

CHAPTER I

INTRODUCTION

A. Background

The development of a region with an increase in economic activity, the mobility of people, goods and services will also increase. All will require an extraordinary level of transportation services in the form of needs in the form of adequate transportation infrastructure and facilities in urban areas and in the surrounding areas. To support the need for transportation is the widening of roads that cross channels or rivers, railways or other roads, it is necessary to widen bridges, overpasses or underpasses.

Train (KA) is one of the modes of transportation to support mobilization. For this reason, the construction of rail lines continues to be improved. For example, with the addition of the Jakarta-Surabaya Double Track, the addition of a railway line will have an impact on crossing a railroad plot. The Ministry of PUPR will build flyovers and underpasses to pedestrian bridges (JPO) including repairing the surrounding environmental roads, using technology and domestic products. The use of local products is used because it is more efficient in processing costs and faster completion time.(Basuki,2019)

The construction of the Purwosari flyover in the city of Surakarta is one of the efforts of the Ministry of PUPR to meet the need for transportation facilities and infrastructure. The construction of the flyover aims to reduce traffic that occurs at the crossing. This infrastructure development aims to unravel the congestion that occurs from the direction of Kartosuro (Yogyakarta/Semarang) to the center of the city of Surakarta or from the opposite direction considering that the route is a very congested route during peak hours.

In the construction of flyovers, it is necessary to have a plan that is carried out before being implemented. Besides that, in planning, you must prioritize the level of security and comfort which is high for the user, so that it can avoid unwanted events during construction and when the flyover is used. To build a safe flyover one of them must have a strong foundation. The foundation of the bridge or

flyover consists of several types, one of which is the pile foundation.

Pile foundations are relatively long and slender rods that are used to transmit the foundation load through a layer of soil with low bearing capacity to a hard soil layer that has a high bearing capacity which is relatively deep compared to shallow foundations.

Due to the construction of the flyover being in the middle of the city, the implementation of the erection uses an inner bore system tool, because it does not cause a loud sound and causes vibrations at the time of erection..

In the construction of the Purwosari flyover, a soil investigation was carried out which aims to determine the compactness or density level of the soil, the structure of the soil layer, the type of soil, and the physical and mechanical properties or parameters of the soil. The data will be used for the analysis of determining the type and depth of the foundation as well as the bearing capacity of the soil on the flyover planning project.

Based on the description of the background above, the title of the research that will be adopted by the author in this Final Project is “REDESIGN BOTTOM STRUCTURE ABUTMENT WITH SPUN PILE FOUNDATION (Case Study of the Fly Over Purwosari Project, Surakarta, Central Java).

B. Problem Formulation

The formulation of the problem from evaluating the comparison of the bearing capacity of the pile foundation and drill pile on the substructure is as follows:

- 1) How big is the bearing capacity of pile foundation with existing data.
- 2) How does the bearing capacity of the bored pile foundation (which is installed on the project) compare with the design of the pile foundation, and
- 3) How big is the settlement value in the pile foundation design.

C. Research Purpose

Based on the formulation of the problem above, the objectives of this study are as follows:

- 1) Analyzing the ultimate bearing capacity of the existing design pile (bored pile foundation installed on the project) abutment A1.
- 2) Analyzing the comparison of the carrying capacity of the foundation resulting from the existing design with the alternative design of the pile foundation using the *Mayerhoff* method.
- 3) Knowing the value of settlement on the pile foundation.

D. Problem Limitation

The limitations of the problem to be studied in this final project are as follows:

- 1) The research location is the construction of the Purwosari Flyover (Surakarta).
- 2) Not analyzing Upper structure.
- 3) Only count one side of Abutment.
- 4) The geotechnical data used are the results of the N-SPT Soil Investigation and drill logs.
- 5) The standard loading on the bridge refers to the Bridge Loading Standard regulations (SNI 1725:2016).
- 6) Foundation laying using the Inner drill system tool.
- 7) Calculate the pile foundation at point A1.
- 8) The foundation safety factor is not set.
- 9) The settlement of the pile foundation is taken into account.

E. Research Benefit

From the results obtained, it is expected to provide the following benefits:

- 1) Increase knowledge and insight, especially in the field of civil engineering regarding the construction of pile foundations on overpasses or bridges.
- 2) Can be used as a reference for academics and practitioners in the field of civil engineering in substructure planning focused on pile foundations.

F. Similar Research

Pile foundation research entitled "Redesign Bottom Structure Abutment with Spun Pile Foundations on the Purwosari (Surakarta) flyover" has never been carried out in the Muhammadiyah University of Surakarta. However, in some universities, the same type of research has been carried out. Similar studies include:

- 1) Wahyu Prasetyo (2019) published the results of his final project with the title "ANALYSIS OF THE SUPPORTING CAPACITY OF THE GROUP SPUN PILE FOUNDATION ON THE CONSTRUCTION OF THE OGAN BRIDGE OF THE KAYU AGUNG TOLL ROAD – PALEMBANG – BETUNG PIER 15 STA 38+020"
- 2) Arif Aris Munanadar (2020) published the results of his final project with the title "ANALYSIS OF CAPACITY CARRIERING CAPACITY ON THE CONSTRUCTION OF THE MANGGALA PRABUMULIH WATER BRIDGE IN SOUTH SUMATRA PROVINCE"
- 3) Siddiq Pramono (2018) published the results of his final project with the title "EVALUATION OF THE CALCULATION OF THE SUPPORTING CAPACITY OF SPILL CONSTRUCTION CONSTRUCTION OF PAGAR MERBAU TOLL BRIDGE"
- 4) Ayu Fitrosyam Sulistia (2018) published the results of her final project with the title "ANALYSIS OF SOIL SUPPORTING CAPACITY OF SPUN PILE FOUNDATIONS WITH MEYERHOFF METHOD"
- 5) Ahmad Fadli Lubis (2019) published the results of his final project with the title "ANALYTICAL AND NUMERICAL ANALYSIS OF SUPPORTING CAPACITY ANALYSIS ON THE MEDAN-BINJAI TOLL ROAD PROJECT IA SEI DELI BRIDGE STA1+600"