

## STUDY ON ANCIENT MANSIONS (WALAWWAS) IN SRI LANKA

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### ABSTRACT

This paper investigates about the ancient mansions (walawwas) in Sri Lanka by using three mansions: Richmond Castle, Lakshman Jayakody Walawwa and Pattivila Walawwa as case studies. This study was carried out through field visits to the actual sites. The key features such as construction and supervision, wall thickness, thermal comfort, ventilation, and sustainable concepts and materials used in the ancient mansions are compared with those used in modern houses. This paper therefore provides some valuable information to the new generation as they could blend some of the inherent features of the ancient mansions when they make their own houses.

**Key words:** Wall thickness, Thermal comfort, Ventilation, Sustainability

### 1. INTRODUCTION

The history of Sri Lankan ancient mansions (walawwas) dates back to more than 2500 years. The ancient walawwas still have the ability to make people gaze at them with reverence. Ancient walawwas are considered to be archaeological gold mines because they are evidence to a very rich civilization. They also emphasize the knowledge and the awareness of the ancient builders in broad areas such as architecture, engineering and sustainability. These places in Sri Lanka represent the remnants of the country's ancient civilization, culture, traditions and philosophy.

These places are well endowed with ecologically rich scenic beauty and ancient Sri Lankan architectural monuments of traditional features. Sri Lanka possesses a rich cultural heritage spanning over 2500 years and enriched by various cultural influences from other countries, especially India. This paper elaborates much on Richmond Castle, Lakshman Jayakody Walawwa and Pattivila Walawwa in Sri Lanka.

Richmond Castle, built at the heart of Kalutara district, is considered as one of the most remarkable architectural works of the period. It was owned by a wealthy landowner turned patron, Padikara Mudali Nanayakkara Rajawasala Appuhamilage Don Arthur de Silva Wijesinghe Siriwardena. The Castle has attractive viewpoints at top of a hill, on a 42-acre estate beside the Kalutara-Palatota Road. Richmond Castle has a fascinating history. Built in 1896, it

is considered to be one of the most spectacular architectural works of the period. Richmond castle is a fusion of Indian and British architecture which was initially imitated from the plans of an Indian Maharaja's palace designed by a London architect. Figure 1 shows an arial view of the Richmond Castle Walawwa.



**Figure 1: Aerial view of the Richmond Castle**

Lakshman Jayakody Walawwa is another magnificent structure which is located in Diwlapitiya area. It was got to know from the residents that this walawwa is lot similar to a mansion situated on Panadura which has very similar resemblance. The unique structure of this mansion is very impressive and it has the ability to stand strong over the other glorious memorials of Sri Lanka. Figure 2 shows the front view of the Lakshman Jayakody Walawwa.

Pattivila Walawwa is slightly smaller than the other two mansions. It was got to know from the residents that the initial plan of this house was

drawn on the sand ground in front of the house, where the skilled builders during that time could convert it into a remarkable product as shown in Figure 3.



**Figure 2: Front view of the Lakshman Jayakody Walawwa**



**Figure 1: Front view of the Pattivila Walawwa**

In Sri Lanka there was a well-organized civilization thriving with vitality about five centuries before Christ. These mansions are a clear demonstration of the imagination, philosophy, architecture, engineering, sustainability, faith and culture of the Sri Lankans. Till date vestiges of this ancient civilization are in existence.

## 2. INHERITED FEATURES OF THE ANCIENT MANSIONS

### 2.1. Highly Skilled Builders and Supervision

At present, it is well known that architects and the engineers should provide detailed drawings to the builders including architectural plans, structural drawings, electrical layout, plumbing details, etc. prior to the construction. Even though all these supportive drawings are provided, it can be commonly seen that builders or masons unable to do a construction according a given plan. Additionally, now builders have access to sophisticated construction equipments and machinery with higher accuracy which were not in the past.

One of the common features of all the mansions used in this study is that they all lack a proper house plan, means that all the construction and supervision work were done by highly skilled builders during that time. This emphasizes the superior knowledge and the skills of our builders, who were capable of converting a drawing on the ground to a memorable creation. These creations are not only simple houses, they are giant mansions enriched with architecture, engineering and sustainability.

### 2.2. Walls and Thermal Comfort

Wall is an important component in a house as it forms the skin of a building. In modern houses different walls are used for internal and external usage. Usually, 150-225mm thick brick walls are used for external walls while 100-150mm walls are used for the internal and up-stair walls. The commonly used 225mm thick external walls in modern houses have 15 mm thick plaster either side of the walls. They can be used as load bearing walls without concrete framework. However, in modern houses it is tend to reduce the wall thickness as the concrete framework carries the vertical loads.

During this study, it was identified that there is an considerable difference between the walls in the ancient houses compared to modern houses. In ancient houses walls are used as load bearing walls, and hence are in high thickness compared to the walls in modern houses. Table 1 compares the wall thicknesses in the ancient houses used in this study.

**Table 1: Wall thicknesses in different mansions**

Mansion	External wall thickness	Internal wall thickness
Richmond castle (1896)	500mm	Ground- 450mm Up- 350mm
Lakshman Walawwa (1924)	400mm	Ground- 350 mm Up- 300mm
Pattivila Walawwa (1930)	270mm	Ground-240mm Up- 240mm

As seen in the modern houses, thinner walls are used for the internal and up-stair walls in ancient houses. It seems that ancient builders were also thought about the thermal comfort of the house as the thicker external walls could considerably cut the heat gain inside the building. This could be felt during the field visits where the inside temperature was too low than the outside temperature.

One of the inherent features of the internal walls in the Richmond castle was that some of the interior walls in upstairs were sound proof. A 5cm cement plastered wall on either sides having a vacuum with a width of 15cm in between 2 layers of wooden stripes made out of teak. Because of this design nothing on the inside can be hard to the outside when the room is seal tide.



Figure 4: Sound proof wall in Richmond Castle

### 2.3. Ventilation

Wind ventilation is a kind of passive ventilation that uses the force of the wind to pull air through the building. Almost all the historic buildings were ventilated naturally. Natural ventilation is an attractive as well as a sustainable method which reduces the energy cost while providing a better indoor environment. As natural ventilation is an advantage with the raising cost, many people tend to use natural ventilation. This concept of natural ventilation was initially developed by our ancestors, and it was passed over to the new generation.

#### Courtyards

Courtyard is one of the common concepts used in the ancient mansions to facilitate the natural ventilation. It could be seen in the mansions used for the present study as well. The approximate floor area used for the courtyard in the Lakshman Jayakodi Walawwa is about  $36.57\text{m}^2$  while that in the pattivilla Walawwa is about  $42.78\text{m}^2$ . It was clearly noticed that the doors and windows of these mansions are faced towards the courtyard. The plan views of the courtyards of the Pattivilla Walawwa and Lakshman Jayakodi Walawwa are shown in Figure 5 and 6 respectively.

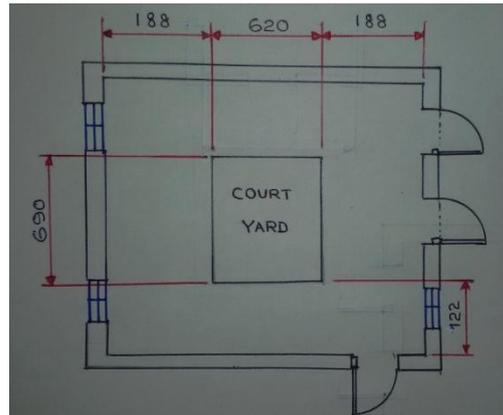


Figure 5: Court yard in Pattivilla Walawwa (dimensions in cm)

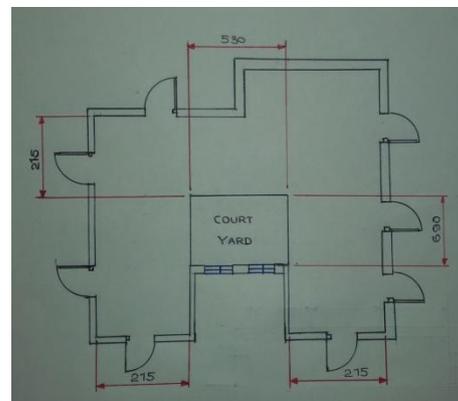


Figure 6: Court yard in Lakshman Jayakodi Walawwa (dimensions in cm)

#### Cross Ventilation

Cross ventilation is one of the most effective forms of wind ventilation. Windows (or openings) placed on opposite sides of building give natural breezes a pathway through the building and this is known as the cross-ventilation. The cross ventilation is more effective when at least two openings are placed in the adjacent walls or in the opposite walls. Placing openings across each other rather than directly opposite to each other causes the room's air to mix, better distributing the cool and fresh air in the room. This method was effectively used in these ancestral houses.

The dining room of the Pattivilla Walawwa, which is shown in Figure 7, is a perfect model to represent cross ventilation. The plan view of this dining room is shown in Figure 8. Through it is not the best idea to have many openings exactly opposite to each other, by using windows and doors; it was able to reduce number of stagnant corners. Not only this dining room, but most of

the rooms in this walawwa and Lakshman Jayakodi Walawwa were designed to use the natural ventilation effectively.



Figure 7: Dining room in the Pattivilla Walawwa

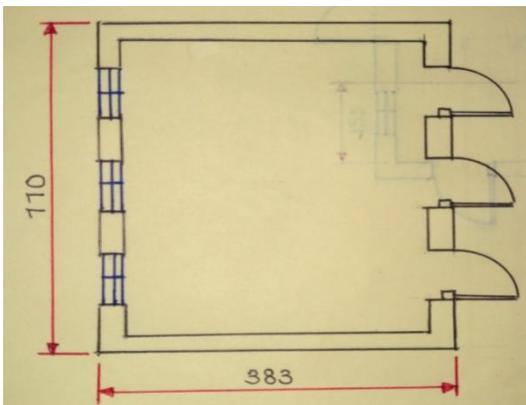


Figure 8: Plan view of the dining room in Pattivilla Walawwa (dimensions in cm)

#### Air Inlets at the Ground Level

A key feature that was seen in the Richmond castle Walawwa is its underground ventilation system that brings cool air into the mansion. This ventilation system harbors the cool air of the Kalu Ganga and directs it into the bouquet hall which of times performance arena for the entertainment foot of the Mudaliyer's guests. The underground ventilation system has an ingenious underground pathway that runs right through the foundation. This condition keeps the guest cool during warmer conditions.

The ventilation tunnel that was built in 1800 is still on operation bringing cool breeze in to the house. These small square type ventilation panels are seen all around the house just above the foundation as seen in Figure 9. Figure 10 shows the ventilation panel that opens to the bouquet hall. Similar ventilation system could also be seen in the Lakshman Jayakodi Walawwa as seen in Figure 11.



Figure 9: Air inlets at the ground level in the Richmond Castle Walawwa



Figure 10: Ventilation panel that opens to the bouquet hall in Richmond Castle Walawwa.



Figure 11: Air inlets at the ground level in the Lakshman Jayakodi Walawwa

In modern houses these air inlets are placed above the doors and windows. The concept of using air inlets at the ground level has a scientific background. Usually, the heated air has less density and they tend to rise up while much cooler air remains at a lower level. So comparatively, cool air can be taken into the house by using the openings at a lower level rather than using those at an upper level.

#### Large Doors and Windows

Large windows and doors provide the anchoring support to the ventilation system. The mansions which were built more than 80 years ago, characterized by large windows, doors and high floor heights providing greater ventilation than

modern houses. Usually the size of a single door used in a modern house is about 1.2-1.5m in width and about 2.0-2.4m in height. However, these ancient mansions have wider doors having a width even more than 2m.

Figure 12 shows the front door of the Lakshman Jayakody Walawwa which consists of four panels. The front door of the Pattivilla Walawwa is shown in Figure 13, while its dimensions are illustrated in Figure 14.



Figure 12: The front door of Lakshman Jayakody Walawwa



Figure 13: The front door of Pattivilla Walawwa.

A unique characteristic found in Lakshman Jayakody Walawwa was the small awning windows above every door in the upper story. As well as, many transoms were found in every door and windows. As explained earlier cooler air sinks lower while hot air rises, therefore designing openings down helps to push cooler air into the building, while locating the exhaust up helps to pull warmer air outside of the building. This strategy helps to maintain a cooler environment inside the walawwa.

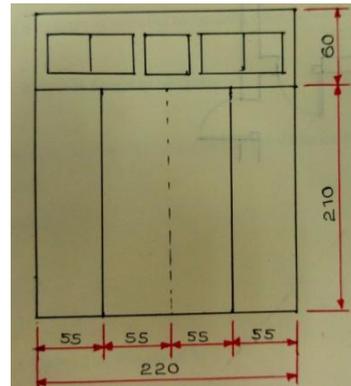


Figure 14: The front door dimensions of Pattivilla Walawwa (dimensions in cm)

### Larger Rooms

In modern houses usually the rooms are in a size of 3-5m in length and width, where the floor area can be around 10-18m<sup>2</sup>. However, in these ancient mansions comparatively larger rooms can be seen. For an example, Figure 15 shows the plan view of a bedroom in the Lakshman Jayakody Walawwa, where the floor area is even more than 30m<sup>2</sup>.

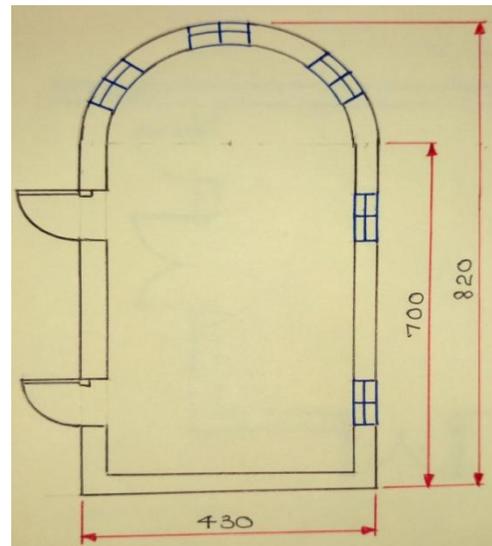


Figure 15: Dimensions of a room in Lakshman Jayakody Walawwa.

### Higher Floor height

As previously mentioned, most of the mansions were designed to have higher floor height to maintain a better ventilation system. The living room of the Pattivilla Walawwa was about 4.85m in height meanwhile in Lakshman Jayakody Walawwa the total height was around 4.5m. These floor heights are considerably higher than that used in modern a house, which is about 3m.

## 2.4. Materials

One of the common features in the ancient mansions is that the use of recyclable and sustainable materials such as wood and clay rather than using reinforced concrete and asbestos.

### Wooden columns and roof trusses

Richmond castle is an outstanding example that proves the engineering knowledge of our ancestors. The load bearing walls of this mansion consists of cement and bricks (moda gadol). Figure 16 illustrates a hall in this building where internal columns are made out of wood which are decorated with Embakka style carvings. The wooden roof trusses which are supported on the wooden columns hold weight of the roof.



Figure 16: Timber pillars in Richmond Castle.

### Staircase, Door & Window frames

According to the residents, essentials for the staircases, door & window frames were imported from “Burume” by ships, then dropped over to flow through the river and finally collected from the destination. Latter Sri Lankan carpenters, hand crafted these large teak woods in to marvels mask pieces. These are still seen in Richmond Castle Walawwa, Pattivilla Walawwa & Lakshman Jayakody Walawwa. Figure 17 shows the giant staircase used in the Richmond Castle Walawwa.



Figure 17: Giant staircase in the Richmond Castle Wallawa

### Slabs

The slabs of most of these mansions were made out of wooden planks supported on wooden rafters. Figure 18 shows the underside of the wooden slab used in Richmond Castle. Similar slabs were seen in both pattivila Walawwa and the & Lakshman Jayakody Walawwa.



Figure 18: Timber slab in Richmond Castle

### Roofs

All these ancient mansions use Calicut tile roofs. These clay tiles provide better thermal comfort than the asbestos which is the common roofing material in modern houses. On the other hand, clay is a more environmentally friendly material than asbestos. It was evident from Figures 1, 2 and 3 that Richmond Castle, Lakshman Jayakody Walawwa and Pattiwila Walawwa use Calicut tile roofs respectively.

## 3. SUMMARY AND CONCLUSION

This paper investigated about the three mansions in Sri Lanka: Richmond Castle Walawwa, Lakshman Jayakody Walawwa and Pattiwila Walawwa. It was evident that these mansions were built without having an architectural plan emphasizing the skills and ability of the ancient builders and the masons. All these ancient mansions use thicker walls compared to the walls in modern houses as those in ancient houses are designed as load bearing walls to carry vertical loads, and also to improve the thermal comfort. Natural ventilation was an inherent component in the ancient mansions where the use of courtyards, cross ventilation, use of air inlets at the ground level, larger doors and windows and higher floor heights are some of the common features that could be seen in all these mansions used in this study. The use of sustainable materials such as wood and clay tiles is also a common feature in the ancient mansions.