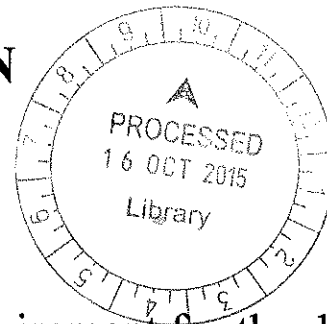


**IMPLEMENTATION OF SOLUTION TO SOLVE
DETERIORATION OF CONCRETE BUILDINGS IN
COASTAL AREAS IN MALAYSIA**

FOR REFERENCE ONLY

BY

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This report is submitted as a partial requirement for the degree

of

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DECLARATION

I, TAN YEOW JIN, I 1200 1476, confirm that the work in this report is my own work and the appropriate credit has been given where references have been made to the work of other researchers.

A handwritten signature in black ink, appearing to be 'TAN YEOW JIN', is written above a horizontal line.

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ABSTRACT

This study is to identify the preventions and remediation that implemented in Malaysia in order to minimise the phenomenon of concrete deterioration at the coastal area. Deterioration is a process of aging of concrete caused by continual usage of natural phenomena or human activities. For example, long exposure to salt condition would have higher chances of corroding the surface of concrete structures. Some symptoms might be occurred due to default in design or poor workmanship during the construction.

The research method I used is Qualitative Method in this study. The respondents selected were contractors and directors of concrete repairing company. They have commented that there are several ways to solve and to encounter the different causes of concrete deterioration. Different condition of location leads to different implementation carried out by the contractors in Malaysia in terms of material, machinery and repairing methods used. Besides that, they agreed that coastal area has an additional effect to accelerate the aggressiveness of concrete deterioration.

Throughout the research, I have identified that the causes of concrete deterioration which also inter-related with the characteristics of the concrete structures. From my research, the concrete deterioration can be occurred at any time and it is also an unforeseen risk to the residents. Besides that, 100% of my respondents preferred assessment work such as testing would be a better choice before carrying out any other repairing works. Thus, the industry should emphasise the effects of concrete deterioration and promote some basic preventions because we are depending so much on the concrete structures in current construction field.

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CHAPTER 1

INTRODUCTION

1.1 Introduction for Chapter 1

Introduction will be represented as an overview of my study content. It includes the background study, problem statement, aim, objectives, key questions, research methodology and research frame.

1.2 Background study

Concrete has been widely used as a building material. From *The Concrete Portal*, it described that concrete has used to build buildings, infrastructure facilities and others. Generally, human activities are relying on concrete buildings due to it is strong to withstand the normal natural disaster. It has replaced other building material such as steel and timber, acting a role of protecting human. For example, we are able to get protected from getting wet when heavy rain and sweating under the hot sun.

Each concrete building will have its own life span and durability rate. Brian Morton (2000) stated faulty in design, poor workmanship and unsuitable materials are affecting the durability of a concrete structure. Deterioration is a process of aging of concrete caused by continual usage of natural phenomena or human activities. For example, long exposure to changes in weather, radiations and air pollutions involved damage the

concrete structures. In worst case, some concrete building might contain moisture after a period of facing the damp environment.

Thus, I choose this title as the deterioration process has apparently affect the maintenance cost after completion of project and life span of the particular building. Thus, I carried out this investigation to find out the causes and impact of deterioration in concrete building and also their possible preventions.

1.3 Aim

To investigate the condition of concrete buildings from deterioration and increase the life span of the buildings.

1.4 Objectives

1. To determine the main cause of deterioration in concrete buildings in Malaysia.
2. To observe the impact of deterioration to the appearance of the building.
3. To identify prevention and remediation strategies implemented to prevent deterioration of concrete in Malaysia.

1.5 Problem Statement/Issues

Malaysia is a climatic season country with hot sun and raining season. Fathoni U et al. (2013) describe that local climate such as humidity, temperature and amount of precipitation will accelerate the deterioration process of the concrete building. Location such as seaside will be catalysing the corrosion on the exposed Reinforcement Bar of the concrete building due to high temperature (Raja R, 2011).

Currently, deterioration in concrete building is a phenomenon due to aging, corrosion rate and failure in design. Deterioration affects the concrete buildings by cracks, spalls and rust stains, causing poor aesthetic looks for future value purpose. Besides the aesthetic aspect, it also creates inconvenient causing residents to worry about the condition of buildings when saw cracking marks from wall which is a sign of corrosion for them.

A lower durability concrete building may have low in resisting the deterioration process. It is caused of the low quality of cement used, poor skill of workmanship or inappropriate proportional of concrete mixture, leading to happen of concrete deterioration effect earlier and aggressively. It also affects the performance of concrete structure.

1.6 Key Questions

1. What are the main causes of deterioration in concrete?
2. What are the symptoms of concrete deterioration on the affected concrete building?
3. What are the recommended strategies to prevent and remediate the deterioration rate in concrete building?

1.7 Importance of the Study

or properly?

The important of study is concerning on the problem of concrete building having the deterioration. Implementation of the solutions to the deterioration is required for eliminating the problems of deterioration. Concrete building are built due to it is more economical and durable compare to other materials. The life span of the building is able to stay until 50 years to 100 years (The Concrete Portal). For example, the old and historical landmark, The Colosseum, Rome, Italy has been preserved until current years (Geno Jezek, 2006-2013). The aging process such as obsolescence and deterioration dismantles the original looks. However, the structure is still not wiped out by the process cause of its durability of its material and maintenance work used.

This study discusses the importance of determining the main causes of deterioration in concrete. The causes of deterioration will show symptoms in various forms such as cracking, discolouration and rust stain at the area (The Concrete Portal). The symptoms of concrete deterioration affect the aesthetic appearance of the concrete building and strength of the concrete structure if worst.

This study reveals that there will be greater impact of deterioration in buildings close to seaside. Corrosions at the area are usually happened at the surface towards the sea. Sea breeze carried by wind load will blow towards the surfaces of the concrete building. *The Concrete Portal* stated sulphate content in sea water will physically attack the concrete surfaces when having drying and wetting cycle. The sulphate will penetrate into reinforcement bar through cracks, causing corrosion and rusting at the reinforcement bar to weaken the strength.

Lastly, the study also identifies prevention and remediation strategies implemented to prevent deterioration of concrete in Malaysia. It will be able to get a solution which fit to the Malaysian climate and sufficient performance after apply the maintenance. Besides that, the study offers recommendations for industries to aware of deterioration that will affect the life span of concrete buildings. Thus, the design failure or weak workmanship phenomena are able to mitigate.

1.8 Research Methodology

To determine the aim and objectives of study, research methodology will be needed by proposing in route maps and picking the suitable research method design. Based on my first objective, I will need to find out the causes of deterioration. From my literature review, the deterioration brings inconvenient and affects the performance of the concrete buildings. Thus, causes of the deterioration can be highlighted so that I gained knowledge and information to prepare for in-depth interview questions.

Secondly, searching for impact of deterioration to the concrete buildings are my second objectives of study. Case study buildings such as old resorts building in Batu Ferringhi, Penang will be targeted. Photos of deteriorated concrete area will be snapped. Thus, the photos will be used as supportive documents in my in-dept interview and my study.

Thirdly, I will pick the “In-dept interview method” in order to have the professional advises. The targeted group will be professionals in construction industries so that they are able to give me more information about the causes and the preventions that they usually used. The sample photos taken will be shown to them so I am able get further understanding about the deterioration occurred at the area. Therefore, I will be able to achieve my third objective.

The map route of methodology is presented next page (Figure 1.1).