



PROGRAMME IN BUILDING SURVEYING
DEPARTMENT OF BUILT ENVIRONMENT AND TECHNOLOGY
FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING
UNIVERSITI TEKNOLOGI MARA
PERAK BRANCH
SERI ISKANDAR CAMPUS

**CASE STUDY: ARCHITECTURAL DESIGN AND DEFECTS OF
TRADITIONAL HOUSE OF DATO' MURSYID DIRAJA HAJI ABDUL
RAHMAN BIN ABDULLAH (SURAU)**

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PROGRAMME IN BUILDING SURVEYING
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This practical training report is fulfilment of the practical training course.

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INTRODUCTION

Students in selected programmes at all levels of higher education at the Institute of Higher Learning must do the industrial training. The curriculum was designed to empower industrial training competency necessary to raise the level of work of graduates. The Lead Implementer (LI) courses give students with hands-on learning experiences in the industry, allowing them to get valuable experience and enhance their skills.

Students will gain knowledge and experience in technological development, effective communication, collaborative methods, rules, procedures, and laws, as well as professional viewpoint and reporting. Students will gain passion and a proactive attitude because of this course, as well as increased confidence in their ability to coach effectively.

One of the requirements for the students of bachelor's degree in Building Surveying to complete the program is the students must finish the 16 weeks of Practical Training starting from 11 October 2021 and will be ended on 30 January 2022.

By doing this practical training, students can have a better understanding of organisational management, technology, design, real estate, building economics and financing, legislation, communications, project planning, and management. This course may also demonstrate the relationships between different experts and their activities in the construction industry, as well as integration and inter analysis and power.

This course also enables practical students to gain a better understanding of the green building concept, as well as more information about building services, elements, and materials used in the building chosen as a case study, and to gain a better understanding of the maintenance management programme that is implemented in their case study. In addition, students may learn more about the construction of the building, the design, features, and specs.

The goal of Industrial Training is to prepare students to real-world work experiences while also providing them with information gained via hands-on observation and job performance. Students will gain skills in work ethics, communication, management, and other areas because of their industrial training. Furthermore, this hands-on training programme enables students to connect academic knowledge to real-world applications in the industrial business. The following are the goals of industrial training:

- To allow students to gauge their interest in a particular profession before making long-term commitments.
- To improve their ability to apply theory to real-world circumstances.
- To learn skills and strategies that will help them advance in their jobs.
- Internships will develop a student's feeling of responsibility and help them develop solid work attitudes.
- Students will be exposed to a real-world work setting and will get experience drafting reports for technical works/projects.
- To develop the students' strength, teamwork spirit, and self-confidence.
- To strengthen student's abilities to think creatively and share their thoughts.

METHODOLOGY OF REPORT



Figure 1.1: Methodology of Report

CHAPTER 1

INTRODUCTION

1.1 COMPANY BACKGROUND

In this chapter, the information about building background of Kedah State Museum will be laid out following with the key plan, location plan, site plan, museum's logo, vision, mission, and their objective. The organizational chart of Kedah State Museum and Development unit will also being put under this chapter. The function of Kedah State Museum and is objectives also being discussed in here.

1.1.1 Building Background

The Kedah State Museum, originally known as the Kedah History Museum, was founded on February 3, 1957. YAB Tan Sri Tunku Ismail Bin Tunku Yahya, Chief Minister of Kedah, opened the museum on the ground floor of Balai Besar in Alor Setar. (Kedah, Muzium Negeri Kedah, 2021)

Then, the museum was transferred to its own building (next to the new museum building) on the Darul Aman Highway, Bakar Bata, on December 30, 1961, due to an increase in the quantity of collections. The Kedah History Museum was renamed the Kedah State Museum in July 1964.

Because of the positive public response, the State Government consented to construct the current structure in 1997. An exhibition hall, workshops, a library, and a mini theatre are all housed in the building.

Culture Hall, History Hall, Manuscript Hall, Textile Hall, Craft Arts Hall, and Language and Literature Corner are among the ten permanent display halls located in the museum. Apart from it, a lift, restaurant, parking lot, and public restrooms have been added to the facilities.



Figure 1.1.1.1: Kedah State Museum

Name	Kedah State Museum
Building Status	Museum
Height of building	30.5m
Address	Lembaga Muzium Negeri Kedah Darul Aman, Lebuhraya Darul Aman, Bakar Bata, 05100 Alor Setar, Kedah Darul Aman.
Contact	04-7331162
Operation time	Tuesday-Sunday 9.00 a.m. to 5.00 p.m. (except for Friday, temporarily closed between 12.30 p.m. to 2.30 p.m.)

Table 1.1: Building Property Information

1.1.2 Key Plan, Location Plan, and Site Plan

This chapter shows the key plan, location plan, and site plan of the Kedah State Museum located in Alor Setar, Kedah.

Key Plan

A key plan is a plan that show the location of the said development. According to Figure 1.1.2.1, it shown the key plan of the development of Kota Setar that locate the Kedah State Museum.

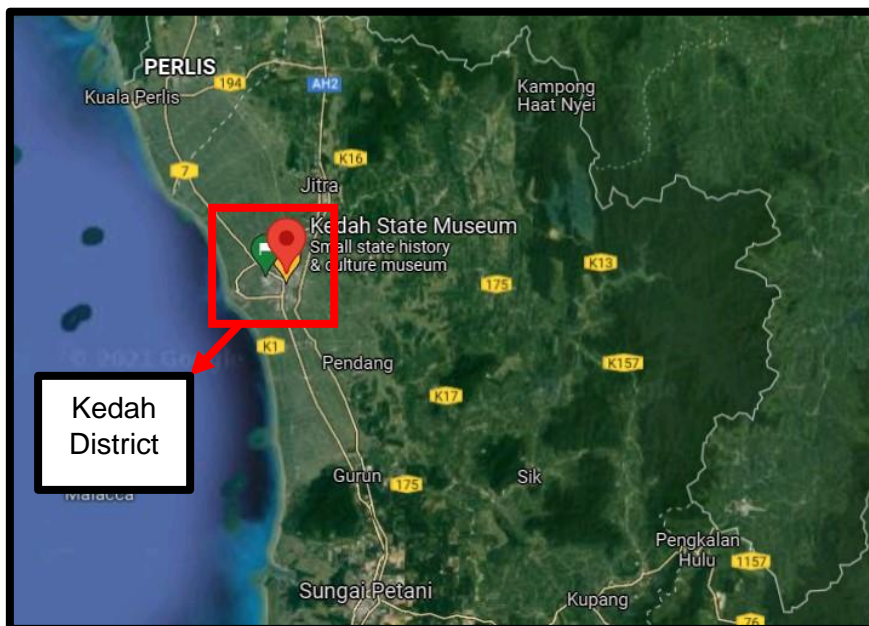


Figure 1.1.2.1: Key Plan

Site Plan

A site plan indicates the existing conditions for a given area where practically a land that has been modified. Figure 1.1.2.2 shows the site plan of the Kota Setar district that contain so many historical places in there including Kedah State Museum.



Figure 1.1.2.2: Area near Kedah State Museum

Location Plan

The definition of location plan is a map that show a metric scale of the chosen location, for instance, the Kedah State Museum as shown in Figure 1.1.2.3.



Figure 1.1.2.3: Location plan of Kedah State Museum

1.1.3 Logo



Figure 1.1.3.1: Logo of Kedah State Museum

1.1.4 Vision

To be Malaysia's foremost heritage material management agency

1.1.5 Mission

Identifying, collecting, investigating, conserving, and promoting historical, cultural, and natural elements of the State of Kedah in order to increase awareness and foster a sense of love for the state and country.

1.1.6 Objective of Kedah State Museum

- Administrate and coordinate the operations of the Museum, including the Kedah State Museum, Paddy Museum, Royal Museum, State Art Gallery, and Tunku Abdul Rahman Memorial, which are all under the administration of the Kedah Darul Aman State Museum Board.
- Collect, preserve, store, and systematically display antique goods and artefacts that have historical significance and the traditional culture of the state and Malaysia in general to preserve historical and cultural heritage.
- Make and engage in research in all areas of the state and natural culture surrounding it so that a description of the country's culture, tradition, and environment can be spread to the masses as knowledge, education, and incorporating national spirit and honour for the nation through publications and exhibitions. This also promotes deeper understanding among the people and contributes to national integration.

- Enforce the applicable legislation.
- To help the tourist business grow.

1.1.7 Function of Kedah State Museum Board

The Kedah State Museum Board is a statutory body under the Kedah State Government entrusted with safeguarding and preserving the history and legacy of the state of Kedah and Malaysia in general. Aside from that, the Kedah State Museum Board helps to ensure that Kedah's history and legacy are recognised across Malaysia, and eventually the whole globe.

(Kedah, Corporate Profile, 2021)

The Kedah State Museum Board also involves the community through a variety of events, exhibitions, and activities while also disseminating knowledge about Kedah's history and traditions. The Kedah State Museum Board is also active in initiatives created by the Kedah State Government to promote tourism and the history of the state of Kedah both inside and beyond the nation.

The Kedah State Museum Board always ensures and improves the quality of work in accordance with the current technological age to produce better productivity, as well as collaborate with other government agencies and private companies in elevating Kedah's history and heritage to the world stage and assisting the Kedah State Government in realising the slogan "Kedah Aman Makmur - Harapan Bersama Makmurkan Kedah."

1.1.8 Customer Charter of Kedah State Museum

In the following duties, we pledge to give efficient, high-quality, and courteous service:

Within three days, customer complaints are addressed.

PENCAPAIAN PIAGAM PELANGGAN 2021						
Bil	Perkhidmatan	Perkhidmatan yang menepati tempoh Masa/Standard Piagam Pelanggan Yang Ditetapkan		Perkhidmatan yang melebihi tempoh Masa/Standard Piagam Pelanggan Yang Ditetapkan		Pencapaian sehingga Sept 2021
		Jumlah	%	Jumlah	%	
1.	Aduan pelanggan dijawab dalam masa 3 hari.	2	100	-		2 aduan diterima. Semua aduan telah dijawab

Figure 1.1.8.1: Customer Charter Achievement in 2021

1.1.9 Organization Chart of The Museum Board

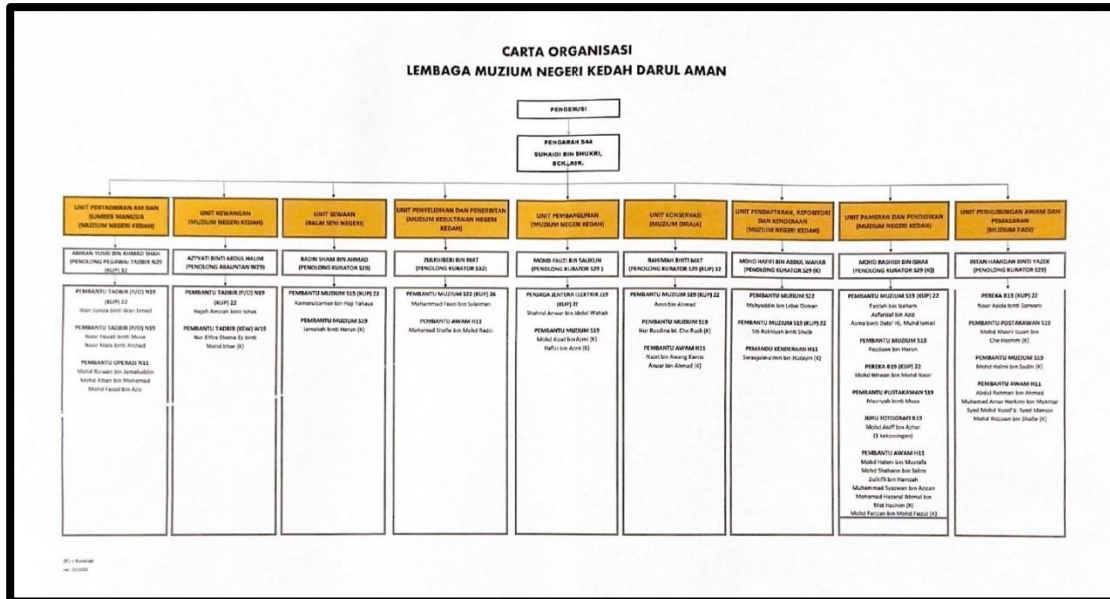


Figure 1.1.9.2: O Organization Chart of Kedah State Museum

1.2 ADJACENT BUILDING

There were lots of good places surrounding the Kedah State Museum which are restaurant located just beside the museum itself, Merdeka Park, food court, gas station, hotel, and shopping mall.


Name of buildings	Description
 <p style="text-align: center;">Figure 1.2.1: Museum Signature</p>	<ul style="list-style-type: none"> Darul Aman Highway, Alor Setar, Kedah <ul style="list-style-type: none"> 010-4403322 Museum Signature is a restaurant/ café that open starting from 3 p.m. until 11 p.m.
	<ul style="list-style-type: none"> Darul Aman Highway, Alor Setar, Kedah



Figure 1.2.2: Merdeka Park

- Merdeka Park is a city park Located near Darul Aman Stadium



Figure 1.2.3: Food Court Stadium Road

- Stadium Road, Darul Aman Highway
- Merdeka Food court Is a place where people and tourists came to enjoy various foods



Figure 1.2.4: Petronas gas station

- Darul Aman Highway, Lubok Peringgi Village, Alor Setar, Kedah
 - 04-7339512
- Petronas Gas Station is a gas station located in Alor Setar



Figure 1.2.5: Caltex Kanchut Road

- Darul Aman Highway, Lubok Peringgi Village, Alor Setar, Kedah
 - 04-7364747
- Caltex Kanchut Road is a gas station in Alor Setar



Figure 1.2.6: Hotel Seri Malaysia

- Jalan Stadium, Alor Setar, Kedah
 - 04-7308737
- Hotel Seri Malaysia is a 3-star hotel located in Alor Setar town



Figure 1.2.7: Aman Central

- Darul Aman Highway, Alor Setar, Kedah
 - 04-7352626
- Aman Central is a shopping centre in Alor Setar, Kedah

Table 1.2: Adjacent buildings near Kedah State Museum

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION TO CULTURE OF MALAYSIA



FIGURE 2.1.1: The Environment of Malay House

The cultural origins of people are constantly portrayed in vernacular architecture, which speaks for itself while also appreciating the connection. The region used to be always buzzing with people of many races. Houses were typically spread out in a defined zone surrounded by vegetation. Neighbours have a custom of visiting each other's homes, exchanging stories, and sometimes even having brief discussions.

For the people of the time, it was a way of life. There were a lot of houses near one another. Even though individual homes were dispersed across a large area, the way of life was open and there were no boundaries separating each family's space back then. Because they could see what was going on around them and there were no boundaries separating them, people became closer together.



FIGURE 2.1.2: Example of Malay Architecture House

From a structural aspect, the house is raised by several straight posts. As the state of the kitchen drainage system in traditional Malay houses improves, it becomes an addition to the sustenance of the adjacent plants. Some amenities, such as the well and the bathroom, are located outside the house, which is representative of Malay building style. The operation of the house is influenced by a few daily living habits.

For instance, the ventilated roof is sometimes implemented to dry dishes. Every feature in this design of a traditional Malay home helped to comprehend the people, especially those from the past who lived a basic lifestyle, making full use of the house's areas and fulfilling many or specific roles. It displays how the home is constructed in such a manner that each design feature is necessary and adds to the people's necessities as well as a certain culture or social component.

2.2 HISTORY OF MALAY ARCHITECTURE



FIGURE 2.2.1: Malay Architecture in Malay Traditional House

Malay vernacular architecture was developed by the Malay people in Malaysia, resulting in unique buildings that represent Malay culture. The traditional Malay homes can be used to trace the early history of basic constructions. When developing a house, the idea of public and private zones was not considered. Architectural elements such as doors and walls are unimportant to them. As a result, traditional Malay houses' spatial identity has been overlooked.

The most striking element of a typical Malay dwelling is the post-and-beam support system. The positioning of the pillar, the elevation of the floor level above the ground, and the use of wood in the building all helped to identify it. Elevated floor levels, gable roofs, and linear pillars are all common features in Southeast Asian architecture. This

depicts how Malay vernacular architecture highlights the Southeast Asian origins of architectural forms.

In terms of characteristics, components, and construction, the traditional Malay home has a similar history to that of other similar houses in Southeast Asian countries. Traditional Malay housing concepts may be seen in countries such as Thailand and Indonesia.



Figure 2.2.2: Basic Design of Malay Architecture

Traditional Malay houses are similar, though there are some differences depending on which states in Peninsular Malaysia. The introduction of new styles from countries such as Indonesia, Siam, Arab, British, Dutch, Portuguese, Southern Chinese, and others has influenced Malay vernacular architecture. During the 15th century, for example, several Chinese labourers arrived in Selangor, Perak, and Pahang to work.



Figure 2.2.3: Hardwood Used to Build the House



Figure 2.2.4: Nipa Palm Leaves Used to Create Atap Roof

Wood is the primary material used to construct traditional Malay home constructions, such as walls, doors, and windows. Most of the components are found in forests. Roof materials used at the time were Nipa palms, Nibong palms, and swamp palms. Some of these materials are also separated into sections for use as flooring.

Although some traditional Malay roofs utilize similar materials, corrugated iron has mostly supplanted the “Atap” roof. Furthermore, Malay homes have developed and altered to fit the tastes of the occupants. Consider the placement of furniture and the height of the walls. The basic layout of a Traditional Malay home, however, stays the same, for instance, Rumah Ibu, Rumah Dapur, Serambi, and Anjung.



Figure 2.2.5: Carvings & Ornamentation in Traditional Malay House

In the nineteenth century, wood carvings were employed to decorate traditional Malay dwellings in Malacca. In addition, art nouveau tiles were employed to cover the entrance door's stairwell. Traditional Malay residences in Malacca include a Chinese-inspired courtyard and tiled stairway, demonstrating the city's mixed background. Consequently, it influences carving patterns and is included into the ornamental design of a typical Malay home.

2.3 HISTORY OF RUMAH DATO' MURSYID DIRAJA ABDUL RAHMAN BIN ABDULLAH (SURAU)

Dato' Mursyid DiRaja Abdul Rahman bin Abdullah, also known as Haji Abdul Rahman Merbok, owns this surau. Originally, it was a traditional Malay home, but the owner has opted to teach the Al-Quran. As a result, the owner converts the Malay home into a surau. Because of his own knowledge in Islamic issues, the Sultan of Kedah bestowed the title 'Dato 'Mursyid DiRaja' on the building owner.

Workers began construction on this Malay house in 1939 and finished it in 1941. The home has been used to teach the al-Quran and religious texts since the residents first moved in in 1941. Until his death on November 1, 1986, the local community would frequently visit the residence to study religious studies. After a new house was built by his family, Dato Mursyid's house was given to the State Museum of Kedah in 1988.

2.4 THE CULTURE OF MALAY ARCHITECTURE

The typical Malay home displays the Malay culture's ingenuity and beauty while also meeting its economic, cultural, and environmental demands.



Figure 2.4.1: Surrounding Environment of Malay Traditional House

The traditional Malay house is enclosed in a small space with open spaces facing the front and plants surrounding it. A variety of fruit trees may be planted around the building's perimeter. A well is in the back enclosure of a typical Malay house and serves as a source of water, washing, and bathing.



Figure 2.4.2: The Joist That Supporting the Weight of The Building

Traditional Malay houses are built in a unique way that allows them to be easily erected and dismantled wherever and whenever they are needed. Traditional Malay homes are also distinguished by their height, which is characterised by a steeply sloping gable roof. "Atap", a lightweight and effective heat insulator made from palm tree leaves, is used to cover the roof of a traditional Malay home. The "Atap" roof cools the indoor regions during the day and night, and it may also release heat during the day. The roof also has "Tebar Layar", which keeps the roof from leaking during rainstorms while yet allowing for enough ventilation.



Figure 2.4.3: Base of The Column

The traditional Malay home also features pillars, which are the posts that support the entire structure as it rises from the ground. Malay houses were frequently constructed alongside streams. The objective of a raised floor structure is to reduce wetness around the home in this hot and humid tropical climate. It can avoid flash floods and provide ventilation through the cracked wood floors during the rainy season. Furthermore, the elevated floor arrangement protects traditional Malay buildings, particularly those located in the forest, from wild animal attacks.


All traditional Malay houses have at least two entrances. The front door faces the street, whereas the back entry faces the back. Male visitors generally utilise the main entrance. On the other side, the back entrance is for both ladies and children. Female visitors regularly enter the kitchen through the back door to engage in activities and group.

At the bottom of the staircase, most traditional Malay buildings feature stone or timber slabs. Visitors must remove their shoes and leave them here before entering the residence. Guests can wash their feet as they ascend the stairs using a clay water pitcher (tempayan) and a water gourd (gayong). This is to keep the insides of the building clean.

2.5 INTERIOR SPACES OF THE MALAY HOUSE

One of the most attractive qualities of a Malay house is its openness. Traditional Malay houses are divided into different segments rather than rooms. The most noticeable feature of a typical Malay home is the lack of partitions or complete ceiling-height walls that separate sections. Rather than creating a solid barrier, Malay people prefer to use cloth barriers to divide places.

In a typical Malay home, the spaces are divided into two categories:

Public Spaces	Description
 <p data-bbox="384 1648 671 1682">Figure 2.5.1: Anjung</p>	<ul data-bbox="927 1144 1385 1429" style="list-style-type: none"> • A covered porch that serves as a gathering place for people to relax. • The location where guests who pass by the owner's residence are greeted.
	<ul data-bbox="927 1704 1385 1937" style="list-style-type: none"> • Connects the front porch to the house's core. • A place where people mingle socially, and religious functions are performed.




 <p>Figure 2.5.2: Serambi</p>	<ul style="list-style-type: none"> • Non-family members occupy much of the space. • Has better air circulation.
<p>Private Spaces</p>	<p>Description</p>
 <p>Figure 2.5.3: Rumah Ibu</p>	<ul style="list-style-type: none"> • Located near to the Serambi. • The main area of a traditional Malay house, as well as one of the most holy and private spaces. • This is the location where people pray and rest.
 <p>Figure 2.5.4: Loteng</p>	<ul style="list-style-type: none"> • Found under the roof area, beneath the gables of Rumah Ibu.
	<ul style="list-style-type: none"> • A closed hallway that goes to the kitchen of a traditional Malay home, Rumah Dapur. • Located at the back of the courtyard and is mostly used by the women to collect and cook.



Figure 2.5.5: Rumah Dapur

- It also serves as a dining area for members of the family.



Figure 2.5.6: Pelantar

- It is a built-in utility in the Rumah Dapur and is made of wood.
- This is where the family prepares food, washes their clothing, and does their dishes.

Table 2.5.1: Two Spaces in Malay Traditional House

CHAPTER 3

**TRADITIONAL HOUSE OF DATO'
MURSYID DIRAJA HAJI ABDUL
RAHMAN BIN ABDULLAH (SURAU)**

3.1 ARCHITECTURE & DESIGN OF TRADITIONAL HOUSE OF DATO' MURSYID DIRAJA HAJI ABDUL RAHMAN BIN ABDULLAH (SURAU)

A study analysis of Traditional House of Dato' Mursyid DiRaja Haji Abdul Rahman Bin Abdullah (surau), from its location to its external and internal features. The functions and meanings ornamentation and details were also being discussed under this chapter.

3.1.1 Site Context

This Surau is one of the historic structures in the bustling city of Alor Setar, Kedah. It is located on the banks of the Kedah River, and on the same grounds as the Kedah State Museum. They face the Darul Aman Highway and are surrounded by suburbs.

NO. & NAMES	DETAILS
1. Name & address of the case study	<div data-bbox="596 842 1318 1384" data-label="Image"> </div> <p data-bbox="780 1402 1134 1435" style="text-align: center;">Figure 3.1.1.1: The Surau</p> <p data-bbox="533 1453 1382 1585">Name: Traditional House of Dato' Mursyid DiRaja Haji Abdul Rahman Bin Abdullah</p> <p data-bbox="533 1655 1382 1787">Address: Lembaga Muzium Negeri Kedah Darul Aman, Lebuhraya Darul Aman, Bakar Bata, 05100 Alor Setar, Kedah Darul Aman.</p>
2. Location plan & outbuilding	<ul style="list-style-type: none"> <li data-bbox="632 1809 1342 1843">• Boundaries of 10 m from Kedah State Museum

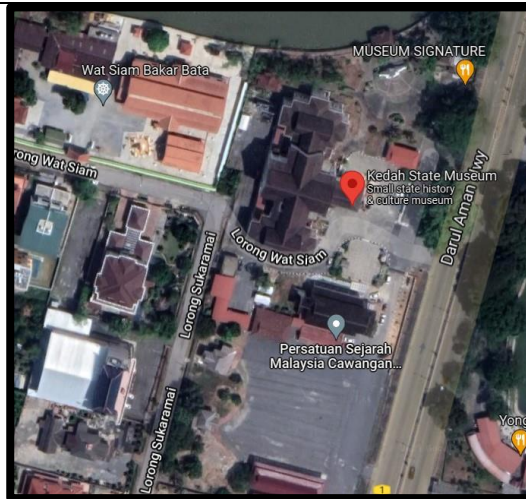


Figure 3.1.1.2: Location Plan of The Surau

Outbuilding

- **Malay Traditional House (Rumah Sungai Ular)**



Figure 3.1.1.3: Rumah Sungai Ular

This traditional Malay house was named Rumah Sungai Ular, Kulim. The owner of the house was Encik Saman Bin Saad. He gave the house to the Kedah State Museum on 19 September 1988 through the hands of the Tunku Abdul Jalil Bin Tunku Tajuddin, Kulim District Officer.

The house used to display tools and pictures that shows the lifestyle of the people from the past. Present day, the house is no

longer opened to public, but only open to students or any research study purposes. It is located next to the Surau.

- **Layang Emas Royal Ark (Bahtera DiRaja Layang Emas)**



Figure 3.1.1.4: The Royal Ark

Used for the ceremonies of the sultan and sultanah march and now being put and open for visitors to come and see at Kedah State Museum area. The distance from the Surau is 50 meters.

- **Wat Siam Bakar Bata (Wat Samosornrajanukpradit)**



Figure 3.1.1.5: Wat Siam Bakar Bata

Wat Samosornrajanukpradit is a Thai Buddhist temple located in the Alor Setar suburb of Bakar Bata, by the banks of Sungai

	Kedah, behind the Kedah State Museum. The distance from the Surau is 80 meters.
4. No of storey	• One-storey (Raised House)

3.1.1.1: General Information About the Case Study

3.1.2 Landscape

The grounds of the house are heavily shaded by trees and covered with plants and vegetation. As a result, the environment in the house becomes cooler. A traditional Malay home's setting, which is close to nature and surrounded by greenery, absorbs a lot of light, and so decreases light.



Figure 3.1.2.1: Mango Tree Besides the Surau

One of the most important components in building a connection between plants and people is food. As a result, the Malay population's sole reason for planting is a need for food. Considering the Malay community culture, which seldom buys essential goods for kitchen needs, the planting of food-producing trees has become a fundamental necessity for every home. In the bulk of their food cuisines, Malays use fresh materials from their nearby surroundings.



Figure 3.1.2.2: Banana Tree Planted Near the Surau

3.1.3 Orientation of The Building

Houses in the village are frequently organised in an adaptable manner, which refers to everything that is unplanned, natural, without evident polars, and does not need expert aid. People have always chosen their home's location based on their religious beliefs. They used to rely on local carpenters and healers to assist them find the finest location for their home, and perhaps still do.

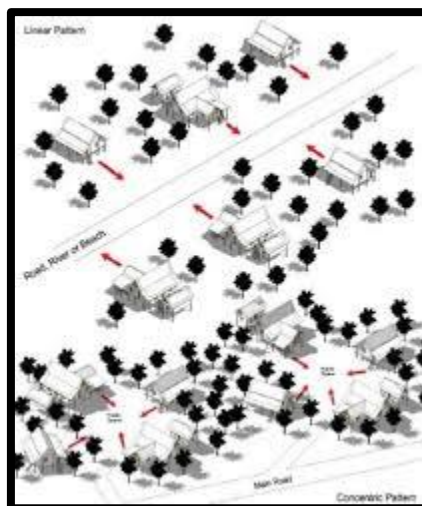


Figure 3.1.3.1: Orientation of Houses in The Village

Once the village has evolved into a major community, modern infrastructures, facilities, and utilities are installed. These infrastructures and services will soon

determine where homes will be constructed. The village was suitable for social activities because of its open atmosphere, and irregular structure.

For the Surau, it is oriented at the southeast, with the main entrance facing a big parking area. The parking area used to be a field with trees before it was tarred. Because Surau is a holy place, one portion of the Surau facing the Qibla makes it easier for people to come for prayers.

3.2 DESIGN CONCEPT

The major portion of vernacular homes is constructed with a strong sense of environmental awareness and respect. Because people had to rely on nature for the bulk of their supplies, most traditional civilizations had a thorough awareness of nature's ways and the ecological balance. All their food, medicine, building, and household goods came from the natural environment. Our Malay home's climatic design represents the natural approach we use in our Malay home.

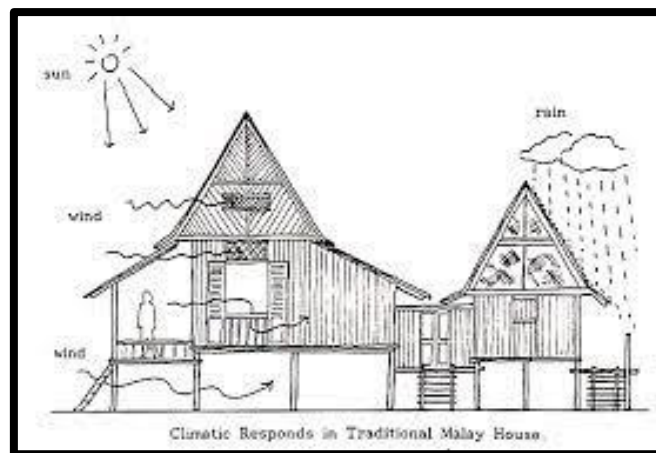


Figure 3.1.3.1: Thermal Diagram

The thatched roof with massive overhangs effectively moderate solar exposure. The large overhangs provide great heat and rain protection. It also allows the windows to be left open for fresh air for most of the time, even during storms, because rain will not get inside.



Figure 3.1.3.2: Ventilation on the Window

The building's many gaps in its windows, ventilation grilles, and panels, as well as its open interior with minimal walls, for example, allow for unrestricted air flow and a substantially cooler internal environment. Both structures are made of wood, and the roof is made of leaves to keep the heat in. Their interiors are similarly spacious, with only a few minor dividers dividing them. The tops of both buildings have carved floral designs to help regulate the passage of light and allow optimal ventilation.

The compound of the residence is also commonly overrun with vegetation. The residence is kept cooler because the trees and plants are not collecting and storing heat from solar radiation and then releasing it into the surroundings. Glare is decreased in these dwellings by eliminating open sky and bright areas from the visual field. The windows are shaded by the vast overhangs, which reduce glare from the open sky. The traditional Malay home primarily relies on ventilation and solar radiation control devices to offer climatic comfort for the dwelling.

3.3 SURAU

Surau's exterior, which includes doors, windows, a staircase, an attap roof, an outer wall constructed of timber boards, a foundation wall, and stumps, is evocative of a typical Kedah home. For example, the Kedah Traditional House shows the purity of material utilisation and indigenous architectural concept.

3.3.1 East Side

From the east side of the Surau, the main staircase, windows, vertical repeating wood planks wall, and building columns were visible. It also shows the wudhu area, where people (especially Muslims) wash their faces, hands, and feet before entering a mosque to worship. The horizontal element of the gable roof is depicted in the surau.

3.3.2 South Side

The house's ventilation characteristics are highlighted by the transom windows on the south side. From a human perspective, it illustrates the simplicity of the house and the extended roof on the front side, as well as the apparent roof support system.

3.3.3 West Side

On the west side of the structure, the extended space at the back, as well as the back side of the surau, are visible. The previously concealed gable roof is also visible from the front. It also appears to be cross planned, owing to the increased wing regions on both sides.

3.3.4 North Side

At this side, it has a stairwell leading to another chamber within the structure. The concrete beneath the stairs and columns kept termites at bay. The transom windows, the entrance, and ventilation are all identical to those on the house's south side.



Figure 3.3.4.2: Carving Detail

The carvings at the entrances and on the wall panels of a typical Malay home also operate as shade devices, controlling and filtering the negative effects. The amount of light in an interior space is critical because it must be sufficient to execute the task at hand; otherwise, an excessive amount of light may be ineffective and waste energy. Carvings at the entrances separate vast brilliant areas into little light holes while yet letting sufficient light into the interiors.



Figure 3.3.4.3: The Interior Details

Surau had a huge room with plenty of light flowing in through the 'open-ceiling' and all the holes, as well as ventilation provided by the openable windows. It provides a spiritual and open environment in which people are free to come in and pray, as well as a peaceful setting where they can hear the wind blowing and birds chirping.

3.4 ORNAMENTATIONS AND DETAILS

3.4.1 Ornaments



Figure 3.4.1.1: Carving on The Staircase

Floral motifs are among Malay woodcarvings' most popular decorative designs. According to the survey, floral patterns of various plants with components such as flowers, flower buds, leaves, tendrils, fruits, and shoots were the popular design pattern employed in Malay house carvings. To create a single complete sculpture, they were assembled in a difficult and detailed method.

3.4.2 Doors



Figure 3.4.2.1: Design of Doorknob

The most significant characteristics for ventilation are windows and doors. Malay homes include multiple full-length openable windows and doors at body level to allow for cross ventilation. The door is constructed composed of two boards that generally open inwards; outward-opening doors are rare. Sliding doors are a type of door that may be found in various residences. These doors may still be found in certain Kutai houses in Perak. On the doors of traditional houses, bolts or crossbars were used, whereas locks or padlocks are used in modern Limas homes.

In addition to the doors that lead out of the house, there are internal doors such as room doors, verandah doors, and doors that separate rooms in the main house from the hallway and kitchen.

3.4.3 Windows



Figure 3.4.3.1: Double Casement Windows

Traditional Malay homes include windows with different opening widths and flexibility to respond to different microclimates, especially sunlight intensity and distribution. Due to the dense cloud cover, daylight dispersion is uneven and fluctuates constantly.

Latticework covers the bulk of the windows. The windows are made up of two outward-opening shutters. In certain cases, the window shutters extend all the way to the floor, and the entryway is partially latticed. There are a few non-latticed window openings as well. The windows, like the doors, have uprights or pedestals, which are made of wood. Fillets serve as wall decoration and link the uprights.

3.4.4 Roof

Depending on the design of traditional Malay dwelling, some appear to have complicated woodcarvings such as “Tebar Layar”, which allows air to circulate through the roof region. The sunbeam design is used on traditional home gable screens to signify the start and end of the day.



Figure 3.4.4.1: “Tebar Layar” Design

The modest walls and exposed stilts at the bottom of the house are dwarfed by the massive roof. Roofs of varied sizes and orientations contrast (two elements viewed or placed close together with contrasting impact) to create an attractive visual form.

3.4.2 Decorations

The decoration also appeals to the user's or visitor's eyes, since it was inspired by local flowers and curved shapes, demonstrating Malay's individuality and ingenuity in crafts. It demonstrates uniformity and generates visual appeal through the design of the ornamentation, which demonstrates repetition and pattern.



Figure 3.4.2.1: Floral Carving

The motif of a specific plant with its numerous features represents the natural growth and flow of life in a live plant. This demonstrates that the art form reflects the craftsman's perception of natural beauty. In carving compositions, plants like ketumbit, ketam guri, bayam pereaksi (all weeds prevalent in-house yards) and kekacang (climbing legume) are usually employed as focal points.

Aside from that, there are aesthetic elements that are specifically designed to allow air to flow into the interior of the house. It shows the ventilation pathways from openings as well as other architectural components to provide thermal comfort.




Figure 3.4.2.2: Window's Ventilation

Cut out carvings are widely used on gables, timber panels above doors or windows, and wind holes at upper levels of partition to ensure proper ventilation and airy interiors. It is worth mentioning that the decorations are not only for show; they're also aids for generating a calm and relaxing atmosphere.

3.5 BUILDING MATERIALS

The average Malaysian home is essentially a timber structure built off the ground by local carpenters or the owners themselves using the post-and-beam method. Each hierarchy employs a different type of wood to distinguish their social ranks.

	Description
 <p data-bbox="352 1977 636 2011">Figure 3.5.1: Timber</p>	<ul data-bbox="906 1556 1390 1892" style="list-style-type: none"> • They usually use kayu jati, chengal and jelutong to build the Malay traditional houses, because it can last for many years. • A good heat insulator that helps to keep the interior at optimum temperatures.




	<ul style="list-style-type: none"> • Easy to work with as most of the ornaments and detailing are directly carved and shaped onto it.
 <p>Figure 3.5.2: Post & Lintel</p>	<ul style="list-style-type: none"> • The crossbeams for the floor are mortised into the posts and secured with wood wedges. • Malay carpenters designed a number of connections to allow the house to be built in stages and then dismantled and reassembled elsewhere.
 <p>Figure 3.5.3: Wall</p>	<ul style="list-style-type: none"> • The wallboards can be arranged vertically, diagonally, horizontally, or in any combination. • The outer walls are lined with rows of shuttered openings made of solid wood panels or wooden louvres. • Carved or latticed panels above and below the windows and doorways let air and light into the Malay dwelling.
 <p>Figure 3.5.4: Roof Structure</p>	<ul style="list-style-type: none"> • The rafters may vary depending on the building's depth, but the building's scale has no bearing on the load on any part, so each structure does not need to be dimensioned separately.
	<ul style="list-style-type: none"> • The steps are frequently connected to the "Serambi" area



Figure 3.5.5: Staircase

directly in front of the home (porch or verandah).

- There may be other stairwells towards the back of the home.
- The stairs will be made of wood and tiled with a gorgeous "ukiran" or brick structure.



Figure 3.5.6: Atap Rumbia

- Atap Rumbia is a sort of atap, which is a building material made from the leaves of the pokok Rumbia tree.

- Atap Rumbia is often composed of 'tulang,' which is formed of pokok Buluh folded in Rumbia leaves to make a 'sayap' and sewed with rattan or the surface of pokok Bemban to keep it tight.



Figure 3.5.7: Concrete

- It may be found on the exposed foundation and at the foot of the stairwell.

Table 3.5.1: Building Materials of the Surau

CHAPTER 4

BUILDING DEFECTS

4.1 ANALYSIS OF DEFECTS

Building defects is referred to as a construction flaw. It frequently results in an incomplete building that is less helpful than it was before. These defects include broken windows, missing decorations, and other problems. These defects are more likely to appear spontaneously after a structure has been standing for decades. Many faults, on the other hand, may usually be fixed to restore a component's full functionality.

4.1.1 Timber Defects



Figure 4.1.1.1: Timber Defect

Even though every effort has been made to maintain these two structures, certain flaws are unavoidable throughout the preservation phase. Construction material flaws are an example of such flaws. Because most of the wood used for both structures came from the original construction, it's only natural that their durability and texture have altered. These chunks of wood are no longer as strong as they once were due to their age. Mould has grown on the bulk of the wood, which is also owing to its age.

Many of these wood pieces have cracks in them, and some chunks of wood have been torn away from the original piece, making the entire structure less sturdy. The wood has faded over time and has lost its colour compared to its more modern competition, because it is possibly decades old.

4.1.2 Column Defects



Figure 4.1.2.1: Column Defect

The deterioration of multiple columns is another structural problem on both structures. The most typical cause of this condition is termite infestation. It might be because all of the columns still contain their original wood components, indicating that they have been in use for a long time perhaps decades.

4.1.3 Woodcarving Defects



Figure 4.1.3.1: Woodcarving Defect

A fault in the woodcarving component of the house was also detected. Some woodcarvings in the house appeared to be fractured and began to fall apart. Some of the shattered parts were reattached to their proper locations by tying them up with strings, but others were completely missing, leaving gap between the engravings.

4.1.4 Window Defects



Figure 4.1.4.1: Window Defect

Aside from that, it was discovered that some of the windows on site, despite seeming to be in decent condition, were in an extremely fragile state. This was discovered only after an effort to open the window for some fresh air was made. Because of this defect, some of the windows were curled to prevent them from being opened.

When it comes to the interior defect, both the windows and the doors share responsibility. One of them is the iron bars that are placed in front of the genuine windows. It was revealed that several of the iron rods were heavily corroded. Rainwater seeping through the atap roofing, along with oxygen exposure, most likely caused the rusting on the bars (air). Furthermore, some of the iron bars were missing totally from their intended placements for unknown reasons. Several of the woodcarving motifs are also gone.

4.1.5 Roof Defects



Figure 4.1.5.1: Roof Defect

There is a large disparity between the atap's ties, according to our findings. The defect in the roof will raise questions about its usefulness as a shelter. Because water may still seep through the atap after it has entirely covered the house, the hole will just admit more precipitation into the structure, making it dangerous, especially if it rains.

4.1.6 Staircase Defects

One of the stairs at the surau's main entrance, has a fault in the last tread. The tread is not as well-reinforced as the rest of the treads because it looks to be shaky. If left unaddressed, this little fault will grow into a major one, as it has the potential to completely break down and harm visitors.

4.2 Difficulties in Implementation of Maintenance Management

In general, there are several critical factors that contribute to the failure of maintenance management of the Surau. The most critical factors in maintaining the Surau consist of:

4.2.1 Exclusion of Maintenance Staff Expertise

The knowledge and skill of the maintenance personnel has been shown to be the most important factor in maintenance management. Kedah State Museum, as previously indicated, lacks a department dedicated to the management of historical and non-historical structures. As a result, they are unable to supervise and create the Surau inspection plan due to a lack of technical knowledge.

In addition, due to a lack of maintenance personnel training and knowledge, many of them have been outsourcing their maintenance work to a contractor. To increase maintenance performance, a maintenance organisation must be established to guarantee that maintenance tasks are carried out efficiently.

4.2.2 Unplanned Approach

The unplanned approach was determined to be the most typical strategy used in preserving the historical structures. For the Surau, the staff only intervene when one or more of the structure's parts fails. There is no regular maintenance procedure for the Surau's structure unless specified needs such as mechanical and electrical repairs, are completed. It was also revealed that there are no long-term strategies in place for the preservation of the structures.

4.2.3 Lack of Guidelines for Historic Building Maintenance

Additionally, Kedah State Museum or any of its departments have no official or established rules, policies, or systems in place in connection to these problems. This indicates that their staffs lack of required knowledge and experiences to effectively maintain and manage the historic structures.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 CONCLUSION

Across the study, the typical vernacular Malay house was created to react to the local environment, and it is one of Malaysia's most valuable cultural assets. The homes not only adapted to the natural environment, but also displayed Islamic ideals. The houses were designed and altered till the homeowner was happy.

The design of a traditional Malay home was customised to the local environment, with a random spatial layout, raised up floor, full-length windows, and a high-insulated roof. The shade created by the trees and plants around the house also helps to keep the interior temperature cool. The orientation of houses towards east and west was inspired by religious motives, which helps to prevent direct sun light exposure.

Overall condition of the traditional house can be said still in good condition. The traditional house sometimes being used for the female visitors or staffs as a place to perform prayer. Hence the condition of the house still maintains in great shape. The house can still be considered as safe to occupied as the defects are curable.

The Malay traditional home is distinguished by the long-term use of traditional components, which contributes to its architectural originality. Furthermore, it is based on the premise that some characteristics connected with the establishment of regional and national identity match to Malay traditional house design principles.

Traditional Malay house design ideas are concerned with blending traditional and contemporary design values through design concepts. Originality, simplicity, honesty, minimalism, interaction, quality, character, style, sense of order, and architectural language, as well as other functional characteristics and the surrounding environment, are infused with a variety of values that influence the development of the design reality.

5.2 RECOMMENDATIONS

A core notion of tropical architecture is finding alternative ways and means of adapting to and utilising the local tropical climate for improved living conditions. The passive approach to tropical architecture involves keeping out unfavourable climate elements such as heat and rain while allowing more positive factors such as natural ventilation and lighting to get through. On the other side, a more active approach to tropical architecture aims to take advantage of certain climatic factors for energy and efficiency.

The method for managing historic buildings' maintenance is crucial, especially for properly conserving and protecting the built heritage. In this regard, this chapter has outlined a few recommendations that may be used as a climbing point for applying best practises in historic building maintenance.

5.2.1 The Board Maintenance Policy and Objectives

Conservation principles should be the primary approach that shapes the entire culture and practise of maintenance. The major focus of maintenance should be on the preservation and improvement of cultural value. The objectives of the maintenance management role should be explicitly matched with the Board's overall goals.

5.2.2 Consideration and Programs

The focus of maintenance programming should be on periodic preventive tasks, with the aim of minimal intervention. Considerations of cultural importance should be included in the prioritisation of maintenance activities.

5.2.3 Good Financial Management

Budgets should reflect and be impacted by the maintenance policy. Managers and other interested parties should have access to information on maintenance performance through a system.

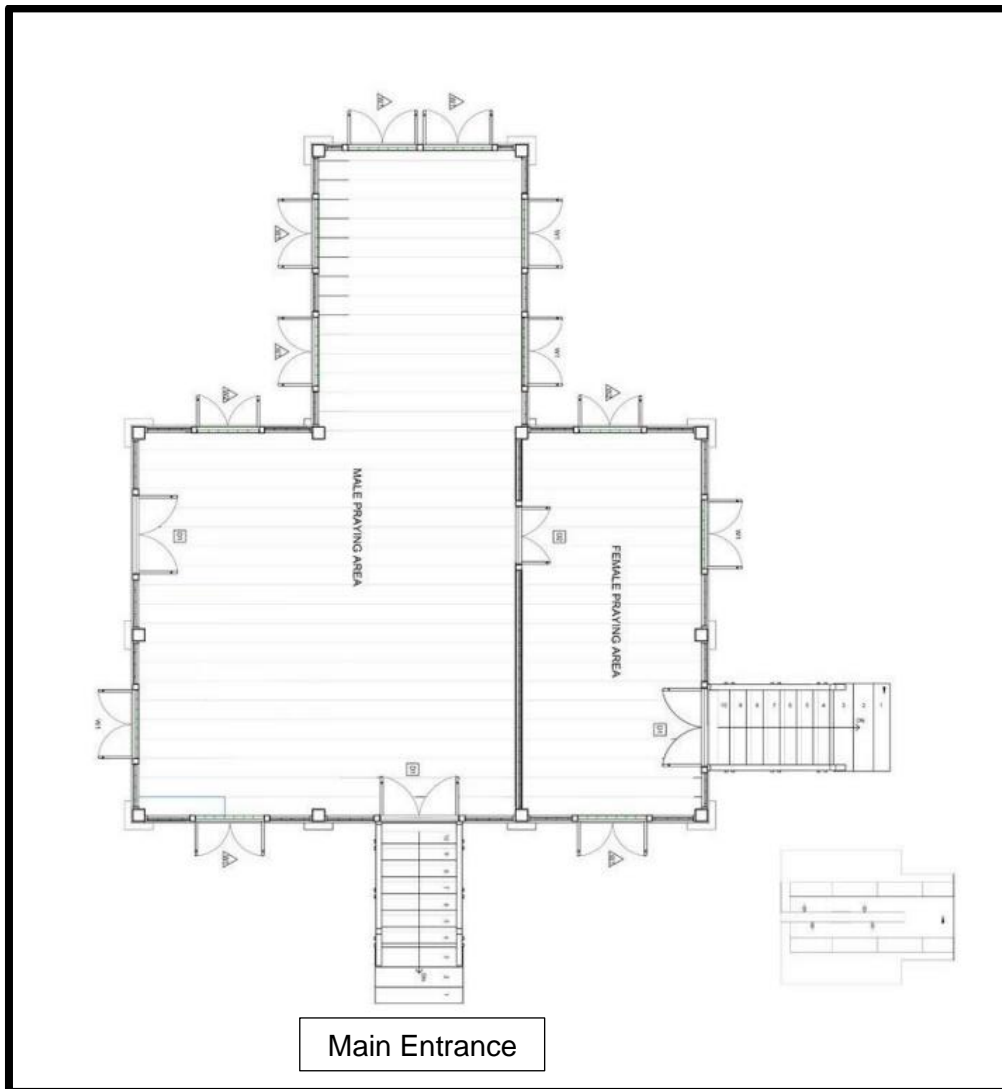
5.2.4 Good Information Management

The data about the condition of the building should be stored in a centralised database system. It should be easily retrievable and manageable for tactical and strategic goals. A mechanism should be in place that allows people who are not directly involved with the maintenance department to contribute their information about building condition to the maintenance information database.

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APPENDICES



Drawing of Existing Spaces of The Surau



Front Elevation of The Surau



Right Elevation of The Surau



Left Elevation of The Surau



Information Board About History of The Surau