



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

**PROCESS BRICKWORK AT THE CONSTRUCTION SITE
(WALL CONSTRUCTION)**

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DECEMBER 2019

STUDENT'S DECLARATION

I hereby declare that this report is my own work, except for extract and summaries for which the original references stated herein, prepared during a practical training session that I underwent at Sun Ridge Sdn. Bhd. at Lembah Sireh, Kota Bharu, Kelantan for duration of 20 weeks starting from 5th August 2019 and ended on 20th December 2019. It is submitted as one of the prerequisite requirements of BGN310 and accepted as a partial fulfilment of the requirements for obtaining the Diploma in Building.

.....

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Date : 13th DECEMBER 2019

ACKNOWLEDGEMENT

Alhamdulillah, praise to Allah, the Most Merciful, the Most Graceful.

The internship opportunity I had with Sun Ridge Sdn. Bhd. was a great chance for learning and professional development. Therefore, I consider myself as a very lucky individual as I was provided with an opportunity to be a part of it. I am also grateful for having a chance to meet so many wonderful people and professionals who led me through this internship period. Bearing in mind previous I am using this opportunity to express my deepest gratitude and special thanks to the MD of Sun Ridge Sdn. Bhd. who in spite of being extraordinarily busy with her/his duties, took time out to hear, guide and keep me on the correct path and allowing me to carry out my project at their esteemed organization and extending during the training. I express my deepest thanks to Koay Woon Keong, Project Manager for taking part in useful decision & giving necessary advices and guidance and arranged all facilities to make life easier. I choose this moment to acknowledge his/her contribution gratefully.

I would also like to thank ALL the UiTM lecturers that have taught and nurtured me in becoming a better student and person. I would also like to extend my deepest appreciation to the lecturers who are directly involved during my training stint. To En. Wan Akmal Zahri Wan Zaharuddin, Supervising Lecturer, En. Muhammad Naim Bin Mahyuddin, Practical training Coordinator and Dr. Dzulkarnaen Bin Ismail, Programme Coordinator. I value the time, effort, encouragement and ideas that they have contributed towards the successful completion of my training, this report and the valuable knowledge that have been shared over the last few semesters.

Last but not least, my special thanks to my beloved parents for their sacrifices over the years.

Thank you so much.

ABSTRACT

A wall is a structure that defines an area, carries a load provides security, shelter, or soundproofing or is decorative. The purposes of the walls in buildings are to support roofs, floors and ceilings to enclose a space as part of the building envelope along with a roof to give buildings form; and to provide shelter and security. In addition, the wall may house various types of utilities such as electrical wiring or plumbing. Wall construction falls into two basic categories: framed walls or mass-walls. This report was conducted for the shop lot building at Jelawat, Bachok Kelantan. The objective of this report is to study the method of brickwall construction. It will focus how to constructed the wall and material and machinery that require to construct it. Based on site visit, the labor use concrete bricks to construct the brick wall and use three types of brick bond that is facing bond, stretcher bond and Flemish bond. A partition wall is a usually thin wall that is used to separate or divide a room, primarily a pre-existing one. Partition walls were usually not load-bearing, and can be constructed out of many materials, including steel panels, bricks, cloth, plastic, plasterboard, wood, blocks of clay, terracotta, concrete, and glass.

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CHAPTER 1.0

INTRODUCTION

1.1 Background and Scope of Study

Brickwork is masonry produced by a bricklayer, using bricks and mortar. Typically, rows of bricks called courses are laid on top of one another to build up a structure such as a brick wall. Bricks may be differentiated from blocks by size. For example, in the UK a brick is defined as a unit having dimensions less than 337.5x225x112.5mm and a block is defined as a unit having one or more dimensions greater than the largest possible brick. Brick is a popular medium for constructing buildings, and examples of brickwork are found through history as far back as the Bronze Age. A load-bearing wall or bearing wall is a wall that is an active structural element of a building, that is, it bears the weight of the elements above wall, resting upon it by conducting its weight to a foundation structure. The materials most often used to construct load-bearing walls in large buildings are concrete, block, or brick. Load-bearing walls are one of the earliest forms of construction. The development of the flying buttress in Gothic architecture allowed structures to maintain an open interior space, transferring more weight to the buttresses instead of to central bearing walls. The Notre Dame Cathedral is an example of a load-bearing wall structure with flying buttresses. In housing, load-bearing walls are most common in the light construction method known as "platform framing", and each load-bearing wall sits on a wall sill plate which is mated to the lowest base plate. The birth of the skyscraper era, the concurrent rise of steel as a more suitable framing system first designed by William Le Baron Jenney, and the limitations of load-bearing construction in large buildings led to a decline in the use of load-bearing walls in large-scale, commercial structures.

A modular form is disclosed for enabling an individual unskilled in bricklaying techniques to install professional looking patios, walkways, or to resurface walls and the like. The forms comprise tray-like modules, containing a network of grids which create brick-shaped voids arranged in commonly used brick patterns. After placing the modules on a suitable surface, bricks are inserted into the voids and a suitable grouting material such as sand and portland cement or masonry cement is applied between the bricks. The modules insure correct brick pattern spacing and a professional looking final product and permit considerable time savings when compared to conventional methods. The grids are preferably arranged to form a "basketweave" pattern for ground use and a "running bond" pattern for wall use, but other patterns are also disclosed. The invention also provides interlocking means for the modules so that uniformity of the pattern is retained in the creation of various sized patios, walkways or brick walls. (United States Patent No. US4026083A, 1976)

A modular brickwork form for producing a regular pattern in brickwork construction. Raised ledges have concave and convex dimples to interconnect with adjoining forms, avoiding added space and deformation experienced by present day forms. The modulator brickwork form has a raised dividers and ledges to form a continuous pattern. The ledges have dimples to interconnect with adjoining modular forms without significant deformation. The lack of overlapping U-shaped edges also avoids added space between bricks and an irregular pattern of bricks. The raised ledges are also tapered to allow nesting of the forms when stacked. The forms may include ports for drainage and corrugation for added strength. (United States Patent No. US4858410A, 1989)

In general, a block and retaining wall formed by a number of such blocks are interconnected between courses by a plurality of Z-shaped anchor elements having an upper and lower body part of substantially rectangular cross-section as viewed in plan. The upper body part is offset from the lower body part. The offset of one course of blocks relative to the course beneath will be a predetermined fixed amount determined by the offset of the body parts of the interlocking Z-shaped anchor elements. A tie-back arrangement includes means for attaching a sheet of geosynthetic material to the embedded end of a block so as to leave the open cells within and those

formed between the blocks unobstructed from above and available for filling with pea gravel or other drainage fill material. (United States Patent No. US5044834A, 1990)

A building wall construction for one story or multiple story buildings where large wall units are delivered to the building site with their exterior surfaces completely finished, and the units are ready to be assembled together with bolted or similar connections only and are connected together to form a structure capable of accepting loads along its entire length. The wall system utilizes large metal L-shaped extrusions, plurally adjacent, having an exterior with a permanent finish applied. One leg of the extrusion provides the exterior wall surface terminating in an inset tongue and the other leg extends inwardly from the exterior wall and provides a socket or recess to receive the tongue of an adjacent wall unit. The other leg also is provided with vertical passages receiving elongated rods or bolts to tie the wall units to head and sill members. (United States Patent No. US3601942A, 1969)

A structural support system for a building is formed from preferably prefabricated, light weight steel framed, bearing wall panels and precast, hollow core concrete floor slabs that are positively interlocked by, for example, splice plates, provided at the top of the bearing wall panels, reinforcing bars and grout, which fills the joints between adjacent slabs to form a unitary structure. (United States Patent No. US5113631A, 1990)

Disclosed is a panel building component, method of making same, and method of fabricating a load-bearing, insulating building wall using the panels and concrete pour after the panels are positioned on site. The panel includes at least one foam core, vertical C-studs, a channel shaped foot member in engaging relationship with the bottom edge of the foam core and the bottom end of the C-studs, two siding members, spacers to keep the foam core centered between the siding members prior to filling the panel with concrete, and the concrete itself. The foam core and C-studs are fabricated shorter than the finished height of the panel so that rebar steel reinforcing rods can be laid horizontally such that when the panel is filled with concrete, the top portion will be a concrete and rebar tie beam. (United States Patent No. US6263628B1, 2002)

This studied was carried out in Bandar Baru Jelawat (UPTOWN JELAWAT) secara Usahasama Dengan Majlis Daerah Bachok di atas tanah seluas 22.72 EK (9.20 HEK), di atas Lot 170, 797-799, 800-802, 806-813, 2248, 2250, 2261, 2254, 2255, 2257, 2258, 2261, 2262, 2265, 2266, 2269, 2270, 2273, 2288, 2289, 2290, 2291, 3121 & 3126, Mukim Rusa, Daerah Bachok, Jajahan Bachok, Kelantan.

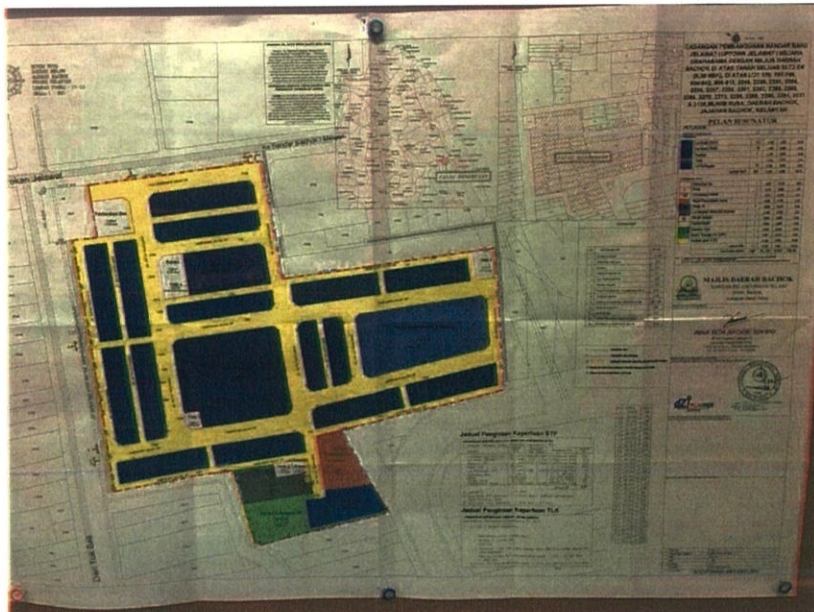


Figure 1.1: Site Plan

1.2 Objectives

1. To identify the method of brickwall construction for each block at the site.
2. To to identify materials, machinery and labor required for brick wall construction and the cost involved.
3. To identify problems in brick wall construction and give recommendations to overcome the problems

1.3 Methods of Study

The study on method of construct brickwall on the site had been carried out by using several methods to gained more information:

1.3.1 Interview

The interview method is the one of the ways to obtain primary data. Therefore, in order to obtain primary information, face to face interviews were employed. Interviews with Sun Ridge Sdn. Bhd. Site Manager, Koay Woon Keong were carried out. Some questions have been asked related to those method of construct brickwall.

1.3.2 Observation

The observation method is the most frequent method used at it has been done throughout the whole practical training by involved the brick layering activities conducted by professional staff for the whole period. The information collected is based on the activities occurred at site construction with guidance from all staff. All the information are collected using a smartphone by taking photo and recording videos of site activites such as work progress and equipment used in the process.

1.3.4 Internet

There are many internet websites that have been referred to as another source in gaining more information about method of construct brickwall. The internet has been a great help in achieving more knowledge related to the construction of substructure in the context of articles and visuals.

1.3.4 Document reviews

A lot of information was achieved by doing studies on construction standard industry procedures, progress report and construction drawings. All progress reports, drawing, plans, and picture were obtained by authorization of Sun Ridge Sdn. Bhd.

CHAPTER 2.0

COMPANY BACKGROUND

2.1 Introduction of Company



Figure 2.1: Company Letter Head

SUN RIDGE SDN. BHD. with its business centre located at No.4-2, Jalan Puteri 2/4, Bandar Puteri, 47100 Puchong, Selangor Darul Ehsan, was established since Dec 2007. The SUN RIDGE SDN.BHD. was formed up by joint ventured of the director from Baxtium Construction Sdn. Bhd., Eternal Prominent Sdn. Bhd. and Low Tiong San. The setting up of the company is in conjunction with the rapid growth of the construction project of Pantai Timur, especially government project and residential property. As a Construction company with its wide work experience of the director and the management staff, SUN RIDGE SDN. BHD. on servicing the building, infrastructure and civil engineering sectors.

Throughout these year, MJ UTAMA BINA SDN. BHD. is aggressively and steadily expansion in construction project in Terengganu and Kelantan and delivered the project in quality and on time. The business of SUN RIDGE SDN. BHD. is growing tremendously through it conceited effort and spirit of each dedicated employees. More importantly with the maintaining of a close business relationship and support from the client and suppliers. SUN RIDGE SDN. BHD. always emphasize the spirit of “Work As One Family” to all employees. SUN RIDGE SDN. BHD. believes that its future success based on philosophy of mutually benefits as a guidance towards a brighter future.

2.2 Company Profile

Name of Company :	MJ UTAMA BINA SDN. BHD.
Company Registration No :	683022-V
Date of Incorporated :	3 rd March 2005
Authorised Capital :	RM 1,000,000.00
Paid Up Capital :	RM 1,000,000.00
Business Address :	No. 4-2, Jalan Puteri 2/4, Bandar Puteri, 47100 Puchong, Selangor Darul Ehsan.
Industry Accreditation :	CIDB
Co. Secretary :	Confidence Biz Mgt Sdn. Bhd.
Auditor:	See Hong Associates
Principal Bankers :	Public Bank Berhad CIMB Bank Berhad

Table 2.1: Company Profile

2.3 Organization Chart

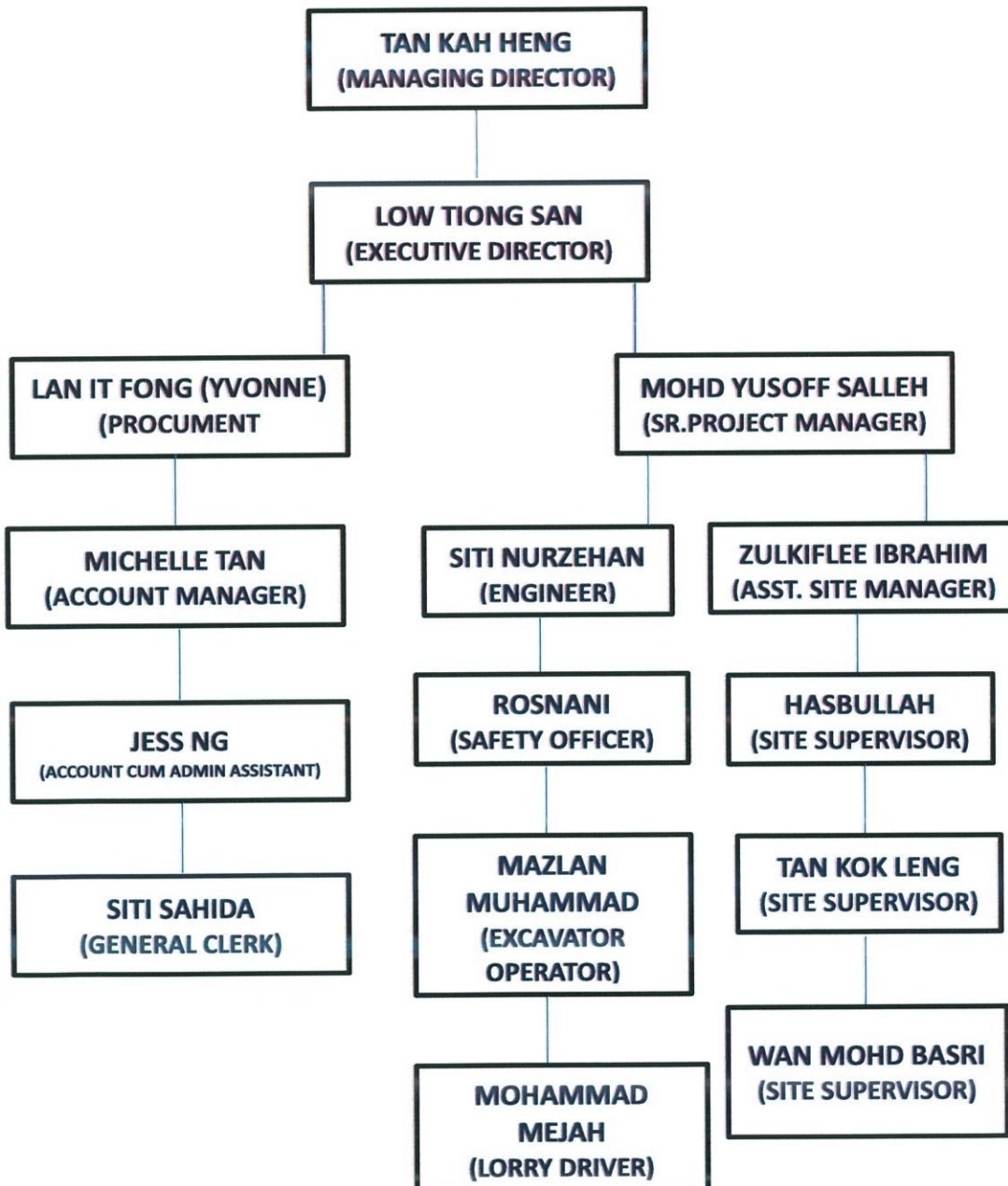


Figure 2.1: Organization Chart of Company

2.4 List of Project

2.4.1 List of Completed Project

No	Client/ Developer	Project Title	Contract price (RM)	Date of completion
1	ASPIRASI VIANA DEVELOPMENT SDN. BHD Main Contractor SUN RIDGE SDN. BHD.	CADANGAN MEMBINA DAN MENYIAPKAN SEBUAH BANGUNAN SERVIS APARTMENT 24 TINGKAT YANG MENGANDUNGI 161 UNIT, DEWAN, RESTORAN DAN RUANG LETAK KERETA DI ATAS LOT 2992, SEKSYEN 62, MUKIM PADANG ENGGANG, WAKAF CHE YEH, JAJAHAN KOTA BHARU KELANTAN DARUL NAIM	RM 18,750,000,00	FEBRUARY 2014

Table 1.2: List of Completed Project



Figure 2.2: Services Apartment at Wakaf Che Yeh

No	Client/ Developer	Project Title	Contract price (RM)	Date of completion
2	<p>IBRANET DAXIIS SDN. BHD</p> <p>Main Contractor SUN RIDGE SDN. BHD.</p>	<p>CADANGAN MEMBINA DAN MENYIAPKAN 17 UNIT KEDAI DAN PEJABAT 3 TINGKAT DI ATAS LOT PT 3398, MUKIM TUMPAT, DAERAH TUMPAT, JAJAHAN TUMPAT, KELANTAN DARUL NAIM.</p>	<p>RM 5,762,156,00</p>	<p>JUNE 2014</p>

Table 2.3: Project Information at Tumpat

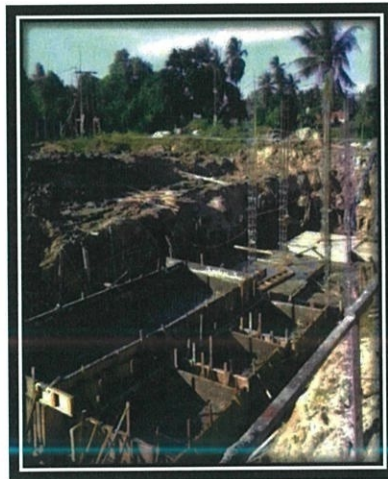


Figure 2.3: Project at Tumpat

No	Client/ Developer	Project Title	Contract price (RM)	Date of completion
3	<p>KEMENTERIAN PELAJARAN MALYSIA</p> <p>Main Contractor SD COM SDN. BHD.</p>	<p>CADANGAN MEMBINA DAN MENYIAPKAN SEBUAH SEKOLAH MENNGAH PADANG KALA YANG MENGANDUNGI 30 BILIK DARJAH DAN KEMUDAHAN BERKAITAN DI DAERAH KOTA BHARU, KELANTAN DARUL NAIM.</p>	RM 6,150,000,00	AUGUST 2009

Table 2.4: Project Information at Kota Bharu



Figure 2.4: School at Padang Kala



Figure 2.5 School at Padang Kala

No	Client/ Developer	Project Title	Contract price (RM)	Date of completion
4	<p>GAZZRIZ SDN. BHD.</p> <p>Main Contractor HASRAT GEMILANG SDN. CBHD.</p>	CADANGAN MEMBINA DAN MENYIAPKAN BANGUNAN SERVIS APARTMENT 21 TINGKAT YANG MENGANDUNGI 251 UNIT SERVIS APARTMENT, 4 TINGKAT TEMPAT LETAK KERETA, DEWAN SEBARGUNA DAN 1 UNIT KEDAI PEJABAT 2 TINGKAT DI ATAS LOT 2048 DAN 879 DAERAH KUBAN KERIAN, JAJAHAN KOTA BHARU, BANDAR KOTA BHARU, KELANTAN DARUL NAIM.	RM 29,100,000,00	JUNE 2013

Table 2.5: Project Information at Kota Bharu

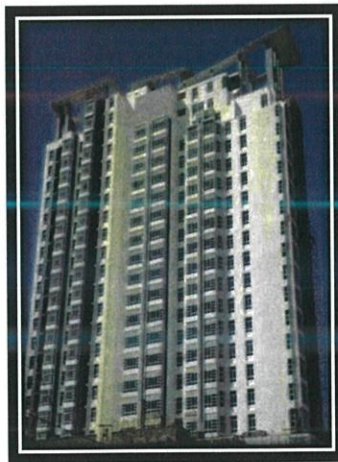


Figure 2.6: Apartment at Kubang Kerian

No	Client/ Developer	Project Title	Contract price (RM)	Date of completion
5	<p>ZEE PALACE HOTEL SDN. BHD.</p> <p>Main contractor DTP DEVELOPMENT SDN. BHD.</p>	<p>CADANGAN MEMBINA DAN MENYIAPKAN HOTEL 9 TINGKAT YANG MENGANDUNGI 114 BILIK, DI ATAS LOT 857, 858, 859 & 850 SEKSYEN 62, MUKIM PADANG ENGGANG, JAJAHAN KOTA BHARU, KELANTAN DARUL NAIM. (HOTEL HOLIDAY VILA KOTA BHARU, KELANTAN DARUL NAIM)</p>	RM 10,800,000,00	SEPTEMBER 2012

Table 2.6: Project Information at Kota Bharu

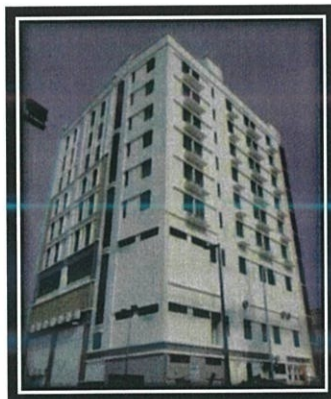


Figure 2.7: Hotel at Wakaf Che Yeh

2.4.2 List of Current Project

No	Client/Developer	Project title	Contract price (RM)	Date of completion
1	ZEE PALACE HOTEL SDN. BHD.	Bandar Baru Jelawat ((UPTOWN JELAWAT) secara Usahasama Dengan Majlis Daerah Bachok di atas tanah seluas 22.72 EK (9.20 HEK), di atas Lot 170, 797-799, 800-802, 806-813, 2248, 2250, 2261, 2254, 2255, 2257, 2258, 2261, 2262, 2265, 2266, 2269, 2270, 2273, 2288, 2289, 2290, 2291, 3121 & 3126, Mukim Rusa, Daerah Bachok, Jajahan Bachok, Kelantan.	RM 80,000,000,00	8 th September 2020

Table 2.7: Project Information at Bachok

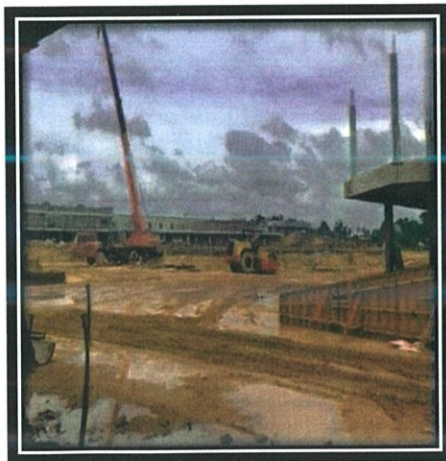


Figure 3: Project at Bachok

CHAPTER 3.0

CASE STUDY

3.1 Introduction to Case Study

This studied was carried out in Bandar Baru Jelawat (UPTOWN JELAWAT) secara Usahasama Dengan Majlis Daerah Bachok di atas tanah seluas 22.72 EK (9.20 HEK), di atas Lot 170, 797-799, 800-802, 806-813, 2248, 2250, 2261, 2254, 2255, 2257, 2258, 2261, 2262, 2265, 2266, 2269, 2270, 2273, 2288, 2289, 2290, 2291, 3121 & 3126, Mukim Rusa, Daerah Bachok, Jajahan Bachok, Kelantan. New city is concentrated a city that will be the focal point of the hotly anticipated Kelantanese. A center point of business center points among Kelantan and southern Thailand and incorporates city-based organizations, Pengkalan Kubur, Genting and Pantai sri Tujuh. Town coordinated with Pasaraya Pantai Timur, Wet and dry open markets, transport quits, driving business sector retailers and sufficient stopping. A shop lot project at Bandar Baru was selected as the main scope of study to obtain the information about the process of brickwork at site. This study focused on the wall construction at each block.



Figure 4: Location of Case Study

3.2 Method Construction

Method to construct brick wall

STEP 1:

Firstly, the site supervisor were mark the slab using string, so the worker know where to place the brick correctly. Bricks come in variety of shapes and size, but the most important thing to remember is that we must adjust the size of bricks we buy to account for the mortar. We must add the mortar measurements when planning the wall. The combination measurement of brick and mortar is called the brick nominal size.

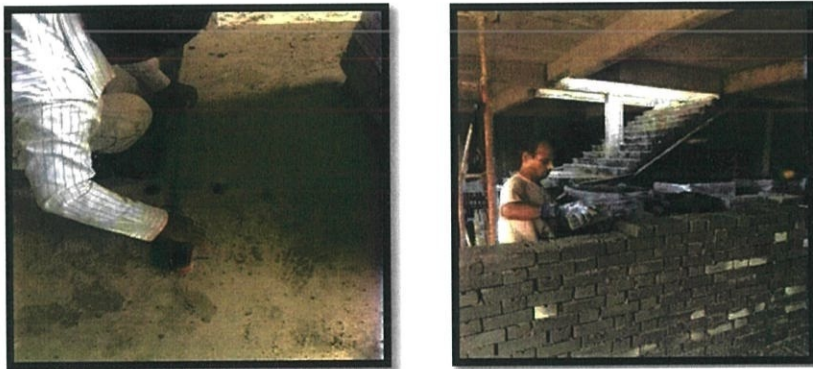


Figure 5 Marking the slab for first layer of brick and brick layering work

STEP 2:

The worker prepare the material such as bricks, mortar and tools that are needed to build the brick wall. Mortar is a workable paste used to bind construction and blocks together and fill the gaps between it. Once the worker mixed the mortar, they will start to lay the bricks, the worker used all the mortar and strike the joints before quitting.

STEP 3:

Make guide post or gauging rods. Using this method, worker can ensure their wall's level. First take 2 long wooden boards or post and measure out each row of the brick wall. Next mark the boards where each brick should be including the mortar lines. It is important to make sure that the worker can drive the post into the ground so that they can be freestanding.

STEP 4:

Clamp a string on first guideline and lay the first row of bricks for a dry run. Lay a small bed of mortar for the first brick lie on and use the spirit level to make sure the accuracy level. Next place the mortar along top of the first brick at a downwards angle. Then lay a bed of mortar on the solid foundation for the wall. The worker use tape measure to make sure that they are the correct distance apart and spirit level to make sure it is flat.

STEP 5:

Laying the next course of bricks. First move the string line up to where the top of the next course of the brick will be then lays a bed of mortar on the top of the first course of bricks, so that it's in a triangle shape. Next, the worker take a mortar and coat the end of the brick that will be pushed up against the first brick. After the worker finished four layers of brick, they put the exmet on the bricks. When embedded into the normal thickness of a brickwork-joint at every fourth joint, it forms an integral structure, which is strengthened against vibration, temperature change and tensional stresses. The mesh is anchored immovably so that the reinforcement cannot slip under tension and it also has no joints, welds or interweaving to fail under stress. The type of bond is English bond that the worker construct in at the block I. English bond in brick masonry has one course of stretcher only and a course of header above it, i.e. it has two alternating courses of stretchers and headers. Headers are laid centered on the stretchers in course below and each alternate row is vertically aligned.

To break the continuity of vertical joints, quoin closer is used in the beginning and end of a wall after first header. A quoin close is a brick cut lengthwise into two halves and used at corners in brick walls. The trowel are used to feather through it to create an air pocket for laying the bricks on. The worker can use spirit level to ensure that the bricks are flush and at an even height then pushing on them lightly to make sure the bricks are perfect. Besides that, scrap also needed to get rid of any excess mortar. Then place the mortar on the side of the bricks and lay them next to each other. Repeat this step until the wall has reached the height that had been set.

STEP 6:

First, the worker need to ensure the wall are clean and free from dust and any loose part of mortar from brick layering process. Sprinkle water also can used over the surface to ensure better sticking of the plaster. Then, starting at the bottom of the wall, use nice and smooth strokes with trowel and press the mortar onto the wall and try distribute the plaster on the trowel evenly over a certain area. Worker should keep that trowel as slight angle when applying plaster. Keep repeating process with the other area until the wall fully covered with plaster. The plaster are apply with 20mm thickness. Wall corner should be the last to be plastered. To allow the plaster to dry, ventilation can used to increase the air such as opening windows for air to come in.

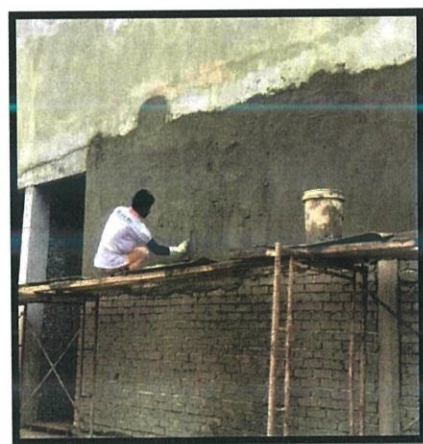
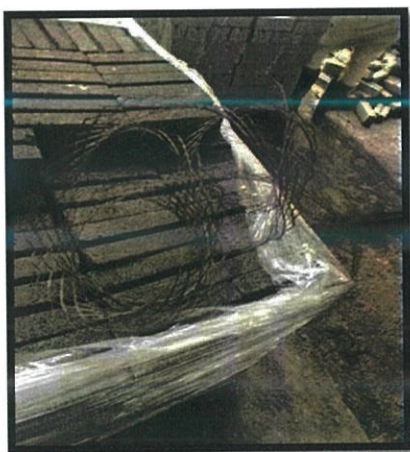


Figure 6 Exmet and worker do plastering at the external wall

3.2.1 Types of Brick and Bonding.

A brick is building material used to make walls, pavements and other elements in masonry construction. Traditionally, the term brick referred to a unit composed of clay, but it is now used to denote rectangular units made of clay-bearing soil, sand, and lime, or concrete materials. Bricks can be joined together using mortar, adhesives or by interlocking them. Bricks are produced in numerous classes, types, materials, and sizes which vary with region and time period, and are produced in bulk quantities. Two basic categories of bricks are fired and non-fired bricks.

- Concrete brick
- Engineering brick
- Fly ash brick

i. Concrete brick

Concrete bricks are manufacturing using concrete with ingredients as cement, sand, coarse aggregates and water. These bricks can be manufactured in sizes as required.

The advantages of using concrete bricks over clay bricks are that they can be manufactured at construction site, reduces quantity of mortar required.

Concrete bricks are used for construction of masonry and framed buildings.



Figure 7 Concrete Brick

ii. Engineering brick

Engineering bricks are hard burnt bricks that are very dense. They have a minimum compressive strength and minimum water absorption. They are not chosen for their appearance. There is no requirement for colour. These bricks are suitable for ground works, manhole, sewer and retaining wall and situation where high strength and low water absorption are the most important factors.



Figure 8 Engineering brick

iii. Fly ash bricks

Fly ash bricks are manufactured using fly ash and water. These bricks have better properties than clay bricks and are great resistant to freeze thaw cycles. These bricks contain a high concentration of calcium oxide which is used in cement production, thus it is also called as self-cementing brick. Fly ash bricks are lightweight and thus it reduces self weight of structures.

The advantages of fly ash bricks over clay bricks are that they have high fire insulation, high strength, uniform sizes for better joints and plaster, lower water penetration, does not require soaking before use in masonry construction.



Figure 9 Fly ash brick

Types of Bonding

i. Header Bond

A header is the shorter face of the brick. In header bond brick masonry all bricks are constructed in the header course. In this bond, the overlap is performed corresponding to a half width of the bricks. The three-quarter brickbats are utilized in alternative courses as quoins. This bond is mainly used for the construction of one brick thick walls.

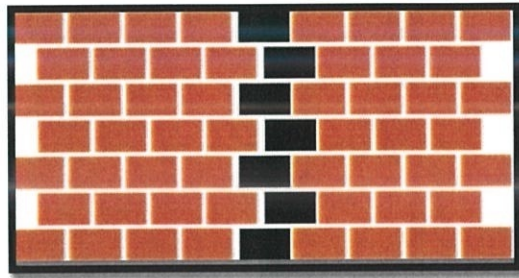


Figure 10 Header bond

ii. Stretcher Bond

One of the most common brick bonds, also popularly called running bonds. This bond is very easy to lay, in fact, is one of the simplest ones used today. Stretcher bond is suitable when walls of half brick thickness need to be constructed.

Stretcher bonds are not very suitable for stand-alone structural walls, but very useful for construction of walls with less thickness. Note, this bond will fail if the thickness of the walls is more than half of the total length of the brick used.

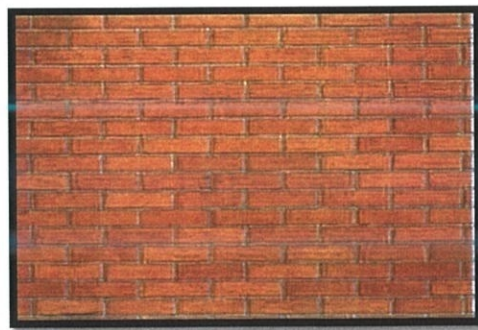


Figure 11 Stretcher bond

iii. Flemish Bond

For this type of bond, each course is made up of alternate headers and stretchers. Each header is centered on a stretcher above and below and every alternate course begins with a header in the corner. For breaking the vertical joints in the successive courses, quoin closers are introduced in alternate courses next to the header. This bond can be significantly sub-divided into two diverse types:

Single Flemish Bond – A combination of English bond and Flemish Bond. The front exposed surface of the wall is composed of Flemish bond and the back surface is composed of English bond in every single course.




Double Flemish Bond – This bond takes a similar appearance both in the front and the back elevations.

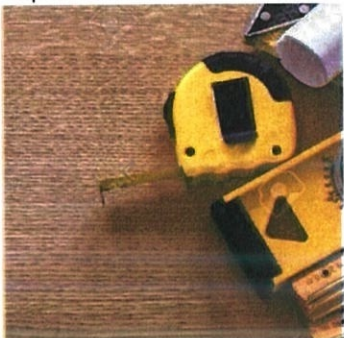


Walls with Flemish Bond are complex to erect and demand greater skills.






Figure 12 Flemish bond

3.3 Identify Materials, Machineries and Labor

NO	MATERIALS, MACHINIRIES AND LABOR	DESCRIPTION
1.	Lines and pins 	<ul style="list-style-type: none"> Used in laying of wall bricks. Where the sills protrude out from the wall the pin is driven into the brickwork each end of the sill and the line set parallel with the two end sill bricks.
2.	Brick hammer 	<ul style="list-style-type: none"> The tools are used for hammering nails and for splitting brick. One end is square and flat and is used like a hammer.
3.	Pointing Trowel 	<ul style="list-style-type: none"> Pointing trowel is a bricklayer's tool used for filling and shaping the mortar in between brick, a process known as pointing.

<p>4.</p>	<p>Tape measure</p> 	<ul style="list-style-type: none"> • Tape measure are used to checking of profiles at the beginning of a job and frequently used in constant checking in the requirement of bricklaying.
<p>5.</p>	<p>Spirit level</p> 	<ul style="list-style-type: none"> • These are metal straight edges specially fitted with glass tube containing a spirit and a bubble of air. It used for keeping brickwork upright and level.
<p>6.</p>	<p>Concrete bricks</p> 	<ul style="list-style-type: none"> • Concrete brick is a mixture of cement and aggregate, usually sand, formed in mold and cured. Certain mineral colours are added to produce a concrete brick resembling clay. One pallet contain 300 bricks.

7.	<p>Cement, sand and water</p> 	<ul style="list-style-type: none"> • This three materials is to make wet mortar when combine it.
8.	<p>Scaffolding</p> 	<ul style="list-style-type: none"> • Is a temporary structure used to support a work crew and materials to aid in the construction, maintenance and repair of buildings, bridges and all other manmade structures. It's easy for the workers to climb it and do the brick layering work at the 2 storey building.
9.	<p>Mixer</p> 	<ul style="list-style-type: none"> • A concrete mixer is a device that homogeneously combines cement, aggregate such as sand or gravel, and water to form concrete. With this machine, it will be easier for the worker to mix the mortar.




10.	<p>Backhoe</p> 	<ul style="list-style-type: none"> • Used for lifting the huge amount of bricks. The backhoe operator will lift the brick for the worker that on the first floor.
11.	<p>Shovel and wheelbarrow</p> 	<ul style="list-style-type: none"> • When the wet mortar is ready, the worker will pour it in the wheelbarrow and it easy to move the wet mortar place to place.
12	<p>Metal sheet</p> 	<ul style="list-style-type: none"> • The worker will put the wet mortar on the metal sheet because they don't want to mortar harden on the floor. It will be hard to remove and it will damage the floor.

Table 2 List of material, tools, machineries and description

3.3.1 Cost

CADANGAN MEMBINA DAN MENYIAPKAN BANDAR BARU JELAWAT (UPTOWN JELAWAT)
 SECARA USAHASAMA DENGAN MAJLIS DAERAH BACHOKMUKIM RUSA, DAERAH BACHOK,
 JAJAHAN BACHOK, KELANTAN.

BUILT UP RATE FOR BRICKWALL

No.	Description	Unit rate/ M2 (RM)
1	<u>MATERIAL</u>	
	i) Cement brick @0.35/ Nos 1 M2 = 60 Nos 60 Nos@ 0.35 = 21.00	21.00
	ii) Mortar	
	a) Sand @50.00/ M3 1 M2 = 0.027 M3 0.027 @ 50.00 = 1.35	1.35
	b) Cement @16.00/ bag 1 bag = 30 M2 1 M2 = 0.53	0.53
2	<u>LABOUR COST</u>	
	i) Installing brick 0.15/ No 1 M2= 60 Nos 60 Nos @ 0.15= 9.00	9.00
3	<u>WASTAGE</u>	
	i) Cement brick 3% on 21.00	0.63
	ii) Mortar	
	a) Sand 3% on 1.35	0.04
	b) Cement 3% on 0.53	0.02

	SUB TOTAL	32.57
c)	Profit 15% of Sub total	4.88
	TOTAL	37.45

Conclusion, for 1 M2 for brick wall is RM 37.45

Table 3 Cost of the wall in 1 M2

3.4 Identify Problems in Brickwall Construction and Recommendations to Overcome the Problem

3.4.1 Problem

i. Thermal Cracking

Although masonry can deform elastically over long periods of time to accommodate small amounts of movement, large movements normally cause cracking. Cracks may appear along the mortar joints or through the masonry units. Cracking can result from a variety of problems: differential settlement of foundations, drying shrinkage, expansion and contraction due to ambient thermal and moisture variations, improper support over openings, the effects of freeze-thaw cycles, the corrosion of iron and steel wall reinforcement, differential movement between building materials, expansion of salts, and the bulging or leaning of walls.



Figure 13 Thermal cracking (Sources: Google)

3.4.2 Ways to Prevent the Thermal Cracking

- i. Assume bricks will increase slightly in size over their life. This is due primarily to moisture expansion and, it's part of how bricks are made. There are helpful formulas to calculate the movement of brick walls.
- ii. Labour have to expansion joints in their brickwork. Expansion joints separate brick masonry into segments to prevent cracking caused by temperature change, moisture expansion, elastic deformation, settlement, or creep. They can be horizontal or vertical.
- iii. The labour have to make sure all expansion joint materials extend through the full thickness of the wythe to keep mortar and other debris from clogging the joint and to keep water from penetrating the joint as much as possible.
- iv. Do not use fibre board or similar materials in expansion joints they are not compressible.
- v. Don't allow the mortar, ties, or wire reinforcement to extend into or bridge the expansion joint, as these can restrict movement .

CHAPTER 4.0

CONCLUSION

4.1 CONCLUSION

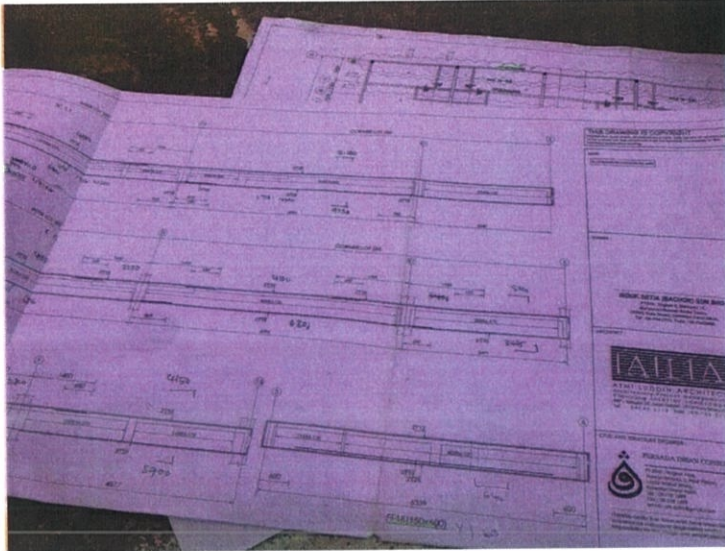
Overall, after involving in this internship at the construction site that focusing on brick wall, Party walls are walls that separate buildings or units within a building. They provide fire resistance and sound resistance between occupants in a building. The minimum fire resistance and sound resistance required for the party wall is determined by a building code and may be modified to suit a variety of situations. Ownership of such walls can become a legal issue. Internal wall partitions, also known as office partitioning, are usually made of plasterboard (drywall) or varieties of glass. Toughened glass is a common option, as low-iron glass (better known as opti-white glass) increases light and solar heat transmission. Various materials, tools and machineries are used to construct the brick wall. By site visit and observation, there are two methods that used to construct the party wall such as brick layering and concrete wall. By using concreting wall method, it can speed it up the process of construct the party wall, while by brick layering method it cause a small problem that is the brick is uneven, this problem can lead to wasting the plaster. The labor will used big amount of plaster to cover up the uneven brick. To prevent it, site manager have to find skill labor to do the brick layering work.

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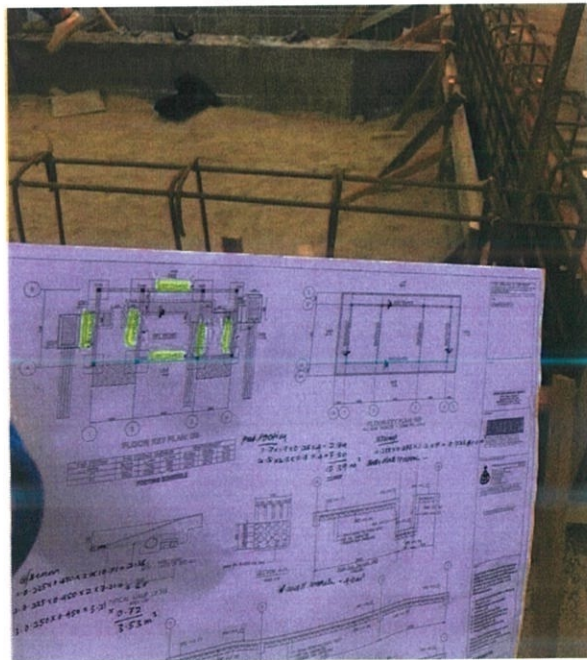
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APPENDIX A



First floor beam Plan at block G

APPENDIX B



Substation TNB number 3 plan