(2025), 3 (7): 175–182 **Scientica** 3021-8209

Jurnal Ilmiah Sains dan Teknologi

Development of a Major Station with a Wayfinding Concept Approach in Binjai City

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Abstract (English)

The use of land transportation such as trains is currently in high demand among the public. With the availability of land transportation such as trains, it is imperative to improve facilities and infrastructure at stations to address urban and inter-city transportation issues. Binjai Station (BIJ), formerly known as Timbang Langkat Station, is a class II railway station. The large number of passengers and activities at the station make the railway station very crowded. Therefore, the development of the railway station in Binjai City is needed to ensure the comfort and safety of the building as a large station that connects the railway station with the bus station. It is hoped that this can be used as a good public service for the community and attract the attention of the community to use this service. The design method for the major station in Binjai City uses the concept of wayfinding, which applies all visual concepts to buildings/spaces/areas that function to create a mental map for visitors of a particular location/area/environment. This allows visitors to have an idea of the characteristics of the area/building and the ease of access to each room.

Article History

Submitted: 1 December 2025

Accepted: 7 December 2025

Published: 8 December 2025

Key Words

Major stations, development, bus terminals, train stations, wayfinding, access.

Introduction

Binjai is one of the cities in North Sumatra Province, located 22 km west of Medan. As of mid-2023, Binjai has a population of 305,977. Most of the residents living in Binjai City work and study in Medan. Binjai City is one of the areas included in the Mebidang development, which covers the Medan, Binjai, and Deli Serdang regions. Currently, Binjai City and Medan are connected by two roads, namely the Trans-Sumatra Highway and the Toll Road. However, this Trans-Sumatra highway often experiences traffic congestion on weekends, long holidays, or when road repairs are being carried out. In addition, the city of Binjai also faces traffic congestion problems, especially during rush hours due to the low number of public transport users and the tendency of people to prefer private vehicles and online transportation over public transportation. This is further exacerbated by the lack of adequate road infrastructure.

Currently, most residents of Binjai City are commuters who use private vehicles (motorcycles and cars) and public transportation (trains, city buses, and city transportation) to get to Medan. In 2022, every day around 18,000 vehicles choose to travel from Binjai City to Medan via the toll road. The Sri Lelawangsa train serves the Binjai-Medan route with 10 departures daily. In addition to the Binjai-Medan route, the Sri Lelawangsa train also serves the Medan-Kualanamu route with 12 departures daily.

The city of Binjai currently has one train station and one bus terminal. The train station is a class II station that only serves the Sri Lelawangsa train on the Kualanamu - Aras Kabu - Batangkuis - Bandar Khalipah - Medan - Binjai - Kuala Bingai) and the bus terminal is a type B terminal that can and will continue to develop in the present and in the future, given the traffic conditions and parking capacity, which are quite dense. Another transportation issue in Binjai City at present is the lack of integrated public transportation between the train station and bus station in Binjai City.

Therefore, connecting bus stations and train stations will make it easier for commuters to switch

modes of transportation. The design of this transportation system aims to improve regional transportation services. The terminals and train stations that will be connected as design objects must facilitate the movement and transfer of commuters. One solution to facilitate commuter movement and transfer and minimize cross circulation is to use the concept of wayfinding. The application of the wayfinding concept aims to enable commuters to easily, smoothly, and safely reach a location within a building, so that they can be properly accommodated within the building.

Literature Review

Title Terminology

According to the Big Indonesian Dictionary (KBBI), development is the process, method, or act of advancing, expanding, or improving. According to Robert M. Gagne, an American education expert, development is a systematic process used to create or improve a product or system. This development involves several stages, from identifying needs, analysis, design, implementation, to evaluation.

A station is a place where passengers board and alight when using railway transportation according to (Railway Law Number 23 of 2007). According to Minister of Transportation Regulation No. 63 of 2019 concerning Minimum Service Standards for Passenger Transportation by Train, a train station is a place for the departure and arrival of trains. A major station or integrated station is a transportation facility that integrates various modes of transportation in one location to facilitate intermodal transfers for passengers. According to the Ministry of Transportation of the Republic of Indonesia, major stations or integrated stations are the result of collaboration between the central government and local governments to improve integrated public transportation services.

Functional Terminology

The functions of large stations are divided into two categories: railway stations function as passenger stations (for loading and unloading passengers and goods) and intermediate stations (stations located between terminal stations), while bus stations function as passenger terminals (as places to wait and transfer from one mode of transportation or vehicle to another).

Large stations have several objectives to improve the efficiency and comfort of public transportation, namely: (1) Integration of Transportation Modes (large stations allow for better integration between various modes of transportation such as trains, buses, public transportation, and others), (2) Improving Passenger Comfort (integrated station layout includes better facilities aimed at improving passenger comfort and safety), (3) Increasing Passenger Volume (with better facilities and integration, passenger volume is expected to increase, which also means more people will use safe and affordable public transportation).

Facilities at train stations can be divided into two categories: main facilities (departure platforms, arrival platforms, waiting rooms, station office buildings, signage, information and complaint rooms) and supporting facilities (toilets, prayer rooms, kiosks, and canteens). Facilities at bus stations are also divided into two categories: main facilities (bus and city transport departure lanes, bus and city transport arrival lanes, waiting rooms for employees and drivers, bus parking areas while waiting for departure, station office buildings, waiting rooms, signage, information and complaint rooms) and supporting facilities (toilets, prayer rooms, kiosks, and canteens).

Thematic Terminology

According to (Calori & Eynden, 2015 in the book Signage and Wayfinding Design), wayfinding design is a comprehensive and easily accessible resource that allows readers to efficiently and systematically apply proven standard design processes to both large and small projects. According to Susan Hunter (2010), wayfinding in architecture is a component of spatial planning, articulation of form-giving features, circulation systems, and environmental communication. Several stages of the process that must be carried out are (1) Grouping spaces, (2) Linking and organizing spaces.

The concept of wayfinding at large stations aims to help users navigate spaces more easily and efficiently. Several stations in Indonesia have implemented this concept to improve comfort and convenience for passengers. Railway stations and bus stations that are integrated using the concept of

wayfinding can facilitate the movement of commuters and minimize cross circulation.

Research Method

The data collection methods used in this study were primary and secondary methods:

Table 1 Primary data

Method	Action
Observation	Conduct observations related to the location where the station will be planned.
Interviews	Conducting interviews regarding knowledge about major stations and their development.

Table 2 Secondary data

Method	Action
Literature Study	Collecting and analyzing data from journals, scientific articles, books, and regulations discussing train and bus stations.
Case Study	Analyzing and comparing projects that have similar functions and approaches.
Media Analysis	Analyzing information obtained from the internet and social media.

Result and Discussion

Project Description

This large station is located on Jl. Ikan Paus, Timbang Langkat, Kec. Binjai Tim., Kota Binjai, North Sumatra, with an area of 1.8 hectares. It is located in the passenger terminal area.

Figure 1 Major Station Locations
Sumber : Google Earth

Design Result

There are three buildings in this image: the bus station building (the position of the building remains the same, only it has been developed into a better building), the old train station building (the shape of the building cannot be changed because it is a cultural heritage building, only its function has been changed from a station to a cafe), and the new train station (the building is located right next to the old station, and all train-related operations are carried out in this building).

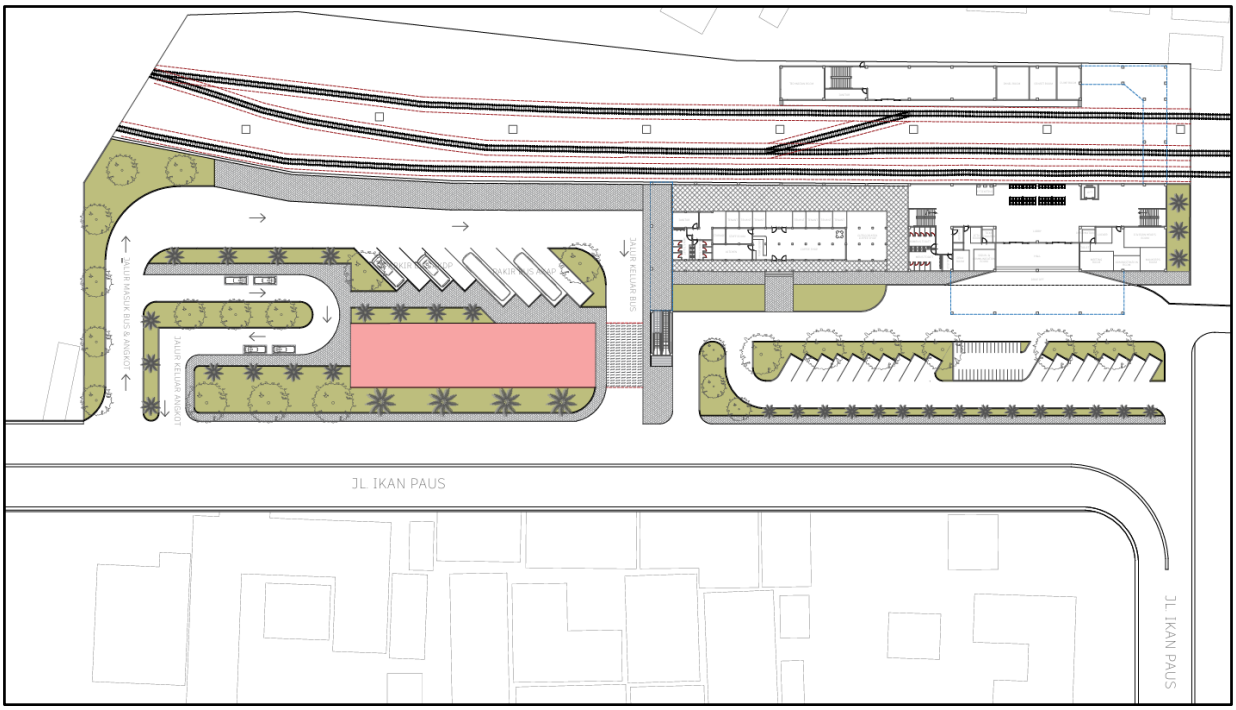

Figure 2 Major Station Ground Plan

The design of this station adopts a directional concept. The shape of the building is adapted to the movement patterns of visitors. This shape allows visitors to reach any location within the building safely, smoothly, and easily.

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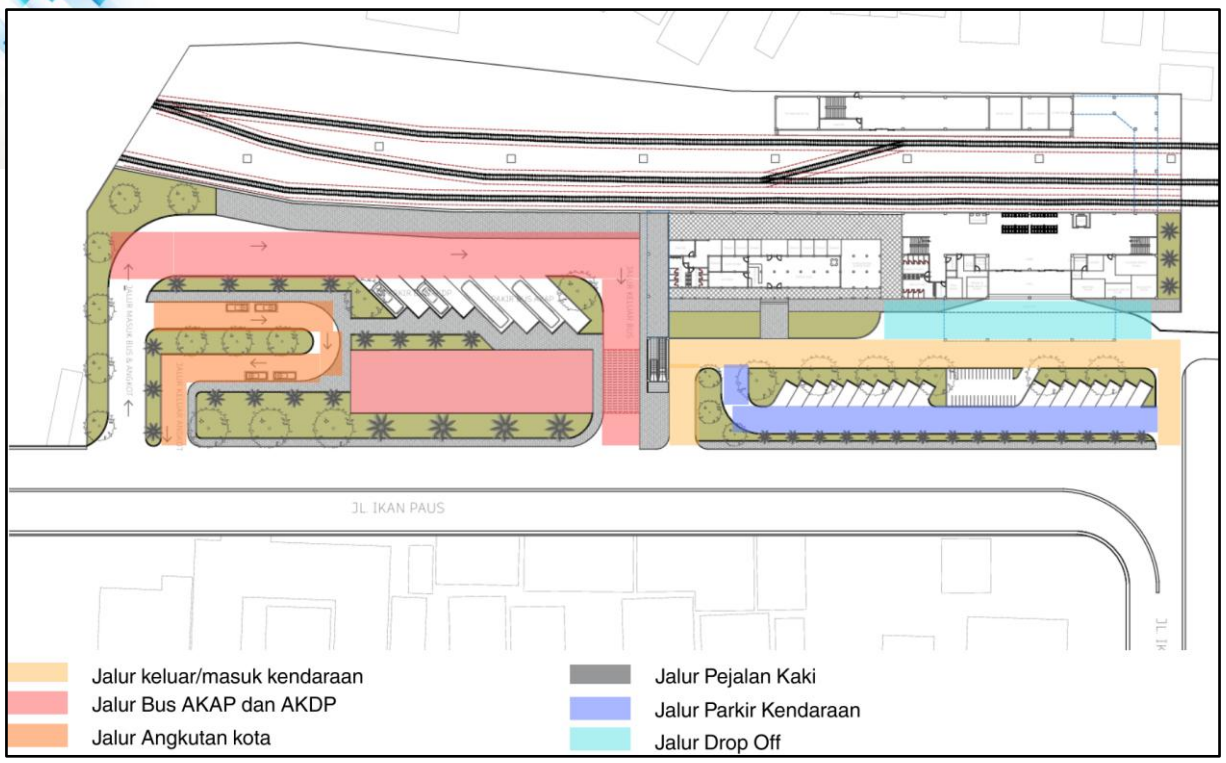

Figure 2 The concept of outer space

The concept of the outer space prioritizes ease and orderly access so that the two buildings can be connected and implement a One Way Circulation system by providing different circulation routes for buses, private vehicles, and pedestrians. There is an addition of an elevated train line from Kuala Bingai to Binjai and Medan.

Application of Wayfinding Concepts

The wayfinding concept used in this design is to connect and group spaces. By using this concept, integrated train and bus stations can facilitate commuter transfers and movements, as well as minimize cross circulation.

The wayfinding concept used is to connect the two buildings with pedestrian access and escalators that lead directly to the skybridge located between the two buildings. This concept makes it easier for passengers to switch modes of transportation.

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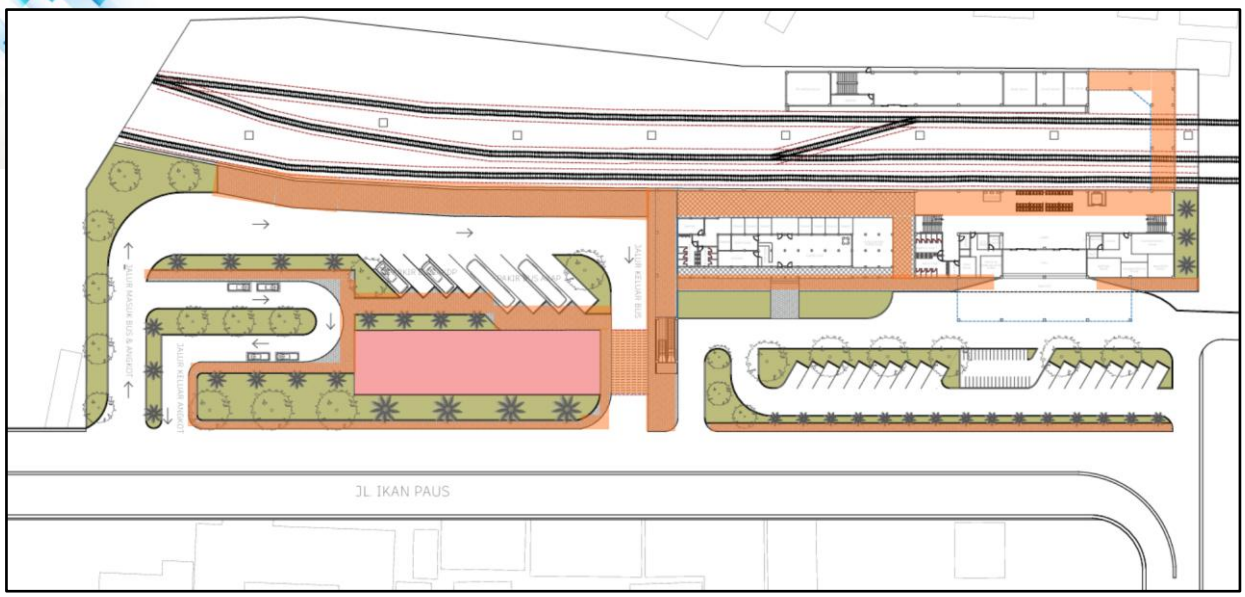

Figure 3 Application of concepts in design

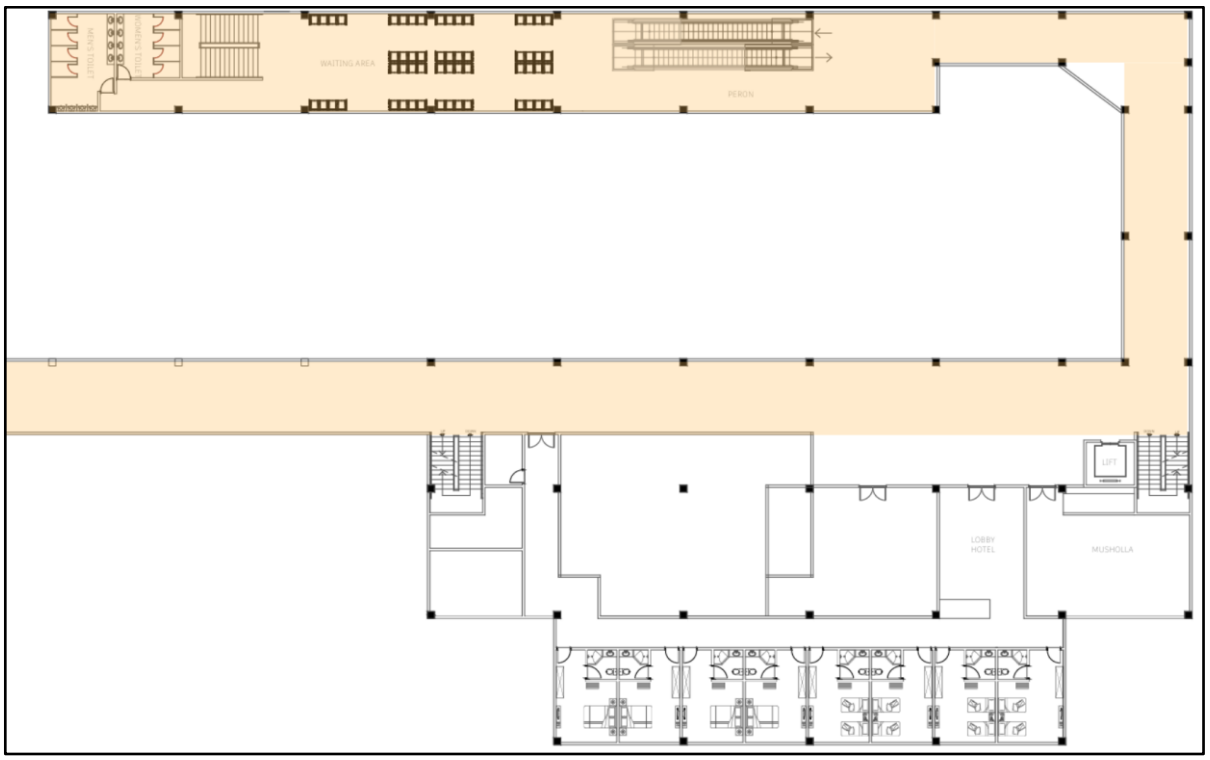

Figure 4 Application of concepts in the design on the second floor

On the second floor, the two stations are connected by a skybridge that spans the length of the building. The platform area connects the second and third floors via escalators, and the second floor is also connected to the second floor of the second building via a skybridge.

Conclusion

The development of Binjai Station is essential due to the increasing number of passengers and the lack of integration between the train station and the city's bus terminal. Binjai, a commuter city closely connected to Medan, faces frequent traffic congestion, largely caused by the high dependence on private vehicles and limited public transportation options. Integrating the train station with the bus terminal is expected to improve mobility, reduce congestion, and support a more efficient

transportation system for daily commuters.

The proposed design applies the "wayfinding concept", which focuses on organizing spatial and visual elements to help users navigate a building or area more easily, safely, and confidently. This concept is particularly important for large stations, where minimizing cross circulation and ensuring smooth passenger movement are key goals. Through clearer navigation cues, improved circulation patterns, and better facility layout, the integrated station aims to enhance user comfort and safety.

The project also emphasizes improving public service quality and encouraging more residents to shift from private vehicles to public transportation. To support the design process, the study uses both primary data (field observation and interviews) and secondary data (literature review, case studies, and media analysis). These methods help analyze existing conditions, identify user needs, and formulate design solutions aligned with transportation development goals in Binjai City.

Acknowledgements

The author would like to extend heartfelt appreciation to everyone who supported the preparation of this article. Special gratitude is directed to Dr. Ir. Nelson Manumpak Siahaan, Dipl.TP., M.Arch., as the academic supervisor, for his guidance, advice, and insightful suggestions throughout the design and writing stages. The author also acknowledges the individuals and institutions that provided essential data and information for this study. In addition, sincere thanks are given to all parties involved in this project, including the Department of Architecture, Faculty of Engineering, University of North Sumatra. The author hopes that this work will offer meaningful contributions to the field of architecture and provide valuable knowledge to its readers.

References

1. Galuh, D. T. N. P., & Sahara, S. (2023). Analisis Kinerja Pelayanan Fasilitas Penumpang Stasiun Kereta Api Manggarai Berdasarkan Standar Pelayanan Minimum dan Importance Performance Analysis (IPA). EKONOMIKA45: Jurnal Ilmiah Manajemen, Ekonomi Bisnis, Kewirausahaan, 10(2), 503-514.
2. Dewi, C. K. S., Yoedawinata, A., & Nilotama, S. K. L. (2019). Desain Signage Yang Efektif Untuk Menghasilkan Wayfinding Dan Orientasi Ruang Pada Public Space (Studi Kasus: Interior Mall Senayan City). Jurnal Dimensi Seni Rupa dan Desain, 15(2), 155-172.
3. Bakkara, M. R., & Surbakti, M. S. (2019). Analisa Kinerja Operasional Bus Trans Mebidang (Studi Kasus Rute Terminal Binjai-Pusat Pasar Kota Medan). Jurnal Teknik Sipil Usu, 8, 1-10.
4. Susanti, A., Soemitro, R. A. A., & Suprayitno, H. (2018). Identifikasi Kebutuhan Fasilitas Bagi Penumpang di Stasiun Kereta Api Berdasarkan Analisis Pergerakan Penumpang. Jurnal Manajemen Aset Infrastruktur & Fasilitas, 2(1).
5. Dharmawan, V., & Rachmaniyah, N. (2021). Kajian Signage dan Elemen Wayfinding di Kampus Perguruan Tinggi (Studi Kasus: Kampus ITS Surabaya). Arsitektura: Jurnal Ilmiah Arsitektur dan Lingkungan Binaan, 19(2), 205-216.
6. Ashadi, A. (2019). Perancangan Stasiun Kereta Api Dan Terminal Bus Terpadu DI Kota Depok Dengan Konsep Arsitektur Hijau. PURWARUPA Jurnal Arsitektur.
7. Salsabila, A. M., & Purwani, O. (2024). KONSEP INTEGRASI TERMINAL DAN STASIUN GROGOL DENGAN PRINSIP TOD. Senthong, 7(3).
8. Zaman, A. S. C. (1999). Landasan Konsepsial Perencanaan dan Perancangan Terminal Terpadu (Angkutan Jalan Raya, Angkutan Kereta Api dan Angkutan Laut serta Sungai) di Palembang.
9. Jamal, B. H., Purwani, O., & Mustaqimah, U. (2021). PENERAPAN KONSEP WAYFINDING PADA DESAIN STASIUN MANGGARAI SEBAGAI STASIUN TERINTEGRASI ANTARANGKUTAN UMUM MASSAL. Senthong, 4(1).
10. Sedayu, A., Sulitio, H., Soehardjono, A., & Wicaksono, A. (2014). Standar Pelayanan Minimal Terminal Bus Tipe A. Universitas Brawijaya Press.
11. Rizki, T., Sasmito, A., & Maria, M. (2015). Perancangan Stasiun Kereta Api Terpadu Dengan Terminal Bus Di Semarang. Journal of Architecture1, 1-20.
12. PERATURAN MENTERI PERHUBUNGAN Nomor : PM.29 Tahun 2011. TENTANG PERSYARATAN TEKNIS BANGUNAN STASIUN KERETA API.

13. Azis, F. A., Dewiyanti, D., & Imaniar, L. N. (2021). Studi penerapan wayfinding pada arsitektur. DESA-DESIGN AND ARCHITECTURE JOURNAL, 2(2), 69-77.
14. Badan Pusat Statistik Kota Binjai. (2025). Kota Binjai Dalam Angka 2025 . Badan Pusat Statistik. https://binjaikota.bps.go.id/
15. PERATURAN MENTERI PERHUBUNGAN Nomor : PM.60 Tahun 2012. TENTANG PERSYARATAN TEKNIS JALUR KERETA API.
16. Harjono, S., Bharoto, B., & Malik, A. (2017). TERMINAL TIPE B DI KAWASAN STASIUN DEPOK BARU (Doctoral dissertation, Universitas Diponegoro).