



# Redesign of Ciamis Station With an Industrialist Concept Approach Using Autodesk Revit Application

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Article Info	Abstract
<p><b>Article history</b></p> <p>Received 1 April,2024 Revised 2 May, 2024 Accepted 15 May 2024</p>	<p>Ciamis Station is one of the train stations located on the Bandung-Banjar railway route. This station needs facility improvement to meet the standard of a medium-class rail station. The purpose of this research is to identify the existing conditions of Ciamis Station, determine the class of Ciamis Station according to PM 33 of 2011, analyze the compliance of station standards according to PM 29 of 2011, redesign the station, and calculate the quantity of work with industrialist concept approach. Field survey data is used as primary data in the study. Passenger volume and existing floor plan are secondary data used in the analysis. Ciamis Station redesign planning is carried out to improve and develop Ciamis Station to increase the facilities using the Autodesk Revit application. Output results are in the form of layout, 3-dimensional views, and interiors of rooms, according to PM 63 of 2019 and the Railway Station Standardization Book. The result of the floor area for constructing the Ciamis Station room is 1.178 m<sup>2</sup>. The industrialist design concept uses materials, color, interior, and exposure of the station building. The result also shows the estimation of quantities for the construction process.</p> <p><b>Keywords:</b> Station, Industrialist Architecture, Autodesk Revit 2024</p>

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## 1. Introduction

The railway is one of the modes of transportation that has experienced a considerable increase in development and passenger numbers. Railway service facilities are part of the National Railway Master Plan (RIPNAS), which is in effect until 2030 (RIPNAS). A sound and easy-to-maintain service system has become mandatory at the station. Structured and organized design planning is a positive value for attracting train passengers. The increasing value of comfort will also affect passengers' choice of transportation. The research aligns with that conducted by Carvalho et al. I regarding the Revitalization of Kedundang Train Station in Kulon Progo (Design Emphasis on Circulation Patterns and Spatial Layout)

that it is necessary to improve and add Kedundang Station spatial facilities according to the 2012 Railway Station Standardization in the architectural concept (de Carvalho, Triastuti, & Prabasmara, 2020).

Efforts to realize service facilities for the convenience of railroad service passengers will be carried out through redesign planning of one of the stations located in West Java, namely Ciamis Station. Ciamis Station is a train station located in Ciamis Regency, West Java. This station is 133 km east of Bandung City and is at an altitude of +199 meters above sea level. The railroad upgrade trains on the Ciawi-Banjar section for passenger comfort and safety have increased passenger mobilization at Ciamis Station. This station has a new travel service recorded since June 1, 2023. Trains crossing this station will stop both executive and economy trains. That is because, on June 1, 2023, PT KAI (Persero) began implementing the 2023 or new Train Travel Chart (GAPEKA) (M.A Wahad, 2023).

Ciamis Station needs to be redesigned because there are problems at this station. The main problem with this station is the lack of over-capping design on the Ciamis Station platform, as shown in Figure 1. The limited over-capping makes it difficult for passengers to board the train, especially in unfavorable weather situations, such as the rainy season, which will make them uncomfortable. PM 63 of 2019 concerning Minimum Service Standards (SPM) for Transportation of People by Train (Regulation of the Minister of Transportation of the Republic of Indonesia, 2019) has regulated the maximum over-capping at the station. The benchmarks that reference the length of overlapping must adjust the size of the station platform and protect passengers from heat and rain in the station, especially Ciamis Station.



**Figure 1.** Ciamis Station

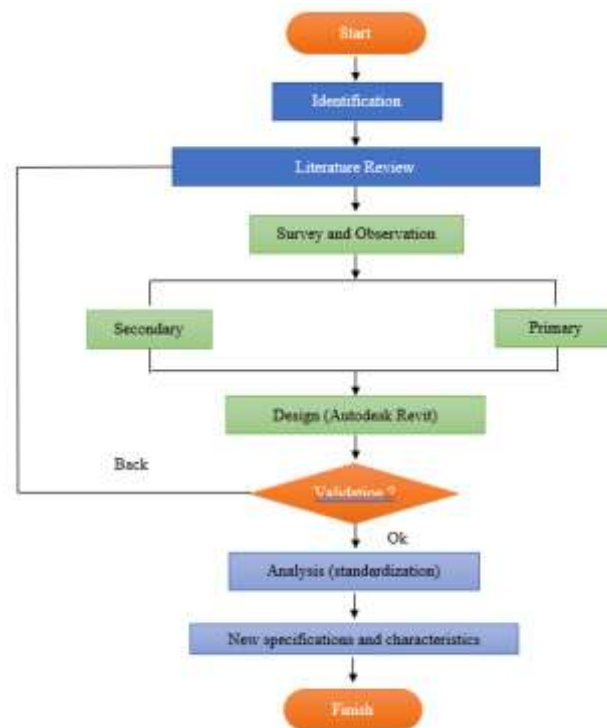
The existing feasibility conditions in the field at Ciamis Station also still found many problems. Many facilities have not been fulfilled and do not have eligibility standards for the medium station class. An inadequate platform does not meet the feasibility requirements and causes passengers to have problems getting on the train because the platform and the train are not aligned. The land area in the train waiting room is minimal, so train passengers sit on the station platform. This creates a buildup in the waiting room and will undoubtedly interfere with the comfort and safety of passengers. This research plans to redesign the overall layout of Ciamis Station by adjusting the new over-capping design plan and determining the station class. Station planning is carried out with the standardization of PM Number 33 of 2011 and PM Number 29 of 2011 to optimize the spatial layout to be planned (Regulation of the Minister of Transportation of the Republic of Indonesia, 2011).

This design planning also applies the Industrialist concept approach. The Industrialist concept leads to friendly, comfortable, and aesthetic buildings. Industrialism uses glass, wood, stone, iron, and aluminum. In addition to these materials, this concept uses recycled materials, which will undoubtedly be environmentally friendly. This concept's functional and efficient principles will also bring character to the station building. Functional means that the building functions or is well-systemized, while efficient efforts produce a lighter or more efficient building in terms of energy consumption. Buildings that are lighter or more efficient in energy, construction costs, operations, and maintenance. (Amini, Sunadyo, & Marlina, 2019).

This research aims to redesign Ciamis Station using the Autodesk Revit application. The objectives to be achieved include identifying the existing condition of the Ciamis Station building; calculating and determining the class number of Ciamis Station by PM 33 of 2011; analyzing the feasibility of arranging facilities and spatial layout according to PM 29 of 2011; planning the redesign of Ciamis Station with an Industrialist concept with Autodesk Revit according to the planning land; calculating the volume of buildings in the design planning of Ciamis Station. Autodesk Revit is an application that creates 3D graphic designs that contain BIM (Building Information Modeling). Station design planning using the Autodesk Revit application can provide visualization and evaluation that is easier to understand in terms of visual and systematic volume calculations, which are the advantages of this application.

## 2. Research Method

The author's flow chart will require primary and secondary data to identify station conditions, classes, and feasibility, which will be a reference in design planning and volume calculations. Researchers describe the course of research through this flow chart, which can be seen in Figure 2.



**Figure 2.** Research Flow Chart

Conclusion Based on Figure 2 in the flow chart of primary data, this research was taken using field surveys as primary data to identify facilities and current field conditions at Ciamis Station according to station land, including (1) Survey data and station measurements obtained from the checklist results of the PM Number 30 Year 2011 testing form to identify the condition of Ciamis Station, the results of the PM 63 Year 2019 minimum service standard checklist, and the results of the PM 33 Year 2011 form to calculate and determine station class criteria. At the same time, measurement data is obtained by measuring the existing platform with the dimensions of the width, height, and length of the platform. Primary data was also taken from the Journal of Industrialist Concept Application Analysis. The secondary data of the study was taken based on the Ciamis station plan data obtained from the station layout and the passenger volume data obtained from the station's processing.

This research is also carried out data analysis and is divided into several stages to make it easier for the author to conduct research. Here are some stages of the data analysis method as follows:

1. Identification of existing station land and buildings  
Identifying the existing aims so that researchers know the field conditions that will be used as material for planning the redesign. The survey will use the station minimum service standard form listed in PM Number 63 of 2019 concerning SPM (Minimum Service Standards).
2. Calculate and determine station class criteria  
Calculating and determining station class criteria aims to determine the building area and which stations are large, small, and medium. The identification is done to know the width of the platform, the area of the main activity building, and the parking area. This identification refers to PM No. 33/2011 article 18 regarding the number of credit points as a benchmark.
3. Analyzing station feasibility  
Analyzing the feasibility of the station aims to determine the building area and determine which stations are large, small, and medium. The identification is done to determine the width of the platform, the area of the main activity building, and the parking area. This identification with PM Number 30, the Year 2011, refers to PM Number 29, the Year 2011, concerning Technical Requirements for Station Buildings.
4. Station redesign planning  
Planning a 3D model station concerning PM Number 29 of 2011 and Station Standardization Book 2012 uses the Industrialist concept approach by adjusting the Ciamis Station land. This design planning will also apply Autodesk Revit software.
5. Calculate volume requirements  
Calculate the volume requirements of the building to be designed, including beams, wall area, roof area, doors, sanitary, and others, with the help of the Autodesk Revit student version application automatically.

### **3. Results And Discussion**

Ciamis Station is a class II or medium station. This station is located in the Bandung Operational Area II with a land area of approximately 6682 m<sup>2</sup>. Ciamis Station has five railway lines in the station emplacement, with one capture line and four main lines for train departures and arrivals. This station's

cross-travel service has a Southern railroad route, namely the Bogor-Bandung-Banjar-Yogyakarta crossing. At this station, trains ranging from economy class to executive class will stop.

### 3.1. Station of Ciamis Condition

#### A. Location Map

This Ciamis station location map will be a reference for design planning land with the addition of a new building space at Ciamis Station. This location map is taken from the Google Earth application to make it easier to find the location of Ciamis Station. Planning a new building space must have a strategic location and not be far from the old building. Observation of the area of Ciamis Station also communicates with the head of Ciamis Station to observe the station's land. The following Figure 3 details the Ciamis Station Location Map:



**Figure 3.** Ciamis Station Location Map

In Figure 3, there is a yellow line as a marker of the Ciamis Station planning land, which is used as a new building space. Ciamis Station is located on Jalan Stasiun and Jalan Saunyan, with a total land area of approximately 6682 m<sup>2</sup>. Ciamis Station has a very strategic location because access to the city center or square is only about 5 minutes, to be precise, only a few meters from the south of Jalan Ir. H. Juanda, Ciamis. The existing building space is 318 m<sup>2</sup>.

#### B. Minimum Service Standard of Ciamis Station

Service standards exist for each type of station class, ranging from small class stations to medium class to large class. In the research conducted at Ciamis Station, the Minimum Service Standard (SPM) used is the Transportation of People by Train. Based on the results of the identification of the Minimum Service Standards of Ciamis Station, the results of available facilities and those not yet available are obtained. The total number of facility items tested at Ciamis Station is 65 facilities, with details of existing facilities totaling 45 and non-existent facilities totaling 20. Based on this data, the percentage of facilities is obtained:



**Figure 3.** Minimum Standard Service testing Result

Based on the observations, it can be concluded that the Minimum Service Standards at Ciamis Station are 69.23% available and 30.76% not available. Thus, Ciamis Station has a Minimum Service Standard that does not meet the medium-class criteria but is still suitable for operation.

### 3.2. Determination of Ciamis Station Grade Credit Score Criteria

The existing classification of the station can be calculated using the criteria values and weighted component values that refer to PM 33 of 2011, with details of the credit score that each criterion weight has determined. Based on the calculation of the credit score above, the result is 39.25. Based on PM Transportation Number 33 of 2011 concerning types, classes, and activities at railway stations, Ciamis Station is included in the class of small stations because it has a credit score below 50. The above results do not match the existing class of Ciamis Station at this time; according to PT KAI Data, Ciamis Station is currently classified as a medium-class station seen from the aspect of minimum service standards, which should have a credit score between 50-70. Therefore, the redesign planning will be adjusted to the criteria for the number of medium-class stations and add several room facilities that are still missing to meet the standard criteria for medium-class stations at Ciamis Station.

### 3.2. Facility Arrangement and Layout of Ciamis Station

#### A. Checklist Results PM Number 30 the Year 2011 Ciamis Station

In this study, the PM Number 30 of the Year 2011 checklist was used to determine the feasibility conditions of parts of Ciamis Station, such as free space, station buildings, supporting installations, and platforms. The types of existing platforms at Ciamis Station are low and medium platforms. Based on the results of identification at Ciamis Station and direct interviews with the station head and employees at Ciamis Station, the test results at Ciamis Station were obtained. The following are the results of the Ciamis Station condition checklist. Testing, especially on the platform, by taking measurements directly in the field. Tests on the Ciamis Station platform can be seen in Figure 5.



**Figure 5.** Measurement Process on Ciamis Station Platform

Figure 5 shows the testing of platform width and free space carried out with meter tools. The results of platform identification at Ciamis Station also need to be upgraded from medium platforms and low platforms to high platforms for passenger safety and comfort. The results of measuring the width of the Ciamis Station platform can be seen in Table 1.

**Table 1.** Platform Width Measurement Results

Platform Type	Platform Position	Width		Description
		Standard	Result	
Medium platform lane 1	At the edge of the lane	2050 mm	550 mm	Platform width does not meet standard criteria
Low platform lane 2	Between two lanes	2500 mm	1810 mm	Platform width does not meet standard criteria

From Table 1, it can be seen that the platform width measurement results do not meet the standard platform width criteria set. Platform width measurements are carried out with meter tools. A meter is used to measure the platform from the edge of the platform to the edge of the platform. After measuring the width of the platform, measurements were also taken on the length of the station platform. The results of the measurement of the length of the platform were 150 meters. The provisions of this platform are not in accordance with PM 29 of 2011 regarding the length of the passenger train operation. The longest train series that stops at Ciamis station has the longest series of 240 meters. The results of the identification of platform components include floors using slippery materials, lights, boards, lane instructions, direction signs, station kilometer signs, and platform safety limits, as seen in Table 2.

**Table 2.** Platform Width Measurement Results

No	Platform component	Result	Description
		Tersedia (Yes/No)	
1	The platform floor does not use slippery materials	No	At Ciamis Station, the platform floor on line 1 still uses ceramic tiles; the platform floor will become slippery, especially in rainy weather, which will make passengers uncomfortable, so they are more careful.
2	Light	Yes	lights function to illuminate the platform area at night or when the platform is dark so that passengers can get on or off the train safely and comfortably. Safe and comfortable.
3	Lane signage	No	Lane signage serves to provide directions to the train line that passengers will ride.
4	Direction signboard	Yes	The direction signboard serves to provide directions to passengers who have finished using train transportation services and want to continue their journey to their respective destinations.
5	The kilometer	No	to provide a sign of the location of the kilometer

No	Platform component	Result	Description
		Tersedia (Yes/No)	
	signboard		at the station
6	Platform safety limit	No	The platform safety limit serves passengers so that when waiting for the train, they do not cross the platform safety limit because it is risky when the train passes.

It can be seen from Table 2 that the results of the identification of platform components partially still do not meet the criteria for platform components due to the unavailability of some components.

### 3.3. Station New Design Planning

The design of Ciamis Station uses an Industrialist concept approach with the help of applications that support BIM (Building Information Modeling), namely Autodesk Revit, which is equipped with two dimensions and three dimensions. Four facade parameters are a reference in the industrialist concept approach, as shown in Table 4, in reference to material, color, decoration (interior), and exposed buildings. The material used is on the upper frame of the Ciamis Station, and the design concept will use steel and iron. Material facades will also be used on the floor of the station building, along with cement plastering materials and wood materials, to give a natural impression of the building. The main principle of the material facade connected to the new design of Ciamis Station uses recycled materials, namely glass and aluminum.

After the color material becomes the second facade, it is applied to the new design of Ciamis Station in the form of brown wooden walls and white bricks to avoid dynamic colors. The decorative facade in this concept shows chandeliers on the ceiling of the new station design and murals on the walls of Ciamis Station. Exposed facades or revealing the character of the design concept building will be applied to the passenger waiting room that exposes the station hall space. Analysis of the reference parameters of the industrialist concept in design from several previous studies can be seen in Table 3.

**Table 3.** Industrialist Concept Reference Parameter Table

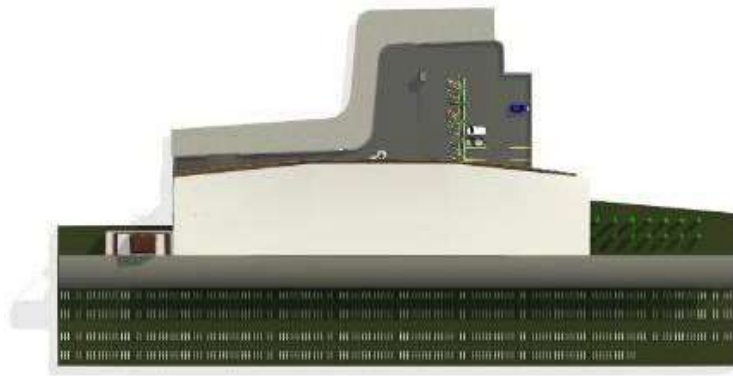
Parameters	
<b>Materials</b>	Using steel and iron materials.
	Using cement plaster floor.
	Using wood materials for a natural impression.
	Using recycled materials or industrial materials such as glass and aluminum.
<b>Color</b>	Avoid dynamic colors such as pink, magenta, purple, light blue, and turquoise.
	Using neutral colors such as black, white, and brown
<b>Decoration (Interior)</b>	Decoration.
	There is a mural graphic design on the wall
<b>Expose</b>	Lighting uses lights that are hung in the sky.
	Showing the character of the building



The design output after using references from 2-dimensional images of location maps and existing plans is a new 3-dimensional design of Ciamis Station which can be seen from the top view, front view, rear view and cut as follows:

A. Top View

That is a design that presents the new station building looking up which can be seen in Figure 8.



**Figure 8.** Top View of Ciamis Station

B. Front View

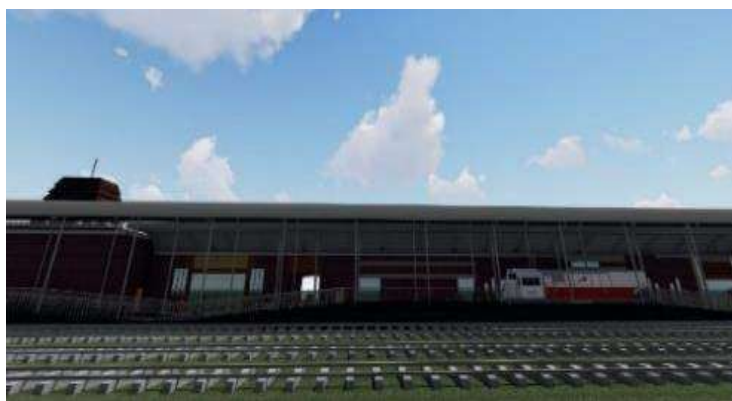
The design that presents the new station building can be seen in Figure 9.



**Figure 9.** Front View of Ciamis Station

C. Rear View

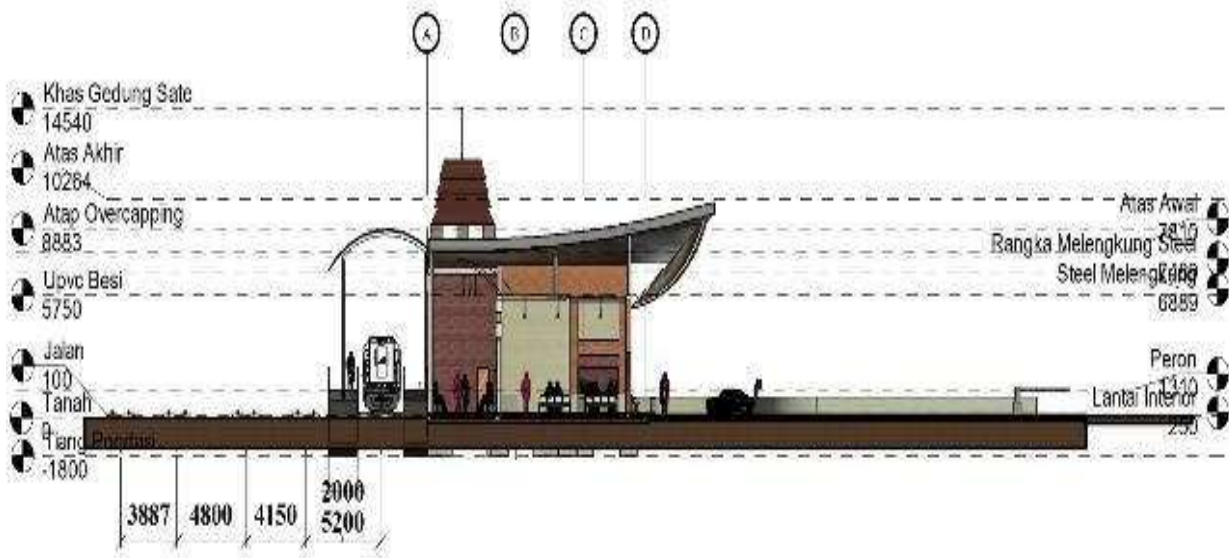
Namely the design that presents the new building of the rear view station can be shown in Figure



**Figure 10.** Rear View of Ciamis Station

D. Cut A-A

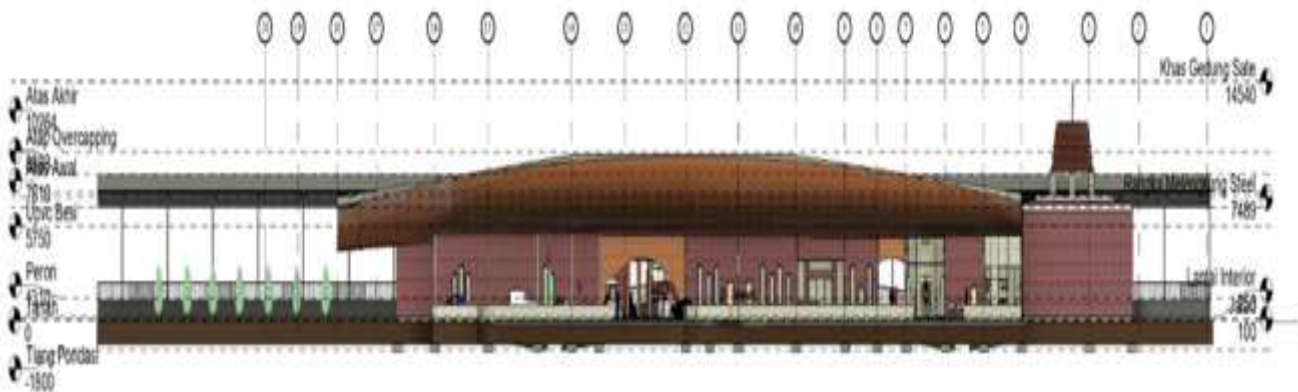
Cut lengthwise is an object cut line lengthwise with the aim to provide information about the size or other on an object in detail. Pictures of Pieces A-A can be seen in Figure 11.



**Figure 11.** Cut A-A View of Ciamis Station

E. Cut B-B

B pieces or pieces of transverse images are almost the same as longitudinal pieces, it's just that in this design a cross section is shown so that a particular object can be seen clearly. Pictures of B-B pieces can be seen in Figure 12.

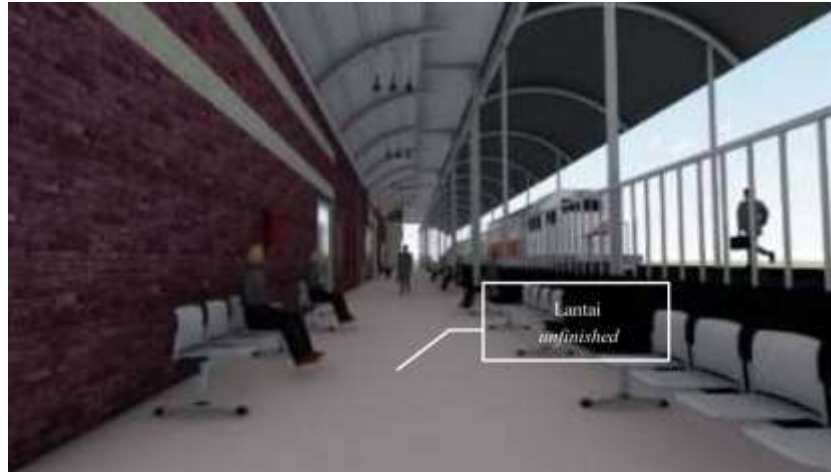


**Figure 12.** Cut B-B View of Ciamis Station

2-dimensional and 3-dimensional design using the Autodesk revit version Student application with building planning that has been done before (Conceptual Planning and Quantity Calculation of Educational Institution Buildings to Increase Demand for Jombang Station Using Autodesk Revit) (Adi, W. T., Prativi, A., Dewi, P., Aghastya, A., Prihatanto, R., & Nurzukhrufa, A.). The Industrialist concept approach to the design of Ciamis Station by categorizing four facades As follow:

A. Materials

The material used at Ciamis Station uses the cement plaster floor shown in Figure 13.



**Figure 13.** Floor Material Using Plastering

B. Colour

In principle, the industrialist concept does not use dynamic colors such as: Pink, Magenta, Purple, Light blue and Toska. The use of color facades can be seen in Figure 14.



**Figure 14.** Use of Color Material

C. Decoration

The use of chandeliers in the Ciamis Station Building can be seen in Figure 15.



**Figure 15.** Use of decoration materials

D. Expose

Showing the character of the building at Ciamis Station with an open space shown in Figure 16.



**Figure 16.** Use of Expose Material

After planning the new design and adding facilities to the station, the calculation of the class criteria number for Ciamis Station can be seen in Table 4, the difference after and before the design

**Table 4.** Credit Score Criteria Comparison

Criteria	Component	Description			
		Before		After	
Operating Facilities (25%)	Signals(60%)	√	Exist	√	Exist
	Telecommunications (20%)	√	Exist	√	Exist
	Electricity (20%)	√	Exist	√	Exist
Number Of Lines (20%)	> 10 Lines (10%)				
	6 - 10 Lines (70%)				
	< 6 Lines (20%)	√	5 Line	√	5 Line
Supporting Facilities (80%)	Parking (30 %)			√	687 m2
	Restaurants (20 %)			√	23 m2
	Shops (20 %)			√	10 m2
	Office (20 %)			√	123 m2
	Hospitality (10 %)				
Supporting Facilities (15%)	Passengers Waiting Room (30%)	√	143 m2	√	372 m2
	Parking (20%)	√	Exist	√	Exist
Special (20%)	Vehicle (15%)			√	23 m2

		Storage (15%)	√	12 m2	√	12 m2
		Loading and Unloading(10%)	√	Exist	√	Exist
		ATM (10%)			√	24 m2
		> 60 Ka (100%)				
	Ka Stop (90%)	40 - 60 Ka (70%)				
Traffic Passenger Per Day / 2 Way (15%)		< 40 Ka (20%)	√	30 KA	√	30 KA
		>80 Ka (100%)				
	Ka Direct (10%)	50 – 80 Ka (70%)				
		<50 Ka (20%)	√	4 KA	√	4 KA
Number of Passenger Per Day hari (20%)	> 50.000 (100%)					
	10.000 - 50.000 (70%)					
	< 10.000 (20%)		√	525pnp	√	525pnp
Number of Items Per Day (5 %)	> 150 Ton (100%)					
	100-500 Ton (70%)					
	< 100 Ton (20%)		√	150kg	√	150kg

### 3.3. Volume Calculation

Autodesk Revit application has access to quantities feature, which is a design volume calculation feature automatically. In addition to calculating the volume, this feature can calculate the component area automatically without manual. Component calculations can be seen in Table 5. As for the results of automatic calculation of station building volume, only some item descriptions can be calculated. Because not all work can be calculated automaticall.

**Table 5.** Ciamis Station Building Volume Calculation

No	Item	Unit	Quantity
1	Wall	m <sup>2</sup>	4673
2	Ceiling	m <sup>2</sup>	725
3	Floor	m <sup>2</sup>	1348
4	Truss	m <sup>3</sup>	3,63
5	Roof	m <sup>2</sup>	3126
6	Coloumn	m <sup>3</sup>	12,06
7	Beam	m <sup>3</sup>	39,61
8	Door	Unit	26

9	Window	Unit	20
10	Foundation	m <sup>3</sup>	38,65
11	Sanitary	Unit	44
12	Railing	m	308

#### 4. Conclusion

Based on the results of the analysis in this study, it can be concluded as follows:

1. The existing conditions of Ciamis Station have facilities that are still lacking to meet the minimum service standards for medium class station criteria, but are still suitable for use. Deficiencies at Ciamis Station are also still widely found as evidenced by the checklist on SPM (Minimum Service Standards) based on PM Number 63 of 2019 recorded that 30.76% have not been fulfilled in certain parts including the main supporting building, supporting installations and so on.
2. Feasibility of structuring facilities and spatial layout Ciamis Station has medium and low platforms and there is still building space for basic activities that have not been facilitated and the minimum area standards for medium class station rooms. After making observations, the Ciamis station platform still uses slippery materials that are not in accordance with the technical requirements in PM Number 29 of 2011. Ciamis Station has Peak Hour at 02.00 WIB with 4 trains that stop at Ciamis Station. Data analysis of the number of annual passenger volumes obtained during peak hours at Ciamis Station serves approximately 80 passengers. In calculating the needs of the main activity building area according to passengers during peak hours the main activity building area must be more than 40.96 m<sup>2</sup>.
3. This redesign planning by developing the available station land and improving station facilities with the help of the Autodesk Revit application to describe the layout and 3 dimensions of the new design with reference to PM 29 of 2011, PM 63 of 2019 and the Station Standardization Book of 2025.
4. This redesign planning by developing the available station land and improving station facilities with the help of Autodesk Revit application to describe the layout and 3 dimensions of the new design with reference to PM 29 Year 2011, PM 63 Year 2019 and in the Station Standardization Book in 2012. The land used in the planning amounted to 6682 m<sup>2</sup>. While the total result of the new station room area is 1178 m<sup>2</sup>. The industrial concept approach is added to the new design of Ciamis Station with its application referring to several journals.
5. The building volume that has been designed using the Autodesk Revit application consists of a wall area of 4,673 m<sup>2</sup>, an iron upvc area of 725 m<sup>2</sup>, a floor area of 1,348 m<sup>2</sup>, a roof area of 3,126 m<sup>2</sup>, an iron frame volume of 3.63 m<sup>3</sup>, a column volume of 12.06 m<sup>3</sup>, a beam volume of 39.61 m<sup>3</sup>, the number of doors 26 units, the number of windows 20 units and the volume of the lower foundation 38.65 m<sup>3</sup>. Sanitary facilities 8 units of water taps, 4 units of urinal, 10 units of washbasin and 22 units of sitting closet. Platform guardrail 308 m.

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