(2025), 3 (4): 140-147 **Scientica** 3021-8209
Jurnal Ilmiah Sain dan Teknologi

BIOPHILIC ARCHITECTURE AS AN APPROACH TO DESIGN BELAWAN STATION

Novrial, Riry Awinda Sari
Faculty of Engineering, Universitas Sumatera Utara, 20155 Medan, Indonesia
e-mail: rawinds0126@gmail.com

Abstract
Railways represent a significant mode of mass public transportation, capable of facilitating the movement of passengers and goods on a substantial scale. In light of the observed surge in passenger and freight traffic at Belawan Port, it is imperative to undertake an upgrade to the Belawan railway station. This enhancement is not only driven by the current demand but also serves for the developments of national railway network, which is scheduled until the year 2030. As a cultural heritage building, it is crucial to meticulously plan its renovation and modernization to ensure that its historical and cultural significance is preserved and enhanced. Given the natural conditions of the area, biophilic architecture was chosen as the design methodology. Biophilic design is an architectural approach that incorporates natural elements into the built environment. Integrating natural elements into buildings can create comfortable, healthy, and sustainable spaces at Belawan Station. Biophilic architecture can be an effective approach in designing railway station that are not only functional, but also environmentally friendly and human-oriented

Article History
Submitted: 30 January 2025
Accepted: 10 February 2025
Published: 11 February 2025

Key Words
Railway, Cultural Heritage, Biophilic Architecture

Abstrak
Kereta api merupakan moda transportasi umum massal yang mampu memfasilitasi pergerakan penumpang dan barang dalam skala besar. Mengingat peningkatan lalu lintas penumpang dan barang di Pelabuhan Belawan, maka peningkatan stasiun kereta api Belawan perlu dilakukan. Peningkatan ini tidak hanya didorong oleh kebutuhan saat ini tetapi juga untuk pengembangan jaringan kereta api nasional, yang dijadwalkan hingga tahun 2030. Sebagai bangunan cagar budaya, renovasi dan modernisasinya harus direncanakan dengan cermat untuk memastikan bahwa signifikansi sejarah dan budayanya dilestarikan dan ditingkatkan. Mengingat kondisi alam kawasan tersebut, arsitektur biofilik dipilih sebagai metodologi desain. Desain biofilik adalah pendekatan arsitektur yang menggabungkan unsur-unsur alam ke dalam lingkungan binaan. Pengintegrasian unsur alam ke dalam bangunan dapat menciptakan ruang yang nyaman, sehat, dan lestari di Stasiun Belawan. Arsitektur biofilik dapat menjadi pendekatan efektif dalam merancang stasiun kereta api yang tidak hanya fungsional, namun juga ramah lingkungan dan berorientasi pada manusia

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Submitted: 30 January 2025
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Kata Kunci
Kereta Api, Warisan Budaya, Arsitektur Biofilik

Introduction

Population growth and economic expansion, especially in the industrial and commercial sectors are critical components in the urban development process. along with population growth, the need for adequate inter-city transportation services continues to increase. the implementation of mass transit systems offers an optimal solution to address this need. Transportation is defined as the activity of moving or transporting something from one place to another [1]. from this

definition, transportation can be defined as the movement or delivery of goods or individuals from one location to another within a certain period of time, using vehicles driven by humans or machines.

Railways represent a significant potential for the provision of rapid, safe, reliable, large-capacity, energy-efficient mass transportation. The increasing number of passengers and freight transported to and from Belawan Port, coupled with the growing environmental and economic concerns, underscores the need for a more sustainable transportation solution. It is therefore evident that in order to facilitate economic growth in the region, the infrastructure and facilities at the railway station must be enhanced [2].

In accordance with Law No. 11 of 2010 of the Republic of Indonesia [3] concerning cultural heritage, cultural heritage is defined as a national asset of great significance, representing the intellectual and behavioural aspects of human life and providing invaluable insights into the understanding and advancement of history, science and knowledge. Furthermore, it is imperative to conserve and manage these cultural assets in a manner that ensures their continued preservation and utilization, with the ultimate objective of advancing national culture and promoting the collective well-being of the people. In 2019, the Expert Panel on Cultural Heritage (TACB) of North Sumatra Province designated the Belawan Train Station as a cultural heritage site.

As a cultural heritage site, the development of the station and its facilities must be undertaken in a manner that preserves the historical value of the building [4]. In consideration of the natural conditions of the area, architectural biophilics were selected as the planning method for the enhancement of this station. Biofilic design is an architectural approach that incorporates natural elements into built environments. The integration of natural elements into buildings is believed to enhance the well-being of individuals who are innately connected to nature [5].

The planned improvements will enhance the functionality of the current station site, which is currently occupied by street vendors and residential buildings, thereby reducing the aesthetic appeal of the station. The planned improvements will also develop the station's facilities, including an increase in passenger capacity, additional transportation support facilities, and a redesigned station that is safe and comfortable.

This research aims to design a design that can improve and develop sustainable Belawan Station facilities with a biophilic architecture approach to maintain harmony with the surrounding environment and meet user needs by considering aspects and history of the area as a cultural heritage building.

Method

The research method used in this research is descriptive qualitative method. This research begins by looking at phenomena in existing buildings in the form of surveys, and interviews with stakeholders, which are then continued with data review. This research aims to provide a clear and comprehensive description of the phenomenon under study, both in terms of characteristics, quality, and interrelationships between activities. qualitative research is a research procedure that produces descriptive data in the form of written or spoken words from people and behaviors that can be observed [6].

The source of data in this research is in the form of library research, which is to inventory and study library data, in the form of laws and regulations, literature books, journals, and official local government documents including electronic information (internet) regarding railways. Second, through field research in the form of surveys, and interviews with stakeholders.

Result and Discussion

3.1 Project Description

The site is located on secondary arterial road, specifically on Jalan Stasiun, Belawan I, Medan Belawan, Sumatra, North Sumatra. Medan Belawan has a tropical climate, with consistently high temperatures and high humidity throughout the year. The average temperature in Medan Belawan is 27 °C (80 °F), with minimal variation between months. The annual average rainfall is 2,000 mm (80 in), with the majority of precipitation occurring between October and April. The topography of the Medan Belawan district is predominantly flat.

Figure 1 Project location

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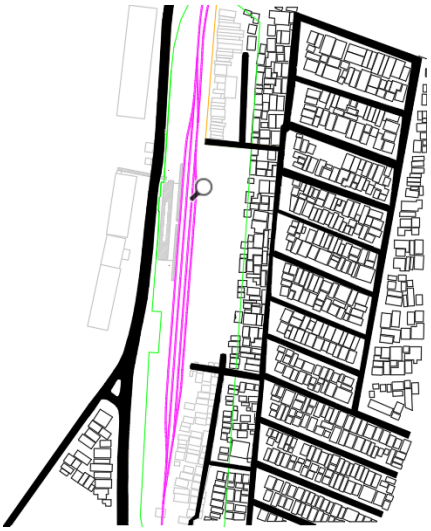

Figure 2 Land boundaries of PT.KAI

3.2 Region Boundaries

Table 1 Region boundaries.

Direction	Boundaries
North	Empty land
East	Residential
West	Bandar deli terminal
South	Empty Land

Figure 3 Region boundaries

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3.3 Mass Concept

In order to maintain the integrity of the existing cultural heritage structure, the mass form of the new station building is designed to align with the dimensions of the original station building, employing the parallel station model, which features a station aligned parallel to the railroad track.

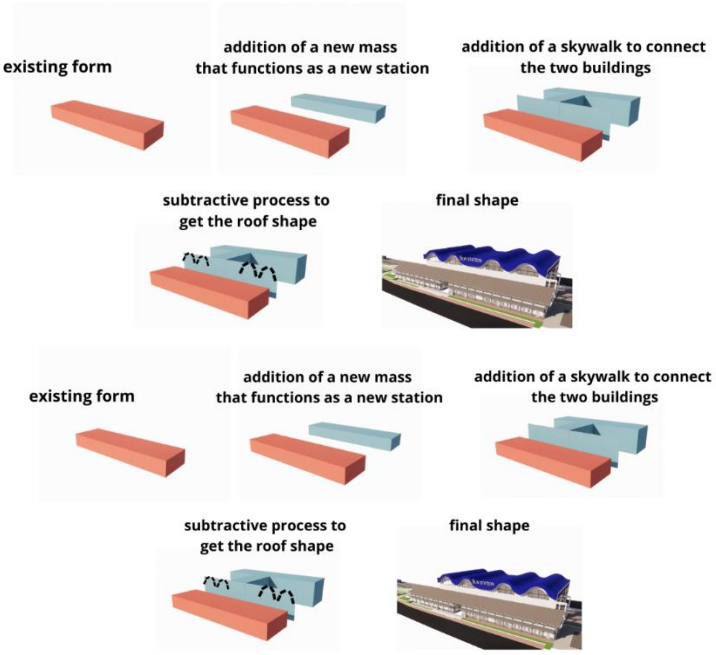

Figure 4 mass concept

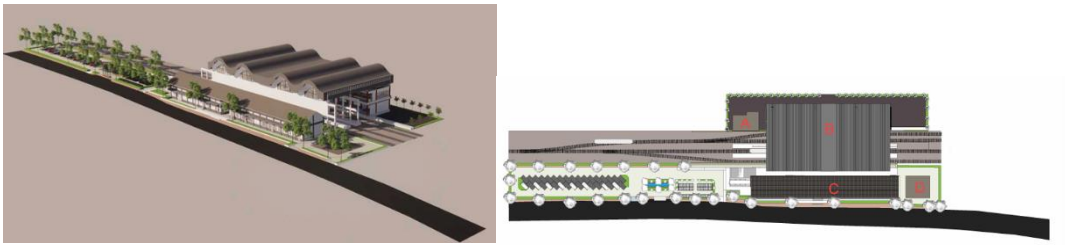

Figure 5 final shape

3.4 Basic Concept

The Belawan Station building was designed without intervening in the existing cultural heritage building. Biophilic architecture was applied to create a comfortable, healthy, and sustainable building by incorporating natural elements into the design. Improvements were made by adding new buildings to the east of the building and north of the old station building. The addition of this building aimed to increase capacity so that the station could function optimally.

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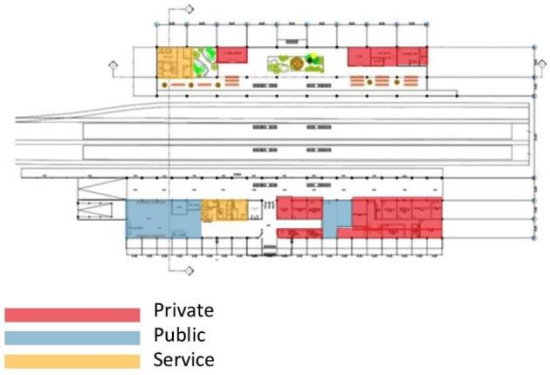

Figure 6 1st Floor

On the first floor, the old station building functions as a management activity zone consisting of managerial and operational offices. visitors can access this zone except the staff room. the new building to the north functions as a waiting room and ticketing.

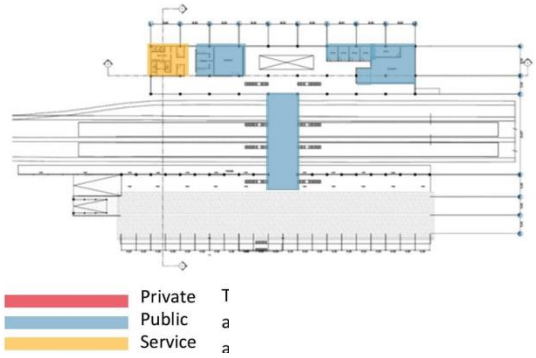

Figure 7 2nd Floor

The new station building to the east of the old station consists of 2 floors. The first floor functions as a waiting room, station utilities and several operational rooms. The second floor functions as a boarding area, check in ticket and platform access area, and food court area.

3.5 Theme Implementation

a. Nature in the space, Creating the presence of nature both directly and indirectly into the design. The nature of the space elements applied to this building are natural light, vegetation and growth, natural materials, variety of shapes and patterns, and presence of water.

Figure 8 implementation of nature in the space elements

b. Nature analogues, Using natural and man-made materials that are similar to the original and natural colors.

c. Nature of the space, The elements that are applied from this principle are presenting a place where visitors can see a wide and open view and are protected.

Figure 9 implementation of nature of the space element

Conclusion

According to the master plan of indonesia railways in the future, belawan station will be upgraded to a passenger station. Biophilic architecture is applied in this design as a solution

to the climate conditions on the site. the principles of biophilic architecture used are nature of the space, nature analogues, and nature in the space.

Acknowledgements

The author would like to thank Ir. Novrial M.Eng, as the supervisor, as well as Prof. Ir. Nurlisa Ginting, M.Sc., Ph.D., IPM and Ir. N. Vinky Rahman, MT, as the final project examiners. who have shared their knowledge with the author. To parents, family, friends, and all those who have given prayers, support, and encouragement to the author.

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