

Reactivation Strategies and Development of Tuban Station as a Heritage Building

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Article Info	Abstract
Article history: Received 20 July, 2024 Revised 10 November, 2024 Accepted 26 January, 2025	Tuban Station is located in Tuban Regency. According to the National Railway Master Plan of 2018 and Presidential Regulation No. 80 of 2019, the Jombang – Babat – Tuban route is included in the reactivation plan aimed at promoting equitable development and accelerating growth in the Gerbang Kertosusila region. This reactivation project will involve the renovation of Tuban Station, a cultural heritage building over 50 years old, to serve as a boarding and alighting point for passengers traveling through Tuban. Tuban Station is one of the few remaining stations along the Jombang – Babat – Tuban route. Currently, the station is being utilized by the local community as a culinary center. The objective of this study is to design the heritage building of Tuban Station in accordance with its designated class and the layout requirements specified in Minister of Transportation Regulation No. 33 of 2011 and Ministerial Regulation No. 29 of 2011, while preserving its original historical appearance. The design process for Tuban Station follows the Station Standardization Book of 2012, employing AutoCAD for 2D designs and Google SketchUp for 3D modeling. The outcome of this research includes the working drawings and 3D design of Tuban Station, fully complying with the classification outlined in the Station Standardization Book of 2012. Keywords: Design, Reactivation of Railways, Tuban Station, AutoCAD, Google SketchUp

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1. Introduction

Tuban Regency has witnessed consistent population growth, with the number of inhabitants rising from 1,163,614 in 2017 to 1,172,790 in 2019, according to data from BPS Tuban Regency. This steady increase, coupled with the expansion of the region's industrial and tourism sectors, has significantly increased the demand for more efficient and accessible public transportation. The industrial landscape in Tuban is rapidly expanding, with major factories such as Semen Indonesia,

Petro China, Olimpiq, and Holcim establishing strong presences in the area. Additionally, the planned Grass Root Refinery (GRR) project by PT Pertamina Rosneft Processing and Petrochemical, slated to begin in 2021, further underscores Tuban's strategic importance as an industrial hub. Beyond its industrial development, Tuban is also emerging as a key tourism destination, with attractions such as Nglirip Waterfall, Boom Beach, and various religious tourism sites, including the graves of Sheikh Maulana Ibrohim Asmoroqondi and Sunan Bonang. Despite these developments, Tuban faces a significant challenge regarding its transportation infrastructure. The Jombang-Babat-Tuban railway route, outlined in the National Railway Master Plan of 2018, is scheduled for reactivation during Phase III (2020-2024) to foster equitable development and drive economic growth in the Gerbang Kertosusila area. However, the railway line, which was once a vital infrastructure asset, now passes through urbanized areas, complicating the reactivation process and highlighting the urgency of addressing the transportation gaps in the region [1] [2] [3] [4].

The current state of transportation infrastructure development emphasizes the need to modernize existing systems while preserving historical landmarks. Tuban Station, a cultural heritage site over 50 years old, represents an opportunity to both preserve local history and contribute to the reactivation of the railway route. This station, which remains structurally intact and is currently used by the local community as a culinary center, is one of the few remaining stations along the Jombang – Babat – Tuban route. Despite the pressing need for improvements to the region's transportation system, the opportunity to preserve Tuban Station's heritage while modernizing it for contemporary use is a central aspect of the reactivation project. Balancing the preservation of the station's historical design with its integration into a new transportation framework presents both challenges and opportunities. Current research and best practices in transportation design suggest that heritage buildings can be successfully repurposed for modern transportation functions while maintaining their cultural significance. This approach not only supports local history but also provides a model for similar initiatives in other regions [5] [6] [7] [8] [9] [10].



Figure 1. Tuban Station

The primary objective of this study is to redesign Tuban Station in accordance with the regulatory standards outlined in Ministerial Regulations No. 33 of 2011 and No. 29 of 2011, ensuring that the station's functionality is aligned with modern transportation needs while preserving its historical integrity. The study will assess the current condition of Tuban Station, determine its classification based on the relevant regulations, and propose an optimal spatial layout to support contemporary transportation demands. Using AutoCAD for 2D designs and Google SketchUp for 3D modeling, this research will develop detailed plans for the renovation and reactivation of Tuban Station, ensuring compliance with accessibility, safety, and passenger convenience standards [11]

[12] [13] [14] [15]. This study is essential for informing the reactivation of the Jombang – Babat – Tuban route and contributes to the broader goals of urban development, industrial growth, and tourism enhancement in Tuban. By addressing both the preservation of cultural heritage and the practical needs of a modern transportation system, this research will provide a comprehensive framework for integrating Tuban Station into the revitalized railway infrastructure.

2. Materials and Method

This study employs both primary and secondary data to assess the current conditions, classification, and feasibility of Tuban Station, which will inform the design planning process. The research methodology is outlined in the flowchart shown in Figure 2, which illustrates the steps taken to gather and analyze data throughout the study.

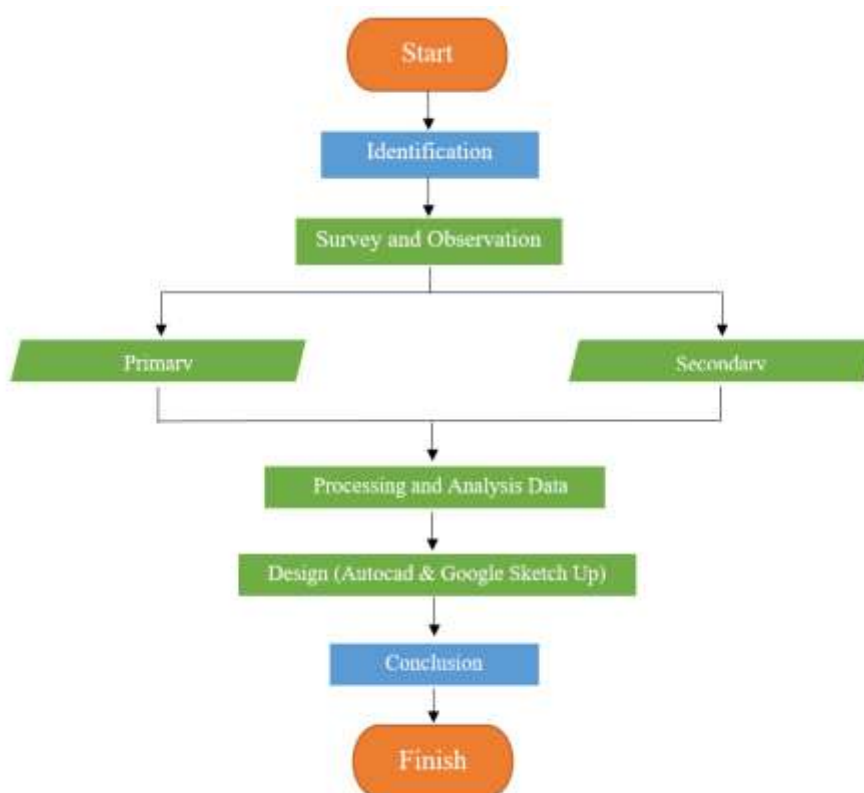


Figure 2. Research Flowchart

As depicted in Figure 2, primary data was collected through field surveys to assess the existing conditions of Tuban Station, including land use, facilities, and the surrounding transportation infrastructure. The field survey results were used to determine the station's classification according to Ministerial Regulation No. 33 of 2011. Secondary data was obtained from PT. KAI, specifically regarding the land use and spatial allocation of Tuban Station [9] [10] [16] [17] [18].

2.1 Identification of Tuban Station Conditions

The field survey aimed to provide researchers with firsthand knowledge of the station's existing conditions, which will serve as a basis for designing the station's buildings. The survey collected data on land use, road networks, and transportation surrounding the planned station development. This

survey was conducted in accordance with Ministerial Regulation No. 31 of 2011, which outlines the standards and inspections for railway infrastructure [19] [20].

2.2 Station Classification and Room Size Planning

Tuban Station's classification was determined through an analysis based on the credit scoring system outlined in Ministerial Regulation No. 33 of 2011, which provides guidelines for the types, classes, and activities of railway stations. The planning for the station's size—including the width, main activity building area, and parking area dimensions—was guided by Ministerial Regulation No. 29 of 2011, which details the technical requirements for railway station buildings. These regulations also served as the foundation for determining the appropriate station class and the corresponding spatial requirements [9] [19] [20] [21].

2.3 Station Redesign and Layout Planning

The design planning for Tuban Station includes the creation of floor plans, spatial layouts, and zoning, which will be developed in 2D using AutoCAD, following the guidelines of Ministerial Regulation No. 29 of 2011. In addition to the 2D floor plans, a 3D design model of the station will be generated using Google SketchUp software. These design tools will help visualize the layout and overall functionality of the station, ensuring that the final design meets both regulatory requirements and modern transportation needs [9] [10].

3. Results And Discussion

Tuban Station is an inactive railway station located at KM 37 + 498 on the Babat-Tuban line, situated in Doromukti village, Tuban district. It was constructed during the Dutch colonial era on August 1, 1920, and ceased operations on December 5, 1990. Currently, Tuban Station can be classified as a historical building due to its age, having been constructed more than 50 years ago. The station was originally categorized as a small station, with a land area of 39,605 m² and a building area of 175.5 m².

3.1 Existing Condition of Tuban Station

A survey conducted on April 3, 2024, revealed that the station building remains intact but has been repurposed as a culinary center. However, the railway tracks are no longer functional, having been buried beneath residential areas.



Figure 1. Existing Condition of Tuban Station

Based on the survey findings, the following conclusions were drawn regarding the current state of Tuban Station: (1) The station building remains structurally intact and can be reused. (2) As a heritage building, the station's original form must be preserved to minimize construction costs. (3) The station requires enhancements to make it more appealing, while ensuring the preservation of its original form.

3.2 Calculation of Tuban Station's Classification and Area

The station's classification was determined using criteria values and weighted component values outlined in PM 33 of 2011, with the credit score for each criterion indicating its importance. Based on the calculated credit score of 42.1, Tuban Station is classified as a small station according to PM Transportation No. 33 of 2011, which governs the types, classes, and activities of railway stations. Since the station has a credit score below 50, it is categorized as a small station. The planning for Tuban Station will continue with this classification, ensuring it is optimized according to small station standards and is made as attractive as possible, while minimizing changes to preserve the station's original form. According to the 2012 Station Standardization Handbook issued by PT Kereta Api Indonesia, the room and parking space areas will be adjusted to meet the minimum requirements. Given that Tuban Station's tracks are inactive, platform area requirements will be modified in line with the reactivation plans for the Jombang-Babat-Tuban line.

Table 1. Minimum Room Area Requirements

No	Type of Room	Minimum Area Required (m ²)	Remarks
1	Station Master Room	20	Available
2	PPKA Room	18	Available
3	Equipment Room	8	Not Available
4	Security Room	9	Not Available
5	Cleaning Staff Room	6	Not Available
6	Health Service Room	15	Not Available
7	Ticket Counter Room	6	Available
8	Information Service Room	9	Available
9	General Waiting Room	40	Available
10	Hall	60	Available
11	Public Toilet Room	30	Not Available
12	Prayer Room	20	Not Available

The total required area for the station is 241 m². Regarding building requirements for Tuban, the Green Base Coefficient (Koefisien Dasar Hijau, KDH) must be met, which includes platform and parking space areas. The KDH requirement for Tuban Regency, as provided by the Ministry of Public Works and Housing, is 30%. The existing building area is 175.5 m², while the standard required area is 241 m². Thus, an additional 65.5 m² of space is necessary, which is planned to be accommodated by expanding the station's terrace. Before developing working drawings, an analysis of the design planning for Tuban Station is required.

3.3 Passenger Zone Analysis

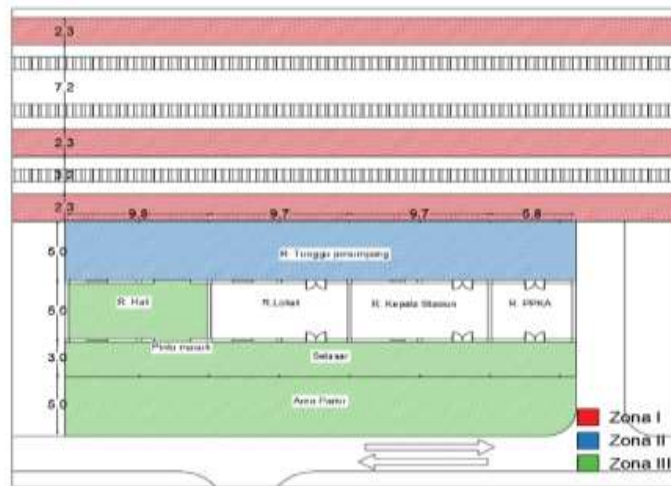


Figure 2. Existing Passenger Zone

The station's circulation needs to be evaluated. If unchanged, adding new rooms could disrupt the workflow of station staff. Additionally, the current passenger entrance is poorly located, not centrally placed, which could hinder passenger access. If the entrance remains unchanged, a facade emphasizing the entrance will be needed to improve passenger visibility. Therefore, the following modifications to the passenger circulation at Tuban Station are proposed:

1. Relocate the passenger entrance to the center, ensuring easy access and separation between staff and passenger areas.
2. Repurpose the existing hall and ticket counter rooms into operational staff rooms to avoid disruptions in staff workflows.
3. Convert the Station Master's Room and PPKA Room into service and public areas accessible to ticketed passengers (Zone II).

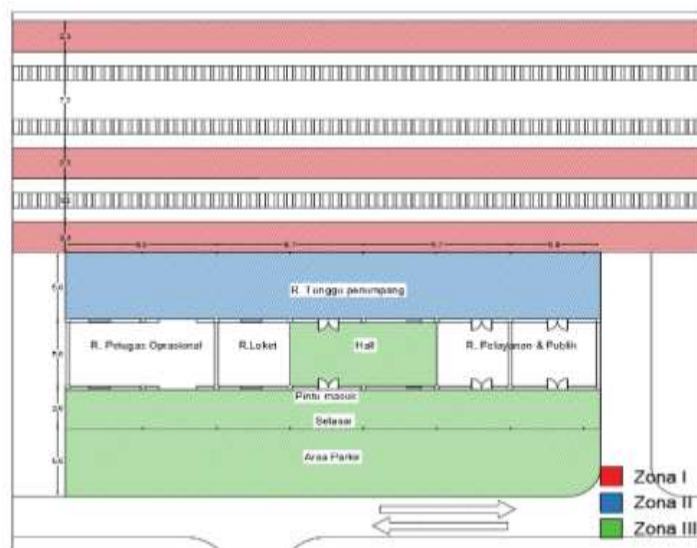


Figure 3. Passenger Zone Planning

3.3 Station Layout Planning

Due to insufficient building area, expansion considerations include:

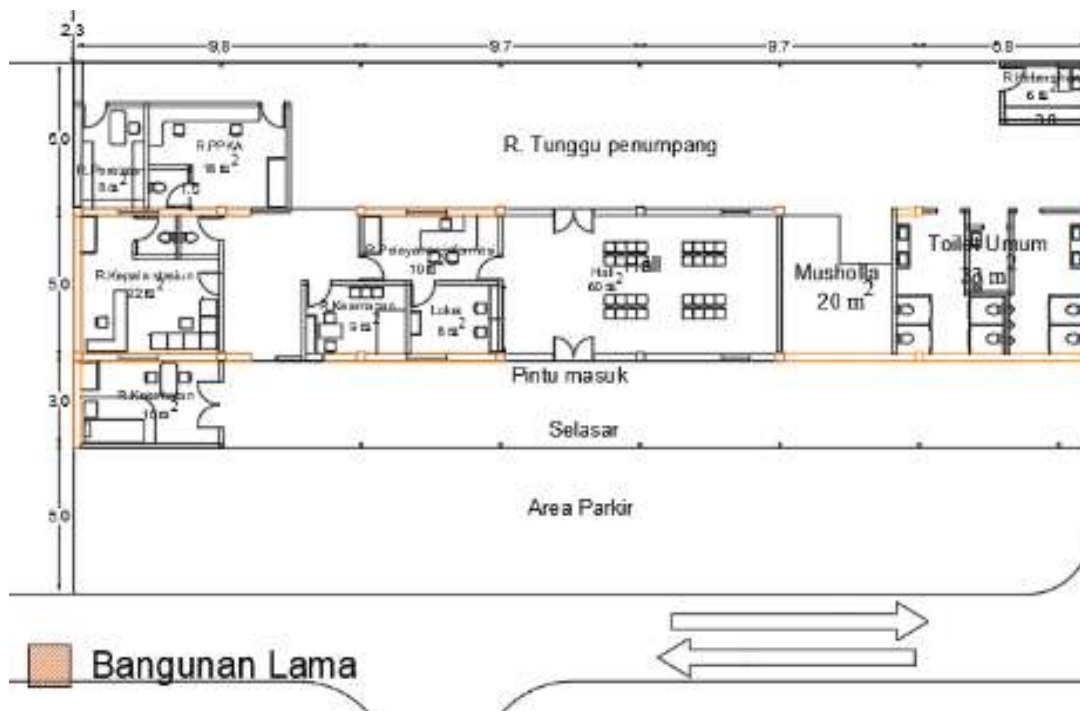


Figure 4. Floor Plan

The expansion strategy involves:

1. Locating the cleaning staff room near the public restroom to maintain cleanliness visibility.
2. Placing the PPKA room outside the station building, closer to the train tracks.
3. Positioning the equipment room outside the station building for easier access to equipment.
4. Situating the health service room in the corridor for convenient access by staff, passengers, and visitors.
5. Locating the security room within the station building to maintain privacy.
6. Retaining the station master's room inside the building for privacy.
7. Placing the ticket counter and information service rooms near the hall to streamline passenger services.

Table 2. Operational Room Results

No	Room Type	Minimum Area Required (m ²)	Room Area Result (m ²)	Compliant/Non-Compliant	Remarks
1	Station Master Room	20	22	Compliant	Located in existing hall
2	PPKA Room	18	18	Compliant	New building south of hall

3	Equipment Room	8	8	Compliant	New building south of hall
4	Security Room	9	9	Compliant	Occupies existing ticket counter room
5	Cleaning Staff Room	6	6	Compliant	New building south of PPKA room
6	Health Service Room	15	15	Compliant	Located in the center of the station
7	Ticket Counter Room	6	8	Compliant	Still in the existing room
8	Information Service Room	9	10	Compliant	Located in the existing room
9	General Waiting Room	40	40	Compliant	Located in the existing waiting room
10	Hall	15	15	Compliant	New building north of hall
11	Public Toilet Room	30	33	Compliant	Located in the PPKA room
12	Prayer Room	20	20	Compliant	Between station master and PPKA rooms

The space planning for this project, as outlined in the provided table, demonstrates that each designated room has been meticulously designed to either meet or exceed the stipulated minimum area requirements. The total minimum area requirement for the project is 241 m², while the actual available space totals 249 m², indicating that there is sufficient additional space to accommodate both functional and user comfort needs. Each room has been allocated the appropriate area, with several exceeding the required space, thereby providing greater flexibility in their utilization.

For instance, the Station Master Room, which is required to have a minimum area of 20 m², offers a total area of 22 m², allowing for enhanced comfort and operational efficiency. Similarly, the PPKA and Equipment Rooms, which each require 18 m² and 8 m² respectively, are designed to meet these requirements exactly. Additionally, the Ticket Counter Room, which has a minimum requirement of 6 m², provides a larger area of 8 m². The strategic placement of these rooms such as the PPKA and Equipment Rooms, located in a new building to the south of the hall reflects efficient space utilization that contributes to the smooth operation of the station [7] [8] [9] [20].

The Security Room, which occupies the existing ticket counter space, also meets the minimum area requirement of 9 m², effectively utilizing the existing infrastructure to optimize space usage. A similar approach is taken for the Cleaning Staff Room, situated in the new building to the south of the PPKA Room, which also fulfills the minimum area requirement of 6 m². Furthermore, the Health Service Room, with a substantial area of 60 m², is centrally located within the station, prioritizing accessibility for both passengers and staff.

The General Waiting Room, which precisely meets the 40 m² requirement, along with the Prayer Room, which aligns with the 20 m² minimum, highlights the careful consideration given to important public spaces within the station, ensuring user comfort and functionality. Likewise, the Public Toilet Room, which offers 33 m² slightly exceeding the required 30 m² provides additional space, enhancing comfort for users.

In summary, the strategic placement of these rooms within the project not only adheres to the required area standards but also considers the functional and comfort needs of the station's users. The thoughtful allocation of essential spaces such as the health services, waiting rooms, and prayer rooms, coupled with the efficient utilization of existing spaces like the ticket counter and Station Master Room, reflects an effective approach to space planning. With the total available space exceeding the minimum requirements, the project is expected to operate efficiently, fully supporting station operations while ensuring user comfort [21] [22] [23].

Table 3. Additional Rooms

No	Additional Room	Minimum Area Required (m ²)	Room Area Result (m ²)	Remarks
1	Platform	-	2691	Meets width requirements
2	Parking Area	472	1479	Meets required area, placed in front of station

The results from Table 3, which presents the additional rooms in the project, indicate that the space allocation exceeds the minimum requirements for both the platform and the parking area. The Peron (platform) does not have a specific minimum area requirement but satisfies the necessary width for platform roads, with a width of 2.3 meters, which is more than the required 2 meters. This ensures that the platform meets operational and safety standards for passenger use. Meanwhile, the parking area has a minimum required area of 427 m², yet the allocated space is significantly larger, totaling 1479 m². This not only meets but exceeds the minimum requirement, providing ample space for parking. The parking area is strategically located in front of the station, utilizing the available land owned by PT. KAI, demonstrating efficient space management and ensuring adequate parking capacity for station users. Overall, both the platform and parking area are effectively planned to accommodate operational needs while adhering to or exceeding the required standards [19] [20].

The total area in the reactivation design is 249 m². To calculate compliance with the KDH, the platform and parking area are included. The KDH compliance for Tuban Station is calculated as follows:

KDH Calculation:
= 249 + 2691 (Total room area + platform area)
= 2940 : 70% (100% - 30%)
= 4200 (70% of land + KDH)
= 4200 x 30% (KDH Calculation)
= 1260 m² (KDH requirement)

Since the parking area is part of the Green Base Coefficient and the Tuban Station parking area is 1479 m², the reactivation planning meets the KDH requirements for the Tuban area.

3.4 Facade Design

When designing the facade, it is crucial to balance the building's functionality with its aesthetic appeal. The facade should be designed to attract passengers while retaining the station's core functions. A contemporary design concept that blends classic and modern elements can be used to enhance the station's appeal while preserving its original structure.



Figure 5. Existing Station Front View

The existing canopy, made of teak wood and corrugated zinc, makes the station appear less attractive. Therefore, renovation of the front canopy is necessary to improve the station's visual appeal. The contemporary facade concept includes:

1. Incorporating Tuban's Cultural Values: This allows passengers to appreciate Tuban's cultural heritage as soon as they view the station.
2. Reflecting Colonial Values: The station's colonial history is represented in the facade.
3. Integrating Modern Values: The modern aesthetic ensures that the station's appearance is up-to-date.

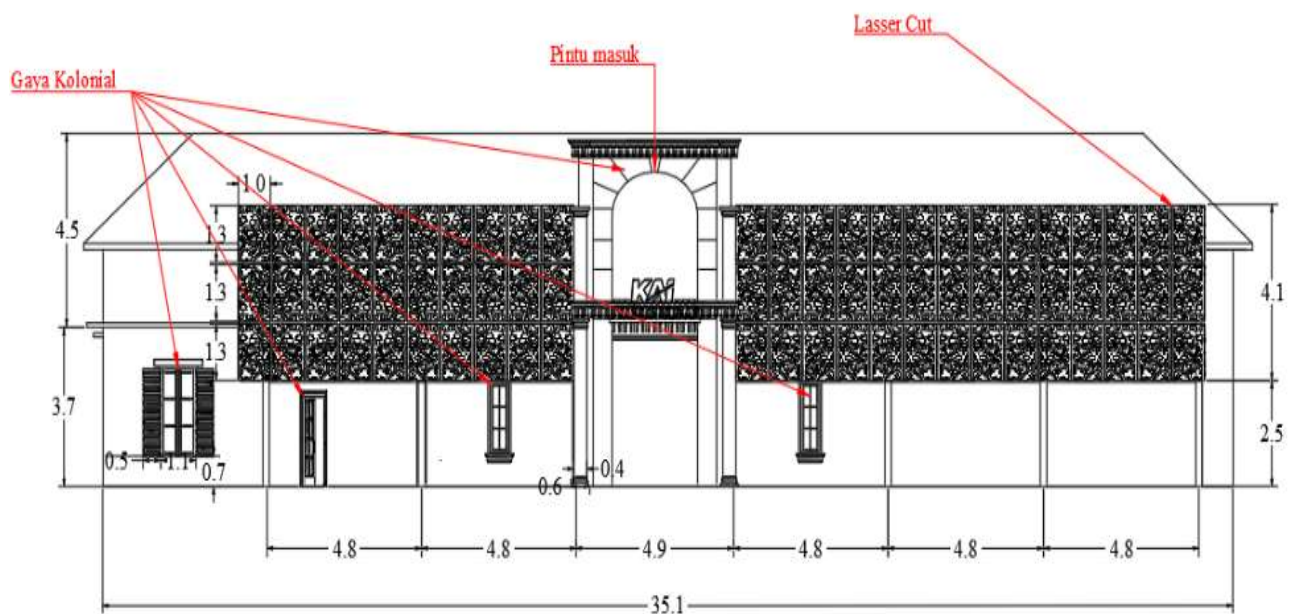


Figure 6. Front View Plan

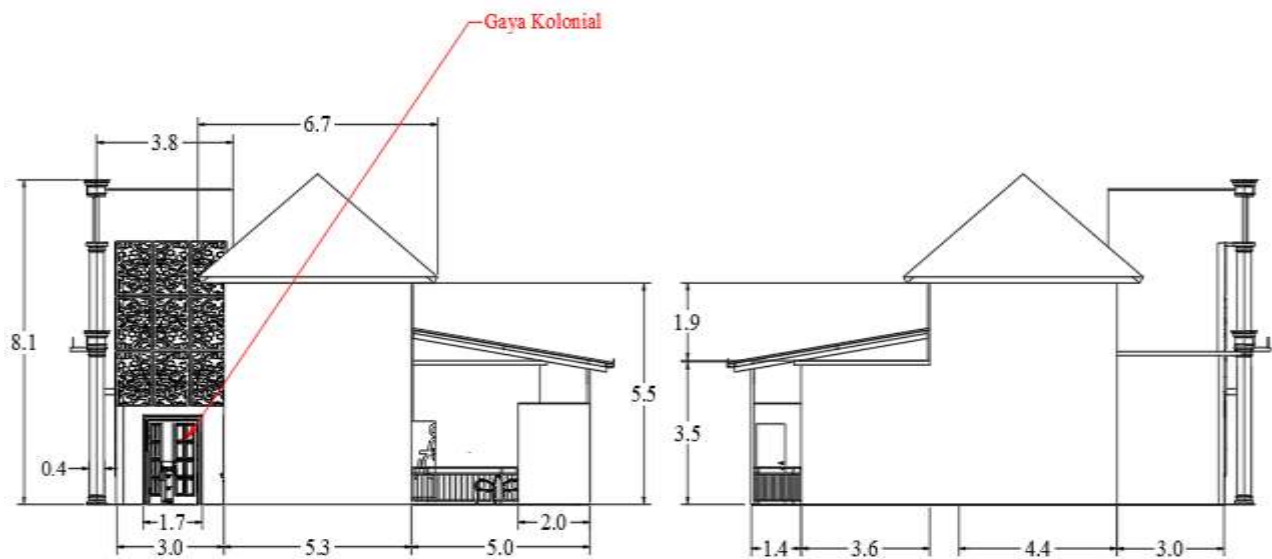


Figure 7. Side View Plan

The updated facade design includes:

1. Cultural Representation: Tuban's cultural heritage is reflected in laser-cut metal plates with batik patterns.
2. Colonial Influence: The colonial history is showcased through the station's entrance and the windows of the hall and health service room.
3. Modern Aesthetic: The modern design is emphasized through a secondary skin that covers the original roof structure, giving the facade a contemporary appearance.

3.4 3D-Design



Figure 8. Front View (3D)



Figure 9. Top View Floor Plan



Figure 10. Top View Exterior

4. Conclusion

Based on the analysis in this study, it can be concluded that Tuban Station, currently repurposed as a culinary center, utilizes its solid structure while the surrounding residential areas have led to the burial of the railway tracks. The credit score classification places the station in the small station class, though its area falls below the required standard for this category. The working drawings for the station's redesign successfully meet the space requirements for a small station, with expansions to the platform and parking areas utilizing PT. KAI-owned land. Additionally, the proposed façade design incorporates a secondary skin to replace the existing canopy, enhancing the station's visual appeal while preserving its historical character. These findings highlight the feasibility of revitalizing Tuban Station, balancing both heritage preservation and the functional needs of a modern transportation facility.

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