



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

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

**THE BRICKLAYING WORKS FOR WALL AT SEKOLAH KEBANGSAAN
PARIT KUDUS**

Prepared by:

MUHAMMAD FAKHRI ZHARFAN BIN AZMAN

2019296066

**DEPARTMENT OF BUILDING
FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING
UNIVERSITI TEKNOLOGI MARA
(PERAK)**

AUGUST 2021

It is recommended that the report of this practical training provided

By

MUHAMMAD FAKHRI ZHARFAN BIN AZMAN

2019296066

entitled

THE BRICKLAYING WORKS FOR WALL AT SEKOLAH KEBANGSAAN PARIT KUDUS
be accepted in partial fulfillment of requirement has for obtaining Diploma in Building.

Report Supervisor : Wan Nordiana Binti Wan Ali

Practical Training Coordinator : Dr. Nor Asma Hafizah Hadzaman

Programme Coordinator : Dr. Dzulkarnaen Bin Ismail.

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AUGUST 2021

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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Name : MUHAMMAD FAKHRI ZHARFAN BIN AZMAN

UiTM ID No : 2019296066

Date : 23 AUGUST 2021

ACKNOWLEDGEMENT

First of all, I would like to show my gratefulness to God because I manage to complete this task with His gratitude. Without His help, I absolutely unable to complete this task smoothly. Then, I also want to say thank you to my reliable helpful lecturer, Puan Wan Nor Diana Wan Ali for her effort to provide guidance and the opportunity to let me experience and go more deep understanding in completing this report. I was blessed.

I would like to thank En.Mohamad Fitri Hazim Bin Mohd Johari for accepting me to take part in industrial training at JKR (D) PONTIAN and provides the best learning environment for me. He also presents and explains many things in the building sector, which might indirectly enhance my understanding in the field. Furthermore, En.Farid and all staff who willingly to support and encourage me went through my time in the company, I would like to give the biggest appreciation to them.

I am grateful to, Puan Wan Nordiana Binti Wan Ali, Supervising Lecturer, Dr. Nor Asma Hafizah Hadzaman, Practical Training Coordinator, and Dr. Dzulkarnaean Bin Ismail, Programme Coordinator, for the time, effort, encouragement, and ideas that they have contributed.

Next, I also want to thank to my fellow friends which they were willing to help me whenever I feel lost during doing this report by giving some information that might helpful. Even, they have their own work to do. They have given me with new ideas about the task and lend me a hand to help on some matters that I could not quite handling throughout completing this report. Last but not least, I would like to thank to my beloved parents for their sacrifices over the years. Finally, I learn many new things and gain more experience during my internship process. I will treasure them for future when I have entered the real working experience in this field.

ABSTRACT

Brickwork is a masonry made by a bricklayer using bricks or block and mortar in building construction. A masonry wall's purpose is to transmit weight from the roof to the foundation. It is also to support roofs, floors, weather protection and seclusion. This report will discuss about the brickworks for the wall of the building using light weight concrete block (AAC) from Starken. It's used in both internal and external wall where loading slightly more restricted. This report also was conducted for The Construction of 3 Units of Classroom at Sekolah Kebangsaan Parit. The objective of this report is to d the methods of bricklaying work for wall and the way how it carried out. It's also to investigate the equipment and tools that used in the methods of bricklaying wall construction. This report will also look to at the problem and the solution that related in wall construction that would fulfill the criteria from what client need.

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CHAPTER 1.0

INTRODUCTION

Brickwork is a masonry made by a bricklayer using bricks or block and mortar in building construction. In most developing countries, masonry is used as a main structural material for building construction (Kimiuro Meguro,2004). Masonry is a composite material made up of various units, various types of arrangements with or without mortar, and used in a variety of buildings (Hugo,2019). It is frequently a cost-effective and low-energy option to reinforced concrete for wall building. Apart from providing the dual functions of carrying load and enclosing space, structural masonry has a high level of fire resistance, thermal insulation, and sound insulation (K.B.Anand,1999).

The type of brick or block for the wall that is used in bricklaying works is Autoclaved aerated concrete (AAC). Autoclaved Aerated Concrete (AAC) blocks are made of fly ash, aluminum powder and water and the manufacturing process of AAC blocks does not cause any environmental problems (Shweta O. Rathi,2016). The Autoclaved aerated concrete (AAC) is light-colored and has several small spaces that can be seen when examined closely (Kamal,2020).AAC blocks are lightweight, high-strength,have good durability, heat-retaining, sound-insulating and fire-resistant.Furthermore, AAC block is designated as a green building material since it is permeable, non-toxic, reusable and it can be utilized for commercial, industrial, and residential construction (Shweta O. Rathi,2016). So that,it is the reason construction nowadays use AAC blocks rather than traditional blocks.AAC blocks very environmentally friendly building material and method.

AAC is relatively easy to work with because of its variety of sizes and is easy to cut and shape. However, it requires careful and precise placement. It requires skilled workers and efficient supervision while doing the work of installing bricks. Compared than traditional bricks, AAC blocks make construction easier and faster and can reduce the bricklaying process and construction time by 20% (Kamal,2020).

Last but not least,there are many types of process for wall. However, the aim of this report is to discover the bricklaying work for wall in the construction.

1.2 Objectives

There are several objectives have been developed from this construction site which are:

- i. To determine the methods of bricklaying work for wall.
- ii. To investigate the equipment and tools that used in the methods of bricklaying work for wall
- iii. To study the problem and solution that related with wall.

1.3 Scope of Study

The scope of study has been carried out at Sekolah Kebangsaan Parit Kudus, Pontian, Johor. The project had been started in 10 December 2020 and the completion date will be on 22 December 2021. The construction is about 3 Unit of Classroom and the cost was about (RM 5,009,000.00). The project is currently were still on going and there's a lots of work that need to do before the completion date. Therefore, the focus of the study is to identify the methods of bricklaying work for wall. Other than that, the study also just not focus about the method of wall bricklaying process but also including the advantages of using light weight concrete block (AAC), stretcher bond during bricklaying, finishes for the wall, as well as equipment and tools. Moreover, this study also include the problems and solutions that are related to all of them.. Despite the fact, that the study does not focus on the entire process, it does only focus on bricklaying work. However, there are three techniques of study that are commonly used to obtain additional information and data about the construction, which are observation, interviews, and document reviews to complete the data for the report.

1.4 Methods of Study

1.4.1 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 until the finishes wall. 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. However, if the wall has opened such as windows and doors, it will take around 5 days for the finishes because it requires ability and need to be done properly. 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.

1.4.2 Interview

The interview is one of the ways for obtaining construction data by conducting an unstructured or semi-structured interview with a project manager or construction workers. Usually, after doing the observation, the unstructured interviews will start between student and Encik Hafiz as a project manager who is responsible for handling the project at the construction site. The interviews were about the process of bricklaying while the workers doing the bricklaying works. Not just interview about bricklaying works, Encik Hafiz also will explain about the material that they used and etc. This interview was also done by asking questions to the workers who were at the construction site while they doing the bricklaying works. This unstructured interview was recorded by audio recorder from smartphone and writing some notes as a reminder, data and new knowledge about the process.

1.4.3 Document

Documents review was 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 will be used as the reference at the site that under monitoring for brickwork process It is also reviews about the profile of contractor’s company, standard operating procedures (SOP), progress of the construction, safety and health procedure. The pictures that were taken by workers also the best reference during the document reviews.

CHAPTER 2

COMPANY BACKGROUND

2.1 JABATAN KERJA RAYA DAERAH PONTIAN



Photo 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 m². 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

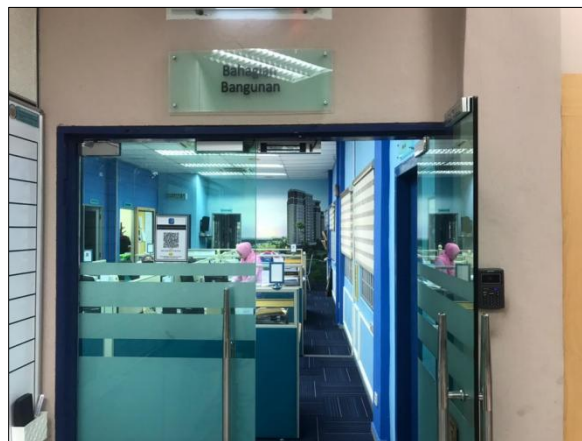


Photo 2.1.1: Department of Building Main Entrance



Photo 2.1.2: Department of Quantity Surveyor



Photo 2.1.3: Department of Road and Facilities Main Entrance



Photo 2.1.4: Room of Architecture Plan Main Entrance



Photo 2.1.5: Administration and Financial Department Main Entrance

2.2 COMPANY PROFILE



Photo 2.2.1: Main Entrance JKR Daerah Pontian

Table 2.2.1: Company Profile

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

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

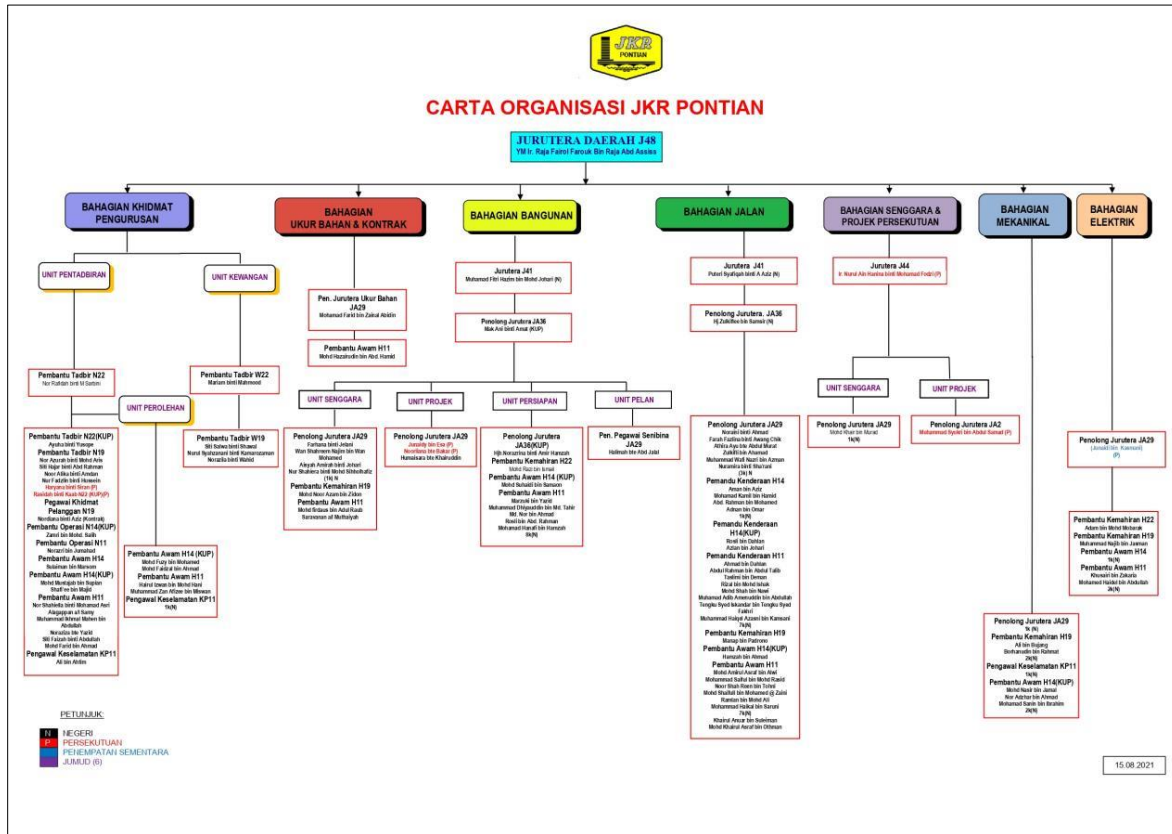


Photo 2.3.1: Organization Chart JKR Pontian

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 driver

2.4 LIST OF PROJECTS

There is the list of projects at Jabatan Kerja Raya Daerah Pontian that on-going:

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	Kementerian Pendidikan 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	Kementerian Pembangunan 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 Pontian
4.	Kerja-Kerja Penyelenggaraan Di Rumah Kenamaan Daerah Pontian, Johor.	Rm 180,950.00	20/09/2021	12/12/2021	12 Weeks	JKR 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	Rm 893,333.00	17/06/2019	01/12/2019	24 Weeks	Kementerian Pendidikan Malaysia
3.	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

4.	Cadangan Menaiktaraf Jalan Parit Ibrahim Dan Jalan Parit Jawa,Pontian,	Rm 23,214,000.0 0	18/04/2018	18/02/2020	23 Months	JKR Johor
5.	Membina Dan Menyiapkan Sebuah Masjid Baru Di Kg. Seri Bunian,Pontian,	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. Permatang Palas,Pontian, Johor	RM 1,589,060.00	24/01/2011	29/05/2011	4 Months	Pejabat Agama Daerah Pontian
7.	Membina Dan Menyiapkan Satu (1) Blok Empat (4) Tingkat Bangunan Gantian Dan Lain-Lain Kerja Berkaitan Di Sek. Keb.Kg Baru Penerok,Pontian	RM 4,8887,901.8 0	05/05/2009	03/02/2011	1 Year 9 Months	Kementerian Pelajaran Malaysia
8.	Membina Dan Menyiapkan Satu (1) Blok Tiga (3) Tingkat Bangunan Pejabat Pendidikan Daerah,Pontian,	RM 4,207,620.00	10/10/2010	18/01/2011	13 Weeks	Kementerian Pelajaran Malaysia

9.	Membina Dan Menyiapkan Satu (1) Blok Empat (4) Tingkat Bangunan Gantian Dan Lain-Lain Kerja Berkaitan Di Sek. Keb. Ayer Baloi,Pontian,	RM 5,363,314.00	26/06/2010	16/12/2021	25 Weeks	Kementerian Kerja Raya
10	Membina Dan Menyiapkan Sebuah Masjid Dan Lain-Lain Kerja Berkaitan Di Kg. Perpat Timbul,Serkap, Pontian	RM 1,678,640.00	04/04/2011	02/07/2011	3 Months	Pejabat Agama Daerah Pontian

CHAPTER 3.0

CASE STUDY

3.1 Introduction to Case Study

The case study is about bricklaying work for wall construction. The project where has started the construction in 10 December 2020 and predictions for completion date on 12 December 2021. The cost of construction approximately Five Million Nine Thousand Ringgit Malaysia (RM 5,009,000.00). Currently, the project progress is still on going. Thus, the study will be explained not only methods of bricklaying work for wall but including the equipment and tools that used in the methods of bricklaying work for wall and the problem and solution that related with wall. The site location took place at the Sekolah Kebangsaan Parit Kudus, 82000 Pontian, Johor.



Photo 3.1: Location of site based on the satellite map

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

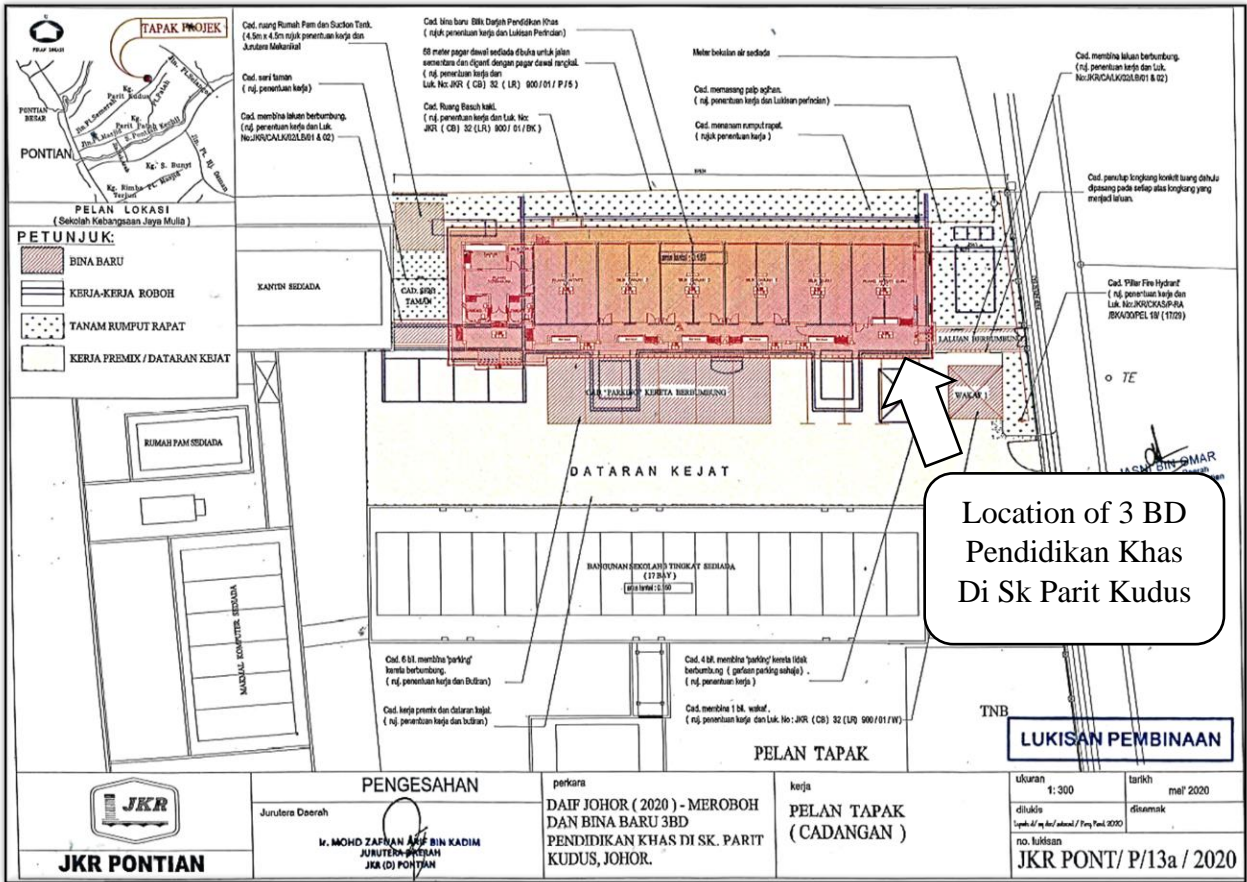


Photo 3.1.1: The location, site and key plan of the project

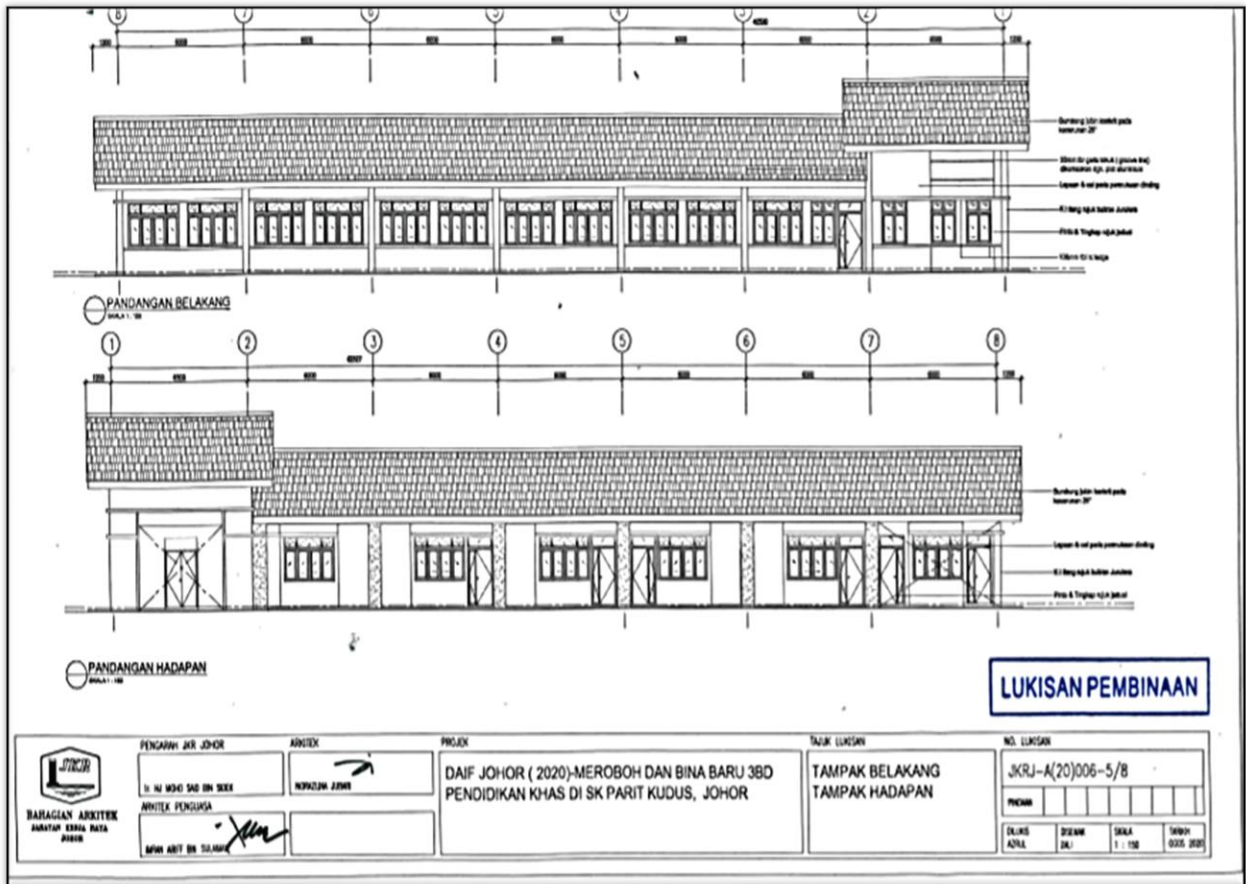


Photo 3.1.2: Side Elevation

The construction project was 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, the area is quite secluded. The main building close to this construction area is Surau Kampung Parit Kudus. Existing residential areas such as Kampung Parit Jawa, Kampung Parit Kuchi, Kampung Parit Bengkok, Taman Rakyat, and Taman Saujana are located near at the construction site.

The activities that have been carry out on the site is bricklaying work. This uneasy work needs to be handled by skilled workers to get a perfect wall bonding. There are also several unskilled workers that help mix the mortar and bring it with the bricks to the construction site to save the time of bricklaying process. Wheelbarrow, gauging towel, metal float, trowels, hawks, scaffolding, spirit levels, concrete mixers, bucket, string line and pins, hammer, saw, mixing drills, shovels, and measurement tape are among the machines and tools used in this construction.

Following that, 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. Before start bricklaying work, the columns and the roof beam must have been done first. 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. This process will take a long time as it requires precision.

Therefore, the brick laying process will be recorded started 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. The solutions of the problems also will be state after determine the problem of the process. This chapter will be focused on the method of bricklaying, the equipment and tools that have been use for bricklaying process and the problem and solution that related with wall.

3.2 To Determine the Method of Brick Laying Work for Wall

i. Site Planning



Photo 3.2.1: Building Site Construction.

First and foremost, the bricklaying process begins with site planning, which refers to the length and height of each wall in the building based on the drawing plan. The length of the wall was measured from one end of the building to the other. Meanwhile, the height of the wall was measured from the ground floor to the roof beam of the building. Following that, the contractor calculates the amount of brick that will be required. The contractor then goes to the construction material store and purchases the correct type and quantity of brick. The amount included 3% to 4% wastage for bricks. The type of brick used in the construction is Autoclaved Aerated Concrete (AAC) Block. The brick's dimensions are 600mm in length, 100mm wide, and 200mm height.

ii. Clean The Floor



Photo 3.2.2 : The floor of building that have been cleaned before bricklaying process.

Unnecessary items at the construction site were removed by the workers. In order to make sure the floor where the bricks will be placed are clean and does not have any dangerous material such as rust nail and etc. This is very important in the process of bricklaying wall to make it easier for workers to layering bricks on a flat surface. Besides, it can avoid any obstacles or accident during the process such as stepped on the rust nail that can cause injuries to the workers.

iii. Lift The Brick



Photo 3.2.3: The brick was lifted by the workers using wheelbarrow

Before starting the bricklaying wall process, the workers used a wheelbarrow to transport the bricks to the construction site. The bricklaying work becomes easier after the bricks have been lifted and brought to the construction site. The workers need to put the brick carefully to avoid AAC Block from breakage. Other than that, the usage of this wheelbarrow does not require a large number of worker or a lot of energy better than the workers carry the brick, this approach can save time during the bricklaying process.

iv. Mix The Mortar



Photo 3.2.4: Mortar are mixed using the shovel

Moreover, to carry out the bricklaying process the worker has to mix the cement mortar according to the required ratio based on the drawing plan. Workers on-site mix the mortar using shovels. Those with high construction knowledge and skills usually know the estimated materials that will be used in mixing cement mortar. The process will begin when the texture for the cement is according to the desired accuracy.

v. Pin And Line



Photo 3.2.5: Pin and Line

The pin and line act as a guideline for workers as they complete the bricklaying wall process. It is to ensure that the bricklayer stays straight and the work-in-progress stays aligned. A thread was inserted between two building columns to mark the bricklaying wall line. All brick walls above a meter in length should be built with their aid. The line should be made of high-quality hemp and not be overly thick. If the line breaks while in use, the ends should be correctly spliced rather than tied together with a knot. The pins should be made of high-quality steel and have a robust blade to prevent them from bending while in use.

vi. Install Bitumen on The Rough Concrete



Photo 3.2.6: Bitumen as A Glue

The worker laid rough concrete towards the floor and then covered it with bitumen. Bitumen acted as a glue to make sure the DPC stick properly to the rough concrete. After poured the bitumen, the worker poured again some amount of rough concrete. Rough concrete should be used for the first layer of block since it can aid the starthen block hold stronger.

vii. Install Damp Proof Course (DPC)



Photo 3.2.7: Pasting the Damp Proof Course (DPC) on the Bitumen

Following that, the workers put a damp proof course (DPC) on the bitumen layer to prevent the wall absorb moisture from the ground. The damp proof course (DPC) is generally applied at basement levels, which restricts the movement of moisture through walls and floors.

viii. Bricklaying Process for Wall



Photo 3.2.8: Starthen cement on the first brick

The first process in bricklaying is to apply a mix of cement mortar made of standard cement, sand, and water with a trowel before pouring the bitumen. The bitumen was poured and the DPC was installed in the second process. The cement mixture was then poured over the damp-proof course once more. Furthermore, a small amount of mortar was applied to the top of the first brick using a trowel before placing another brick on top of it at a downwards angle guided by the spirit level and line from the strings pinned in between the wall's columns. Before installing the wire mesh, the process was repeated until the third layer of bricklaying was completed.



Photo 3.2.9: Opening part of windows and doors

Other than that, there are parts of wall that have an opening windows and doors need to measure the dimension of window. This measurement work should be measured first based on the drawing plan before the installation work. This is to ensure that there are no problems while installing windows and doors. If there is a problem, workers have to rebuild the walls and there is a waste of time and money on materials that used for bricklaying process.

ix. Install Wire Mesh

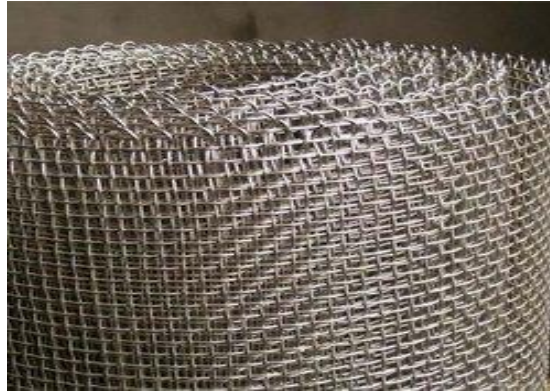


Photo 3.2.10: Wire Mesh

After every three or four layers of bricks were laid, wire mesh was installed on the layer of the brick wall based on the length of the wall to absorb stress and vibration in the building and prevent the wall from collapsing. The process was continued until the wall reached the height of the roof beam. Scaffolding was applied to support workers in laying the brick at the top of the wall. To make the wall look neater, any extra mortar was scraped away using a trowel

x. Finishing Works









Photo 3.2.11: Plastering Work





Finishing works is a job in the building construction process that creates the attractiveness of a building and normally required a skilled worker to do. Cement plaster is made by combination between sand, cement, and water. It is frequently used on the interiors and exteriors of masonry work in construction. To begin the process, the skilled workers apply cement plaster with a trowel on a clean wall, then smooth it from corner to corner using a straight edge. Then, for the exteriors wall will be painted with water using a sponge to reveal more gross wall surface. The wall will then be ready for paint or wallpaper when the plaster has cured. The exteriors were plastered in two layers by the skilled workers, who used a cement plaster base grey. For the interiors, 3 or 4 layers of plastering were applied by skilled workers using a cement plaster quick skim. It repeated with the other area until the wall fully covered with the plaster.




3.3 To investigate the Equipment and Tools used in Wall Construction

Table 3.3.1: Tools and Equipment

No.	Tools and Equipment	Description
1.	<p>Wheelbarrow</p> 	<p>Wheelbarrows are commonly used in yard work and homeowners find them to be an extremely useful gardening tool. But, on the other hand, the construction companies use wheelbarrows to transport sand, dirt, and other heavy materials. They can be used to remove scrap, debris, or rubble from a construction site. Wheelbarrows can also be used to mix concrete.</p>
2.	<p>Bricklayer's Trowel</p> 	<p>A masonry trowel is used to scoop up grout and cement and spread it between bricks. The trowel's flatness is used to compact the cement that holds the bricks together. The top of the trowel's point can also be used to shape concrete and masonry.</p>
3.	<p>Plastering Trowel</p> 	<p>Finishing trowels, which are generally rectangular in shape, are used to smooth, level, or texture the top layer of curing concrete. A flooring trowel features one rectangular end and one pointed end that is designed to fit into corners. A grout float is used for applying and working the grout into gaps in floor and wall tile</p>

4.	<p>Scaffolding</p> 	<p>Scaffolding, also known as staging, is a temporary framework used to support a work crew and materials during the construction, maintenance, and repair of buildings, bridges, and other man-made structures. Scaffolds are commonly utilized on-site to get access to heights and regions that would otherwise be difficult to access.</p>
5.	<p>Bucket</p> 	<p>Mason buckets are made of rubber and are designed for long-term intensive use in masonry. They are typically used to transport sand, cement, concrete, mortar, or water.</p>
6.	<p>Measurement tape</p> 	<p>A tape measure is a flexible ruler used to measure size, distance and around curves or corners. The design allows a long measure and it also can be carried in a pocket or toolkit.</p>

<p>7.</p>	<p>Shovel</p> 	<p>A Shovel is used to manually shift large quantities of cement and aggregates.</p>
<p>8.</p>	<p>Spirit Level</p> 	<p>A level is a tool for determining whether a surface is horizontal (level) or vertical (vertical) (plumb).Normally workers use level for the first brick layering of the wall to check if the wall is straight or not</p>
<p>10.</p>	<p>Brick Line</p> 	<p>Brick lines are used to produce highly apparent patterns for masonry and construction works. They are also used as guide lines when laying bricks, assisting in keeping them plumb and level.</p>
<p>11.</p>	<p>Bitumen</p> 	<p>It is used for filling cracks in masonry and stopping leakages</p>

<p>12.</p>	<p>Damp Proof Course (DPC)</p> 	<p>A damp-proof course (DPC) is a barrier installed in a structure to prevent moisture from rising by capillary action, such as rising damp. Rising damp is caused by water rising from the ground and entering the property. The damp-proof course can be horizontal or vertical in orientation. A DPC layer is often installed beneath all masonry walls, whether they are load-bearing or partition walls.</p>
<p>13.</p>	<p>Hammer</p> 	<p>A hammer is one of the most commonly used tools in a mason's toolbox. It may be used to cut, clean, and install bricks or masonry. For a good reason, there are two sides of the head are significantly distinct from each other. One resembles a hammer, while the other resembles a chisel. The hammer side is used to break up large stone or concrete, while the chisel side is used to pull out pins or nails.</p>
<p>14.</p>	<p>Pins</p> 	<p>Line pins are inserted into a brick course or staked into the ground, and string is wound around and pulled tight between the two places. Pin function as a reference or guideline to the workers when do bricklaying process.</p>

3.4 To Identify the Problems and Solutions in Wall Construction

Problem 1: Improper Storage of Starken Block

The AAC block was placed in an open area on the construction site. It just covered by a plastic and it was still exposed to hot weather and rain that causing precipitation seep into the AAC block. As we all know, AAC blocks are made up of several raw materials such as quartz sand, calcined gypsum, lime, cement, water, and aluminum powder. As a result, AAC Block has high water absorption capacity. Due to their expansion when absorbing water and contraction while losing moisture cause fissures in the structure.

Solution 1: Storing the Starken Block in Right Place

The workers need to place the AAC Block at the enclosed area such as in the building. So that, the AAC Block will be shade away from rain. Other than that, if there is no enclosed area, the workers can use a canvas to cover the AAC Block. So that, the AAC will not have too much exposure to the weather. The workers need to make sure that the AAC Block dried well before they start the brick layering process.

Problem 2: Lack of Proper Safety Equipment

Sometimes some companies try to save on their costs, or whether construction workers feel more comfortable working without wearing safety equipment, but they don't think about the consequences of not wearing it. The workers in the construction industry are exposed to risks such as falls, cuts, burns, lacerations, injuries when handling heavy machinery and building collapses. Based on the observation, the workers were not using full Personal Protective Equipment (PPE) such as glove, safety helmet, safety boots and vast. During the brick layering process, the workers cutting the AAC Block using axe without wearing safety equipment. So that, it can cause of workplace accident to the workers and they need to know that nothing more worth it than saving lives.

Solution 2: Provide Proper Safety Equipment

Every construction site's management should provide pre-employment and in-service training to all workers. It should cover workplace hazards and safety procedures, as well as training on the importance and use of personal protective equipment (PPE). Safety is a major concern for day laborer. Accidents frequently occur in the construction industry each year, and many of them are caused by a lack of Personal Protective Equipment (PPE) or a failure to wear the provided PPE. PPE is equipment that protects workers from health and safety hazards on the job. The goal is to reduce employee exposure to hazards when performing construction work or operating machinery. These hazards can range from wet floors to falling debris and everything in between. PPE includes items such as protective helmets, eye protection, high-visibility clothing, safety footwear, safety harnesses, and, in some cases, respiratory protective equipment.

Problem: String Lines Did Not Straight

The quality of the brickwork is vital to the wall because low quality brickwork compromises the structural integrity. When the workers rely on the string line as a guide in brickwork, the level is not always straight. So that, it can make the wall did not straight and collapse. Sometimes, when bricklaying process, the workers do not measure the height of the mortar when laying bricks.

Solution: Used Laser Level

Laser levels are frequently used by companies working on large projects. This is due to the fact that the use of a laser level for bricklaying work can help solve the problem because the laser is a light that moves in a straight line, allowing the worker to lay the bricks in a straight line. Because a laser level is adjustable and portable, it is preferable to a string as a guide for brickwork. In addition, the use of this level laser can also save time compared to using a stringed line that needs to be adjusted. When doing brickwork with a laser level, use a spirit level to achieve better results. As a result, the bricklaying work is more neatly done and can be completed before the deadline.

CHAPTER 4.0

CONCLUSION

The walls of a building are crucial for creating a suitable and comfortable environment, as well as giving privacy and weather protection for the people in the building. The bricklaying wall method began with site planning, cleaning the floor, lifting the brick, mixing the mortar, pin and line, installing a bitumen and damp-proof course, the wall bricklaying process, installing a wire mesh on the brick, and finishing the wall with plaster. All of the methods were carried out by skilled workers and contractors with prior experience in the field. The professional workers completed this wall building work efficiently and without making any serious problems.

Moreover, the bricklaying process took around 2-3 weeks to complete for all areas but did not include the finishing work. As a result of the weather and the movement control order during the Covid-19 epidemic, building work was also delayed for a few months. Therefore, it takes more time than estimated. Due to the Covid-19, the company in charge of the project will be unable to finish it within the initial contract period. As a conclusion, JKR Pontian grants the company an extension of time (EOT) to complete the project before the deadline.

Last but not least, the bricklaying process in this project is a common method that is related to the theory that was studied. Nothing was done differently throughout the bricklaying wall construction. The workers completed the whole bricklaying process based on the drawing plan. Furthermore, problems presented by engineer JKR Pontian, such as improper storage of Starken Block, a lack of safety equipment, and string that is not straight, may be readily resolved by the contractor and employees on the building site.

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