Comparison of Wall Construction Costs Using Brick, Batako, and Hebel Materials in Denpasar City

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| Submitted: January 07, 2026 | Revised: May 16, 2026 | Accepted: May 22, 2026 |

| Published: May 29, 2026 |

ABSTRACT

A construction project is a series within a certain scope where work in the field certainly has a limited time. Several previous researchers conducted research on the comparative cost of wall materials and found that the cost of installing walls using bricks was cheaper than red bricks or bricks. Based on the results of previous research with a comparison of the costs of the three wall materials, namely brick, brick and Hebel as wall materials, in this research we will compare the work costs of the three materials Brick, Brick and Hebel with a case study in the SMA Negeri 9 Building Construction Project Denpasar. From the calculation of wall construction costs in the Denpasar 9 Public High School building construction project, the results obtained were that for walls made of brick material it was IDR. 425,894,615.49, walls made of brick material amounting to IDR 401,891,935.33 and for walls made of hebel material IDR. 507,619,946.90. From the results of the comparison of the total wall construction costs in the Denpasar 9 State High School Building Project, the cost of wall work using brick material is 5.80% higher compared to wall work using brick material, the cost of wall work using brick material is 17.65% lower than wall work using brick material. hebel material and the cost of wall work using brick material is 24.47% lower compared to wall work using hebel material. Brick material has the lowest work costs, brick material has higher work costs than brick but lower than hebel, while hebel material has the highest work costs.

Keywords: comparison, materials, brick, hebel, walls.

INTRODUCTION

A construction project is a series of tasks within a specific scope, where field work naturally has a limited timeframe. Achieving optimal results requires resources that are expected to contribute to the success of a construction project [1-3].

Conducted a study comparing the costs of wall construction using red brick, Hebel concrete, and concrete blocks. They found that the cost of installing concrete blocks is lower than that of red brick or Hebel, with a difference of 14% between concrete blocks and Hebel and 5% between concrete blocks and red brick [4]. Conducted a study comparing the costs of wall construction using brick and concrete blocks. The results showed that concrete blocks are more cost-efficient, with a 29% difference in cost compared to brick [5]. Comparing wall construction using Hebel and concrete blocks. The results showed that Hebel walls are more cost-efficient than red brick, with a 10% difference in cost [6-8].

Based on previous research comparing the costs of three wall materials: brick, concrete block, and Hebel concrete. This study will compare the costs of brick, concrete block, and Hebel concrete using a case study of the Denpasar 9 State Senior High School Building Construction Project.

Walls are building elements that separate one space from another. They function as a barrier between the interior and exterior spaces, as a barrier against light, wind, rain, dust, and other natural sources, as a divider within a home, as a divider between private and public spaces, and as a specific artistic function [9-11].

pISSN 2302-4240
eISSN 2655-2086
Volume 15, Issue 2, June 2026, pp.0626-0632
DOI: http://dx.doi.org/10.32832/astonjadro.v15i2.22588 http://ejournal.uika-bogor.ac.id/index.php/ASTONJADRO

Conventional red brick is made from clay, a building material that is used as a primary component in building structures, particularly wall construction. The red brick manufacturing process is carried out traditionally (manually) on a home-based scale (non-factory).

Concrete block is a mixture of cement, aggregate, and water with or without additives. The concrete block mixture consists of Portland cement, aggregate, and water. Batako, or tras-lime cast stone, is a brick made by molding and curing it in a humid environment using a mixture of tras, lime, and water, with or without other additives [12].

Hebel is a porous brick with a lighter density than conventional brick. As the name suggests, hebel is designed to lighten the structural load in building construction. Hebel is made from quartz sand, cement, lime, gypsum, water, and aluminum paste [13-4].

Unit price analysis is a method of calculating the unit price of construction work, defined as multiplying the required building materials, labor wages, and equipment by the price of the materials, labor wage standards, and equipment rental/purchase prices to complete the construction work [15].

RESEARCH METHODS

The method used in this research is a qualitative descriptive analysis method, which involves collecting primary and secondary data. Primary data is data obtained directly, in the form of daily notes and project documentation, while secondary data is data obtained from the project agency, in the form of project documents and the Budget and Budget (RAB).

Primary Data

Primary data collection methods are data obtained and collected by the researcher directly from data sources in the field. In this final project, the data collected are the results of a survey of material prices and labor wages used. The method used to obtain primary data was a price survey from three material stores.

Secondary Data

Secondary data is data obtained and collected by the researcher from various existing sources, in the form of project implementation documents and labor wages. This research took place at the construction project of SMA Negeri 9 Denpasar, a school located in Kesiman, East Denpasar District, Denpasar City, Bali.

Descriptive analysis is a research method that collects data based on actual data, then organizes, processes, and analyzes it to provide an overview of the existing problem. In descriptive analysis, data is usually presented in the form of regular tables or frequency tables, graphs, bar charts, line charts, pie charts, measures of central tendency, measures of data distribution [16]. This study will compare the costs of wall construction using brick, concrete blocks, and Hebel.

RESULTS AND DISCUSSION

From the unit price analysis of wall construction above, the cost of the wall construction is calculated by multiplying the unit price by the volume of the wall construction.

Brick Wall Installation Work

The cost calculation for wall construction using red brick for the SMA Negeri 9 Denpasar construction project can be seen in Table 1 below.

Table 1. Calculation of the cost of red brick wall laying work

No	Job Description	Volume	Unit	Unit Price (Rp.)	Total price (Rp)
1	Brick Wall Package, 1st Floor				
	Fit. 1 Brick Wall: 4 Pp	330.60	M^2	182,700.00	60,400,736.93

No	Job Description	Volume	Unit	Unit Price (Rp.)	Total price (Rp)
	Plastering: 1 Pc: 4 Pp	720.85	M²	61,900.00	44,620,338.93
	Plastering	720.85	M²	48,200.00	34,744,755.03
2	Brick Wall Package, 1st Floor				
	Fit. 1 Brick Wall: 4 Pp	365.49	M²	182,700.00	66.744,144.21
	Plastering: 1 Pc: 4 Pp	790.61	M²	61,900.00	48,939,046.08
	Plastering	790.61	M²	48,200.00	38,107,625.65
3	Brick Wall Package, 1st Floor				
	Fit. 1 Brick Wall: 4 Pp	356.66	M²	182,700.00	65,162,384.91
	Plastering: 1 Pc: 4 Pp	825.22	M²	61,900.00	54,080,861.73
	Plastering	825.22	M²	48,200.00	39,775,404.45
	Total				449,605,298.06

Table 1 above shows the results of multiplying the wall masonry unit times the wall masonry volume. The total cost obtained from this calculation is Rp. 449,605,298.06.

Cement of Brick Wall Material

The cost calculation for brick wall masonry for the construction of the Denpasar 9 State Senior High School project can be seen in Table 2 below:

Table 2. Calculation of Brick Wall Masonry Cost

No	Job Description	Volume	Unit	Unit Price (Rp.)	Total price (Rp)
1	1st Floor Cement Wall				
	1 Pc: 4 Pp Brick Wall	330,60	M²	159,300.00	52,664,681.95
	1 Pc: 4 Pp Plaster	720,85	M²	61,900,00	44,620,338.93
	Mattress	720,85	M²	48,200,00	34,744,755.03
2	2nd Floor Cement Wall				
	1 Pc: 4 Pp Brick Wall	365,49	M²	159,300,00	58,221,790.77
	1 Pc: 4 Pp Plaster	790,61	M²	61,900,00	48,939,046.08
	Mattress	790,61	M²	48,200,00	38,107,625.65
3	1st Floor Cement Wall				
	1 Pc: 4 Pp Brick Wall	356,66	M²	159,300,00	56,816,463.69
	Mattress	825,22	M²	61,900,00	54,080,861.73
	1 Pc: 4 Pp Brick Wall	825,22	M²	48,200,00	39,775,404.45
	Total				424,970,968.41

Table 2 above shows the results of multiplying the wall masonry unit costs by the wall masonry volume. The total cost obtained from this calculation is Rp. 424,970,968.41.

Brick Wall Installation

The cost calculation for wall masonry using Hebel concrete for the construction of the Denpasar 9 State Senior High School project can be seen in Table 3 below.

pISSN 2302-4240
eISSN 2655-2086
Volume 15, Issue 2, June 2026, pp.0626-0632
DOI: http://dx.doi.org/10.32832/astonjadro.v15i2.22588 http://ejournal.uika-bogor.ac.id/index.php/ASTONJADRO

Table 3. Calculation of Hebel Wall Masonry Costs

No	Job Description	Volume	Unit	Unit Price (Rp.)	Total price (Rp)
1	Pack of 1-story lightweight brick walls				
	10 cm tall lightweight brick walls	330,60	M²	163,300.00	53,987.084.51
	Ready-to-use mortar plaster	720,85	M²	92,300.00	66,534.043.34
	Ready-to-use mortar plaster	720,85	M²	60,500.00	43,611.155.17
2	2 Packs of 1-story lightweight brick walls				
	10 cm tall lightweight brick walls	365,49	M²	163,300.00	59,683,731.53
	Ready-to-use mortar plaster	790,61	M²	92,300.00	72,973,731.27
	Ready-to-use mortar plaster	790,61	M²	60,500.00	47,832,185.72
3	3 Packs of 1-story lightweight brick walls				
	10 cm tall lightweight brick walls	356,66	M²	163,300.00	58,243,116.89
	Ready-to-use mortar plaster	825,22	M²	92,300.00	73,167,423.88
	Ready-to-use mortar plaster	825,22	M²	60,500.00	49,925,559.53
	Total				**528,958,031.84**

Table 3 above shows the results of multiplying the wall masonry unit costs by the wall masonry volume. The total cost obtained from this calculation is Rp. 528,958,031.84.

Cost Comparison

After calculating the unit price and cost of each work item using brick, concrete block, and hebel wall materials, the total cost of the wall work is obtained, which can be seen in Table 4 below:

Table 4. Comparison of total wall work costs

No	Job Description		Job Cost
1	Brick wall work/bata	Rp	449,605,298.06
2	Brick wall work/batako	Rp	424,970,968.41
3	Hebel wall work	Rp	528,958,031.84

Table 4 above shows a comparison of the construction costs for each wall material. Each wall material, whether brick, concrete block, or hebel, has a different construction cost. When combined in a single graphical frame, the three comparisons above can be seen in Figure 1 below.

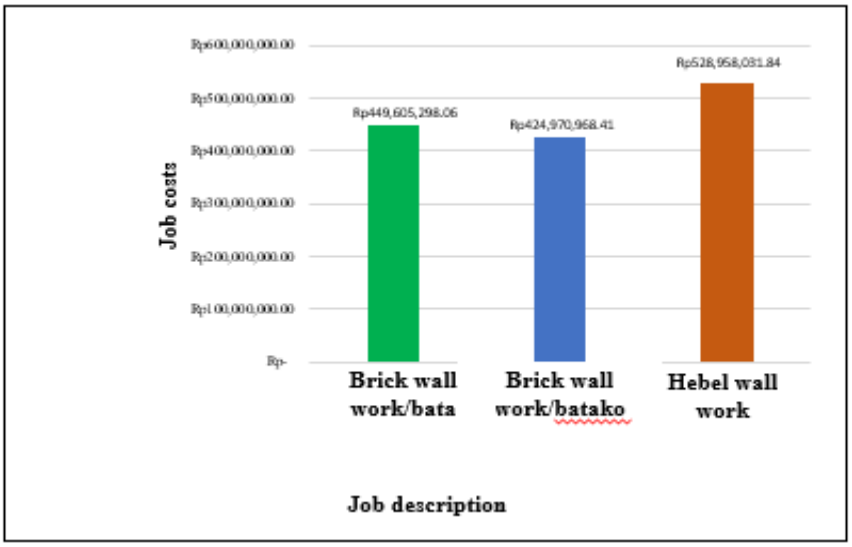

Figure 1. Comparison of Wall Construction Costs

As seen in Figure 1 above, comparing the two materials, the cost of brick construction is 5.80% higher than that of concrete blocks. The cost of brick construction is 17.65% lower than that of concrete blocks. The cost of concrete blocks is 24.47% lower than that of concrete blocks.

From Figure 1 above, concrete blocks have the lowest construction costs, while concrete blocks have the highest construction costs.

Converting these prices to a unit price per square meter by adding the unit prices for each wall material yields the following comparison:

Table 5. Wall Construction Cost per Square Meter

No	Job Description	Job Cost		Cost Per M²	
1	Brick wall work/bata	Rp	425,894,615.49	Rp	292,800.00
2	Brick wall work/batako	Rp	401,891,935.33	Rp	269,400.00
3	Hebel wall work	Rp	507,619,946.90	Rp.	316,100.00

If the comparison in Table 5 above is displayed in graphic form, it can be seen in Figure 2 below:

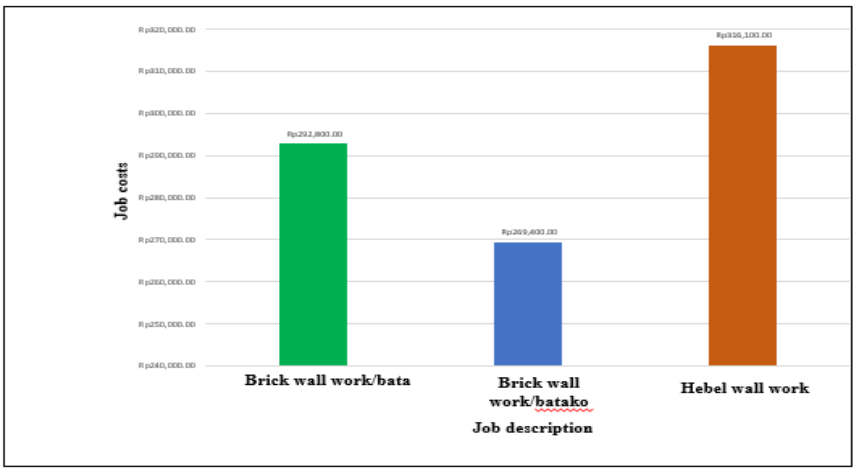

Figure 2. Comparison of wall construction costs per square meter

pISSN 2302-4240
eISSN 2655-2086
Volume 15, Issue 2, June 2026, pp.0626-0632
DOI: http://dx.doi.org/10.32832/astonjadro.v15i2.22588 http://ejournal.uika-bogor.ac.id/index.php/ASTONJADRO

From Figure 2 above, comparing the two materials, the cost per square meter of wall construction using brick is 8.69% higher than that of wall construction using concrete blocks. The cost per square meter of wall construction using brick is 7.96% lower than that of wall construction using Hebel concrete. The cost per square meter of wall construction using concrete blocks is 17.33% lower than that of wall construction using Hebel concrete.

From the comparison of costs per square meter above, concrete blocks have the lowest cost per square meter, while Hebel concrete has the highest cost per square meter.

CONCLUSION

From the results of this final project, several conclusions can be drawn, as follows: a) The calculation of wall construction costs for the SMA Negeri 9 Denpasar building construction project resulted in a wall construction cost of Rp. 425,894,615.49, walls with concrete blocks cost Rp. 401,891,935.33, and walls with Hebel material cost Rp. 507,619,946.90. b) From the comparison of the total wall construction costs in the SMA Negeri 9 Denpasar Building Construction project, the cost of wall work using brick material is 5.80% higher than wall work using concrete blocks, the cost of wall work using brick material is 17.65% lower than wall work using Hebel material, and the cost of wall work using concrete blocks is 24.47% lower than wall work using Hebel material. Concrete blocks have the lowest construction costs, brick materials have higher construction costs than concrete blocks but lower than Hebel, while Hebel material has the highest construction costs.

ACKNOWLEDGEMENTS

The author certainly received guidance, direction, and knowledge in completing this final project. Therefore, the author would like to express his deepest gratitude to the Dean of the Faculty of Science and Technology, Dr. Ir. Putu Doddy Heka Ardana, S.T., M.T., IPM, Vice Dean Dr. Ir. Ni Kadek Astariani, ST., MT., IPM., ASEAN Eng. as well as Supervisor 1, Tri Hayatining Pamungkas, ST., MT. as Head of Civil Engineering Study Program and Ir. I Gusti Ngurah Eka Partama, ST., M.Sc., IPM. ASEAN Eng. as Supervisor 2 who have guided the preparation of this final assignment until completion, as well as my beloved family and colleagues who have participated in helping smooth the preparation of this final assignment until the final stage. The author realizes that this final assignment is still far from perfect, therefore, criticism and suggestions from all parties that are constructive, the author always hopes for the perfection of this final assignment. Hopefully this final assignment can provide greater benefits to the readers.

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