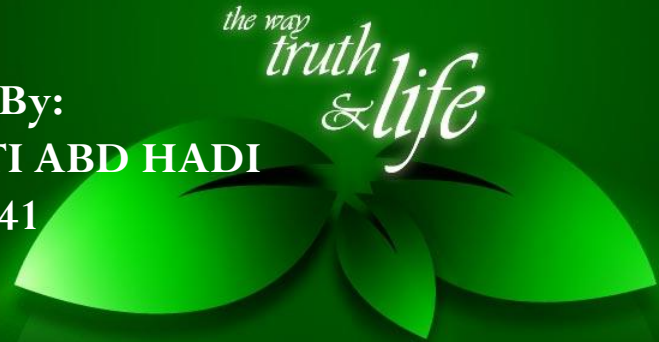


BSB 658 :

ACADEMIC PROJECT

**A SURVEY ON THE CAUSES WATERPROOFING
DEFECTS IN GOVERNMENT OFFICE BUILDING
AT PUTRAJAYA**

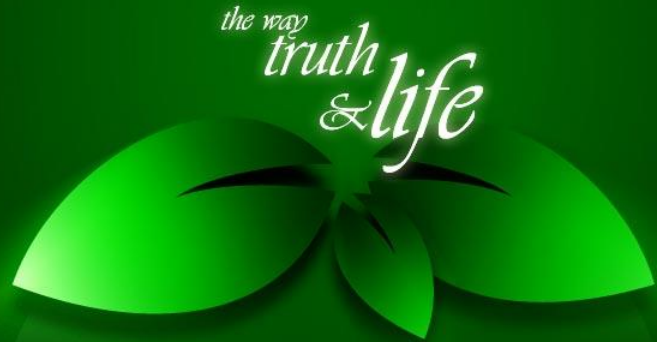
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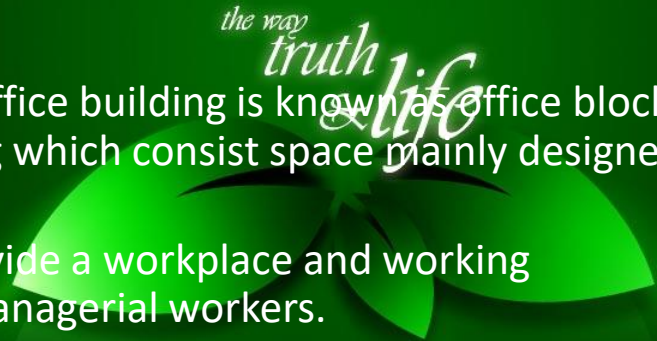
1.0 INTRODUCTION

WHAT IS WATERPROOFING

- Waterproof or water-resistant can be describe as an objects relatively unaffected by water or resisting the way in of water under circumstances and often refer to penetration of liquid water.
- Waterproofing is the combination of materials or systems that prevent water intrusion into structural elements of building or its finished space.

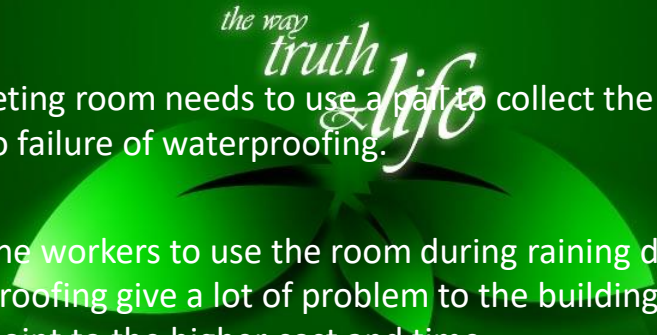
DEFINITION OF OFFICE

- Office is defined as a room or space for work. Office building is known as office block or business centre is a form of commercial building which consist space mainly designed to be used for offices.
- The main purpose of an office building is to provide a workplace and working environment primarily for administrative and managerial workers.
- Office building commonly will be divided into section for different companies or may be dedicated to one company (<http://en.wikipedia.org/wiki/office>).



2.0 PROBLEM STATEMENT

- Usually waterproofing is not given enough priority as required and consequently, a cheap and inappropriate option is used. This leads to consequential losses that can be harmful for the owner of the building or property.
- The leaking problem due to waterproofing give a lot of problem to the building occupant and building maintenance to fix it because it appoint to the higher cost and time.
- According to the report of building audit by Public Work Department Federal of Territory Putrajaya, it show that there are leaking and watermark at the ceiling at meeting room and pantry at Menara Seri Wilayah building.
- From the report, it show during heavy raining day, the meeting room needs to use a pail to collect the water that comes out through the ceiling that cause due to failure of waterproofing.
- This actual event gives uncomfortable and unpleasant to the workers to use the room during raining day because of the problem he leaking problem due to waterproofing give a lot of problem to the building occupant and building maintenance to fix it because it appoint to the higher cost and time



3.0 AIM AND OBJECTIVE

- To identify the types of waterproofing that is apply in government's office building
- To investigate the causes of waterproofing defects in government's office building
- To recommend a guideline to ensure good waterproofing construction for government's office building.



4.0 SCOPE AND LIMITATION

- This study will focus on the type of waterproofing that frequently used in government's office building
- The selection of the building for the case study is based on the differences of types of waterproofing apply in the government's office building
- It shall also consider on the common of the waterproofing defect at government's office building
- Condition survey shall be carried out on selected government's office building that are affected by waterproofing failure. The case study will be carried out on government office building at Wisma Putra, Presint 2, Menara Seri Wilayah, Presint 2 and Ministry Office, Parcel B.

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5.0 RESEARCH METHODOLOGY

LITERATURE REVIEW

Secondary data collected from books, magazines, newspapers, journals and websites through internet exploration. Consist of the study's definitions, types, programmes and others.

COLLECTION OF DATA AND INFORMATION

PRIMARY DATA

- Data collection during visiting case study building.
- Study and survey through interviews and observation.

SECONDARY DATA

- Collecting relevant data from references books, magazines, newspaper, journals and websites.

ANALYSIS OF DATA AND DISCUSSION

Analyze the primary and secondary data. Data will be shown in the form of figures, tables and texts.

RESULTS AND FINDINGS

Based on data that have been analyzed.

STAGE 1 - Find Problem And Select Topic

- This is the early stage of research methodology. Usually the problem is come out from the news, political issues and other sources. The selection of this dissertation is based on the current issue reported by building maintenance of the building. After the topic has been selected, the objective of this dissertation will be approach.

STAGE 2 – Data Collection

- Data collection is required in order to achieve the objectives of this dissertation. It plays importance roles to provide overall the information about the waterproofing and residential quarters. After all the data obtain, it transfers to finding and require further analysis. There are two types of data collection which are:

Primary Data

Primary data is also known as raw data. This data is collected directly by first-hand experience (**Business Dictionary, 2011**). This data obtain from the data that come out from the author itself based on some. This data is present by:

- **Observation**
- **Interview**
- **Questionnaire**



STAGE 3 – Data Analysis

- Data analysis is the process of describe a data set by computing a small number of measures that characterize the data set in ways that are meaningful to the researchers. This data is obtained from the collection data. Then the data will be convert into pie chart, bar chart, line chart and other types of bar for analysis in order to find the recommendation and conclusion and as reference.

STAGE 4 - Recommendation And Conclusion

- This is a last stage to complete this dissertation. After go through all the stage then the recommendation and conclusion come out based on the objectives that have been achieved.

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6.0 CASE STUDY



Case Study 1 :
Wisma Putra, Presint 2, Putrajaya

Year Built: 1995



Case Study 2 :
Menara Seri Wilayah, Presint 2,
Putrajaya

Year Built: 1995



Case Study 3 :
Prime Minister, Parcel B, Putrajaya

Year Built: 1995

CASE STUDY 1 : WISMA PUTRA



Figure 6.1: The waterproofing failure at roof top of multipurpose hall Wisma Putra 2



Figure 6.2: The Waterproofing Failure because of Repairing Work



Figure 6.3: Surface crack of cementitious waterproofing system at the roof top of Wisma Putra 1 due to weather expose.



Figure 6.4: Splitting of cementitious waterproofing due to weather expose and poor workmanship.

CASE STUDY 2 : MENARA SERI WILAYAH



Figure 6.5 : Waterproofing Failure at Atrium because of Deterioration



Figure 6.6: The deterioration of bituminous membrane waterproofing with time



Figure 6.7: The waterproofing already detach from the sub screed



CASE STUDY 3 : PRIME MINISTER, PARCEL B



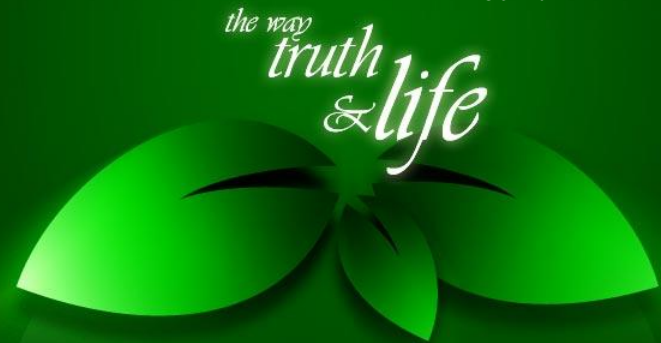
Figure 6.8 :The Blistering of Waterproofing Cause By Weather Expose.



Figure 6.9: Waterproofing failure at Block B7



Figure 7.0: The Watermark Cause by Waterproofing Failure at Roof Level at Block 7



7.0 DATA ANALYSIS

- Analysis Based On Interview And Observation
 - ✓ Background of the building
 - ✓ Condition survey to the affected location
- Analysis Based On Questionnaire
 - ✓ Section A – Demographic Profile
 - ✓ Section B – The Waterproofing System In The Government's Office Building
 - ✓ Section C – The Best Solution To Ensure Good Waterproofing System Apply In Government's Office Building



8.0 FINDINGS

No	Types of waterproofing system	Waterproofing defects	Causes of defect	Problem arise	Location	Case Study
1	Cementitious waterproofing (add acrylic)	<ul style="list-style-type: none">• Crack• Blister• Splitting	<ul style="list-style-type: none">• Weather Exposure• Vibration	Leaking	Roof top	Wisma Putra
2	Bituminous Membrane waterproofing	<ul style="list-style-type: none">• Crack	<ul style="list-style-type: none">• Deterioration of time• Weather exposure• Vibration	Leaking	Roof top	Menara Seri Wilayah
3	Liquid Waterproofing Membrane	<ul style="list-style-type: none">• Crack• Blister	<ul style="list-style-type: none">• Poor workmanship• Weather exposure	Leaking	Roof top	B7 JPM

9.0 CONCLUSION

The main goal of this dissertation is to survey the waterproofing defect in government office building.

The first objective is to identify the types of waterproofing system apply in the government office building. Through the finding and analysis that have been done, it can conclude that there varies types of waterproofing systems that apply in the office government building such as membrane waterproofing, cementitious waterproofing and liquid waterproofing.

The second objective is to investigate the causes of waterproofing defect in the government office building. According to the condition survey had been made to the selected case study, it can conclude that the waterproofing defect that occurs in the mostly happen because of deterioration of waterproofing with the time. There are many factors that contribute to the causes of the waterproofing defect in the government office building such as vibration, temperature, deterioration of waterproofing due to time, improper installation or poor workmanship, lack of detailing, wrong selection of waterproofing system to the application area and the method of application.

The last objective is to recommend the best guideline to ensure the good installation of waterproofing in the building. It can conclude that many guidelines and suggestion can be done to make sure there have an improvement of the waterproofing characteristic and quality which can expand the life time of waterproofing material over 10 years of waterproofing system in the building such as engage in the waterproofing field to get the best information about the waterproofing system in the building such as manufacture or contractor with have expertise, experience and more knowledge on waterproofing application.

As the summary, the waterproofing system is required to keep the structure watertight since, it exposed to the weather. The causes of waterproofing defect can be reduced if we do more study about the appropriate and toughness of material to be applied in the government building with our harsh weather. Hence, most of the waterproofing defect can be identified at the roof top especially reinforced concrete flat roof so it can be prevented by use the other alternative such enlarge the thickness of roof slab and others.

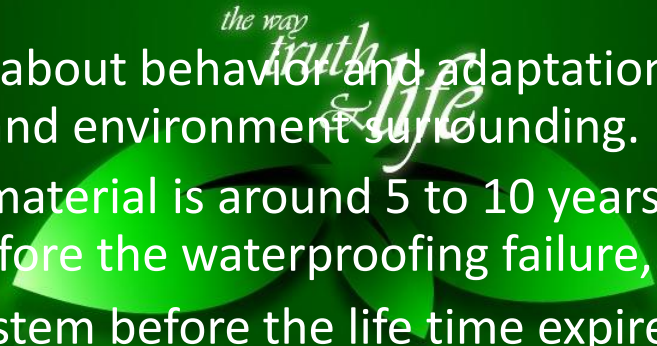
10.0 RECOMMENDATION

Design Stage

- The selection of waterproofing system must already be done during the design stage. The choice of waterproofing system
- Design the proper roof slope of minimum fall of 1 in 80 in flat roof can help for water runoff as quickly as possible to suitable discharge points.

Maintenance Management

- The building maintenance need to study about behavior and adaptation of waterproofing system with the building and environment surrounding.
- The standard life time of waterproofing material is around 5 to 10 years depending on the area of application. Before the waterproofing failure, planning to change the waterproofing system before the life time expired.



Manufacture and Supplier

- The manufacturer and supplier of waterproofing is the people that have expertise, knowledge, experience and skill about the waterproofing system. In order to get a good waterproofing, they need to guide and suggest the building owner or client to select the most suitable waterproofing with the area of application.

Contractor and applicator

- During construction, precaution must be taken to prevent excessive moisture from being trapped between reinforced concrete roof structure and membrane. The surface that will layer new waterproofing must in the clean, no dust and dry condition.
- Careful supervision and control during application is needed to ensure proper curing of concrete, consistent thickness and uniform application.
- Lastly, refer to the guideline by Uniform Building by Law (UBBL) 1984 and Public Work Department about the minimum requirement to install waterproofing system in the building.

