REDESIGN OF RANTAU PRAPAT TRAIN STATION

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ABSTRACT
Along with the passage of time, the human need for modes of transportation is increasing. The increasing number of residents is inversely proportional to the limited time they have, so transportation modes such as trains are one solution. Rantau Prapat Railway Station has many shortcomings which of course must be improved and added to be able to serve the community in the future. This redesign is oriented to the community as users of transportation modes, how the flow of human and vehicle circulation is the main problem. The Rantau Prapat Railway Station must also be an attractive city gate, especially since the city of Rantau Prapat is the last destination city on the North Sumatra railway line. Therefore, the application of the Contextual Architecture theme is used so that the design that is set also follows the flow of an increasingly sophisticated future era. How a Railway Station that can function well functionally but can also be a city gate that gives interest to visit.

Keywords: redesign; train; station; railway line; contextual architecture.

INTRODUCTION
During the leadership of President Joko Widodo and Vice President Muhammad Jusuf Kalla, infrastructure became one of the main focuses of national development in various regions in Indonesia. Based on the 2015-2019 National Medium-Term Development Plan (RPJMN), the direction of national development is to prioritize transportation mode infrastructure so as to create national connectivity that can encourage the strengthening of the transportation mode industry as well as the economy. Construction of transportation facilities and infrastructure, including the construction of the Trans Sumatra Railway to connect the island of Sumatra from the provinces of Aceh, North Sumatra, West Sumatra, South Sumatra and Lampung along 2,168 km.

Figure 1. Railroad track map

The aims and objectives of the planning and design of "Rantau Prapat Railway Station" are as follows:
1. Changing or redesigning the Rantau Prapat Railway Station due to several considerations such as facilities and design issues.

2. Application of the Contextual Architecture theme at the Rantau Prapat Railway Station without changing the condition of the existing building.

The formulation of the problem at the Rantau Prapat Railway Station, including:

1. What additional facilities are needed at the Rantau Prapat Railway Station and also changes to its design?

2. How to apply the Contextual Architecture theme to the Rantau Prapat Railway Station without changing the existing condition of the existing building?

The current rail service is a transportation need in addition to other land public transportation such as buses and city transportation. Train is a safe and comfortable long and medium distance travel service. The existence of the train is supported by facilities for station users and services in the train carriages. The comfort and completeness of the station reflects the good and clean condition of the station. This will support the performance of railway employees in creating safe and comfortable conditions (Sulastri.D, et.al, 2020; Anugrah.IA, et.al, 2019; Sah.MB, 2021).

In planning the rail road and rail road planning pay attention to the accuracy and speed in the process. Railroad work must be correct according to standard standards. So that the results of planning can be used over a hundred years (Sanjaya.A, 2017; Sulastri.D, et.al; Syaiful.S, Rulhendri.R, 2014).

RESEARCH METHODS

![Figure 2: Design schedule]

- **Redesign Of Rantau Prapat Train Station**
  - **Background**
    - There are several problems at the current Rantau Prapat train station where infrastructure development is very important to encourage transportation activities as well as the current economy. For this reason, it is necessary to add facilities and also improve the current physical building by applying an architectural theme. Contextual without disturbing the condition of existing buildings.
  - **Purpose of research**
    1. Added several facilities that are not yet available at the Rantau Prapat Railway station.
    2. Improving the physical building by designing the Railway Station with a contextual architectural theme with the applied design being able to follow the direction of the times.
  - **Formulation of the problem**
    1. How to manage the circulation inside the station and also outside the station.
    2. How to change the architectural theme at the Rantau Prapat train station, which is now more contextualized to a more modern futuristic one.

- **Data**
  1. Site data
  2. Literature study
  3. Comparative study of similar projects

- **Design analysis**
  - Analysis of site and environmental conditions
  1. Analysis of the location and existence of the site
  2. Analysis of achievements and circulation
  3. Vegetation analysis
  - Functional analysis
    1. Activity user description
    2. Description of space requirement

- **Design concept**
  - Zoning concept, mass concept, achievement and circulation concept, structure and construction concept, unity concept

**Feedback**
RESULTS AND DISCUSSION

Definition of Title
The title taken in this final project is "Redesign of Rantau Prapat Railway Station" which can be interpreted as follows:

1. Understanding Redesign
   Redesign is the design involvement of an existing building and making it more complex or enlarging the building context for a design project.

2. Understanding Station
   Station is a place where trains depart and stop to serve the boarding and disembarkation of passengers and/or loading and unloading of goods and/or equipment needed for train operations. (Law. No. 13 of 1992 Article 19).

3. Definition of Rantau Prapat
   Rantau Prapat is a capital city in Labuan Batu Regency, North Sumatra, Indonesia.

Indonesian Railway Station Institute
The management of Indonesian railways is currently under one parent company, namely PT Kereta Api Indonesia (Persero) which is a State-Owned Enterprise (BUMN) that provides, regulates, and manages Indonesian Railway transportation services.

Train Station Type
The type of Rantau Prapat Railway Station is a Type C Large Station which will be developed into a Type B Large Station.

Train Type
The type of train used to serve the Medan - Rantau Prapat trip and vice versa is the Sribilah Train which is a train with the CC201 Locomotive type and the following are the specifications.
Figure 5. Specifications of CC 201. Locomotive

Theme Elaboration
Contextual Architecture

Contextualism in architecture is a situation that does not allow an object that is in a place without considering the objects that are already there, but focuses primarily on the characteristics of the existing objects rather than the objects to be created.

Theme Interpretation

Contextual theme selection takes context into account as an important element in the design approach. Designing existing buildings with new ones to create a cohesive or unified relationship. By strengthening and developing the characteristics of the environmental arrangement or at least maintaining the existing pattern. By following the style of the environment in order to adapt to the context and have a visual unity with the environment and have the same characteristics. Contextual design is a useful development tool because it allows the intended building to be maintained in a good context.

RESULTS AND DISCUSSION

Project Description
General Description

1. Existing Condition
Rantau Prapat Railway Station has a site area of around 12,743 m², the site is located on Jalan W.R. Supratman with a road width of about ± 15 m and is a two-way road.

2. Train Schedule
The following is a passenger train schedule that stops at Rantau Prapat Station and an example of a train ticket can be seen in the image below.

Figure 6. KA station location plan
3. Organizational Structure
The following is an organizational structure at the Rantau Prapat Railway Station.

Site Location Analysis
Site Condition
Project Title: Rantau Prapat Railway Station Redesign
Theme: Contextual Architecture
Project Status: Fictional
Location: W.R. Surpatman Rd.
Village: Padang Matinggi
District: Labuhan Batu
Province: North Sumatra
Land Area: ± 12,743 m²
Building Area: ± 2,141.94 m²
Road Width: ± 15 meters
Site Height: ± 27.14 masl
Facility:
- Water: PDAM source
- Electricity: PLN source
Building Orientation: South
Site Limitation:
- North Boundary: North Rantau 1 Public High School and Residents' Housing
- West Boundary: Residents' housing
- East Boundary: Abdul Aziz Road.
- Southern Boundary: W.R. Supratman Road and housing residents.
Environmental Analysis Around the Site

The review of facilities around the site includes facilities located at a radius of 1 km and 2 km. The radius distance taken based on the supporting facilities can be seen in the image below which can support railway activities at Rantau Prapat Station, including:

![Figure 9. Rantau Prapat Station site](image-url)
• A radius of 1 km from the site or site contains:
  1. SMA Negeri 1 Rantau Utara
  2. Kodim 0209 Labuhan Batu
  3. Rantau Prapat Branch Post Office
  4. Several restaurants
  5. Some residential or community housing
• Radius of 2 km from the site or site there are:
  1. PT. PLN
  2. PDAM Labuhan Batu Tirta Bina
  3. Elpi Al Aziz General Hospital Rantau Prapat
  4. Several restaurants
  5. Some residential or community housing

The location of the site that has been determined is a very strategic railway line because it is surrounded by public buildings. The development of the Rantau Prapat Railway Station is expected to facilitate the surrounding environment as a means of transportation between cities in order to increase tourist activities visiting the city of Rantau Prapat and also as a mode of transportation, plantation or oil transportation.

Noise and Dust Analysis

Figure 10. Noise analysis
Conclusion:

The alternative that will be used to reduce the level of dust and noise intensity is to add more suitable vegetation at point A without disturbing the view inside.

**Analysis of the Sun and Wind**

![Figure 11. Analysis of the sun and wind](image1)

The east sun is a good sun that is found in the morning in the range of 6 am to 10 am. While the sun during the day in the range of 11 to 2 in the afternoon has a very strong exposure or intensity of light from sunlight because the position of the sun is very close to the earth. While the west sun is in the afternoon in the range of 3 pm to 5 pm. The site is divided where on the east side there is 20% morning sunlight, 60% of the afternoon sun is right on the top of the building and 20% of the afternoon sun is on the west side.

![Figure 12. Analysis of the sun and wind](image2)

High levels of light and heat intensity are released directly from sunlight and wind that blows from Southeast to Northwest and vice versa which can disturb the comfort of visitors who come and managers.

**Conclusion:**

Based on the results of the existing analysis, ways to reduce heat in areas exposed to excessive sun exposure are by using plants as wind filters and also shade and applying lattices to several parts of the place or room.

**Entrance Analysis**
Analysis of the achievement to the site where the main entrance at point A and also the exit at point B have been determined through the W.R. Supratman highway which has a road width of ± 15 m, and has a two-way path.

Parking Analysis

In addition to the parking module, the parking area has the availability of land to accommodate vehicles, both cars, motorbikes, or public transportation such as taxis and buses with capacities as shown in the table below.

<table>
<thead>
<tr>
<th>No</th>
<th>Transportation type</th>
<th>Station class</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Big</td>
</tr>
<tr>
<td>1</td>
<td>Private car</td>
<td>200</td>
</tr>
<tr>
<td>2</td>
<td>Taxi</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>Motorcycle</td>
<td>300</td>
</tr>
</tbody>
</table>

Conclusion:

Based on the results of the existing parking analysis, the Rantau Prapat Railway Station will use a parking barrier application system and also a parking module as follows:

1. Parking lot divider with ornamental plants or shrubs
2. Park the car with a parallel angle of 180° and also an angle of 45°
3. Parking motorcycles at an angle of 90°.

Building Analysis

Building Characteristics Analysis

The appearance of the Rantau Prapat Railway Station building must be adapted to the contextual architectural theme with the development of the train station itself, such as changing the facade or adding new buildings or facilities without changing the existing structure of the existing building.

Building Mass Analysis

The mass pattern that will be applied is a compound pattern equipped with a bridge infrastructure link between the first building and the supporting buildings. The basic shape of the mass will be used in accordance with the Contextual theme, namely a rectangle combined with a circle in order to create a modern and not monotonous impression.
Building Circulation Analysis
Circulation is an achievement made by humans to achieve the desired functions in buildings. Judging from the building system, circulation is divided into horizontal and vertical circulation.

Based on the results of the existing analysis, the horizontal circulation pattern that will be used at the Rantau Prapat Railway Station is a linear pattern and a grid pattern, while the vertical circulation that will be used at the Rantau Prapat Railway Station are escalators, stairs and also ramps for disabled users and goods.

Functional Analysis
Activity Pattern Analysis

A. Circulation and Departure Process of Train Station Passengers.

B. Circulation and Process of Passenger Arrival.

C. Circulation and Arrival Process for Station and Bus Stop Pick Ups.
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Figure 17. Analysis of circulation and arrival process for pick-ups and bus stops

D. Circulation and Arrival Process for Station and Bus Stop Managers.

Figure 18. Analysis of circulation and arrival process for station and bus stop managers

Tread Concept
The Concept of Noise and Dust

Figure 19. Analysis of the concept of noise and dust

Sun and Wind Concept

Figure 20. Analysis of the concept of sun and wind
Entrance Concept

The concept of the existing building form of the Rantau Prapat Railway Station will be developed and modified slightly from the previous form.

Building Concept

Building Form Concept

The concept of the existing building form of the Rantau Prapat Railway Station will be developed and modified slightly from the previous form.
### Building Functional Concept

**Space Program Concept**

<table>
<thead>
<tr>
<th>Space</th>
<th>Space requirement</th>
<th>Calculation/Standard (m²)</th>
<th>Capacity</th>
<th>Source</th>
<th>Large (M²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>R. Stationmaster</td>
<td>R. Stationmaster</td>
<td>15 – 25 m²/ unit</td>
<td>7 – 8 person</td>
<td>BPSS</td>
<td>24 m²</td>
</tr>
<tr>
<td>R. Deputy Station Master</td>
<td>R. Deputy Station Master</td>
<td>10 – 15 m²/ unit</td>
<td>3 – 5 person</td>
<td>BPSS</td>
<td>15 m²</td>
</tr>
<tr>
<td>PPKA Room</td>
<td>PPKA Room</td>
<td>-</td>
<td>8 – 10 person</td>
<td>BPSS</td>
<td>18 m²</td>
</tr>
<tr>
<td>PAP room</td>
<td>PAP room</td>
<td>2 m²/ person</td>
<td>2 person</td>
<td>BPSS</td>
<td>4 m²</td>
</tr>
<tr>
<td>Customer Service</td>
<td>Customer Service</td>
<td>-</td>
<td>6 – 8 person</td>
<td>BPSS</td>
<td>15 m²</td>
</tr>
<tr>
<td>Finance Room</td>
<td>Finance Room</td>
<td>2,625 m² / person</td>
<td>4 person</td>
<td>Assumption</td>
<td>10,5 m²</td>
</tr>
<tr>
<td>Train Crew Rest Room</td>
<td>Train Crew Rest Room</td>
<td>3 m² / person</td>
<td>8 person</td>
<td>BPSS</td>
<td>30 m²</td>
</tr>
<tr>
<td>Security Guard Room</td>
<td>Security Guard Room and CCTV</td>
<td>-</td>
<td>5 person</td>
<td>BPSS</td>
<td>13,5 m²</td>
</tr>
<tr>
<td>Janitor's Room</td>
<td>Janitor's Room</td>
<td>-</td>
<td>3 person</td>
<td>Assumption</td>
<td>9 m²</td>
</tr>
<tr>
<td>Hall room</td>
<td>Hall room</td>
<td>-</td>
<td>40 person</td>
<td>Assumption</td>
<td>100 m²</td>
</tr>
<tr>
<td>Counter Room</td>
<td>Counter Room</td>
<td>1.5 m² / person</td>
<td>4 person</td>
<td>BPSS</td>
<td>12.5 m²</td>
</tr>
<tr>
<td>VIP Lounge</td>
<td>VIP Lounge</td>
<td>-</td>
<td>15 person</td>
<td>BPSS</td>
<td>90 m²</td>
</tr>
<tr>
<td>Platform</td>
<td>Platform</td>
<td>-</td>
<td>45 – 50 person</td>
<td>Assumption</td>
<td>256 m²</td>
</tr>
<tr>
<td>Public toilet</td>
<td>Men's Toilet</td>
<td>3 m² / person</td>
<td>15 person</td>
<td>Neufert</td>
<td>45 m²</td>
</tr>
<tr>
<td></td>
<td>Women's Toilet</td>
<td>3 m² / person</td>
<td>15 person</td>
<td>Neufert</td>
<td>45 m²</td>
</tr>
<tr>
<td>Islamic Prayer Room</td>
<td>Prayer Room + Imam</td>
<td>2 m² / person</td>
<td>10 person</td>
<td>BPSS</td>
<td>20 m²</td>
</tr>
<tr>
<td></td>
<td>Cleansing room</td>
<td>-</td>
<td>-</td>
<td>BPSS</td>
<td>2,625 m²</td>
</tr>
<tr>
<td></td>
<td>Tool Case</td>
<td>-</td>
<td>-</td>
<td>BPSS</td>
<td>2,625 m²</td>
</tr>
<tr>
<td></td>
<td>Terrace</td>
<td>motion circulation</td>
<td>-</td>
<td>BPSS</td>
<td>10,75 m²</td>
</tr>
<tr>
<td>R. Breastfeeding Mother</td>
<td>R. Breastfeeding Mother</td>
<td>-</td>
<td>3 person</td>
<td>Assumption</td>
<td>15 m²</td>
</tr>
<tr>
<td>Warehouse Luggage</td>
<td>Warehouse</td>
<td>-</td>
<td>-</td>
<td>Assumption</td>
<td>25 m²</td>
</tr>
<tr>
<td></td>
<td>Luggage</td>
<td>-</td>
<td>-</td>
<td>TSS</td>
<td>160 m²</td>
</tr>
<tr>
<td>Retail</td>
<td>Retail</td>
<td>16 m² / unit</td>
<td>-</td>
<td>Neufert</td>
<td>160 m²</td>
</tr>
<tr>
<td>Parking</td>
<td>Parking and Drop Off</td>
<td>12.5 m² / vehicle / 2 m² / motorcycle</td>
<td>-</td>
<td>Neufert</td>
<td>230 m²</td>
</tr>
<tr>
<td>Smoking Area</td>
<td>Smoking Area</td>
<td>-</td>
<td>6 person</td>
<td>Assumption</td>
<td>12 m²</td>
</tr>
<tr>
<td>Janitor</td>
<td>Janitor</td>
<td>4 m² / unit</td>
<td>2</td>
<td>Assumption</td>
<td>8 m²</td>
</tr>
<tr>
<td>Panel Room</td>
<td>Panel Room</td>
<td>9 m² / unit</td>
<td>1 person</td>
<td>Neufert</td>
<td>6 m²</td>
</tr>
<tr>
<td>Chiller Room</td>
<td>Chiller Room</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>6 m²</td>
</tr>
<tr>
<td>Pump Room</td>
<td>Pump Room</td>
<td>6 m² / unit</td>
<td>6 person</td>
<td>Neufert</td>
<td>36 m²</td>
</tr>
</tbody>
</table>
CONCLUSION

Rantau Prapat Railway Station has many shortcomings which of course must be improved and added to be able to serve the community in the future. This redesign is oriented to the community as users of transportation modes, how the flow of human and vehicle circulation is the main problem. The Rantau Prapat Railway Station must also be an attractive city gate, especially since the city of Rantau Prapat is the last destination city on the North Sumatra railway line. Therefore, the application of the Contextual Architecture theme is used so that the design that is set also follows the flow of an increasingly sophisticated future era. How a Railway Station that can function well functionally but can also be a city gate that gives interest to visit.

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