

DEFECT AND M



IN GOVERNMENT

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ABSTRACT

Malaysia is a developing country and many projects are being implemented. Some of the projects involve construction of buildings. Nevertheless, some of the buildings are poorly constructed and maintained. One of the components that need attention is concrete. The concrete structure need to be inspected and maintained regularly. Poor maintenance of concrete components will lead to the buildings being rendered not fit for occupancy. The main objectives of this study are to determine the types of concrete defect, the factors that cause concrete defects, the method of repairs and the problems faced by the Public Work Department (PWD) in carrying out the maintenance work. The study is carried out on government buildings in Terengganu. The data are collected through questionnaire and also from the records of the PWD. The data is analyzed by using average mean index. From the study, it was found that the main types of concrete defects are spalling and delamination. The factors that cause the defects are inefficient maintenance and poor construction method. The method of concrete repairs that are adapted by PWD are patching and sealing.

ABSTRAK

Malaysia adalah negara yang membangun dengan banyak projek-projek baru yang dilaksanakan. Antara projek ini adalah melibatkan pembinaan bangunan baru. Namun demikian, masih terdapat bangunan yang telah dibina dan diselenggara dengan tidak memuaskan. Salah satu komponen yang perlu diberi perhatian adalah konkrit. Pemeriksaan dan penyenggaraan yang tetap adalah penting untuk struktur bangunan konkrit. Sistem penyenggaraan yang tidak memuaskan boleh menyebabkan bangunan tersebut menjadi tidak sesuai untuk penghunian. Objektif utama kajian ini adalah untuk mengenalpasti jenis kerosakan konkrit, faktor-faktor yang menjadi punca kerosakan, teknik-teknik pembaikan dan masalah yang dihadapi oleh Jabatan Kerja Raya (JKR) dalam sistem penyenggaraan bangunan. Skop kajian ini adalah pada semua bangunan kerajaan di Terengganu. Data adalah dikumpul melalui borang soal selidik serta rekod kerja penyenggaraan daripada JKR. Analisis data dilakukan dengan menggunakan Kaedah Purata Index. Daripada kajian ini, didapati kerosakan utama pada bangunan adalah spalling dan pengupasan. Faktor yang menyebabkan kerosakan ini adalah sistem penyenggaraan yang tidak cekap dan teknik pembinaan yang tidak sempurna. Teknik pembaikan yang paling kerap digunakan adalah pembaikan tampalan dan sealing.

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LIST OF SYMBOLS

=	-	Equal to
\leq	-	Less than or equal to
<	-	Less than
Σ	-	Total of
%	-	Percentage

CHAPTER 1

INTRODUCTION

1.1 Introduction

After almost 50 years of independence, Malaysia once known as Malaya is going into a new era of globalization, unleashing its potential and competition worldwide. Both federal and state government worked hand in hand to make full utilization of the country's source and expertise in expanding the infrastructure in Malaysia. Most recent attribute is Northern Corridor Economic Region (NCER) in which one of its main objectives is to promote social and community development that will contribute greatly to Malaysia's growth and economy. As the technology advances and changes, the need of more infrastructures will be more apparent.

Infrastructure includes buildings, roads, bridges, utilities, water supply, sewerage system, mechanical and electrical systems. All of these infrastructures are important because it helps civilians to be able to live in a more systematic and ease environment. It helps to save cost, traveling time and providing facilities that will make life easier.

Many of these infrastructures will need proper maintenance to extend the lifespan besides promoting safety and reliability to the public. In the Malaysian Budget 2012, a total Budget 2012 allocate RM 232.8 billion for government plans, including RM 181.6 billion for management and RM 51.2 for development and another RM 29.8 billion has been allocated for investment in infrastructure, industrial and rural development. Buildings in particular are important structures and are a main concern of the government to make sure it is maintained regularly to prevent it from deteriorating and eventually could pose as a threat to the public.

Malaysia is a developing country and many projects are being implemented. Some of the projects involve construction of buildings. Nevertheless, some of the buildings are poorly constructed and maintained. One of the components that need attention is concrete. The concrete structure need to be inspected and maintained regularly. Poor maintenance of concrete components will lead to the buildings being rendered not fit for occupancy.

Poor maintenance might result in structural failure and wastage in money. For example, The Sultan Mizan Zainal Abidin Stadium in Kuala Terengganu, which grabbed the headlines three years ago when a large part of its roof collapsed, has lost more than RM 292 millions. The official said that following the roof collapse, minor damage was detected throughout the stadium. But due to neglect and the actions of irresponsible people entrusted to clean up the massive mess at the 50,000-seat stadium, the problem has now become acute (The Star, February 1, 2012). The issue here is not who to blame but to prove that poor maintenance will result in repeated repairs and dire consequences.

One of the major components of building that needed attention is concrete defects. Defects in concrete, if not repaired, will eventually lead to major maintenance. Failure to provide necessary maintenance will cause more

expensive repairs or replacement of otherwise useful structures. Besides that, any negligence in any of the phases of its maintenance would lead to its deterioration and ultimately failure to perform its intended function. Therefore a proper and systematic maintenance management is required to reduce possible occurrence of disaster that may cause life injury due to structural failure.

1.2 Significant of Study

Maintenance is a very important element for concrete structures. Although concrete is a very high durable building material, concrete can deteriorate and become defective under certain circumstances such as environmental conditions. To further probe this problem is poor maintenance. Improper maintenance work could lead to repetition repairs that can be more costly and wastage in materials. Therefore maintenance plays an important role as it sustains the building serviceability up to its required and expected standard. Maintenance works in Malaysia are under the concern of Public Work Department (PWD). PWD is in charge of inspection and performing maintenance on all for state and federal buildings. A through inspection on concrete structures would be determining the cause of defect, having adequate knowledge regarding the extent of the problem and carrying appropriate repair works that could minimize or eliminate the problem altogether.

Building defect are so common that Malaysians no bat an eye anymore, or one could say they are immune to news of these defects when highlighted. The question is why we must let this issues conquer the development of government building? Nothing packs a more costly punch and ruins a project than a construction defect dispute. I choose this title for my study because I personally interest to understand this issue more deeply and get the knowledge by my own way and experience. When buildings suffer defects, the causes of the defect have to be

properly identified before any remedial work can be undertaken. The study has been done to assist professionals and students who are involved in building construction to identify types of government building defects, cause of defects and method to repair of the defects. Besides, the readers will know the satisfaction level of residents at my case study area.

A building construction defect caused by the deficiency in the design, construction, or materials on construction project. Broadly speaking, building defects fall into two (2) categories: defects that affect the performance of the structure and defects that affect the appearance of the structure. From the legal perspective, a building defect is defined in somewhat different terms. Legally, a building defect is a violation of the applicable building code, a violation of the standard of care in the community in which the project is located, or a violation of the manufacturer's recommendations (Robert S Mann, 2007). Defect is the nonconformity of a component with a standard or specified characteristic. Defect is used sometimes as a synonym for 'failure', but the preferred meaning is to indicated only a deviation from some (perceived) standard that may, but will not necessarily, result in failure (David, 1997).

1.3 Problem Statement

Concrete is a very high durable and versatile material as it can be cast in place with or without reinforcement and precast or prestressed for achieving any required strength. Therefore it is a very popular construction building material. Under normal conditions, concrete buildings are expected to have a long life service.

However, concrete members can deteriorate due to several factors such as aggressive environment, faulty design and construction defects etc. Inadequate

maintenance will leave these defects unattended thus compromising the integrity of the building.

Many reasons can contribute to poor maintenance of concrete buildings such as local authorities as they often lack manpower when being confronted or challenged to check the safety of structures (Lee, 2004). The economical aspect is also a decisive factor on types of repair works that might be conducted. There is usually more than one method of repair in concrete defects. These techniques vary from each other in terms of cost, execution time and effectiveness. The more higher the cost, it would deter many building owners from executing essential repair works.

Other than that, remedial works are only done on areas where the damage is visible. This is to avoid stability problems in the structure. Unfortunately what usually happens is reoccurrence of the damage shortly after the previous remedial work has been carried out and leads to repeated repairs. This only contributes to wastage in money and time besides compromising the safety factor of the structure.

In Terengganu, maintenance of many government buildings, schools and hospitals is under the custody of Public Work Department (PWD). The biggest challenge faced is conducting effective maintenance. As stated by Prime Minister fifth, Datuk Seri Abdullah Badawi, the weakness of government department was that they lack a building maintenance culture. He also added that they will not see the need to inspect if they think it is a new building (The Star, April 13, 2007).

A preliminary survey is conducted on government buildings in the district of Kuala Terengganu and Hulu Terengganu. From the survey, it was found that the problems faced are poorly maintained buildings. Buildings have become an eyesore or a danger to general public. An unidentified Bangladeshi worker was crushed to

death and five others injured when a pile of concrete blocks crumbled at the Oceanographic and Tropical Aquaculture building at University Malaysia Terengganu (UMT), in Gong Badak.

The repair works for concrete defects will be carried eventually. Some defects are only visually disturbing and will not affect the structural integrity of the whole structure. Some on the other hand can be dangerous and lead to major failures. Hence, a study will be carried out as stated in the objective 1.4.

1.4 Objective of Study

The objectives of carrying out this study are as follow:

- i. To study the types of concrete defects that occurs in buildings
- ii. To identify the factors that causes the concrete defects in buildings
- iii. To identify the method of concrete repair carried out
- iv. To identify the problems faced by PWD in maintenance of buildings

1.5 Scope of Study

In relation with the objectives the study, this study is carried out on buildings in Terengganu under the supervision of Public Work Department (PWD).All the government buildings are taken into count.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Maintenance is a very important element for concrete structures. Although concrete is a very high durable building material, concrete can deteriorate and become defective under certain circumstances such as environmental conditions. To further probe this problem is poor maintenance.

Improper maintenance work could lead to repetition repairs that can be more costly and wastage in materials. Therefore maintenance plays an important role as it sustains the building serviceability up to its required and expected standard. Maintenance works in Malaysia are under the concern of Public Work Department (PWD). PWD is in charge of inspection and performing maintenance on all for state and federal buildings. A through inspection on concrete structures would be determining the cause of defect, having adequate knowledge regarding the extent of the problem and carrying appropriate repair works that could minimize or eliminate the problem altogether.

2.2 Maintenance

According to BS3811:1993 British Standard Glossary of Maintenance Terms in Terotechnology, the term maintenance is the combination of all technical and administrative actions, including supervision actions, intended to retain an item in, or restore it to, a state which it can perform its required function.

Generally, there are two process of building maintenance activities. There are rehabilitation and repair.

i. Rehabilitation

An activity to make sure the building is up to current acceptable functional conditions, often involving improvements.

ii. Repair

An action that is intended to restore a building back to its original appearance or state by renewal, replacement and restoration.

Meanwhile, maintenance can be divided into two main categories which are planned maintenance and unplanned maintenance.

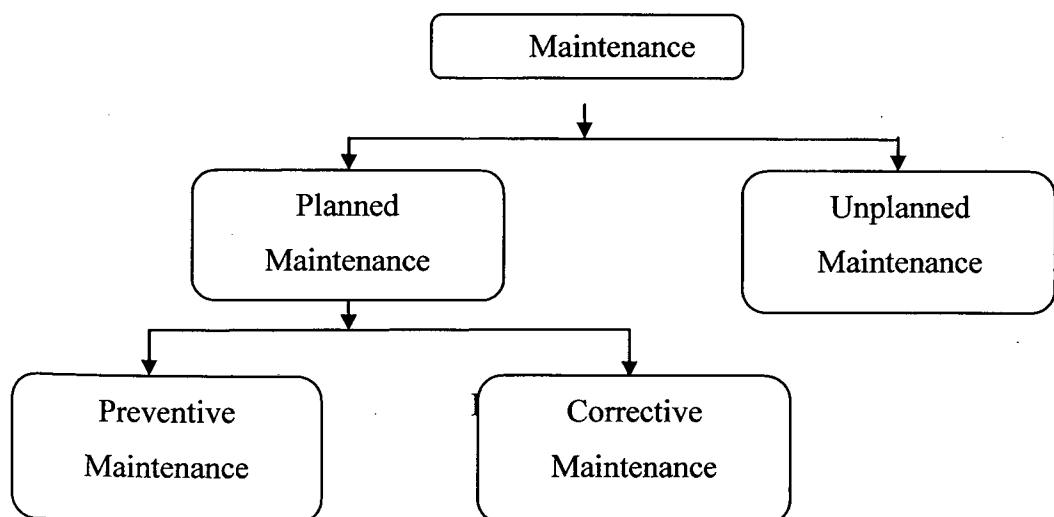


Figure 2.1 : Forms of Maintenance (BS3811, 1993)

2.2.1 Planned Maintenance

As stated in BS3811(1993), planned maintenance can be described as the maintenance organized and carried out with forethought, control and the use of records to a predetermined plan. There are two sub categories of planned maintenance which is preventive and corrective maintenance.

2.2.1.1 Preventive Maintenance

Preventive maintenance is the maintenance carried out at predetermined intervals or according to pre described criteria and intended to reduce the probability of failure or the degradation of the functionality of an item. There are two different types of preventive maintenance which is scheduled maintenance and condition-based maintenance. Scheduled Maintenance is the preventive maintenance carried out in accordance with an established time schedule. Meanwhile condition-based maintenance is the maintenance carried out according to the need indicated by condition monitoring (BS3811, 1993).

2.2.1.2 Corrective Maintenance

The type of maintenance carried out after fault recognition is intended to put an item into a state in which it can perform a required function. Scope of work comprises repair, restoration, rehabilitation or replacements of components (BS3811, 1993).