



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

**CONSTRUCTION OF BRICWORK (LOAD-BEARING WALL)  
FOR  
WORKER'S QUARTERS**

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**(PERAK)**

**FEBRUARY 2022**

It is recommended that the report of this practical training provided

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**entitled**

**CONSTRUCTION OF BRICKWORK (LOAD BEARING WALL)**  
**FOR WORKER'S QUARTERS**

be accepted in partial fulfillment of requirement has for obtaining Diploma in Building.

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**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 ZH Engineering Consultants 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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Last but not least, a million thanks to my beloved parents for their sacrifices over the years. Thank you so much.

## **ABSTRACT**

Walls are one of the most important structure elements of a building. A wall plays several functions in the performance of a house and these functions need to be fully understood in order to create suitable and comfortable building as well as providing privacy also as protection from weather. This report will discuss about brickwork for the load bearing wall of the building. This report was conducted for the Proposed of 1 Construction and Completion of 2 Blocks 1x4 Units (F) Worker's Quarters at Genting Tanah Merah Estate, Tankak Johor. The objective of this report is to analyze the construction of load bearing wall and the way how it carried out. It will focus on the whole process of brickwork wall construction. It also to recognize the tools and materials in the methods of brickwork wall construction process.. This report will also look to at the problem and the solution in brickwork wall construction that would fulfill the criteria of load bearing wall.

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## CHAPTER 1.0

### INTRODUCTION

#### 1.1 Background of Study

In building construction, a load bearing wall is provided in every construction included brickwork construction. Load bearing wall is designed to carry the vertical load and directly above the beam. Load bearing wall is most in the light construction method such as in house and a wall plate which is mated to the lowest base plate, each load bearing wall sits on it. (Ramiz, 2020) Load bearing wall also know as 'platform framing'. Majority of load bearing walls above grade required reinforcement to provide the flexural strength required, as these masonry walls expand and contract due to temperature changes, load imposed by strong winds and the weight of the wall itself. (M.Levy, 2010)

Load bearing wall is a wall that is constructed to support the above slab or other building elements in structure and also supports the weight of the structure. (Ramiz, 2020) The structure in the components of building will carries and transfers the load to the ground safely. The structure guarantee stability of building and its performance. (Arjun, 2020) By conducting its weight to a foundation structure, a load bearing wall bears the weight of the elements above the wall resting upon it. (Ramiz, 2020) The main load bearing structural elements are beam, columns, walls, braces and trusses. (Arjun, 2020) Meanwhile, concrete, blocks, or bricks are the most often used materials to construct load bearing walls in large building. (Ramiz, 2020)

Load bearing walls theoretically consist of six types of wall such as precast concrete, retaining wall, masonry wall (brick wall), pre panelized load bearing metal stud wall, stone wall and engineering brick wall. For precast concrete walls, it constructed by casting in a reusable wall mold or form which is then cured in a controlled environment, transported to the construction site and lifted into place. (Rahman, 2020) It will speed up the construction process. In load bearing wall units resist and transfer loads from other element and cannot be removed without affecting the strength or stability of the building. (Grudette, 2016)

Next, retaining walls are vertical or near-vertical structures that designed to retain the material on one side, preventing it from collapsing, slipping or preventing erosion. (Constro, 2020) The lateral pressure could be also due to the earth filing, liquid pressure, sand and other granular materials behind the retaining wall structure. (Ramiz, 2020)

Meanwhile, masonry wall or known as brick wall is typically site constructed (laid) using manufactured masonry units and site mixed mortar. (Richard, 2016) The masonry units are held together by means of mortar which imparts strength and stability to the whole unit. (Arjun, 2010) Masonry wall also can form structural elements such as bearing walls, columns, pilasters or the finished cladding system. (Richard, 2016) The function of masonry wall is to transfer the load from the roof to the foundation. (Arjun, 2010)

Moreover, pre panelized load bearing wall are rarely used in construction. It was a metal stud walls that support gravity, wind and seismic loading. (Ramiz, 2020) It also known for built the cladding exterior wall in construction. The metals that can be used for pre panelized load bearing metal stud walls are aluminum, stainless steel and copper.

Furthermore, stone walls are made by stone and mortar without mortar which is known as a dry stone wall and these walls are mostly used for outdoor. (Ramiz, 2020) This construction technique is used for building foundation, arches, retaining wall, floor, and wall sand columns. (Arjun, 2020) Stone walls also can give a natural looks in construction and it also one of the most durable and strong building materials.

Other than that, in construction where strength and resistance to water and frost attack are important, engineering bricks are used in such construction and through the top to the bottom, engineering bricks have a smooth finish with perforations. (Ramiz, 2020) It specifically made to improve the technical and practical point of view rather than to improve the look of a building. (O'Connor, 2018)

Masonry or brick load bearing wall is a popular construction around many world, due to its advantages. One of the advantages of masonry (brick wall) is it can improve fire protection for the building and its occupants because it was non - combustible. (Muresan, 2019) In addition, it has great sound proofing because it block

out noise more efficiently than more traditional building material such as timber. (Kathir, 2018) Next, it is also durable and resistant because it can with stand large amounts of compressive weight loads. (Muresan, 2019) Finally, masonry (brick load) bearing wall units increase the thermal mass of a building and also have longer lifespans than any other building types. (Muresan, 2019)

There are six main type of load bearing wall in building construction. However, the aim of this report is to discover the masonry (brick wall) process int the construction.

## **1.2 Objectives**

There are several objectives that have been developed from this construction in providing this Practical Training Report. The objective are as following:

- i. To identify the methods of brickwork process
- ii. To recognize the tools and material that use in the brickwork process
- iii. To investigate the problem and solution in brickwork wall construction

### **1.3 Scope of Study**

The scope of study has been carried out at Genting Tanah Merah Estate, Tangkak, Johor. The project had started in 20 October 2020 and supposed to be completed on 20 June 2021. As a result of the tragedy, the Pandemic Covid-19, the project was suspended for a while because of Pandemic Covid-19 and will continue until further notice. The project is about to proposed of 1 Construction and Completion of 2 Block 1x4 Units (F) Workers Quarters and cost about “Four Hundred Thirty Five Thousand Ringgit” Malaysia. Due to Pandemic Covid-19, the project is currently ongoing. For this study, this will focus to identify on how the brickwork process (load bearing wall) will be explained for this construction. Other than that, the study will explained about the method of brickwork process, the tools and materials that use in this brickwork construction and also the problems and solution in brickwork wall construction. Even so, the study for this scope do not concentrate on the costs and duration matters. To complete the data, there are three methods need to be carried out which is observation, interview and document reviews.

## **1.4 Methods of Study**

There are several data collection methods that used to achieve the objectives for this report such as:

### **1. Observation**

The observation is a way of collecting data through observing. The observation is about how the brickwork construction process for load bearing wall starting from brickwork process until complete. The average time taken for this observation approximately around 5 hours but only for brickwork process and it depends on the length for the wall. The longer the wall, the longer it takes to complete the brickwork process. Overall, it took 1 month of workers day for the brickwork process. Meanwhile, for the finishes of the wall it took 3-4 days only per one part of the wall because it requires skill and need to be done carefully. This make it took around 1 month and half to complete all the finishes process for the interior and exterior wall. All the observation of the brickwork wall construction process had been recorded from the resources of Zh Engineering Consultants thru smartphone and data.

### **2. Interviews**

Sufficient information can be collected through the interview. Unstructured interview process happens when questions can be ask directly and the answers can be get on the spot. A qualitative research is done by interviewing people who have experienced in construction industry such as supervisors, architect, engineer, plumbing quantity surveyors and the labors on site during the educational site visit. Different people have different skill and experience thus it will be helpful to understand more while doing the observation.

### **3. Document Reviews**

This method involves systematic data collection from the existing records that can be derived from the company such as construction drawings, tender, company profile, monthly progress report and pictures taken by the workers. Most of the important and confidential data about the company or project can be acquired and beneficial to accomplish the objectives of this report.

## CHAPTER 2.0

### COMPANY BACKGROUND

#### 2.1 Introduction of Company

The firm ZH Engineering Consultants is a company that involved in M&E Consulting Industry. ZH Engineering Consultants was established in 2006 by Ir. Encik Zamzuri Bin Hashim and Ir. Hj. Tumiran Bin Hj. Saru, professional engineers who are highly experienced and have knowledge in the M&E Consulting Industry. The firm is registered with Board of Engineers, Malaysia (BEM) and Ministry Of Finance (MOF).

The principles were involved in hands on M&E design and project management of diversified buildings and infrastructure projects such as Astro All Asia Broadcast Centre, Sg. Besi, Sheraton Imperial Hotel, Kuala Lumpur, SIRIM Incubator Building, Sepang and Universiti Sains Islam Malaysia, Nilai. The firm was established to provide a better alternative and quality services to the construction industry through direct participation of the principals at all stages of the projects.

The health care in Malaysia has notably undergone some radical transformation. The government is very much committed to its principle of a universal access to high-quality health care in which the local Ministry of Health offers thru wide varieties of nationwide networks of clinics and hospitals. With the development of Healthcare Sector in Malaysia, ZH Engineering Consultants has initiate an effort for a Medical Equipment Division, as part of the consultancy services provides by the company.



## 2.2 Company Profile

ZH Engineering Consultants head quarters is located at N-3-2B, Jalan Seksyen 3/12, Taman Kajang Utama, 43000 Kajang, Selangor Darul Ehsan. ZH Engineering Consultants can be contacted via company email at zhec09@gmail.com, dayanafiqah9992@gmail.com or directly contact through mobile number (012-2917067 or 011-11936390)



Figure 2.1: ZH Engineering Consultants Profile Cover

Source: ZH Engineering Consultants (2006)

With strength of multi-skill experienced and capable staff, ZH Engineering Consultants is leading to multi-disciplines jobs consultancy works in infrastructure, private and government, such as Development of Schools, Highway and Healthcare Sector.

Next, the Mission of this company is “We, at ZH Engineering Consultants, firmly believes that Engineers have very crucial role in developing the nation and this role is fulfilled through provision of proactive practical, optional and ethical engineering solutions and services to both Government and private clients”

Besides that, the strength of experienced personal in Mechanical & Electrical (M&E) and Medical Equipment for the development of Hospitals and other

Healthcare Facilities, shows that ZH Engineering Consultants is developing seriously in the Healthcare Industries.

Table 2.1 : List of Services provides by ZH Engineering Consultants

<b>No.</b>	<b>Services</b>
1.	<p>MECHANICAL ENGINEERING SERVICES</p> <ul style="list-style-type: none"> <li>● Air Conditioning and Mechanical Ventilation Installation</li> <li>● Water and Sanitary Plumbing Services</li> <li>● Fire Protection Services</li> <li>● Medical Gas Services</li> <li>● Domestic NG and LPG Services</li> <li>● Compressed and Industrial Gas Service</li> <li>● Kitchen Equipment and Cold Room Installation</li> </ul>
2.	<p>ELECTRICAL ENGINEERING SERVICES</p> <ul style="list-style-type: none"> <li>● HT and LV Services</li> <li>● Lighting Installation</li> <li>● Telecommunication Installation</li> <li>● Lightning and Surge Protection System</li> <li>● MATV/SMATV Services</li> <li>● Public and Emergency Announcement System</li> </ul>
3.	<p>BUILDING MANAGEMENT AND CONSTRUCTION SERVICES</p> <ul style="list-style-type: none"> <li>● Building Automation System</li> <li>● Building Security System</li> </ul>

	<ul style="list-style-type: none"> <li>● Building Construction</li> </ul>
4.	<p>VERTICAL TRANSPORTTION SYSTEM</p> <ul style="list-style-type: none"> <li>● Lift Installation</li> <li>● Escalator Installation</li> </ul>
5.	<p>PLAN AND DRAWING SERVICES</p> <ul style="list-style-type: none"> <li>● Electrical Services Drawing</li> <li>● Construction Drawing</li> <li>● Engineering Drawing</li> </ul>

### 2.3 Company Organization Chart

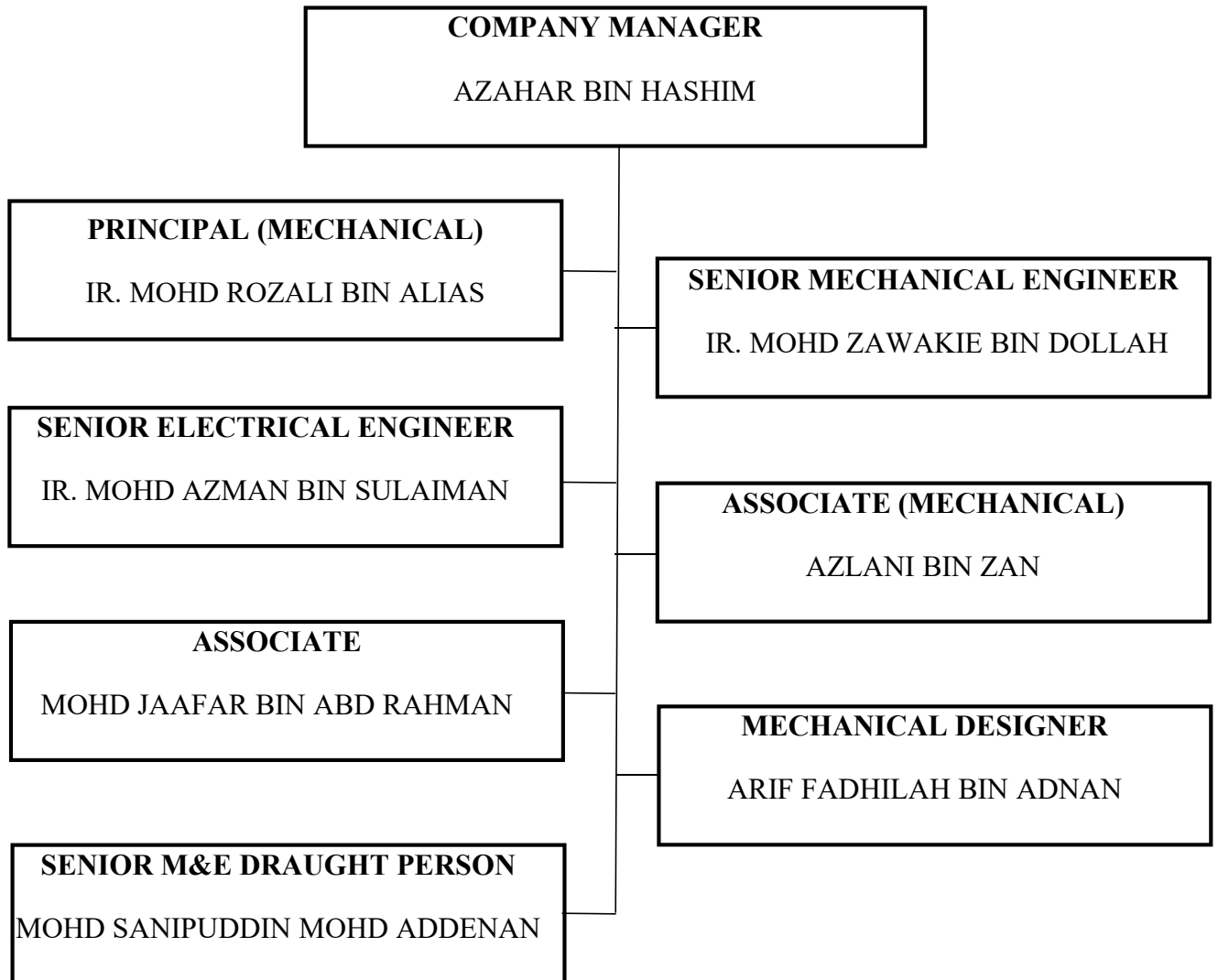


Figure 2.2 : Organizing Chart of The Company ZH Engineering Consultants

## 2.4 List of Projects

### 2.4.1 Completed Project

Table 2.2 : List of Completed Project

No.	Project Title	Project Value	Start Date	Completion Date	Project Duration	Client
1.	Proposed Recycle Centre At Precinct 9 Putrajaya For Putrajaya Corporation	RM 950,000	September 2013	September 2015	2 Years	Jabatan Alam Sekitar
2.	CO2 Fixed Installation at Samsung Corning Factory, Senawang Negeri Sembilan	RM 30,000	March 2016	July 2016	4 Month	Samsung Corning (M) SDN. BHD.
3.	Cadangan Merobohkan Banglo 2 Tingkat Sedia Ada dan Mendirikan Sebuah Rumah Banglo 3 Tingkat dan	RM 1,600,000	October 2016	January 2019	2 Years 3 Months	Coral Street (M) SDN. BHD.

	Kolam Renang, Bukit Bandaraya, Kuala Lumpur					
4.	Proposed Design and Build of New Lean-To Warehouse for Cargo Extension at Malaysia Airline Cargo Centre, KLIA	RM 25,300,000	February 2014	January 2017	2 Years 11 Month	Malaysia Airlines Cargo SDN. BHD.
5.	Proposed Showroom And Office In Section 22, Shah Alam, Selangor Darul Ehsan	RM 600,000	April 2018	April 2019	1 Years	Kumpulan Rahman Brothers SDN. BHD.

## 2.4.2 Project In Progress

Table 2.3 : List of Project in Progress

No.	Project Title	Project Value	Start Date	Completion Date	Project Duration	Client
1.	Proposed Flood Mitigation Works For Taman Merdeka Along (Sungai Pari), Bandar Ipoh, Daerah Kinta, Perak Darul Ridzuan (Preliminary Stage)	RM 1,343,500	-	-	-	Jabatan Pengairan Dan Saliran
2.	Cadangan Membina & Menyiapkan 1 Blok Bangunan Tambahan 4 Tingkat yang mengandungi 6 Bilik serta 1 Bengkel (Menservis Alatan Elektrik Domestik) dan Surau di Sekolah Menengah Kebangsaan Sri	RM 633,500	November 2019	-	Ongoing Construction	Kementerian Pelajaran Malaysia

	Istana, diatas Lot 28, 78 & 80, Jalan Istana, Klang, Selangor Darul Ehsan					
3.	Proposed of 1 Construction and Completion of 2 Blocks 1X4 Units (F) Workers Quarters at Genting Tanah Merah Estate, Tangkak, Johor	RM 435,000 (cost before project delayed)	October 2020	Supposed complete in June 2021 (Delayed project)	Ongoing Construc tion	Gelombang Jaya Enterprise



## **CHAPTER 3.0**

### **CASE STUDY (CONSTRUCTION OF BRICKWORK (LOAD BEARING WALL) FOR WORKER'S QUARTERS )**

#### **3.1 Introduction to Case Study**

The site project entitled “ Proposed of 1 Construction and Completion of 2 Blocks 1X4 Units (F) Workers Quarters”. The surrounding construction project consist of main road, forest and palm oil plantation. The project also located at Genting Tanah Merah Estate KM5, Segamat Road Tangkak Johor. Next, this project is cost amount RM 435,000. The project had started in 20 October 2020 and supposed to be completed on 20 June 2021. As a result of the tragedy, the Pandemic Covid-19, the project was suspended for a while because of Pandemic Covid-19 and will continue until further notice. The construction should will be end near before the end of year 2021 but with the delayed of construction, this project have to stop in the middle of construction and will suffer huge losses.

Besides that, the activities that have been carry out on this construction site is brickwork process. This uneasy work need to be handle by skilled workers to get a perfect wall bonding and to accommodate the load from the beam.

Next, to carry out the brickwork, the tools and material used are the main thing for this process it is because the tools need to used to completed the work while the material also needed to mixed and to apply between the each brick.

Lastly, the problems of brickwork process will be determines throughout the construction process. The solutions of the problems also will be state after determine the problem of the process. The chapter will be focused on the method of brickwork, the equipment and material that use in the brickwork process and the problem and solution in brickwork wall construction.

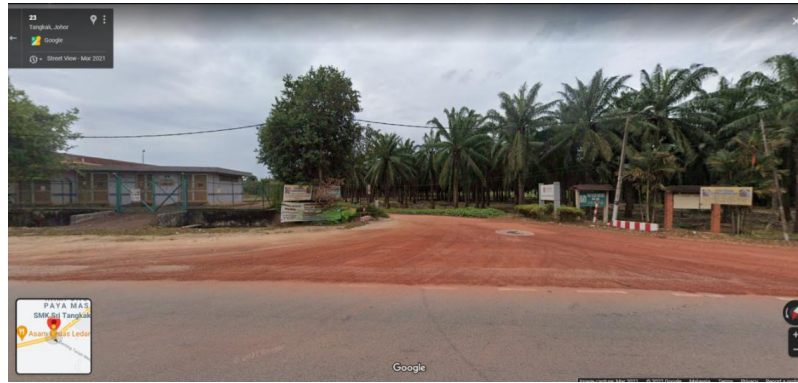


Figure 3.1: View entrance to the project site

Source : Goggle Maps



Figure 3.2: Site View

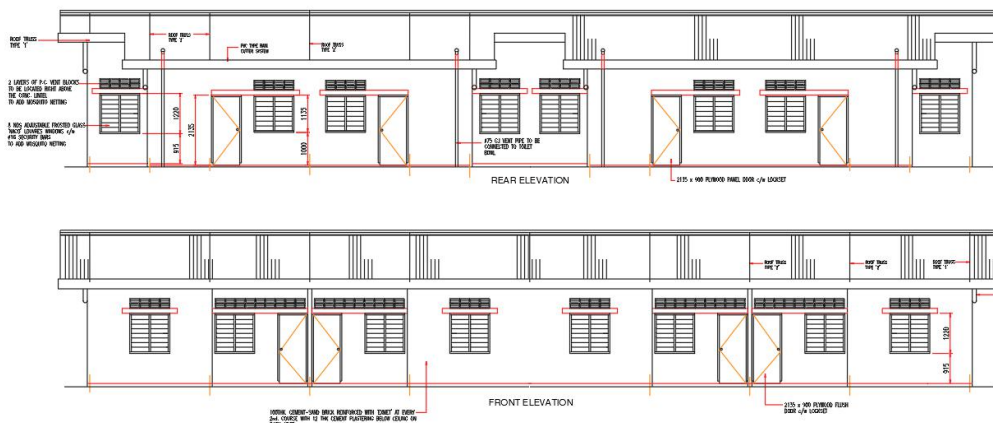


Figure 3.3: Front Elevation and Rear Elevation

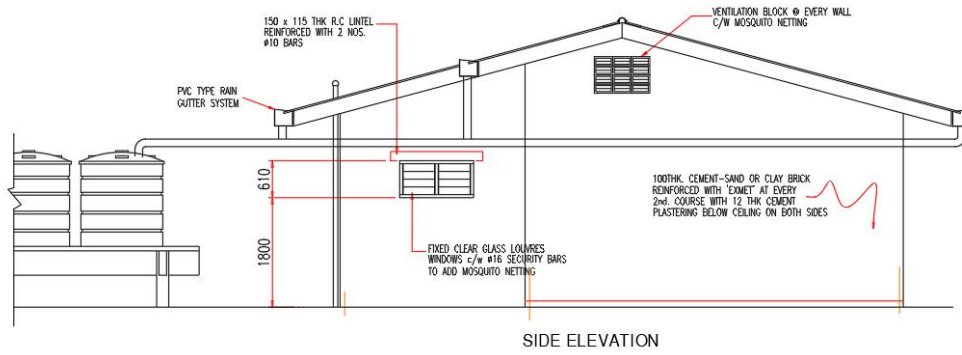


Figure 3.4: Side Elevation

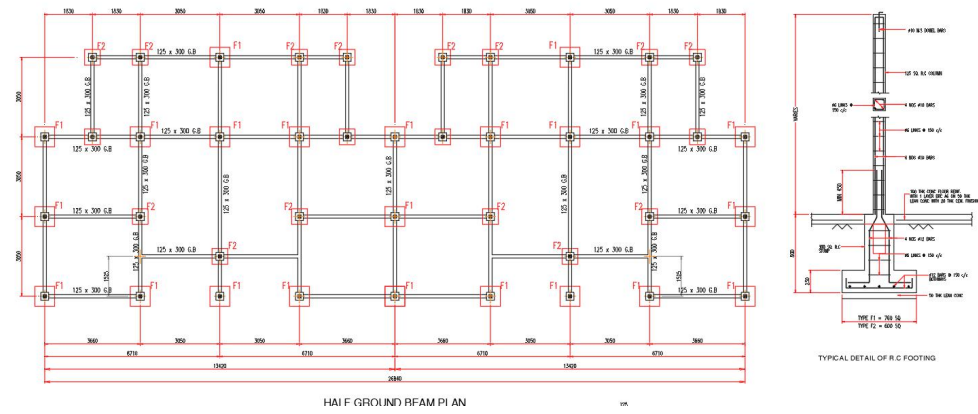


Figure 3.5: Half Ground Beam Plan

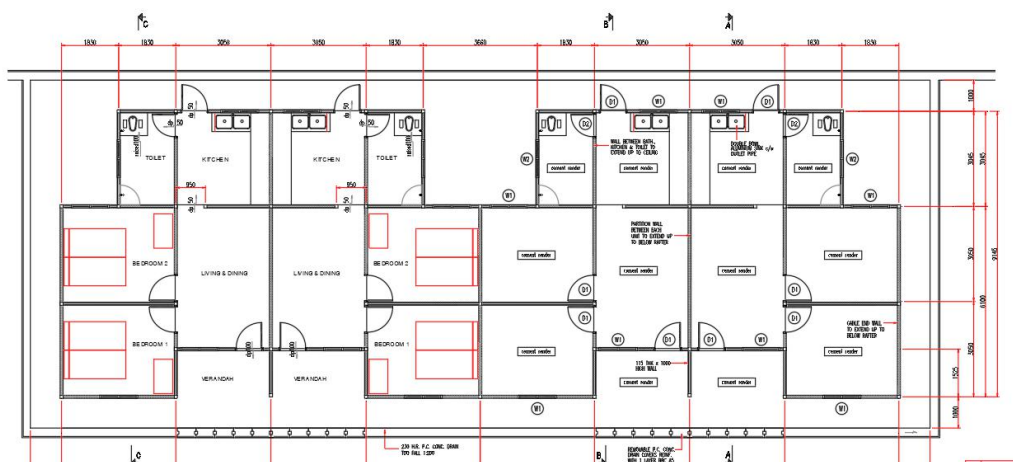


Figure 3.6: Floor Plan

## 3.2 The Method of Brickwork Process

### i) Plan Out The Wall



Figure 3.7: Clay Brick that use for this construction

Source: Goggle (<https://buildingmaterials.com.my/products/details/clay-brick-532>)

Firstly, plan out the wall by referring the length and height of each wall in the building on the drawing plan from floor plan and elevation plan. The length of building were used from the value inside the floor plan that already state it. Meanwhile, the height value of wall was measure from ground floor until the roof beam of building in the drawing plan. After plan out and calculate the amount of brick that need to be usedby using a calculator, purchase the right type and amount of the brick at the hardware. The amount was included 5% of wastage. The types of brick that used in the construction is clay brick with 21cm length, 9.5m width and 6.5m height.

## ii) Clean The Floor



Figure 3.8: Floor that have been clean before brickwork process

The floor is swept with a wire broom and all unnecessary items such as dust were removed from the place where the bricks will be fastened. Clean floor surfaces are very important in the process of tying brick wall to make it easier for workers to tie bricks on a flat surface and avoid any obstacles during the process. It was easy for workers to pile all the bricks on the floor when the floor is already clean.

## iii) Lift The Brick



Figure 3.9: Lifting brick using wheelbarrow from stock pile

Workers were using wheelbarrow to lifting bricks from stock pile to the construction place. It is because it easier and can save workers time using wheelbarrow to lift bricks.

#### iv) Mix The Mortar



Figure 3.10: Mortar are mixed using the concrete mixer

Source :Goggle (<https://www.istockphoto.com/photo/bricklayer-and-concrete-mixer-gm184148621-168203720>)

Using mortar ratio of 4:1 (4 sand : 1 cement), the workers mix cement mortar using a concrete mixer. These 4:1 ratio mortars will be used as joints for each brick to another brick. The mixer mortar that mix using shovel were put inside the bucket and brought to wall work site.

#### v) Pin And Line

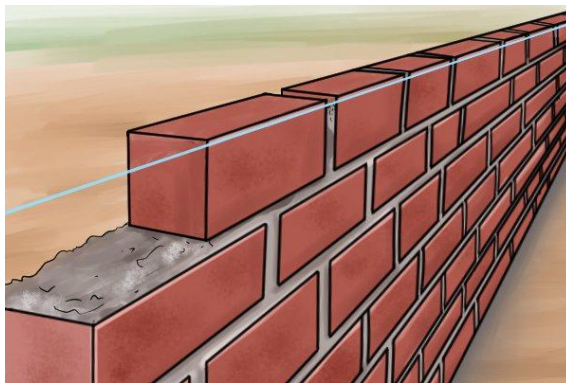


Figure 3.11: Strings that pinned together between column

Source: Goggle (<https://www.wonkeedonkeetools.co.uk/brick-lines/how-to-lay-a-brick-wall-using-a-brick-line>)

The line for brickwork wall (bricklaying) were marked using a string which were pinned in between two columns of building. Strings are installed at every

distance of one meter on column of the building from the floor level to the roof beam as a guide for workers during the wall bricklaying process.

#### vi) Install Damp Proof Course (DPC)



Figure 3.12: Install Damp Proof Course Under Between The Bricks

The damp proof were installed according to the length of the wall that measured using measured tape from the distance between two columns. The width of the damp proof must bigger than the width of clay brick. It is because to protect groundwater from being absorbed by bricks. Damp proof course (DPC) is a barrier of impervious material built into a wall or pier to prevent the moisture from moving to any part of the building that build.

#### vii) Wall Brickwork Process



Figure 3.13: Brickwork the wall (Brick Wall) process

Source: Goggle (<https://www.beidoou.com/materials/how-to-bulid-a-brick-wall.html>)

A small bed or mortar for the first brick to the line on were layer over damp proof course by using the trowels and hawks. Next, a small amount of mortar were placed on the top of the first brick by using the trowel and placed another brick on the top of it at a downwards angle guided by the line from the strings that have been pinned in between of the column of the wall. The brick are trapped using a trowel handle to level the position of the brick after stacking with each other. After that, a slab of mortar was coatat the end of the brick and pushed against the first lay of brick by using the trowel.



Figure 3.14: An exmet wire inside the layer of the brick wall

Source: Goggle (<https://banhinleong.com/manufacturing/brick-reinforcement-mesh/>)

Exmet wire were placed on the layer of the each brick wall based on the length of the wall after every three layers of bricks are stacked to absorb stress and vibration in building and avoid the wall from collapse.

Next, the step was repeated until the wall had reached the height of the roof beam. Scaffolding were used to help the workers laying the brick at the top of the wall. Any excess mortar was scrape away by using trowel for the wall to look neater. Stretcher bond is the type of bonding that used for the construction of this wall.





Figure 3.15: The view of door opening part of the wall



Figure 3.16: Lintels That Used As Load Support At the Top Of Opening Parts

Source: Goggle (<https://www.istockphoto.com/photo/window-or-door-concrete-lintel-on-brick-unfinished-house-construction-gm622303060-108950939>)

The opening part such as doors part were leaved it empty for the doors frame after measured it with the measurement tape based on the length of the opening that stated in the drawing plan. The brick will be laid at the top of lintel that fix at the top of the opening parts to support the load from the roof.

## vii) Finishes Work



Figure 3.17: Plastering the top of wall for the finishes



Figure 3.18: The wall after finish plastering process

Plastering is one of the finishing process for the wall in construction. The wall were cleaned and free from dust and any loose parts of mortar from bricklaying process. Then, the water were sprinkled over the surface of the wall to ensure better sticking of the plaster. The process started by lay the plaster and distributed it on the trowel evenly over a certain area at the top of the wall. It repeated with the other area until the wall fully covered with the plaster.

### **3.3 The Tools and Material That Use in The Brickwork Process**

#### **i) Tools**

The tools that involved or used in this brickwork construction are wheelbarrow, trowels, hawks, scaffolding, spirit levels, concrete mixer, brick bolster, concrete bucket, brick line and pins, brick hammer, measurement tape and shovel.

#### **ii) Material**



Figure 3.19: Brick

Source: Goggle ((<https://buildingmaterials.com.my/products/details/clay-brick-532>)

Brick is a material that used in construction for example in brickwork. Brick also know as a type of block that used in walls and other elements in masonry construction.



Figure 3.20: Cement

Source: Goggle (<https://structville.com/wp-content/uploads/2020/10/cement-powder-on-trowel.jpg>)

Cement is known as binder that used for construction that sets, hardens, and adheres to other materials to bind them together.



Figure 3.21: Sand

Source: Goggle (<https://civilread.com/check-quality-sand-site/>)

Sand is of of the most important materials in construction other than cement. In construction, mixing sand or known as fine aggregate in concrete is to fill voids between coarse aggregate. Sand also to increase the workability of concrete.



Figure 3.22: Water

Source: Goggle (<https://mytopfitness.com/how-to-add-minerals-back-to-reverse-osmosis-filtered-water/>)

Water is used in construction to prepare a mixer mortar between sand, cement, water and aggregate. The quality and quantity of water has much effect on the strength of cement concrete in construction.

### **3.4 The Problems and Solutions in Brickwork Wall Construction**

#### **3.4.1 i) Problem: Non-straight Brick Level**

The quality of brickwork are important to load bearing wall because the poor quality of brickwork can affects the structural integrity. The level become non-straight when the workers too depends on the string line as a guide in brickwork. It also happened when the workers does not measure the height of the mortar while doing the brickwork.

#### **ii) Solution: Used Bricklaying Laser Level Or Spirit Level**

The brick 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 adjust and portable hence it will also save moretime. Other than that, use spirit level while doing the brickwork with the laser level to check the level of the wall to get a better results.

#### **3.4.2 i) Problem: Brick Containing Dirt, or Dusk**

When take the brick from supplier, sometime bricks can get dirty or have moss or mold growing on it. This happened because of exposure to pollution and other airborne particles that attached to the bricks and mortar. It's not typically damaging to the bricks and can even be considered protective, it does compromise the overall look of the brick.

#### **ii) Solutions: Clean and Cover The Wall With Plaster**

The dirt or dusk or mold on the brick surface can be cleaned with water as gently as possible. Next, the wall can also be plastered to protect the brick surface from dirt while covering the mold on the wall. This will result in a cleaner and more better wall surface.

## **CHAPTER 4.0**

### **CONCLUSION**

In conclusion, the brickwork process have been successfully adopted for this project which is to build workers quarters at Tanah Merah Estate, Tangkak, Johor. The brickwork of load bearing wall is popularity in construction works such as build a house, condominium, hotel and others. Load bearing wall is used in every brick work to accommodate the weight of the beam.

The walls are important to the building to create suitable and comfortable building as well as providing privacy also as protection from weather. The brickwork wall method or process was started from plan out the wall, clean the floor, lifted the brick, mix the mortar, pin and line, install damp proof course, wall brickwork process and lastly apply plaster as the finishes work for the wall to make it look beautiful

The brickwork process for the wall need to be done by using tools to done the work easier. Using the tools also can save much more time for workers to complete the work. Other than that, before apply the mortar to the brick and ground floor, the mortar must be mixing first. The mixing process can be done by including this material for example cement, water, sand and aggregate.

Lastly, the method for brickwork process in the construction are basic method and it similar to the theory. There are the same carried out for the construction during brickwork (bricklaying) wall. Moreover, the problem that happen such as dirt or mold on the brick can be also solved by clean the brick using water.

## **REFERENCES**

R.Chudley (2008), Construction Handbook, Seventh edition

Sidney M.Levy (2010), Construction Process Planning and Management

Tanzila Bhuiyan (2016), What is Load Bearing Wall

Kathir (2018), Advantage and Disadvantage of Masonry Structure

Ramiz (2020), Stone Wall-Its Types,Construction&Advantages

Building Technology Guide (2009), Stone Masonry Construction- Materials and Classification