



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

**INSTALLATION OF IBS LIGHTWEIGHT CONCRETE PANEL WALL**

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**(PERAK)**

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It is recommended that the report of this practical training provided

**By**

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**INSTALLATION OF IBS LIGHTWEIGHT CONCRETE PANELWALL**

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

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**JANUARY 2021**

**STUDENT DECLARATION**

I hereby declare that all the information in this report are prepared by me except the certain information provided by the company. During my internship at AZ MEGA PLUS GROUP SDN BHD for 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 fulfilment of the requirements for obtaining the Diploma in Building.

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## **ACKNOWLEDGEMENT**

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Also, I would like to thank my lecturer, Dr Ida Nianti Binti Mohd Zin for given me the opportunity to complete this report with her guidance. I'm glad that my lecturer has guided and regularly monitoring all of my work on this report. My lecturer has trusted me to complete this report successfully. Not to forget, I also would like to express my gratitude to En. Muhammad Naim Bin Mahyuddin as the practical training coordinator and Dr. Dzulkarnaen Bin Ismail as the programme coordinator.

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Thank you so much.

## **ABSTRACT**

Construction industry encompasses all available constructions and has a wide range of construction methods. Industrialized Building System (IBS) is one of the methods of construction believed to be safe to use to construct a building. In Malaysia, IBS is well known in construction industry for its cost savings and time savings. The main aim of this report is to explain about the Industrialized Building System (IBS). Despite of the quality, IBS Lightweight Panel Wall also time saving and cost-effective. The objectives of this report are to explain the installation of IBS lightweight concrete panel wall, to identify the tools required in the installation of Industrialised Building System (IBS) lightweight concrete panel wall and to determine the problem and solution of IBS lightweight concrete panel wall. The report has explained the installation of IBS Lightweight Panel Wall at the construction site. Hence, there are many benefits of using IBS Lightweight Panel Wall in construction.

## **CONTENTS**

Acknowledgments.....	i
Abstract.....	ii
Contents.....	iii
List of Table.....	iv
List of Figures.....	v

## **CHAPTER 1.0 INTRODUCTION**

1.1 Background of Study.....	1
1.2 Objectives .....	3
1.3 Scope of Study.....	3
1.4 Methods of Study.....	4

## **CHAPTER 2.0 COMPANY BACKGROUND**

2.1 Introduction of Company.....	5
2.2 Company Profile.....	6
2.3 Organisation Chart.....	8
2.4 List of Project.....	9
2.4.1 Completed Projects.....	9
2.4.2 Project in Progress.....	10

## **CHAPTER 3.0 CASE STUDY**

3.1 Introduction to Case Study.....	11
3.2 Installation of IBS Lightweight Concrete Panel Wall.....	12
3.3 Tools and Equipment to Install IBS Panel Wall.....	18
3.4 Problem and Solution of IBS Lightweight Panel Wall.....	25

## **CHAPTER 4.0 CONCLUSION**

4.1 Conclusion.....	26
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<b>REFERENCES.....</b>	<b>27</b>
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## **LIST OF TABLES**

Table 1.1 : Projects in Progress.....	10
Table 1.2 : Completed Projects.....	10

## LIST OF FIGURES

Figure 1: AZ Mega Plus logo.....	4
Figure 2: AZ Mega Plus logo.....	5
Figure 3: Organizational chart.....	7
Figure 4: Location of the project.....	11
Figure 5: Levelling track.....	12
Figure 6: Installation of bottom track.....	13
Figure 7: Applying bonding adhesive SIKA cream.....	13
Figure 8: Installation of IBS lightweight panel wall.....	14
Figure 9: Cutting the panel wall.....	14
Figure 10: Locking Y10.....	15
Figure 11: Locking.....	15
Figure 12: Locking R6.....	16
Figure 13: Applying hybrid mesh and skim coating to the panel wall.....	16
Figure 14: Top track.....	17
Figure 15: IBS Lightweight Concrete Panel Wall.....	17
Figure 16: Thread and permanent ink.....	18
Figure 17: Power drill impact.....	19
Figure 18: Scaffolding.....	19
Figure 19: Concrete nails .....	20
Figure 20: Circular saw.....	20
Figure 21: hand held diamond blade.....	21
Figure 22: Bottom track.....	21
Figure 23: Top track.....	22



Figure 24: Y10 and R6 steel.....	22
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## **CHAPTER 1.0**

### **INTRODUCTION**

#### **1.1 Background of Study**

Industrialised Building System (IBS) is one of the system used in Malaysia for construction. The Industrialized Building System (IBS) can be defined as the construction technique that are manufactured in a controlled environment which is the components manufactured can be on-site or off-site. Industrialized Building System (IBS) usually covered the construction of building components such as walls, floors, staircases and beams. The technology of Industrialized Building System is not new as the technology is known as early as 1624 in North America. The construction industry with Industrialized Building System (IBS) has boosted since 1700s with various types of construction in States. The construction of the skyscrapers building in States are often combined the pre-cast panels and steel frame.

The industrialisation process can be defined as an investment in equipment, facilities and technology with the main objectives are decrease the manual labour for the construction, increasing production output and improving quality (Warswaski, 1999). Also, (Junid, 1986) claimed that the components of the system are conceived, planned, fabricated, transported and erected on site. Various studies such as (CIDB, 2003a) defined that components of the Industrialized Building System (IBS) are manufactured in a factory, on-site or off-site, positioned and assembled into structures with minimal additional site work.

According to Warszawski (1999), IBS building system can be classified into five IBS main groups that are used in Malaysia. Firstly, the precast concrete framing, panel and box system which is encompassed the pre-cast concrete elements such as columns, beams, slabs, walls, “3D” components (balconies, staircases, toilets, lift chambers, refuse chambers) and permanent concrete formworks. Secondly, steel formwork systems which is encompassed tunnel forms, tilt-up systems, beams and columns moulding forms and permanent steel formworks. Next, steel framing systems which is encompassed the portal frames and roof trusses that commonly used with precast concrete slabs, steels columns and beams. Fourth, prefabricated timber framing systems which is encompassed timber frames and roof trusses and lastly, blockwork

systems which is encompassed the usage of interlocking concrete masonry units (CMU) and lightweight concrete block.

Industrialized Building System (IBS) is widely used in Malaysia as the technology is bringing more benefits than using conventional way. One of the types of IBS panel wall used in Malaysia is IBS Lightweight Concrete Panel Wall. The materials of the panel wall are mixed concrete and high technology of Expanded Polystyrene Super flat (EPS). The size of the panel wall is 2ft×10ft and the thickness of the IBS panel wall are 3 inch and 4 inch. In addition, the IBS lightweight panel wall is a trusted technology system that are safe and approved by SIRIM, BOMBA and CIDB.

There are many advantages of using Industrialized Building System (IBS) lightweight panel wall such as cost effective, accelerated construction timelines, improved quality and many more. The construction of Industrialized Building System (IBS) is more economical and cost savings compared to conventional way which is the construction using conventional way is more complex. Basically, the conventional way needed various materials such as sand, cement, aggregate and many more. Also, the method, tools and equipment required to construct a building in conventional way are more complicated than Industrialized Building System (IBS) which is the panel wall is ready-made at the factory and the labour needed to install the panel wall at the site. The cost for the raw materials can be reduced by using IBS panel wall. Moreover, the construction time can be reduced since the panel wall is ready-made at the factory and the installation of the panel wall is easier. Compared to conventional way which is using concrete blocks.

There are many types of Industrialized Building System (IBS). However, the aim of this is to discover the construction using IBS lightweight concrete panel wall.

## **1.2 Objectives**

- i. To explain the installation of IBS lightweights panel wall.
- ii. To identify the tools required in the installation of Industrialised Building System (IBS) lightweights panel wall.
- iii. To determine the problem and solution of IBS lightweights panel wall.

## **1.3 Scope of Study**

The study was at Lorong Padang Sri Paduka, Taman Desa Paduka, Kota Bharu, Kelantan Darul Naim. The project was to build a personal house for the customer. In this project, Industrialized Building System (IBS) lightweight concrete panel wall is used and the installation of the lightweight panel wall are studied. For example, before the installation of the panel wall, mark out the floor so that the installation of the bottom track and the panel wall is follow the floor plan. The construction of Industrialized Building System (IBS) is different with conventional system. Construction using conventional way is more complicated because it required various materials and tools compared to IBS panel wall. Thus, the numbers of manpower needed to install the IBS panel wall are studied. Beside the installation of the lightweight panel wall, the problem and solution using IBS system also studied.

## **1.4 Methods of Study**

1. Observation – The observation of how the works of installing the lightweight concrete panel wall which is more convenient and easier than conventional method. Also, the short period of the installation for the project. All the information of the installation is recorded in various way such as pictures, videos and the information written in the notebook.

2. Interviews – The interview is done by approach the assistant manager of the site project. Various questions have been prepared before the interview session. The assistant manager has explained the methods of installing the IBS lightweight panel wall at one of the site project in Kelantan. All the important information is recorded in the notebook.

3. Document reviews – There are various types of architectural plans and other documents for the contractors are used as the reference.

## CHAPTER 2.0

### COMPANY BACKGROUND

#### 2.1 Introduction of Company



Figure 1: AZ Mega Plus logo

AZ MEGA PLUS GROUP SDN BHD are developed by Encik Mohd Zulhusni and Puan Nor Akma Binti Zaini since 30 August 2009. Before the company commenced operations as Sendirian Berhad on 1 July 2019, the company once an enterprise company. AZ MEGA PLUS GROUP SDN BHD is a company that specializes in the construction of IBS and also Trusted Technology System Lightweight Panel Wall material. In addition, AZ MEGA PLUS GROUP SDN BHD is also a contractor that builds personal houses with IBS panel wall and the main supplier of IBS materials in the East Coast to contractors and house owners in Malaysia. All the components of IBS MeGGa (GO GREEN) by AZ MEGA PLUS GROUP SDN BHD are fully tested for guaranteed quality, cost savings, safer construction method and they are manufactured in a controlled factory environment. Contractors are able to use IBS panel wall to build various type of building such as houses, school, hospital and also highrise building.

## 2.2 Company Profile



Figure 2: AZ Mega Plus logo

Company Name	: AZ MEGA PLUS GROUP SDN BHD
Founder Name	: Mohd Zulhusni Bin Mohd Zamri Nor Akma Binti Zaini
Company Address	: Lot 1529-A Kampung Tapang, Jalan Hospital, 15200 Kota Bharu, Kelantan
Email	: <a href="mailto:azmegaplus@yahoo.com">azmegaplus@yahoo.com</a>
Phone/Fax Number	: 09-7658818
Banking	: Maybank Cawangan Kubang Kerian, Kelantan
Account Number	: 553131024882
Website	: <a href="http://www.azmegaplus.com.my">www.azmegaplus.com.my</a>
Social Media	: FACEBOOK, INSTAGRAM, TWITTER, WHATSAPP, YOUTUBE, WEBSITE, GOOGLE, LINKEDIN

## MISSION & VISION

### Company Vision:

- Become a leader for IBS approaching 2022 for construct bungalows.
- Is known as a contractor as the IBS leader.
- Targeted revenue will reach RM20,000,000.00 by 2022.
- Helping many contractors turn to IBS.
- Assist and appoint quality control vendor contractors with AZ Mega Plus.

### Company mission:

- Reach 1000 house supply year with average cost RM15,000.00 with revenue RM15,000,000.00
- Housing project in construction & development RM5,000,000.00
- Helping 10 consumer to have house RM300,000.00 revenue RM3,000,000.00
- Ensuring the quality of the goods or products is enhanced and guaranteed.
- Open branches in Terengganu, Pahang, and Kuala Lumpur to help other contractors.



## 2.3 Company Organizational Chart

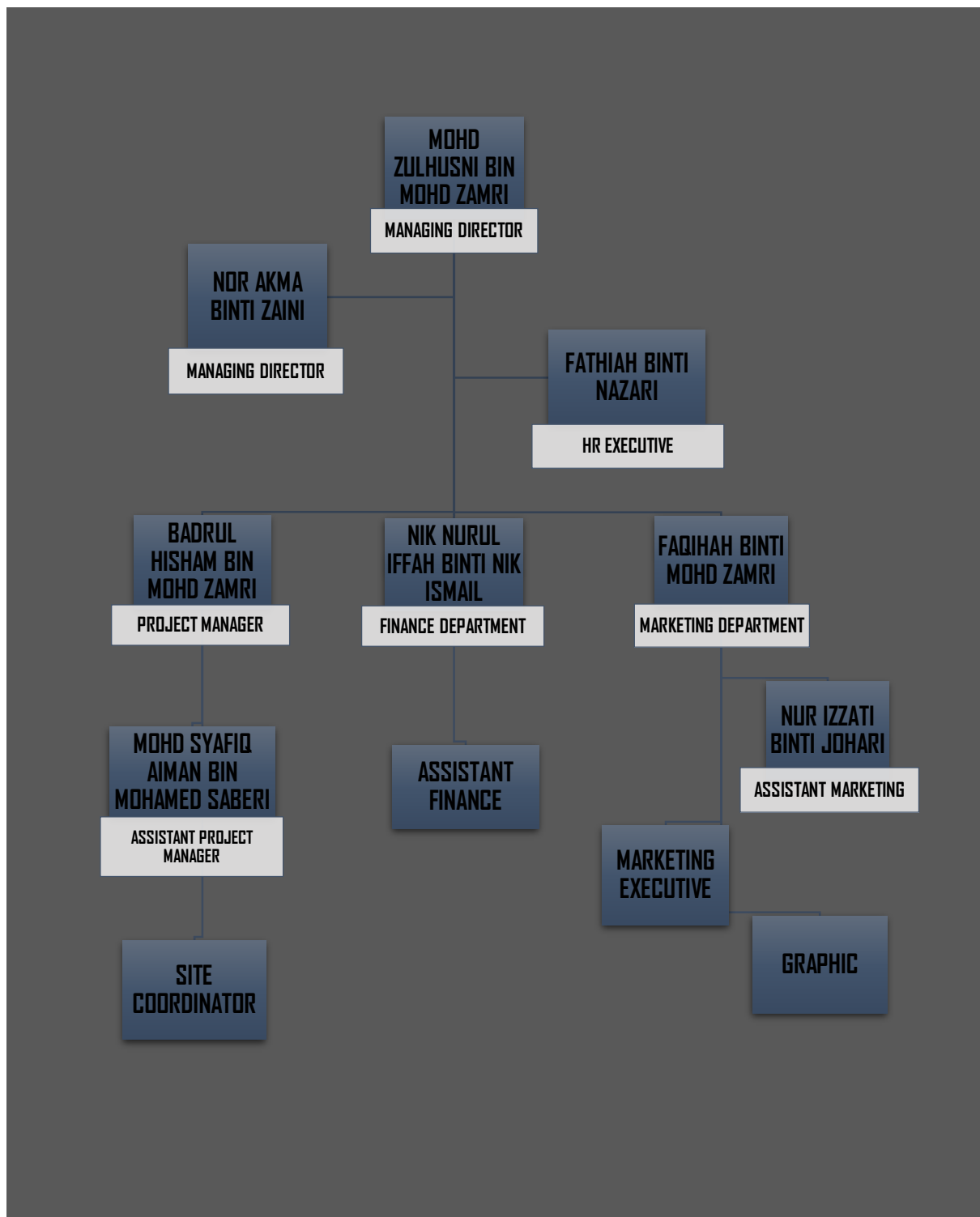


Figure 3: Organization chart



## 2.4 List of Projects

### 2.4.1 Completed Projects

No	Project title	Project Value	Start Date	Completion Date	Project Duration	Client
1	CADANGAN MEMBINA DAN MENYIAPKAN 1 UNIT RUMAH BANGLO 1 TINGKAT, DI ATAS LOT 222, MUKIM PANCHOR, KAMPUNG JEJAWI DAERAH KEMUMIN, JAJAHAM KOTA BHARU, KELANTAN DARUL NAIM.	RM120,800.00	1 MARCH 2020	1 JUNE 2020	3 MONTHS	ENCIK MOHD SAYUTI BIN A. RAHMAN @ OTHMAN
2	CADANGAN MEMBINA DAN MENYIAPKAN 1 UNIT RUMAH BANGLO 1 TINGKAT, DI ATAS LOT 5295, MUKIM MAKU, DAERAH KUSIAL JAJAHAN TANAH MERAH, KELANTAN DARUL NAIM.	RM174,000.00	27 SEPTEMBER 2020	27 DECEMBER 2020	3 MONTHS	ENCIK MOHD FAIZ BIN MAMAT

#### 2.4.2 Project in Progress

No	Project title	Project Value	Start Date	Completion Date	Project Duration	Client
1	CADANGAN MEMBINA DAN MENYIAPKAN 1 UNIT RUMAH BANGLO 1 TINGKAT, DI ATAS LOT 2504, SEKSYEN 36, MUKIM BAUNG, DAERAH PANJI, JAJAHAN KOTA BHARU KELANTAN DARUL NAIM.	RM143,103.00	21 MARCH 2021	21 JULY 2021	4 MONTHS	PUAN SITI ZAINAB BINTI HAMZAH @ YAACOB
2	CADANGAN MEMBINA DAN MENYIAPKAN 1 UNIT RUMAH BANGLO 1 TINGKAT, DI ATAS LOT 984, MUKIM MANEK URAI, DAERAH OLAK JERAM, JAJAHAN KUALA KRAI, KELANTAN DARUL NAIM.	RM170,560.00	1 AUGUST 2021	1 DECEMBER 2021	4 MONTHS	ENCIK ASMADI BIN ABIDIN

## CHAPTER 3.0

### CASE STUDY

#### 3.1 Introduction to Case Study

The case study for this report, the location of the project is at Lorong Padang Sri Paduka, Taman Desa Paduka, Kota Bharu, Kelantan Darul Naim. The house owner and the contractor of the project has agreed to use IBS lightweight concrete panel wall to construct the house. In addition, the company has prepared a mentoring session for the manpower at the site project on how to install the IBS lightweight pane wall. The location of the project is not too far from the company as it's just took 10 minutes by car. Also, the area is not too crowded with trees and bushes and it was easier for the machineries required to be used there.

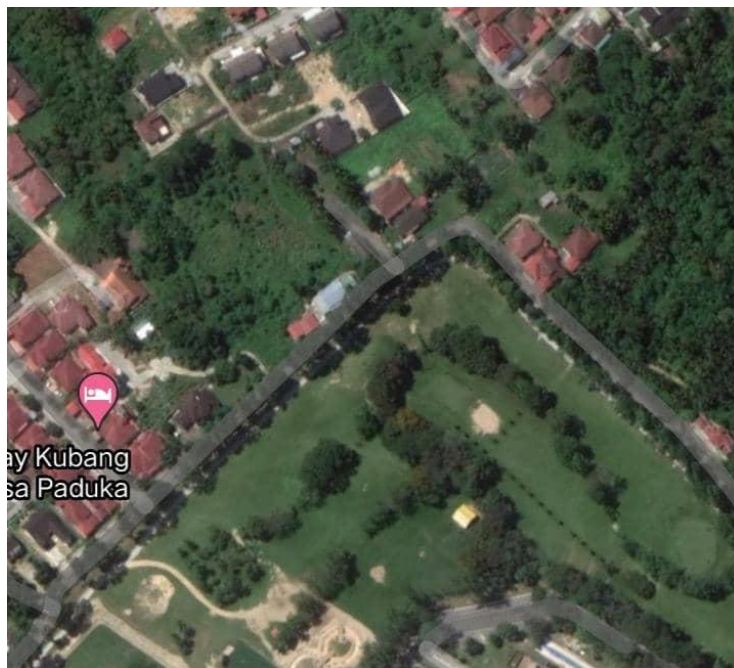


Figure 4: Location of the project.

## 3.2 Installation of IBS Lightweight Concrete Panel Wall

### 3.2.1 Leveling track



Figure 5: Leveling track

Before installing the bottom track at the site, track leveling work should be done so that the bottom track is in good condition and not tilted. Thread and permanent ink is used to mark out the lines on the floor based on the wall position. Firstly, the lines are measured to the required length of the wall according to the house plan. Then, the thread with ink is held by two labors and the lines are marked as shown in the picture above.

### 3.2.2 Bottom track



Figure 6: Installation of bottom track

Secondly, the installation of the bottom track. Bottom track is the important item to install the lightweight panel wall. The length of the bottom track is 8 feet and it is used to ensure the panel wall is installed stably and according to the house plan. The bottom track is nailed using concrete nails according to the marking lines made on the floor. The bottom track is cut to its required length and nailed on the floor using concrete nails. The excess of the bottom track is cut with hand held diamond blade.

### 3.2.3 Applying bonding adhesive SIKA cream



Figure 7: Applying bonding adhesive SIKA cream

Thirdly, blended the SIKA 288 cream with water using a “whisk” according to the prescribed amount and ensure there is no particles left. Make sure SIKA 288 cream did not mix with aggregate such as sand and rock. Next, apply the SIKA 288 cream on one side of the IBS concrete panel before the panel is installed.

### 3.2.4 Installation of IBS lightweight concrete panel wall



Figure 8: Installation of IBS lightweight panel wall

Then, the installation of IBS panel wall is installed vertically and make sure the panel wall is stand on the bottom track. The size of the panel wall in the picture above is 2feet×10feet and the thickness is 4 Inch. The panel wall is placed on top of the bottom track and rubber hammer is used to knock the side of the panel wall so that there is no gap between joint. The installation of the panel wall can be made with at least 3 manpower.



Figure 9: Cutting the panel wall

The cutting of the IBS panel wall is done using a circular saw. The panel wall is cut to make a lintel for opening such as doors and windows. The labors needed to pay more attention when measuring the panel wall so that the panel wall is cut perfectly.



### 3.2.5 Locking



Figure 10: Locking Y10

After the IBS concrete panel wall is installed, Y10 steels are used as the locking to the panel wall. The steel is cut using hand held diamond blade to the required length and bent as shown in the figure above. Then, power drill impact is used to screw a hole into the panel wall and the floor. The Y10 locking steel is nailed at the end of the panel using a hammer to give them strength.



Figure 11: Locking Y10

Also, locking at the top of the panel wall is important. Y10 steel is used as the locking on top of the panel wall. The steel is cut to its required length and the steel is nailed using hammer.



Figure 12: Locking R6

In addition, R6 steel also used as locking for the panel wall. R6 steel is cut using hand held diamond blade to the required length and bent as shown in the figure above. R6 steels are stapled at each joint between two panels. The locking using R6 steel usually needed 7 locks which is 4 locks for the outside area and 3 locks for the inside area. The locking will give more strength to the panel wall.

### 3.2.6 Hybrid mesh and skim coat



Figure 13: Applying hybrid mesh and skim coating to the panel wall.

Next, hybrid mesh is used to cover the joint between two panel and to avoid them from crack. Firstly, hybrid mesh is cut to two part and applied to the jointing with sika 288 cream. Applied the hybrid mesh then applied skim coating as the finishing to the concrete panel wall especially to the jointing.

### 3.2.7 Installation of top track



Figure 14: top track

Lastly, top track is installed on top of the panel wall. Top track is also an important item in the installation of IBS lightweight panel wall. It is used to replace the roof beam of a house. The length of the top track is 8 feet and it is installed as shown in the picture above. After the top track is installed, it is nailed at the side to give strength to the panel wall.

The Industrialized Building System (IBS) house located at Kubang Kerian, Kota Bharu, Kelantan.



Figure 15: IBS Lightweight Concrete Panel Wall

### 3.3 Tools and Equipment to Install The IBS Panel Wall

Before starting the project, it is important to ensure the tools required are prepared to facilitate the construction work and in good condition to avoid any problems such as incidents. Basically, Industrialized Building System (IBS) lightweight concrete panel wall is easy to install which is the tools needed are less than conventional method. Besides, the tools also easy to find and can be conducted by ordinary labor expertise.

#### 3.3.1 Thread and permanent ink.



Figure 16: Thread and permanent ink

Firstly, thread and permanent ink are important as a permanent marking on the floor based on the house plan. The thread is dipped into the ink and two labors are required to hold the thread to mark out the lines on the floor.



### 3.3.2 Power drill impact.



Figure 17: Power drill impact

Power drill impact is used to screw a hole into the bottom of the panel wall and the floor. It is to facilitate the locking work of the panel wall.

### 3.3.3 Scaffolding.



Figure 18: Scaffolding

Scaffolding is a common tool that are required at the construction site. It is an important tool for the construction works that gives balanced for the labors to work at a high altitude.

#### 3.3.4 Concrete nails.



Figure 19: Concrete nails

Concrete nails are important in the process of installing the IBS panel wall. The concrete nails (2 inch) are used to nail the bottom track so that the bottom track did not tilt.

#### 3.3.5 Circular saw.



Figure 20: Circular saw

Circular saw is used to cut the IBS panel wall to its required size and length. Circular saw shall be handled by the professional to avoid any incident.

### 3.3.6 Hand held diamond blade.



Figure 21: Hand held diamond blade

Hand held diamond blade is used to cut the mild and high tensile steel at the site. Y10 and R6 steel are cut to the required size and length for the locking. Hand held diamond blade is able to cut high tensile steel and is easy to handle.

### 3.3.7 Bottom track.



Figure 22: Bottom track

Bottom track is the most important element to install the IBS panel wall. Bottom track is used to ensure the panel wall is stand stably. It is 8 feet long and the excess for the construction is cut. Bottom track is nailed according to the house plan.

### 3.3.8 Top track.



Figure 23: Top track

Top track is used to replace the roof beam of a house. It is time saving and cost-effective since it reduced the use of sand and cement to construct a roof beam. Top track is 8 feet long and it is installed on top of the panel and the top track is nailed using concrete nails at the side.

### 3.3.9 Y10 and R6 steel.

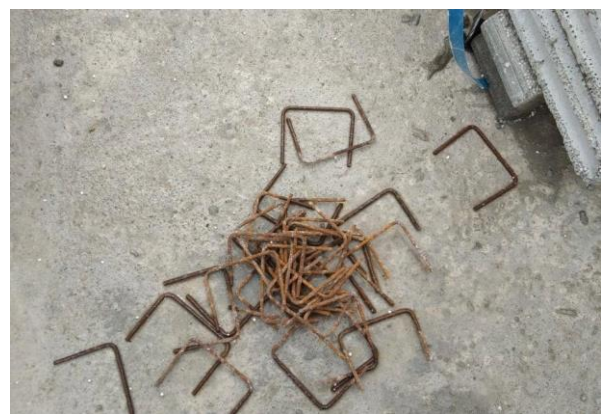


Figure 24: Y10 and R6 steel

Y10 and R6 steel are the high tensile steel that are cut and bent based on the required size as shown above. The steels are used as the locking of the panel wall. The locking made the panel wall more strong.



### 3.3.10 Hybrid mesh.



Figure 25: Hybrid mesh

Hybrid mesh is used to close the space between the panel joint and to avoid cracking after the installation the IBS panel wall. Hybrid mesh needed to be applied at the joint of the panel using SIKA 288 cream.

### 3.3.11 Adhesive bonding cream (SIKA 288)



Figure 26: Adhesive bonding cream

Adhesive bonding cream (SIKA 288) are important to attach the panel wall during the installation of the IBS lightweight panel wall. SIKA cream is stronger and more suitable to be used in the installation of the IBS lightweight panel wall.

### 3.3.12 Skim coat (skim premium grey).



Figure 27: Skim coat

Skim coat is used to smooth the joint between two panel. The skim coat will be blended and applied on the panel wall as a finishing.

### 3.4 Problem and Solution of IBS Lightweight Panel Wall.

**Problem:** Cracking on the panel wall after finishing.

The problem that usually happened after the installation of IBS lightweight panel wall is cracking. Cracking at the joint of the panel wall is caused by the improper installation or mistakes by the manpower during the installation of the panel wall.



Figure 28: Crack at the joint

**Solution:** Crack sealer.

The solution for this problem is using crack sealer. The crack sealer will be applied to the crack surface of the lightweight panel wall.



Figure 29: Crack sealer

## **CHAPTER 4.0**

### **CONCLUSION**

#### **4.1 Conclusion**

In conclusion, Industrialized Building System (IBS) is increasingly known in Malaysia for its advantages and it is proved to be more economical than conventional method. Therefore, IBS method is starting to become a major focus for the contractors because of its cost savings and time savings. The constructions using IBS panel wall can be done by 3 or 4 manpower and the construction usually takes less time than conventional method. With the reduction of manpower and time savings, the cost of the construction can also be reduced.

Furthermore, Industrialized Building System (IBS) lightweight concrete panel wall also easy to install at the site. Compared to conventional method that required various materials such as sand and aggregate, IBS method only using sand and aggregate to construct a foundation and beam because the panels are ready-made at the factory and only need to be installed at the site. Also, the panels can be installed with ordinary labor expertise.

Finally, this report explained about Industrialized Building System (IBS) thoroughly included the installation method of IBS lightweight panel wall, the tools and equipment needed to install the panel wall and also the problem and solution of Industrialized Building System (IBS). In short, this report has finished successfully.

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