



## Comparison Analysis of Bore Pile Foundations and Piles to Time and Cost of Construction in Tanjung Perak Sea Keeping Base and Class II Beach Construction Project

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### ABSTRACT

In this project using a pile foundation, but during the foundation work there were several obstacles, namely hydraulic tools that were still not ready to use, hydraulic tool repairs, and piles that were one week late, causing delays in foundation work. Therefore workers cannot work optimally while waiting for the tools to arrive. In addition to delays, there are also cost overruns where workers are still being paid for work that is not optimal, so it is necessary to compare these foundations with other foundations in order to find differences in foundations that are more efficient and minimize the problems that have occurred. From the results of data processing, it can be seen that the duration of time required for the preparatory work to the 30x30cm pile foundation with a depth of 16m for 65 points on the class 2 marine and beach guard base of Tanjung Perak is 56 days and requires a fee of IDR 655,305,366.00. For the duration of the preparatory work up to the 30cm bore pile foundation with a depth of 16m as many as 65 points on the class 2 marine and beach guard base Tanjung Perak is 59 days and requires a fee of IDR 520,779,603.00. Then the difference in time between the pile foundation and the bore pile foundation is 12 days. The pile foundation can save as much as 21.4% or 12 days of time from the bore pile foundation.

### 1. Introduction

The development of the world of construction is currently very rapid. With any construction process, the completion from start to finish also takes a long time[1]. Therefore, to determine the most appropriate and efficient way of carrying out a construction project requires careful consideration, even with good cooperation between various parties, especially on large projects such as buildings [2]



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According to [3] Pile foundation is part of the structure used to receive and transfer (transmit) loads from the superstructure to the supporting soil which is located at a certain depth. The use of pile foundations as building foundations when the soil under the building base does not have sufficient bearing capacity to carry the weight of the building and the loads acting on it[4]. Bored pile foundation is a pile foundation whose installation is carried out by drilling the ground first, which is then filled with reinforcement that has been assembled and poured with concrete. If the soil contains water, an iron pipe or what is commonly known as a temporary casing is needed to hold the walls of the hole so that it does not slide, and this pipe will be removed when the concrete is poured[5].

Marine and Coast Guard Base (PLP) Class II Tanjung Perak is a Technical Implementation Unit of the Directorate General of Sea Transportation which is under the authority and responsibility of the Directorate General of Sea Transportation as stipulated in the regulations of the Ministry of Maritime Affairs[6]. In this project using a pile foundation, but during the foundation work there were several obstacles, namely hydraulic tools that were still not ready to use, hydraulic tool repairs, and piles that were one week late, causing delays in foundation work[7]. Therefore workers cannot work optimally while waiting for the tools to arrive. In addition to delays, there are also cost overruns where workers are still being paid for work that is not optimal, so it is necessary to compare these foundations with other foundations in order to find differences in foundations that are more efficient and minimize the problems that have occurred[8].

This study discusses the foundations for buildings, namely using bore pile foundations, compared to pile foundations in the construction of Class 2 Tanjung Perak Marine and Beach Guard Base foundations[9]. In terms of this comparison, it is possible to determine the efficiency of each of these foundations in terms of cost, time, quality and method of implementation must be considered [10]. This study formulates the problem of how the difference in cost and time of carrying out work on pile foundations and bored pile foundations and what are the problems that often occur when carrying out work on pile foundations and bore pile foundations[11]

## **2. Research Method**

The planning procedure for Comparative Analysis of Bore Pile and Pile Foundations Against Time and Cost of Work on the Tanjung Perak Class II Sea and Coast Guard Base Development Project will illustrate how to complete the calculation through the following flow chart[12].

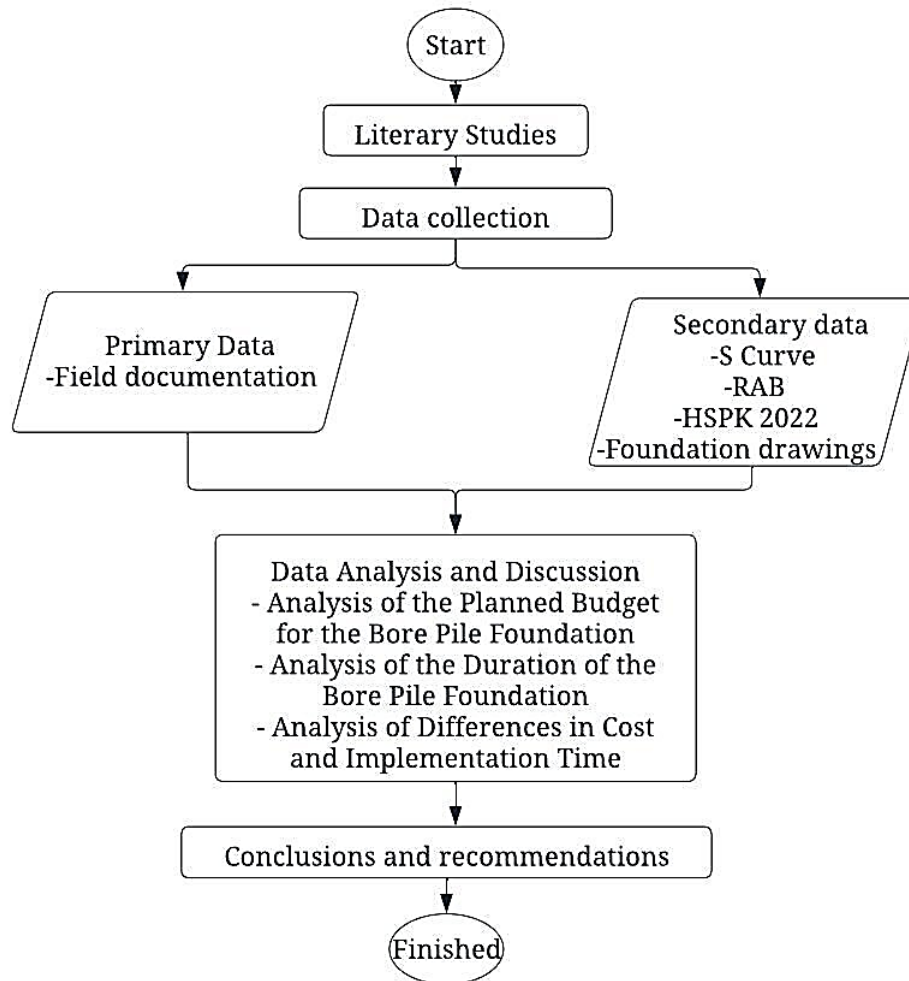


Figure 1. FlowChart

**3. Description and Technical**

Please explain clearly the methodology, covering some technical work as follows :

**1) Population and Samples.**

**Primary data**

Primary data is data sourced internally which is obtained directly through the implementation of observation, namely direct observation, and others[13].

1. Field Documentation

**Secondary Data**

Externally sourced secondary data obtained through external references[14], namely CV. ARTHA MULYA

1. WED
2. HSPK 2022
3. S-Curve
4. Image of foundation point

**2) Sampling Techniques.**

**Productivity Calculations**

The calculation of labor productivity requires a coefficient value contained in UPA (Unit Price Analysis), in which labor productivity is taken from the labor coefficient that has the highest work weight [15], there is a calculation formula in calculating labor productivity which can be seen below:

$$\text{Productivity} = 1/(\text{Labor Coef.})$$

### Calculation of Each Job

The project schedule data on work volume, labor productivity, and number of workers are needed to calculate the duration of each job[16]. Information on work volume is usually obtained from BoQ (Bill of Quantity) data, information on labor productivity is obtained from previous calculations, and the number of workers is a plan that can be adjusted in volume[17]. In accordance with the work calculation formula, it can be seen in the formula below:

$$\text{Duration} = (\text{Work Volume}) / (\text{Productivity} \times \text{Number of Workers})$$

### 3) Instrument Analysis Tool.

#### Calculating Duration With Microsoft Project

Determination of the relationship between activities based on scheduling principles with Microsoft Project. Activities whose start and finish times depend on other activities are successors, while successors depend on their predecessors[18]. The relationship between these activities includes:

Then input each work activity, work duration, relationship between work items in the Ms-project application, to obtain the total work duration[19].

### 4) Data Analysis Techniques.

After doing a comparison between bore pile and pile foundations based on cost and time, it can be concluded how much the difference is between the two foundations, namely pile foundation and bore pile[20].

## 4. Results and Discussions

From the results of the data processing above, it can be seen that the duration of time required for the preparatory work to the 30x30cm pile foundation with a depth of 16m for 65 points on the class 2 marine and beach guard base in Tanjung Perak is 56 days and requires a fee of IDR 655,305,366.00. For the duration of the preparatory work up to the 30cm bore pile foundation with a depth of 16m as many as 65 points on the class 2 marine and beach guard base Tanjung Perak is 59 days and requires a fee of IDR 520,779,603.00.

From the discussion and discussion above, the time difference between pile foundation and bore pile foundation is 3 days. The pile foundation can save as much as 5.4% or 3 days of time from the bore pile foundation and the difference in cost between the pile foundation and the bore pile foundation is IDR 134,525,763. Bore pile foundations can save costs of up to 20.5% or Rp. 134,525,763 from pile foundation work.

## 5. Conclusion and Suggestion

### 5.1 Conclusion

From the data processing that has been done, several conclusions are obtained in accordance with the objectives of this study, the following conclusions can be drawn.

1. From a comparison between the bore pile foundation with a diameter of 30cm and a depth of 16 meters with 65 points and piles with a depth of 30x30cm with 16 meters with 65 points, the difference in work time is 3 days where the pile work is much faster than the bore pile work. The pile work was carried out for 56 days while the bore pile work was carried out for 59 days.
2. From a comparison between bore pile foundations with a diameter of 30cm and a depth of 16 meters with 65 points and piles with a depth of 30x30cm with 16 meters with 65 points, the difference in work costs is IDR 134,525,763.00 where the pile work is much more expensive than the bore pile work. The pile work cost Rp. 655,305,366.00 while the bore pile work cost Rp. 520,779,603.00.

### 5.2 Suggestion

The important things that the author conveys as considerations and suggestions for further research are as follows.

1. Does not count any work other than bore pile and pile foundation work.
2. Only calculating the cost and time used for bore pile and pile foundation work.
3. Only discusses the difference between bore pile and pile foundations in terms of cost and time

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