine with calibrated proving ring of 28 kN maximum capacity	Frame Load Testing Machine, 250 kN maximum capacity	the loading system consist of han-operated hydraulic jack.

Where :
D = diameter of footing
L = length of skirt
h/D = ratio between height of soft soil layer and sand layers
L/D = ratio between diameter and length footing
L/h = ratio between skirt length and soft soil layer.