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Feasible study of simple residence house functions in Pedes District, Karawang Regency

D D Purnama[1*], B Amal[1] and Siswadi[2]

[1] Civil Engineering, Faculty of Engineering, Universitas Singaperbangsa Karawang, Karawang, Indonesia
[2] Mechanical Engineering, Faculty of Engineering, Universitas Singaperbangsa Karawang, Karawang, Indonesia
[*]Corresponding author email: dicki.dianpurnama@ft.unsika.ac.id

Abstract

Indonesia is included in the category of countries with a sufficient level of vulnerability to disasters, one of which is earthquakes. To create a functional building in accordance with a building layout that is harmonious and harmonious with the environment, the reliability of the building must be guaranteed in terms of safety, health, comfort, and convenience. In Indonesia, efforts to ensure the reliability of buildings are regulated in Law Number 28 of 2002 concerning Buildings and confirmed to Government Regulation Number 36 of 2005 and clarified in the Regulation of the Minister of Public Works and Public Housing of the Republic of Indonesia Number 27/PRT /M/2018 Concerning Certificates of Functional Appropriateness for Buildings and Their Timing. This has become Law Number 11 of 2020 concerning Job Creation. According to the regulations, buildings are categorized as simple buildings such as residential houses, and non-simple buildings such as multi-story buildings. A simple home is a primary need that almost everyone has in its entirety. The reliability or suitability of a simple residence is very important, especially regarding safety aspects in addition to health, comfort, and convenience aspects. This research aims to examine the feasibility of building a simple residence in the Pedes Timur Karawang area that meets various required aspects. The method used is direct observation and interviews with building owners. Observations or inspections are based on the attachment to regulation Number 27/PRT/M/2018. In this review, research is divided into 3 (three) focuses, namely material aspects, upper structural aspects, and roof structural aspects. The research results show that the material aspect has 100% suitability, the upper structural aspect has 50-75% suitability and the roof structure has 40-60% suitability. The results of this research can be a reference for the Karawang Regency government in determining locations that are vulnerable to disasters, especially earthquakes, and determining steps to handle them.

Keywords

Simple residence house, feasibility study, Pedes District

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Introduction

Law Number 28 of 2002 on Buildings governs the technical conditions, safety requirements, and licensing procedures for building construction in Indonesia. This law was enacted to ensure public safety and environmental protection in building development. It establishes technical conditions that must be met in construction, such as structural design, building material quality, and utility installations.

Furthermore, this law aims to ensure that buildings are constructed to be safe, durable, and functional. It also regulates essential safety requirements, including emergency stairways, fire protection systems, and emergency lighting systems. These provisions are intended to provide adequate protection against fire hazards, natural disasters, and other emergency situations.

This law is crucial in ensuring that building construction in Indonesia adheres to appropriate safety standards and technical requirements. In the context of earthquake resilience, this law helps ensure that constructed buildings meet the necessary technical and safety conditions to prevent damage or collapse during seismic events.

The implementation of this law has been extensively enforced by the government, especially for non-simple buildings. This is reflected in the requirement for each regional government to establish specific construction regulations. For instance, the Karawang Regency Government issued Regent Regulation Number 55 of 2018 on Building Function Feasibility Certification [5].

Buildings in Indonesia are classified into several types, including: (1) simple single-family residential buildings; (2) simple single-family and row houses with up to two floors; (3) non-simple residential buildings exceeding two floors; and (4) public-use buildings. Currently, the regulatory application is less stringent for simple residential houses, partly due to the perception among many Indonesians that these regulations may complicate the licensing process. However, enforcing these rules could have a positive impact by enhancing safety, health, comfort, and convenience for residents of simple housing.

The National Board for Disaster Management (BNPB) reported that over 42,000 houses were damaged by natural disasters in 2020. This includes damage in varying degrees—severe, moderate, and light—and excludes the large number of homes that were flooded, which numbered in the hundreds of thousands. Specifically, 1,926 houses were recorded as damaged due to earthquakes, with 241 units heavily damaged, 492 moderately damaged, and 1,193 slightly damaged [6].

The assessment of residential building suitability for earthquake resistance and other factors is conducted through observation, interviews, and questionnaires. Research findings generally categorize suitability into three levels in relation to established standards. The percentage breakdown of residential buildings that meet earthquake-resistance standards is as follows: (1) fully compliant at 44%, (2) moderately compliant at 42%, and (3) non-compliant at 16% [7]. In the city Tidore House stays (60%) categorized as not enough suitable and (8%) not suitable for earthquakes, because there is no beam

sloof used [8]. Even percentage conformity is only 30% and not under 70% based on the suitability structure of House stay with guidelines technical [9]. Each study owns its parameters.

Based on this data, earthquakes are one of the disasters that threaten both lives and valuable objects, including homes. Code Number 27/PRT/M/2018 is used to anticipate damage and failure to buildings and residential buildings. The research aims to determine the suitability of simple residential buildings in Pedes District, Karawang Regency with the established standards. So that policymakers can take preventive action in dealing with housing suitability issues.

Method

The research location is in Pedes District, Karawang Regency, where the object of review is a residential house that is currently under construction. The sampling technique was carried out using purposive sampling technique. Purposive sampling is carried out by taking samples not based on strata and random, but based on a certain objective [10]. This technique was chosen because of the limited number of houses still under construction and the limitations of research time, surveyor personnel and research costs if we had to carry out samples of all existing houses.

Points inspection directly and interview as many as 30 reviews. Based on results observations and interviews obtained information that suitability between table provision based on PUPR Ministerial Code Number 27/PRT/M/2018 is sufficient by code.

On research moment these aspects reviewed more focus to:

1. Material aspect
2. Upper Structure
3. Roof Structure

Meanwhile, sub structural aspects and health aspects were not reviewed in this research. These three aspects guarantee that the roof frame of a building also plays a role in accelerating the collapse of a building [11]. The discussion focuses on points 1-11, 21-32 and 33-47 contained in the code.

To meet the required time and substance targets, this research was carried out in accordance with the sequence of activity implementation stages. In general, the stages of implementing this research consist of: Preparation Stage, Data Collection Stage, Analysis and Review Stage, and Finalization Stage.

Preparation Stage

In this preparation stage, several activities are carried out as the initiation of the entire series of planned activities. The results of this preparation stage will greatly influence the processes carried out in subsequent stages.

The initiation of the study took the form of team consolidation, literature study, and methodology consolidation. Survey preparation in the form of selecting survey methods, preparing survey forms and equipment.

Determining the points and number of survey samples, as well as Human Resources (HR) implementing the introduction of the study area in the form of survey locations and preparation of the survey team. Identify related previous studies. In general, there are 3 main activities in this preparation stage, namely:

1. Methodology consolidation, the purpose of this activity is:

Plan in more detail the stages of implementing the next activities, to make efficient use of time and resources. Determining the analytical method that will be used is important because it will affect data requirements, the provision of analysis time and the overall quality of research results.

2. Survey preparation and planning, useful for: (1) Discuss the planned and directed survey methods; (2) Prepare/mobilize survey equipment; and (3) Preparation of survey form Creation of data needed for survey

Table 1. Inspection of simple residential buildings refers to code Number 27/PRT/M/2018

No	Type of Inspection
1	Aggregate
2	Sand
3	Cement
4	Gravel or Crushed Stone
5	Big Stone
6	Measuring Stones Currently
7	Curvature of Brick
8	Mixture Concrete
9	Mortar Mix
10	Wood
11	Without Material Building Dangerous
21	Dimensions column 15x15 cm with 4 bars with a diameter of 10 mm and stirrups with a diameter of 8 cm, a distance of 15 cm.
22	Column stirrups bent 135°. Minimum link length 6D stirrup or minimum 5 cm.
24	Connection length late between columns and beams has a minimum length of 40D or a minimum of 40 cm.
25	The formwork column is strong and does not leak
26	Thick blanket minimum column 15 mm.
27	Mixture of concrete cement:sand: gravel in column 1:2:3
28	Mixture concrete on columns is good and uniform
29	mortar mixture is 1 cement: 4 sand and enough water
30	the mixture on the column is good and uniform
31	Partner brick true and thick mortar layer 1.5 cm.
32	Connection between walls and columns Correct. Reinforcing steel anchored every 6 layers of brick 40 cm long
33	beam ring dimensions 12x15 cm, 4 10 mm reinforcement bars, and 8 mm diameter stirrups, 15 cm apart
34	Beam ring stirrups bent 135°. Minimum link length 6D stirrup or minimum 5 cm.
35	Reinforcing steel be extended to the beam ring at least 40 cm.
36	Connection length late between columns and ring beams has a minimum length of 40D or a minimum of 40 cm.
37	The beam ring formwork is strong and does not leak

No	Type of Inspection
38	Thick Beam ring blanket minimum 10 mm.
39	Mixture of concrete cement:sand: gravel in column 1:2:3
40	The mixture of concrete on the beam ring is good and uniform
41	The minimum extension length is 40D or at least 40 cm.
42	Dimensions minimum mountains 12x15 cm, blanket 10mm concrete
43	Anchor length easel 40 cm every 6 layers brick mountains, Reinforcement 10 mm diameter and long pass 40 D or 40 cm.
44	Sawhorse wood anchored to column/ring beam use reinforcement diameter 10 mm
45	The minimum size of easel wood is 8 cm x 12 cm
46	The bond wind is a wood size 6 cm x 12 cm
47	Quality wood horses and ties wind is good quality
48	Distance from the septic tank to the source of drinking water from the minimum well is 10 m
49	ventilation area (openings) is at least 10% of the wide room

3. Literature studies are useful for: (1) Identify traffic engineering techniques; (2) Identify techniques to improve services at ports; and (3) The output at this stage is in the form of selecting methods and methods for carrying out field surveys accompanied by time planning so that research implementation is more focused.

Data Collection Stage

Implementation of a primary survey consisting of: architectural review (ventilation, lighting), structural review (reinforcement dimensions, reinforcement distance, etc.), MEP review of sanitation/plumbing systems (clean water, dirty water, solid waste), Electrical Network (source, network, lighting).

Collecting data from secondary sources, especially data contained in the checklist for each field (structure, architect, MEP).

The output at this stage is in the form of data from field measurements directly related to aspects of safety, health, security, comfort and convenience in architectural, structural and MEP reviews. The data taken refers to Minister of PUPR Regulation Number 27/PRT/M/2018 (Table 1).

Analysis Phase

The initial analysis consists of identifying reviews contained in the checklist for each field

Further analysis takes the form of finalizing the results of the Team's review

The output at this stage is the results of field survey data analysis and interviews which are analyzed using descriptive analysis and refer to PUPR Ministerial Code Number 27/PRT/M/2018.

Finalization Stage

Article improvements

Results and Discussion

Review results field showing that all materials used have fulfilled standard (Figure 1). The necessary thing noticed is placement from this material. Sometimes cement placed outside (exposed to rays of sun and rain) as well as location annoys wood access, road workers.

On review inspection required that use of asbestos should avoided. For house, it is known that he lives in Pedes District still enough lots of houses just uses it asbestos as roof covering.

The use of sand and gravel materials has undersized the grain and the condition of the material is still intact and in good condition. The entire house has surveys and inspections are carried out directly using sand, gravel, and cement materials that have been fulfilling standard criteria.

Figure 1. Construction Materials

Figure 2. Usage Asbestos As Main Roof Covering

Even though Indonesian rules for the use of asbestos are prohibited is asbestos blue (Figure 2). However, PUPR Ministerial Decree No 27/PRT/M/2018 on the use of asbestos stated should avoided.

Figure 3. Thickness Blanket Concrete

On reference is known that installed reinforcement no can seen from outside (disappearance blanket concrete) (Figure 3). This matter happens because lack of compaction process as well as mold/formwork the wood used is leaking or uneven. Should reinforcement be closed repeat at least with a mortar mixture to protect it from the condition of the environment outside.

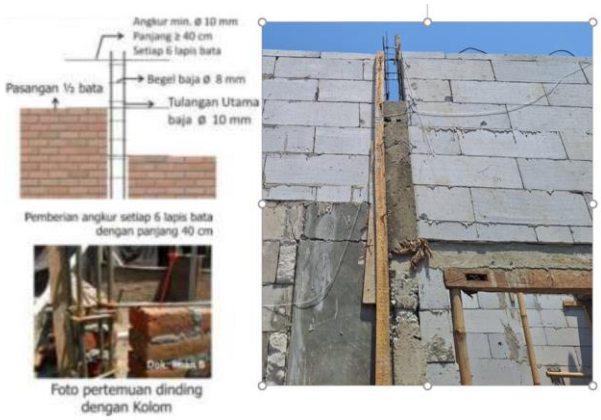

Figure 4. Anchor Reinforcement and Condition of Casting Results

In the picture (Figure 4) seen that there are no reinforcement installed anchors from wall to column. As well as results in poor casting. Concrete no compacted with perfect so that arise cavities along column.

Figure 5. Thickness Broadcast

On review structure on stock, broadcast make up complete review sample house fulfill. Standard reference has been understood by the worker's craftsman building. Moment

this type of wall used not only brick but already started to switch to hebel and brick (Figure 5).

The brick position has an installed hose alternating between the position brick top and bottom (Figure 6). This matter was done to avoid damage in a way comprehensive moment burden exceeded. A thickness space of 1.5 cm has also been appropriate and spacious the walls are not too big can avoid from collapse wall because lack of support.

Figure 6. Distance to Sengkang

On review reinforcement, besides dimensions and quantity reinforcement, there are also related requirements with distance stirrup. In part house matter This escape workers are aware of the building. So, there is no standard reference.

From various conditions as described previously. Grouping suitability-worthy function is differentiated into 3 (three) categories (Figure 7).

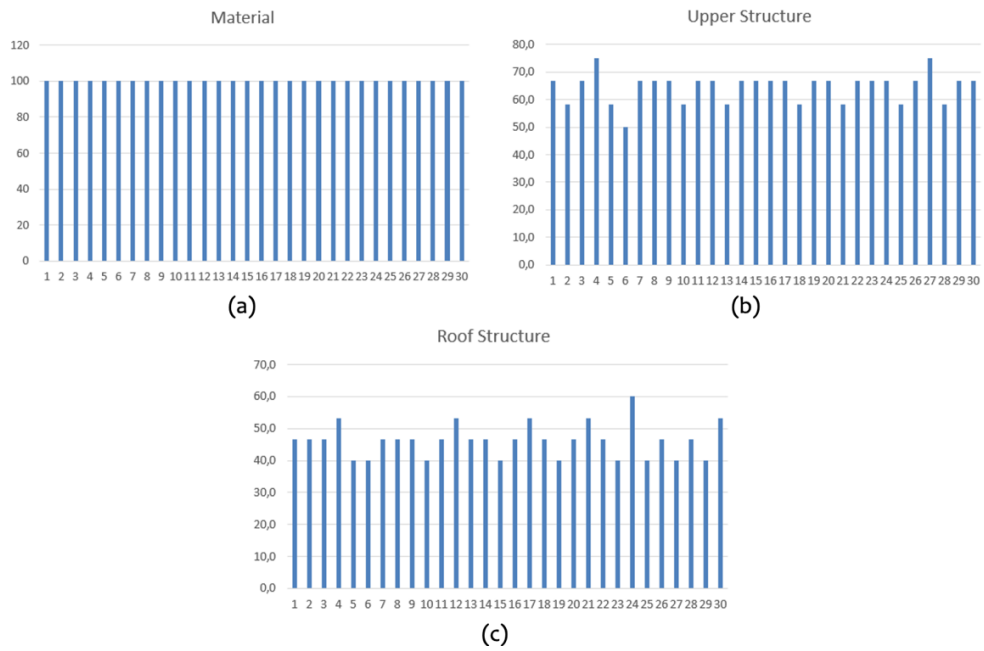

Figure 7. Conformity (a) Material Aspect, (b) Upper Structure, (c) Roof Structure

Conclusion

In all material aspects condition, worthy function fulfilled one hundred percent. For review suitability of the material in the reference reviewed in terms of aspects inspection no. 1-11. There is aspect structure on all condition worthy function seen Still in sufficient scale Good although No fulfilled one hundred percent. The range of suitability ranges between 50%-75%. For review suitability of the material in the reference reviewed in terms of aspects inspection no 21-32. In the structural aspect, all functional requirements appear to be inadequate. The range of suitability ranges between 40%-60%. For review suitability of the material in the reference reviewed in terms of aspects inspection no. 33-45. The most dominant aspect of suitability is related to the material aspect. For the inspection aspect of the upper structure and roof structure, the thing that is most often not suitable is related to reinforcement the distance between reinforcement is often neglected especially the bend angle distribution length, and pass length. Of the three aspects reviewed, the material aspect is very suitable, the upper structural aspect is quite suitable, and the roof structural aspect is less suitable.

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