



conference proceeding



# SIMPOSIUM NUSANTARA<sup>9</sup>

THE 9TH REGIONAL SYMPOSIUM OF THE MALAY ARCHIPELAGO  
*Revisit Islamic Civilization and Built Environment In The Malay World*

11 & 12 December 2012  
Al-Khawarizmi Lecture Hall  
UiTM(Perak)

Organized by:  
Centre for Knowledge & Understanding of Tropical Architecture & Interior (KUTAI)  
Centre for Islamic Thought & Understanding (CITU)  
Centre for Architecture, Planning & Surveying (FSPU)  
Faculty of Architecture, Planning & Surveying (Perak)  
Universiti Teknologi MARA (Perak)  
<http://perak.uitm.edu.my/simp09>



FSPU

PAPER CODE : AC114

# BUILDING CONDITION ASSESSMENT AFTER CONSERVATION WORK AT MASJID LAMA KAMPUNG DAL, PADANG RENGAS, PERAK

Ahzahar, N.<sup>a</sup>, Zakaria, I.B.<sup>a</sup> and Bahari, M.M.<sup>a</sup>

<sup>a</sup> Faculty of Architecture, Planning & Surveying, Universiti Teknologi MARA (Perak), Malaysia  
nadira754@perak.uitm.edu.my

---

## Abstract

Masjid Lama Kampung Dal was built in year 1936 at the order of the 30th King of Perak, Sultan Iskandar Shah. The architecture design of the mosque is different from other typical mosque at that time because of its simple design with no dome and the walls are made of woven sliced bamboo in a diamond shaped pattern (kelera). The mosque has been conserved started in 22 Dec 2008 and completed in 21 June 2009 with RM 786,100.00 cost funded by Jabatan Warisan Negara. After 3 years of conservation work, there is no current condition survey has been made. Therefore, this study is conducted to evaluate existing condition of the mosque according to Building Condition Survey CP BS101. The mosque is currently not being use for any function since a new replacement mosque is located nearby operating for local people. The study is done by assessing overall condition of the mosque and rated accordingly using Building Assessment Rating System (BARIS). This study is succeed in determining the existing condition of the mosque. From the survey, it can be concluded that the mosque is in fair condition which need minor repair. Furthermore timber decay has become the most occurred defect in the building. Apart from that, the mosque is also proposed to be open to public such as transform into a gallery in order to be able its architecture being appreciated by everybody considering government has spent so much money for its conservation work.

**Keywords:** Conservation; Condition Survey; Building Assessment Rating System..

---

## 1. Introduction

Masjid Lama Kampung Dal was built in year 1936 at the order of the 30th King of Perak, Sultan Iskandar Shah. The architecture design of the mosque is different from other typical mosque at that time because of its simple design with no dome and the walls are made of woven sliced bamboo in a diamond shaped pattern (kelera). The mosque has been conserved started in 22 Dec 2008 and completed in 21 June 2009 with RM 786,100.00 cost funded by National Heritage Department (JWN). After 3 years of conservation work, there is no current condition survey has been made. Therefore, the objective of this paper is to evaluate existing condition of the mosque according to Building Condition Survey CP BS101.

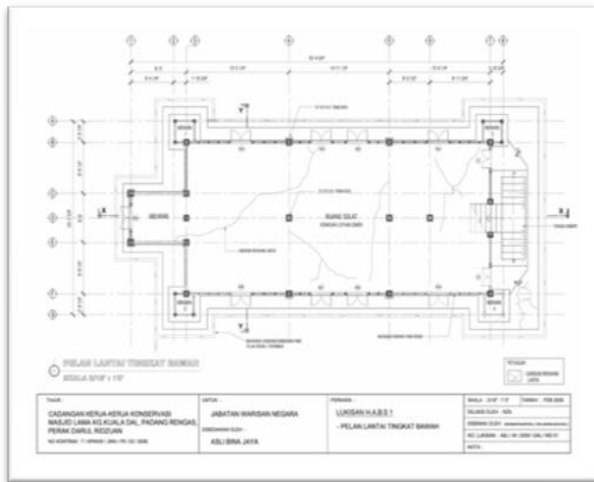
## 2. Background

### 2.0 Background of Masjid Lama Kg Dal

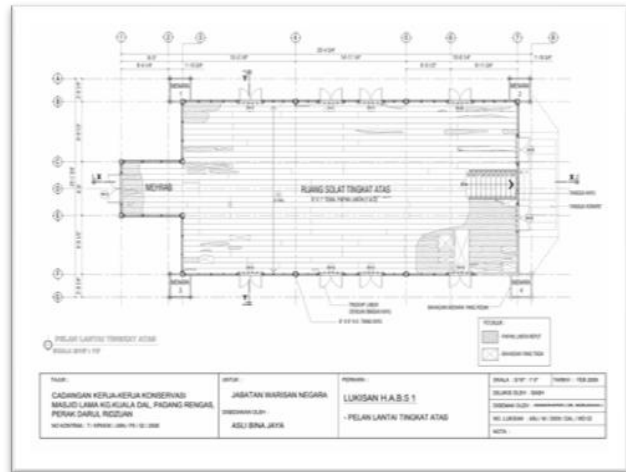
Kampung Kuala Dal Mosque or known as Insaniah Mosque located in Kampung Kuala Dal, Padang Rengas Kuala Kangsar, Perak. It is about 4.8 kilometers from Kuala Kangsar town. The mosque was built by Sultan Iskandariah Shah, the 30<sup>th</sup> Sultan of Perak in 1936. The opening ceremony was held on Friday, 10<sup>th</sup> of Muharram 1356H or 11 February 1938 by Sultan Iskandariah Shah. Sultan was intended to build a mosque when one of his sons had recovered from illness. Kampung Kuala Dal is the favorite place by the king and the royal family to go picnics at the waterfall nearby. The place is called Lata Bubu. Along the way, the Sultan often saw the people praying in the mosque of the village which has been obsolete. Then, the Sultan had decided to build the mosque for the villagers. The mosque was named as Masjid Ikhsaniah Iskandariah. The cost of the construction at that time is around RM 8,000. The mosque was built on a piece of land that was endowed by a nobleman named Abdul Syukur bin Mohamad Ali. The construction of this mosque is led by a Chinese craftsman and assisted by the villagers that have an expertise in craftsmanship such as wood carvings and kelera tepas wall.

2.1. Conservation Works of Masjid Lama Kg Dal

Conservation is the process to prolong the life of the building with a suitable maintenance programmed to prevent further damage and deterioration. In heritage building, originality in conservation can be defined through the workmanship, design; material and setting that apply in the conservation work. In Malaysia, the process of the conservation work must be referred to the conservation principles and guidelines from the National Heritage Department (JWN). It is a compulsory requirement that must be fulfilled by the practitioners who involved in the conservation projects and to make sure the quality and standard of the conservation work can be achieved. The conservation work at Kampung Dal Mosque was started at 22 December 2008 until 21 August 2009. It is about 8 month's contract period. The Superintending Officer(S.O) for this project is by Commissioner of National Heritage Department, Ministry of Information, Communication and Culture (Malaysia). Masjid Kampung Dal was constructed by a hardwood timber consisting of two levels. The function of upper floor is for praying hall and the use of ground floor is for religious activities such as fardhu ain classes, and also gathering.



Drawing 1.0: Ground Floor Plan  
 Sources: National Heritage Department (2009)



Drawing 2.0: First Floor Plan  
 Sources: National Heritage Department (2009)

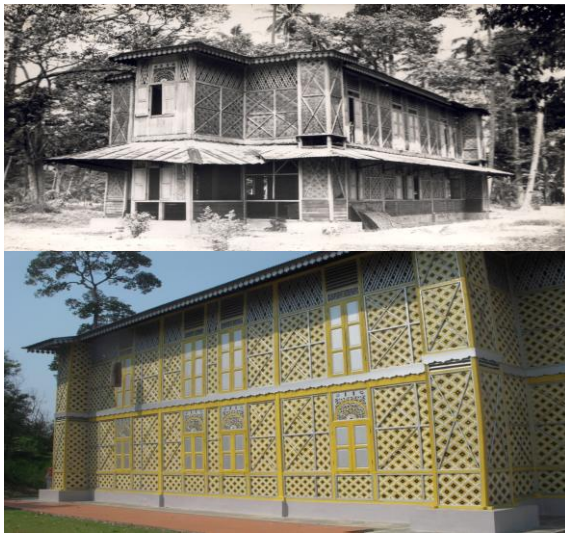


Photo 3.0: The site elevation of the Kampung Dal Mosque after conservation work.  
 Source: Field Work (2012)



Photo 4.0: The rear elevation of the Kampung Dal Mosque after conservation work  
 Source: Field Work (2012)

### 2.3 The conservation work process

Conservation work of this mosque is systematically done accordance with the procedures as stated by the National Heritage Department. Conservation procedures are started from the top to bottom of the building. The conservation work is starting with roof works, and then it is followed by the column, walls, openings, floors and also the installation of decorative elements such as wood carvings and kelarai wall. The scope of the conservation works are:

- 1) Roof and the structures
- 2) Termite prevention treatment
- 3) Kelarai bamboo wall
- 4) Doors, windows and carvings
- 5) Floor board at upper floor
- 6) Wooden and concrete staircase
- 7) Floor at ground floor
- 8) Painting

### 2.4 The Building Construction

The building is supported by eight columns of *Kempas* timber. The stone pedestal is used as a base for the columns. Kelarai from a bamboo is used as a wall with diamond or *rubus* pattern. The internal space plan is divided into three parts according to the distribution of the column. At the upper floor, the space mainly used as a prayer hall. In the prayer hall, more opening is created to allow more natural ventilation and lighting into the building. The ceiling is made by timber. The wood carvings with the floral motifs at the building opening make the building appearance so interesting. Timber floor board is used at the upper floor. For the ground level, a ceramic tile was used as a finishes. Timber staircase is placed at the internal and the concrete staircase at the external of the building.



Photo 4.0: The internal space of the prayer hall at a first floor.

Source: Field Work (2012)

Photo 5.0: The internal space of the ground floor.

Source: Field Work (2012)



Photo 6.0: The internal space of the ground floor.

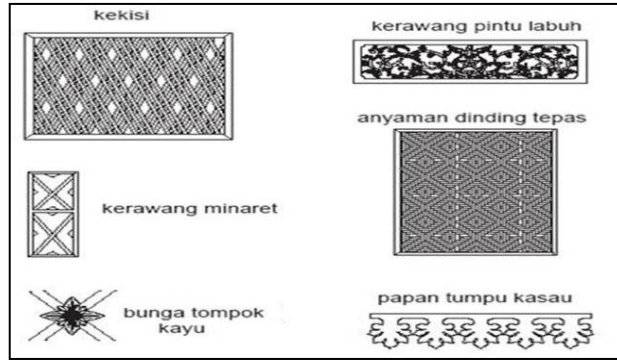
Source: Field Work (2012)

Photo 7.0: The timber floor joist.

Source: Field Work (2012)

2.5 Architectural Special Features

Kelarai from a bamboo is used as a wall gives a very unique building appearance. The pattern of the kelarai is known as a *Kelarai Bunga Potong Berlian*. It is one of the traditional Malay patterns that apply in local architecture. Tepas wall is decorated with carved motif and the name of the pattern is *Bunga Tikam Seladang*.



Drawing 3.0: The decorative pattern at Masjid Kg.Dal  
 Source: National Heritage Department(2009)



Photo 8.0: The *Kelarai Bunga Potong Berlian*.  
 Source: Field Work (2012)



Photo 9.0: The *kerawang* with a floral pattern.  
 Source: Field Work (2012)



Photo 10.0: The *Kerawang* with a floral pattern as an opening for upper windows.  
 Source: Field Work (2012)

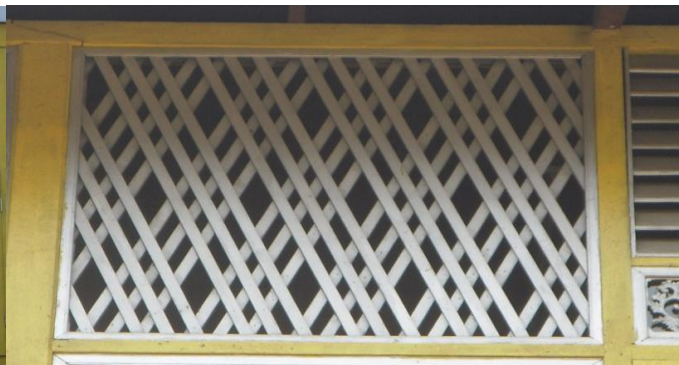


Photo 11.0: *Kekisi* as a decorative element and opening for ventilation and lighting.  
 Source: Field Work (2012)



Photo 12.0: *Kerawang Pintu Labuh* and louvers window as a decorative and opening for ventilation and lighting.  
Source: Field Work (2012)

Photo 13.0: *Papan Tumpu kasau* as a fascia board.  
Source: Field Work (2012)

## 2.6 *The Research and Documentation Report*

The implementation of the conservation work is based on the basic research studies, including the research method of the construction and installation techniques. Monitoring work is important to give a priority to make sure the authenticity of this building is clearly protected. As a result, the original appearance of the mosque is clearly giving an attractive view to the surrounding with very impressive façade and colours.

- a) Before conservation work began
  - 1) Historical Architectural Building Survey (HABS) I Report
  - 2) Dilapidation report
  - 3) Measured drawing
- b) During conservation work done
  - 1) Historical Architectural Building Survey (HABS) II Report
  - 2) Material Sample Test Report
  - 3) Scheme Colour Report
  - 4) Method Statement
- c) After conservation work done
  - 1) Historical Architectural Building Survey (HABS) III Report
  - 2) Final Report

2.7 Building Condition Survey CP BS101: Code of Practice for Building Inspection

Building Condition Survey is a method of assessment used widely by Building Surveyors to diagnose building performance. The building condition assessment made note of the following standards of CP BS101: Code of Practice for Building Inspection Reports which have been published by the Building Surveying Section, Institution of Surveyors Malaysia. All information recorded, the defects supported by photographs and then analyzed in BARIS (Building Assessment Rating System) as shown in Table 1 and presented with recommendations for repair or further detailed review.

Table 1: BARIS table

SCALE		PRIORITY ASSESSMENT			
		E4	U3	R2	N1
CONDITION ASSESSMENT	5	20	15	10	5
	4	16	12	8	4
	3	12	9	6	3
	2	8	6	4	2
	1	4	3	2	1
<b>NO</b>	<b>MATRIX</b>	<b>SCORE</b>			
1	Plan Maintenance	1 to 4			
2	Condition Monitoring	5 to 12			
3	Serious Attention	13 to 20			
<b>OVERALL BUILDING RATING</b>					
No	Building rating	Score			
1	Good	1 to 4			
2	Fair	5 to 12			
3	Dilapidated	13 to 20			
<b>CONDITION ASSESSMENT</b>					
<b>CONDITION</b>	<b>SCALE VALUE</b>	<b>DESCRIPTION (VALUE)</b>			
1	New /As New	Minor Servicing			
2	Fair	Minor Repair			
3	Poor	Major Repair / Replacement			
4	Very Poor	Malfunction			
5	Dilapidated	Damage/Missing			

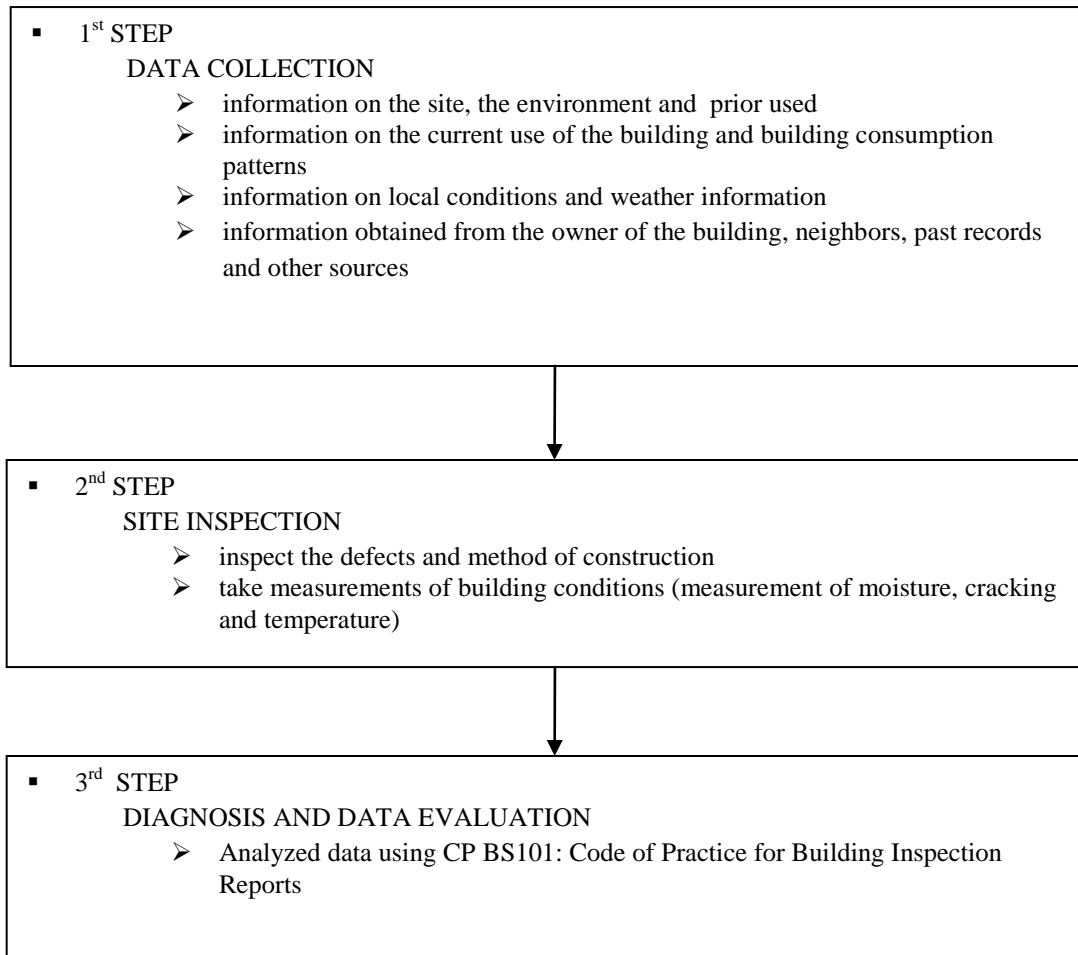
<b>PRIORITY ASSESSMENT</b>		
<b>PRIORITY</b>	<b>SCALE VALUE</b>	<b>DESCRIPTION (VALUE)</b>
Normal	1	Functional, only cosmetic defect
Routine	2	Minor defect, but can lead to serious defect if left unattended
Urgent	3	Serious defect, cannot function to an acceptable standard
Emergency	4	Element/structure not function at all; OR Risks that can lead to fatality and/or injury



### 3. Methodology

During assessment, standard forms and checklists have been used to ensure that all necessary observation are made and recorded. This building condition assessment essentially identifies physical deficiencies of a building material systems and components and equipment as observed at the time of the walk-through survey. The assessments included visual inspection, observation of the subject facilities and a review of available records and construction documentation. The assessment were divided into four categories: (1) Primary Systems –Structural System, Exterior Wall System; (2) Secondary Systems – Ceiling System, Floor Coverings, and Interior Wall; (3) Service Systems –Electrical and Lighting and (4)Infrastructure Components.

The basic principles of building defect diagnosis can be divided into three main steps:



### 4. Data & Analysis


From the data obtained, there are only five types of defect found in Masjid Lama Kampung Dal which are peeling paint, termite attack, minor crack, timber decay and timber shrinkage.

#### 4.1 Peeling Paint

Peeling paint is a common defect that has been found in the building including on the external bamboo wall. Based on BARIS Assessment, the condition of the defect is rated as 2 , which is fair and needs a minor repair. Meanwhile, for priority assessment, the defect is rated as 1 which is functional and only cosmetic defect. Peeling

paint is occurred due to exposure to weather such as rain and sunlight. Other possible cause is due to the double layer of paint. The external wall was firstly painted in orange – yellow scheme colour based on the original scheme colour of the wall. But before the officiating ceremony that was scheduled to be held in 2010, Sultan Perak had instructed the contractor to repaint the wall to royal yellow scheme colour similar to the scheme colour of Istana Kenangan wall. Due to this contribution factor, the upper layer paint started to peel off badly especially on the external wall after being exposed to weather. For the internal wall the painting was remained with the first scheme colour and they are in a good condition during the assessment done. Peeling paint will affect the appearance of the building. Therefore as corrective measure, it is suggested to scrap off or sand off both layers of the painting, cleaning them and then repaint the wall.


Table 2: Defect Sheet for Peeling Paint

Defect Sheet No:	GF/W/P/01	Level	Ground floor		
	Location	External Wall			
	Element	Wall			
	<b>BARIS</b>				
	Condition	Priority	Matrix	Colour	
	2	1	2		
	Defect Description				
	Peeling paint				
	Possible Causes				
	<ul style="list-style-type: none"> <li>• Exposure to weather</li> <li>• Double layer of paint</li> </ul>				
	Remedies				
Sand off all outside skin of the bamboo surface, clean it and then paint it.					

#### 4.2 Termite Attack

Termite attack is a typical defect to timber building including Masjid Lama Kg Dal. There is one defect found at beam located at external facade near staircase of the building. Timber can deteriorate easily if it is exposed to water penetration, high moisture content and loading beyond its capacity. Based on BARIS assessment, the condition of the defect is rated as 3, which is poor and need replacement. Meanwhile, for priority assessment, the defect is rated as 2 which is minor defect, but can lead to serious defect if left unattended. The possible cause is the existence of insect or termite attacks usually happen in a damp and digestible timber. It is dangerous to leave the timber with many insect or termite holes because they may soften the timber and form further cracks. For above case, the affected timber should be replaced and after replace it should be pressure-spraying with insecticide or fumigant insecticidal processes to prevent reoccurrence of the defect.


Table 3 : Defect Sheet for Termite Attack

Defect Sheet No:	GF/CO/TA/02	Level	Ground floor		
	Location	External façade near staircase			
	Element	Timber column and beam			
	<b>BARIS</b>				
	Condition	Priority	Matrix	Colour	
	3	2	6		
	Defect Description				
	Termite attack				
	Possible Causes				
	Insect or termite attacks happen in a damp and digestible timber				
	Remedies				
Replace affected timber and pressure-spraying with insecticide or fumigant insecticidal processes					

#### 4.3 Minor Crack

From the observation, there is one minor crack found at the joint of external brickwall and apron of the building. Based on BARIS Assessment, the condition of the defect is rated as 2, which is fair and need minor repair. Meanwhile, for priority assessment, the defect is rated as 1 which is functional and only cosmetic defect. It is caused due to the minor settlement occurred at the problematic area. The crack is minor and will not affect the strength of the building. It is suggested to inject an epoxy resin as sealant to the crack as corrective measure. Epoxy resins are excellent binding agents with high tensile strength.

Table 4 : Defect Sheet for Minor Crack


Defect Sheet No:	GF/W/C/03	Level	Ground floor		
	Location	External			
	Element	Brick wall and apron			
	<b>BARIS</b>				
	Condition	Priority	Matrix	Colour	
	2	1	2		
	Defect Description				
	Minor Crack				
	Possible Causes				
	Minor settlement				
	Remedies				
Injection of epoxy resin as sealant to the crack					

#### 4.4 Timber Decay

Timber decay is another major defect occurred in Masjid Lama Kg Dal. It is found at most of the windows of the building. Based on BARIS assessment, the condition of the defect is rated as 3, which is poor and need replacement. Meanwhile, for priority assessment, the defect is rated as 2 which is minor defect, but can lead to serious defect if left unattended. The possible cause of timber decay is wet rot. Wet rot is occurred due to dampness and it's promotes fungus. The fungus causes brown rot decay, leaving timber brittle and eventually will form a hole

at window and affect the appearance of the building. For corrective measures it is suggested to increase the ventilation and drying out the affected areas, rectify any cause of dampness and replace required timber.


Table 5 : Defect Sheet for Timber Decay

Defect Sheet No:	GF/WD/TD/04	Level	Ground Floor		
		Location	Internal		
		Element	Window		
		<b>BARIS</b>			
		Condition	Priority	Matrix	Colour
3	2	6			
Defect Description					
Timber decay					
Possible Causes					
<input type="checkbox"/> Caused by wet rot .The fungus causes brown rot decay, leaving timber brittle.					
Remedies					
<input type="checkbox"/> Increasing the ventilation and drying out the affected areas. <input type="checkbox"/> Rectifying any cause of dampness. <input type="checkbox"/> Replacing required timber.					

#### 4.5 Timber Shrinkage

Timber shrinkage happened at almost every window panel of Masjid Lama Kg Dal. Shrinkage is a defect occurring during the seasoning process. Seasoning is the reduction of moisture content of timber to that of the surrounding air. Seasoning is important to increase the strength of the timber panel. However due to insufficient seasoning process of the timber before installation, it can cause the timber to shrink after being installed and leaving a gap between window panels. The gap will allow rain penetration into the building and may lead to more defect to the other part of the building. Based on BARIS assessment, the condition of the defect is rated as 3, which is poor and need replacement. Meanwhile, for priority assessment, the defect is rated as 2 which is minor defect, but can lead to serious defect if left unattended. As for corrective measure, it is required to replace the affected timber panels.

Table 6 : Defect Sheet for Timber Shrinkage

Defect Sheet No:	GF/WD/TS/05	Level	Ground floor		
		Location	Internal		
		Element	Window		
		<b>BARIS</b>			
		Condition	Priority	Matrix	Colour
3	2	6			
Defect Description					
Timber Shrinkage					
Possible Causes					
<input type="checkbox"/> Caused by insufficient seasoning process of the timber before installation					
Remedies					
<input type="checkbox"/> Replacing required timber.					

#### 4.6 Overall Building Rating

From the analysis done, Masjid Lama Kampung Dal is rated as fair condition which needs minor repair at certain elements such as replacement of window panels, replacement of affected beam, and repainting of external bamboo wall.

Table 7 : Building Assessment Rating System for Masjid Lama Kampung Dal

<b>BUILDING ASSESSMENT RATING SYSTEM FOR MASJID LAMA KAMPUNG DAL</b>						
No	Defect	<b>Building Condition</b>				
		Condition Assessment (a)	Priority Assessment (b)	Matrix analysis (c) = (axb)	Defect sheet	Defect indication code
1	Peeling paint	2	1	2	GF/W/P/01	
2	Termite attack	3	2	6	GF/CO/TA/02	
3	Crack	2	1	2	GF/W/C/02	
4	Timber decay	3	2	6	GF/WD/TD/03	
5	Timber shrinkage	3	2	6	GF/WD/TD/03	
Total Marks (d) ( $\Sigma$ of c)				22		
Number of defects (e)				5		
Total score (d/e)				4.4		
Overall building rating				<b>FAIR</b>		

#### CONCLUSION & RECOMMENDATION

As for conclusion, Masjid Lama Kampung Dal is rated as fair condition which needs minor repair to certain elements. The most critical element needs to be repaired is a beam located at external facade near staircase of the building due to termite attack. Furthermore, timber decay and timber shrinkage have become the most occurred defects in the building. Replacement work of timber panels are recommended to improve existing condition in order to prolong the building lifespan.

Apart from that, the mosque is also proposed to be open to public such as transform into a gallery in order to be able its architecture being appreciated by everybody considering government has spent so much money for its conservation work.

#### REFERENCES

Hamid M.Y. and Wahab S.N.A. (2012). *Teori dan Praktis Pemeriksaan Bangunan*. Penerbit UiTM.

CP BS 101 : *Code of Practice for Building Inspection Reports*, ISM (2011)

Hollis, M. (2004). *Pocket Surveying Buildings*. RICS Book. United Kingdom

Kubba, S.A.A (2008). *Architectural Forensics*. Mc Graw Hill. United States