BULLETIN OF ENGINEERING SCIENCE, TECHNOLOGY AND INDUSTRY

https://bestijournal.org | PT. Radja Intercontinental Publishing

E-ISSN: 3025-5821

STUDY OF WOODEN PILE FOUNDATION STRUCTURE IN STAGE HOUSES ON THE BANYUWANGI COAST

Sunarko
Universitas 17 Agustus 1945 Banyuwangi[1]
*Correspondence Email : Sunarko@untang-banyuwangi.ac.id

Abstract

This research aims to determine the structure of the foundation of wooden pillars in stilt houses on the coast of Banyuwangi. The method used in the discussion is descriptive analysis, namely analyzing study object data based on theory related to the topic and object of observation, with the aim of finding the system and form of construction applied to The foundations of residential houses in this village correspond to three zones, namely water, transition and land. The final results conclude the form of the structural system and foundation construction of residential houses in each regional zone. The foundations of the houses in each zone show that on land the houses use pile foundations, in transitions with stone masonry, and on the water using stone masonry and some directly with pillars.

Keywords: Foundation Structure, Wooden Pillars, Stilt House.

INTRODUCTION

According to the 1945 Constitution and Amendment to Article 28, it is explained that housing is one of the basic rights of citizens. Therefore, every citizen has the right to have a place to live and a good and healthy living environment. Houses in coastal areas generally have stilt structures. The development of housing and settlements in coastal areas is a critical element in supporting sustainable development and can improve the welfare of coastal communities, in particular (Son, 2021). In general, stilt houses are built using wooden construction without taking into account the applicable technical norms. Houses that do not meet health, comfort and safety standards pose a serious risk to the survival of their residents. Apart from that, the condition of the house is not suitable for habitation. In order to get a healthy home, you need to consider several factors, including air ventilation and natural lighting. Apart from health factors, houses must also meet construction safety standards and the selection of building materials (Leni, 2022).

Building structure is the arrangement or arrangement of building parts that receive the load or main construction, regardless of whether the construction is seen as a building structure or not (Naing, 2019). In general, building structures involve elements such as foundations, walls, columns, floors and roof frames. Construction is the way building materials are arranged and connected so that they form a unit that can withstand loads and be sturdy (Nurfansyah, 2020). Structure has a close relationship with understanding the anatomy of a building, where one of the elements is the bottom structure. This lower part acts as the main foundation for the building, which is generally called the building foundation and consists of various types (Saputra, 2020). Substructure construction reflects the relationship between the foundation and the loads it supports, such as columns or building walls. In traditional buildings, the structural concept often involves the use of wood as the main material. In traditional architecture, a simple structural system is generally implemented which involves the use of posts or columns and wooden beams that are connected using a peg method. The stability of this construction depends on knowledge passed down from generation to generation (Fransiska, 2022). In traditional architecture, a simple structural system is generally implemented which involves the use of posts or columns and wooden beams that are connected using a peg method. The stability of this construction depends on knowledge passed down from generation to generation, as explained by Fransiska (2022). The discussion focuses on structural analysis and lower construction, including the relationship between the foundation system, pillars and the middle boundary of the structure, based on three zones of residential areas on the Banyuwangi coast.

METHOD

This research is qualitative research that uses descriptive methods, using literature studies and data collection through surveys or field observations. The research steps involve identifying house foundations with wooden pillars, surveys or field study observations, analysis of the development of wooden pole foundations, models for implementing variations of wooden pole foundations, and finally, concluding and providing suggestions.

RESULTS AND DISCUSSION

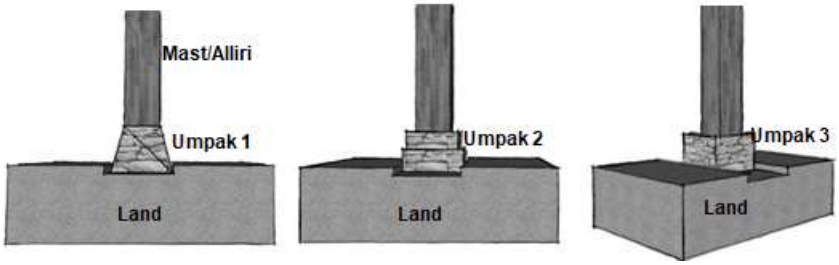
Overview of Research Locations

East Java is a province in the Republic of Indonesia, located in the easternmost region of Java Island. The island of Java itself is divided into six provinces, namely DKI Jakarta, Banten, West Java, Central Java, DI Yogyakarta and East Java. With an area of 46,428.57 square km, East Java Province is administratively divided into 38 districts or cities, with details of 29 districts and 9 cities. The names of districts in East Java include Bangkalan, Banyuwangi, Blitar, Bojonegoro, Bondowoso, Gresik, Jember, Jombang, Kediri, Lamongan, Lumajang, Madiun, Magetan, Malang, Mojokerto, Nganjuk, Ngawi, Pacitan, Pamekasan, Pasuruan, Ponorogo, Probolinggo, Sampang, Sidoarjo, Situbondo, Sumenep, Trenggalek, Tuban, and Tulungagung. Meanwhile, cities in this province include Batu, Blitar, Kediri, Malang, Madiun, Mojokerto, Pasuruan, Probolinggo and Surabaya. Banyuwangi Regency has an area of 5,782.50 square km. This area is still classified as a forest area because its proportion is greater than other areas. The territorial boundaries of Banyuwangi Regency involve Situbondo Regency to the north, the Bali Strait to the east, the Indonesian Ocean to the south, and Jember and Bondowoso Regencies to the west. Based on the boundary line coordinates, Banyuwangi Regency is located between 70°43' - 80°46' south latitude and 113°53' – 114°38' east longitude.

Structure and Construction of House Foundations on Mainland

The structure or basic elements beneath a building are the main foundation of a structure, known as the foundation. House foundations on land generally use pile foundations or cast concrete which are placed under the pillars as a foundation (Gultom, 2020). Houses located in water are generally in the form of houses on stilts with poles planted directly into the surface of the seabed (Mungok, 2020). An explanation of the house sub-structure in each regional zone can be found below. Residential houses on the coast of Banyuwangi which are located on land generally have a house structure on stilts. This building was built with the main structure using wood, as well as other parts of the house which use a lot of wood. Vertically, the structure is divided into three parts, namely the lower structure, the middle structure and the upper structure. The lower structure includes umpak foundations made of stone or cast concrete, pillars/alliri, and peg/pattolo beams. The pillars/alliri, as the main structure, stand in a grid pattern and have a height of around 2.5-3 meters which are tied with beams/pattolo.

Figure 1. Shape of House Foundations on Mainland

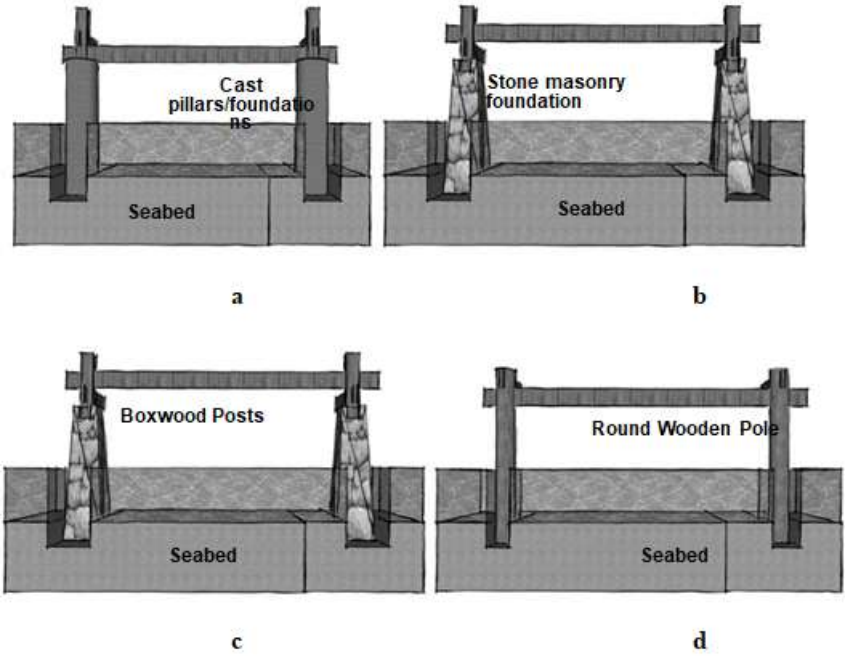


The construction system in the lower structure is designed to support the building load and transfer it directly to the ground. In sequence, starting from the ground surface, followed by the pile foundation, and above the foundation there are pillars/alliri. The umpak acts as a guide for the load from the pole to the ground, protects the wood of the pole/alliri from termite attacks, and prevents

direct contact with flowing water. Umpaks are generally made of stone or concrete and have various shapes, including trapezoids, umpak 3 in the form of a single box, or umpak 2 in the form of stacked flat boxes. Apart from that, the umpak is planted in the ground to a depth of around 5-10 cm.

Structure and Construction of House Foundations in Water

There are two basic types of structures used for homes in water areas. First, some use stone or cast foundations. Second, there are those who use alliri poles made of wood which are planted directly into the seabed (Thoyibah, 2021). Foundations made of stone or alliri pillars are placed higher than the water surface, creating an empty space or pit under the house. This step was taken to anticipate more significant tidal heights and seabed depths in the transition area. Under the house can also be used to store fishing equipment (Sitorus, 2021). Houses in this water area adopt a structural concept similar to the Banyuwangi coast, using round or square wooden poles as the main structure. There is another type that uses a stone masonry foundation with a trapezoidal shape, similar to those used in transition areas. There are also those who use cast poles in the shape of round columns (a paraphase of the last sentence is not given because the original statement is not clear). Replacing wooden materials with stone masonry or cast concrete aims to achieve long-term structural sustainability and better durability compared to wooden post structures.



Models of house foundation structures in the water area of the object of observation have a variety of shapes and appearances. Even though the principles of implementing the structural and construction systems remain the same, the difference lies in the use of materials or the appearance of the materials. In Figure a and Figure b, the foundation functions as the main pillar that supports the building structure. Figure a shows a foundation cast in a round column shape, similar to the one applied on the Banyuwangi coast although with a different shape. Meanwhile, Figure b uses stone pairs arranged into a trapezoid-shaped foundation. In Figure c and Figure d, the foundation structure does not rely on the foundation as the main foundation; instead, the poles are embedded directly into the seabed. Although the construction system remains similar, the difference lies in the shape of the pole, with Figure c using a square pole, while Figure d uses a round pole. Figure a and Figure b reflect efforts to adapt to modern structures by taking into account structural durability and strength over a long period of time. In contrast, Figure c and Figure d are examples of the application of traditional systems in the context of traditional technology sustainability.

CLOSING

Conclusion

The structure and construction of house foundations on the Banyuwangi coast shows variations in application depending on the regional zone. Although most houses in the mainland zone still use traditional structures, there are changes that reflect the level of prosperity and understanding of more modern structural technology and materials. The structure and foundation construction of houses on land as a whole still adopts traditional structural principles. This involves the use of alliri poles under the house, as well as umpaks of various shapes which serve as a foundation to support the alliri poles. In water areas, the concept of structure and house construction applies the same principles as on land and transition zones. Basic structures include the use of cast or masonry foundations as the main pillars, with some using wooden pillars without foundations beneath them, but embedded directly into the seabed. Variations in the shape or appearance of the lower structure in this zone are adjusted to the economic capabilities of the home owner

REFERENCES

Fransiska M,. Henny H,. Utomo, (2022), Kajian Struktur Bangunan Untuk Permukiman Rawan Banjir Berdasarkan Kearifan Lokal di Kabupaten Landak, Jurnal Rekayasa Lingkungan Tropis, Vol.3 No.1

Gultom, B. J. B., Jati, D. R., & Andi, A. 2020. Komparasi Adaptasi Bencana Banjir Di Kawasan Waterfront Sungai Kapuas (Pontianak) Dan Sungai Kakap. Jurnal Pengembangan Kota, 8(1), 12-22.

Leni Susanti, (2022), Pelestarian Rumah Panggung Berbahan Dasar Kayu Di Kabupaten Tanggamus, Provinsi Lampung, Jurnal Belantara Vol. 5, No.2

Mungok, D. C., Herawati, H., & Utomo, K. P.2020. Pengaruh Perubahan PenggunaanLahan Terhadap Zona Potensi Banjir Pada Daerah Aliran Sungai Landak. Jurnal Rekayasa Lingkungan Tropis, 4(1).

Naing, N., & Halim, H. (2019). Sistem Struktur Rumah Mengapung di Danau Tempe Sulawesi Selatan. Jurnal Permukiman, 8(3), 145-152.

Nurfansyah,. Ibnu Saud, (2020), Perkembangan Pondasi Tiang Kayu Pada Rumah Tinggal Di Banjarmasin, jurnal keilmuan dan aplikas teknik, vol 22, no 2

Putra, R. W. S., & Pigawati, B. (2021). Tipologi Permukiman Kawasan Pesisir Kecamatan Semarang Utara. Jurnal Planologi, 18(1), 41.

Saputra, A. K., Santoso, D. H., & Yudono, A. R. A. (2020). Zonasi Tingkat Kerawanan Banjir Pada Ruas Bekas Sungai di Kabupaten Sukoharjo. Jurnal Geografi, 12(1), 3 2-38.

Sitorus, I. H. O., Bioresita, F., & Hayati, N. (2021). Analisa Tingkat Rawan Banjir di Daerah Kabupaten Bandung Menggunakan Metode Pembobotan dan Scoring. Jurnal Teknik ITS, 10(1),

Thoyibah, R. N., & Pamungkas, A. (2021). Prinsip Penataan Bangunan Permukiman Kawasan Bencana Banjir Di Desa Centini Kecamatan Laren Kabupaten Lamongan. Jurnal Teknik ITS, 9(2),