DEPARTMENT OF BUILDING

UNIVERSITI TEKNOLOGI MARA

(PERAK)

INSTALLATION OF ROOF BEAM

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DEPARTMENT OF BUILDING

FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING

UNIVERSITI TEKNOLOGI MARA

(PERAK)

JULY 2020

It is recommended that the report of this practical training provided

By

MUHAMAD KAMIL BIN RAMLE

2019244444

INSTALLATION OF ROOF BEAM

Practical Report Title

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

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AUGUST 2021

STUDENT'S DECLARATION

I hereby declare that this report is my own work, except for extract and summaries for which the original references stated herein, prepared during a practical training session that I underwent at NH Ivory Home SDN. BHD. 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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Date : 10/1/2021

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ACKNOWLEDGEMENT

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

I would like to extend my heartfelt gratitude for the guidance, advice and help rendered throughout the period of training by the following group of amazing individuals. First and foremost, I would like to thank to my Chief Executive Officer, Encik Mohd Alhafiz Bin Abdul Malik and Chief Operation Officer, Encik Muhammad Afiq bin Arif for the opportunity given, to conduct my training in his esteem company. His team of professionals comprising of En Raimi Mohd Razuki, En Mohd Izrul Bin Ghazali, En Illahi Mohd Ashri, En Norizan Alias, En Hafiz Bin Kimi and En Azman Mohammed Tawil, have enabled me to learn and develop my understanding, knowledge and feel of real time projects, and the theory involved in analysis of structures, building and civil works. They are also responsible towards streamlining and assessing my training. Also to the site personnel in both UMW, Shah Alam and 1MDB, Subang who have extended their cooperation and help to further enhance my ability in understanding the procedures in construction and site administration, tests procedures, site safety and best practices in the industry. It is an honour for me to be given the opportunity to 'work' with all of you.

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 Cik Nor Azizah Binti Talkis, Supervising Lecturer, Puan Nurhasyimah Binti Ahmad Zamri, Evaluation Lecturer, En. Muhammad Naim Bin. Mahyuddin, Practical Training Coordinator and Dr. Dzulkarnaean 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

Energy is a very important thing to elaborate, therefore this report will discuss about energy efficiency for the building envelope based on Code of Practice on Energy Efficiency and Use of Renewable Energy for Non-Residential Building MS 1525: 2007. This report was conducted for the building envelope at Library of UiTM Perak and Main Library of UM. The objective of this report is to compare the capacity of two educational buildings and how far it fulfills the requirements in the guideline. It will focus on energy conservation that provides a comfortable environment for its occupants. To illustrate the function of building envelope as an important aspect to focus on building surface design achievement and then to evaluate how far the potential of the building envelope that could fulfill the building criteria that is prescribed by the requirements in the guideline based on U Value and OTTV Value. This report will also look at the energy efficiency management based on the guideline by producing the use of effective and continuous energy and to evaluate the quality of energy usage by creating energy efficient environment that gives a better impact for the National Energy Sector in the future.

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CHAPTER 1.0

INTRODUCTION

1.1 Background of Study

A roof beam is a load-bearing element that is important to the building's structural strength. It adds durability to walls while sustaining the floor or roof above it. It also holds joists, trusses, and other roofing elements in position. A roof beam is the thickest and most important component of a property's roof or levels. (Roofing Superstore 2021)

In the construction of buildings and structures, different kinds of beams are used. Vertical loads, shear stresses, and bending moments can all be absorbed by these horizontal structural elements. Beams carry loads to their endpoints, such as walls, columns, and foundations, along their length. One of them is Simply Supported Beam. This is one of the most basic structural elements are those that have both ends resting on supports but are free to rotate. At one end, there is pinned support, and at the other end, there is a roller support. It can resist shearing and bending according on the load. Both ends are supported and fastened to prevent rotation for Fixed Beam. A built-in beam seems to be another term for it. Other than reactions, the fixed ends produce moments. Reinforced concrete beam is commonly used in the construction works in Malaysia**.** Reinforced concrete beams are structural elements that are designed to carry external loads in a transverse direction. Across their length, the loads cause bending moments, shear forces, and in certain cases torsion. Concrete is also strong in compression however weak in tension. Steel reinforcement was used in reinforced concrete beams to absorb tensile stresses. *(21 Types of Beams in Construction [PDF] - The Constructor 2018)*

1.2 Objectives

The main objectives in this study are:

1) To know the types and sizes of roof beam.
2) To understand the construction method of roof beam.

1.3 Scope of Study

This study is carried out at Rumah Kediaman 1 Tingkat Banglo Eksklusif Di Lorong Sri Saga, 36600 Chenderong Balai, Perak Darul Ridzuan. The focus of this study is the installation of simple roof beam. Throughout this report I will study the methods of installation such as materials and machineries used, the time and cost to complete the roof beam before the installation until it finished specifically for this site since it located in rural area and last but not least the problems that may and will occurred and the solutions to counter the problems.

1.4 Methods of Study

1) Observation

   By observing the methods of constructing the beam for three days with phone and camera to record while laptop, tablet and notebook used to write notes.

2) Interviews

   By asking question to both CEO, En. Muhammad Alhafiz and the CEO, En. Muhammad Afiq if having any confusion. To understand more about roof beam, I will ask skilled worker at site about the detail. It can be in constructed interviewers and unconstructed interviews.

3) Document Reviews

   By referring company profile, company agreement, construction drawings and progress report.

CHAPTER 2.0

COMPANY BACKGROUND

2.1 Introduction of Company

NH IVORY HOME SDN.BHD is a new company started in 2017. Despite being a new company, they already have built more than 30 houses. The company's focus is to involves in construction based on the latest technology as well as strength in terms of systematic and high quality of houses. In order to help the company, gain trust from various customers who will and deal with them. NH IVORY HOME also build houses based on the customer's taste from scratch.

2.2 Company Profile

NH IVORY HOME SDN BHD is located at NO 70 A, Persiaran SIBC 4, Pusat perniagaan Seri Iskandar, 32610 Bandar Baru Seri Iskandar, Perak Darul Ridzuan. The company is a Gred 2 in construction and have two founder the CEO and the COO. The CEO is En. Muhammad Alhafiz and the CEO is En. Muhammad Afiq also the most interesting part is both of them are 24 years old, young and ambitious men who wants to help youngsters like them to work and gain knowledge.

Figure 2.1: NH IVORY HOME SDN. BHD.

2.3 Company Organisation Chart

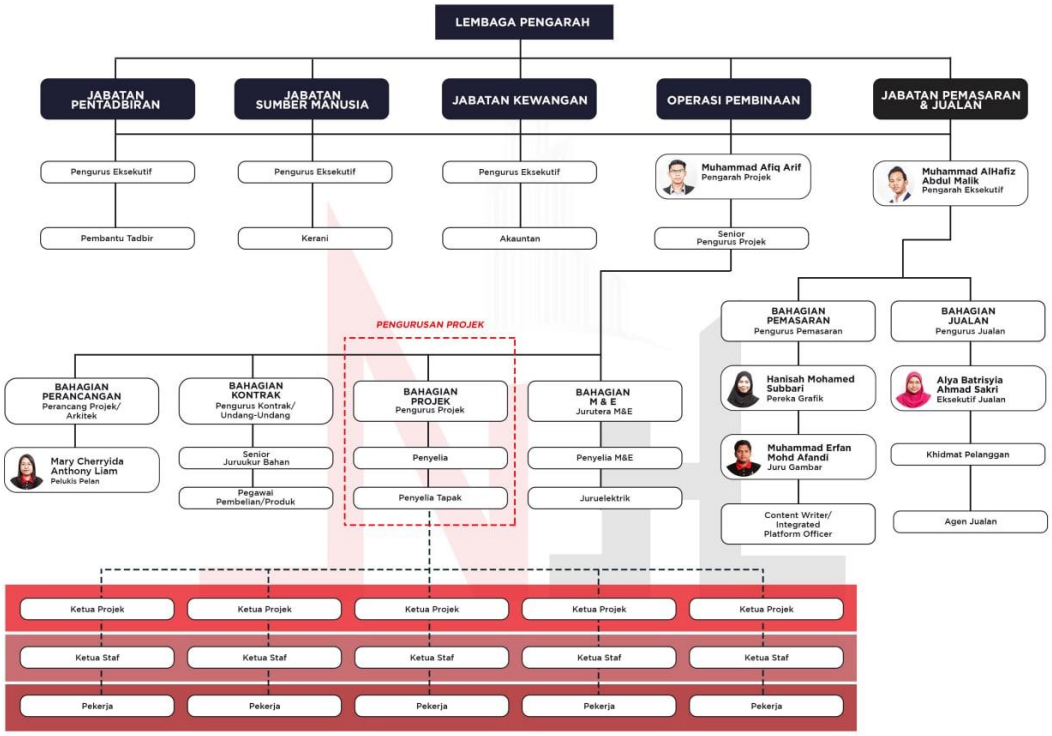


Figure 2.2 : organization chart of NH Ivory Home SDN. BHD

2.4 List of Projects

2.4.1 Completed Projects

No.	Project Title	Project Value	Start Date	Completion Date	Project Duration	Client
1.	CADANGAN MEMBINA DAN MENYIAPKAN RUMAH KEDIAMAN 1 TINGKAT BANGLO EKSKLUSIF DI KG ANAK KURAU, BATU KURAU, 34500 TAIPING, PERAK DARUL RIDZUAN.	RM272,000.00	5/1/2021	10/4/2021	4 month	YUSRI BIN ZANUDIN
2.	CADANGAN MEMBINA DAN MENYIAPKAN RUMAH KEDIAMAN 1 TINGKAT SETENGAH BANGLO EKSKLUSIF DI LOT 1434, NO.22, LORONG MASJID 4, KAMPUNG BAHAGIA 36000 TELUK INTAN, PERAK DARUL RIDZUAN	RM281,500.00	26/4/2021	30/9/2021	5 MONTH	HAJI ABDUL NASSIR BIN OTHMAN

Table 1.1: Completed Projects

2.4.2 Project in Progress

No.	Project Title	Project Value	Start Date	Completion Date	Project Duration	Client
1.	CADANGAN MEMBINA DAN MENYIAPKAN RUMAH KEDIAMAN 1 TINGKAT BANGLO EKSKLUSIF DI NO.14, JALAN UTAMA, FELCRA NASARUDDIN 32600 BOTA, PERAK DARUL RIDZUAN	RM252,340.00	10/9/2021	20/1/2022	4 MONTH	ALI OSMAN BIN HAJI LAHAKIM
2.	CADANGAN MEMBINA DAN MENYIAPKAN RUMAH KEDIAMAN 2 TINGKAT BANGLO EKSKLUSIF DI 316, JALAN MELOR, FELDA TROLAK SELATAN, 35600 SUNGKAI, PERAK DARUL RIDZUAN.	RM167,500.00	6/10/2021	15/2/2022	4 MONTH	HANIF BIN ABDUL RAHMAN @ ABDUL RADZI
3.	CADANGAN MEMBINA DAN MENYIAPKAN RUMAH KEDIAMAN 1 TINGKAT SETENGAH BANGLO EKSKLUSIF DI LOT 1434, NO.22, LORONG MASJID 4, KAMPUNG BAHAGIA 36000 TELUK INTAN, PERAK DARUL RIDZUAN.	RM281,500.00	26/4/2021	30/8/2021	4 MONTH	HAJI ABDUL NASSIR BIN OTHMAN
4.	CADANGAN MEMBINA DAN MENYIAPKAN RUMAH KEDIAMAN 1 TINGKAT BANGLO EKSKLUSIF DI LORONG SRI SAGA, 36600 CHENDERONG BALAI,	RM184,950.00	27/5/2021	5/10/2021	4 MONTH	MUHAMMAD FERDAUS BIN SELAMAT

	PERAK DARUL RIDZUAN.					

CHAPTER 3.0

CASE STUDY

3.1 Introduction to Case Study

This case study is about construct roof beam for residential building. This project is started on 27th May 2021 and estimated to be ready on January 2022. However, this project is still on-going. This study case will give a proper way to construct roof beam. This case study carried out at Lorong Sri Saga, 36600 Chenderong Balai, Perak Darul Ridzuan. The value of this project is RM 168 500 with 1260 square feet.

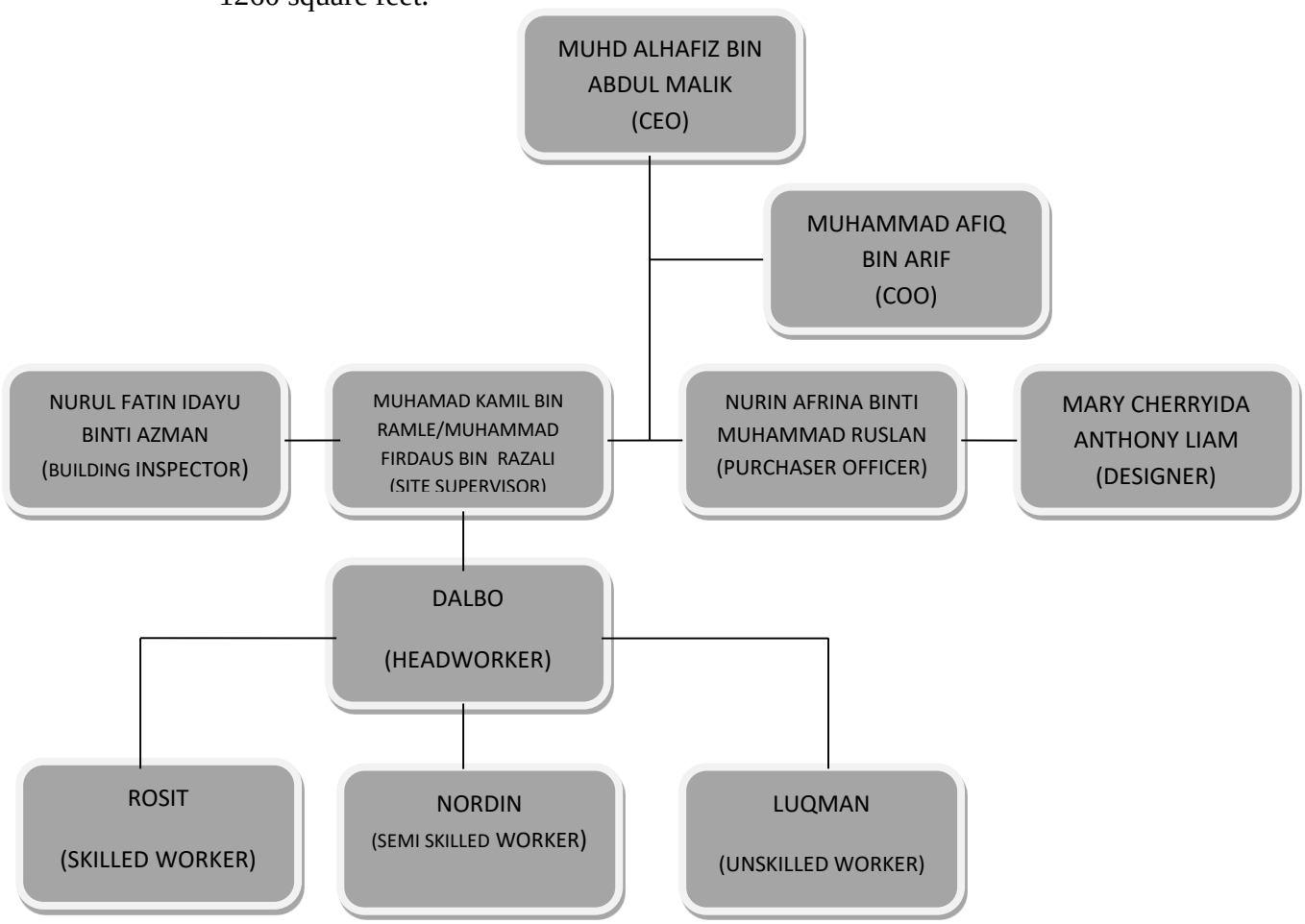


Figure 3.1: Organization Chart of Project's Site

The project area is in the palm tree plantation. It facing paddy field and in front of the house there is a large ditch that workers fishing if a holiday. There is no existing building near site construction because this site project is in the palm tree plantation. The nearest building is neighbourhood 100 meters away. In the entrance hall to the project site there is an orphanage 200 meters away from site project

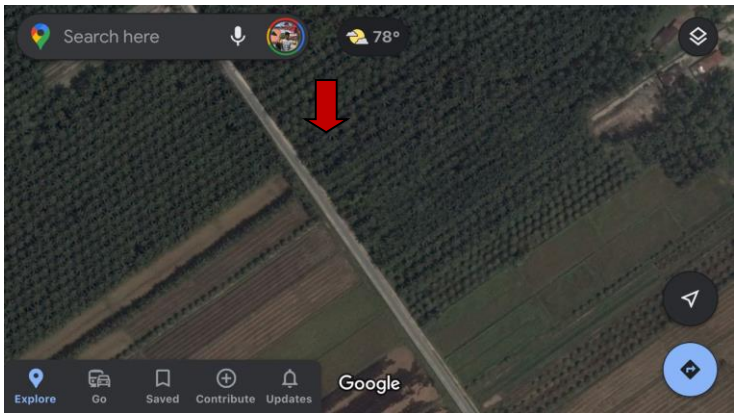


Figure 3.2: Location of site based on the satellite map

Source: https://goo.gl/maps/maUsakCcczEyHfAJ6

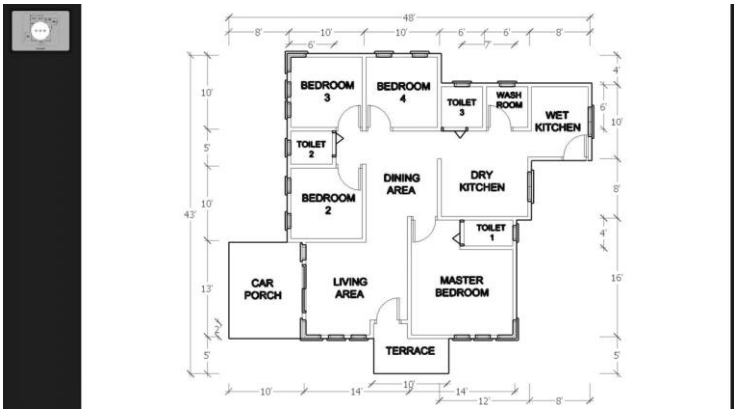
Roof beam is a structural element. The main power that handled this element are head, skilled and unskilled workers. Head workers job is to execute plan construct from the office. It delivered to skilled workers to make sure the process going properly. Unskilled worker is in charged in crafting steel form, beam formwork, and preparing concrete. The materials involved to construct roof beam of this site are cement, rough sand, aggregate and water. Concrete ratio used to construct this beam are 1:1:2.

Last but not least, the problems of roof beam process will determine throughout the construction process. Also, the solutions of the problems will be state after the problem of the process were identified. This chapter will be focused on the type and size of roof beam, the method of roof beam and the problem of roof beam process and the solutions for all the problems.

3.2 Subtopic (Based on objective 1)

The study are focusing on the types and sizes of roof beam, the method that used in this process and last but not least the problem and the solutions for the problems. There are many types of beam, such as concrete beam, steel beam, continuous beam and more. This project mainly focused on standard type and size of roof beam which is concrete beam. The length of the beam is usually according to the floor plan. The standard size of beam is 18 inches height and 4 inches thickness.

Figure 3.3: Floor Plan Of The Project



The beam that used in this project is 24 in total. Based on the beam of this site, the concrete that used in this project is using the formula LenghtxHeightxThickness. These elements have 4 workers that in charged for this project to be done. One of the worker is Headworker. Headworker job is to make sure the materials and to make sure worker at site according to the specified beam type and size specifications. The job of headworker is also a planner at the site, and to make sure the job is delivered to the worker at site. Headworker job is a bit difficult because he has to play a very important role so that there are no accidents or any major problems while carrying out the work.

3.3 To study the construction method of installation the roof beam

Figure 3.4 : Process Installation of Roof Beam at Site Chenderong Balai.

Figure 3.5: Process Installation of Roof Beam at Site Chenderong Balai.

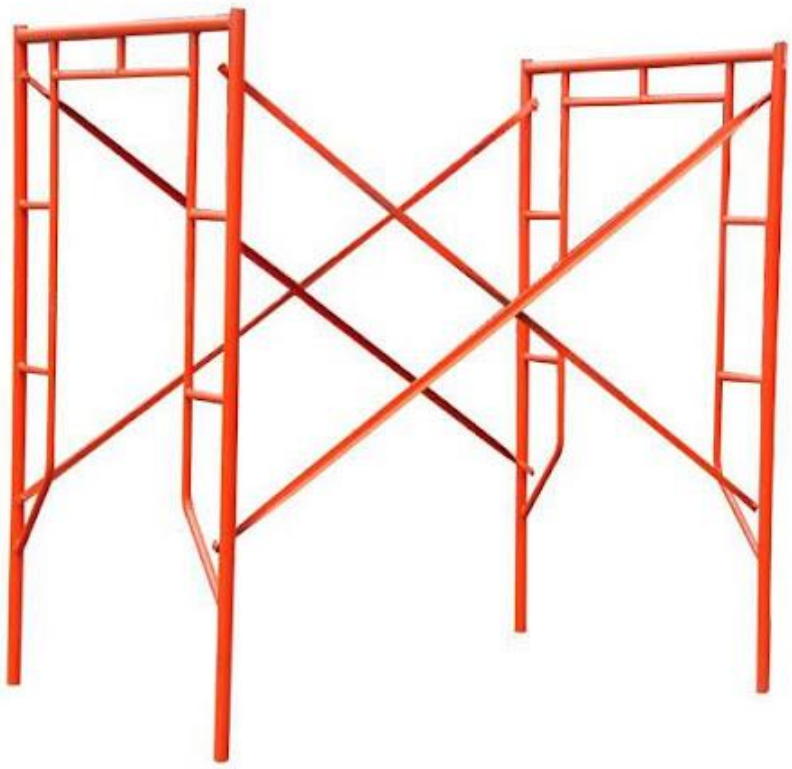


Figure 3.6: The example of staging that used

Firstly, roof beam element is an element that need to be done at a high place. To make sure the safety of the workers at site, the workers need to install the staging before the work for this element start. This way, hazard won't happen. By hazard, it can be the workers may fell to the ground using used woods as stairs.

Figure 3.7: Formwork of Roof Beam

Formwork for this element is using plywood, ½ wood and 2/2 wood. This formwork can be used several times. It also can be used for ground beam. The materials of plywood and wood is high quality of materials. Usually this formwork can be used again at the next 2 or 3 project. This process took 3 days to complete.

Figure 3.8: Example of reinforcement bar in roof beam

Source: (godshutter 2022)

Reinforcement bar installation is using y10 steel, r6 link steel and galvanized wire or iron wire. This process is to make the great strength of concrete. The steel for roof beam is connected with column steel. Longitudinal rebars are placed to withstand the bending tensile stresses that appear along the beam axis while stirrups are used to carry the diagonal tensile stresses caused by shear. The beam load will go to the base of the pad through the column. This process took 3 days to complete.

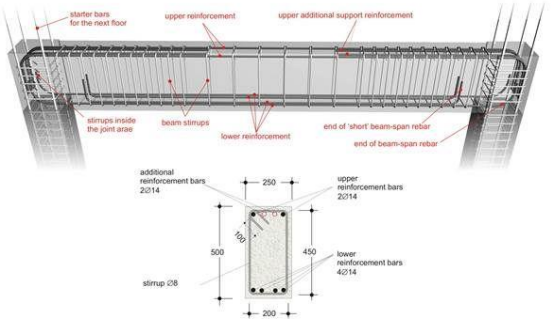


Figure 3.9 : Example of the steel in roof beam

Source : (*BuildingHow > Products > Books > Volume A > The reinforcement I > Beams > General | Structural design engineer, Concrete design, Beams* 2021)

Figure 3.10 : Example of concreting work of roof beam.

Concete that be used for roof beam is grade 25, which is the ratio of the concrete is 1 :1 :2. The materials for concrete is cement, rough sand, aggregate and water. According to the ratio, 1 equal to cement, another 1 equal to rough sand and 2 equals to aggregate. The concrete that usually used at site project is ready mix concrete or mix at construction site by workers. Concreting work took 1 or 2 days to complete. After concrete, the formwork can't open for the next 3 days to ensure the concrete is hard enough and durable.

Figure 3.11: Example of dismantling formwork of roof beam

Source : (*Construction workers dismantling beam formwork* 2014)

To ensure the concrete is hard enough, the workers will wait for 3 days before opening the formwork. After dismantling the formwork, workers will check the formwork first to make sure the formwork can be used at next project or not. If the

formwork can be used, workers will keep the formwork at the site store. The formwork that can no longer be used, workers will be dismantling the formwork and segregate the plywood and wood to workers can used for others work at site project. This work usually took 1 or 2 days to complete.

After dismantling the formwork, the workers will check the concrete to make sure concrete have to curing or not. If the concrete uneven, workers have to curing the beam before start next element which is roof element.

3.3 Subtopic (Based on objective 3)

In construction, problem is always occurring in any situation either minor or major. Roof beam is one of important element where it reinforces the upper structure of the house. Workers need to make this work very carefully with their skilled and according to the SOP given by the authorities. There are several problems that often occurs during roof beams element.

One of the problem at site during the roof beam construction process is quality of material used such as the quality of concrete mixing and the quality of steel work. For quality of concrete mixing, usually workers mix the concrete estimate themselves based on their experienced and not following the proper standard ratio. This problem causes major structure defect which is honey comb. Honeycomb is a rough pitted surface or gaps in concrete that emerge as a result of poor compaction or inadequate concrete filling. This defect happens when the concrete is not filled properly. This will create gaps between concrete and aggregates. The solution for it is site supervisor need to always supervise the site workers while they mixing the concrete so that the concrete won't have any problems in the future. This also help the company from losing more money and time.

Next, the problem that occurred during roof beam installation is weather. This is because it was raining so it reducing strength and endurance of roof beam. It is because of too much water in the concrete mix. The structure will not be damaged or broken in a short time but its durability is not guaranteed for a long period of time. The solution to this problem is site supervisor or site manager have to forecast weather, one week before the work actually start. This way, the concrete can be saved and the time to do the element will be less time consuming.

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CHAPTER 4.0

CONCLUSION

The conclusion of this case study is practical training can be so much important for students to learn how to install roof beam for a house. in this report, it explained the details procedure of installing the roof beam and it can be easily for student to understand about installation of roof beam.

Roof beam is easy to install if we understand the types and sizes of roof beam. Most of the house used same types and sizes of roof beam, which is the standard size that be used is 18 inches' height and 4 inches thickness. The length of roof beam based on the length of the house. Roof beam is one of the easiest method to be installed.

During this project, I learned about a typical problem that can happened. Even though it was a big problem; it still can be solved. There is no problem that can't be solved. The same as problems at site during the construction of roof beam. The problems happened were caused from the workers and weather. The solution to it were, site supervisor need to always supervise the site workers while they mixing the concrete so that the concrete won't have any problems in the future and another solution is site supervisor or site manager have to forecast weather, one week before the work actually start. This way, the concrete can be saved and the time to do the element will be less time consuming.

NH Ivory Home SDN. BHD will give the best and high quality home to customers because this company priority is customer's happiness more than anything. Lastly, in hoping of this study will help the company be more aware and have less problems during the construction of roof beam.

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