DEPARTMENT OF BUILDING
UNIVERSITI TEKNOLOGI MARA
(PERAK)

INSTALLATION OF BRICKWALL AND LINTEL

Prepared by:
FIKRUL HAZIM BIN ABDUL NISZAN
2019292282

DEPARTMENT OF BUILDING
FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING
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(PERAK)

AUGUST2021

It is recommended that the report of this practical training provided

By

FIKRUL HAZIM BIN ABDUL NISZAN

2019292282

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

Report Supervisor	:	Cik Nor Azizah Binti Talkis
Practical Training Coordinator	:	Dr Nor Asma Hafizah Bt. Hadzaman
Programme Coordinator	:	Dr. Dzulkarnaen Bin Ismail.

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STUDENT'S DECLARATION

I hereby declare that this report is my own work, expect for extract and summaries for which the original references stated herein, prepared during a practical training session that I underwent at ABDAN PRESTIGE HOLDING SDN BHD for duration 20 weeks starting from 23 August 2021 and ended on 7 JANUARY 2022. It is submitted as one of the prerequisite requirements of BGN 310 and accepted as a partial fulfillment of the requirements for obtaining the Diploma in Building.

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Name : FIKRUL HAZIM BIN ABDUL NISZAN
UiTM ID No : 2019292282
Date : 7 January 2022

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Alhamdulillah, all praise be to Allah SWT.

I would like to express my deepest appreciation for your guidance, advice and assistance throughout the training. It is a privilege to undergo a 20 week internship a good company with a lot of experience, ABDAN PRESTIGE HOLDING SDN BHD.

First of all I would like to appreciate myself because I was able to finish the practical training given by the lecturers without any problems. Although many trials befell while performing this practical training, the training provided was completed in a timely manner.

First of all, I would like to thank my supervisor Mr. Ariff Izuddin Bin Zakaria for successfully guiding me throughout this practical training. He always guide me when I make a mistake. Not only that, he often compromised with me and simplified the task.

Secondly, I am very grateful to my family and friends who always give me encouragement during difficult times. I know this practical training is not too difficult but sometimes I make mistakes. My family always helps and supports me to improve my capabilities. Not forgetting the lecturers who always answer students' questions and queries.

Finally, I really appreciate the services of people who have helped me a lot over the years. May the services of those who help me be rewarded one day.

ABSTRACT

A brick wall is a wall made of bricks and immovable blocks. Brick walls are vertical building elements made of bricks and mortar that are used to form the exterior walls of buildings, parapets, interior partitions, free standing walls, retaining walls and many more.

The common brick size used in any construction area is 215mm x 102.5mm x 65mm. Bricks are bonded with cement mortar or lime. Brick walls can be fastened straight, curved and so on according to the plan shape.The construction of brick walls creates a suitable and comfortable building as well as provides privacy as well as protection from weather and noise.

In addition, lintels are also one of the important materials to install on the wall if the wall has doors and windows. Lintels need to be installed first before the bricks are fastened. Lintels are used to support loads from the above structure.

This report will discuss the work of installing bricks and lintels. This report was conducted at PT63807, JALAN KERAYONG, BUKIT KAPAR, KU11, MUKIM KAPAR, KLANG DISTRICT, SELANGOR. The objective of this report is to analyze the installation of brick and lintel walls. It will focus on the whole process brick wall construction. It can also find out the equipment and machinery used during this installation. This report will also show problems and solutions in installing brick walls and lintels.

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CHAPTER 1.0

INTRODUCTION

Background of Study1.0

Most load-bearing walls above grade require reinforcement to provide the flexural strength required, as these masonry walls expand and contract due to temperature changes, loads imposed by strong winds, and the weight of the wall itself. Reinforcement also provides stability of CMU walls during seismic events. Walls can be solid masonry or “veneer” or “cavity” walls.

Cavity wall construction often consists of a brick outer wall, an air space, and a structural inner wall of steel or wood studs faced with gypsum board. These two wall types must be joined together to provide structural integrity and steel wall reinforcement. Reinforcements can be truss and ladur types or wall ties that tie the outer wall to the inner wall.

Sections of masonry walls are known as wythes; a single wythe is one masonry wall thick, and a double-wythe wall consists of one outer and one inner wall, often of different masonry types: one brick (outer) and one CMU (inner). (Sidney M. Levy, in Construction Process Planning and Management, 2010).

A brick is a building material used to make walls, pavements and other elements in masonry construction. Traditionally, the term brick referred to unit composed of clay, but it is now used to denote any rectangular units laid in mortar. A brick can be composed of claybearing soil, sand and lime, or concrete materials. Bricks are produced in numerous classes, types, materials, and sizes which vary with region and time period, and are produced in bulk quantities. Cement sand brick is a type of brick made from a mixture cement and sand and molded under pressure (McGraw-Hill Dictionary of Scientific & Technical Terms, 2003). The cementation process involves the introduction of bacteria and nutrients to sand, and through bacterial processes calcite precipitation binds particles together, ultimately creating a sandstone material (Bernandi et al, 2014).

Paper is a thin material produced by pressing together moist fibers of cellulose pulp derived from wood, rags or grasses, and drying them into flexible sheets. The pulp papermaking process is said to have been developed in China during the early 2nd century A.D., possibly as early as the year 105 A.D. by the Han court eunuch Cai Lun, although the earliest archaeological fragments of paper derive from the 2nd century BC in China (Michael, 2003). Shredded paper has less fiber value. Shredding cuts fibers into very short pieces, many of which pass through paper making screens and become waste at the paper plant. In addition, the wasted of shredded paper can increase costs. As a higher demand of paper, logging process will increase from time to time. Logging will reduce the amount of tree. This also can cause environment pollution. So, there are much of waste product produces every years that contribute to environment pollutant unless recycle it for other applications.

1.2 Objectives

The objectives that can be obtained from this practical training are:

I. To identify the method of brick wall installation.
II. To identify the method and function of lintels on doors and windows.
III. To investigate any problems or issues that occur before, during and after the construction process in addition to the solutions taken to complete it.

1.3 Scope of Study

The scope of the study was conducted at PT63807, JALAN KERAYONG, BUKIT KAPAR, KU11, MUKIM KAPAR, KLANG DISTRICT, SELANGOR. The project has been started on 15 February 2021 and is expected to be completed on 15 July 2022. The construction is the construction of 9 units of double storey terrace houses and 33 units of single storey terrace houses costing Seven Million Nine Thousand fifty two three hundred eighty five Ringgit Malaysia (RM 7,952,385.00). The project is not running very smoothly due to the covid-19 epidemic that is plaguing the country. So, most of the construction work could not be carried out and was delayed. The running time of this project has been extended. Focus from the study was to determine how the process of wall construction and lintel installation. Therefore, the study will be described not only on the wall method brick installation process but includes door and window lintels, finishes for walls, as well as machines and tools. Furthermore, the problem and solutions are also included in this report. Even so, the study is not focused the quantity of labor or labor, its cost and duration are important. The three ways required to collect data were by interview, observation and document review.

1.4 Methods of Study

1. Observation - Observation is one way to gain new knowledge. From there we can see how the installation of brick walls from the initial stage to completion. Indirectly we can see the skills of the workers in building brick walls. For 3-4 hours the average time used for the installation of bricks for each wall includes lintels but also depends on the length and width of the wall. It takes 3-4 days to complete a single storey house unit. Observations on the construction process of brick walls have been recorded via smartphone for 10 weeks.

2. **Interview** -Interviews are an easy way to get information without observing or while observing. Most interviews performed while conducting observations and while doing work on site. Interviews were conducted with the site manager and the contractor in charge to handle current projects at the construction site. Workers at the construction site were also interviewed while doing the bricklaying work. Each interview session is estimated to last 5-10 minutes. Some interviews were recorded in notebooks.

3. **Document Review -** Document review needs to be done to collect company data, project list, project drawings and more. A drawing plan will be used as a reference at the site being monitored for the bricklaying process. Photographs taken on site during construction work are the best reference during document review. Time for document review will usually take 15 minutes for one drawing plan in a week. Review of project drawings can be done in the office and on site.

CHAPTER 2.0

COMPANY BACKGROUND

2.1 Introduction of Company

ABDAN Prestige Holding Sdn Bhd (APHSB), is a Bumiputera company established on the 13th September 2006 mainly to participate in construction works across the country. Furthermore, APHSB is G7 class contractor registered with the Contractor Service Center (PKK), Construction Industry Development Board (CIDB) of the Ministry of Finance (MOF) and more. Abdan first states in landscaping industry and is slowly growing and venturing into the world of developers and construction.

The company provides the following expertise:

I. Infrastructural
II. Civil and Structural Engineering Works
III. Landscapes

Figure 2.1: APHSB Headquarters located at Shah Alam, Selangor

Previously, APHSB completed the project from JKR as a sub-con, which is to build two floors car park, multipurpose hall and bridge at Section 5, Shah Alam, Selangor. APHSB too operating a project from Wira Muhibbah as a sub-con to build a mosque in Section 24. The project is almost 90% complete and is expected to be fully completed by the end of this year.

APHSB places emphasis on building symbiotic relationships with our customers to identify the optimal ones workable solutions and implementation strategies, taking into account the finances of our clients commitment to the project.

Apart from its core business, APHSB has also diversified into non -core business areas such as Mechanical and electrical works, Landscaping and Maintenance works.

2.2 Company Profile

Company name :	ABDAN Prestige Holding Sdn. Bhd.
PPK registration no. :	0120061212-SL111710
Date of registration :	12 December 2006
Nature of business :	Infrastructure contractors, property developer, building contractors, landscape and maintenance works and other related services
Registered address :	39-4 & 41-4, Menara Klang, Blok B, Jalan Nenas, 41400, Klang Selangor
Correspondence address :	48-2, Jalan Nelayan B 19/B, Seksyen 19, 40300 Petaling,
Telephone/Fax :	03-55454499
Board of director :	Dato' Sri Abdul Rahman Bin Hj. Maarum

Table 2.2.2: APHSB Company details

OFFICIAL LOGO

VISION

- Listed in Bursa Saham Malaysia.

MISSION

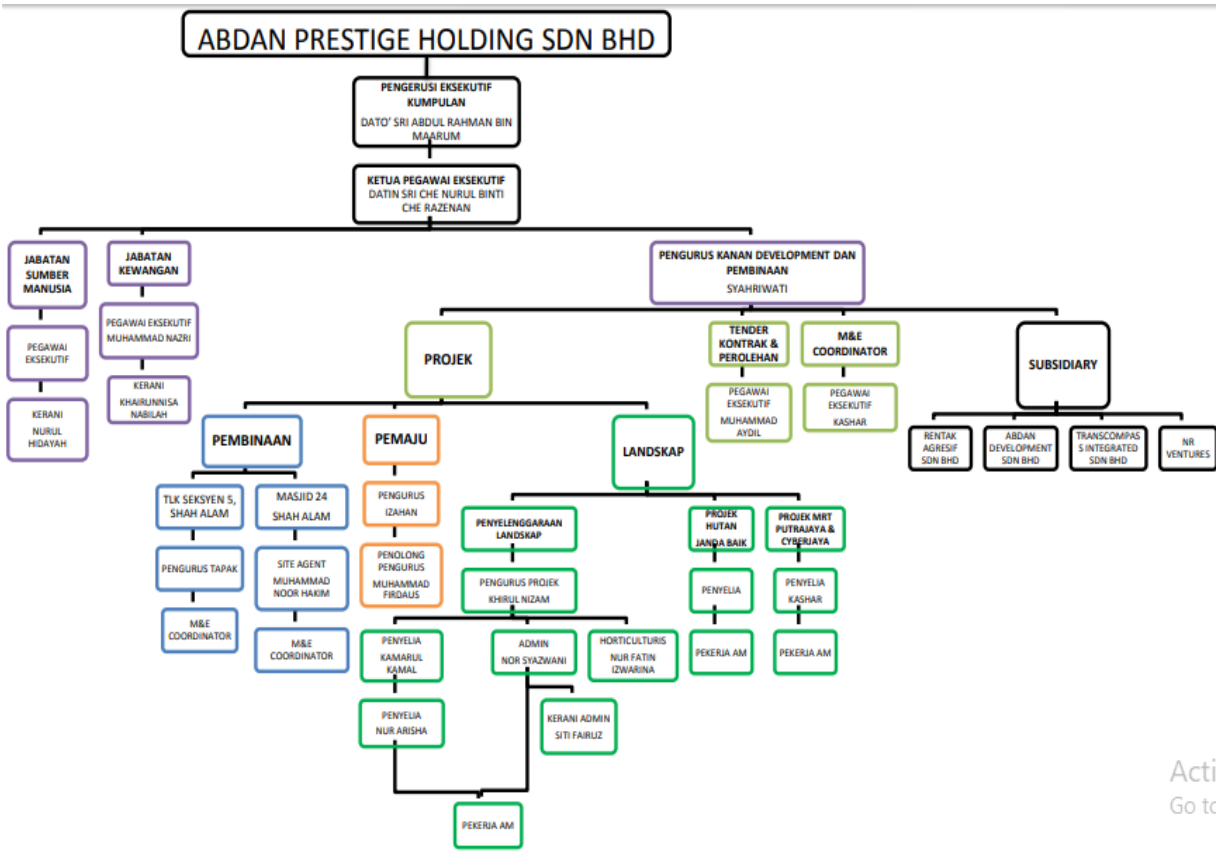
- Excellent and caliber contractor .
- Free from any debts .

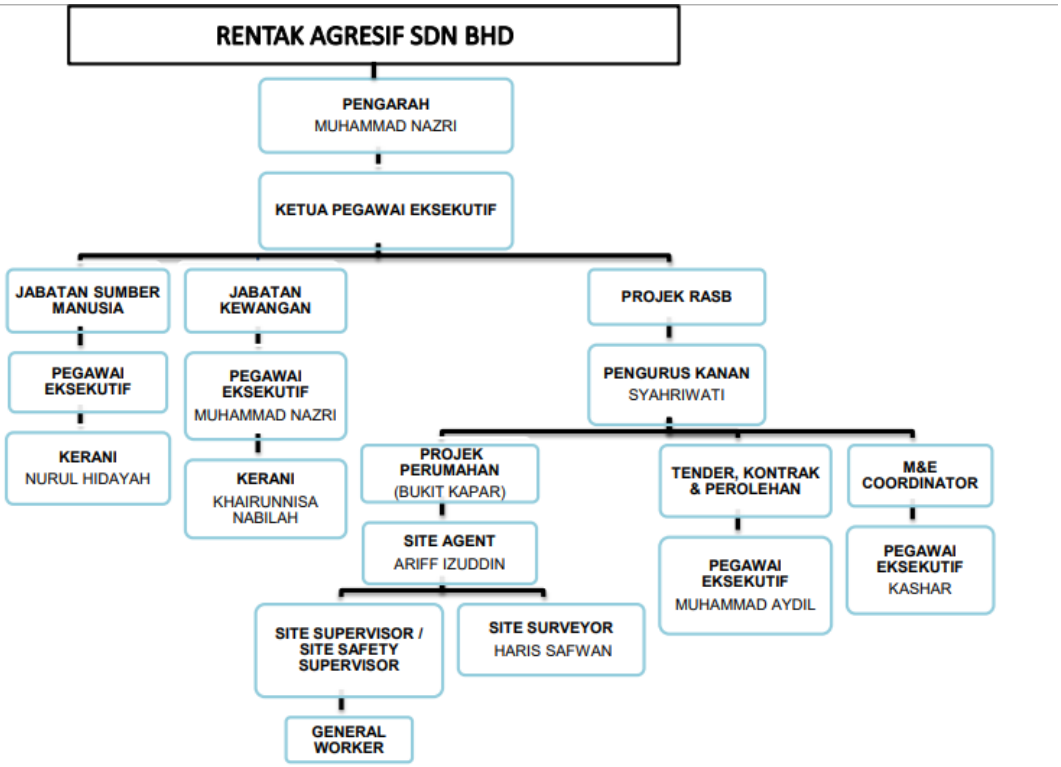
COMPANY QUALITY RIGHTS

- APHSB is a company which do works for landscape preparation and public cleaning following with quality standard:

- Fully commit to prepare landscape and public cleaning works as client satisfaction .
- Planning method statement to identify quality of the objectives .
- Committed to fulfill clients' needs, laws and regulations, and ISO 9001:2015 .
- Committed to direct and regular enhancement of APHSB quality management system.

2.3 Company Organization Chart





2.4 List of Projects

2.4.1 Completed Projects

No.	Project Title	Project Value	Start Date	Completion Date	Project Duration	Client
1	Kerja-Kerja Penyelenggaraan Dan Perkhidmatan Di Kompleks Unit Berkuda Putrajaya Dan Presint Diplomatik, Presint 15, Putrajaya (Sub-Kontrak)	4,398,295.89	2/1/2013	31/1/2016	36 Months	Perbadanan Putrajaya
2	The Proposed Landscape Improvement Works In Medini Iskandar Malaysia, Johor Darul Takzim For Medini Iskandar Malaysia Sdn Bhd ("works")	2,079,117.50	10/12/2015	2/12/2016	13 Months	Medini Iskandar Malaysia Sdn Bhd
3	Cadangan Membina 102 Unit Rumah Teres 2 Tingkat Yang Mengandungi 82 Unit A75 (22' x 75') Dan 20 Unit Jenis A80 (22'x80') (Fasa 1b) Di Atas Lot 53842 (Hs (d) 290186), Mukim Tebrau, Daerah Johor Bahru, Johor Darul Takzim -Nsc For Soft And Hard Landscape Works	537,131.68	23/1/2018	22/7/2018	18 Months	Jallcon (M) Sdn Bhd
4	Proposed Developement On 448.61 Acres Of Land On Lot 18370 (Pt 21628) Mukim Of Semenyih, Daerah Hulu Langat, Selangor Darul Ehsan	750,000.00	15/5/2017	14/9/2017	4 Months	UEM Sunrise Berhad

Table 2.4.1: APHSB Completed project

2.4.2 Project in Progress

No.	Project Title	Project Value	Start Date	Completion Date	Project Duration	Client
1	Maintenance For Landscape Services At Istana Negara, Jalan Duta, Kuala Lumpur	11,472,123.60	11/1/2018	31/10/2021	36 Months	Widad Builders Sdn Bhd
2	Cadangan Membina Dan Menyiapkan Masjid Seksyen 24, Shah Alam, Dalam Daerah Petaling, Selangor Darul Ehsan (Sub-kontrak) EOT no 4 in progress	12,298,991.75	28/11/2017	EOT NO 4 30/7/2021 EOT NO 5 (DALAM PROSES PERMOHONAN BERKAITAN PKP)	30 Months	JKR Negeri Selangor
3	CADANGAN MEMBINA DAN MENYIAPKAN 9 UNIT RUMAH TERES 20' X 61.8' (DUA TINGKAT), 33 UNIT RUMAH TERES 22' X 60' (SATU TINGKAT), SATU UNIT PENCAWANG ELAKTRIK, SATU UNIT LOJI RAWATAN KUMBAHAN MEKANIKAL DI ATAS PT 63807, JALAN KERAYONG, BUKIT KAPAR, MUKIM KAPAR, DAERAH KLANG, SELANGOR DARUL EHSAN	7,952,385.00	15/2/2021	15/2/ 2022	12 Months	ABDAN DEVELOPEMENT SDN BHD

Table 2.4.2: APHSB list project in progress

CHAPTER 3.0

CASE STUDY

3.1 Introduction to Case Study

The APHSB project that is being carried out is a terrace house housing project in JALAN KERAYONG, BUKIT KAPAR, Klang. This project is carried out in the village area of Kampung Bukit Kerayong. APHSB has appointed a site engineer, Mr. Ariff Izuddin who is also my supervisor to handle this project. I have been assigned by APHSB to be on this site and assist my supervisor while gaining experience knowledge throughout the internship period. The main goal is to prepare a one -story house (22 ’x 60’) and a two -story house (20 ’x 61.8’). Therefore, the study will be explained not only by about installation but includes machines and tools, time spent and construction problems and their solutions.

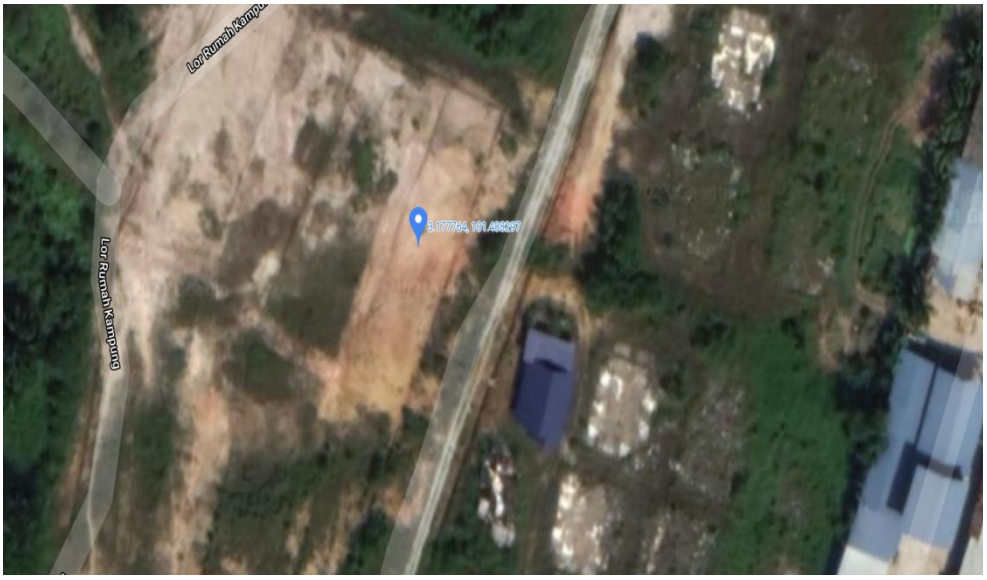


Figure 3.1: Location of site based on the satellite map

As shown in Figure 3.1 above, the site of this housing project is located at Jalan Bukit Kerayong. The site was previously an orchard full of bushes. The project site is a developing area as there are also many new housing projects set up in the district.

The activities that have been carried out on the site are the work of installing bricks. This work is quite difficult as it needs to be handled by skilled workers to get the perfect wall bond. There were also some unskilled workers who helped mix the mortar and carry it along with the bricks to the construction site to assist the masons. There is a lot of machinery and tools involved in this construction. Examples are wheelbarrows, scaffolding, buckets, brick lines and pins, brick hammers, measuring tapes and many more.

My job assigned by the company is that I will be responsible for assisting the site Supervisor. I will monitor the work done on the construction site. Machinery carrying materials such as rocks and sand entering the site will also be monitored. Always contact the supplier if there is a shortage of material supply on site.

3.2 Method of brick wall installation

PLAN OUT THE WALL

Figure 3.2.1: Sand Brick that used for the construction.

The first is to make good planning before installing a brick wall. Make sure the quantity of bricks needed for each wall is according to the height and size of the wall. Wall height values are measured from the ground floor to the roof beams of the building. Type of brick used in the construction is a sand brick with a length of 201MM x a width of 100MM x a height of 64MM.

CLEAR THE FLOOR

Figure 3.2.2: The floor has been cleared.

Before starting the process of installing bricks, the floor should be clean and free of waste. Floor cleaning is done using an air compressor. A clean floor surface is important in the process of binding brick walls to facilitate workers to tying bricks neatly and without any problems.

LIFTING BRICKS

Figure 3.2.3: Bricks that have been lifted using a crane.

Each brick pallet is lifted using a crane to be placed inside the building. This simplifies the work of workers to tying bricks and saves time. Each pallet has six hundred sand bricks.

MIX THE MORTAR

Figure 3.2.4: Concrete mixers that have been used to mix mortar.

A mixture of water, cement and sand to produce a mortar. The base mixture of mortar can be made using a volume ratio of 1 water: 2 cement: 3 sand. Shovels are used to shovel sand and mortar. After that, the mortar will be put into a bucket and brought to the site.

MARKING

Figure 3.2.5: Using plumb bob to make the mark.

The thread line for the brick wall is marked using a plumb bob between the two pillars of the building. Ropes are attached to each wall to be built as a worker guide during the process of installing wall bricks.

DAMP PROOF COURSE (DPC)

Figure 3.2.6: DPC that has been installed under the brick layer.

A damp proof course is important as any excessive moisture entering the building can lead to more serious property problems such as wood decay or structural damage. All damp proof course must be laid between an even and fresh layer of mortar in a continuous length to the full width of the wall and preferably projecting past the outer surface.

THE PROCESS OF TYING BRICKS

Figure 3.2.7: Workers are tying bricks.

Figure 3.2.8: An exmet that has been installed.

A scoop of mortar for the first coated brick is placed on top of the damp proof course using an eagle and trowel. Mortar will be placed on the foundation and make a ‘v’ shape along the mortar. Creating a ‘v’ shaped trench spreads the mortar out and makes it easier to lay the path. Place the bricks in the mortar and press firmly into place, being careful to make them flat. The remaining mortar can be reused as long as it is free of any dirt. Exmet is also installed during the brick tying process. Exmet, a type of brickwork reinforcement, is added for every fourth layer of brick. Exmet works by absorbing vibrations and stresses in buildings.

FINISHES WORK

Figure 3.2.9: The walls have been marked for plaster.

Figure 3.2.10: Mortar used for plaster.

Figure 3.2.11: The walls have been plastered.

Plaster is a building material used for protective coatings or decoration of walls and ceilings and for shaping and pouring decorative elements.Plaster is a building material used to coat, protect and decorate interior walls and ceilings. It can also be used to create architectural molds such as ceiling roses, cornices, corbels, and so on. The most common type of plaster is a composition of gypsum, lime or cement with water and sand.

3.3 Method and function of lintels

1. Measure the gap to be closed with the door sill and note the exact size.

Figure 3.3.1: Measurements using laser levels.

2. Make a mold to size by sawing one bottom off the plywood, adding half an inch on each of the four sides.

Figure 3.3.2: The process of cutting plywood.

3. Nail the pieces of wood tightly to produce the mold container using a hammer.

Figure 3.3.3: Tap the nail with a hammer.

4. Cut the rebar to the same size as the length of the box and place it inside. Place a spacer between the bars to prevent them from moving.

Figure 3.3.4 : Rebar was placed into the box.

5. Mix ballast and cement in a mixer. Add water and stir the mixture.

Figure 3.3.5: The mold has been mixed.

6. Pour the concrete mixture into a mold box on top of the rebar. To ensure an even distribution of concrete, take a hammer and tap lightly around the edges of the mold.

Figure 3.3.6: The mold has been poured into the mold box.

7. Leave for 24 hours then remove the mold. Place the concrete plate horizontally on a dry surface and leave for a week.

Figure 3.3.7: Lintel drying process.

8. Lintel is ready for use after seven days of drying.

Figure 3.3.8: Lintel that has been installed.

Lintel Function.

- The function of the lintel is to carry the weight of the structure over the opening. In a curve because of its shape, the blocks support each other with joint pressure of their own weight and the structure remains in position with resistance from the supports.

3.4 **Problems and solution taken**

Problem: Incorrect level of brick installation.

- Workers sometimes mistakenly tie bricks because they are guided by incorrect measurements. Bricks should not be mistakenly tied as it will affect the building.

Solution: Use the Laser Level.

- The brick level problem can be solved by using a laser level because the laser is light. The light will move in a straight line and it helps the worker lay the bricks in a straight line. The work of tying the bricks will be more tidy. Brick bonding errors can be avoided by applying the use of laser level.

Problem: Water rises from the ground and shrinkage.

- Brick is a porous material that absorbs water from the soil or its surroundings which causes it to expand and then shrink as the water evaporates. That shrinkage causing cracks at the masonry joints. This causes damage to the wall finish after it is installed but does not interfere with the strength of the wall structure.

Solution: Install Damp Proof Course (DPC).

- The damp proof course prevents moisture from the soil from rising to the walls and causing damage. Walls that do not have a damp proof course layer may be affected by excessive moisture rising from the soil. To get better brick protection rather than being absorbed by water, damp proof course should be installed on each wall.

Problem: Brick contains dust and dirt.

- Bricks become dirty or grow moss or dirt after being left for a long time. This is happen because of exposure to airborne pollution and dirt attached to the bricks and mortar. The brick structure is not affected but the overall appearance of the brick will be affected.

Solution: Clean the walls.

- Dirt, dust and on brick surfaces can be cleaned with water. The use of equipment such as water jets is very useful because it can remove moss very easily and quickly. The walls will look clean and have neat surface.

CHAPTER 4.0

CONCLUSION

Walls are important to a building to create a sturdy and comfortable building as well as protection from weather such as heat and rain. The manufacture of bricks to produce a wall starts from the plan, floor cleaning, collection of bricks, mixing sand and cement, pins and lines for marking, the process of installing wall bricks and finally the plaster process for finishing the walls.

This process takes 1 week for a block of houses that have 9 housing units without plaster. The process of installing stone walls cannot be carried out during rainy weather because the bricks are wet. Sandstone is a rock that easily absorbs water and is easy to break. If the brick wall installation process takes place during the rainy season then the brick wall finishing process may take quite some time.

The methods used during the brick wall installation process are common at any construction site and there are no different methods. It also depends on the skills and experience of the workers who install the brick walls. In addition, problems such as dust, stone waste and mold dirt have also been resolved.

REFFERENCES

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