

CHAPTER I

INTRODUCTION

B. Background of Research

Foundation are structural elements such as beams and columns, which has function to transfer building loads to the underlying ground safely. There are two types of foundation, they are Shallow Foundation and deep foundation. A shallow foundation generally placed within the soil at a depth less than the width of foundation, while a deep foundation can extend the depth much larger than its width. As for the shallow foundation itself include pad, strip, and mat (raft) foundation.

To construct such a safe building, it is important to considering which foundation need to be used so it can resist load from the building structure and is it suitable with soil type that the building is constructed. some of building use raft foundation with any compatible reason such as, it will less noise pollution, suitable for soil that has low bearing capacity, and if structure load that is resisted by column is quite big so when pad footing is applied the total area of those foundations is larger than 50% from building area itself.

The design of raft (mat) foundations is not straightforward because of the complex soil-structure taking place. (Braja M.Das and Sivakugan, 2017) In the designing of raft foundation, some factor that need to be considered are structure load that will be resisted type of soil also subgrade reaction of foundation such as settlement. So, to make the analysis design of raft foundation more effective, fast, and reduce errors, there are some software that can help engineer to design some geotechnical problem, one of them is using software called PLAXIS.

In this study, author will focusing on calculation and design raft foundation for 5 stories building of rusun construct on site that has soft soil in Sleman, Yogyakarta. The design will be done using plaxis 3D and will be compared with manual calculation using conventional rigid method.

C. Problem Formulation

Some problems are often encountered in determining and designing a foundation that is strong enough to resist high rise buildings in this case 1 basement and 5 stories of buildings and 1 basement, which are usually it will be built on soil conditions that has low bearing capacity and using pile foundations or pad-footing foundations, problems reappears when using a pile type of foundation will certainly cause noise pollution and if applied to the pad-footing foundation must also consider the distance of columns that may have been designed close so that it is not possible to use the pad-footing foundation. Then a solution to using a raft type foundation can be applied, and to speed up the analysis, PLAXIS 3D software is used.

D. Authenticity of Research

The problem that will be discussed in this study is never been discussed before by another author in Muhammadiyah University of Surakarta.

E. Problem Limitation

- a. Analysis of 5 stories and 1 basement building using SAP2000 3D v.20.0.0 to get the axial load from column of the building structure.
- b. Soil data is used from Site Investigation report by Soil Mechanic Laboratory, UAJY for hotel project at Jl. Yogya-Solo km 9 Sleman, Yogyakarta.
- c. Foundation modeling using plaxis 3D V.22 CONNECT Edition to get the total settlement

F. Objective of Research

The objective of this research is to calculate the bearing capacity and settlement of soil due to the structure load of the building that is constructed above the soil, and to know if the raft foundation that will be designed can resist the building, also to proven that the analysis using PLAXIS 3D is compatible with manual calculation.

G. Benefits of Research

The benefit that be expected from this paper are :

- a. May be implemented for civil engineering study especially in scope of raft foundation.
- b. May be planning and designing raft foundation for stories building.
- c. Can be a one of references or example in analysis of raft foundation using manual and Plaxis 3D method.