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

Alifiandi Varian Jaya[1*], Michella Beatrixm, S.T, M.T[2], Putri Suci Mawariza, S.T, M.T[3],

Universitas 17 Agustus 1945 Surabaya

Email : alifiandivarianjaya@gmail.com

A R T I C L E   I N F O

A B S T R A C T

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. 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. So the difference in time between the pile foundation and the 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.

First Author/ Civilla vol (no) year

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. 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 (Frederika, 2019).

According to Muluk 2020 A pile foundation is a crucial part of a structure that is used to support and transfer loads from the building to the underlying soil at a certain depth. It is employed when the soil beneath the building lacks adequate bearing capacity to sustain the weight of the structure and the loads it experiences. A specific type of pile foundation is the bored pile foundation, which involves drilling the ground before filling it with reinforcement and concrete. In cases where the soil contains water, a temporary casing such as an iron pipe is used to prevent the hole walls from collapsing. This casing is later removed when the concrete is poured.

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. 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.

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. 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. 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

2. Literature Review

Definition of Foundation

The foundation is a structure at the bottom of the building (substructure) whose role is to transfer the load from the superstructure to the subsoil below without cracking and soil settling. surplus land/building. To ensure the stability of a building against its own weight, building loads, and external forces such as wind pressure and earthquakes, among others, the foundation must be calculated. In addition, there must be no greater than the allowable drop. (Frederika, 2019).

Foundation Function

The foundation is the underground structure of the building above it. The task of the foundation is to transfer the load of the building to the hardest layer of soil under the foundation and not to exceed the strength of the soil. Because if this happens, it will cause excessive weakening and damage to the structures that support it (Frederika, 2019).

Bore Pile Cost Analysis

The following are the steps to look for an analysis of the cost of making a foundation using HSPK 2022 with the Bore Pile working method, namely:

1. Analysis of the Cost of Ordinary Excavation

Asp formula = Coefficient x Unit Price

Pack Cost Analysis Formula. Excavation = volume x Ashp

Time Planning On Construction Projects

To calculate the duration of each task in a project, information is needed about the volume of work, labor productivity and the number of workers required. The volume of work is usually found in the Bill of Quantity, while labor productivity is obtained from previous calculations. The number of workers needed can be adjusted to the planned volume of work. Using this information, you can create an accurate project schedule that is on track. In accordance with (Maulidi, 2021), there is a work calculation formula which can be seen in the formula below

Weight Formula = Total Work Price/Total Worker Price 100%

Duration Formula = (Coefficient X Unit Price)/Number of Workers

Calculating Productivity

Calculation of labor productivity requires a coefficient value found in AHS (Unit Price Analysis), in which labor productivity is taken from the labor coefficient that has the highest work weight. According to Mulidi (2021), there is a calculation formula for calculating labor productivity, which can be seen in below:

Productivity = 1/(Labor Coef.)

First Author/ Civilla vol (no) year

3. 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.
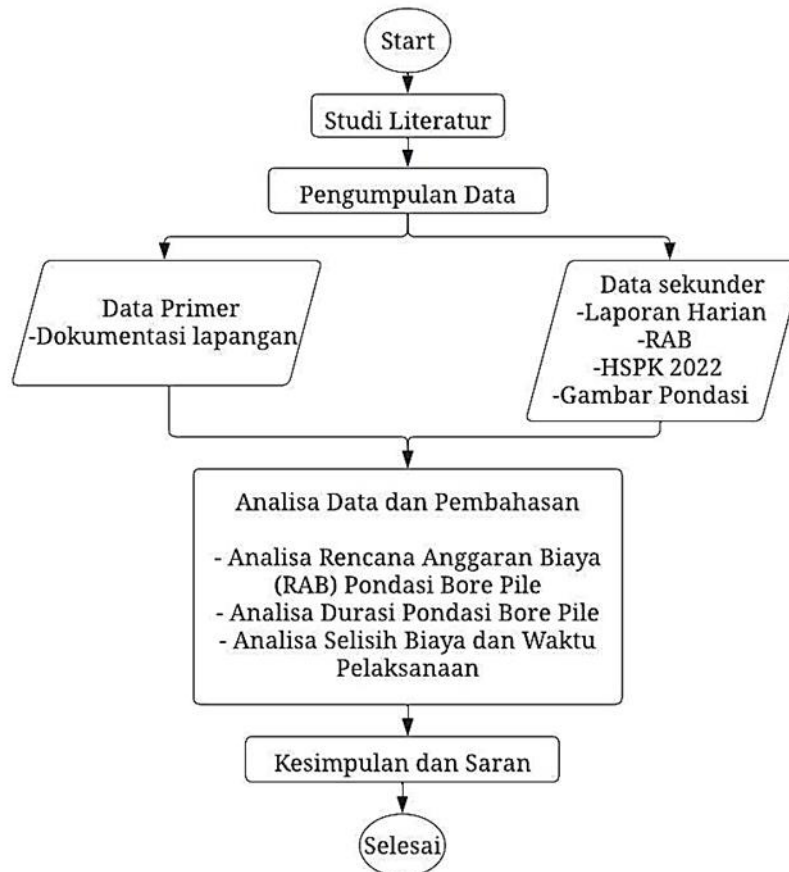
Figure 1. FlowChart

3.1   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.

1. Field Documentation

Secondary Data

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

1. WED

2. HSPK 2022

3. S-Curve

4. Image of foundation point

2. Sampling Techniques.

Productivity Calculations

Calculating labor productivity involves utilizing a coefficient value found in AHS (Unit Price Analysis). In this analysis, labor productivity is derived from the labor coefficient associated with the highest work weight. The formula used to calculate labor productivity can be observed below:

Productivity = 1/(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. 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. In accordance with the work calculation formula, it can be seen in the formula below:

Duration = (Work Volume)/(Productivity x 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. 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.

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.

5. 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

Based on the data processing conducted, several conclusions have been drawn that align with the objectives of this study. The following conclusions can be derived from the analysis.

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.

5.1 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

References

[1]   Ahmad, Raudah, Agus Darmawan Adi, and Hary Christady Hardiyatmo. 2019. "Studi Eksperimental Fondasi Dangkal Dengan Beban Tarik Pada Tanah Pasir." VII(1).

[2]   Alwie, rahayu deny danar dan alvi furwanti, Adi Bagus Prasetio, Roni Andespa, Politeknik Negeri Lhokseumawe, and Kata Pengantar. 2020. "Tugas Akhir Tugas Akhir." Jurnal Ekonomi Volume 18, Nomor 1 Maret201 2(1):41–49.

[3]   Ariany Frederika, A.A Wiranata, and Kadek Riska Larasati. 2019. "Perbandingan Biaya Dan Waktu Pelaksanaan Pekerjaan Balok Struktur Beton Gedung Antara Metode Konvensional Dengan Precast (Studi Kasus: Grand Whiz Hotel, Gatot Subroto Barat)." Jurnal Ilmiah Teknik Sipil 18(2):1–8.

[4]   Hilfi Harisan, 2020. 2021. "Analisis Daya Dukung Tanah Pada Pondasi Dangkal." 6(1):1–5.

[5]   I Wayan Jawat, Putu Panji Tresna Gita, and I Made Satria Dharmayoga. 2020. "Kajian Metoda Pelaksanaan Pekerjaan Pondasi Bored Pile Pada Tahap Perencanaan Pelaksanaan." PADURAKSA: Jurnal Teknik Sipil Universitas Warmadewa 9(2):126–42. doi: 10.22225/pd.9.2.1830.126-142.

[6]   Indonesia, Standar Nasional, and Badan Standardisasi Nasional. 2017. "Baja Tulangan Beton." SNI 2052:2017.

[7]   Kusuma, Catra Editya, and Fera Lestari. 2021. "Perhitungan Daya Dukung Tiang Pancang Proyek Penambahan Line Conveyor Batubara." Jurnal Teknik Sipil 02(01):1–7.

[8]   Maulidi, Ahmad, Syamsul Arifin, and Hernu Suyoso. 2021. "Penjadwalan Proyek Konstruksi Menggunakan Critical Path Method (Studi Kasus: Gedung Laboratorium Terpadu Fakultas Teknik Universitas Jember)." Jurnal Ilmiah MITSU 9(1):1–8. doi: 10.24929/ft.v9i1.992.

[9]   Muluk, Mafriyal, Desmon Hamid, Satwarnirat Satwarnirat, Dalrino Dalrino, and Melia Santi. 2020. "Studi Perbandingan Pondasi Tiang Pancang Dengan Pondasi Bore Pile (Studi Kasus: Pelaksanaan Pembangunan Pondasi Tower Grand Kamala Lagoon-Bekasi)." Jurnal Teknik Sipil ITP 7(1):26–33. doi: 10.21063/jts.2019.v701.04.