CHAPTER I

INTERODUCTION

A. Background

Foundation is the base and the low artificial built part of a structure which carries and transmits the load of the structure to the ground. It could be called ground sill. Foundations are broadly classified into two categories, shallow foundations carry the load directly such as spread footing or open trench foundations, and the deep foundation that transfers building loads to the earth farther down from the surface than a shallow foundation does, to a subsurface layer or a range of depths.

The foundation provide a continuous vertical support as well as the forces of friction and passive bearing of the soil .These forces and the foundation minimize movement damage also anchorage. The foundation and forces minimize movement and damage , Strength and stiffness resist both horizontal loads and vertical loads resulting from racking and over turning of bracing wall within the house.

There are important elements that should be taken in any foundation design such as the site topography, soil conditions, rating requirements, the upper load of the building, frost depth, termite and decay exposure.

The method that will be used is to try to improve the bearing capacity by increasing depth of foundation, In general, at deeper depths, the over burden pressure on soil is higher; hence the soil is more compacted at deeper depth. As a result, it means that higher bearing capacity. This is applicable only for cohesion less soils such as sandy and gravelly soils. The method of improving bearing capacity of soil is not applicable if the subsoil material grows wetter as depth increase. Most researches that used this method shows that has a limited use because increasing the depth, leads the weight and cost of foundation also increases and the second result is draining the soil with increase in percentage of water content in soil, the bearing capacity decreases.

In case of sandy soil, researches show that the bearing capacity may reduce as much as 50% due to presence of water content. Cohesion less soils (i.e. sandy & gravelly

soils) can be drained by laying the porous pipes to a gentle slope, over a bed of sand and filling the trenches above the pipes with loose boulders. These trenches subsequently should lead to the nearest well or any water body.

According to these conclusions and explanation, it is important to find an effort of improvement in both sectors of fundamental area either it is on foundation or in soil itself. This research will be focused on the improvement of the soil bearing capacity. By adding the partially skirt (partially vertical plate) surroundings under the footing's surface. This type of footing is known as partially-skirted on the bearing capacity of square footing on sand.

B. Problems Formulation

1. Does the process of adding partial skirt of sqare footing effect on the soil bearing capacity?

2. Does the partial skirt of square footing effect on the settlement?

C. Research Objectives

Research Objectives can be summarized

a. Implemented the partial skirt footing supposed to increase the bearing capacity, the main goal of this research is concluded the advantages and disadvantages of this implementation.
b. Implemented the skirts could affect the settlement, this research concludes how implementing the skirt could affect the settlement.

D. The benefits of research

c. The research is trying to improve the soil bearing capacity and to explain advantages and disadvantages of implanting the skirt. Moreover, it shows the effectiveness of the soil layer; those objectives in the research would be helpful to implement in order to increase the soil bearing capacity in all soil layers. The general goal of the research is to concluded advantages and disadvantages of this implementation.

D. Limitations and restrictions

This research is restricted according the following conditions and datas:

1. The study results will be according to the Soil Mechanics Laboratory of Civil Engineering Department, Muhammadiyah Surakarta University.
2. Tests are applied on a small sample and scale model in the lab.
3. The tested foundation has square shape.
4. The footing and skirt models are made from steel and rigid plates,
5. Vertical loadings are measured Frame Load Testing Machine, and the vertical displacements of footing are measured by two-dial gauges that attached vertically on the top surface of footing.
6. Centric load is used.
7. All soil layers are sand , 20 kg sand for each layer , therefor the compaction method is the same for all test(100 hit)
8. Ground water level is neglected.
9. The soil bin is circular with 500 mm height and 600 mm diameter, the top side of cubic is opened.
10. The confinement of soil bin is neglected.
11. Nine partially skirted footing models which are conducted .The skirt thickness is 2 mm for 75, 100, and 150 mm of footing and 75, 100, 150 mm of skirt length. Three partially un-skirted footing models with 75, 100, 150 mm width and 10 mm of thickness are also conducted to make data comparison for the partially skirted footing.

12. The table of(L/B) ratios are:

L/B	B 75 mm	B 100 mm	B 150 mm
L 75 mm	1.00	0.75	0.5
L 100 mm	1.33	1.00	0.66
L 150 mm	2.00	1.5	1.00

13. The depth of footing (Df) is zero (0).

14. partially skirts are welded firmly and accurately attached to the periphery of footings.

E. Research Authenticity

The research of quadrant footing modification with title “Effect of skirt on the bearing capacity of quadrant footing on sand” has conducted at the Universitas Muhammadiyah Surakarta (2015) by ISVAN FAJAR SATRIA. And in several countries, the same type of research has already conducted.

El Wakil (2013) has already published his journal with the title “Bearing Capacity of Skirt Circular footing on Sand” on Alexandria Engineering Journal, Alexandria University, Egypt.

Finally, another research has been conducted at the University of Muhammadiya Surakarta by Isvan Fajar Satria “Effect of skirt on the bearing capacity of circular footing on sand” (2015), Nella Kusumaningtyas “Effect of skirt to circular footing on clay subjected on vertical loading” (2016), and Niat Surgo Utomo “bearing capacity of skirted footing on sand soil” (2016)

another research has been conducted at the University of Muhammadiya Surakarta by Danar “Bearing Capacity of partially skirted footing on sand” (2017)