RESEARCH ARTICLE

Adaptive Reuse Implementation in Public Facilities: From Residential Use to Community Health Centers

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Abstract

Bandung is Priangan Residency's capital, founded during the Dutch Colonial era. Dutch heritage buildings are easily recognizable because they have an architectural style with certain characteristics, notably, towers. After Indonesian independence, several empty residential buildings changed their function from private to public facilities for economic reasons, and some of the changes implemented the adaptive reuse concept. This paper aims to investigate the condition of former Dutch colonial buildings with towers and various changes made to them. The method chosen for this study is qualitative–descriptive research using observational themes, such as spatial zoning, building elements, and flow circulation. The study found that adaptive reuse succeeded in retaining original architectural features, such as the unique hexagonal tower and Greek-style pillars. Minor modifications, including partitions (e.g., in a dental clinic and laboratory), are a form of adapting to the health center's needs and balancing the significance and functionality of the building's heritage as a conservation practice. The research implies that adaptive reuse can ensure sustainability yet maintain heritage integrity. The findings contribute to practices in reusing historic buildings, particularly in efforts at urban conservation.

***Keywords**: Adaptive reuse, Adaptability, Ex-residential, Tower Building, Community health center*

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Introduction

Bandung, the capital of the Priangan Residency, was planned during the colonial period, in terms of the environmental arrangement and the buildings. Many ex-colonial buildings remain in several cities, especially in the city centers. This area is easy to recognize, from the layout of the buildings and the architectural style. The architectural style of the buildings in Bandung is known as Indische Architektur (Hadinoto, 2010), which combines a European architectural style with local Indonesian architecture. The ex-colonial buildings perform various functions, such as facilities and residential houses.

This study focuses on towered ex-colonial residential buildings, which have yet to be studied widely. Ex-colonial residential buildings are generally classified as class B or C cultural heritage buildings (Harastoeti, 2011), and there is a high likelihood of demolition. Residential buildings have several typologies, depending on their purpose and location. In the central area of Bandung, a typology of Dutch heritage buildings with residential functions can still be found. Some of these residential buildings have been repurposed as public facilities while retaining their status as heritage buildings. Several ex-residential buildings can be found easily through their architectural styles; one is a corner tower building located at a node in the city center. Heritage residential-type buildings are not easy to reuse because of

their spatial orientation, which is private and cannot accommodate public functions easily. However, there is a concept known as adaptive reuse, which falls under the criteria of conservation practices. A recent study on adaptive reuse highlighted vacant buildings as bringing environmental, social, and economic benefits (Owojori et al., 2021).

In this case, several other considerations, such as economic benefits, allow the adaptive reuse concept to be implemented. Repurposing abandoned buildings for public functions can minimize economic development factors in some countries. Before deciding to reuse a building, it is necessary to study its physical and historical characteristics, social and cultural values, and the condition of the building site to determine the potential for reuse (Ali Mustafa, 2022). Some buildings that have been repurposed from their original function to a new one try to adjust the zoning layout, building elements, and circulation flow.

According to Bandung City Regional Regulation, Number 19 of 2009, concerning the Management of Cultural Heritage Areas and Buildings, preservation or conservation includes any effort to extend the life of cultural heritage areas and buildings through protection and maintenance measures. One of the conservation efforts undertaken is to defend cultural heritage buildings so that they can be reused rather than demolished. Moreover, based on a principal component analysis of adaptive reuse, 33 factors are grouped into eight main components: sustainability, economics and finance, markets, change, location and environment, culture and public interest, legal and regulatory issues, and the physical condition of buildings (Tan et al., 2018).

In this case, the object of the study was an ex-residential building, which now functions as the Tamblong Community Health Center (CHC). This building faces a node at the intersection of four streets in the center of Bandung City and has a distinctive tower element at the corner facing the node. According to Owojori et al. (2021), successful adaptive reuse considers the building's heritage significance by including contemporary developments that guarantee long-term value.

The novelty of the research is that there is an urgent need to align cultural heritage preservation with modern functional requirements, especially for former colonial residential buildings in Bandung. Buildings originally designed for private use are now used for public functions due to their economic and social benefits. However, challenges arise in maintaining the authenticity and integrity of their architectural and cultural value amid adaptive reuse. This study focuses on evaluating this transformation—specifically, adjustments to zoning, building elements, and circulation flows—using the case of the Tamblong CHC. The aim is to balance cultural heritage conservation with contemporary urban demands, ensuring sustainability while preserving historical significance. This research can address the importance of setting public facilities in adaptive reuse and determining which building elements can still be reused without destroying their authenticity.

Literature Review

Colonial Architecture Style in Bandung, Indonesia

Hadinoto (1996) mentions that the colonial architectural style in Indonesia is divided into four development stages based on the political situation at the time: (1) the late sixteenth century (around the year 1800): Nederlands-Indië was still under the authority of the Vereenigde Oostindische Compagnie (VOC) trading company, so there was no clarity of any colonial architectural style; (2) around the year 1800 until 1902: After the VOC takeover, the Netherlands' economic standing increased. Therefore, the buildings were constructed somewhat pretentiously in a neo-

classic architectural style. This style was called “The Empire style,” i.e., colonial architecture adjusted to the local climate, environment, and material conditions.

During the 19th century, this architectural style evolved in Dutch people’s residences called landhuis and was developed all over the Dutch Indische colony. The primary characteristic was a symmetrical floor plan, on one level, with a shield-shaped roof; (3) around the year 1902 until 1920: Dutch liberals pressed for what they called “ethical politics” to be applied to the Dutch colonies. The Empire style was imposed and changed with modern architecture oriented to the Netherlands. The building layout was still symmetrical and surrounded by porches; (4) around the year 1920 until 1940: The renewal movement in architecture emerged in the Netherlands, spreading nationally and internationally, and later influenced colonial architecture in Indonesia.

Moreover, in 1940, Dutch architects appeared and found it necessary to give their design, local architecture, and climate a unique characteristic. There were two main streams: (1) The indische architectural style with traditional architectural sources; and (2) a modern architectural style adjusted to climate, technology, and local materials. Buildings in this era had more variations, were not symmetric, and had no porches surrounding the building. Shade elements were used over the doors or windows to shield against direct sunlight (Hadinoto, 2010)

Bandung is the capital of the West Java province and lies approximately 140 km southeast of Jakarta, the capital city of Indonesia. The city’s elevation is approximately 786 meter ASL, and mountains surround it. Because of the remote and challenging position, the Dutch army reached Bandung almost two centuries after they arrived in Indonesia in 1602 (Kunto, 1984). The first colonial buildings were built in the 1800s. Among them are the Post Office (1863) and the Gedung Pakuan (Governor’s residence), built between 1864 and 1867. The residential buildings were generally built in the early 19th century, simultaneously with the plan to move the capital of Dutch Indische rom Batavia (Jakarta) to Bandung (Voskuil, RPGA, 1996). Heritage buildings in Bandung City embody a cultural identity that needs to be preserved for posterity.

The Indonesian Local Government Regulation Number 19, 2009 concerning Area and Heritage Building Management mentioned five criteria in the determination of the subject: (1) historical value; (2) architectural value; (3) scientific value; (4) sociocultural value; and (5) the age of the building. The criteria above determine the Cultural Heritage Building classification (A, B, or C) related to the restoration provisions. Moreover, according to Alhojaly et al. (2022), heritage buildings are witness to previous civilizations and are essential in transmitting cultural identity through generations. In Indonesia, a cultural heritage building is declared an example of cultural heritage according to Article 5 Regulation Number 11, 2010. There are four criteria for determining cultural heritage: (1) aged 50 years or more; (2) representative of an architectural style timeline for 50 years or more; (3) having a special meaning in terms of history, science, education, religion, or culture; and (4) having cultural value in the affirmation of the national character. The building in this case study meets the criteria stated in the local regulations.

Adaptive Reuse and Authenticity

The National Trust defines adaptive reuse as converting a building to a use other than its original design (Murtagh & William, 1988). Moreover, a study using the semi-structured interview method in Malaysia found that the purpose of maintaining authenticity in adaptive reuse is to preserve the quality, design, materials, and setting of cultural heritage buildings (Mat Hasan et al., 2019). Various changes usually accompany adaptive reuse. In addition, James (2006) stated that adaptive

reuse involves modifying a building into something different and accommodating the intended function. According to Mat Hasan et al. (2019), the most important building elements affected by the adaptive reuse of heritage buildings are the roof, floor, doors and windows, internal partitions, walls, and façade. These modifications are usually followed by a significant physical transformation of the building.

In the premodern era, adaptive reuse was a process driven by public policy and the justification of the underlying theory. Moreover, these practice assessment and decision-making tools for heritage buildings are scarce and create challenges. The first step in developing a model is to identify the essential categories of challenges (Mehr & Wilkinson, 2021). According to Della Spina (2020), adaptive reuse can play a decisive role as an urban strategy capable of generating new economic, cultural, and social values.

Thus, the most successful adaptive reuse projects respect and maintain the heritage significance of a building and add new layers of value for the future (Aprilian & Widiastuti, 2021). This method can become a useful approach to preserving the old building as an example of cultural heritage because it can preserve the originality of the building.

Moreover, the adaptive reuse of a historic building should have minimal impact on the heritage significance of the building and its setting (Othman & Elsaay, 2018). Thus, this method does not destroy or change the physical building but rather, switches the function with a minor addition that interferes little with the original. Repurposing cultural heritage buildings with new parts is often carried out since many Dutch heritage buildings were originally residential and were abandoned by their owners after Indonesia's independence. The government has begun to record buildings with potential space for public functions, including the CHC.

According to Kwanda (2015), to achieve the principle of authenticity in conservation work, the actions taken must follow the principle of minimal intervention by preserving the original form, material, and substance. In addition, authenticity can be found in three areas (1) Historicity and substance; (2) Creativity and continuity of tradition; and (3) values and diversity of cultures and environmental systems (Ehteshami & Soltaninejad, 2020). In this study, adaptability and authenticity will be the main concepts used to dissect cases of cultural heritage buildings that have been repurposed as a different typology from their previous ones.

Community Health Center Building: Between Space Requirements and Circulation Patterns

The technical guidelines for buildings and infrastructure for health centers (Ministry of Health, 2013) state that a CHC is a technical implementation unit for the district or city health service, which is responsible for carrying out some of the healthcare tasks in a community. CHCs are divided into inpatient and noninpatient care based on the implementation capacity. In this case, the Tamblong CHC was included in the criteria for a non-inpatient health center. The spatial design of the CHC building is expected to be mindful of its function as a health service facility. Buildings must be organized according to the allotment of the location regulated in the regional spatial layout plan, the building layout plan, and the local city environment.

The layout of the spaces that accommodate the function of service activities in the design of the CHC building must be regulated by taking into account the zoning of the CHC as a health facility building, e.g.,:

1. Zoning based on the level of risk of disease transmission includes the separation of the clinic area and the waiting room for infectious patients from the clinic for midwifery, children, and older adults.

2. Zoning based on activity privacy is divided into public areas that have direct access to the environment outside the CHC, semi-public areas that are not directly related to the outside environment of the CHC, and private areas, namely, areas restricted to the CHC's visitors such as sterilization rooms and inpatient rooms;
3. Zoning based on services includes the room layout, which is regulated with consideration for ease of access, such as emergency rooms adjacent to the operation room and obstetrics and children's clinics adjacent to the delivery room.

Problems and State of the Art

An ex-colonial property, such as the Tamblong CHC, is valued highly since it is located in the city center. It can be bought and sold and can become a contested unit. In Indonesia, after independence, ex-colonial property such as buildings generally became state-owned assets. As assets of the holders of power at that time, most colonial residences were generally built on large plots, well-oriented, and surrounded by gardens, as in the case of the research objects, which included an ex-colonial residential building located on 1,700 m^2 of plots on a street corner in Bandung city center.

However, nowadays, only 880 m^2 of the building remains. This is because the courtyard on the left side of the building has changed ownership and has become a shop. The building on the left side differs from the buildings next to it in style and materials used. Likewise, the backyard was bought and used as a residence, a rental house, and a coffee shop. Vandalism is still a frequent occurrence in Indonesia, especially on ex-colonial land and buildings that are left empty and neglected. Apart from that, the city center area is developing rapidly with government offices and a busy commercial area, making land difficult to obtain and expensive.

Most of the ex-colonial buildings have been declared conservation buildings that are worth preserving. These buildings have a specific architectural style, shape, and structure and were built strategically in the city. Therefore, cases of the occupation and seizure of ex-colonial buildings often occur. If the government takes over a building, its existence is more secure because, generally, it will not be demolished or bought and sold. The conversion of functions is considered appropriate to maintain ex-colonial cultural heritage buildings, such as the former residence that was converted into a CHC in downtown Bandung.

Research Methodology and Case Study

Research Methodology

The methodology chosen to study the reuse of observed objects is a qualitative descriptive research method. The theory used arises from the notion of adaptive reuse in the last ten years and several supporting techniques in the field. This is based on the argument that adaptive reuse provides a more effective and efficient process of dealing with buildings than simple demolition (Ali Mustafa, 2022). The research procedures include the preparation stage and data collection, either of literature or sources that can be found in the field. Analysis by re-drawing the building objects will help the reader understand the observational case study better from visual illustrations. The step-by-step research phases can be seen in the following diagram (see Figure 1):

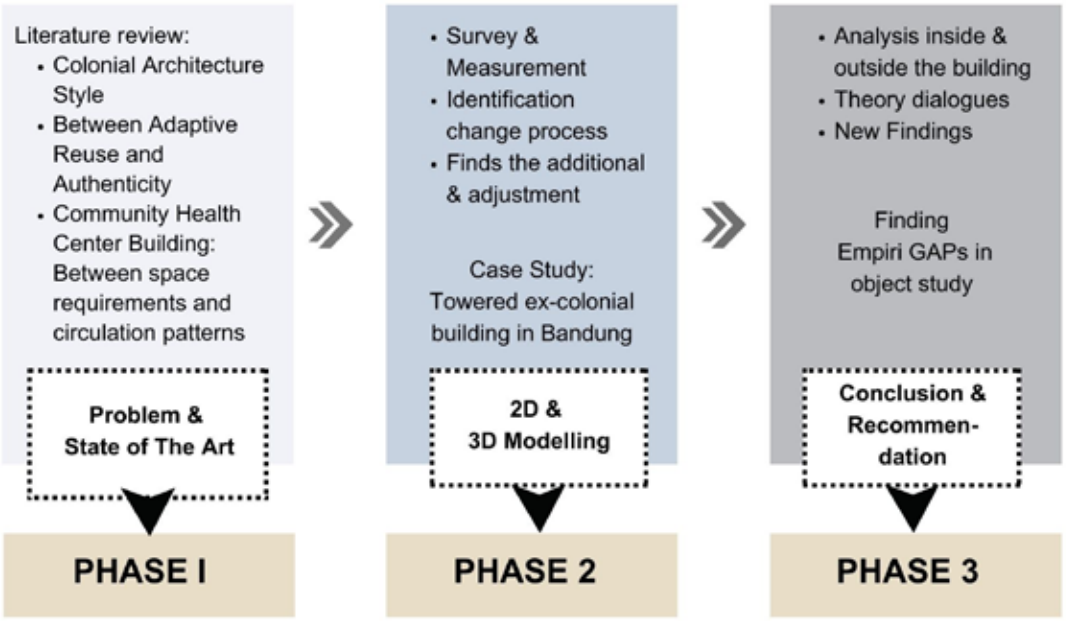


Figure 1. Research phase (Source: Authors, 2024)

Case Study

The research focuses on a towered colonial building in Bandung that now functions as a health center. Characteristically, tower buildings are often located at the corners of intersections. Their appearance is different from those around them and can thus define an identity (Lynch, 1960). Apart from that, according to Lynch (1960), tower buildings can also be a landmark in an area because they have distinctive characteristics, such as the former Nederlandsch Indische Escompto Maatschappij and Warenhuis De Vries buildings, which are located on Groote Post Weg, the oldest street in Bandung, which was founded in the early eighteenth century.

The tower of the Nederlandsch Indische Escompo building marks the location of the center of Bandung, to which the majority of visitors came from the direction of the capital of the Dutch East Indies (currently Jakarta). Likewise, Warenhuius De Vries was a supermarket that sold various necessities for Dutch people who lived on the tea plantations around Bandung. The tower on the east side of the building was made different and taller than the building itself so that it marks the location of the building from the east, the direction from which the tea plantation owners came (see Figure 2) below:

Figure 2. The single-type buildings—nonresidential: Mandiri Bank (previously Escampto Bank 1915), OCBC Bank (previously Warenhuis de Vries 1909) (Source: Wikipedia, 2024)

The other tower building is the Zeni (military office), which is the entrance to the military office area from the east. This building is located at the end of Java Street and faces east toward warehouses and army housing. The building tower faces northeast, so it is easy to recognize from where the Dutch people lived in the north.

Figure 3. The Salvation Army, 1894 (until present time), Kodam III Siliwangi–Zeni (military office until present time) (Source: Wikipedia, 2023)

The theory expressed by Lynch (1960) assessed the four examples of tower buildings, which show that tower buildings can become landmarks in an area and also become an identity. From the functional and visual aspects, the tower is a "focal point" at the corner of the street. This type of tower building is used for various functions, such as offices, banks, schools, hotels, and residential, and former colonial residential buildings with towers are scattered at several points in Bandung. The discourse on corner tower buildings is considered something new since this typology in Bandung has not been widely discussed in the latest scientific articles.

Results and Discussion

The object of this research is the ex-Dutch merchant's residence located at the node in the city center of Bandung. This building was developed around 1925 during the colonial period and is considered rare because it has a hexagonal tower at the front corner (see Figure 4). Only a few residential buildings with a hexagonal tower remains, and only a few are still used as residential properties. This building has been transformed into a public facility, which is different from its previous function, and still maintains its unique hexagonal tower.

The uniqueness of the hexagonal tower in this building is that it has two canopies at the top and the middle. The canopy at the top covers the air holes, while the canopy in the middle is under the ventilation (bouvenlight) and covers several windows. The roof covering of the tower is a shingle roof, which is different from the main building, which is a tile roof. This is because the angle of inclination of the two is different; the angle of the tower needs to be lower, and it is not possible to use roof tiles. The tower has facing in various directions according to the shape of the tower, allowing sunlight to enter and providing air circulation. At the bottom of the canopy, vertical windows follow the tower's various directions, as shown in Figure 4 below.

Figure 4: Previous (1930) and present front view, the hexagonal tower as a unique feature (Source: Wikipedia and Author, 2024)

The building is between Tamblong Street (Tamblong Weg) and Veteran Street (Boengsoe Weg). According to history, this building was initially confiscated by the Bandung City Government. From 1993, this residential building was used as a maternity clinic until 2008, when its function was changed to a CHC building. The building is approximately 362 m^2, with a plot area of 880 m^2, and according to preliminary records, the plot area was initially 1,700 m^2. In Bandung City, most ex-colonial buildings were transformed to provide commercial functions such as cafés, hotels, bistros, and boutiques (Soewarno & Duhita, 2019). As time passed, environmental conditions changed significantly. Development in the city center must continue; many tall buildings have been erected around it so the existence of these towered buildings is hardly noticeable, as shown in Table 1 below.

Table 1 Surroundings of the towered building (Source: Survey, 2024)

The outdoor environment around the building	
	
Previous condition	Present condition

The parameters to be observed in this study are spatial zoning, building elements, and circulation flows before and after reuse. The first building element that will be discussed is the existence of a tower, which is a characteristic of the building. The tower as the distinctive element of the building still exists, but its function has changed. Due to limited space, the octagonal floor plan currently serves as the administration space for the emergency room. The new additional room built facing the street is not prominent, having the same color, but blocks the entry of air and sunlight to some rooms at the rear, as seen in Figure 5.

Figure 5: The additional room blocks the entry of air and sunlight (source: Author, 2024)

The hexagonal tower and the Greek pillars on the front of the building reflect the Empire style influence (see Figure 8). The Tamblong CHC building was established from 1910 to 1920, transitioning from the Empire style to the modern architectural style oriented to the Netherlands. This transitional architectural style applies a symmetric layout with porches surrounding the building (Sumalyo, 1993). The symmetric floor plan divides private areas (bedrooms) in the south and the semipublic area (family room) in the north. In addition, porches appear in four places at the front and side (no. 1 and 5) and two porches at the rear parts (no. 6 and 10) as shown in Figure 6 below:

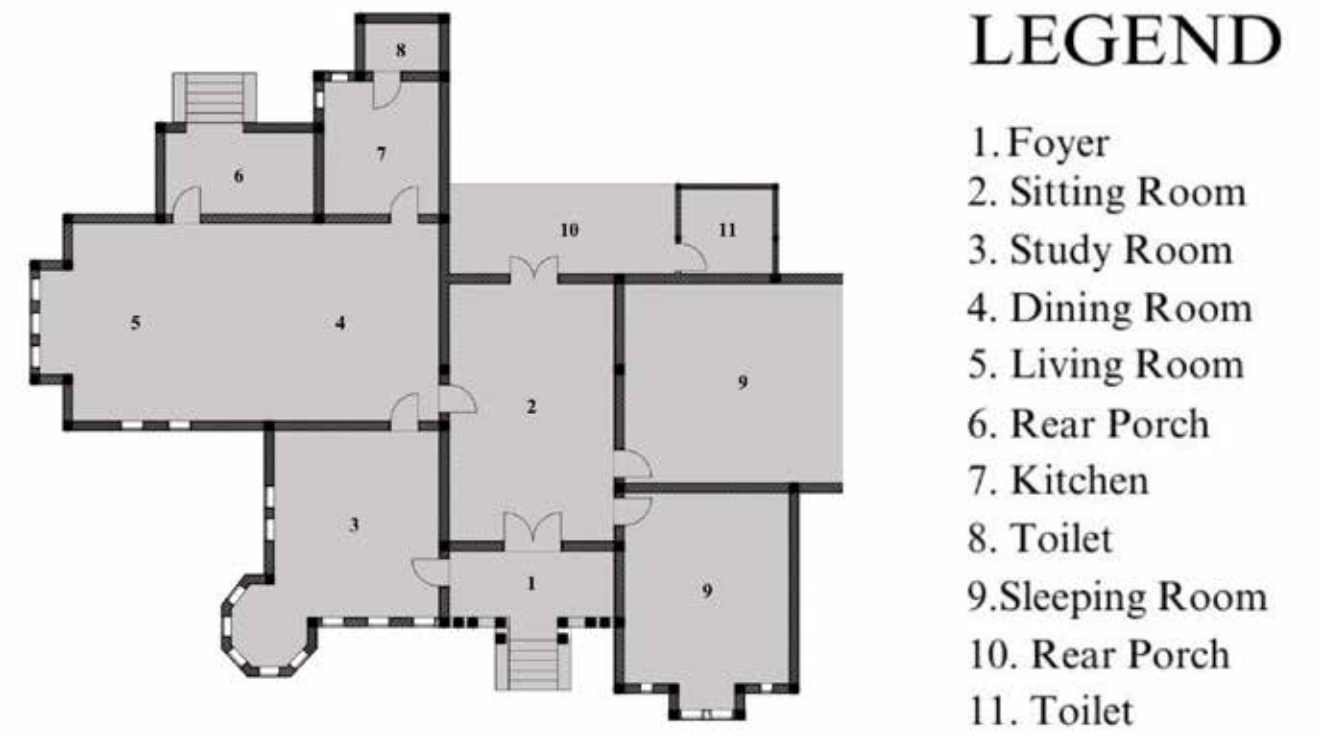


Figure 6: Previous Floor Plan (Source: Author, 2024)

Adapting the building for new use must abide by certain regulations and requirements that must be considered in the decision-making process before choosing a function for a heritage building (Alhojaly et al., 2022). In this case, an additional room on the right side and rear side is used as a dental clinic, laboratory, and public toilet (with purple color). An entrance to these rooms leads from the south side to simplify access and separate access from the emergency unit (as seen in Figure 7 below).

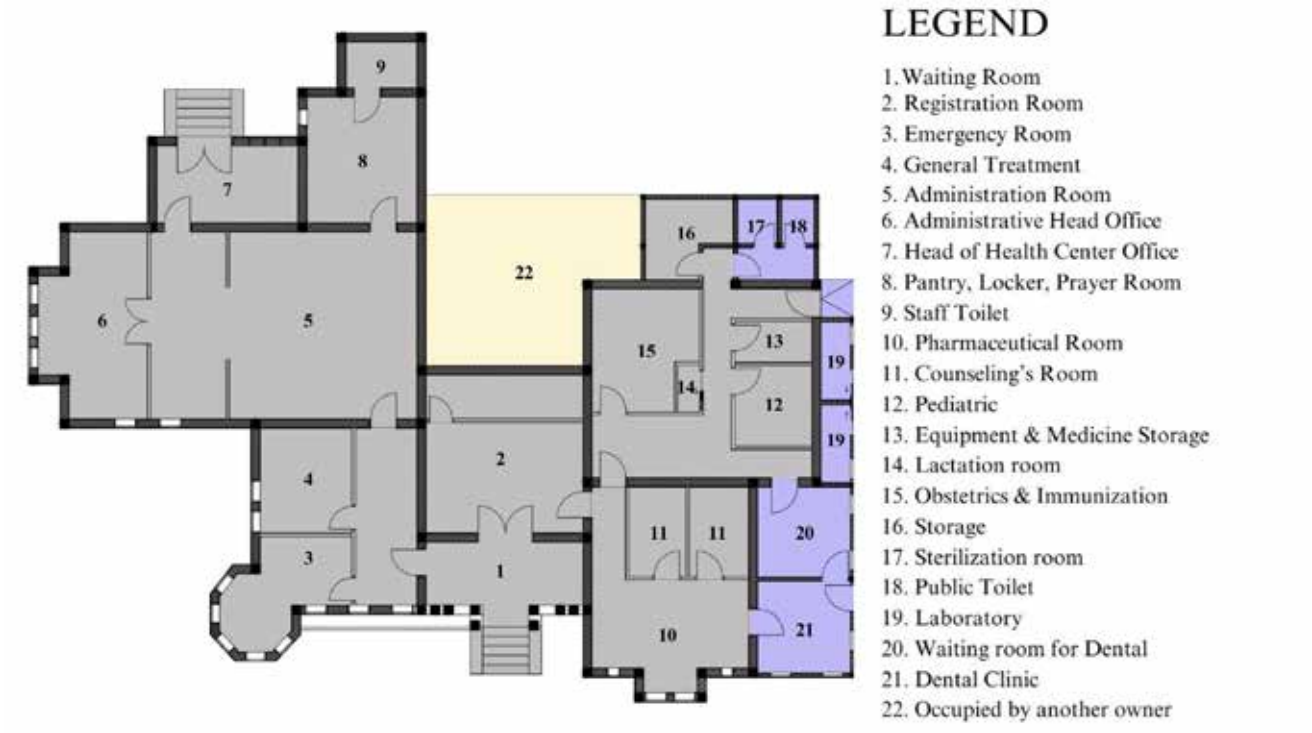


Figure 7: An additional building at the right and back (purple) used as a dental clinic, laboratory, and public toilet (Source: Author, 2024)

At the front porch, the adaptation to the new function can be seen in the addition of a trellis on the front windows for security. Apart from that, a non-permanent ramp was added for wheelchair and gurney access because this path is also used as an emergency exit (as seen in Figure 8 below).

Figure 8: The Greek pillars on the front porch and the additional installation of the trellis (Source: Author, 2024)

This condition is different from the two porches (side and rear numbers 6 and 7), which are no longer functioning. Another part of the building (number 10) is occupied by another owner and became part of the house at the back. Meanwhile, the other rear porch (number 7) is closed and used as the office of the head of the CHC. The door and the windows are permanently closed, but this room still receives morning sunlight from the east (see Figure 9). Apart from that, the doors and windows in rear porch number 7 are closed by a trellis for security because the backyard is occupied by another owner and used as a coffee shop.

Figure 9: Current rear porch condition (source: Survey, 2024)

Partitions dominate the room as a divider for urgent activities. The emergency room is located in the tower because it is close to the main entrance, and the circulation is conceptualized in a concentric radial manner, concentrating on the registration section. The clinic is distributed to the right of registration, and the emergency room is placed on the left to avoid crowding patients queuing to enter the available polyclinics. The sections that depict the left and right sides of the main entrance can be seen in Figure 10 below:

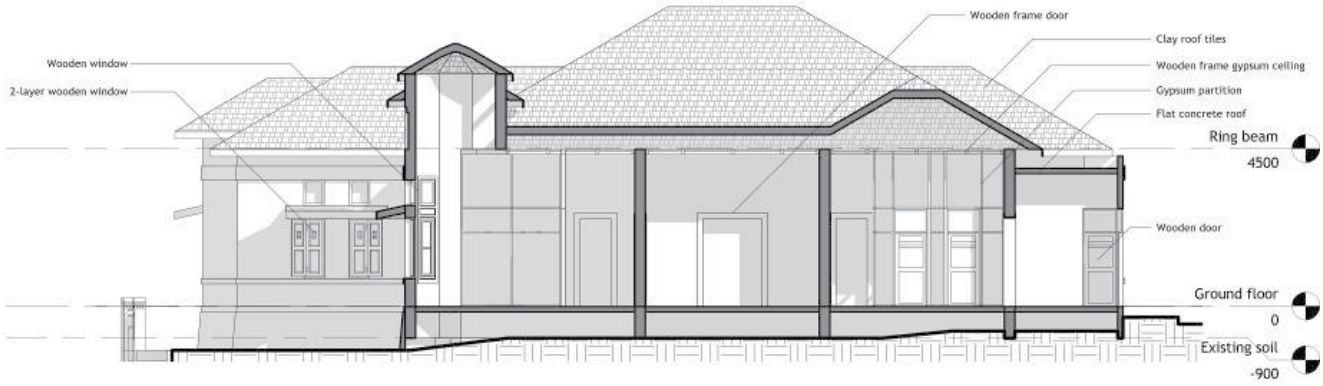
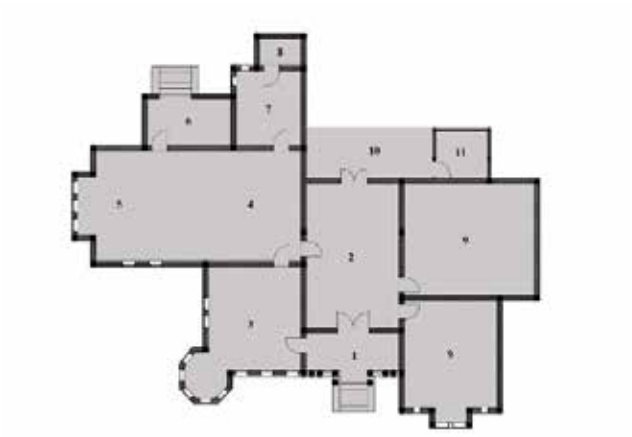


Figure 10. A section depicting the sequence in the CHC building (Source: Author, 2024)

Table 2 Changes to the building layout (Source: Survey, 2024)

Previous Condition	Present Condition
	

1	Foyer
2	Sitting room
3	Study room
4	Living & dining room
5	Side porch
6 & 10	Rear porch
7	Kitchen
8	Toilet
9	Sleeping room
11	Toilet

1	Waiting room
2	Registration room
3	Emergency room
4	General treatment
5	Administration room
6	Administrative head office
7	Head of the health center's office
8	Pantry, locker, and prayer room
9	Staff toilet
10	Pharmaceutical room
11	Counseling room
12	Pediatrics
13	Equipment and medicine storage
14	Lactation room
15	Obstetrics and immunization
16	Storage
17	Sterilization room
18	Public toilet
19	Laboratory
20	Waiting room for dental clinic
21	Dental clinic
22	Occupied by another owner

The building now provides various clinics, such as dental, pediatric, and obstetrics, equipped with an emergency unit, laboratory, pharmacy, and administration. The former residency building could not meet the needs of these "complex" rooms, so the former bedrooms and study rooms were eventually divided into smaller rooms using semi-permanent gypsum partitions. The overall changes in the building layout can be seen in Table 2 above. The implications of these actions are (1) they created a narrow alley (90 cm) as access to some rooms, which does not qualify as a public building; (2) nonpermanent access to the emergency unit for wheelchairs and gurneys; (3) the administration room used is also used as a passageway to another room (rooms 6,7,8, and 9); (4) room number 8 is more like a multifunction

room used as a pantry, locker room, prayer room, and passageway to the staff toilet; and (5) the front yard could be used as an overflow waiting room, as seen in Table 3. The other effects are poor air circulation and natural lighting, which necessitates the use of lights during activities (8 AM–4 PM). Additional gypsum partitions for dividing the room can be seen in Figure 11 below:

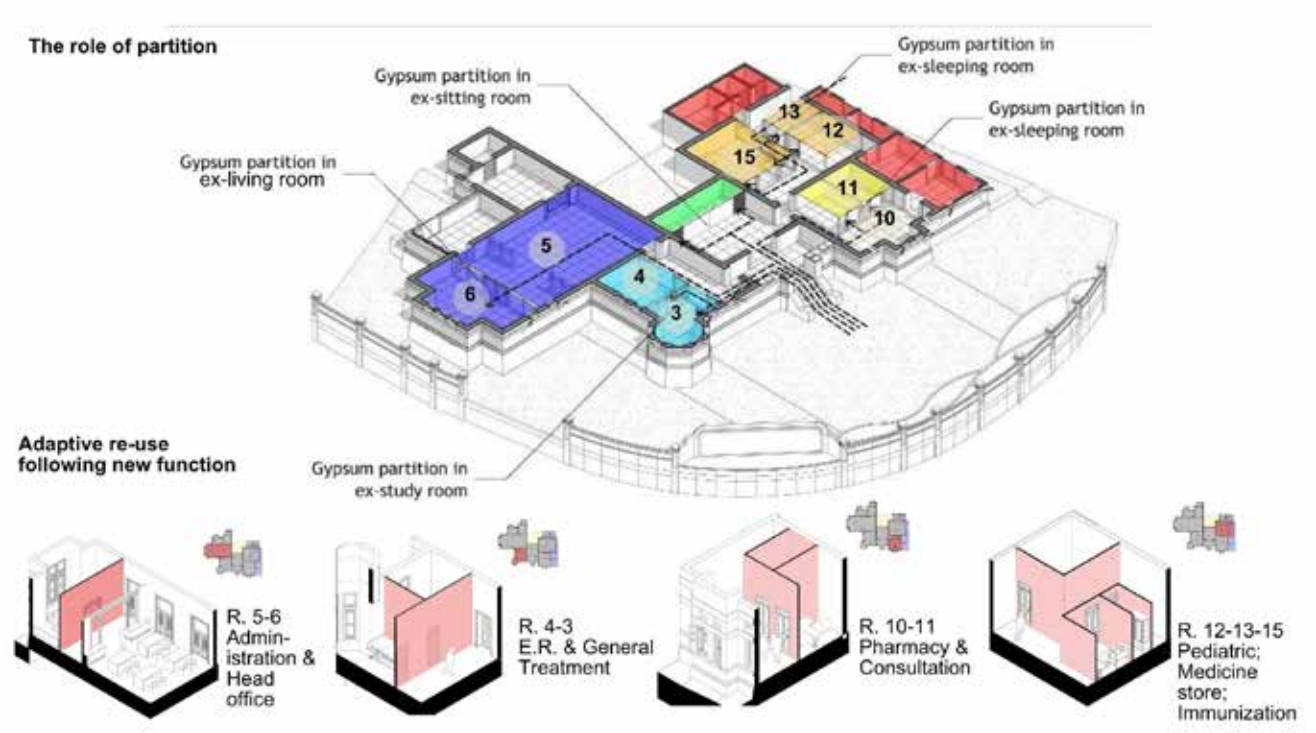
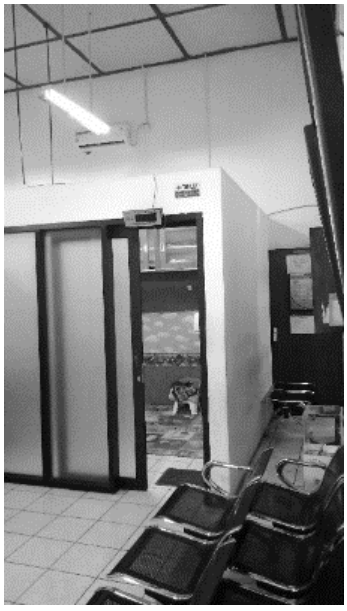


Figure 11. Additional partitions (Source: Author, 2024)

Table 3 Current room situation (Source: Author, 2024)

Adaptability in the spatial layout and flow circulation		
		
Narrow access to the lactation room (14)	**Narrow access to the general treatment room (4)**	**The multifunction room is used as a pantry, locker, prayer room, and access to the staff toilet (8)**

Adaptability in the spatial layout and flow circulation		
		
The living and dining room were transformed into the administrative head's office (4)	**The living and dining room was transformed into an administration room, which also accesses other rooms (5)**	**The dental clinic in the additional building (21)**
		
Narrow access to the immunization room (15)	**The front yard was used as a waiting room**	**The rear porch was transformed into the administrative head's office (6)**

Based on the survey, the Tamblong CHC has been declared a heritage building with an A classification (Harastoeti, 2011), which means it has fulfilled three criteria: historic value, architectural value, and the age of the building. Special treatment in renovation and maintenance is required. In this case, there are several changes, such as additions to the building and closing of the rear porch, with some consideration, such as (1) the additional building attached to the right side and rear of the building. This is considered not to violate the rule because the additional building was built lower and no more prominent than the main building and used the same color, which is white; (2) the additional building did not face the main street, which is Tamblong Street; and (3) closing the rear porch does not cause significant changes.

Similar previous studies using semi-structured interview methods in Malaysia have shown that the purpose of maintaining authenticity in adaptive use is to maintain the quality, design, materials, and layout of cultural heritage buildings (Mat Hasan et al., 2019). This study's findings align with previous studies conducted in other developing countries in Southeast Asia, where spatial planning is an important

consideration in adaptive use. Spatial planning of a private and public space zone is accompanied by circulation flows and building elements that follow their activities.

Conclusion

The results show that the addition of space does not interfere with changes in the physical form of the old building, so the goal of conserving cultural heritage buildings can be met. Implementing the adaptive reuse concept can maintain the sustainability of ex-colonial residential buildings as public facilities and thus be considered successful. The adjustment does not damage the original architectural style of the building; changes only occur in the layout zone, the addition of partitions, and circulation flow. Although there is a little discomfort in the indoor area due to the lack of proper division of space and circulation for doctors and patients, medical treatment activities can still run smoothly. Adaptive reuse is a concept that is considered appropriate to be applied to cultural heritage buildings as a conservation effort. Government intervention is needed so that the changes that occur do not damage or eliminate the authenticity or characteristics of the building but keep it comfortable and safe to use. The limitation of this study is that the discourses are only limited to the layout zoning and circulation flow in indoor installations. Further research can focus more on the percentage of changes in residential functions into public facilities, which can be presented as numerical tabulations and spatial syntax evidence.

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