



**DEPARTMENT OF BUILDING  
UNIVERSITI TEKNOLOGI MARA  
(PERAK)**

**REPAIR WORKS ON FLOOR AND WALL**

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**DEPARTMENT OF BUILDING  
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UNIVERSITI TEKNOLOGI MARA  
(PERAK)  
DECEMBER 2019**

**It is recommended that the report of this practical training provided**

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**REPAIR WORKS ON FLOOR AND WALL**

Accepted in partial fulfillment of requirement has for obtaining Diploma in Building.

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**DECEMBER 2019**

**STUDENT'S DECLARATION**

I hereby declare that this report is my own work, except for extract and summaries for which the original references stated herein, prepared during a practical training session that I underwent at PWD Jajahan Machang for duration of 20 weeks starting from 5 August 2019 and ended on 20 December 2019. It is submitted as one of the prerequisite requirements of BGN310 and accepted as a partial fulfillment of the requirements for obtaining the Diploma in Building.

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## ABSTRACT

Buildings are among the most important in human life. Buildings are used in a variety of activities including to protect oneself. A building renovation work is process to reconstruct or rebuilt the old building to form a new building that can be used safely and comfortably. Building maintenance is the process of a thorough check-up of a building to detect and repair any structural or other problems. In addition, building maintenance is commonly contracted to an independent maintenance firm. It keeps the building safe and helps extend the design life of the building. This report was conducted at Balai Polis Pulau Chondong, Machang Kelantan. The objective of this report is to identify problems occurred at Balai Polis Banggol Judah and solutions taken to solve it. The second objective is to study method of the building repair work. Lastly, the last objective is to analyses the resources (material and costs) used for repairing the damage of the building at Balai Polis Banggol Judah, Machang, Kelantan. In conclusion, this report contain the specific detail of building repair work.

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## CHAPTER 1.0

### INTRODUCTION

People use building as shelter to prevent from weather and other dangerous situation to protect themselves. Building is a structure with walls and a roof, such as a house or factory while the maintenance is a work needed to keep building in good condition. (Cambridge Dictionary) Maintenance also defined in BS 3811: 1984 as 'The combination of all technical and associated administrative actions intended to retain an item in, or restore it to, a state in which it can perform its required function.' (Lee How Son and George C.S. Yuen, 1993)

Maintenance work can be undertaken by contractors, direct labour organizations or a combination of both systems. (Ivor H. Seeley, 1976) The building elements exist largely to divided the building's uses one from another. Thus, the important of building maintenance is to allow those functions to continue to be carried out. (Brian Wood, 2009) Poor maintenance can affect people in the building and danger may be occur. It may not be necessary to inspect every square inch of every part of the building, the method must be possible to identify a broken and damage immediately adjacent to the dampness. (Brian Wood, 2009)

Every country has building maintenance and it is very important in every development to have good maintenance management to maintain good building performance. In addition, building maintenance means the work done by someone who has detailed expertise in building maintenance and ensuring that each piece of building can be improved for long-term occupancy. The building will maintain the value of the building, comfort to the residents of the building and the building can be used for a long time. The different types of maintenance are preventive maintenance (PM) and corrective maintenance (CM). When do is preventive maintenance it is doing a task before a failure has occurred, when conducting corrective maintenance the failure has already occurred and the work is basically reinstating equipment functionality. (Erik Hupjé, 2018)

Thus, the differences between preventive between and corrective maintenance are the cost of maintenance services are generally divided into two parts. Repairs to inoperative units or component and applying preventive services. (Carl M.Mann, 1952) Corrective maintenance is done after problem while preventive is before problem. Corrective maintenance is done randomly while preventive is done frequently. (Karol Velišek, 2019)

Additionally, there are distinct advantages to preventative maintenance management, the advantages include the management control overtime, parts inventories, standby equipment, safety and pollution, quality and support to users. The management control is unlike repair maintenance, which must react to failures, preventive maintenance can be planned. Overtime can be reduced or eliminated. Another advantage is parts inventories because the preventive maintenance approach permits planning of which parts are going to be required and when, those material requirements may be anticipated to be sure they are on hand for the event.

Safety and pollution if no preventive inspections or built-in detection devices are used, equipment can deteriorate to a point where it is unsafe or may spew forth pollutants. Quality is the same general reasons discussed previously, good preventive maintenance helps ensure quality output. Next, support to users. If properly publicized, preventive tasks help show equipment operators, production managers, and other equipment users that the maintenance function is striving to provide a high level of support. Last but not least, cost-benefit relationship. Preventive maintenance allows a three-way balance between corrective maintenance, preventive maintenance, and production revenues. (R. Keith Mobley, 1943)

## **1.1 Scope of Study**

The study was carried out at Balai Polis Banggol Judah, Kampung Banggol Judah, 18500, Machang, Kelantan. The study focuses on the building maintenance. There is an analysis of the resources (material and the costs) used for repairing the defect, the method of building maintenance, and determine the problems occurred and the solutions taken to solve during the maintenance. This report form all the information that are needed and it is mainly to understand how the building maintenance work. This study does not include the detail about the project because it is confidential.

## **1.2 Objectives**

- To analyse the resources (material and the costs) used for repairing the building at Balai Polis Banggol Judah, Machang, Kelantan.
- To explore the method of the building maintenance.
- To determine problems occurred and solutions taken to solve the problem

### **1.3 Research Methods**

This building maintenance research method consists of observation, interview and document analysis.

#### **a) Observation**

The site visit was held on Tuesday, 20<sup>th</sup> August 2019. The observation was conducted on located at Balai Polis Banggol Judah, Kampung Banggol Judah, 18500, Machang, Kelantan. Based on the observation during site visit was the process of installation of floor of the building by using fresh mixing cement on the site. The process of the installation takes about a few weeks. The data to be collected during the observation of the maintenance are collected in the form of written notes and capture a pictures.

#### **b) Interviews**

The interview has been carried out Balai Polis Banggol Judah, 18500, Machang, Kelantan with a site supervisor of this project. The progress of the building maintenance was 60% done. The architect of this project is from K-Fayakun Construction and Trading. The quantity surveyor in this project is from the Public Work Department Machang. In this site visit, the interview method use was unstructured interviews. The questions are questioned during the site visit. The questions are answered by the person in charge and the supervisor that responsible in this project. During the interview, the video was recorded. Besides, the pictures of the site also were captured.

#### **c) Document reviews**

The documents were shared by the company regard to the architectural and structural drawing of the building maintenance, work schedule, and progress photo of the maintenance process to support the research about the whole working procedure of the building maintenance. Data collected are also

obtained from the responsible party. However, not all of the document can be referred because it was confidential.

## **CHAPTER 2**

### **COMPANY BACKGROUND**

#### **2.1 Introduction of Company**

At the beginning of the Public Work Department (PWD) Kelantan was divided into three areas namely PWD North Kelantan, PWD Kelantan Tengah and PWD West Kelantan. Each area is governed by an Executive Engineer. PWD Machang is managed by PWD Kelantan Tengah under Executive Engineer, P.C Sakaran. From 1963, PWD Machang was formed and administered by the Colonial Engineer. Its office building is located on Jalan Bahagia, in Machang city. The old offices that have being built in 1963 have being upgrade into the new building presently occupied.

Part of this Department's work related to drainage and drainage work was set aside for the establishment of the Department of Irrigation and Drainage -DID (JPT-Drainage and Drainage Department, now known as the Department of Irrigation and Drainage-DID) in 1956. The objectives are to submit the project in a good quality, time and costs that have being approved and provided facilities (roads and buildings) government to safely and comfortably use.

To achieve the country's aspiration in providing the best service to the people, PWD Machang expressed it through the vision and mission of the department. The vision state that PWD Machang will be a world-class service provider and center of excellence in asset management, project management and engineering services for the country's infrastructure development through creative and innovative human capital and the latest technology. The Mission of PWD Machang will contributes to the development of the country through assist clients in delivering policy and service outcomes through the cooperation of strategic partners, Standardization of processes and systems for consistent

delivery of results. Furthermore, PWD Machang also will develop human capital and new Preserve the environment in service delivery.

## **2.2 Company Profile**

### **1. ENGINEER**

Nazamira Bin Razali as a Colonial Engineer in the PWD Machang .He handle many scope of works, responsible for all policies relating to the administration of the PWD Machang. As we know JJ also serves as the Head of PWD Machang. JJ is the highest hierarchy of occupation at PWD Machang. Each office is headed by a Colonial Engineer who is directly responsible to the State JKR Director for implementing and maintaining Federal and State projects.

### **2. BUILDING DEPARTMENT**

Building department lead by building engineer Tengku Munirah Binti Tuan Mahmood and assisted by electricity, quantity surveyor, architecture, and others. Building department not only focuses on building, they also plan, organize, supervise and oversee PWD Machang PWD road and bridge projects, Kelantan. Next, to ensure management and preparation of construction projects government buildings such as offices and residential houses governments can be prepared according to schedule, specifications and requirements contract.

### **3. ROAD DEPARTMENT**

Road department lead by road engineer Norhafiza Binti Che Kamaruzaman. The main task of road department is planning, organizing, monitoring and supervising projects and road works and bridges of PWD Machang, Kelantan. Administer and manage the procurement of supplies, services, and work of PWD Machang, Kelantan.

### **4. ELECTRIC DEPARTMENT**

Among the scope of the electrical unit tasks are to operate and maintains electricity services at state and federal government premises. Encik Muhammad Rashidi bin Ramli as assistant of electrical engineering was assigned to perform maintenance works Street lights, traffic lights, schools, federal buildings. To carry out electrical work in conjunction with the government premises or buildings to operate in a safe manner.

### **5. ADMINISTRATION DEPARTMENT**

Consists of multimedia unit, services, finance and stores. Administration department managing incoming and outgoing correspondence. The function also is to make sure the office situation and condition is always monitored.

I was placed under Puan Tengku Munirah as a student of building and my course relate with the department. I always help Puan Tengku settle up her document and double check the cost of the project.





## 2.4 List of Project

### 2.4.1 Completed Project

Projects of road safety infrastructure as shown in the table below:

Projects	Quotation cost	Date	Contractor
Kerja-kerja Menggantikan Komponen Perabut FT008 Jalan Kota Bharu – Kuala Krai	RM 17,132.49	31/10/2017	Bintang Idaman Enterprise
Kerja-kerja Menggantikan Komponen Perabut FT004 Jalan Machang – Pasir Puteh	RM7,861.29	8/11/2017	Amir Enterprise
Membina Dan Menyiapkan Jajaran 10KM Lebuhraya Rakyat Dari Machang Ke Kuala Krai	RM417,100.00	20/11/2017	Keys Resources
Projek Baiki Laluan Berbahaya FT004 Jalan Tanah Merah-Pasir Puteh	RM270,609.52	7/5/2018	Al Hakim Maju Enterprise
Kerja Pembinaan Infrastruktur keselamatan Jalan FT008 Jalan Kota Bharu-Kuala Krai Machang Kelantan	RM336,670,.00	31/7/2019	Mohd Supian Bin Saud

Table 2.1: Completed projects

## 2.4.2 Project in Progress

Projects of building construction and maintenance as shown in the table below:

Projects	Quotation cost	Date	Contractor
Kerja-Kerja Penyelenggaraan Kuarters Di JKR – Machang Kelantan	1,301,000.00	7/8/2018	Husain Enterprise
Kerja-Kerja Penyiasatan Tanah Dan Ujian Makmal Bagi Projek Klinik Kelantan	100,000.00	20/9/2018	TQ Construction
Kerja-Kerja Penyiasatan Tanah Projek Klinik Kesihatan Jenis Dan Ujian Makmal Bagi 7 Joh, Machang	115,007...50	15/7/2019	FRG Resources
Kerja-Kerja Penyiasatan Tanah Dan Ujian Makmal Bagi Projek Klinik Kesihatan Jenis 7 Tekilla, Machang	RM67,857.00	15/9/2019	Salam Wibawa Construction
Kerja-Kerja Penyediaan Infrestruktur Telekomunikasi TM di Kompleks Perpaduan Daerah Machang	RM29,487.30	06/07/2019	Telekom Malaysia Berhad

Table 2.2: Project in Progress

## CHAPTER 3

### CASE STUDY OF BUILDING MAINTENANCE AT BALAI POLIS BANGGOL JUDAH, KAMPUNG BANGGOL JUDAH, 18500, MACHANG, KELANTAN

#### 3.1 Introduction to Case Study

This project was selected for the building maintenance project under developer K.Fayakun Sdn.Bhd located at Balai Polis Banggol Judah, Kampung Banggol Judah, 18500, Machang, Kelantan. The purpose of building maintenance project is to repair the damage at the building which are the cracked floor of the building and also the wall. The project was undertaken to provide comfort for residents in the building. The average of total cost is RM20,745.09 and the time period of this project is 11 weeks. This project uses material such as cement, paint, blue sheet waterproof membrane to complete all the maintenance work towards the building so it can be completed at a predetermined time period given.

In this case study, all the works of building maintenance will be focus on the maintenance of the quarters in Balai Polis Banggol Judah. Besides, the maintenance of this project can be easier to handle because of the equipment used and it is suitable with this topic of Building Repair Work. Figure 3.1 shows the location of the building maintenance.

This project will repair the floor with a total area of 212m<sup>2</sup>. The workers will hack the floor and replace them with the new cement rendering. The main purpose for this work is to replace the damage floor that occurred over several years.



Figure 3.1: Building maintenance at Balai Polis Banggol Judah, Machang, Kelantan

The figure shows the picture of the building involved in this project. This project also repair to the wall because there are so many cracks on the wall. The workers need to cover the cracked wall with new cement plaster and also make a new wall frame to renew the wall. The size of the wall that need to be repaired is 150m<sup>2</sup>

**3.2 Analyze the resources (material and the cost) used for repairing the defects to the building at Balai Polis Banggol Judah, Kampung Banggol Judah,18500, Machang, Kelantan**

There are two repairing works that included in this project of building maintenance at Balai Polis Banggol Judah.

List of works included in the building maintenance project: -

- i) Repairs to floor
- ii) Repairs of wall

### i) Repairs of floor

In repairing the floor damage, the main ingredient needed is fresh concrete grade 25. Furthermore, the process of floor repairs at Balai Polis Banggol Judah, Kampung Banggol Judah, 18500, Machang, Kelantan also need reinforcing wire mesh size A8. The cost for each reinforcing wire mesh A8 (100mm x 400mm) is Rm30.40 per m<sup>2</sup>. So, the cost for all the wire mesh reinforcement needed was Rm1,679.53 Other than that, blue sheet water proof membrane is also needed in the process as it is also the main materials in the floor repairs. The cost for the blue sheet is Rm250.00. All the material used for floor maintenance should be of high quality to ensure the highest level of safety to avoid injury. The total cost of materials for the floor repairs at Balai Polis Banggol Judah, Kampung Banggol Judah, 18500, Machang, Kelantan are Rm6,700.09. The main purpose of this work is because the resident always brought in heavy objects into the building that cause the floor to be cracked. The workers hack all the floor and prepare the surface before they started to make a new floor layer.



Figure 3.2: Laying of new floor

## ii) Maintenance of wall



Plywood were used because of their fireproofing and heat resistance properties. Additionally, emulsion paint is also the important material used to complete the maintenance of the building at Balai Polis Banggol Judah, Kampung Banggol Judah, 18500, Machang, Kelantan. The total cost for this work is Rm 14,045.00. The size of wall to be repaired was 150m<sup>2</sup>. The workers used plywood to make a new timber wall after they demolished the old wall. They use plywood, timber frames and paint. The main reason for repairing this wall is because of infection of termites and pests in the wall. The termites ate all the wood in the wall that makes the wall cracked and did not last long.





Figure 3.3: Erection of new Wall



### 3.3 Method Statement of Building repairs work



Table 3.1 Laying of new floor

NO	OPERATION	SEQUENTIAL DIAGRAM	MACHINERY&PLANT	LABOUR	EQUIPMENT	PERIOD
1	Measure and make a calculation towards the floor area of the room by using the note book to record the measurement.			-no labor	-note book -pen -measuring tape	-1 Days
2	Start to hack floor by using the demolition hammer drill. Every inch of the floor in the room hacked to remove the unwanted floor that are cracked and dangerous to be use.	 Figure 3.5:Drilling the floor		-1 skilled labor	-hand rill machine	-3Days
NO	OPERATION	SEQUENTIAL DIAGRAM	MACHINERIES&PLANT	EQUIPMENT	LABOR	PERIOD



3	<p>Collect all the concrete waste from the hacking process of the floor. The waste from the concrete floor was collected to one place. All the concrete waste are put into the truck.</p>	 <p>Figure 3.6 :Collecting the concrete floor waste</p>	<p>- lorry</p>	<p>- wheelbarrow -board -hoe</p>	<p>-2 unskilled labor</p>	<p>-2Days</p>
4	<p>Lay the blue sheet for water proofing on the floor. Blue sheet was straddle carefully and neatly. Every inch and side of the room were straddle by the blue sheet. If there are an excess it will be cut by using a scissors.</p>	 <p>Figure 3.7: The blue plastic</p>		<p>-blue sheet -water proof membrane -scissor</p>	<p>-1 skilled labor -2 unskilled labor</p>	<p>-5 Days</p>
NO	OPERATION	SEQUENTIAL DIAGRAM	MACHINERIES&PLANT	EQUIPMENT	LABOR	PERIOD

5	<p>After that, put the reinforcement wire mesh A8 on the blue sheet of the floor which the proof membrane. The reinforcement are arranged neatly on the floor.</p>	 <p>Figure3.8: Wire mesh reinforcement</p>  <p>Figure3.9: Wire mesh reinforcement</p>		<p>-reinforcement bar A8 -plier</p>	<p>-1 skilled labor -3 unskilled labor</p>	<p>- 4 Days</p>
NO	OPERATION	SEQUENTIAL DIAGRAM	MACHINERIES&PLANT	EQUIPMENT	LABOR	PERIOD

6	<p>Mix a fresh concrete grade 25 to pour on the floor to create a good and hard concrete floor, using a concrete mixing lorry.</p>	 <p>Figure3.10: Process of concrete mixing</p>	-Concrete mixing machine	<ul style="list-style-type: none"> <li>-wheelbarrow</li> <li>-cement shovel</li> <li>-basket</li> <li>-hoe</li> </ul>	-4 unskilled labor	-1 Days
7	<p>Pour the cement into the wheelbarrow to bring it on the building for the floor maintenance purpose. Fresh concrete grade 25 was good for the floor maintenance process.</p>	 <p>Figure3.11: Cement concrete grade25</p>	-concrete mixing machine	<ul style="list-style-type: none"> <li>-wheelbarrow</li> <li>-cement shovel</li> <li>-basket</li> </ul>	-2 unskilled labor	-1 Days
NO	OPERATION	SEQUENTIAL DIAGRAM	MACHINERIES&PLANT	EQUIPMENT	LABOR	PERIOD


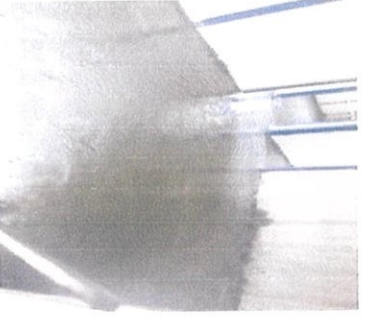



8	<p>Pouring the fresh concrete on the wire mesh reinforcement bar. The fresh concrete need to be lay at least two layers for good strength and to create a high durability of the floor.</p>	 <p>Figure3.12: Pouring the cement</p>	<ul style="list-style-type: none"> <li>-wheelbarrow</li> <li>-hoe</li> </ul>	<ul style="list-style-type: none"> <li>-2 unskilled labor</li> </ul>	<ul style="list-style-type: none"> <li>-4Days</li> </ul>
9	<p>A smooth layer was produce by using flattening tools. After pouring the cement, workers will level the fresh concrete to create a smooth surface and to form a floor finishes.</p>	 <p>Figure3.13: Floor finishes</p>	<ul style="list-style-type: none"> <li>-flattening tools</li> <li>-cement shovel</li> <li>-board</li> </ul>	<ul style="list-style-type: none"> <li>-1 skilled labor</li> <li>-2 unskilled labor</li> </ul>	<ul style="list-style-type: none"> <li>-5Days</li> </ul>

Table 3.2 Erecting of new wall

3.	Each corner of the wood join is tightened using nails and screws. Each vertical timber of frame is mounted first before the horizontal timber.	 <p>Figure 3.16: Installation wall frame</p>	-wood planner machine	-drill -screw -nail -hammer	-3 unskilled labor	-6Days
4.	Next step is cutting the plywood to size. Draw the line first on the plywood to make sure the cut lines are not curved and the plywood is neatly cut	 <p>Figure 3.17: Cutting plywood</p>	-wood cutting machine	-ruler -measuring tape -pencil -chalk	-1skilled labor -1 unskilled labor	-2Days
<b>NO</b>	<b>OPERATION</b>	<b>SEQUENTIAL DIAGRAM</b>	<b>MACHINERIES&amp;PLANT</b>	<b>EQUIPMENT</b>	<b>LABOR</b>	<b>PERIOD</b>

<p>5.</p> <p>Put up a plywood that has been cut to the frame carefully by using drill, screw, hammer and nail.</p>	 <p>Figure 3.18: Installation of plywood</p>		<p>-drill</p> <p>-screw</p> <p>-hammer</p>	<p>-2unskilled labor</p>	<p>-5Days</p>
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### 3.4 Determine problems occurred and solutions taken to solve the problem

Table 3.2: Problem and Solution

PROBLEM	SOLUTION
Lack of workers	<p>Lack of workers may cause the project not complete on time. The solution to prevent this to happen is by adding more workers at the site. This can reduce the problem and may complete the work of building maintenance on time.</p> <p>The total labor is 3 people and will be increase to 6 people were required.</p>
Exposed to the danger during the building maintenance	<p>Safety equipment is very much needed during maintenance. Use complete equipment during the service to protect self from danger and sharp things while the work is being done.</p> <p>The workers always need to be careful towards the surrounding area during the maintenance work.</p>

<b>PROBLEM</b>	<b>SOLUTION</b>
Materials that do not arrive on the due date	<p>Material that do not arrive on the due date may slow down the maintenance process. So to avoid this to be happen supervisor will always to be alert toward the supplier about the materials that will be distributed. If the requested material does not arrive on due date, the supervisor will liaise with the responsible managers.</p> <p>Finding other supplier that may supply good material like the other supplier as a backup plan.</p>
Too many pests (Termites and insects)	<p>Too many pests may cause more decaying wood.</p> <p>Pesticides have been used to kill all the insects.</p> <p>Collect all the decay wood and destroy it and replacing it with the new one</p>
Uncertain weather conditions	<p>During the uncertain weather conditions, the temporary tent was built to facilitate the convenience of the floor and the wall.</p>



## CHAPTER 4.0

### CONCLUSION

#### 4.1 Conclusion

The investigation is to analyse the resources (material and the costs) used for repairing the defects to the building at Balai Polis Banggol Judah, Kampung Banggol Judah, 18500, Machang, Kelantan. Material used for the building maintenance at Balai Polis Banggol are wood, reinforcement wire mesh, fresh concrete. The total cost for all the materials used in this project was Rm 20,745.0.

The investigation also studies the method of the building maintenance. In this case, the corrective method had been used to identify errors in order for equipment and assets to fail to be returned to operating conditions within the limits set for in-service operations. This method is suitable with the building maintenance at Balai Polis Banggol Judah as it is a simple process and can be detected easily the defect of the building, especially for the maintenance of the floor and the wall of the building. This method is quite different with other type of building maintenance which is preventive method.

Lastly, the investigation also determine problems occurred and the solutions taken to solve during the building maintenance. There were a few problems occurred during the maintenance. Among the problems during the construction are lack of workers, exposed to the danger during the building maintenance, materials were not supplied on the due date, too many pests (termites and insects) and uncertain weather conditions. All of these issues were resolved immediately so that all the work could be completed smoothly and completed on a set date.

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