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**FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING  
DIPLOMA IN BUILDING  
(AP116)**

**PRACTICAL REPORT TITLE  
CONSTRUCTION OF SEKOLAH KEBANGSAAN PARIT KUDUS USING  
LIGHTWEIGHT CONCRETE**

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It is recommended that the report of this practical training provided

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**Entitled**

**Practical Report Title**

Construction of Sekolah Kebangsaan Parit Kudus using lightweight concrete  
be accepted in partial fulfillment of requirement has for obtaining Diploma in Building.

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**FEBRUARY 2022**

**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 JKR (D) PONTIAN for duration of 20 weeks starting from 23 August 2021 and ended on 7 January 2022. 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**

This report will discuss the construction of Sekolah Parit Kudus using light weight concrete block (AAC) from Starken especially the construction of wall which including the bricklaying process . The objective of this report is to explain the construction of wall using lightweight concrete block by bricklaying process and next is to list the equipment and tools which are using for bricklaying the lightweight concrete block and construction of wall . Lastly, it is to identify the problem and solution of using lightweight concrete block in the construct of the wall.

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## CHAPTER 1.0

### INTRODUCTION

Lightweight concrete is a mixture made with lightweight coarse aggregates such as shale, clay, or slate which gives its characteristics low density. The density lightweight concrete are 90 to 115 lb/ft whereas the regular concrete weight are ranges from 140 to 150 lb/ft. With that, lightweight concrete are the ideal building modern structure that require minimal cross section in the foundation, (Specify Concrete, 2019).

A well-known product is the AAC, also called as Autoclaved Aerated Concrete in Malaysia. AAC can act as an insulator against sound, heat, fire, resistant agent to mold, water. AAC also can be used as internal wall, external wall, roof and floor. It also, easy and fast to be build where inexperienced workers to work it. AAC also has high insulation against thermal. It has steam curing process involve in high pressure because it physically properties of these AAC which are consisting of more than millions tiny air pocket which are not connected with each other (MKH, 2016)

The types of brick or block for wall that used in bricklaying works is light weight concrete block (AAC). AAC is completely devoid of any toxic or harmful chemicals and it is very environmentally friendly building material and method. AAC also low energy consumption, low raw material use, simplicity of use in construction, and improved indoor air quality are necessary (Pansar, 2015).

The compressive strength of light weight concrete (AAC) blocks is higher than the conventional clay bricks. These are appropriate for RCC-framed construction walls. The use of fly ash reduces the amount of cement used in the product, resulting in a decrease in greenhouse gas emissions. AAC blocks have a density that is 1/3 that of typical clay bricks, and there is no change in wet conditions. It aids in the reduction of the structure's dead load. (Pansar, 2015)

The cost of construction is reduced by up to 20% since the dead load of the wall on the beam is reduced, resulting in lighter components. Because both sides of an AAC block wall are straight, the thickness of the plaster is very thin, resulting in a significant decrease in the amount of cement and sand required for plastering. Because AAC is made from common and plentiful natural raw materials, it is very resource-efficient and environmentally (MKH, 2016)

There are many types of process for wall. However, the aim of this report is to discover the wall process in the construction by using lightweight concrete wall in bricklaying.

## **1.2 Objectives**

There are several objectives have been developed from these construction sites which are:

- i. To explain the process of construction for wall using lightweight concrete block in bricklaying. .
- ii. To list the equipment and tools for bricklaying and wall construction.
- iii. To identify the problem and solution of using lightweight concrete block.

### **1.3 Scope Of Study**

The scope of study carried out at Sekolah Kebangsaan Parit Kudus, Pontian, Johor. This project started in 10 December 2020 and the completion date will be on 22 December 2021. the cost was about (RM 5,009,000.00). The project is currently were still on going. Therefore, the focus of the study is to identify the construction of wall using lightweight concrete block which is bricklaying. Other than that, the study also just not focus about the process of bricklaying using lightweight concrete block but the equipment and tools. This study also includes the problems and solutions that are related to all of it.

## **1.4 Methods of Study**

### **1. Observation**

The observation is about how the process of bricklaying works until the finishes of the wall. For this observation approximately around 1-2 hours for the bricklaying works. But it depends on the length of the wall because the length of the wall determines how long it takes to finish the bricklaying process. It's also depending on the skilled workers how they carried out the process. However, according on the observation, it's only taken 2 weeks for the skilled workers did the bricklaying process at Sekolah Kebangsaan Parit Kudus. Meanwhile, for the finishes of the wall only took 1 to 3 days for the one section of the wall. . Usually, the observation of the wall construction process was documented by taking notes, taking pictures, and video recording of the skilled workers doing the bricklaying process.

### **2. Interview**

The interview is one of the ways for obtaining construction data by conducting an interview with a project manager or construction workers. During the observation, student will ask some questions to Encik Hafiz as a project manager who is responsible for handling the project at the construction site. The interviews were about the construction of Sekolah Parit Kudus using lightweight concrete block. This interview was also done by asking questions to the workers who were at the construction site. This interview was recorded by audio recorder from smartphone and writing some notes as a reminder, data and new knowledge about the process.

### **3. Document**

Documents review used to collect all the data for the construction. One of the documents that have been reviewed is document tender and construction drawing of project ‘ ‘ Meroboh Dan Bina Baru 3 BD Pendidikan Khas Di Sk Parit Kudus’’. This document tender and construction drawing are used as the reference at the site. It is also reviews about the profile of contractor’s company, standard operating procedures (SOP), progress of the construction, safety and health procedure.

## CHAPTER 2

### BACKGROUND OF COMPANY

#### 2.1 JABATAN KERJA RAYA DAERAH PONTIAN



Figure 2.1 : Jabatan Kerja Raya Logo

In 1872, the country's first career department was established. The JKR Pontian District Office is housed in its own structure. The Sultan Ismail building houses the original JKR Pontian office. In 1995, it relocated to its current location at JKR 1869 Jln. Alsagoff. The Pontian District PWD office is located on Jalan Alsagoff and has a total area of 1299 m<sup>2</sup>. It was built for RM 1 244 864.00 by the contractor Syarikat Zainal & Din Construction Sdn. Bhd. Previously, JKR administration was housed in the Pontian District Office, specifically the Sultan Ismail Building. It moved into this new structure in 1955.

JKR Pontian District is led by a number of units that each serve a specific purpose. JKR Pontian is in charge of infrastructure development and serves as a Technical Consultant to other Pontian District Departments. The JKR Pontian organization, which is led by a District Engineer, has 118 State Service officers and staff, as well as 13 Federal Service officers. JKR Pontian's structure is divided into five major parts and a unit breakdown.

There are five departments in JKR Daerah Pontian :

- i. Department of Building
- ii. Department of Quantity Surveyor
- iii. Department of Road and Facilities
- iv. Room of Architecture Plan
- v. Administration and Financial Department

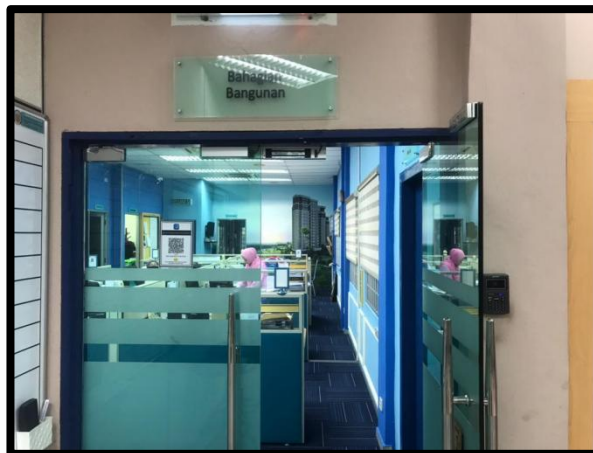


Figure 2.2.1: Department of Building Main Entrance





Figure 2.2.2: Department of Quantity Surveyor

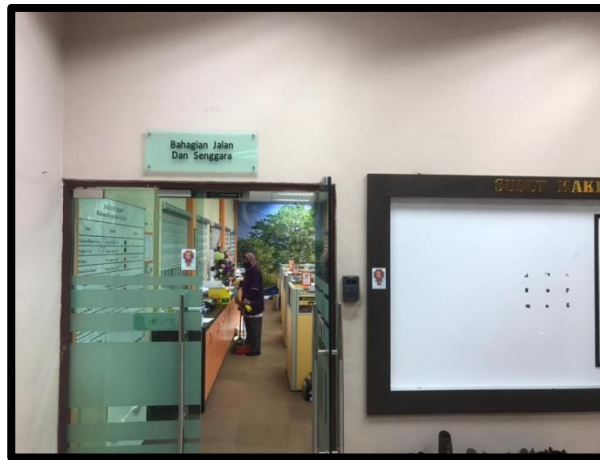


Figure 2.2.3: Department of Road and Facilities Main Entrance



Figure 2.2.4: Room of Architecture Plan Main Entrance



Figure 2.2.5: Administration and Financial Department Main Entrance

## 2.2 COMPANY PROFILE



Figure 2.2 JKR building

<b>Name of Company</b>	JABATAN KERJA RAYA DAERAH PONTIAN
<b>Address</b>	Jalan Alsagoff (430.55 km) 82000 Pontian Kecil, Johor, Malaysia
<b>Contact Number</b>	07-6871388
<b>Email</b>	pontian@jkr.gov.my
<b>Core Business</b>	<ul style="list-style-type: none"> <li>i. Planning, designing and construct infrastructure project</li> <li>ii. Appointed as technical service advisor toward the government</li> <li>iii. Main consultant toward Pontian's government to complete the project within the time and also on budget.</li> </ul>

## **2.2.1 VISION, MISSION AND OBJECTIVE**

### **VISION**

To become an international standard of service provider and centre of excellence in asset management, project management and engineering for country infrastructure development based on sense of behavior which are creative and innovative as well as latest technology.

### **MISSION**

Our mission is to contribute for national development with:

- i. Help customer realizing basic goal and deliver services through cooperation as strategic partner
- ii. Our process and system were standardized for outcome services that are consistent
- iii. Provide an asset management services and effective and innovative project
- iv. Prioritize integrity in services
- v. Built a harmonies relationship with community
- vi. Protect the environment in deliver the services

## **OBJECTIVE**

Deliver products and perform maintenance services that are timely, quality and cost specified to achieve optimal asset benefits.

## 2.3 ORGANISATION PLAN

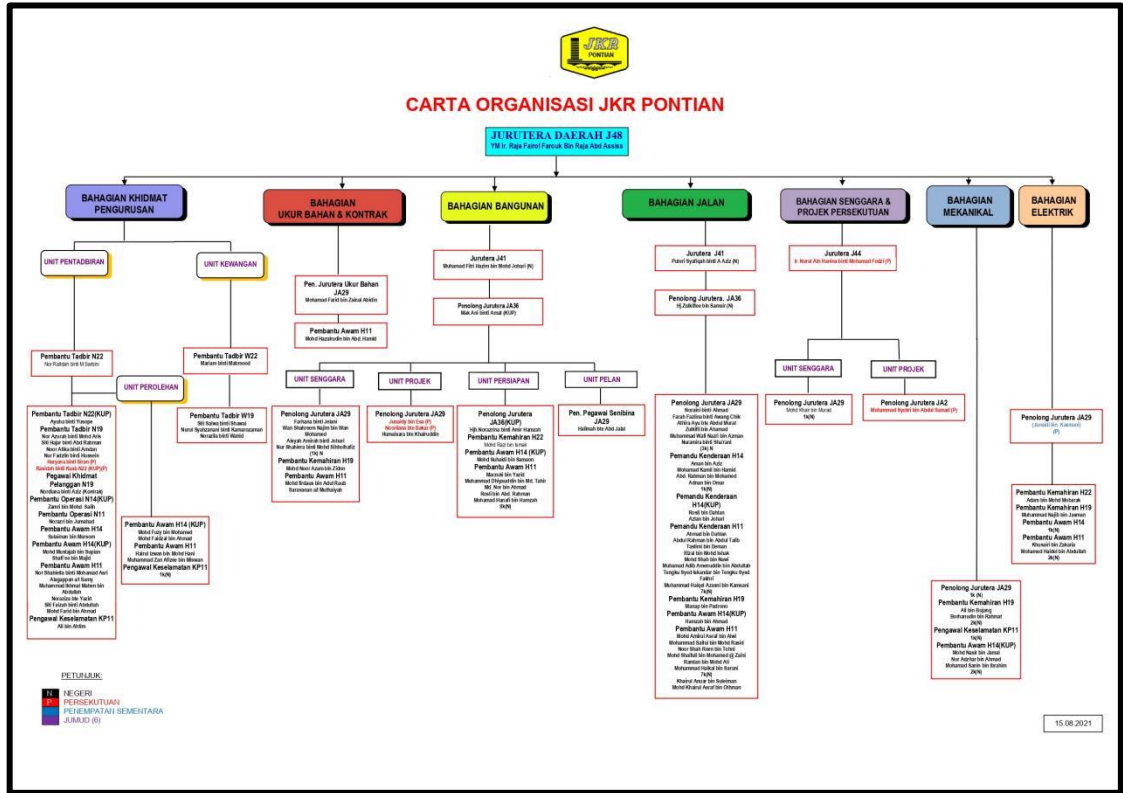


Figure 2.3.1: Organization Chart JKR Pontian

### 2.3.1 NUMBER OF WORKERS

Total number of workers in Jabatan Kerja Raya Daerah Pontian are 60 workers. There are five main department all together. Other than that, 60 workers also included the clerks, guards and company car's drivers.

## 2.4 LIST OF PROJECTS

Jabatan Kerja Raya Daerah Pontian responsible with planning, designing and consult infrastructure project such as road, government buildings, airport, jetty, and other product that related.

There is the list of projects at Jabatan Kerja Raya Daerah Pontian that still ongoing:

Table 2.4.1: Project On-Going

No.	Project Title	Project Value	Start Date	Completion Date	Project Duration	Client
1.	Daif Johor (2020) - Meroboh Dan Bina Baru 3 Bd Pendidikan Khas Di Sk Parit Kudus	Rm 5,009,000.00	10/12/2020	22/12/2021	54 Weeks	Kementeri an Pendidika n Malaysia
2.	Projek Naiktaraf Jalan Dari Pekan Nenas Ke Tanjung Piai, Daerah Pontian, Johor	Rm 65,664,193.33	09/06/2017	27/06/2021	4 Years 18 Days	Kementeri an Pembangu nan Luar Bandar

3.	Kerja-Kerja Penyelenggaraan Jalan Di Laluan Ft005 Jalan Johor Bahru-Melaka Seksyen 80.00-83.50	Rm 500,000.00	28/09/2021	22/11/2021	8 Weeks	JKR (D) Pontian
4.	Kerja-Kerja Penyelenggaraan Di Rumah Kenamaan Daerah Pontian, Johor.	Rm 180,950.00	20/09/2021	12/12/2021	12 Weeks	JKR (D) Pontian
5.	Kerja-Kerja Naiktaraf Dan Pemulihan Bangunan Mahkamah Di Seluruh Malaysia (Negeri Johor)	Rm 364,339.00	26/05/2021	12/09/2021	18 Weeks	Jabatan Peguam Negara



There is the list of projects at Jabatan Kerja Raya Daerah Pontian that already completed:

Table 2.4.2: Project Completed

No.	Project Title	Project Value	Start Date	Completion Date	Project Duration	Client
1.	Cadangan Menyiapkan Baki Kerja Bagi Klinik Kesihatan 3 (Kk3) Cermai 2 Dan Kuarters Benut, Pontian, Johor (Fasa 2 : Kerja Bangunan Dan Lain-Lain Kerja Berkaitan)	Rm 3,988,000.00	18/04/2019	17/08/2020	12 Months	Kementerian Kesihatan Malaysia
2.	Pembinaan Semula Dan Menaiktaraf Sekolah Daif Tahun 2019 Di Sekolah Kebangsaan Parit Markom,Pontian,Johor	Rm 893,333.00	17/06/2019	01/12/2019	24 Weeks	Kementerian Pendidikan Malaysia
3.	Pembinaan Padang Bola Sepak Tiruan Di Padang Bola Sepak Taman Megah,Pontian, Johor	Rm 3,763,000.00	02/04/2018	31/03/2019	52 Weeks	Majlis Daerah Pontian

4.	Cadangan Menaiktaraf Jalan Parit Ibrahim Dan Jalan Parit Jawa,Pontian, Johor	Rm 23,214,000.00	18/04/2018	18/02/2020	23 Months	JKR Johor
5.	Membina Dan Menyiapkan Sebuah Masjid Baru Di Kg. Seri Bunian,Pontianm Johor	RM 1,610,568.00	23/08/2009	13/01/2011	5 Months	Pejabat Agama Daerah Pontian
6.	Membina Dan Menyiapkan Sebuah Masjid Dan Lain-Lain Kerja Berkaitan Di Kg.Perpat Timbul,Serkat,Pontian ,Johor	RM 1,678,460.00	04/04/2011	02/07/2011	3 Months	Pejabat Agama Daerah Pontian
7.	Membina Dan Menyiapkan Sebuah Masjid Dan Lain-Lain Kerja Berkaitan Di Kg. Permatang Palas,Pontian,Johor	RM 1,589,060.00	24/01/2011	29/05/2011	4 Months	Pejabat Agama Daerah Pontian

8.	Membina Dan Menyiapkan Sebuah Masjid Di Kg Maju Jaya,Pekan Nenas,Pontian Johor	RM 1,884,547.40	13/12/2007	24/04/2009	1 Years 4 Months	Pejabat Agama Daerah Pontian
9.	Membina Dan Menyiapkan Satu (1) Blok Tiga (3) Tingkat Bangunan Pejabat Pendidikan Daerah,Pontian,Johor	RM 4,207,620.00	10/10/2010	18/01/2011	13 Weeks	Kementerian Pelajaran Malaysia
10.	Membina Dan Menyiapkan Satu (1) Blok Empat (4) Tingkat Bangunan Gantian Dan Lain-Lain Kerja Berkaitan Di Sek. Keb. Ayerr Baloi,Pontian,Johor	RM 5,363,314.00	26/06/2010	16/12/2021	25 Weeks	Kementerian Kerja Raya
11.	Membina Dan Menyiapkan Satu (1) Blok Empat (4) Tingkat Bangunan Gantian Dan Lain-Lain Kerja Berkaitan Di Sek. Keb.Kg Baru Penerok,Pontian Johor	RM 4,8887,901.80	05/05/2009	03/02/2011	1 Year 9 Months	Kementerian Pelajaran Malaysia

## CHAPTER 3.0

### CASE STUDY

#### 3.1 Introduction to Case Study

The case study is about construction of wall which is the process of bricklaying using lightweight concrete block (AAC). The project where has started the construction in 10 December 2020 and predictions for completion date on 12 December 2021. The total cost of these construction project are approximately Five Million Nine Thousand Ringgit Malaysia (RM 5,009,000.00). Currently, the project progress is still on going. The site location took place at the Sekolah Kebangsaan Parit Kudus, 82000 Pontian, Johor With that, this case study will be explained methods of bricklaying work for wall including the equipment and tools that used in the methods of bricklaying work for wall and the problem and solution that related with wall.



Figure 3.1: Location of site based on the satellite map

Source: <https://www.google.com.my/maps>

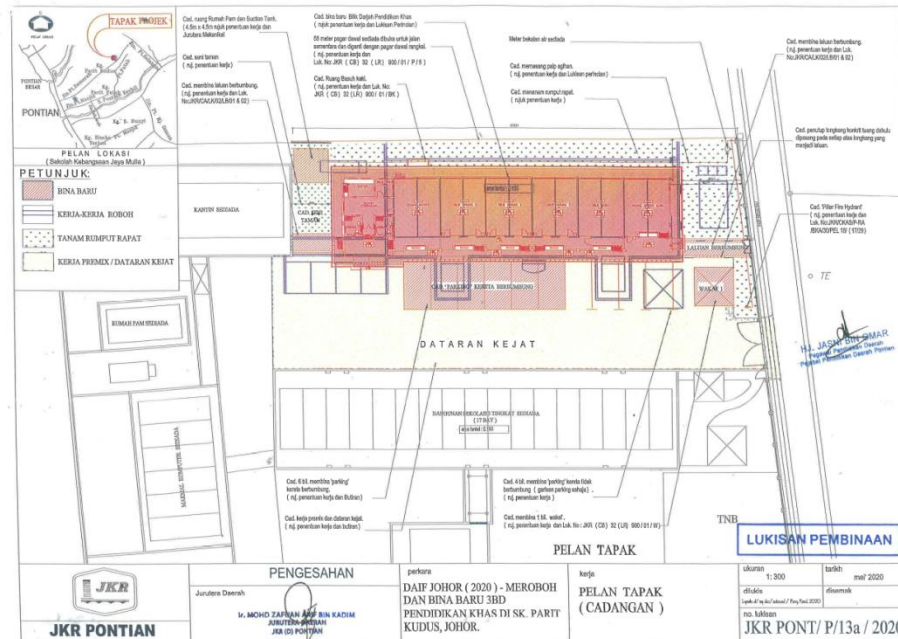


Figure 3.1.2: The location, site and key plan of the project

The project construction located at Parit Kudus, 82000 Pontian, Johor. This construction area is facing the road of Jalan Parit Semerah – Parit Kudus. Because it is located far from the Pontian city area,

According to the building's drawing plan, the building's length is 42,500 mm and its width is 9,300 mm. There were many partitions wall in this building such as 6 rooms which is 3 units of classroom, 2 units of teacher's activities area and 1 unit of multipurpose area. Besides, there was also toilet, walkway, self-care room and kitchen area right next to it

The activities that have been carrying out on the site currently is bricklaying work. It is because they are going to construct the wall for these projects. Thus, this work needs to be handled by skilled workers to complete it.. The tools that are using during this construction are wheelbarrow, gauging towel, metal float, trowels, hawks, scaffolding, spirit levels, concrete mixers, bucket, string line and pins, hammer, saw, mixing drills, shovels, measurement tape and etc. The columns and the roof beam must have been done first before construct the bricklaying. After that, the string will be attached with the

brick pin and pulled from each column to another column to make a line as a mark for bricklaying work. To create a straight wall, the bricks will be tied together and guided by a string.

At lastly, the time used for the brick laying process will be explained from the first process of bricklaying until the finishes process for wall. Last but not least, the problems of bricklaying process will be determining throughout the construction process including the solutions of the problems of this process. This chapter will be focused on the construction of wall by the process of bricklaying, the equipment and tools that have been use for bricklaying process and the problem and solution that related with wall.

### **3.2 Process of the wall construction using lightweight concrete block**

#### **I. Clearing the place**



Figure 3.2.1 place clearance

Firstly, before the bricklaying process starting, the workers do some clearance of unnecessary items at the bricklaying place. With is of any dangerous item or materials such as rusty nails or etc. This first step of clearance the place of bricklaying is very important because it will make and help the works do their bricklaying more easily with the safety environment and it can prevent any unnecessary accident or injuries from occur during the process

#### **II. Mix the cement according to the ratio**



Figure 3.2.2 The mix of cement mortar

the next after clearing the place the workers mix the cement mortar according to the ratio that are required and follow based on the drawing plan to start the bricklaying. The mortar are mix by the workers on site using the equipment such as shovel. The estimated material that will be used on site for the bricklaying process are usually handle by the skilled worked. Witch is because there are more skillful and knowledge for the construction. After the mortar as the according to the accurency with the texture are good the bricklaying process will begin.

### **III. Install pin and guid line**



Figure 3.2.3 pin and guide line

The first step of bicklaying is the workers install the pine and the line. This it is to act as the guideline for the workers during the bricklaying. This pin and line function are to ensure that the brick stays straight through the process for the it to stay aligned during the work in progress. Between the 2 building a thread was inserted. It is for marking the brick wall line. This brick walls that are above a meter in length should be build with aid. If the line break the ends should be correctly spliced rather that tied together with knot



#### IV. laid the concrete and bitumen



Figure 3.2.4 laid of rough concrete



Figure 3.2.5 laid of bitumen

The next step of bricklaying is the workers laid the rough concrete straight to the floor and then after that the worker will cover it with the layer of bitumen in the quantities that are needed. The function of the bitumen are acted as glue to make the damp proof course (DPC) stick properly together to the rough concrete and it also act as the barrier to prevent the wall from ansorb moisture. It was generally put in the basement level.

**V. Install the damp proof course and laid the concrete again.**



Figure 3.2.6 damp proof course (DPC)

The third step of bricklaying is the workers install the damp proof course (DPC) after the workers laid the rough concrete and the bitumen. The damp proof course (DPC) will be on top of the mix of rough concrete and bitumen layer for the second process which will be glued by the bitumen. The function of these damp proof course (DPC) are for prevent the wall absorb moisture from the ground. The damp proof course (DPC) will restrict the movement of moisture through walls from floor. Damp proof course generally on the basement level. The

**VI. The apply of cement mortar and placing of the lightweight concrete block (starken)**



Figure 3.2.7 bricklaying of lightweight concrete block

The fourth of these process after the install and pour the bitumen, rough concrete and damp proof course(DPC). The workers then apply the a mix of cement mortar. With are made of standard cement, sand and water with trowel to cover the rough concrete, bitumen and damp proof course (DPC) . Then the lightweight concrete block are placing on top of the cement mortar. Apart from that, a small amount of cement mortar was apply on the top of the first lightweight concrete block and on the side as well before placing another block at the downward angle guided by the sprint level and line from the strings pinned in between the wall columns. Then, this process was repeated until the third layer of bricklaying was completed.

#### **VII. Install of wire mesh and plastering work.**






Figure 3.2.8 wire mesh




Figure 3.2.9 plastering work( finishes touches)

In this step, after the brick were laid with every 3 or 4 layer of the mix of cement mortar The workers will install the wire mesh on to the layer of the lightweight concrete block wall. This will be based on the length of the wall. It is because to prevent wall from collapsing by absorb stress and vibration of the building. Until it reached the height of the roof beam, this process will be continued by the workers by using the scaffolding. Lastly the workers will do the finishing touches were plastering works to complete the whole process of wall construction. With that th wall surface will be more smooth and clean to complete th whole process.

### 3.3 The Equipment and Tools used in Wall Construction

Tools and Equipment	Description
<p>1. Wheelbarrow</p>  <p>Figure 3.3.1 wheelbarrow</p>	<p>Wheel barrow are equipment that are commonly used and in construction field. These wheel barrows are designed to be pushed or guided by one person. The function of wheel barrow in construction are for carrying the heavenly load such as dirt's, rock, sand, or light weight concrete block. This item make the workers work more easily and efficiently.</p>
<p>2. Trowel</p>  <p>Figure 3.3.2 trowel</p>	<p>Trowels are equipment that are used and can be seen in the construction field. The workers use the trowel for the digging, applying, smoothing and mixing for the particular material such as cement, sand, etc. The common trowels that are used in this construction are masonry trowel.</p>
<p>3. Bucket</p>  <p>Figure 3.3.3 bucket</p>	<p>Bucket are one of the usually equipment that are used at the construction field. It is because bucket has many functions. The function of bucket in this case is the workers will use it to carry out the mix of cement mortar or water to the spot that are needed. With this bucket it make the workers Job for efficiently and fast</p>

<p>4. Shovel</p>  <p>Figure 3.3.4 shovel</p>	<p>Shovels are also the equipment that is needed during construction project. The function of these shovel are for to shove the sand. The workers also using it to mix the cement mortar mix until it complete before putting it into bucket. These are equipment that also help the workers at the field construction.</p>

### 3.4 The Problems and Solutions in Wall Construction

#### 1. **Problem: Containing Dirt or Mold in the lightweight concrete block**

This problem is happened because of the exposure of the block to the pollution and other airborne particles that attached to the block or mortar. it's not typically damaging to the bricks but it does compromise the overall look of the brick. Over time the block will get dirty or mold growing on it if not care.

- **Solution: Clean the wall with water and plaster**

The lightweight concrete block surface as gently can be cleaned with water from the dirt, dust and mold. To protect the lightweight concrete block surface from dirt the wall can also be plastered while covering the mold on the wall. This will result in a cleaner and more smooth wall surface.

## **2. Problem: Shrinkage**

The lightweight concrete block absorbs the water from the ground or surrounding that causing it swell and then shrink when the water evaporates. It is because it is a porous material the shrinkage then causes cracks in bricklayer joints when it happen . It will cause damage on wall finishes after it is installed.

- **Solution: Installation of the Damp Proof Course**

Before the brickwork work begins the workers need to be installing the damp proof course on the floor below the bottom of the wall so the shrinkage can be prevented. Damp proof course used to prevent damp rising through the walls. The damp proof course is installed beyond the width of the brick wall. It is because to obtain better protection of the block from being absorbed by the wate

## **3. Problem: Bricklaying Level is Unstraight**

The quality of brickwork isff important to load bearing wall because the poor quality of brickwork affects the structural integrity. The level become un straight when the workers too depend on the string line as a guide in brickwork. It also happened when the workers do not measure the height of the mortar while doing the brickwork.

- **Solution: Used Laser Level and Spirit Level**

The bricklaying level problem can be fixed by using the bricklaying laser level because laser is a light. A light will travel in straight lines and it helps the workers laying the brick in the straight line. The brickwork will be neater when used laser level than string as a guide because it can be adjusted and portable hence it will also save more time. Use spirit level while doing the brickwork with the laser level to check the level of the wall to get a better result.

## **CHAPTER 4.0**

### **CONCLUSION**

#### **4.1 CONCLUSION**

In this report the conclusion the construction of wall using lightweight concrete block (AAC) has many process and step in order to full construct, from the mix to bricklaying and to plastering. By completing this report and learn from the practical, we managed to gets many experience and knowledge that are good for the future in use,

Next, we also get to fell the environment of the working place and see how the workers works to complete this project from the start until finished. By doing these practical, apart from see the works, we also learn so many things from the engineer at our working place and many more workers. We also learn many things from this report and many other project , such as what equipment that are needed in order to complete this project, which is from scaffolding, wheelbarrow and etc.

In this practical also walkthrough us step by step of these project from meeting until the date of completion of this project. And it also teaches us the step by step such as the process of bricklaying. From the mix of the cement mortar until the applying of wire mesh and plastering job. In this bricklaying we learn from the workers about the arrangement of these lightweight concrete blocks (AAC).

Lastly, from the report also we managed to tell the problem, solution and benefit or advantages of lightweight concrete block in wall construction at this project. With that we managed to working and feel confident of these constructions environments and for the future.



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