Malay heritage: rehabilitation of Uma Kabuong Limo house

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Abstract. Uma Kabuong Limo is an 80-year-old traditional Malay house located in an old village of Pulau Belimbing, Riau Province. This building represents Malay architecture. Currently, the building is experiencing damage to its structural and architectural components. Several factors cause building damage such as building age, weather, usage, and flooding. This damage can lead to collapse and loss of the building as a whole. This study aims to identify the characteristics and see the damage to the building elements of Uma Kabuong Limo. This research method is descriptive qualitative with synchronic reading analysis technique. The research stage was to collect data through field observations and interviews. The next stage is making the model through Building Information Modelling to see the comparison of building damage. The results showed that the architectural knowledge was manifested in construction techniques, building materials, and carvings. Damage to buildings can be seen in structural and architectural elements. The level of damage is in the category of heavy damage, so it is necessary to immediately carry out building rehabilitation. The results of this research will be used further in the stage of preparing the document for the rehabilitation model of the Uma Kabuong Limo.

1. Introduction
Buildings can reflect the cultural roots of a particular group resulting from cultural and environmental processes. This process comes from the management of life which has meaning and symbols in society in fulfilling demands. Old buildings are architectural assets that need learning and maintenance. One building that cannot be separated from life is a house. A house is a place for the interaction of residents with the surrounding to protect and fulfilling their living demands. Primitive houses lasted a very long time based on high-level traditions with a depth of local traditions [1]. The vernacular architecture includes residential houses and other buildings related to the context of the environment and local/local resources, individuals, or local communities [2]. In contrast to Uma Lontiok which functions as a traditional house, the Malay house Uma Kabuong Limo operates as a resident's house. Malay house Uma Kabuong Limo is a term in the local language as design for a house. Uma is home, Kabuong is Lorong, and Limo is five. So, the Malay house of Uma Kabuong Limo is a house with 5 alleys (Lorong). The Malay house of Uma Kabuong Limo is the original building of the Malay community in Kampar Regency, Riau Province. The Malay community in Kampar district is categorized as the mainland Malay community [3]. This construction is a hereditary building that has been inherited for a long time, the average age is 80-100 years. Professional craftsmen or architects but rather the ability of the community to jointly use local techniques and materials did not design this building. In the development process, it adapts to the climate, traditions, economy, and the environment. They scattered these buildings in groups to form villages.
Malay buildings have building constituent components comprising stairs, foundations, pillars, floors, walls, doors, windows, and roofs [4]. The Malay home building of Uma Kabuong Limo develops with excellent techniques and awareness of meaning through carvings, spatial orientation, and materials. This seems to be proportional to the opinion of who says that vernacular buildings are rough [5]. The current era of globalization has transformed effect on many aspects such as economy, social and building. Nowadays, there is a change in the transformation of houses in the villages of Kampar Regency. The community has switched to not using the Malay house of Uma Kabuong Limo as a place to live, but buildings with new shapes, materials, and techniques. So, that many of Uma Kabuong Limo's Malay houses were damaged. Some of the reasons for the damage to the building of the Malay house in Uma Kabuong Limo, such as being unoccupied, the old building age, due to weather, and flooding.

This research is an identification of the damage to the building components of the Malay household Uma Kabuong Limo. The discussion will be carried out by grouping building materials based on structural aspects and architectural details. The results of this study can be used as a formulation of action for the restoration of the Malay house building in Uma Kabuong Limo. The government of Kampar Regency can take advantage of the proceeds of the research in preparing a program to maintain the Malay house building in Uma Kabuong Limo, which is in the tourist village of Pulau Belimbing, Kuok District.

2. Literature review

Settlement is defined as an individual-made formation of a natural process by providing support to live in and organize human life as individuals or groups [6]. Meanwhile, that there is socialization between individuals by introducing enforced norms and customs [7]. As an old village, Pulau Belimbing has a hierarchy of space through inter-ethnic levels and internal spaces of the tribe. Furthermore, stated that it equipped tribal settlements with supporting facilities and houses. Apart from functioning as a residence, a house is also a symbol and a reflection of the values of its owner [8]. Kampung Pulau Belimbing is an area with the category of Malay mainland Riau, so the building style includes Malay architecture [9].

As a construction that has attributes, it can be seen based on vernacular architecture. Vernacular architecture applies cultural and environmental elements that are manifested in architectural physical forms such as floor plans, structures, details, ornaments, etc. [10]. Vernacular’s architecture in all parts of the world has a similar type and puts forward specific local themes. The Malay house symbolizes the owner’s social status by providing better carvings and material quality [11]. The roof of traditional Malay houses not only reflects the origin of the residents but also their social and financial position. Malay house has been three physical components in the way of construction: that the house is in the form of a stage, gable shape, and roof finishing with gable-finials [12]. The Typology of traditional Malay houses is a home on stilts or a classed house and has high poles [13].

The Malay house of Uma Kabuong Limo is an old house with an average age of 80-100 years and has architectural characteristics so that this factor can be used as a cultural heritage building. Therefore, the buildings must be carefully based on the actions of cultural heritage buildings. The Indonesian government has regulated reserve cultural buildings in Law number 11 of 2010 concerning cultural heritage. Cultural heritage criteria such as being 50 years or more, representing a style period of at least 50 years, having special and scientific significance, and strengthening the national personality. Cultural heritage buildings need conservation, namely the entire process of maintaining a place to maintain its cultural significance [14]. The goal of conservation is to care for places of cultural heritage value [15]. There are seven levels of conservation, prevention, preservation, consolidation, restoration, rehabilitation, reproduction, and reconstruction. The action chosen in the Uma Kabuong Limo Malay house is restoration, restoring, and maintaining the original concept or finding the initial shape of the object. Restoration and re-integration of details and drawings are carried out based on archaeological evidence, original design, and authentic evidence.
3. Methodology
The research method is a descriptive qualitative analysis that involves theory, hypothesis, and subject determination. It is supported by data collection, processing, and analysis [16]. The research target used was the Malay house of Uma Kabuong Limo belonging to the Nurdin Abdullah family in Pulau Belimbing Village, Kuok District, Kampar Regency, Riau. Some of the reasons for choosing the building as an object, such as the construction is 80 years old, the house has all the components of a Malay building; the house is in an old village; the house is owned by Shiompulu (traditional elders), the house has been registered by the Riau Center for Settlement and Building Development Information Ministry of Public Works and Housing (see figure number 1). This research has 4 steps. First, collecting data is done by field observations, interviews, and secondary data publication. The collection was carried out using the synchronic reading technique, which is to find synchronization of empirical facts found in the field [17]. Secondly, creating a building simulation model through Building Information Modelling (Archicad Software). Third, the study carried out is to see the correlation between the conditions that should be simulated through the engineering model of Building Information Modeling with the phenomena/data obtained. Fourth, result of the research through comparison of the damage to house components analysis with literature. It based the percentage of damage to buildings on Permen PU No. 24 of 2018, while the calculation of damage is through comparison of modeling with facts found in the field. The research variable is characteristic of building and component building condition.

Figure 1. Location and Object Map of Uma Kabuong Limo Malay house.

4. Results and discussions

4.1. The characteristic of Uma Kabuong Limo
The Malay house of Uma Kabuong Limo is found on the island of central Sumatra, with the largest distribution center in Kampar Regency. It classified environmental characteristics as tropical climates. The characteristics of a tropical climate such as high humidity and rainfall, non-extreme weather changes, dry and rainy seasons, and so on. The building has a tropical character considering the orientation of the building, heat protection (sun shading) with lots of openings, and bright-colored materials [18]. The Malay house building in Uma Kabuong Limo responds to the tropical climate by applying a sloping roof, an overstock, a vent grid, living windows, and wood materials. The color used is the original wood color, which is dominated by light brown.
The Malay house building of Uma Kabuong Limo has different functions. 1st Kabuong called Serambi functioned as a room having 5 passageways (Lorong). Each hallway has guests. 2nd Kabuong is named Biliok which serves as the central area. The main bedroom is for the parents. The bedroom is outside connected to Tompek Kojo or the work area. 3rd Kabuong is called Biliok Pajie which functions
as a child's bedroom. 4th Kabuong functions as a circulation link between functions. 5th Kabuong is a Dapu that functions as a kitchen. This function illustrates the zoning in the area. The semi-public zone is located in 1st Kabuong, where there is an interaction between house owners and guests. Guests who may enter are recognized and important guests. The private zone is in 2nd Kabuong and 3rd Kabuong. Children may not enter Biliok / parents' room. Meanwhile, parents may enter the child's Biliok (room) limitedly. The semi-private zone is in Dapu (kitchen) or 5th Kabuong (see figure number 3). This space may be used by all homeowners for cooking and eating activities. The public zone is located in the floor's basement. This building has a stage structure so that the lower space serves as a public space. Activities in this room such as interacting with neighbors, welcoming unfamiliar guests, and wood storage space.

Malay house on stilts. The average building height of 1.5 Malay houses Uma Kabuong Limo is a construction typology of 2 m. On the front and back, on the left side of the building, there are stairs connected to the door. The number of steps is an odd number such as 5, 7, 9, and so on. The structural components of the Malay house Uma Kabuong Limo are divided from the lower structure in contact with the ground, the middle structure as a building frame, and the roof structure as a support for the roof and retaining storage space (Salang). The structure material is wood except for foundations. The stiffener of structural components did not use nails, but used a connection as knots, holes, and pegs. However, using nails in the roof structure. Uma Kabuong Limo is seen as a traditional Malay architecture on the aspects of the roof, materials, ornaments, this is following literature number 11.

### Table 1. The Structure Components of Uma Kabuong Limo

| Components                          | Description                                                                 | Figure |
|-------------------------------------|-----------------------------------------------------------------------------|--------|
| The lower structure uses a stone foundation | Supporting building loads and distributing loads to the ground | ![Image](image1.png) |
| The middle structure uses columns and beams. Material using wood | The building frame uses a beam and column bonding system. There are 2 types of beams, bonding beams between columns and retaining beams for wooden floors. | ![Image](image2.png) |
| The upper structure is a roof frame that uses wood material | The roof frame functions as a holder for the roof cover. The form of the roof that is often encountered is a saddle. | ![Image](image3.png) |

Architectural component materials use wood materials. Architectural components are found on walls, floors, ceilings, roof coverings, stairs, doors, windows, and carvings. The Malay house, the Malay house Uma Kabuong Limo, has carvings with various motifs such as Bees depending on the roof trim and Gasiong on the stairs. Carvings are a symbol of the homeowner’s social status, so the more carvings, the higher the owner's social status.
### Table 2. Architectural components of Uma Kabuong Limo

| Components       | Description                                                                                   | Figure |
|------------------|-----------------------------------------------------------------------------------------------|--------|
| Walls            | The wall as a building envelope uses wood planks. There are 2 types of patterns for the arrangement of the planks.  
1. The diagonal pattern is used on full walls with no windows  
2. The vertical pattern is used on the wall under the window. |        |
| Ceilings         | The ceiling uses wood planks. The pattern of the arrangement of the boards is in the direction of the width of the building. |        |
| Floor            | The floor uses wood planks. Arrangement pattern along the length of the building. The floor is installed above the floor beams, which are arranged in the direction of the width of the building. |        |
| Roof cover       | The roof cover uses zinc plate.                                                               |        |
| Door and window  | Doors and windows use wooden frames and are closed using wooden planks. Doors and windows have vents using a grid (jalousie). |        |
| Stairs           | The stair uses a wooden structure and a cover from wooden planks. The lower floor uses a pile of stones or cast cement. On the outside there are dividers and handles. |        |
4.2. Damage to Uma Kabuong Limo's Malay house

Damage to buildings is visible on all sides of the building. The heaviest damage occurred in Lorong 5 (kitchen) was damaged 100% or collapsed so that all components could not be used. Damage to buildings was found in structural and architectural components. The structural components of the damage were dominated by beams 57.14% and 37.5% floor beams, while columns were 30%. From the remaining damage to the columns and beams, Uma Kabuong Limo is a traditional Malay house following literature number 12 and 13 that a traditional Malay house is a house on stilts and has high pillars. Architectural damage is the biggest damage. The damage was to doors and windows 76.47%, roof coverings 60.10%, and floors 55.79%. The windows and doors of Uma Kabuong Limo have detailed arrangements of fields and carved ornaments so that it is in accordance literature number 10 that cultural elements are manifested in physical form in the form of ornaments and details. The damage can be seen from weathering due to wet (rain) and fungi. Meanwhile, the roof of the building experiences corrosion / rust. The percentage of total damage to all components of the Uma Kabuong Limo building is 55.14%. Based on the comparison between the Minister of Public Works Regulation No. 24 of 2018-part 3 page 17 with the fact that the building was mostly structural and non-structural, it required special maintenance for the Uma Kabuong Limo building.

![Figure 4. The original look of Uma Labuong Limo](image1)

![Figure 5. Computer model of Uma Kabuong Limo using Building Information Modelling (Archicad 24)](image2)

| Table 3. Analysis of damage to the elements of the Malay house of Uma Kabuong Limo |
|-------------------------------|-----------------|-----------------|-----------------|
| Num. | Building components | Amount | Damage amount | Percentage (%) |
|------|---------------------|--------|---------------|----------------|
| 1    | Foundation          | 20 pieces | 3 pieces | 15 |
| 2    | Columns             | 20 pieces | 6 pieces | 30 |
| 3    | Floor beams         | 16 pieces | 6 pieces | 37.5 |
| 4    | Wall beams          | 14 pieces | 8 pieces | 57.14 |
| 5    | Roof truss          | 24 pieces | 10 pieces | 41.66 |
| 6    | Wall                | 126,5 m² | 90,75 m² | 71.73 |
| 7    | Ceilings            | 72 m²   | 72 m² | 100 |
| 8    | Floor               | 72 m²   | 40.17 m² | 55.79 |
| 9    | Roof cover          | 86.4 m² | 51.93 m² | 60.10 |
| 10   | Door and window     | 34 pieces | 26 pieces | 76.47 |
| 11   | Stairs              | 2 pieces | 2 pieces | 100 |
| 12   | Curving             | 50.6 m | 8.3 pieces | 16.40 |
5. Conclusion
The Malay house of Uma Kabuong Limo is the original house of the mainland Malay people who are scattered in Kampar Regency. Unlike the Lontiok Malay house as a traditional house used by traditional elders and customary events, the Malay house Uma Kabuong Limo Malay house is a resident's house, so it has a unique form and construction structure. This building is said to be the Malay House of Uma Kabuong Limo because it has 5 volume sides with their respective functions. Materials use wood and stone. The building has spatial planning rules by dividing the zone into public, semi-public, private, and private zones. For the people of Pulau Belimbing, a house is not just a place to live but a symbol of social status so that it shows unique qualities and is equipped with a variety of carvings. This building is suitable for data collection and rehabilitation because it has architectural characteristics and knowledge, especially Malay. Changes in the times caused people to leave the Malay house. The Malay house of Uma Kabuong Limo so that many houses were found damaged or even destroyed. Based on the examination, it was found that there were defects in all aspects, structural components, and architectural components. Overall, the building suffered damage in all components so that it could be categorized as heavy damage.

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